



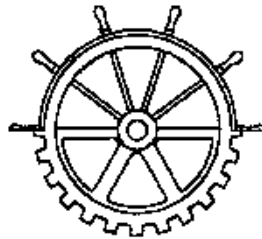
Public Works and
Government Services
Canada

Travaux publics et
Services gouvernementaux
Canada

SPECIFICATIONS FOR
TSW – Thompson's Bay
Dam Rehabilitation
2014

Project No. R.065830.301
Ref. No. COTSW – 14/R11
August 26th, 2014

Prepared by:



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Trent-Severn Waterway	SPECIFICATION	Section 00 00 00
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Rehabilitation 2014		2014-08-10

PROJECT TITLE Thompson's Bay Dam Rehabilitation

PROJECT NUMBER R.065830.301

PROJECT DATE 2014-10-15

_____ END _____

PART 1 - GENERAL

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|---|----|--|
| <u>1.1 SECTION INCLUDES</u> | .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. |
| <u>1.2 PRECEDENCE</u> | .1 | For Federal Government projects, Division 01 Sections take precedence over technical specification sections in other Divisions of this Project Manual. |
| <u>1.3 RELATED SECTIONS</u> | .1 | Section 01 14 00: Work Restriction |
| | .2 | Section 01 20 01: Site Access |
| | .3 | Section 01 35 43: Environmental Procedures |
| | .4 | Section 01 33 00 - Submittal Procedures |
| | .5 | Section 01 71 00: Examination and Preparation |
| <u>1.4 WORK COVERED BY CONTRACT DOCUMENTS</u> | .1 | Work of this Contract comprises of major rehabilitation of Thompson's Bay Dam on the Trent-Severn Waterway (TSW), located in Peterborough, Ontario, and further identified as PWGSC Project No.R.065830.301. |
| | .2 | The Construction Work includes but is not limited to the following: |
| | .1 | Temporary Site Access; |
| | .1 | Access to staging area and structure, |
| | .2 | Access to upstream and downstream location of proposed Cofferdams, |
| | .2 | Design, construct and maintain temporary access road and staging areas; |
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1.4 WORK COVERED BY .2
CONTRACT DOCUMENTS
(Cont'd)

- (Cont'd)
- .3 Provided public/recreational traffic control/detours;
 - .4 Provide drainage, sediment and erosion control, and other environmental protection;
 - .5 Obtaining regulatory permits and certificates of authorization and approvals;
 - .6 Design, install and maintain dewatering of work area, including cofferdam construction and supply of the dewatering system;
 - .7 Provide water diversion work to supplement downstream aquatic habitats within Thompson's Creek, including maintenance and operation of diversion system throughout project;
 - .8 Protection of existing adjacent structures/properties and other works including earth embankments and riparian aquatic zones, during construction;
 - .9 Clearing and grubbing of localized tree and vegetation growth;
 - .10 Selective demolition of the existing concrete water retaining (Dam) structure, including excavation and removal of bedrock and organic material deposited upstream of spillway stop logs;
 - .11 Construction of the new concrete structure and related work:
 - .1 Cast-In-Place Concrete:
 - .1 New foundation slab,
 - .2 New Wingwall and abutments,
 - .3 Spillway,
 - .2 Pre-Cast Concrete:
 - .1 New Solid concrete deck slabs,
 - .3 Public Safety:
 - .1 Signage,
 - .2 Safety Boom including In-water and shore Anchors,
 - .3 Public safety railings and fencing,
 - .4 Additional structure requirements:
 - .1 New Winch Anchor frames
 - .2 New Timber Stop logs.
 - .12 Embankment erosion protection (Rip-Rap) supply and placement;
 - .13 Removal of cofferdam,, water diversion system and other temporary works;
 - .14 Site reinstatement and restoration.
- .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 tradespersons to perform the work.
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|--------------------------------|----|---|
| <u>1.5 TIME OF COMPLETIONS</u> | .1 | Commence work in accordance with notification of acceptance of your offer and complete the work within the dates outlined in the contract. |
| <u>1.6 CONTRACT METHOD</u> | .1 | Construct work under combined lump sum and unit price contract. |
| <u>1.7 LOCATION OF WORK</u> | .1 | Thompson's Bay Dam is one of four main earth embankment dams that retains water on the Trent Canal downstream of Nassau Dam and upstream of the Peterborough Lift lock within the city limits of Peterborough, Ontario.
.1 Coordinates: N 44.34194°N 78.2983°W, |
| | .2 | The dam acts as a retention structure only for the water levels on the Trent-Severn Waterway for navigation and is infrequently operated. The dam is owned and operated by Parks Canada Agency (PCA). |
| <u>1.8 EXAMINATION OF SITE</u> | .1 | Visit the site before submitting tender. Examine site, adjacent premises, means of access and egress. Investigate and be fully informed of the nature and extent of the work required, difficulties in performing the work, facilities available for delivery and placing of materials. |
| | .2 | Be completely familiar with every detail and intent of these specifications and scope of work to be performed, and all regulatory requirements governing the Work. |
| | .3 | 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 Department Representative. |
| | .4 | Refer to Section 01 71 00 for additional requirements. |
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- 1.9 COST BREAKDOWN .1 Within ten (10)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 payment.
- .1 If supporting documentation cannot be submitted or a breakdown cannot be justified to the satisfaction of the Department Representative, the Contractor will revise and resubmit the cost breakdown(s). The Contractor will submit supporting documentation for all breakdowns that the Department Representative considers unbalanced.
- .4 Within forty-eight (48) hours of award of Contract, submit a list of subcontractors.

- 1.10 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.

- 1.11 SCHEDULING .1 Within ten (10)days of award of the Contract, provide the Department Representative with a copy of the Construction Progress Schedule - Critical Path Method(CPM).
- .1 Progress schedule must include the quantity of work to be accomplished within each two (2) week timeframe.
- .2 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.
- .3 Commencement of work will not be permitted until a detailed schedule, has been reviewed
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- 1.11 SCHEDULING
(Cont'd)
- .3 (Cont'd)
by the Department Representative, and revised and resubmitted by the Contractor.
- .1 No progress payments will be made until the construction progress schedule is approved..
- .2 Submit together with the progress schedule a cost breakdown for each unit price and lump sum payment items.
- .4 When requested by departmental representative, resubmit the schedule with all revisions made to show the progress of the work and to show any changes which are required to meet the approved completion dates, within ten (10) working days.
- .5 Do not make changes to the approved schedule, without the Departmental Representative's approval.
- .6 The requirements of Section 01 33 00 apply to the construction progress schedule.
- .7 Notify Departmental Representative forty-eight (48) hours prior to work being carried out during "off-hour" periods.
- .8 Provide a schedule for the submission of shop drawings, plans and procedures.
- .9 If progress of work should fall behind, take steps required to bring work back to schedule. Do not change schedule without Department Representative's approval.
- .1 Weather related delays with their remedial measures will be discussed and negotiated.
- 1.12 CONTRACTOR'S
TECHNICAL SUPPORT
TEAM
- .1 Within five (5) days of acceptance of bid, submit a list of technical personnel and specialist 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/Civil Engineer(Dewatering works, Cofferdam, etc.),
- .5 Surveyor OLS (layout and monitoring).

- 1.13 WORK SEQUENCE
- .1 Construct Work in an appropriate manner to accommodate Owner's requirement to pass specified flow downstream of construction site during construction and to minimize interference with the natural aquatic habitat downstream of the site.
 - .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 relocation to the requirement of the local authorities.
 - .4 Maintain fire access/control to work area and adjacent properties at all time.

- 1.14 ADMINISTRATIVE
- .1 Schedule and administer project meetings throughout the progress of the work at the request of the Department Representative.
 - .2 Prepare agenda for meetings.
 - .3 Distribute written notice of each meeting four (4) days in advance of meeting date to Department Representative.
 - .4 Provide physical space and make arrangements for meetings.
 - .5 Preside at meetings.
 - .6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
 - .7 Reproduce and distribute copies of minutes within three days after meetings and transmit to Department Representative, meeting participants and affected parties not in attendance.
 - .8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.
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1.15 PRECONSTRUCTION.1
MEETING

- .1 Within ten (10) days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Department Representative, Contractor, major Subcontractors, and field inspectors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum five (5) days before meeting.

1.16 PROGRESS
MEETINGS

- .1 During course of Work and eight (8) weeks prior to project completion, schedule progress meetings weekly.
- .2 Notify parties minimum three (3) days prior to meetings.
- .3 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within two (2) days after meeting.
- .4 Agenda to include the following:
- .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule.
 - .5 Review of off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revision to construction schedule.
 - .8 Progress schedule, during succeeding work period.
 - .9 Review submittal schedules: expedite as required.
 - .10 Maintenance of quality standards.
 - .11 Review proposed changes for affect on construction schedule and on completion date.
 - .12 Other business.
- .5 Department Representative will provide written notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.
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- 1.17 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 Confine work, including temporary structures, plant, equipment and materials to established Construction limit, unless otherwise agreed to in writing by the Department Representative.
 - .3 Coordinate use of premises under direction of PCA with Department Representative.
 - .4 If applicable and where required:
 - .1 Obtain and pay for use of additional off site storage or work areas to carry out the work under this Contract. Provide copy of formal agreement with the landowner to the Department Representative. Furthermore, at completion of the work, provide copy of landowner owner release letter stating the all land use agreement conditions that have been met.
 - .5 Locate temporary buildings, access roads, drainage facilities, services and utilities as approved by the Department Representative and maintain in clean and orderly manner
- 1.18 QUALITY CONTROL
- .1 Refer to Section 01 45 00 - Quality Control.
- 1.19 WATER LEVELS
- .1 Water levels on the Trent Canal segment between Nassau Dam and the Peterborough Lift Lock are:
 - .1 212.58m = Maximum Navigational Operation Level.
 - .2 212.48m = Minimum Navigational Operation Level.
 - .3 The water levels given are constant year round with minor fluctuations.
 - .2 Further information on the Otonabee River and TSW water levels are available from the Departmental Representative.
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| <u>1.20 WATER
MANAGEMENT AND
CONTROL</u> | .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 any water control issues. |
| <u>1.21 COMMUNICATION
PROTOCOL</u> | .1 | Due to nature of the work along a controlled navigational waterway, a communication protocol shall to be established between the Departmental Representative, the Contractor and PCA, prior to commencement of work. |
| <u>1.22 RECORD
DRAWINGS</u> | .1 | As work progresses, maintain accurate records to show deviations from contract drawings. Submit the record drawings just prior to the Departmental Representative's inspection of the work for the issuance of the Final Certificate of Completion. The Departmental Representative will provide two sets of clean white prints for this purpose. |
| <u>1.23 SIGNS</u> | .1 | Provide common-use signs related to navigation and vehicle traffic 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 Department Representative's approval. |
| | .2 | No advertising will be permitted on this project. |
| <u>1.24 ACCESS AND
EGRESS</u> | .1 | Design, construct and maintain temporary "access to" and "egress from" work areas, including barricades, delineators, local structure protection, protection vehicle and signs as required, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations. |
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- 1.25 REGULATORY REQUIREMENT
- .1 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. The Contractor will not make any claim for additional compensation due to delays on commencing work due to compliance with the above.
- 1.26 GUARANTIES AND WARRANTIES
- .1 Before completing the work, collect all manufacturer's guarantees and warranties and deposit with Departmental Representative.
- 1.27 DOCUMENTATION
- .1 Maintain on site, one copy of each document as follows:
 - .1 Contract Drawings,
 - .2 Specifications,
 - .3 Addenda,
 - .4 Reviewed Shop Drawings,
 - .5 List of Outstanding Shop Drawings,
 - .6 Change Orders,
 - .7 Field Test Reports,
 - .8 Copy of Approved Work Schedule,
 - .9 Site Specific Health and Safety Plan,
 - .10 Manufacturers' installation and application instructions,
 - .11 Other related documents as specified herein.

PART 2 - PRODUCTS

- 2.1 NOT USED
- .1 Not used.
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PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

_____ END _____

PART 1 - GENERAL

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|---------------------------------------|----|--|
| <u>1.1 USE OF SITE AND FACILITIES</u> | .1 | Execute work with least possible interference or disturbance to normal use of adjacent premises. Make arrangements with Department Representative to facilitate work as stated. |
| <u>1.2 EXISTING SERVICES</u> | .1 | Notify, Department 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 Department Representative forty-eight (48) hours of notice for necessary interruption of mechanical or 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 - Temporary Barriers and Enclosures. |
| <u>1.3 ENVIRONMENTAL RESTRICTIONS</u> | .1 | Section 01 35 43 - Environmental Procedure list environmental restrictions and times frames that need to be considered in the planning of the Work. |
| | .2 | Maintain existing flow pattern for the aquatic reach on the Thompson's Creek below the Thompson's Bay Dam throughout the project period as directed by PCA.
.1 Diversion system discharge to be capable of minimum environmental discharge requirements between 0.15 cms to .5 cms (cubic meters per second)
.2 In lowland wetland systems, maintain existing hydrological conditions. |
| | .3 | Undertake in-water work on the Trent Canal and Thompson's Bay creek outside the fishery spawning windows. In-water work and work adjacent to open water is to be done in accordance with Section 01 35 43 - |
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1.3 ENVIRONMENTAL
RESTRICTIONS
(Cont'd)

- .3 (Cont'd)
Environmental Procedures. Departmental Representative is actively seeking approval for appropriate exemption work permits.
- .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.

1.4 ROAD
RESTRICTIONS

- .1 Minimize construction traffic along access roads and maintain safe speeds in accordance to local authorities and regulations.
- .2 Construction vehicles over 5 tonnes are not allowed to use the temporary and public access roads leading to the construction site on Sundays, between the hours of 7:00pm and 7:00am.
- .3 Limit transportation activities from 8:00a.m. to 5:00 p.m.
- .4 Where work involves disruption to site and rerouting of vehicular traffic, provide Department 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.
- .5 Provide a minimum of three (3) weeks formal notification for alterations to the local road access to the local authorities, emergency services, Canada Post and residents.
- .6 Install Road closure and construction advertising signs, two (2) weeks in advance of planned access changes.

1.5 REGIONAL ROAD
LOAD RESTRICTIONS

- .1 City of Peterborough,
 - .1 Contractor will be responsible to obtain authorization from the Regional Municipality beforehand, and provide a copy of the authorization to the Department Representative.
 - .2 Should authorization not be given, the Contractor is responsible to make alternative
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1.5 REGIONAL ROAD
LOAD RESTRICTIONS
(Cont'd)

- .1 (Cont'd)
 - .2 (Cont'd)
- arrangements at no additional cost to the project.

1.6 SPECIAL
REQUIREMENTS

- .1 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, environmental, traffic and security regulations.
- .2 Keep within limits of work and avenue of ingress and egress.
- .3 Coordinate any operation of the diversion system control structure with the Trent Severn Waterway operator and Municipality to permit manipulation of the downstream water flow from the site. Failure to do so could result in unacceptable water flows and levels, and possibly harm or damage aquatic habitats downstream of the reach.
- .4 Coordinate all operations for Work so that environmental mitigation measures are followed. Refer to Section 01 35 43.
- .5 Blasting for demolition and rock excavation is prohibited.

1.7 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 use for:
 - .1 the Contractor's construction camp or staging area, including site washroom facilities, and workers parking area;
 - .2 fuel storage or refueling staging;
 - .3 storage of machinery, equipment or material; and
 - .4 the contractor's sediment trap, unless approved by the Department Representative and that all environmental protection regulations can be met.
- .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.

1.7 CONTRACTORS USE OF DEWATERED AREA (Cont'd) .3 Contractor to maintain dewatering operations, to enable Work to proceed in the dry, for the duration of Work.

1.8 WATER LEVELS .1 During the navigation (June-September) and non-navigation season (October to May), an acceptable upstream operating range is EL. 212.48m and EL. 212.58m, with the preferred normal minimum level being EL. 212.55m (EL, Elevation).

.2 The downstream range of water levels throughout the year is approximately EL. 209.64m.

.3 The contractor is solely responsible for making their own interpretation of the data included herein, and any received from PCA.

.4 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/viit/ne-wl/trent_e.asp.

.5 The contractor is cautioned that, while the Trent-Severn Waterway / Parks Canada Agency / Departmental Representative endeavors to manage the water levels within the indicated ranges, it cannot be held responsible for events, or the result of natural occurring events, that are not under its control.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

_____ END _____

PART 1 - GENERAL

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| <u>1.1 DESCRIPTION</u> | .1 | The work of this Section includes but is not limited to:
.1 The use of local roads and highways to access the Work area.
.2 The use of Staging Areas provided under the Contract.
.3 Providing construction fence and perimeter security measures around work area.
.4 Maintaining the work/storage area for the duration of the work.
.5 Design, construct, maintain temporary granular access roads to access all parts of the Work including access ramp over earth embankment to access upstream side of the existing concrete structure.
.6 Removal of the temporary access routes. |
| <u>1.2 RELATED SECTIONS</u> | .1 | Section 01 35 00.06 - Special Procedures for Traffic control |
| | .2 | Section 01 48 00 - Construction Control and Monitoring |
| | .3 | Section 01 52 00 - Construction Facilities |
| | .4 | Section 01 56 00 - Temporary Barriers and Enclosures. |
| | .5 | Section 01 74 11 - Cleaning |
| | .6 | Section 31 11 00 - Clearing and Grubbing. |
| | .7 | Section 35 20 21 - Dewatering and Division |
| <u>1.3 MEASUREMENT AND PAYMENT PROCEDURES</u> | .1 | There will be no measurement of Work described in this Section. |
| | .2 | Payment of this Section shall be included in the applicable Lump Sum Price as set out in Section 01 22 01 . |
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- 1.4 ACCESS TO THE WORK
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- .1 The Dam is accessible via Cunningham Boulevard off Armour Road.
.1 Access road: Municipal Pedestrian gravel pathway via Scollard Rd.
- .2 Staging area: Located within the municipal property, have been negotiated by the Crown for the use by the contractor.
.1 Staging Areas are as indicated on Contract Drawings.
- .3 For the access to the work and Contractors Staging Areas by local roads and highways, and for the use of residential roads, make all arrangements, obtain any required permits from the authorities having jurisdiction. The work includes, but is not limited to:
.1 Prepare a traffic control and detour plan in accordance to Section 01 35 00 and the requirements of the authorities having jurisdiction.
.2 Confine activities to such routes and load limits as specified by the authorities having jurisdiction.
.3 Clean and maintain haul routes in accordance with the authorities having jurisdictions.
.4 A copy of the permit and agreed arrangements with the authorities having jurisdiction for the usage of local roads and highways is to be submitted to the Departmental Representative.
- .4 As part of the planning for the access to the work site via the local roads make provisions for:
.1 Access to private residences along Scollard Road. Particular attention shall be given to private residences that are located next to the work area.
- 1.5 GROUND WATER TABLE
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- .1 Ground water table is assumed to be equal to surface water elevation of the downstream reach of Thompson's bay creek. Departmental Representative to make available upon request Geotechnical test pit findings from Cambrium inc. for Onsite soil and water table conditions.
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1.6 CONTRACTORS
STAGING AREAS

- .1 Arrangements have been made for the use of municipal land adjacent to the project site for the Contractor's use as Staging Area. Abide by the agreement between the landowner and the Crown.
- .2 In preparing the designated area, the Contractor needs to consider the general grading and drainage of the property and ensure that any work being done for the preparation of these areas will not cause additional runoff toward the watercourse and or toward portions of the adjacent privately own residential properties.
- .3 Construction Area will require the placement and grading of granular material overlaying geotextile filter fabric along the access road and staging pad as indicated on Contract Drawings prior to being used by the Contractor.
 - .1 Access road to be minimum 4.0m wide.
- .4 The use of the Staging Area is to accomodate, but not limited to the following:
 - .1 Fuel storage and refueling station at the assigned safety distance of 30m from any watercourse, with containment measures acceptable to the Departmental Representative;
 - .2 parking of machinery;
 - .3 material delivery area and temporary storage site for construction/demolition material and waste;
 - .4 site-office/trailers, site washroom facilities and workers parking area;
 - .5 associated power generators;
 - .6 sediment settling basin/filtration system for the dewatering activities;
 - .7 dry/stockpile excavated material;
 - .8 stockpile of new granular material for the project;
 - .9 temporary storage of material and equipment.
- .5 Provide a plan of the usage/layout of the Staging Areas for review by the Departmental Representative.
- .6 Provide a sediment and erosion control plan for Staging Area in accordance to Section 01 35 43 and acceptable to the Regulatory Authorities having jurisdiction and the Departmental Representative. Provide measures to protect the watercourse. Address the

- 1.6 CONTRACTORS STAGING AREAS (Cont'd)
- .6 (Cont'd)
tracking of mud onto Scollard Road and other local roads. Implement the approved plan.
- .7 Restoration Plan for Staging Area in accordance to Section 01 35 43, Section 01 74 11 and Section 32 94 00, acceptable to the Departmental Representative. The restoration plan shall include the removal of the contractors temporary works, regrading of the affected areas and the landscaping work as set out in the contract drawings.
- .8 At completion of the work, prior to general Landscaping activities, the Departmental Representative may request to collect soil samples within Staging Area to confirm that the areas have not been contaminated as result of the work by the contractor. The Contractor shall bear the cost of removal, disposal and replacement of any contaminated soil.
- 1.7 ACCESS TO AND USE OF PARKS CANADA AGENCY PROPERTY
- .1 Restrict usage of Parks Canada Agency (PCA) property to agreed construction limits as set on the contract drawings.
- .2 Respect set speed limits, and operate construction vehicles in such a way as to minimize dust.
- 1.8 PRE-CONDITION ASSESSMENT
- .1 Carry out a Pre-Construction Inspection of Staging Area and Haul Routes as described in Section 01 48 00.
- 1.9 ENVIRONMENTAL PROTECTION OF SITE
- .1 Departmental Representative to make available the detailed Environmental Impact Assessment Report.
.1 Become familiar and knowledgeable of given information provided in provided report regarding Species at risk and environmental mitigation measures.
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- 1.10 DELINEATION OF WORK/STORAGE AREA
- .1 Supply, install, and maintain for the duration of the work a minimum 1800 mm welded-wire construction fence delineating the work area shown on the contract drawings and as agreed by the Departmental Representative. Do not use loose rock or other site materials as counter balance material. Obtain Departmental Representative's approval on "securing" measures for post stability before proceeding with work.
- .1 Provide one lockable truck entrance gate and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys. Maintain fence in good repair.
- .2 Provide secure coverings to all openings to prevent Public access to the work areas at all times during construction. Secure the work area in an approved manner.
- .3 Provide dust and privacy control measures to fence perimeter adjacent to residential structures as indicated on Contract drawings
- .4 Remove the fences in their entirety from the site after work is completed. Make good all damage.
- 1.11 PARKING
- .1 Parking will be limited to areas confined by the limits of work. Do not block residential vehicular access to driveways.
- 1.12 SNOW CLEARING
- .1 Be responsible for snow clearing within the work area, the work/storage area and all parking areas designated for contractor's use. Included in these areas is all snow removal to access these areas or to complete the work.
- .2 Contractor will not be responsible for clearing the snow from the haul route to the Work site. No claims will be considered should these haul routes become inaccessible during the course of the work.
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- 1.13 SECURITY .1 Take appropriate security precautions to safeguard equipment, tools, and materials on site.

PART 2 - PRODUCTS

- 2.1 CONVEYANCE SYSTEMS .1 Materials: new or used, in good condition.

PART 3 - EXECUTION

- 3.1 REQUIREMENTS OF REGULATORY AGENCIES .1 Obtain approvals from and pay all fees to Federal, Provincial Agencies and Municipal Authorities for works as may be required by this Contract.

- 3.2 TRAFFIC CONTROL .1 Provide a traffic management plan and all required signage and traffic control devices as set out in Section 01 35 00.

- 3.3 SHOP DRAWINGS .1 Be responsible for the conceptual and detail design of all access systems.
- .2 Submit three sets of shop drawings showing layout and details of access systems to the Departmental Representative for review.

- 3.4 REMOVAL .1 Any material placed on the watercourse bottom for temporary access to the work is to be removed as per Section 35 20 21.

PART 1 - GENERAL

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| 1.1 SECTION
INCLUDES | .1 | This section provides a list of work items that needs to covered under the Contract Lump Sum Price and the procedures for payment that will be applied to these work items within the Contract Lump Sum Price. |
| | .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 APPLICATIONS
FOR PROGRESS
PAYMENT | .1 | Make applications for payment on account as provided in Agreement as Work progresses. |
| | .2 | Date applications for payment last day of payment period and ensure amount claimed is for value, proportional to amount of Contract, of Work performed and products delivered to place of work at that date. |
| | .3 | Submit to Departmental Representative, at least 14 days before first application for payment. Schedule of values for parts of Work, aggregating total amount of Contract Amount, so as to facilitate evaluation of applications for payment. |
| 1.3 SCHEDULE OF
VALUES | .1 | Make schedule of values out in such form and Representative may reasonably direct and when accepted by Departmental Representative, be used as basis for applications for payment. |
| | .2 | Include statement based on schedule of values with each application for payment. |
| | .3 | Support claims for products delivered to place of work but not yet incorporated into Work by such evidence as Departmental Representative may reasonably require to establish value and delivery of products. |
-

1.4 PREPARING
SCHEDULE OF UNIT
PRICE TABLE

- .1 Submit separate schedule of unit price items of Work requested in Bid and Acceptance Form
- .2 Make form of submittal parallel to Schedule of Values, with each line item identified same as line item in Schedule of Values. Include in unit prices only:
 - .1 Cost of material.
 - .2 Delivery and unloading at site.
 - .3 Sales taxes.
 - .4 Installation, overhead and profit.
- .3 Ensure unit prices multiplied by quantities given equal material cost of that item in Schedule of Values.

1.5 MEASUREMENT
AND PAYMENT
PROCEDURES

- .1 Lump Sum Price - All Work other than that which is specifically designated in the Unit Price Table, there shall no measurement and shall be paid at the Contract Lump Sum Price. This item includes all costs to undertake the Work including but not limited to equipment, personnel, overhead, etc. 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.
- .2 Items of work to be considered in the Lump Sum Price are:
 - .1 Mobilization.
 - .2 Demobilization.
 - .3 Design, installing and maintain all temporary site access routes required to access the Work areas, including access ramp over earth embankment to access upstream side of the existing concrete structure.
 - .1 Public/Residential Access Areas - sidewalk approach protection on Scollard Road. Temporary Construction to be in accordance with municipal standards.
 - .2 Maintenance and repair as required due to heavy machinery use.
 - .4 Construction Control and Monitoring - Condition surveys and monitoring of temporary

1.5 MEASUREMENT
AND PAYMENT
PROCEDURES
(Cont'd)

- .2 (Cont'd)
- .4 (Cont'd)
- works including temporary and permanent bench marks.
- .5 Providing construction fence and perimeter security measures around work area.
- .6 Maintaining the work/storage area for the duration of the work:
- .1 Site security;
- .2 Snow removal (if required);
- .3 Contractor's Site Office;
- .4 Dust, privacy, and noise management.
- .5 Protection, maintenance, relocation and reconnecting of existing services and utilities.
- .6 Preparation, clearing and grubbing, rough grading, geotextile and granular backfill, drainage of area etc. as required;
- .7 Traffic Control - Temporary measures for vehicle and navigation traffic control provisions and maintenance.
- .8 Environmental Procedures, including control work to provide effective environmental, waterbody, and fish habitat protection.
- .1 Sediment, erosion and Turbidity control measures;
- .9 Temporary utilities.
- .10 Construction Facilities.
- .11 Progressive and Final Site Cleaning.
- .12 Demolition and removal of Existing Dam Structure top deck.
- .13 Removal and disposal off site of:
- .1 All existing handrails.
- .2 Existing concrete filled steel Bollards(2).
- .3 Existing signage.
- .4 Existing make-shift timber canoe dock.
- .14 Metal Fabrication and installation of the following items as indicated on the drawings:
- .1 All parts embedded in cast-in-place concrete.
- .2 Base plates with anchors in cast-in-place concrete and for handrail posts.
- .3 Base plate pipe sleeve assemblies for handrail systems, complete with bolts and washers.
- .4 Steel liner at gains and sill beam.
- .5 Gain Covers.
- .6 Winch frames:

1.5 MEASUREMENT AND PAYMENT PROCEDURES (Cont'd)	.2	(Cont'd)
	.14	(Cont'd)
	.7	Supply, placement and compaction and finish grading of new Crushed stone pathway and associated subgrade.
	.8	Chain Link fence assembly components.
	.9	Anchorage and support components for safety signage and boom installation.
	.10	Staff Gauge.
	.11	Operator Safety System.
	.12	Other miscellaneous steel hardware and fabrications items.
	.15	Handrail Systems.
	.16	Timber Stop Logs.
	.17	Dam Safety Signage(permanent).
	.18	Clearing and Grubbing.
	.19	Chain Link Fencing.
	.20	General Landscaping and reinstatement of the site.
	.21	Water Diversion System - Design and approvals, construction, maintenance, operation (including record keeping).
	.22	Cofferdam - Design and approvals, construction, maintenance and deconstruction of the upstream and downstream cofferdams.
	.23	Safety Boom system.
	.24	Removal of the temporary access routes.
1.6 UNIT PRICE ITEM MEASUREMENT AND PAYMENT PROCEDURES	.1	Item No. 1 - "Class 1 Concrete" - New concrete slab on-grade foundation shall be paid at the contract unit price by the unit Cu.M.
	.2	Item No. 2 - "Class 2 Concrete" - New concrete wingwalls and abutments shall be paid at the contract unit price by the unit Cu.M.
	.3	Item No. 3 - "Class 3 Concrete" - New concrete Spillway shall be paid at the contract unit price by the unit Cu.M.
	.4	Cast-in-place concrete: All classes of concrete shall be paid at the Contract unit price by the cubic metre calculated from neat dimensions indicated on Contract drawings or authorized in writing by Department Representative. Concrete placed beyond dimensions indicated will not be measured.
	.1	No deductions will be made for volume of concrete displaced by reinforcing steel.

1.6 UNIT PRICE
ITEM MEASUREMENT
AND PAYMENT
PROCEDURES
(Cont'd)

- .4 Cast-in-place concrete:(Cont'd)
- .2 Include in the prices of concrete the bonding agent.
- .3 Include in the price of concrete the work described in Section 03 10 00 Concrete Forming and Accessories and Section 03 20 00 Concrete Reinforcing.
- .4 Include in the price of concrete the heating, cooling, hot and cold weather protection, curing, and finishing, including pre-heating of substrate.
- .5 Include in the price of concrete the supply and installation of waterstops with keyways.
- .6 Include in the prices of concrete the supply and installation of joint filler, bond breaker and joint sealer, including that required for the prestressed concrete decks.
- .5 Item No. 4 - "Reinforcing Steel" shall be paid at the contract unit price by the unit KG. Reinforcing steel will be measured in kilograms of steel incorporated into work, computed from the theoretical unit mass specified in CAN/CSA- G30.18 for lengths and sizes of bars as indicated on the Contract Drawings or authorized in writing by Departmental Representative.
- .6 Item No. 5 - "Precast Concrete Works": New solid core precast concrete deck panels shall be paid at the contract unit price by the unit EACH. This includes design, fabrication, delivery, installation and associated works for inserts, and embedded hardware components.
- .7 Item No.6 - "Type C anchors" shall be paid at the contract unit price EACH for each anchor.
- .1 Payment for Type C anchors includes drilling hole in rock base material; setting and stressing; supplying and placing all attached hardware; supplying and placing the grout pad for anchor plates; supplying and placing the anchor grout; and proof testing each anchor.
- .8 Item No. 7 - "Concrete Excavation" shall be paid at the contract unit price by the unit Cu.M. This item shall include concrete excavation of existing abutments and wingwalls

1.6 UNIT PRICE
ITEM MEASUREMENT
AND PAYMENT
PROCEDURES
(Cont'd)

- .8 (Cont'd)
for the partial concrete refacing as described in Section 02 41 19.
- .1 Saw-cuts: as required for concrete excavation. This item is to be included in the price of Concrete Excavation.
- .2 No payment will be made for concrete excavation beyond the limits shown on the drawings, which has not been authorized by the Engineer; any overbreak beyond these limits shall be replaced by concrete at the Contractor's expense.
- .9 Item No.8 - "Rock Excavation" shall be paid at the contract unit price by the unit Cu.M. This item shall include the removal of rock as required for new construction. It will be measured in cubic metres in place within the lines and limits shown on the drawings.
- .1 Quantities will be taken from cross section showing original rock surface and actual grade line set by Departmental Representative.
- .2 No payment will be made for rock excavation beyond the limits shown on the drawings which has not been authorized by the Departmental Representative; any overbreak beyond these limits shall be replaced by concrete at the Contractor's expense.
- .3 Include in the price of rock excavation the cost of rock crushing and associated work.
- .10 Item No.9 - "Common Excavation" shall be paid at the contract unit price by the unit Cu.M. This item shall include:
- .1 Excavation, removal, hauling and disposal of debris, sediment in work area to allow for rock excavation and new construction of concrete water retaining structure. This including watercourse sediment and debris from the upstream side of the stoplogs, which is composed of mainly waste and build up from past wildlife (beaver) activities.. Excavation
- .2 Excavation of Granular native soil (if required).
- .11 Item No.10 - "Backfilling" shall be paid at the contract unit price by the unit Cu.M. This

1.6 UNIT PRICE
ITEM MEASUREMENT
AND PAYMENT
PROCEDURES
(Cont'd)

- .11 (Cont'd)
item shall include backfilling, and surface preparation prior to general landscaping work.
.1 Quantities will be taken from cross section showing original rock surface and actual grade line set by Departmental Representative.
.2 supplying, hauling, placement and compaction of site and imported materials within work area. Granular material backfill on downstream and upstream side, including new elevation approaches;
- .12 Item No. 11 - "Rip-Rap" Erosion Protection Upstream - Heavy Rip-rap shall be paid at the contract unit price by the unit TONNE. Quantities and Payment for this item shall be according to the lines, elevations and dimensions on the Contract Drawings and or determined by the Departmental Representative.
.1 The supply and installation of non-woven geotextile shall be incidental to the supply and placement of rip-rap.
.2 Backfilling to authorized excavation limits for rip-rap, if required will be measured for payment in tonne for supply, placement and consolidation.

1.7 PROGRESS
PAYMENT

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

1.8 SUBSTANTIAL
PERFORMANCE OF WORK

- .1 Prepare and submit to Departmental Representative a comprehensive list of items to be completed or corrected and apply for a review by Departmental Representative to establish Substantial Performance of Work or substantial performance of designated portion of Work when Work is substantially performed
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- 1.8 SUBSTANTIAL PERFORMANCE OF WORK (Cont'd)
- .1 (Cont'd)
if permitted by lien legislation applicable to Place of Work designated portion thereof which Departmental Representative agrees to accept separately is substantially performed. Failure to include an item on list does not alter responsibility to complete the Contract.
 - .2 Submit an application for final payment when Work is completed.
 - .3 Departmental Representative will, no later than 10 days after receipt of an application for final payment, review Work to verify validity of application. Departmental Representative will give notification that application is valid or give reasons why it is not valid, no later than 7 days after reviewing Work.
 - .4 Departmental Representative will issue a Certificate of Completion and a Certificate of Measurement when application for final payment is found valid.

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 This Section specifies general requirements and procedures for Contractor submissions of shop drawings, product data and samples to Departmental Representative for review. Additional specific requirements for submissions are also specified in individual sections of these specifications.
 - .2 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.
 - .3 Do not proceed with Work until relevant submissions are reviewed and accepted by Department Representative.
 - .4 Present shop drawings, product data, samples and mock-ups in SI Metric units.
 - .5 Where items or information is not produced in SI Metric units converted values are acceptable.
 - .6 Review submittals prior to submission to Department 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.
 - .7 Notify Department Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
 - .8 Verify field measurements and affected adjacent Work are co-ordinated.
 - .9 Contractor's responsibility for errors and omissions in submission is not relieved by Department Representative's review of submittals.
-

- 1.1 ADMINISTRATIVE (Cont'd)
- .10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Department Representative review.
- .11 Make any and all changes in submissions which Department Representative may require consistent with Contract Documents and resubmit as directed by Department Representative.
- .12 Notify the Department Representative, in writing, when resubmitting any revisions other than those requested by the Department Representative.
- .13 Keep one reviewed copy of each submission on site.
- 1.2 SHOP DRAWINGS AND PRODUCT DATA
- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work, which are specific to the project requirements.
- .2 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario of Canada.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications and/or applicable portions of Contract Documents.
- .4 Allow three (3) working days for Department Representative's review of each submission.
- .5 Adjustments made on shop drawings by Department Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Department Representative prior to proceeding with Work.
-

1.2 SHOP DRAWINGS
AND PRODUCT DATA
(Cont'd)

- .6 Make changes in shop drawings as Department Representative may require, consistent with Contract Documents. When resubmitting, notify Department Representative in writing of revisions other than those requested.
 - .7 Submit shop drawings as follows:
 - .1 Electronic format in PDF, JPEG or Word, and on either a USB drive, CD/DVD disk, or by email.
 - .8 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.
 - .9 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 Engineer's stamp, signed and dated as required for specified components of the work.
 - .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 Relationship to adjacent work.
 - .10 After Department Representative's review and approval, distribute copies to appropriate parties involved.
 - .11 Submit three hard copies and one electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Department
-

- 1.2 SHOP DRAWINGS AND PRODUCT DATA
(Cont'd)
- .11 (Cont'd)
Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Delete information not applicable to project.
- .13 Supplement standard information to provide details applicable to project.
- .14 If upon review by Department Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .15 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.
.1 This review shall not mean that PWGSC 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.
- .16 Submit shop drawings for the following but not inclusive list:
.1 Reinforcing Steel,
.2 Formwork,
.3 Metal Fabrication,
.1 Railings,
.2 Fencing,
.3 Winch Frames,
.4 Gain Covers,
.4 Anchors , Type C,
.5 Cofferdam design and dewatering system,
.6 Temporary access ramp over earth embankment design,
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- | | | |
|---|--------------|---|
| 1.2 SHOP DRAWINGS
AND PRODUCT DATA
(Cont'd) | .16 (Cont'd) | .7 Environmental Turbidity/sediment control plan, |
| | | .8 Pre-Cast solid concrete deck slabs, |
| | | .9 Signage, |
| | | .10 Safety Boom, in-water and shore anchors. |

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|-------------|----|--|
| 1.3 SAMPLES | .1 | Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use. |
| | .2 | Deliver samples prepaid to Department Representative's business address as requested. |
| | .3 | Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents. |
| | .4 | Where colour, pattern or texture is criterion, submit full range of samples. |
| | .5 | Make changes in samples which Department Representative may require, consistent with Contract Documents. |
| | .6 | Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified. |

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|-----------------------------------|----|---|
| 1.4 PHOTOGRAPHIC
DOCUMENTATION | .1 | Submit electronic copy of colour digital photography in jpg format, standard resolution as directed by Department Representative. |
| | .2 | Project identification: name and number of project and date of exposure indicated. |
| | .3 | Frequency of photographic documentation: as directed by Departmental Representative. |
| | .1 | Upon completion of: excavation, foundation, forming and prior to concrete pours and as directed by Departmental Representative. |
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|---|----|--|
| <u>1.5 CERTIFICATES
AND TRANSCRIPTS</u> | .1 | Immediately after award of Contract, submit Workers' Safety and Insurance Board Experience Report. |
| | .2 | Submit transcription of insurance to contracting authorities immediately after award of Contract. |
| <u>1.6 FEES, PERMITS
AND CERTIFICATES</u> | .1 | Provide authorities having jurisdiction with information requested. |
| | .2 | Pay fees and obtain certificates and permits required. |
| | .3 | Furnish certificates and permits. |

PART 2 - PRODUCTS

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|---------------------|----|-----------|
| <u>2.1 NOT USED</u> | .1 | Not Used. |
|---------------------|----|-----------|

PART 3 - EXECUTION

- | | | |
|---------------------|----|-----------|
| <u>3.1 NOT USED</u> | .1 | Not Used. |
|---------------------|----|-----------|

END

PART 1 - GENERAL

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|---|----|--|
| <u>1.1 REFERENCES</u> | .1 | Ministry of Transportation, Ontario (MTO)
.1 Ontario Traffic Manual, Book 7:
Temporary Conditions - 01. |
| <u>1.2 MEASUREMENT
AND PAYMENT</u> | .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. |
| <u>1.3 PROTECTION OF
PUBLIC TRAFFIC</u> | .1 | Comply with requirements of Acts, Regulations
and By-Laws in force for regulation of traffic
or use of roadways upon or over which it is
necessary to carry out Work or haul materials
or equipment. |
| | .2 | When working on travelled way:
.1 Place equipment in position to minimize
interference and hazard to travelling public.
.2 Keep equipment units as close together
as working conditions permit and preferably on
same side of travelled way.
.3 Do not leave equipment on travelled way
overnight. |
| | .3 | Close lanes of road only after receipt of
written approval from Department
Representative.
.1 Before re-routing traffic erect suitable
signs and devices to Ontario Traffic Manual,
Book 7: Temporary Conditions. |
| | .4 | Keep travelled way graded, free from pot
holes and of sufficient width for required
number of lanes of traffic. Provide four (4) m
wide minimum temporary roadway for traffic in
one-way sections through Work areas and on
detours.
.1 Place and compact granular sub-base in
accordance with Section 32 11 16.01.
.2 Place and compact granular base in
accordance with Section 32 11 23. |
| | .5 | Provide and maintain road access and egress
to adjacent properties fronting along Work |
-

1.3 PROTECTION OF
PUBLIC TRAFFIC
(Cont'd)

- .5 (Cont'd)
under Contract and in other areas as
indicated.

1.4 INFORMATIONAL
AND WARNING DEVICES

- .1 Provide and maintain signs, and other devices
required to indicate construction activities
or other temporary and unusual conditions
resulting from Project Work which requires
road user response.
- .2 Supply and erect signs, delineators,
barricades and miscellaneous warning devices
to Ontario Traffic Manual, Book 7: Temporary
Conditions.
- .3 Place signs and other devices in locations
recommended in Ontario Traffic Manual, Book 7:
Temporary Conditions.
- .4 Meet with Department Representative prior to
commencement of Work to prepare list of signs
and other devices required for project. If
situation on site changes, revise list to
approval of Department Representative.
- .5 Continually maintain traffic control devices
in use:
.1 Check signs daily for legibility,
damage, suitability and location. Clean,
repair or replace to ensure clarity and
reflectance.
.2 Remove or cover signs which do not apply
to conditions existing from day to day.

1.5 CONTROL OF
PUBLIC TRAFFIC

- .1 Provide competent flag personnel, trained in
accordance with, and properly equipped to
Ontario Traffic Manual, Book 7: Temporary
Conditions for situations as follows:
.1 When public traffic is required to pass
working vehicles or equipment that block all
or part of travelled roadway.
.2 When workmen or equipment are employed
on travelled way over brow of hills, around
sharp curves or at other locations where
oncoming traffic would not otherwise have
adequate warning.
.3 In situations where complete protection
for workers, working equipment and public
traffic is not provided by other traffic
control devices.

1.5 CONTROL OF PUBLIC TRAFFIC (Cont'd) .1 (Cont'd)
.4 Delays to public traffic due to contractor's operators:15 minutes maximum.

1.6 OPERATIONAL REQUIREMENTS .1 Maintain existing conditions for traffic throughout period of contract except that, when required for construction under contract and when measures have been taken as specified and approved by Department Representative to protect and control public traffic, existing conditions for traffic to be restricted as follows:
.1 Section from Cunningham drive to Scollard road:
.1 Speed limit reduced to 30 km/h on Scollard road.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

PART 1 - GENERAL

- | | | |
|--------------------------------|----|---|
| <u>1.1 GENERAL REQUIREMENT</u> | .1 | Comply with Ontario Occupational Health and Safety Act, Canada Labour Code Part II, and Canada Occupational Safety and Health Regulations. |
| | .2 | Develop written Site Specific Health and Safety Plan Based on hazard assessment prior to commencing any site work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications. |
| | .3 | Relief from or substitution from any portion or provisions of minimum Health and Safety Guidelines specified herein or reviewed site-specific Health and Safety Plan must be submitted to the Department Representative in writing. Department Representative will respond in writing, either accepting or requesting improvements. |
| <u>1.2 REFERENCES</u> | .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 | National Fire Code 2010 (NFC):
.1 NFC 2010, Division B, Part 2 Emergency Planning, subsection 2.8.8 Fire Safety Plan. |
| | .4 | Canadian Labour Code, Part 2, Canada Occupational Health and Safety regulations. |
| | .5 | Workplace hazardous Materials Information System (WHMIS) |
| | .6 | Province of Ontario:
.1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, (updated 2005), Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended.
.2 Ministry of Labour publication "Silica on Construction Sites", 2004.
.3 O. Reg. 490/09, Designated Substances. |

1.2 REFERENCES (Cont'd)

- .6 Province of Ontario:(Cont'd)
 - .4 Workplace Safety and Insurance Act, 1997.
 - .5 Municipal statutes and authorities.
- .7 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

1.3 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit site-specific Health and Safety Plan: Within Seven (7) days after award of contract, date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operations found in work plan.
 - .3 Measures and controls to be implemented to address identified safety hazards and risks.
 - .4 Contractor's and Sub-contractors' Safety Communication Plan.
 - .5 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations. Coordinate plan with existing Emergency Response requirements and procedures provided by Department Representative.
 - .3 Department Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within five (5) days after receipt of plan. Revise
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- | | | |
|----------------------------|-----|--|
| 1.3 SUBMITTALS
(Cont'd) | .3 | (Cont'd)
plan as appropriate and resubmit plan to
Department Representative within five (5) days
after receipt of comments from Department
Representative. |
| | .4 | Department 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. |
| | .5 | Submit names of personnel and alternates
responsible for site safety and health to be
present on site, and use of personal
protective equipment. |
| | .6 | Submit records of Contractor's Health and
Safety meetings when requested. |
| | .7 | Submit copies of orders, directions or
reports issued by health and safety inspectors
of the authorities having jurisdiction. |
| | .8 | Submit copies of incident and accident
reports. |
| | .9 | Submit Material Safety Data Sheets (MSDS). |
| | .10 | Submit Workplace Safety and Insurance Board
(WSIB)- Experience Rating Report. |
| 1.4 FILING OF
NOTICE | .1 | File Notice of Project with Provincial
authorities prior to commencement of Work. |
| 1.5 SAFETY
ASSESSMENT | .1 | Perform site specific safety hazard
assessment related to project. |
| 1.6 MEETINGS | .1 | Schedule and administer pre-construction
Health and Safety meeting with Department
Representative prior to commencement of Work. |
-

- 1.7 REGULATORY REQUIREMENTS
- .1 Comply with the Acts and regulations of the Federal Acts and Province of Ontario.
 - .2 Comply with specified standards and regulations to ensure safe operations at site.
 - .3 In the event of conflict between any provisions of specified standards and regulations, the most stringent provision governs.
- 1.8 PROJECT/SITE CONDITIONS
- .1 Work at site will involve contact with:
 - .1 Silica/silica dust from concrete demolition.
 - .2 Benzene in fuel/oil, and adhesives.
 - .3 Arsenic and acrylonitrile in adhesives.
 - .4 Fresh Concrete, concrete admixtures and bonding agents.
 - .5 Corroded metals.
 - .2 Hazards on-site include but are not limited to:
 - .1 Working around moving equipment and heavy machinery.
 - .2 Working near and or over open water.
 - .3 Working in inclement weather.
 - .4 Falling, tripping and slipping surfaces and hazards (uneven terrain).
- 1.9 GENERAL REQUIREMENTS
- .1 Site-Specific Health and Safety Plan needs to cover all subtrades utilized on the project.
 - .2 Department 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.
- 1.10 RESPONSIBILITY
- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
 - .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations,
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|--|----|---|
| 1.10 RESPONSIBILITY
(Cont'd) | .2 | (Cont'd)
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. |
| 1.11 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 Department 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. |
| 1.12 HEALTH AND
SAFETY CO-ORDINATOR | .1 | Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must: <ul style="list-style-type: none"> .1 Have site-related working experience specific to activities associated with similar dam rehabilitation 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. .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan. .5 Be on site during execution of Work and report directly to and be under direction of site supervisor. |
| 1.13 POSTING OF
DOCUMENTS | .1 | Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario, and in consultation with Departmental Representative. <ul style="list-style-type: none"> .1 Contractor's Safety Policy. .2 Constructor's Name. .3 Notice of Project. |
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1.13 POSTING OF
DOCUMENTS
(Cont'd)

- .1 (Cont'd)
 - .4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).
 - .5 Ministry of Labour Orders and reports.
 - .6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.
 - .7 Address and phone number of nearest Ministry of Labour office.
 - .8 Material Safety Data Sheets.
 - .9 Written Emergency Response Plan.
 - .10 Site Specific Safety Plan.
 - .11 Valid certificate of first aider 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 and the work.

1.14 CORRECTION OF
NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.15 BLASTING

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

1.16 WORK STOPPAGE

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.
 - .2 Assign responsibility and obligation to Health and Safety Coordinator to stop or start Work when, at Health and Safety Coordinator's discretion, it is necessary or advisable for reasons of health or safety. Department
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1.16 WORK STOPPAGE	.2	(Cont'd)
(Cont'd)		Representative may also stop Work for health and safety considerations.

PART 2 - PRODUCTS

2.1 NOT USED	.1	Not used.
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PART 3 - EXECUTION

3.1 NOT USED	.1	Not used.
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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, waterbody, and fish habitat protection. Department Representative will monitor environmental protection measures and will identify whenever such protective measures are found to be ineffective. Change protective measures or work procedures as directed by Department Representative.
- 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 Material" - any substance that, if added to a waterbody, could degrade water quality or impact fish, fish habitat and aquatic wildlife. This includes, but is not limited to:
- .1 Masonry and concrete dust.
 - .2 Soils (clay, silt, sand).
 - .3 Oil, diesel, or gasoline.
 - .4 Chipped or fresh mortar, concrete and admixtures.
 - .5 Alkali water resulting from fresh mortar, concrete or cementitious grout.
 - .6 Salt.

1.2 DEFINITIONS (Cont'd)

- .3 (Cont'd)
- .7 Solvents.
- .4 "Dripline" - means the location on the ground surface directly beneath a theoretical line described by the tips of the outermost branches of the trees.
- .5 "Barrier" - means fence consisting of approved material, supported by steel posts and being a minimum of 1.8m high, without breaks or unsupported sections.
- .6 "Designated Substances" - hazardous materials as defined and listed in Ontario Regulation 490/09.

1.3 MEASUREMENT AND PAYMENT

- .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 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00.
 - .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: include:
 - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Names and qualifications of persons responsible for training site personnel.
 - .3 Erosion and sediment control plan including Turbidity curtain, which identifies type and location of erosion and sediment
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- 1.4 SUBMITTALS
(Cont'd)
- .4 Environmental protection plan:(Cont'd)
- .3 (Cont'd)
- 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.
- .4 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.
- .5 Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.
- .6 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.
- .7 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
- .8 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
- .9 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.
- .10 Contaminants 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 Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- .11 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.

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| 1.4 SUBMITTALS
(Cont'd) | .4 | Environmental protection plan:(Cont'd)
.12 Historical, archaeological, cultural
resources biological resources and wetlands
plan that defines procedures for identifying
and protecting historical, archaeological,
cultural resources, biological resources and
wetlands. |
| 1.5 FIRES | .1 | Fires and burning of rubbish on site not
permitted. |
| 1.6 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. |
| 1.7 TURBIDITY
CONTROL AND
DRAINAGE | .1 | Provide erosion and sediment control plan
that identifies type and location of erosion
and sediment controls to be provided. Plan to
include but not limited to; monitoring and
reporting requirements to assure that control
measures are in compliance with erosion and
sediment control plan, Federal, Provincial,
and Municipal laws and regulations. |
| | .2 | Obtain a "Permit to Take Water" (PTTW)from
the Ontario Ministry of the Environment if
more than 50,000 Litres of water per day is
taken from the waterway, or if the waterway is
restricted during construction. |
| | .3 | Provide temporary drainage and pumping as
necessary to keep excavations and site free
from water. |
| | .4 | Do not pump water containing suspended
materials into waterways, sewer or drainage
systems. Send all discharge to a settling pond
or filtration area before removal from site.
.1 If required upon site observations,
provide a marine grade turbidity curtain
across all areas where sediments can enter the
watercourse. Turbidity curtain to be anchored
or weighted down along its length to form a
continuous seal on the lake bed with adequate |
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1.7 TURBIDITY
CONTROL AND
DRAINAGE
(Cont'd)

- .4 (Cont'd)
 - .1 (Cont'd)
flotation at water surface to prevent over spills of turbid water.
 - .2 In the event of significant silting or debris caused by construction activities, contractor must take appropriate measures to confine work and install additional turbidity curtains.
- .5 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 and turbidity values shall be less than 25 NTU (Nephelometric turbidity Units) for normal dry weather (<25mm of rain within 24hrs) and less than 75mg/l and less than 100 NTU for wet weather conditions (>25mm of rain in 24hrs).
 - .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.
- .6 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.
- .7 If the sediment, debris or erosion control measures are not functioning properly, no further work will be permitted until the sediment/erosion problem has been rectified.
- .8 Where any in-water work is to take place, the work area shall be enclosed by a turbidity curtain (silt curtain) to prevent any sediment to escape the enclosed area. Turbidity

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| 1.7 TURBIDITY
CONTROL AND
DRAINAGE
(Cont'd) | .8 | (Cont'd)
curtains are to be installed and maintained throughout the period of work. |
| | .9 | Sediment, debris and erosion control measures shall be left in place until all disturbed areas within the work area have been stabilized and any sediments in the water have settled. Removal will be permitted only after written approval from the Departmental Representative. |
| 1.8 SITE CLEARING
AND PLANT
PROTECTION | .1 | Protect trees and plants on site and adjacent properties which are to remain as determined by Departmental Representative. |
| | .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 two (2) m. |
| | .3 | Protect roots of designated trees to dripline during work 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. |
| 1.9 IN-WATER
WORK | .1 | The Contractor shall submit their proposed temporary works (cofferdam, water diversion and, sediment and erosion control) to PCA for review and approval prior to implementation. |
| 1.10 WORK
RESTRICTION PERIODS | .1 | Migratory Bird Nesting Protection:
.1 Do not schedule removal of vegetation between March 31st to August 31st to avoid destruction of active migratory bird nests, breeding, migrating/staging, hibernation or nursing periods.
.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 |
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1.10 WORK
RESTRICTION PERIODS
(Cont'd)

- .1 (Cont'd)
- .2 (Cont'd)
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 implementation.
- .2 Fish Habitat and Spawning Protection:
 - .1 Any work done outside allowable in-water work windows, as defined in the Detailed Environmental Impact Assessment (DEIA) will require an exemption from the Ministry of Natural resources (MNR).
 - .2 Any amphibians, reptiles or fish that have been trapped within the cofferdam area shall be salvage 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 Refer to Article 1.21 within this Section for SAR information.

1.11 WORK ADJACENT
TO WATERWAYS

- .1 Do not operate construction equipment in waterways.
 - .2 Do not use waterway beds for borrow material.
 - .3 Do not dump excavated fill, waste material or debris in waterways.
 - .4 Design and construct temporary crossings to minimize erosion to waterways.
 - .5 Do not use salt as a deicer near canal. In areas where ice is a safety concern, the use of sand will be permitted, but it must not be allowed to enter the watercourse.
 - .6 Any concrete wash water shall be directed to a collection basin area to effectively remove
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- 1.11 WORK ADJACENT TO WATERWAYS
(Cont'd)
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- .6 (Cont'd)
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.
 - .7 Stockpile excavated or fill materials must be stored and stabilized away from water.
 - .1 Runoff from the excavated or fill material must be contained from entering the watercourse.
 - .2 Stockpile height cannot exceed 2.0m.
 - .8 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.
- 1.12 POLLUTION CONTROL (SEDIMENT,) DUST AND EROSION)
-
- .1 Maintain temporary erosion and pollution control features installed under this contract.
 - .2 Prevent drilling and removal operations and other extraneous materials from contaminating air and waterways beyond application area, by providing temporary enclosures.
 - .3 Before starting work that will create dust or debris, (such as woodcutting, excavation, backfilling, etc.), install effective mitigation techniques for sediment, dust, debris and erosion control to the satisfaction of Departmental Representative. Maintain these protective measures at all times, including shut down periods.
 - .4 Provide a 1 metre high silt fence barrier in all areas where, due to construction activities, silt or debris may enter the lake. Install silt curtain minimum 3 m from shoreline.
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1.12 POLLUTION
CONTROL (SEDIMENT,
DUST AND EROSION)
(Cont'd)

- .5 Maintain a standby supply of pre-fabricated silt fence barrier, or an equivalent ready-to-install sediment control device.
- .6 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
- .7 Temporary access dust control:
 - .1 supply and application of water for alleviation or prevention of dust nuisance caused by traffic..
 - .2 Material:
 - .1 Water: in accordance with Departmental Representative's approval.
 - .3 Application:
 - .1 Apply water with distributors equipped with means of shut-off and with spray system to ensure uniform application.
- .8 Spills of deleterious substances:
 - .1 Immediately contain, limit spread and clean up in accordance with provincial regulatory requirements.
 - .2 Report immediately to Ontario Spills Action Centre: 1-800-268-6060.
 - .3 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.
 - .4 Using appropriate safety precautions, collect liquid or solidify liquid with an inert, noncombustible material and remove for disposal.
 - .5 Be responsible for all costs of cleaning up any spills to the satisfaction of the Departmental Representative.
 - .6 Have an environmental emergency response plan in place and a spill kit readily available.

1.13 OPERATION AND
MAINTENANCE OF
EQUIPMENT

- .1 Operation of construction equipment in water is prohibited.
 - .2 Design and construct temporary crossings to minimize environmental impact to watercourse and wetland
 - .3 Provide drip trays to prevent the discharge oil, grease, antifreeze, or any other materials into the ground.
-

1.13 OPERATION AND
MAINTENANCE OF
EQUIPMENT

(Cont'd)

- .4 Equipment and heavy machinery used shall meet or exceed all applicable emission requirements.
- .5 Leave machinery running only while in actual use, except where extreme temperatures prohibit shutting machinery down.
- .6 Conduct all vehicle/equipment maintenance and refueling over impermeable/absorptive material situated at a designated site that is located a recommended distance of 30 m away from the waterway and basin.

1.14 CLEANING OF
EQUIPMENT

- .1 Use trigger operated spray nozzles for water hoses.
- .2 Contractor will designate a cleaning area for equipment and tools to limit water use and runoff as approved by Department Representative. The cleaning area shall be sufficiently far away from the watercourse to prevent contamination. Where no safe cleaning area is available, Contractor shall be required to provide a settling pond where the equipment can be cleaned. All alkali water is to be disposed of in accordance with federal, provincial, and local authority requirements.

1.15 REMOVED
MATERIALS

- .1 Unless otherwise specified, materials designated for removal become the Contractor's property. Remove these from site.

1.16 CLEAN UP

- .1 Clean up work area as work progresses. At the end of each work period, and more often if ordered by the Department 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 Separate and recycle all materials that can be recycled.
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| 1.16 CLEAN UP
(Cont'd) | .4 | Dispose of hazardous materials and designated substances in accordance with Ontario Regulation 347/90. |
| | .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 and / or the Public. |
| | .7 | Remove all scaffolding, temporary protection, surplus materials, tools, plant, rubbish and debris and dispose of them in an approved manner off Crown property by the completion date of the Work. |
| | .8 | Clean areas under contract to a condition at least equal to that previously existing and to approval of Departmental Representative. |
| | .9 | Repair all damages to property due to work activities. Replace riparian trees, shrubs and other deep root vegetation. Stream banks and shorelines fully restored and re-vegetated to near original soil materials and contours. Restore area with fast growing, low maintenance, diverse native species adapted to the project area to enhance the local plant community. |
| 1.17 TRANSPORTING
WASTE MATERIALS | .1 | All waste subject to Regulation 347/90 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. |
| 1.18 NOISE CONTROL | .1 | Minimize the noise levels from construction activities by using proper muffling devices, in addition to appropriate timing and location of these activities to reduce or minimize the effect of noise on nearby residents, recreational users, and wildlife. |
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- 1.18 NOISE CONTROL (Cont'd)
- .2 Comply with any local or municipal Noise By-Laws, notify residents of planned activities that may cause disturbance and schedule them to avoid sensitive time periods.
 - .3 Conduct work during normal business hours.
 - .4 Monitor and mitigate public complaints by keeping a record of complaints and addressing any issues raised by the public with the Departmental Representative.
- 1.19 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 onsite or in area are discovered during construction.
 - .2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Department Representative.
- 1.20 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.
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- 1.21 SPECIES AT RISK
- .1 A Detailed Environmental Impact Assessment (DIA) Report for the Thompson's Bay Dam rehabilitation is available and lists all potential and highly probable Species at Risk (SAR) in the work area. The Contractor is to familiarize themselves with the information found in the DIA and at the following link: www.ontario.ca/speciesatrisk
 - .2 Questions regarding SAR, contact: Departmental Representative for further information and contact numbers.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Geotextiles: refer to Section 31 32 19.01.

PART 3 - EXECUTION

- 3.1 TURBIDITY CURTAIN INSTALLATION
- .1 Supply, install, maintain and remove silt curtains as instructed by the Departmental Representative.
 - .2 Turbidity curtains shall consist of turbidity curtain geosynthetic, load line, flotation, ballast, anchors, mooring buoys, mooring lines, adjustment lines, and tie-downs.
 - .3 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.
 - .4 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 Where turbidity curtain geosynthetic is joined to provide a continuous run, the sections shall be connected to provide a
-

3.1 TURBIDITY
CURTAIN INSTALLATION
(Cont'd)

- .4 (Cont'd)
- .3 (Cont'd)
- 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.

3.2 OPERATION AND
MAINTENANCE OF
TURBIDITY CURTAIN

- .1 Turbidity curtains shall be installed to prevent sediment passage, from the area enclosed by the curtain, 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 floatation collar shall be regularly monitored and freed of collected sediment.
- .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.

3.2 OPERATION AND
MAINTENANCE OF
TURBIDITY CURTAIN
(Cont'd)

- .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.

3.3 DRAINAGE

- .1 Establish energy dissipators at outlet of diversion works to accommodate safe surface water entry to watercourse as directed by Departmental Representative.
- .2 Maintain existing drainage patterns to greatest extent possible on lands adjacent to the water course.

END

PART 1 - GENERAL

- 1.1 INSPECTION .1 Allow Department 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.
- 1.2 SI SYSTEM .1 SI metric units of measurement are used exclusively on the drawings and in the specifications for this project.
- 1.3 PROTECTION .1 Prevent overloading of any part of the existing structure.
- 1.4 INDEPENDENT INSPECTION AGENCIES .1 Independent Inspection/Testing Agencies will be engaged by Department 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 Department Representative.
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1.4 INDEPENDENT
INSPECTION AGENCIES
(Cont'd)

- .2 Contractor is responsible for all Quality Control. Employment of inspection/testing agencies does not relax responsibility to perform work in accordance with Contract Documents.
- .3 Provide equipment required for executing inspection and testing by appointed agencies.
- .4 Co-operate to provide reasonable facilities for such access.
- .5 If defects are revealed during inspection and/or testing, and additional inspection and/or testing to ascertain full degree of defect are requested, costs of additional testing to be borne by Contractor.
 - .1 Correct defect and irregularities as advised by Department Representative at no cost to Department Representative. Pay costs for retesting and reinspection.

1.5 PROCEDURES

- .1 Notify Department 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 on site, and at existing site conditions.

1.6 PRODUCTS

- .1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended.
 - .2 Should any dispute arise as to quality or fitness of products, decision rests strictly with Department Representative based upon requirements of Contract Documents.
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- 1.6 PRODUCTS (Cont'd)
- .3 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building
 - .4 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
 - .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
 - .2 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
 - .5 Store products subject to damage from weather in weatherproof enclosures.
 - .6 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- 1.7 REJECTED WORK
- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Inspection does not relieve responsibility, but is precaution against oversight or error. Replace or re-execute in accordance with Contract Documents.
 - .2 If in opinion of Department Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Department 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 REJECTED WORK .3 Remove and replace damaged products at own
(Cont'd)

1.8 REPORTS .1 Submit three (3) copies of inspection and
test reports to Department Representative.
.2 Provide copies to Subcontractor of work being
inspected or tested, manufacturer or
fabricator of material being inspected or
tested.

1.9 TESTS AND MIX .1 Furnish test results and mix designs as may
DESIGNS 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 Department
Representative and may be authorized as
recoverable.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

PART 1 - GENERAL

- | | | |
|---|----|---|
| <u>1.1 DESCRIPTION</u> | .1 | Work under this section relates to condition surveys and monitoring of structures (adjacent earth embankment) and buildings which are adjacent to the construction site and which may be affected by excavation, dewatering, foundation work and vibration producing activities (such as concrete demolition work, excavation of bedrock, and operation of heavy construction equipment.) |
| | .2 | The Contractor is advised that construction activities are to be conducted in such a manner to preclude damage to nearby structures and buildings. The Contractor shall be responsible for any damage caused by their activities. |
| | .3 | The scope of work described in this section is a minimum requirement for conducting a condition survey and monitoring of the work. The Contractor is to review and advise the Department Representative on any additional monitoring requirements. |
| | .4 | 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. |
| <u>1.2 MEASUREMENT AND PAYMENT PROCEDURES</u> | .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. |
| <u>1.3 INDEPENDENT INSPECTION AGENCIES</u> | .1 | An Independent Inspection/Monitoring Firm(s) 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. |

1.3 INDEPENDENT
INSPECTION AGENCIES
(Cont'd)

- .2 The Independent Inspection/Monitoring Firm(s) team shall be qualified and competent in:
 - .1 performing condition surveys;
 - .2 the protection of adjacent earth embankments;
 - .3 the establishment of measurement procedures and their implementation;
 - .4 monitoring and reporting.
- .3 The Condition Survey shall be undertaken by a qualified and competent inspector.
- .4 If requested by the Department Representative, submit the inspector and monitoring specialist qualification and experience.

1.4 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 retained by the Contractor to design and oversee the construction of the temporary works (diversion system, cofferdams and stabilization (shoring) wall and any other temporary works required to complete the work under the Contract.

1.5 CONSTRUCTION
CONTROL & 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, the excavation 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 conditions 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,
-

1.5 CONSTRUCTION
CONTROL & MONITORING
(Cont'd)

- .2 (Cont'd)
- .4 (Cont'd)
type of monitoring equipment and frequency of measurement.
- .3 Prior to commencement of the work meet with Department Representative to discuss the CCM plan, report format, report frequencies, emergency report and distribution list

1.6 CONDITION SURVEY.

- .1 Prior to commencement of the work, a Pre-Construction Condition Survey Report of adjacent properties and structures, within 10m 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 Department Representative, private land owners and Township/municipality representatives (as applicable).
- .3 The survey shall include the location and condition at adjacent properties (including TSW property located outside of the contract limits of work) of: buildings; structures; and where applicable: underground utility structures.
- .4 The reports shall detail, by sketches, video tape, photographs, and/or notes, the existing structural, and cosmetic condition, but should not be limited to areas of of the specified structures exhibiting distress (damage). Any significant damages are to be identified and monitored.
- .5 Condition Surveys are to be performed for all building and structures located within 20 metres from the edge of excavation and dewatering work. As a minimum, the following properties and structures are to be surveyed:
 - .1 Trent-Severn Waterway (TSW) property including, adjacent earth embankment.
 - .2 Adjacent properties along access route.
- .6 Furthermore, Condition Survey is to be performed for:
 - .1 Township and municipalities roads to be used as Haul Routes.
 - .2 Staging areas.

1.6 CONDITION SURVEY.6
(Cont'd)

- (Cont'd)
- .3 Shoreline and riparian zones at edges of construction areas.
 - .7 The Contractor shall perform a monthly inspection of the Haul Routes and report their findings to the township/municipality and Department Representative. Repair and make good any damage to the satisfaction of the Local Authorities and the Department 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.

1.7 CONDITION SURVEY REPORT

- .1 Prepare and submit a DRAFT Condition Survey Report for review and approval by the Department Representative within ten (10) days of construction commencement.
- .2 Revise as required by the Department Representative and submit Final version of report.
- .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 land owners and/or township/municipality. One copy is to be maintained on site.

1.8 MONITORING

- .1 The Contractor will be responsible to carry out monitoring of TSW land and assets. Monitoring work is to include:
 - .1 monitoring structures which were identified as part of the Pre-Construction Condition Surveys;
 - .2 movement monitoring: adjacent earth embankments.
-

1.8 MONITORING
(Cont'd)

- .2 Movement monitoring:
- .1 Earth embankments:
- .1 Install monitoring points along the top edge of the earth embankment as recommended by Monitoring firm Engineer.
- .2 The monitoring points are to be durable and not interfere with construction activities and provided accurate and repeatable readings.
- .3 In general these may be installed as follows:
- .1 A +/-50mm dia hole is drilled to 1.5m (to be below the frost line). An ABS tube is placed in the hole (to fit snugly).
- .2 A rod (+/-20mm) is inserted into the tube and driven 300mm into undisturbed ground, below the end of the ABS tube.
- .3 The rod is to extend at least one meter above the ground surface and have a survey target attached to it. The rod and target are to be protected by a sleeve similar to the one used on ground water monitoring wells.
- .2 The work also includes the construction of two (minimum) reference monuments, from which the monitoring points can be easily surveyed. If acceptable, these reference monuments may also serve as temporary bench mark for the construction.
- .3 Survey work for the movement monitoring is to have an accuracy of +/- 2 mm.
- .4 Movement monitoring schedule:
- .1 Pre-construction: Initial measurements are to be taken before any work is started. Initial reading are to be taken on two different days, and result should be identical.
- .2 Construction: Measurements are to be taken on a weekly basis during excavation, anchor installation (if required), demolition, backfill and compaction work near the structures (minimum 10m).
- .3 Post-construction activities: Measurements can be reduced to a weekly basis for the first two weeks following the completion of the activities listed above. If no movement has been observed during this period, the monitoring can be discontinued until the next activity.
- .4 Construction and post-construction activities: The Contractor will undertake

1.8 MONITORING
(Cont'd)

- .2 Movement monitoring:(Cont'd)
- .4 Movement monitoring schedule:(Cont'd)
 - daily visual inspection of the areas being monitored. The visual inspection shall continue until substantial completion of the work.
- .5 Monitoring criteria.
 - .1 The movement criteria given below are nominal criteria and need to be reviewed and confirmed by the Monitoring Firm and Design Engineer.
 - .2 Earth embankment:
 - .1 Total movement of 10 mm at any monitoring point - stoppage of work and review of construction procedure.
 - .2 Total movement of 25 mm at any monitoring point - stoppage of the work, add, adjust, replace or repair damaged and weakened elements of stabilization (shoring)system or modify work procedure.
- .3 Immediately repair any damage to any adjacent structure to the satisfaction of the Department Representative.
- .4 Reporting:
 - .1 Provide a written record of findings including new data and 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 Department Representative.
 - .3 The report shall be clear and concise and be acceptable to the Department 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.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

- 3.1 ADJUSTMENT
- .1 Monitor applicable system performances and maintain their effectiveness by making adjustments, replacing or repairing damaged and weakened elements of systems until substantial completion of project.

END

PART 1 - GENERAL

- | | | |
|--|----|---|
| <u>1.1 RELATED SECTIONS</u> | .1 | Section 01 52 00 - Construction Facilities. |
| | .2 | Section 01 56 00 - Temporary Barriers and Enclosures. |
| <u>1.2 MEASUREMENT AND PAYMENT PROCEDURE</u> | .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. |
| <u>1.3 SUBMITTALS</u> | .1 | Provide submittals in accordance with Section 01 33 00. |
| <u>1.4 INSTALLATION ORDER AND REMOVAL</u> | .1 | Provide temporary utility controls in order to execute work expeditiously. |
| | .2 | Remove from site all such work after use. |
| <u>1.5 DEWATERING</u> | .1 | Provide temporary drainage and pumping facilities to keep work area, excavations and site free from standing water. |
| <u>1.6 WATER SUPPLY</u> | .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 his crew. |
| <u>1.7 TEMPORARY POWER AND LIGHT</u> | .1 | Provide and pay for temporary power during construction for temporary lighting and operating of power tools. |
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<u>1.8 TEMPORARY COMMUNICATION FACILITIES</u>	.1	Provide and pay for temporary telephone, fax, data hook up, lines equipment necessary for own use and use of Department Representative.
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<u>1.9 FIRE PROTECTION</u>	.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

<u>2.1 NOT USED</u>	.1	Not Used.
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PART 3 - EXECUTION

<u>3.1 NOT USED</u>	.1	Not Used.
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END

PART 1 - GENERAL

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|-----------------------------|----|-------------------------|
| <u>1.1 SECTION INCLUDES</u> | .1 | Construction aids. |
| | .2 | Office and sheds. |
| | .3 | Parking. |
| | .4 | Project identification. |

- | | | |
|---|----|---|
| <u>1.2 MEASUREMENT AND PAYMENT PROCEDURES</u> | .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. |

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|-----------------------|----|---|
| <u>1.3 REFERENCES</u> | .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 | CSA Z797-09 (R2014), Code of practice for Access Scaffold. |
| | .5 | CAN/CSA-Z321-96(R2006), Signs and Symbols for the Occupational Environment, withdrawn but still available from CSA, CCOHS and Techstreet. |
| | .6 | CAN/CSA-S269.2-M87(R2003), Access Scaffolding for Construction Purposes, withdrawn but still available from CSA, CCOHS and Techstreet. |

- | | | |
|-----------------------|----|---|
| <u>1.4 SUBMITTALS</u> | .1 | Provide submittals in accordance with Section 01 33 00. |
|-----------------------|----|---|
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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.
- .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, and temporary stairs (if applicable).

1.7 HOISTING

- .1 Provide, operate and maintain hoists/cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.
- .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 on site within the Contractors Staging area provided it does not disrupt performance of Work.
 - .2 Provide and maintain adequate access to project site.
-

- | | | |
|---|----|---|
| <u>1.9 CONSTRUCTION
PARKING
(Cont'd)</u> | .3 | Build and maintain temporary roads where indicated or as required and provide snow removal during period of Work. |
| | .4 | If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads. |
| | .5 | Clean construction runways and taxi areas where used by Contractor's equipment. |
| <u>1.10 SECURITY</u> | .1 | Pay for suitable security measures and methods to guard site and contents of site after working hours and during holidays. To be submitted and approved by Department Representative. |
| <u>1.11 OFFICES</u> | .1 | Provide office heated to 22°C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table. |
| | .2 | Provide a 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. |
| <u>1.12 EQUIPMENT,
TOOL AND MATERIALS
STORAGE</u> | .1 | Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials. |
| | .2 | Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities. |
| <u>1.13 SANITARY
FACILITIES</u> | .1 | Provide sanitary facilities for work force in 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. |
-

1.14 CONSTRUCTION SIGNAGE

- .1 Provide and erect, within three (3) weeks of signing Contract, a project sign in a location designated by Department 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, and Contractor, of a design style established by Department Representative as detailed herein.
- .4 No other signs or advertisements, other than warning signs, are permitted on site.
- .5 Locate project identification sign as directed by Department Representative and construct as follows:
 - .1 Build concrete foundation, erect framework, and attach signboard to framing.
 - .2 Paint all surfaces of signboard and framing with one coat primer and two coats enamel. Colour white on signboard face, black on other surfaces.
 - .3 Apply vinyl sign face overlay to painted signboard face in accordance with installation instruction supplied.
- .6 Signs and notices for safety and instruction shall be in both official languages. Graphic symbols shall conform to CAN/CSA-Z321.
- .7 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 Department Representative.

1.15 PROTECTION AND MAINTENANCE OF TRAFFIC

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
 - .2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Department Representative.
 - .3 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
-

1.15 PROTECTION AND .3
MAINTENANCE OF
TRAFFIC

(Cont'd)

- .3 (Cont'd)
maintenance of adequate warning, danger, and
direction signs
- .4 Protect travelling public from damage to
person and property.
- .5 Contractor's traffic on roads selected for
hauling material to and from site to interfere
as little as possible with public traffic.
- .6 Verify adequacy of existing roads and
allowable load limit on these roads.
Contractor: responsible for repair of damage
to roads caused by construction operations.
- .7 Construct access and haul roads necessary.
- .8 Haul roads: constructed with suitable grades
and widths; sharp curves, blind corners, and
dangerous cross traffic shall be avoided.
- .9 Provide necessary lighting, signs,
barricades, and distinctive markings for safe
movement of traffic.
- .10 Dust control: adequate to ensure safe
operation at all times.
- .11 Provide snow removal during period of Work.
- .12 Remove, upon completion of work, haul roads
designated by Departmental Representative.

1.16 CLEAN-UP

- .1 Remove construction debris, waste materials,
packaging material from work site daily.
 - .2 Clean dirt or mud tracked onto paved or
surfaced roadways.
 - .3 Store materials resulting from demolition
activities that are salvageable.
 - .4 Stack stored new or salvaged material.
-

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

- | | | |
|------------------------------------|----|--|
| <u>1.1 DESCRIPTION</u> | .1 | 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 & Safety regulations for construction. |
| <u>1.2 MEASUREMENT AND PAYMENT</u> | .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. |
| <u>1.3 RELATED SECTIONS</u> | .1 | Section 01 51 00 - Temporary Utilities. |
| | .2 | Section 01 52 00 - Construction Facilities. |
| <u>1.4 REFERENCES</u> | .1 | 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. |
| | .2 | Canadian Standards Association (CSA):
.1 CSA-0121-08, Douglas Fir Plywood. |
| | .3 | 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 REFERENCES
(Cont'd) | .4 | Ontario Provincial Standard Specifications (OPSS) and Ontario Provincial Standard Drawings (OPSD). |
| | .5 | Ontario Ministry of Transportation, Book 7 of the Ontario Traffic Manual - Temporary Conditions. |

- | | | |
|------------------------------|----|---|
| 1.5 WORK AREA
DELINEATION | .1 | Place construction warning signage at the work area and each public pathway entrance leading to the dam. |
| | .2 | 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 20 22. |
| | .3 | Provide a construction Traffic Control Plan for both work related and local vehicular traffic as set out in Section 01 35 00. |

- | | | |
|---------------------------------|----|--|
| 1.6 INSTALLATION
AND REMOVAL | .1 | Provide temporary controls in order to execute Work expeditiously. |
| | .2 | Remove from site all such work after use. |

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|---|----|--|
| 1.7 TEMPORARY
HEATING AND
VENTILATION | .1 | Provide temporary heating required during construction period, including attendance, maintenance and fuel. |
| | .2 | Construction heaters used inside enclosures (if applicable) must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted. |
| | .3 | Provide temporary heat and ventilation in enclosed areas as required to: <ul style="list-style-type: none"> .1 Facilitate progress of work. .2 Protect work and products against dampness and cold. .3 Prevent moisture condensation on surfaces. .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials. |
-

- | | | |
|---|----|---|
| 1.7 TEMPORARY
HEATING AND
VENTILATION
(Cont'd) | .3 | (Cont'd)
.5 Provide adequate ventilation to meet health regulations for safe working environment. |
| | .4 | Ventilation:
.1 Prevent accumulations of dust, fumes, mists, vapours or gases in enclosed areas during construction.
.2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
.3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
.4 Ventilate storage spaces containing hazardous or volatile materials.
.5 Ventilate temporary sanitary facilities.
.6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants. |
| | .5 | Be responsible for damage to work due to failure in providing adequate heat and protection during construction. |
| 1.8 HOARDING | .1 | Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures. |
| 1.9 GUARD RAILS AND
BARRICADES | .1 | Provide as required by governing authorities. |
| 1.10 DUST TIGHT
SCREENS | .1 | Provide dust tight screens to localize dust generating activities, and for protection of workers, finished areas of Work and public. |
| | .2 | Maintain and relocate protection until such work is complete. |
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<u>1.11 PRIVACY SCREENS</u>	.1	Provide privacy screen with minimum of 88% blockage to limit visual disruption to adjacent residential units.
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<u>1.12 ACCESS TO SITE</u>	.1	Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.
	.2	Refer to Section 01 20 01.

<u>1.13 PUBLIC TRAFFIC FLOW</u>	.1	Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect the public.
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<u>1.14 FIRE ROUTES</u>	.1	Maintain access to property including overhead clearances for use by emergency response vehicles.
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<u>1.15 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY</u>	.1	Protect surrounding private and public property from damage during performance of Work.
	.2	Be responsible for damage incurred.

PART 2 - PRODUCTS

<u>2.1 PRIVACY SCREEN</u>	.1	Minimum 88% visibility blockage, knitted HDPE polyethylene Construction finished with reinforced binding and grommets on all corners and edges. Maximum air passage, Water and UV resistant, ASTM D5041, Colour Green.
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Trent-Severn Waterway	TEMPORARY BARRIERS	Section 01 56 00
Thompson's Bay Dam	AND ENCLOSURES	Page 5
Rehabilitation 2014		2014-08-10

PART 3 - EXECUTION

3.1 PRIVACY SCREEN .1 Installation as per manufacturer's
recommendations.

END

PART 1 - GENERAL

- | | | |
|---|----|---|
| <u>1.1 SECTION
INCLUDES</u> | .1 | Field engineering survey services to measure and stake site. |
| | .2 | Survey services to establish and confirm inverts for Work. |
| | .3 | Installation of geodetic bench marks to the new dam structure on top of the concrete structure wall tied-in with existing referenced bench mark elevations. |
| <u>1.2 MEASUREMENT
AND PAYMENT</u> | .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. |
| <u>1.3 REFERENCES</u> | .1 | Owner's identification of existing survey control points and property limits. |
| <u>1.4 QUALIFICATIONS
OF SURVEYOR</u> | .1 | Qualified registered land surveyor, licensed to practice in Place of Work, acceptable to Department Representative. |
| <u>1.5 SURVEY
REFERENCE POINTS</u> | .1 | Locate, confirm and protect control points prior to starting site work. Relocate and place permanent reference points after completion of Work. |
| | .2 | Make no changes or relocations without prior written notice to Department Representative. |
| | .3 | Report to Department 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 bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.
- .2 Establish lines and levels, locate and lay out, by instrumentation.
- .3 Stake for grading, placement and new construction features.
- .4 Stake batter boards for foundation.
- .5 Establish new foundation and sill elevations.

1.7 RECORDS

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 On completion of foundation, 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.

1.8 SUBMITTALS

- .1 Submit name and address of Surveyor to Department 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.
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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 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 or other Contractors.
 - .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 access, bank/pile snow in designated areas only or if required remove from site.
 - .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
 - .5 Provide on-site containers for collection of waste materials and debris.
 - .6 Provide and use clearly marked separate bins for recycling.
 - .7 Remove waste material and debris from site at end of each working day.
 - .8 Dispose of waste materials and debris off site.
 - .9 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.
 - .10 Clean and maintenance of 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, tools, construction machinery and equipment not required for performance of remaining Work.
 - .2 Remove waste products and debris and leave Work clean and suitable for operation.
 - .3 Prior to final review, remove surplus products, tools, construction machinery and equipment.
 - .4 Remove waste products and debris.
 - .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Department Representative. Do not burn waste materials on site.
 - .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
 - .7 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
 - .8 Remove stains, spots, marks and dirt from railing, signs, safety boom and dam equipment.
 - .9 Remove dirt and other disfiguration from surfaces.
 - .10 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

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 CONSTRUCTION & DEMOLITION WASTE
- .1 Carefully deconstruct and source separate materials/equipment and divert, from D&C waste destined for landfill to maximum extent where possible. 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 Portland cement concrete.
 - .2 Corrugated cardboard.
 - .3 Wood, not including painted or treated wood or laminated wood.
 - .4 Steel.
 - .3 Submit a waste reduction workplan 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, reduced, 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
 - .3 Email: rco@rco.on.ca.

PART 1 - GENERAL

- 1.1 DESCRIPTION
- .1 This Section specifies the methods and procedures for selective demolition of the existing structure and the removal 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, excavation, and disposal including any recycling of materials:
 - .1 Demolition, removal and disposal of concrete structure deck.
 - .2 Removal of existing vertical concrete face of the abutments and wing walls by means of saw cutting and mechanical chipping to a depth of 200mm (Neat Line).
 - .3 Removal of existing concrete on abutment walls by means of saw cutting and mechanical chipping from top-down by 500mm (Neat line).
 - .4 Saw-Cuts to a minimum of 75mm depth required to remove the concrete as shown on the Contract Drawings.
 - .2 Preparation of all surfaces against which new concrete is to be cast.
 - .3 Disposing off site all concrete debris, removed steel members, steel reinforcement and all garbage generated during Work as described in this Section.
- 1.2 MEASUREMENT AND PAYMENT
- .1 Measurement Procedures: in accordance with Section 01 22 01.
 - .2 Work under this Section will comprise of both unit price and Lump sum cost payment procedures.
 - .1 Items to be measured for payment and paid for under the unit price table:
 - .1 Item No. 7 - Concrete Removal: This item covers the work described in sub-section 1.1.2.1.2, 1.1.2.1.3 and sub-section 1.1.2.1.4.
 - .2 No Payment will be made for concrete removal beyond the limits shown on the drawings, which has not been authorized by the Departmental Representative. Any overbreak beyond

1.2 MEASUREMENT AND .2
PAYMENT
(Cont'd)

- (Cont'd)
- .1 (Cont'd)
 - .2 (Cont'd)
these limits shall be replaced with concrete at the Contractor's expense.
 - .3 Include in the price of the concrete removal, the preparation of all surfaces which are to accept new concrete.
 - .2 Items which there will be no separate measurement of Work and payment shall be included in the applicable Lump Sum Price items as set out in Section 01 22 01.
 - .1 Structure Demolition: This item covers the work described in subsection 1.1.2.1.1 and sub-section 1.1.2.1.4.

1.3 DEFINITIONS

- .1 Deconstruction: systematic dismantling of structure in a manner that achieves safe removal/disposal of hazardous materials and maximum salvage/recycling of materials.
 - .1 Ultimate objective is to recover potentially valuable resources while diverting from landfill what has traditionally been significant portion of waste system.
 - .2 Demolition: rapid destruction of structure with or without prior removal of hazardous materials.
 - .3 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, including but not limited to: corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health, well being or environment if handled improperly.
 - .4 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
 - .5 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form.
 - .1 Recycling does not include burning, incinerating, or thermally destroying waste.
-

1.3 DEFINITIONS
(Cont'd)

- .6 Source Separation: acts of keeping different types of waste materials separate, beginning from first time they became waste.
- .7 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

1.4 REFERENCES

- .1 Canadian Standards Association (CSA International).
 - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
- .2 Federal Legislation.
 - .1 Canadian Environmental Assessment Act (CEAA), 1992, c. 37.
 - .2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
 - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
- .3 Ontario Occupational Health and Safety Act (OHSA).

1.5 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit copies of certified bills of lading from authorized disposal sites and reuse and recycling facilities for material removed from site to Departmental Representative upon request.
 - .3 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 20 and indicate:
 - .1 Descriptions and anticipated quantities of materials to be recycled and landfilled.
 - .2 Number and location of dumpsters.
 - .3 Anticipated frequency of tippage.
 - .4 Name and address of haulers and waste facilities.
 - .4 Prior to demolition of the existing structure, establish reference points (minimum
-

1.5 SUBMITTALS (Cont'd)	.4	(Cont'd) of 4) that will allow the transference of the coordinates and elevations of the existing geodetic bench mark to the new geodetic bench mark on the new structure or such other approach as approved by the Departmental Representative. Provide all data regarding the reference points to the Departmental Representative. Survey work shall be undertaken by an Ontario Legal Survey.
1.6 QUALITY ASSURANCE	.1	Ensure Work is performed in compliance with CEPA, CEAA, TDGA, and applicable provincial regulations.
1.7 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.
1.8 ENVIRONMENTAL REQUIREMENTS	.1	Do Work in accordance with Section 01 35 43.
1.9 EXISTING SITE AND STRUCTURE PROTECTION	.1	Protect existing site works designated to remain. In event of damage, immediately replace such items or make repairs to the satisfaction of the Department Representative and at no additional cost to PCA.
	.2	Provide a pre-construction condition survey and assessment in accordance with Section 01 48 00 and Section 01 71 00.
	.3	Prevent movement, settlement or damage to adjacent structures during selective demolition of the existing dam. Provide bracing, shoring or such other measures as required and approved by the Department Representative. Repair damage caused by demolition beyond work scope as approved by Department Representative.

- 1.9 EXISTING SITE .4 Support affected structures and, if safety of
AND STRUCTURE structure being demolished or adjacent
PROTECTION structures appears to be endangered, take
(Cont'd) preventative measures and notify the
Department Representative.

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.
.1 Leave equipment and machinery running
only while in use, except where extreme
temperatures prohibit shutting down.
.2 Equipment shall be sized adequately for
the work.
.3 Minimize machinery running time to only
while in use.
.4 Machinery used for concrete demolition
must minimize air borne pollution.

PART 3 - EXECUTION

- 3.1 PREPARATION .1 Inspect site and verify with the Department
Representative items designated for demolition
as identified on the contract drawings, and
items to be recycled, and disposed
accordingly.
.2 Take and record all dimensions and elevations
necessary to establish the reconstruction to
the correct alignment, and in designated
location.
.3 Make templates in sufficient numbers to
ensure successful installation of items such
as Gain liners.
.4 Do not remove or demolish items, or otherwise
destroy pertinent data, until all such data
has been recorded and any necessary templates
made. Provide survey layout controls to the
satisfaction of the Department Representative.
-

3.2 REMOVAL OF HAZARDOUS WASTES

- .1 Prior to start of deconstruction work remove contaminated or hazardous materials as defined by authorities having jurisdiction from site and dispose of in safe manner to minimize danger on site.

3.3 DEMOLITION

- .1 Obtain the Departmental Representative's approval to start the demolition part of the work.
 - .2 Materials removed are property of Contractor.
 - .3 Demonstrate to the Department Representative the methodology of demolition will not result in physical or structural damage to site works, existing earth embankments adjacent to the concrete structure.
 - .4 Saw cut to a depth of 75mm or otherwise indicated on the Contract Drawings. Use small, hand operated chippers (max 15kg).
 - .1 Contractor must maintain jackhammer chipping bits sharp, so as to minimize micro-cracking in the concrete layer behind the area of removal.
 - .5 Demolish in a manner to minimize dusting. 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.
 - .6 Maintain structural integrity of existing structure.
 - .7 Remove materials that cannot be salvaged for reuse or recycling and dispose of at licensed facilities.
 - .8 Stockpile materials in a safe manner for workers and equipment until removed from the work area. Remove all stockpiled materials from the construction area at the end of each day.
 - .9 At end of each day's work, leave Work in safe and stable condition.
-

3.4 PREPARATION CONCRETE SURFACES

- .1 Use a stiff broom to remove loose concrete surfaces, and a high pressure water jet to clean the surfaces after the excavation has been complete.
- .2 Use a handheld jack-hammer (maximum 30lbs) to roughen all existing concrete surfaces against which new concrete is to be cast. Use a high pressure water jet to clean all surfaces and to partially expose the coarse aggregate.
- .3 Keep the surfaces clean until new concrete is cast.
- .4 Do not exceed 1000 kPa waterjet pressure.
- .5 Do not discharge the water from cleaning directly to the watercourse. Direct the water to a settling pond, or filter before releasing to the watercourse. See Section 01 35 43.
- .6 Undertake saw-cutting at concrete exposed surfaces where new concrete is cast against existing concrete.

3.5 PROCESSING

- .1 Keep processing area clean and free of excess debris.
- .2 Supply separate, marked disposal bins for categories of waste material.
- .3 Separate processed materials into organized piles for stockpiling. Provide collection area for materials processed.

3.6 CLEANING AND RESTORATION

- .1 Keep site clean and organized throughout deconstruction.
- .2 Upon completion of project, remove debris, trim surfaces and leave work site clean.
- .3 Upon completion of project, reinstate areas affected by Work to condition which existed prior to beginning of Work.

PART 1 - GENERAL

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|---|----|---|
| <u>1.1 DESCRIPTION</u> | .1 | This section covers the removal and disposal of the following existing structure components and such other items as may be directed by the Department Representative:
.1 Removal and disposal of existing pipe railings.
.2 Removal and disposal of existing notifications, warning and advisory signage.
.3 Removal and disposal of existing timber stoplogs.
.4 Removal and disposal of existing steel angle plates for both the main gains and service gains.
.5 Removal and salvage and re-installation of concrete filled steel bollards.
.6 Removal and disposal of makeshift boat launch/dock directly adjacent to concrete structure as indicated on Contract Drawings. |
| <u>1.2 MEASUREMENT AND PAYMENT PROCEDURES</u> | .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. |
| <u>1.3 PROTECTION</u> | .1 | Protect existing structures or parts of structures designated to remain. In the event of damage, make repairs and replacements to the approval of, and at no additional cost, to the Departmental Representative. |
| | .2 | Protect all exposed electrical wiring and conduits during the concrete excavation, forming, heating and placement of concrete. |

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

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|----------------------------------|----|---|
| <u>3.1 PREPARATION</u> | .1 | Inspect the site and verify with the Departmental Representative objects designated to be removed and objects to be preserved. |
| <u>3.2 REMOVALS</u> | .1 | Do not disturb adjacent work designated to remain in place. |
| | .2 | Items to be disposed of in a manner approved by the Departmental Representative. |
| <u>3.3 REINSTALLATION</u> | .1 | None of the pipe railing will be reinstalled. Refer to Handrail System - Section 05 52 20 for installation of new posts and pipe railing. |
| | .2 | Reinstall new all other items which were removed as a result of construction activities to the Departmental Representative's approval and the Contract documents. |
| <u>3.4 DISPOSAL OF MATERIALS</u> | .1 | Dispose of materials not designated for salvage or reuse in work off the site. |

END

PART 1 - GENERAL

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| <u>1.1 RELATED SECTIONS</u> | .1 | Section 03 20 00 - CONCRETE REINFORCING. |
| | .2 | Section 03 30 00 - CAST-IN-PLACE CONCRETE |
| <u>1.2 MEASUREMENT PROCEDURES</u> | .1 | No measurement will be made under this Section. Include costs in items of work for which concrete formwork, and falsework is required. |
| <u>1.3 REFERENCES</u> | .1 | Canadian Standards Association (CSA)
.1 CSA-A23.1-09/A23.2-09, Concrete materials and methods of concrete construction/Test methods and standard practices for concrete.
.2 CAN/CSA-086.1-01(R2006), Engineering Design in Wood (Limit States Design).
.3 CAN/CSA-086.1S1-05, Supplement No. 1 to CAN/CSA-086-01, 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. |
| <u>1.4 SHOP DRAWINGS</u> | .1 | Submit shop drawings for formwork and falsework in accordance with Section 01 33 00. |
| | .2 | Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1, for falsework drawings. Comply with CAN/CSA-S269.3 for formwork drawings. |

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| 1.4 SHOP DRAWINGS
(Cont'd) | .3 | Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms. |
| | .4 | Indicate sequence of erection and removal of formwork/falsework to minimize exposure time to adverse weather conditions. |
| | .5 | Each shop drawing submission shall bear stamp and signature of qualified professional engineer registered or licensed in Province of Ontario, Canada. |

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| 1.5 REQUIREMENTS
OF REGULATORY
AGENCIES | .1 | Conform to municipal, provincial and national codes relating to design and construction of formwork and falsework. |
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| 1.6 WASTE
MANAGEMENT AND
DISPOSAL | .1 | Use sealers, form release and stripping agents that are non-toxic, biodegradable and have zero or low VOC's. |
|---|----|--|

PART 2 - PRODUCTS

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| 2.1 MATERIALS | .1 | Formwork materials:
.1 For concrete without special architectural features, use wood and wood product formwork materials to CAN/CSA-086.1 CSA-0153. |
| | .2 | Form ties: use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm dia. in concrete surface. |
| | .3 | Form release agent: non-toxic, biodegradable, low VOC. |
| | .4 | Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 15 to 24 mm ² /s at 40°C, flashpoint minimum 150°C, open cup. |
| | .5 | Falsework materials: to CSA-S269.1. |
-

PART 3 - EXECUTION

3.1 FABRICATION AND ERECTION

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Hand trim sides and bottoms and remove loose earth and/or rock from earth/bedrock forms before placing concrete (if applicable).
- .3 Fabricate and erect falsework in accordance with CSA S269.1.
- .4 Refer to Contract Drawings and Section 03 30 00 for concrete members requiring specified exposed finishes.
- .5 Do not place shores and mud sills on frozen ground.
- .6 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .7 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA A23.1/A23.2.
- .8 Align form joints and make watertight. Keep form joints to minimum.
- .9 Use 20 mm chamfer strips on external corners and/or 20 mm fillets at interior corners , joints, unless specified otherwise.
- .10 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .11 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.
- .12 Line forms for following surfaces:
 - .1 Exposed faces of abutments, wingwalls. Do not stagger joints of form lining material. Align joints to obtain uniform pattern.
- .13 Clean formwork in accordance with CSA A23.1/A23.2, before placing concrete.

- 3.2 FORM RELEASE
AGENT
-
- .1 Surface preparation:
- .1 Protect adjacent surfaces not designated to receive concrete form release.
 - .2 Clean and prepare surfaces to receive form release in accordance with manufacturer's instructions.
 - .3 Clean form surfaces thoroughly prior to application.
 - .4 Remove all rust, scale and/or previously used form release agents from the forms in accordance with good concrete practices.
 - .5 When using new wooden forms, form release shall be applied and re-applied until complete saturation has been accomplished prior to first use.
- .2 Application:
- .1 Apply concrete form release in accordance with manufacturer's instructions.
- 3.3 REMOVAL AND
RESHORING
-
- .1 Leave formwork in place for following minimum periods of time after placing concrete.
- .1 Seven days for abutments, spill way and wing walls or until 80% of design strength is reached.
 - .2 Three days for footings and foundations.
- .2 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.
- .3 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

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.
- 1.3 MEASUREMENT AND PAYMENT .1 Measurement Procedures: in accordance with Section 01 22 01.
- .2 Work covered by this section will be paid for under payment items included in the unit price table:
- .1 Measure reinforcing steel in kilograms of steel incorporated into work, computed from theoretical unit mass specified in CSA-G30.18 for lengths and sizes of bars as indicated or authorized in writing by Department Representative.
- .1 Item No. 4 Reinforcing Steel:
- .1 For all concrete work as indicated in Contract documents.
- .2 Includes reinforcement costs in items of concrete work in Section 03 30 00.
- .3 All other work of this section, which is not identified as a unit price item, is to be included in the Lump Sum Price stated in the Tender Form.
- 1.4 REFERENCES .1 American Concrete Institute (ACI)
- .1 SP-66, ACI Detailing Manual 2004.
- .1 ACI 315, Details and Detailing of Concrete Reinforcement.
- .2 ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.
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1.4 REFERENCES
(Cont'd)

- .2 American National Standards Institute/American Concrete Institute (ANSI/ACI)
 - .1 ANSI/ACI 315, Details and Detailing of Concrete Reinforcement.
- .3 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.
- .4 CSA International
 - .1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CAN/CSA-A23.3-04(R2010), Design of Concrete Structures.
 - .3 CSA G30.3-M1983(R1998), Cold Drawn Steel wire for Concrete Reinforcement.
 - .4 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
 - .5 CSA-G40.20-04(R2009)/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .6 CSA W186-M1990(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .5 Reinforcing Steel Institute of Canada (RSIC)
 - .1 RSIC-2013, Reinforcing Steel Manual of Standard Practice.

1.5 ACTION AND
INFORMATIONAL
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

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|---|----|--|
| 1.5 ACTION AND
INFORMATIONAL
SUBMITTALS
(Cont'd) | .3 | Shop Drawings:(Cont'd) |
| | .1 | (Cont'd) |
| | .1 | (Cont'd) |
| | .4 | (Cont'd) |
| | | 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 | Submit in accordance with Section 01 45 00 -QUALITY CONTROL. |
| | .1 | Mill Test Report: upon request, provide Department Representative with certified copy of mill test report of reinforcing steel, minimum three (3) weeks prior to beginning reinforcing work. |
| | .2 | Upon request submit in writing to Department Representative proposed source of reinforcement material to be supplied. |
| 1.7 DELIVERY,
STORAGE AND
HANDLING | .1 | Deliver, store and handle materials in accordance with manufacturer's written instructions. |
| | .2 | Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address. |
| | .3 | Storage and Handling Requirements: |
| | .1 | Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area. |
| | .2 | Replace defective or damaged materials with new. |
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PART 2 - PRODUCTS

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|-----------------------------------|----|---|
| <u>2.1 MATERIALS</u> | .1 | Substitute different size bars only if permitted in writing by Departmental Representative. |
| | .2 | Reinforcing steel: billet steel, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise. |
| | .3 | Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18, minimum 30% recycled content. |
| | .4 | Cold-drawn annealed steel wire ties: to ASTM A82/A82M, or to CSA G30.3-M. |
| | .5 | Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2. |
| | .6 | Mechanical splices: subject to approval of Department Representative. |
| <u>2.2 FABRICATION</u> | .1 | Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2, ANSI/ACI 315 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.. |
| | .2 | Obtain Department Representative's written approval for locations of reinforcement splices other than those shown on placing drawings. |
| | .3 | Upon approval of Department Representative, weld reinforcement in accordance with CSA W186. |
| | .4 | Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists. |
| <u>2.3 SOURCE QUALITY CONTROL</u> | .1 | Inform Departmental Representative of proposed source of material to be supplied. |

PART 3 - EXECUTION

- 3.1 FIELD BENDING
- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Department Representative.
 - .2 When field bending is authorized, bend without heat, applying slow and steady pressure.
 - .3 Replace bars, which develop cracks or splits.
- 3.2 PLACING REINFORCEMENT
- .1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.
 - .2 Prior to placing concrete, obtain Department Representative's approval of reinforcing material and placement.
 - .3 Ensure cover to reinforcement is maintained during concrete pour.

END

PART 1 - GENERAL

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|---|----|--|
| <u>1.1 DESCRIPTION</u> | .1 | This section specified the requirements for cast-in-place concrete placed as described by the drawings and the specifications. |
| | .2 | Three classes of concrete are used as described under paragraph 1.3.2.1 to 1.3.2.3. |
| | .3 | Class GU for cast-in-place concrete is specified for use at all mass concrete pours at all reinforced concrete structure segments. |
| <u>1.2 RELATED SECTIONS</u> | .1 | Section 03 10 00 -Concrete Forming and Accessories. |
| | .2 | Section 03 20 00 - Concrete Reinforcing. |
| | .3 | Section 05 05 20 - Anchors. |
| | .4 | Section 31 23 35 - Excavating and Backfilling. |
| <u>1.3 MEASUREMENT AND PAYMENT PROCEDURES</u> | .1 | Measurement Procedures: in accordance with Section 01 22 01. |
| | .2 | Work covered by this section will be paid for under payment items included in the Unit Price Table: <ul style="list-style-type: none"> .1 Item No.1 - Class 1 Concrete: <ul style="list-style-type: none"> .1 Concrete in the construction of the new dam foundation slab. .2 Item No.2 - Class 2 Concrete: <ul style="list-style-type: none"> .1 Concrete in the construction of the new dam abutment/piers and adjacent retaining wingwalls. .3 Item No. 3 - Class 3 Concrete: <ul style="list-style-type: none"> .1 Concrete in the construction of the new central "Ogee" spillway. |
| | .3 | Cast-in-place concrete will be measured in cubic metres calculated from field measured dimensions authorized in writing by the Department Representative. |
| | .4 | No deductions will be made for volume of concrete displaced by reinforcing steel. |

1.3 MEASUREMENT
AND PAYMENT
PROCEDURES
(Cont'd)

- .5 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.
- .6 Include in the prices of concrete the installation of all items embedded therein.
- .7 Include in the prices of concrete the work described in Section 03 10 00.
- .8 Include in the prices of concrete the supply and installations of waterstops.
- .9 Include in the price of concrete any foundation preparation of the receiving surface including dental concrete at bedrock surfaces.
- .10 All other work, necessary to the completion of the work of this section, will not be measured separately for payment, but will be considered incidental to the work.

1.4 REFERENCES

- .1 Abbreviations and Acronyms:
 - .1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement.
 - .1 Type GU, GUb and GUL - General use cement.
 - .2 Type LH, LHb and LHL - Low heat of hydration cement.
 - .2 Fly ash:
 - .1 Type F - with CaO content less than 15%.
 - .2 Type CI - with CaO content ranging from 15 to 20%.
 - .3 Type CH - with CaO greater than 20%.
 - .3 GGBFS - Ground, granulated blast-furnace slag.
- .2 Reference Standards:
 - .1 ASTM International
 - .1 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.
 - .2 ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

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| 1.4 REFERENCES
(Cont'd) | .2 | Reference Standards:(Cont'd) |
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| | .1 | (Cont'd) |
| | .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. |
| | .2 | 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 | CAN/CSA-A23.5, Supplementary Cementing Materials. |
| | .3 | CSA A283-06(R2011), Qualification Code for Concrete Testing Laboratories. |
| | .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. |
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| 1.5 ACTION AND INFORMATIONAL SUBMITTALS | .1 | Provide submittals in accordance with Section 01 33 00. |
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| | .2 | Submit warranty performance parameters of concrete for review, including supporting back-up data and manufacturer's data sheets. |
| | .3 | At least two (2) weeks prior to beginning work, submit to Department Representative concrete mix design and product data of the following materials proposed for use: aggregate source, curing compound, and waterstops. |
| | .4 | Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken. |
| | .5 | Provide testing inspection results and reports for review by Department Representative and do not proceed without written approval when deviations from mix design or parameters are found. |
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| 1.5 ACTION AND
INFORMATIONAL
SUBMITTALS
(Cont'd) | .6 | Concrete hauling time: provide for review by Department Representative deviations exceeding maximum allowable time of 90 minutes for concrete to be delivered to site of Work and discharged after batching. |
| | .7 | Provide two copies of WHMIS MSDS in accordance with Sections 01 35 29.06 - Health and Safety and 01 35 43 - Environmental Procedures. |
| 1.6 QUALITY
ASSURANCE | .1 | Quality Assurance: in accordance with Section 01 45 00. |
| | .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 4 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:
.1 Falsework erection.
.2 Hot weather concrete.
.3 Cold weather concrete.
.4 Curing.
.5 Finishes.
.6 Formwork removal. |
| | .4 | Ensure that mix design is adjusted suitably to prevent alkali aggregate reactivity problems. |
| 1.7 DELIVERY,
STORAGE AND
HANDLING | .1 | Delivery and Acceptance Requirements:
.1 Concrete hauling time: deliver to site of Work and discharged within 90 minutes maximum after batching.
.1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative laboratory representative |
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| 1.7 DELIVERY,
STORAGE AND
HANDLING
(Cont'd) | .1 (Cont'd) | |
| | .1 (Cont'd) | |
| | .1 (Cont'd) | and concrete producer as described in CSA A23.1/A23.2. |
| | .2 | Deviations to be submitted for review by Department Representative. |
| | .2 | Modifications to maximum time limit must be agreed by the Departmental Representative and concrete producer as described in CSA A23.1/A23.2. |
| | .3 | Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2. |
| | .2 | Packaging Waste Management: |
| | .1 | remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials in accordance with Section 01 74 20. |
| | .2 | Provide an appropriate area on the job site where concrete trucks can be safely washed. |
| | .3 | 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. |
| 1.8 REQUIREMENTS
OF REGULATORY
AGENCIES | .1 | Conform to municipal, provincial and national codes relating to design and construction of formwork. |
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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-3001.
- .3 Cementitious hydraulic slag: 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.
- .1 hard, dense, well graded aggregates of normal mass-density, approved by the Department Representative both as to quality and source:
- .2 Aggregates to be free from materials identified as having deleterious reactions with certain constituents of cements. Minimal amounts of these reactive materials will be given consideration for inclusion - the basis of consideration will be:
- .1 Conformance to the requirement of CAN/CSA-A23.1/A23.2; and/or
- .2 The performance criteria as given in Clause 5.9 of CAN/CSA-A23.1/A23.2.
- .7 Admixtures:
- .1 Air entraining admixture: to ASTM C260 & CAN3-A266.1.
- .2 Chemical admixture: to ASTM C494/C494M, ASTM C1017/C1017M and CAN3-A266.1, Type WN. Department Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
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2.3 MATERIALS (Cont'd)

- .7 Admixtures:(Cont'd)
 - .3 Superplasticizers: to ASTM C1017.
- .8 Non premixed dry pack grout for formwork cone packing: composition of non metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 35 MPa at 28 days.
- .9 Curing compound: to CSA A23.1/A23.2 white and ASTM C309, Type 1-chlorinated rubber Typel-D with fugitive dye.
- .10 Hydrophilic waterstop:
 - .1 For all construction joints.
 - .2 Rectangular profile measuring 7 mm thick x 25 mm wide and incorporating hollow longitudinal compression openings.
 - .3 Comprised of non-bentonite synthetic chloroprene rubber.
 - .4 Co-extruded hydrophilic and non-hydrophilic composition.
 - .5 Hardness exceeding 50 (ASTM-D2240).
 - .6 Tensile strength exceeding 30 kg/cm².
 - .7 Elongation of synthetic chloroprene rubber exceeding 600% (ASTM-D412).
 - .8 Elongation of chloroprene rubber only exceeding 400% (ASTM-D412).
 - .9 Volume expansion capability exceeding 3.0 times original size.
 - .10 Adhesive and sealant as recommended by waterstop manufacturer.
- .11 Bonding agent:To ASTM c1059/c1059M-99 (2008).

2.4 MIXES

- .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.
 - .2 Placeability: provide the lowest slump compatible with the conditions of placement. Slump shall be measured at the point of discharge;

2.4 MIXES
(Cont'd)

- .1 (Cont'd)
 - .2 (Cont'd)
 - .1 For vertical formwork such as walls and abutments: 80 mm +/- 30 mm.
 - .2 For flat sections such as slabs: 60 mm +/- 20 mm.
 - .3 Workability: free of surface blemishes loss of mortar colour variations segregation.
 - .4 Finishability: amount of bleeding.
 - .5 Set time: to conditions of pour and to acceptance of the Department Representative.
 - .3 Provide concrete mix to meet following hard state requirements:
 - .1 Durability and class of exposure:. F-1
 - .2 Compressive strength at 28 days age: 30 MPa minimum.
 - .3 Intended application: water retaining structure (dam).
 - .4 Surface texture: all deformities repaired including tie-rods; sack rubbed to provide a uniform texture and colour.
 - .5 Nominal size of coarse aggregate: 20 mm maximum.
 - .6 Air content: 5-8%
 - .7 Maximum water Cement ratio: 0.5
 - .8 Volume stability: acceptable volume change range due to shrinkage, creep and freeze thaw cycle.
 - .2 Admixtures: to approval of Department Representative. Use admixtures to correct deficiencies in the mix or improve placement of concrete.
 - .1 Department 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.
 - .3 Provide quality management plan to ensure verification of concrete quality to specified performance.
 - .1 Concrete supplier's certification: both batch plant and materials meet CSA A23.1/A23.2 requirements.
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PART 3 - EXECUTION

- 3.1 PREPARATION
- .1 Obtain Department 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 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.
 - .4 Pumping of concrete will be permitted only after confirmation and approval of equipment and mix by concrete supplier.
 - .5 Ensure formwork, reinforcement and inserts are not disturbed during concrete placement.
 - .6 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.
 - .7 Protect previous Work from staining.
 - .8 Clean and remove stains prior to application for concrete finishes.
 - .9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
 - .10 Do not place load upon new concrete until authorized by Departmental Representative.

- 3.2 FORMWORK
- .1 Construct mortar-tight formwork in accordance with reviewed formwork drawings, maintain tolerances of finished concrete work as specified in CAN/CSA-A23.1/A23.2.
 - .2 Where forms appear to be unsatisfactory stop work until defects corrected.
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- .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 compaction - plan the work and use such methods and performance rates as to allow no cold joints and/or honeycomb;
 - .2 During clement weather or with protection;
 - .3 During daylight hours;
 - .4 Without unscheduled construction joints.
- .3 When applicable - pumping concrete:
- .1 Coordinate with concrete supplier in selection of appropriate pumping equipment for determined concrete mix and placement applications.
 - .2 Arrange equipment so that no vibrations result which might damage freshly placed concrete. Use reversible pumps.
 - .3 Operate pump so 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 parts:
- .1 Set other embedded parts and openings as indicated or specified elsewhere.
 - .2 Check locations and sizes of embedded parts and openings shown on drawings.
- .5 Sleeves and inserts:
- .1 Do not permit penetrations, sleeves, or other openings to pass through slabs or walls, except where approved by Department Representative.
 - .2 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Departmental Representative before placing of concrete.
 - .3 Confirm locations and sizes of openings shown on drawings where applicable.
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3.3 INSTALLATION/
APPLICATION
(Cont'd)

- .6 Waterstops (hydrophilic):
 - .1 Install waterstops at locations shown on the drawings and to CAN/CSA-A23.1/A23.2-09. Follow manufacturer's recommendations.
 - .2 Install waterstops to provide continuous water seal.
 - .3 Do not distort or pierce waterstop in way as to hamper performance.
 - .4 Do not displace reinforcement when installing waterstops.
 - .5 Use equipment to manufacturer's requirements to field splice waterstops.
 - .6 Tie waterstops rigidly in place.
 - .7 Use only straight heat sealed butt joints in field.
 - .8 Use factory welded corners and intersections unless otherwise approved by Department Representative.
 - .9 Use adhesive and sealant as recommended by waterstop manufacturer.
- .7 Do not commence placing concrete until the Departmental Representative has inspected and approved forms, falsework, reinforcing steel, conveying, spreading consolidation and finishing equipment, and curing and protective methods.
- .8 Finishing and curing:
 - .1 Finish concrete to CSA A23.1/A23.2.
 - .2 Use procedures as reviewed by Departmental Representative or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.
 - .3 Unformed surface concrete tolerance to conventional classification in accordance with straight edge method.
 - .4 Use curing compounds compatible with applied finish on concrete surfaces. Applied finish on concrete: Provide written declaration that compounds used are compatible.
 - .5 Use a wood float finish for unformed surfaces that are buried. Exposed surfaces shall be float finished and sack rubbed to the satisfaction of the Departmental Representative.
 - .6 Use smooth-form finish for formed surfaces. Apply a sack rub finish to formed concrete surfaces acceptable to the Departmental Representative.
 - .7 Do patching of form-tie holes, cutout areas, and cavities to CAN/CSA-A23.1 Clause

3.3 INSTALLATION/ APPLICATION (Cont'd)	.8	Finishing and curing:(Cont'd) .7 (Cont'd) 24.2. Use material that matches in colour with concrete surface.
3.4 BONDING AGENT	.1	Apply two coats of bonding agent on all sawcut and other stone faces in contact with new concrete.
	.2	Follow the manufacturer's instructions for application.
3.5 SURFACE TOLERANCE	.1	Concrete tolerance to CSA A23.1/A23.2 Straightedge MethodFF =: FL = Waviness Index Method to tolerance schedule as indicated.
3.6 CURING	.1	If formwork is left in place for 7 days or more, no additional curing will be required. If formwork is removed in less than 7 days, cure with double-layer of wet burlap. Maintain burlap in place and keep thoroughly wet for 7 days after day of placing.
	.2	Unformed surfaces: cure with burlap and water. Carefully place two layers of damp burlap on the surface of the concrete. Overlap each strip by at least 75 mm and secure against displacement by wind. Maintain burlap in place and keep thoroughly wet for 7 days after day of placing.
	.3	During curing period uncover only such areas that are immediately needed for finish treatment. Recover and continue curing.
3.7 COLD WEATHER PROTECTION	.1	For concrete placed when air temperature is at or below 5 degrees Celsius, 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 Equipment shall be capable of keeping interior air at a constant temperature

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| 3.7 COLD WEATHER PROTECTION
(Cont'd) | .1 | (Cont'd) |
| | .2 | (Cont'd) |
| | | sufficiently high to maintain concrete at following curing temperatures: |
| | .1 | Ensure that a minimum substrate temperature of 5 degrees Celsius shall be achieved and maintained, prior to concrete pour. |
| | .2 | For an initial 3 days, at a temperature of not less than 15 degrees Celsius nor more than 27 degrees Celsius at concrete surfaces. |
| | .3 | Cure at not less than 10 degrees Celsius for an extra 4 days. |
| | .4 | Keep concrete surfaces moist continuously while protected. |
| | .5 | Reduce temperature at a rate not exceeding 10 degrees Celsius per day until outside temperature has been reached. |
| | .2 | Submit shop drawings for the heating and hoarding in accordance with Section 01 33 00 - Submittal Procedures. |
| 3.8 HOT WEATHER REQUIREMENTS | .1 | When applicable, during hot weather place concrete to hot weather requirements of CAN/CSA-A23.1/A23.2, clause 21.2. Ensure concrete temperatures at placing meet the requirements of Table 15: take suitable control measures when mixing ingredients. |
| 3.9 FIELD QUALITY CONTROL | .1 | Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Department 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 Department Representative. |
| | .3 | Department Representative will pay for costs of tests. |
| | .4 | Department Representative will take additional test cylinders during cold weather concreting. Cure cylinders on job site under |
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3.9 FIELD QUALITY CONTROL
(Cont'd)

- .4 (Cont'd)
same conditions as concrete which they represent.
- .5 If tests do not meet requirements of the Departmental representative, take such measures as indicated in CAN/CSA-A23.1/A23.2, after confirmed approval by the Departmental Representative.
- .6 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.
- .7 Inspection or testing by Consultant will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

3.10 CLEANING

- .1 Cleaning of concrete equipment to be done in accordance with Section 01 35 43.
- .2 Divert unused concrete materials from landfill to local quarry or facility after receipt of written approval from Departmental Representative.

PART 1 - GENERAL

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| <u>1.1 DESCRIPTION</u> | .1 | This Section specifies the requirements for:
.1 Design, Fabrication, Supply, Delivery and erection of pre-cast concrete units (Solid concrete deck slabs) and other related items such as concrete reinforcement, embedded galvanized steel components, inserts, bearing pads and steel dowel anchor points as indicated on Contract Drawing.
.2 Supply and installation of epoxy anchored smooth rods that are used to secure deck slabs in-place on abutment walls. |
| | .2 | Supply information required for the installation of bracing, supports, inserts and similar accessories required for the work under this contract supplied and to be installed by others. |
| <u>1.2 MEASUREMENT PROCEDURES</u> | .1 | The work of this section will be paid as a Unit price item as listed in Section 01 22 01 and shall cover all the work described in this section. Unit Price will be measured as precast elements in units supplied, delivered, stored and erected on site.
.1 Item No. 5 - "Precast Concrete Work" |
| | .2 | Precast elements measured as individual units, will include cost, supply, delivery, storage and erection of bearing assemblies, anchor bolts, removal and patching of erection devices, supply and installation of joint filler, bond breaker and joint sealant and field grouting of grout keys between precast members. |
| <u>1.3 REFERENCES</u> | .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 A185/A185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
.3 ASTM C260-10a, Standard Specification for Air-Entraining Admixtures for Concrete. |

1.3 REFERENCES (Cont'd)

- .1 (Cont'd)
 - .4 ASTM D2240-05(2010), Standard Test Method for Rubber Property - Durometer Hardness.
 - .5 ASTM D412-06a (2013), Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
 - .6 ASTM D624-00(2012), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
 - .7 ASTM D1751-04(2008), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-99, Ready Mixed Organic Zinc-Rich Coating.
- .3 Canadian Standards Association (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 CSA-A23.3-04(R2010), Design of Concrete Structures, Includes Update No. 1 (2005), Update No. 2 (2007), and Update No. 3 (2009) .
 - .3 CSA-A23.4-09(R2014), Precast Concrete - Materials and Construction.
 - .4 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .1 CAN/CSA-A3001-08, Cementitious Materials for Use in Concrete.
 - .5 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
 - .6 CAN/CSA-G40.20-04(R2009)/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .7 CAN/CSA-S6-06, Canadian Highway Bridge Design Code.
 - .8 CSA S6S1-10, Supplement #1 to CAN/CSA-S6-06, Canadian Highway Bridge Design Code.
 - .9 CSA W47.1-09, Certification of Companies for Fusion Welding for Steel.
 - .10 CAN/CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).

<u>1.3 REFERENCES (Cont'd)</u>	.3	(Cont'd)
	.11	CSA-W59-03(R2008), Welded Steel Construction (Metal Arc Welding) (Metric version).
	.4	The Master Painters Institute (MPI) - Architectural Painting Specification Manual (ASM)
	.1	MPI #18, Organic Zinc Rich Primer.
	.2	MPI #23, Oil Alkyd Primer.
	.5	Canadian Precast/Prestressed Concrete Institute (CPCI) - CPCI Design Manual - Third Edition.
<u>1.4 DESIGN REQUIREMENTS</u>	.1	Design precast elements to CSA-A23.3 and CSA-A23.4 to carry handling stresses.
	.2	Design precast elements to carry loads in accordance with CAN/CSA-S6-06, CL.3.8.10 - Maintenance Vehicle Loads.
	.3	Tolerate a structural deflection of span/360 due to live load.
	.4	Minimum cover:70mm.
	.5	Provide detailed calculations and design drawings for precast elements and connections as described in PART 1 - SUBMITTALS.
<u>1.5 PERFORMANCE REQUIREMENTS</u>	.1	Tolerance of precast elements to CSA-A23.4, Section 10.
<u>1.6 SUBMITTALS</u>	.1	Submittals in accordance with Section 01 33 00.
	.2	Submit WHMIS MSDS - Material Safety Data Sheets.
	.3	Submit shop drawings in accordance with Section 01 33 00, CSA-A23.3 and CSA-A23.4, include following items:
	.1	Design calculations for items designed by manufacturer.
	.2	Details of non-prestressed members, reinforcement and their connections.
	.3	Camber.
	.4	Finishing schedules.

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| 1.6 SUBMITTALS
(Cont'd) | .3 (Cont'd) | .5 Methods of handling and erection. |
| | | .6 Openings, sleeves, inserts and related reinforcement. |
| | .4 | Each drawing submitted shall bear the stamp of a qualified professional engineer registered in the Province of Ontario. |
| | .5 | Submit 3 copies of detailed calculations and design drawings for typical precast elements and connections for review by Departmental Representative 2 weeks prior to manufacture. |
| | .6 | At least two (2) weeks prior to beginning work, submit to Department Representative product data of the following materials proposed for use: shear key grout, joint filler, and joint sealant. |
| | .7 | Submit samples in accordance with Section 01 33 00. |
| 1.7 QUALIFICATIONS | .1 | Fabricate and erect precast concrete elements by manufacturing plant certified in appropriate category B-I (Structural precast, non-prestressed) according to CAN/CSA A23.4-05 |
| | .2 | Precast concrete manufacturer to be certified in accordance with CSA's certification procedures for precast concrete plants prior to submitting bid and to specifically verify as part of tender that plant is currently certified in appropriate category, Structural. |
| | .3 | Only precast elements fabricated in such certified plants to be acceptable to Departmental Representative and plant certification to be maintained for duration of fabrication, erection until warranty expires. |
| | .4 | Welding companies certified to CSA-W47.1. |
| 1.8 DELIVERY,
STORAGE AND
HANDLING | .1 | Deliver, handle and store precast units according to manufacturer's instructions. |
| | .2 | Protect unit corners from contacting earth to prevent from staining. |

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| <u>1.9</u> | <u>WARRANTY</u> | .1 | Contractor warrants that precast elements will not spall or show visible evidence of cracking, except for normal hairline shrinkage cracks, in accordance with General Conditions "C", but for 12 months warranty period, which is extended to five (5) years. |
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PART 2 - PRODUCTS

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| <u>2.1</u> | <u>MATERIALS</u> | .1 | Cement, aggregates, water, admixtures: to CAN/CSA A23.1 and CAN3-A23.. | | |
| | | .2 | Supplementary cementing materials: with minimum 20% Type F fly ash replacement to ASTM C618, by mass of total cementitious materials to CAN/CSA-A3001. | | |
| | | .3 | Reinforcing steel: to CSA-G30.18. | | |
| | | .4 | Hardware and miscellaneous materials: to CSA-A23.1/A23.2. | | |
| | | .5 | Forms: to CSA-A23.4. | | |
| | | .6 | Anchors and supports: to CAN/CSA-G40.20/G40.21 Type 300 W galvanized after fabrication. | | |
| | | .7 | Welding materials: to CSA W48.1. | | |
| | | .8 | Welding electrodes: to CSA W48.1 and certified by Canadian Welding Bureau. | | |
| | | .9 | Galvanizing: hot dipped galvanizing with minimum zinc coating of 600 g/m ² to. ASTM A123/A123M. | | |
| | | .10 | Zinc-rich primer: to CAN/CGSB-1.181. | | |
| | | .11 | Bearing pads: neoprene, 60 durometer hardness to ASTM D2240, moulded to size or cut from moulded sheet. | | |
| | | .12 | Air entrainment admixtures: to ASTM C260. | | |
| | | .13 | Chemical admixtures: to ASTM C494.C494M-13. | | |
| | | .14 | Shims:plastic. | | |
| | | .15 | Premoulded joint fillers: <table> <tr> <td>.1</td> <td>ASTM D175-05 (2011) - Standard Specification for preformed Closed Cell</td> </tr> </table> | .1 | ASTM D175-05 (2011) - Standard Specification for preformed Closed Cell |
| .1 | ASTM D175-05 (2011) - Standard Specification for preformed Closed Cell | | | | |

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| 2.1 MATERIALS
(Cont'd) | .15 Premoulded joint fillers:(Cont'd)
.1 (Cont'd)
polyolefin Expansion Joint Fillers for
concrete Paving and Structural Construction. |
| | .16 Polyethylene foam: use as a bond breaker
between joint filler and sealer as shown on
drawings. |
| 2.2 MIXES | .1 Concrete:
.1 Alternative 1 - Performance Method for
specifying concrete: to meet Departmental
Representative performance criteria in
accordance with CSA-A23.1/A23.2.
.1 Provide concrete mix to meet
following hard state requirements:
.1 Durability and class of
exposure: C-1.
.2 Minimum compressive strength
at 28 days: 35 MPa.
.3 Intended application:. water
retaining structure deck
.4 Water-cement Ratio: 0.40.
.5 Air Content: 5-8% |
| | .2 Grout:
.1 Shrinkage compensating grout: to
CAN/CSA-S6 and Section 03 30 00. |
| 2.3 MANUFACTURED
UNITS | .1 Manufacture units in accordance with
CSA-A23.4.
.2 Mark each precast unit to correspond to
identification mark on shop drawings for
location with date cast on part.
.3 Provide hardware suitable for handling
elements.
.4 Galvanize steel embedments after fabrication
and touch up with zinc-rich primer after
welding.
.5 Provide hardware suitable for handling
elements. Anchors, lifting hooks, spacers and
other inserts or fittings required shall be as
recommended and design by manufacturer for a
complete and rigid installation.
.1 Lift hooks shall be adequately sized to
safely handle panels according to member
dimension and weight. |

2.4 FINISHES .1 Finish units to standard grade to CSA-A23.4.

2.5 SOURCE QUALITY CONTROL .1 Provide Departmental Representative with certified copies of quality control tests related to this project as specified in CSA-A23.4.

.2 Precast plants should keep complete records of supply source of concrete material, steel reinforcement, prestressing steel and provide to Departmental Representative for review upon request.

PART 3 - EXECUTION

3.1 HANDLING AND ERECTION .1 Precast components shall be delivered and handled in such a manner as to avoid warping.

.2 Holes and reglets shall be protected from forming of ice during freezing weather.

.3 Lifting devices shall be protected from rusting at all times.

.4 Units shall be set plumb and true with joints parallel and Uniform.

.5 Patch damaged, or chipped components as required.

3.2 ERECTION .1 Do precast concrete work in accordance with CSA-A23.4, and CAN/CSA-S6.

.2 Do welding in accordance with CSA-W59, for welding to steel structures and CSA-W186, for welding of reinforcement.

.3 Erect precast elements within allowable tolerances.

.4 Set elevations and alignment between units to within allowable tolerances before connecting units.

.5 Fasten precast units in place as indicated on drawings.

- 3.3 EMBEDDED STEEL PARTS AND INSERTS .1 Provide embedded steel parts and inserts as indicated on the drawings for:
- .1 Stoplog gain opening Cover frame.
 - .2 Anchor Pins.
- 3.4 INSTALLATION/ APPLICATION .1 Anchor bolts:
- .1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.
 - .2 Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from Department Representative.
 - .1 Formed holes: to manufacturer's recommendations and product specification.
 - .2 Drilled holes: to manufacturers' recommendations and product specification.
 - .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
 - .4 Set bolts and fill holes with shrinkage compensating grout.
- .2 Joint fillers:
- .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Department Representative. When more than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
 - .2 Locate and form construction and expansion joints as indicated. Install joint filler, bond breaker and sealer.
- .3 Joint Sealant:
- .1 Install to manufacturer's recommendations.
- 3.5 CLEANING .1 Use cleaning methods as reviewed by Departmental Representative before cleaning soiled precast concrete surfaces.

PART 1 - GENERAL

- 1.1 DESCRIPTION .1 This section specifies requirements for drilling anchor holes, and supply and installation of anchors, including pre-tensioning and grouting, as indicated by the drawings and the specification.
- .2 The work site lies in an area of Sherman Fall limestone bedrock of the Middle Trenton age.
- 1.2 SHOP DRAWINGS .1 Submit shop drawings in accordance with Section 01 33 00.
- 1.3 QUALIFICATIONS .1 The installation of the anchors Type C (rock anchors) is to be performed by a contractor with extensive experience in this type of work.
- .2 The Contractor is obligated to provide examples of relevant experience to the Department Representative, if requested. Proof of the crew experience providing the work may also be requested.
- 1.4 MEASUREMENT AND PAYMENT .1 The work of the anchor installation will be paid for under payment item included in the Unit Price Table:
- .1 Item No. 6 - "Type C Anchors " - per unit anchor installed.
- .2 The price for Type C anchors includes:
- .1 Drilling hole in bedrock; setting and stressing; supplying and placing all attached hardware; supplying and placing the anchor grout; and Proof testing of each anchor.
- .3 Housing and heating are included in the unit price for each anchor.
- .4 All other work, necessary for the completion of the work of this section, will not be measured separately for payment, but will be considered as incidental to the work of this section.
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| <u>1.5 SEQUENCE OF WORK</u> | .1 | Anchors Type C shall be installed, including pre-tensioning, after the excavation of the bedrock base to 500 mm depth, but before placement of new concrete slab foundation. |
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PART 2 - PRODUCTS

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| <u>2.1 MATERIALS-GENERAL</u> | .1 | Use materials approved by the Departmental Representative. |
| | .2 | Epoxy resin anchors shall not be considered equivalent for Type C anchors. Use only mechanical anchors. |
| | .3 | Supply anchors in one piece, continuous up to length indicated on drawings. |
| | .4 | Anchors to be complete with all accessory parts as specified by the manufacturer, and additional accessories indicated on the drawings or described in the specification. |
| | .5 | All steel components of the anchor to be hot dipped galvanized. |
| | .6 | Clean steel surfaces of all deleterious matter. Remove grease or oils thoroughly. Bars showing pitting will be rejected. |
| | .7 | Store bars straight, and protect threads. |
| | .8 | Deliver cementitious materials in clearly marked, sealed bags. |
| | .9 | Store materials in dry, heated enclosure maintained between 2 and 40 degrees C. |

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| <u>2.2 TYPE C ANCHORS</u> | .1 | Medium and weak rock anchor. |
| | .2 | Pre-tensionable mechanical expansion anchor and steel bar, continuously threaded. |
| | .3 | Type C head assembly - Long cone and shell with flange components. |
| | .4 | Steel plates to ASTM A36/A36M-12.
.1 plate size (millimetres) : 12 x 150 x 150. |
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- 2.2 TYPE C ANCHORS .5 Location, capacity, diameter and length:
(Cont'd)
- .1 Permanent anchoring of new Dam foundation slab; guaranteed ultimate tensile strength 320 kN; nominal diameter 25 mm; minimum 2000 mm long.
 - .6 Nuts to be hexagonal, heavy duty type conforming to ASTM A325M or the anchor bar manufacturer's recommendation.
 - .7 Acceptable product:
 - .1 Williams Spin-lock Mechanical Anchor B7S, yield stress 90 KSI, 25mm dia. with type C14 head assembly, or equivalent.
- 2.3 TYPE C ANCHOR .1 Proportion grout mix to comply with the
GROUT
- .1 Proportion grout mix to comply with the following requirements:
 - .1 28 day compressive strength: 35 MPa;
 - .2 Maximum water/cement ratio 0.4;
 - .3 Portland cement type GU;
 - .4 Do not use expanding or shrinkage compensating agents, unless otherwise approved by Department Representative.
 - .5 Use admixtures, including superplasticizers and anti-washout agents to assure workability and as required.
 - .6 winter grade formulas to be selected if work is to take place in winter months.
 - .7 Alternatively, a cable grout approved by the manufacturer of the anchors can be used.
 - .2 Acceptable Grout:
 - .1 MS Cable Grout, KPM (King Packaged Materials Company), 1-800-461-0566.
 - .2 SikaGrout Arctic 100, Low temperature substrate, pile and rock Bolt Grout. Sika Canada Inc. 601 Delmar Ave, Pointe-Claire, QC, 1-800-933-SIKA.
 - .3 Dayton Superior " Sure Grip" High performance grout. 1125 Byers Road, Miamisburg, OH 45342, 1-800-745-3700.
 - .4 Sealocrete PLA Ltd. "BoltGrout", winter grades, Greenfield Lane, Rochdale OL11 2LD.
 - .5 Or Equivalent as provided by the Contractor based on anchor manufacturer's recommendations.
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PART 3 - EXECUTION

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| <u>3.1 GENERAL</u> | .1 | Except as specified in this section, install to the manufacturer's recommendations. |
| | .2 | For all anchors: provide housing and heating for anchors and grouting and stressing equipment, when the temperature is under 5° Celsius. Maintain housing above 10° Celsius for 3 days after grouting. |
| | .3 | Minimum substrate temperature shall be maintained at 5° Celsius minimum, prior to grouting. |
| | .4 | The Contractor is to provide to the Department Representative a complete list of equipment which will be used for work, prior to starting any work. |
| <u>3.2 STRESSING EQUIPMENT</u> | .1 | Supply tensioning equipment specially adapted to the anchor system used. |
| | .2 | Design equipment to impose a controlled force gradually, inducing no dangerous secondary stresses in the bar, anchor head or supported structure. |
| | .3 | Tension anchor in one operation. |
| | .4 | Provide load cells which are robust and appropriately protected for site work; capable of accurate centering on the jack to ensure co-axiality with the bar. Provide calibration certificates. |
| | .5 | Calibrate load recording instruments with the actual tendon to be used on site. |
| | .6 | Provide calibration certificates for pressure gauges. Mount duplicate gauges adjacent to the jack, when the pump is more than 5 m from the jack. Provide gauge capacity within 80% to 160% of the bar strength; accuracy within 2% of actual tensioning force. |
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3.2 STRESSING
EQUIPMENT
(Cont'd)

- .7 Assemble stressing head and bearing plate concentrically with anchor bar within plus or minus 10 mm, and not more than 5 degrees from the bar axis.
- .8 Ensure that the free anchor length is ice free before stressing.
- .9 During stressing, take adequate precautions to protect personnel and property from injury and damage due to failure of the bar or the stressing equipment. Post notices stating "DANGER - Tensioning in Progress".

3.3 GROUT MIXING

- .1 Provide water free of deleterious materials.
- .2 Add water to mixer before cement.
- .3 Mix for 5 minutes minimum, with high speed mixer (1000 rpm minimum), or paddle mixer (150 rpm minimum).
- .4 Provide holding tank with paddle mixer.
- .5 Inject grout within initial setting time.

3.4 INSTALLATION

- .1 The Contractor shall provide to Departmental Representative all details describing method that will be used to install the anchors.
 - .2 Type C anchors:
 - .1 Type C anchors are prestressed.
 - .2 Drill holes, using manufacturer's recommended drill size, to extend 150 mm beyond the length of the rock bolt.
 - .3 Clean the hole thoroughly of dust and debris.
 - .4 Place nut, washer and plate on rock bolt, attach grout tube, and lower bolt into drill hole with thrust-ring and malleable shell cone set in position on the inner threaded portion of the bolt.
 - .5 Set the expansion anchor by torquing the rod to the torque required by the manufacturer's specifications.
 - .6 Place de-air tube at the highest point of the hole.
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- 3.4 INSTALLATION (Cont'd) .2 Type C anchors:(Cont'd)
- .7 Install extensions, couplings and accessory plates with keyhole and nuts as shown on the drawings.
- .8 Do proof test on each anchor, using a design load, $P = 160 \text{ kN}$. Test anchor as per Type C anchor proof test (sub-paragraph 3.6.1) and then lock off.
- .9 Grout with anchor grout through grout tube until a continuous flow of grout starts coming out of the de-air tube.
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- 3.5 GROUT TESTING .1 Test compressive strength of grout using 50 mm cube specimens in accordance with CAN/CSA-A23.2-6B (See A23.2-09).
- .2 Obtain samples for testing from each different batch of grout, from the grout tube.
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- 3.6 ROCK ANCHOR TESTING .1 Proof test:
- .1 Incremental load the anchor in accordance with the following schedule. Record movement at each increment to an accuracy of 0.025 mm with respect to an independent fixed reference point. Monitor jack load with a pressure gauge or load cell. $P = \text{design load}$.
- Proof Test
- 0.25 P
- 0.50 P
- 0.75 P
- 1.00 P
- 1.20 P
- .2 Acceptance Criteria: an anchor will be acceptable if:
- .1 The total elastic movement obtained from the performance test exceeds 80 % of the theoretical elastic elongation of the stressing length and is less than the theoretical elastic elongation of the stressing length plus 50 % of the bond length.
- .2 Lift-off tests show an anchor load within 10% of the specified lock-off load.
- .3 Reports: provide copies of all data to the Departmental Representative.
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3.7 MANUFACTURERS' SPECIFICATIONS	.1	Keep a manual of manufacturers' specifications and installation procedures at the work site.
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PART 1 - GENERAL

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| <u>1.1 DESCRIPTION</u> | .1 | This section specifies requirements for the supply, delivery and installation of miscellaneous steel components required including but not limited to embedded cast-in-place concrete components, anchors, fasteners, welds or other fixtures and hardware as indicated or specifically noted otherwise; as described by the drawings and specification; |
| | .2 | This Section does not attempt to specify all metal fabrication items that may be required for a project. Examine drawings, check sizes and specify all items. |
| | .3 | The work includes but is not necessarily limited to the supply and installation of: <ul style="list-style-type: none"> .1 Frames and cover for gain opening, .2 stop log winch assembly, .3 Anchorage and supports for safety signage and safety boom installation. .4 Chain link fence system components .5 Anchors and base plate assemblies for safety railings. |
| <u>1.2 MEASUREMENT FOR PAYMENT</u> | .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. |
| <u>1.3 REFERENCES</u> | .1 | ASTM International <ul style="list-style-type: none"> .1 ASTM A53/A53M-10, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless. .2 ASTM A123/A123M-12, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products. .3 ASTM A269-10, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service. .4 ASTM A307-12, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength. |

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| 1.3 REFERENCES | .1 | (Cont'd) |
| (Cont'd) | .5 | ASTM A780-09, Standard Practice for Repair of Damaged and uncoated Areas of Hot-Dip Galvanized Coatings. |
| | .6 | ASTM B221-13, 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. |
| | .2 | Canadian General Standards Board (CGSB) CGSB 1-GP-181M-99 Coating, Zinc-Rich, Organic, Ready Mixed. |
| | .3 | CSA International |
| | .1 | CSA G40.20-04(R2009)/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel. |
| | .2 | CSA S16-09, Design of Steel Structures. |
| | .3 | CSA W48-06(R2011), Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau). |
| | .4 | CSA W59-M03(R2008), Welded Steel Construction (Metal Arc Welding) Metric. |
| | .5 | CSA HA Series M1980, Standards for Aluminum and Aluminum Alloys. |
| | .4 | Health Canada / Workplace Hazardous Materials Information System (WHMIS) |
| | .1 | Material Safety Data Sheets (MSDS). |
| | .5 | The Master Painters Institute (MPI) |
| | .1 | Architectural Painting Specification Manual - current edition. |
| 1.4 ACTION AND INFORMATIONAL 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. |

1.4 ACTION AND
INFORMATIONAL
SUBMITTALS
(Cont'd)

- .3 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.

1.5 QUALITY
ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 DELIVERY,
STORAGE AND
HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations.
 - .2 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Steel sections and plates: to CSA G40.20/G40.21, Grade 350W, unless otherwise indicated.
 - .2 Steel pipe: to ASTM A53/A53M standard weight, black galvanized finish.
 - .3 Welding materials: to CSA W59.
 - .4 Welding electrodes: to CSA W48 Series.
-

2.1 MATERIALS
(Cont'd)

- .5 Bolts and anchor bolts: to ASTM A307.
- .6 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.
- .7 Frames for gain openings:
 - .1 Steel, galvanized finish, angle frame as per drawings.
 - .2 Frame depth shall match grating depth and allow flush installation.
 - .3 Fabricate frames from steel, sizes of channel and opening as indicated. Provide frames in time for embedment in Pre-Cast concrete.
 - .4 Weld channels together to form continuous frame, sizes as indicated.
 - .5 Supply gain covers in dimensions and lengths as indicated on the drawings.
- .8 Gratings for gain opening:
 - .1 Fabricate Bar gratings from extruded aluminum bars, rods and shapes complying to ASTM B221.
 - .2 Finish: Aluminum Mill Finish.
 - .3 Type: aluminum grating with serrated surface.
 - .1 Bearing bars: Rectangular shaped with anti-slip serrated top surface, spaced at 30mm.
 - .2 Cross bar: Square aluminum bars spaced at 102mm.
 - .3 Locked: Pressure, swaged or squeezed locked shall be permitted.
 - .4 Gratings shall be rated at a uniformly distributed load of 5kPa. Deflection shall not exceed 1/160 of the span under a concentrated load of 5kPa.
 - .5 Supply gain covers in dimensions and lengths as indicated on the drawings.
 - .6 Fastening hardware: Provided fasteners and attachments hardware of type, size, and spacing as recommended by the manufacturer for the substrate and project conditions and as required to secure attached gratings.
 - .7 Maximum approximate weight allowance below 18Kg/S.M . Refer to Contract drawings.
 - .8 Acceptable product or equivalent:
 - .1 Standard Fishlow Rectangular Bar Grating type 30, Fisher & Ludlow, 1-800-268-6277, www.fisheludlow.com
 - .2 Serrated surface 19AG4 aluminum pressure locked bar grating, Ametco manufacturing Corp. 1-800-321-7042, www.ametco.com

- 2.1 MATERIALS
(Cont'd)
- .8 Gratings for gain opening:(Cont'd)
.8 (Cont'd)
.3 Pressure Locked Grating aluminum,
Borden Gratings, 1-800-263-2013,
www.bordengratings.com.
- .9 Internally threaded Anchor sleeves/inserts(in
pre-cast concrete deck slabs): Steel,
zinc-plated (min. 5 micormeter),ASTM F568M
Grade 5.8 respectively unless specified
otherwise.
- 2.2 FABRICATION
- .1 Fabricate work square, true, straight and
accurate to required size, with joints closely
fitted and properly secured.
- .2 Where possible, fit and shop assemble work,
ready for erection.
- .3 Ensure exposed welds are continuous for
length of each joint. File or grind exposed
welds smooth and flush.
- 2.3 FINISHES
- .1 Galvanizing: hot dipped galvanizing with zinc
coating 600 g/m², Coating Grade 85, to ASTM
A123/A123M.
.1 Touch-Up Primer for Galvanized coating.
SPCC 20 Type I Inorganic zinc rich.
- .2 Zinc primer: zinc rich, ready mix to MPI-INT
EXT 5.2C in accordance with chemical component
limits and restrictions requirements and VOC
limits of CCD-047a CCD-048 GS-11.
- .3 Bolts are to be hot dipped galvanized to ASTM
A153/A153M, unless otherwise specified.
-

PART 3 - EXECUTION

- 3.1 EXAMINATION
- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.
- 3.2 ERECTION
- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
 - .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
 - .3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
 - .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
 - .5 Supply components for work by other trades in accordance with shop drawings and schedule.
 - .6 Make field connections with bolts to CSA S16 or Weld field connection.
 - .7 Deliver items over for casting into concrete with setting templates to appropriate location and construction personnel.
 - .8 Touch-up galvanized surfaces with zinc rich primer where damaged.
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3.3 GAIN COVERS .1 Install gain covers as indicated.

3.4 CHANNEL FRAMES .1 Install steel channel frames to openings as indicated for pre-cast slabs.

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

END

PART 1 - GENERAL

- 1.1 DESCRIPTION
- .1 This Specification covers requirements needed for the fabrication of handrails for the water retaining structure including posts, anchors, fasteners and other fixtures and hardware.
 - .2 The work of this Section includes but is not limited to:
 - .1 Fabrication and installation requirements of new galvanized steel HSS handrails as shown on Contract Drawings.
 - .2 Fabrication and installation of new base plate assemblies for steel handrail system complete with bolts, washers and other component fasteners as indicated on Contract Drawings.
 - .3 Surface coating, supply and installation of handrail, epoxy anchors, and all associated components.
 - .3 All other work, necessary to the completion of the work of this section, will not be measured, but will be considered as incidental to the work of this Section.
- 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 REFERENCES
- .1 ASTM International
 - .1 ASTM A53/A53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .3 ASTM A153/A153M-09a, Standard Specification for Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Hardware.
 - .4 ASTM A194 / A194M - 11 Standard Specification for Carbon and Alloy Steel Nuts for Bolts

1.3 REFERENCES (Cont'd)

- .1 (Cont'd)
 - .5 ASTM E935-00(2006), Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
 - .6 ASTM A325M-09, Standard Specification for Structural Bolts,
 - .7 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .8 ASTM A501-07, Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
 - .9 ASTM A501-07, Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- .2 CSA International
 - .1 CAN/CSA-G40.20-G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels..
 - .2 CAN/CSA-S16-09. Limit States Design of Steel Structures.
 - .3 CAN/CSA-S136-07, Cold Formed Steel Structural Members.
 - .4 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
 - .5 CSA W48-06 (R2011) Filler Metals and Allied Materials for Metal Arc Welding.
 - .6 CSA W55.3-08, Certification of companies for resistance welding of steel and aluminum
 - .7 CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding) Metric Version.
 - .8 CAN/CSA - B651-04 (R2010), Accessible Design for the Built Environment.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181.99, Ready Mixed Organic Zinc Rich Coating.
- .4 Health Canada/ Workplace Hazardous Materials Information System (WHMIS)
 - .1 Materials Safety Data Sheets (MSDS)

1.4 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.
 - .1 Submit complete shop drawings showing all field measurements, details of the fabrication, core thickness,

<u>1.4 SUBMITTALS</u> (Cont'd)	.2 Shop Drawings:(Cont'd)
	.1 (Cont'd)

finishes, connections, joints, method of anchoring, number of anchors, supports, installation details including accessories and a materials list.

.2 Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

<u>1.5 SAMPLES</u>	.1 Submit 2 - 300mm long samples of each finish.
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<u>1.6 QUALITY ASSURANCE</u>	.1 Perform all welding to CSA W59.
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<u>1.7 DELIVERY, STORAGE AND HANDLING</u>	.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 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: New handrail system: Structural steel railing and posts and plates, to CAN/CSA-G40.20/G40.21, Grade 350W. Note that for all angles, Grade 300W as detailed on contract drawings.
 - .2 Mounting: adjustable brackets and flanges, with steel plates for mounting to steel members and concrete.
 - .3 Anchor bolts (to concrete): Bolts are to be hot dipped galvanized to ASTM A153/A153M, unless otherwise specified complete with epoxy adhesive. Polyester resins 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.
 - .6 Galvanizing: to ASTM A123/A123M, provide minimum grade 85 zinc coating of 600 g/sqm galvanized coating.
 - .1 Galvanized finished surfaces to have a uniform appearance with no protuberance and blemishes.
 - .2 Touch-Up Primer for Galvanized Surfaces: SPCC 20 Type I Inorganic zinc rich.
- 2.2 FABRICATION
- .1 Fabricate handrails in accordance with CAN/CSA-S16 and in accordance with reviewed Shop Drawings. Provide sleeves to accommodate site assembly and installation.
 - .2 Fit and shop assemble components in largest practical sizes for delivery to site.
 - .3 Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
 - .4 Form all changes in rail direction by mitered or uniform radius bend within tolerance of tubing/HSS size. Fit joints in true planes and securely fasten weld to CSA W59-03. File or

2.2 FABRICATION
(Cont'd)

- .4 (Cont'd)
grind welds smooth and flush with adjoining surfaces.
- .5 Provide anchors bolts, plates, angles required for connecting railings to structure.
- .6 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .7 Verify dimensions and handrail layout on site prior to shop fabrication.
- .8 Ensure exposed welds are continuous for full length of each joint.
- .9 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 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 building structure.
 - .5 Accommodate for expansion and contraction of members and structure movement without damage to connections or members.
- .10 Thread lock adhesive: general purpose for threaded fasteners requiring disassembly with standard hand tools, one component acrylic, medium strength, dimethacrylate ester adhesive for fasteners subjected to medium shock/vibration loads/medium levels of stress.
 - .1 Breakaway torque: 20 N.m to ISO 10964.
 - .2 Prevail torque: 7 N.m to ISO 10964.
 - .3 Breakloose torque: 24 N.m to DIN 54454.

- 2.2 FABRICATION
(Cont'd)
- .10 Thread lock adhesive:(Cont'd)
- .4 Maximum prevail torque: 24 N.m to DIN 54454.
- .5 Acceptable material: "Loctite 243" manufactured by Loctite Corporation, www.loctite.us, distributed by Trane Parts Centre 416-499-1616.
- .11 Prior to installation, ensure that all burrs or other "sharp" irregularities due to the fabrication or galvanizing process are removed from 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.
- .4 Report any discrepancy to Departmental Representative for direction before commencing fabrication. Only proceed with installation after remediation of site discrepancies and receipt of written approval from Departmental Representative.

- 3.2 PREPARATION
- .1 Supply items required to be cast into concrete with setting templates, to appropriate locations.
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- 3.3 INSTALLATION
- .1 Install picket type handrails in accordance with Contract drawings and manufacturer's instructions.
 - .2 Install components plumb and level.
 - .1 On inclined surfaces, posts and pickets are to be vertical
 - .3 Anchor railing to structure with anchors bolts at concrete members including all plates and angles.
 - .4 Field weld anchors as indicated:
 - .1 Grind welds smooth.
 - .2 Touch-up welds with primer for galvanized surfaces with inorganic zinc rich primer.
 - .5 Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
 - .6 Assemble with spigots and sleeves to accommodate tight inconspicuous joints and secure installation.
 - .7 Supply and install galvanized steel handrails, in accordance with CAN/CSA-S16 and reviewed drawings. If using galvanized steel and stainless steel anchor components for securing hand railings to base plate assemblies, use rubber/plastic sleeves, washers or protective coatings to prevent anode-cathode reactions between the two metals.
 - .8 Drill, clean and install base plates sleeves and anchor bolts with epoxy injection adhesive anchoring systems approved by Departmental Representative in accordance to manufacturer's recommendations.
 - .9 Align posts so that the maximum deviation of any post from a straight line drawn between end posts is less than 4 mm.
 - .10 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.
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| <u>3.4 ERECTION
TOLERANCES</u> | .1 | Maximum Variation From Plumb: 6 mm. |
| | .2 | Maximum Out-of-Position: 6 mm within 3.6m. |
| <u>3.5 TOUCH UP</u> | .1 | Touch up scratched surfaces of handrail system or other galvanized components with cold galvanizing repair compound using approved methods recommended by manufacturer.
.1 Acceptable product: Galvafroid or Equivalent. |
| <u>3.6 PROTECTION</u> | .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 the fabrication, supply and installation of timber stop logs. The work includes but is not limited to:
- .1 Supply of three (3) new timber beams stop logs,
 - .2 Fabrication, assembly, and hardware of stop logs as per Contract drawings,
 - .3 Delivery to site,
 - .4 Supplying necessary equipment for installation and removal of the new stop logs during construction.
- 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 REFERENCES .1 ASTM International
- .1 ASTM A153/A153M-09a, Standard Specification for Zinc (Hot-Dip Galvanized)Coating on Iron and Steel Hardware.
- .2 CSA International
- .1 CSA B111-74(R2003), Wire Nails, Spikes and Staples.
 - .2 CAN/CSA O80 Series-08, Wood Preservation.
 - .3 CSA O86-09, Engineering Design in Wood.
- .3 Forest Stewardship Council (FSC)
- .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
 - .2 FSC-STD-20-002-2004, Structure and Content of Forest Stewardship Standards V2-1.
 - .3 FSC Accredited Certified Bodies.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).
- .5 National Lumber Grades Authority (NLGA)
- .1 NLGA Standard Grading Rules for Canadian Lumber 2003 and 2008.
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| <u>1.3 REFERENCES</u>
(Cont'd) | .6 | West Coast Lumber Inspection Bureau (WCLIB 2004) |
| | .7 | Western Wood Product Association (WWPA 2005) |
| <u>1.4 ACTION AND INFORMATIONAL SUBMITTALS</u> | .1 | Submit in accordance with Section 01 33 00. |
| | .2 | Certifications: submit certificates signed by manufacturer/supplier certifying materials comply with specified performance characteristics and physical properties. |
| <u>1.5 QUALITY ASSURANCE</u> | .1 | Lumber identification: all lumber supplied is to be stamped showing the grade, species and grading agency, by agency certified by Canadian Lumber Standards Accreditation Board or equivalent American organization. |
| | .2 | Each piece of treated lumber to be identified by CSA 0322 certified stamp. |
| <u>1.6 SAMPLES</u> | .1 | Submit samples in accordance with Section 01 33 00. |
| | .2 | Prepare sample of typical stoplog machined end and U bolt installation for approval of Departmental Representative. |
| <u>1.7 DELIVERY, STORAGE AND HANDLING</u> | .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. |
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PART 2 - PRODUCTS

- 2.1 MATERIALS .1 Stoplog timbers: Select Structural grade Douglas Fir, 305 x 305 x 4764m long, rough lumber, full sawn, with lifting "U" bolts installation as detailed. Stoplogs ARE NOT to be treated. Three (3) stop logs required. Timber grading to be in accordance with:
- .1 For timber organization from Canada:
 - .1 NLGA (2003), Standard Grading Rules for Canadian Lumber, Section 5, paragraph 130 and 130a, all to rough lumber, full sawn, and paragraph 711, rough with no wane.
 - .2 For timber organization from the United States:
 - .1 WCLIB (2004), rule #17 Section 5, Paragraph 130 and 130a, all rough lumber, full sawn Section 9, paragraph 250 and 250a, and.or;
 - .2 WWPA 2005, Section 10, Paragraphs 70.00 and 70.10, all to rough lumber, full-sawn Paragraph 3.20.
- .2 Fasteners and U bolts: to ASTM 307, hot dipped galvanized finish, sizes as indicated.

PART 3 - EXECUTION

- 3.1 EXAMINATION .1 Verification of Conditions: verify conditions of structural concrete surfaces to support stop log installation.
- .1 Visually inspect new gains and sill 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.

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|---------------------------|----|--|
| 3.2 FABRICATION | .1 | Comply with the requirements of the following paragraphs: |
| 3.3 STOP LOGS | .1 | Timber beams to be manufactured to the dimensions shown and with lifting components as shown in the Contract Drawings. |
| | .2 | Machine stop log ends and install galvanized U-bolts as detailed. |
| | .1 | Lifting bolt shall not be more than 2mm less in nominal height than the timber beam. |
| | .2 | Lifting bolt shall not extend beyond the plane of the top or bottom of the timber beam when installation is complete. |
| | .3 | Align and plumb faces of lifting bolt with the end of the timber at the distance specified in contract drawings. |
| | .4 | Lifting bolt to be installed centered in the timber beam at the required distance from the finished end of the stop log. Once placed into timber, the lifting bolt fasteners to be tightened a single half-turn after hand-tightening. |
| | .5 | Both ends of the timber beam and the portion of the timber beam altered for placement of the lifting bolt components to be painted or wax coated prior to lifting bolt installation to prevent checking. |
| 3.4 FIELD QUALITY CONTROL | .1 | Testing: |
| | .1 | Testing moisture content of delivered material will be performed by testing laboratory designated by Departmental Representative. |
| | .2 | Departmental Representative will pay for costs of testing. |
| | .3 | Testing moisture content of delivered material will be by testing laboratory designated by Departmental Representative by moisture meter with adjustments for species and temperature. |
| 3.5 DELIVERY | .1 | All Timber to be enclosed with a waterproof covering while in transport. Contractor is responsible to supply waterproof covering for timber bundles once on site or consigned storage facility. |
| | .2 | ALL items shall have or exceed minimum moisture content of 30% at the time of delivery. |

- 3.5 DELIVERY
(Cont'd)
- .3 All stop logs will be inspected by Departmental Representative and must meet or exceed the specified grade and conditions of the contract. Any additional costs resulting from material deemed unacceptable by Departmental Representative will be borne solely by the contractor.
- 3.6 PROTECTION
- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by wood decking installation.

END

PART 1 - GENERAL

<u>1.1 DESCRIPTION</u>	.1	This section specifies requirements for the permanent safety signage around the Thompson's Bay Dam for public safety and navigation.
<u>1.2 MEASUREMENT AND PAYMENT PROCEDURES</u>	.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.
<u>1.3 REFERENCES</u>	.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-07, 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 A276-13, Standard Specification for Stainless Steel Bars and Shapes. .5 ASTM D2244-14, Standard Practice for Calculation of Color Tolerances and Color Differences from Instrument Measured Color Coordinates. .6 ASTM D4214-07, Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paints Films.
	.3	Canadian General Standards Board (CGSB) .1 CGSB 62-GP-9M-80, Prefabricated Markings, Positionable, Exterior, for Aircraft Ground Equipment and Facilities. .2 CGSB 62-GP-11M-78, Marking Material, Retroreflective, Enclosed Lens, Adhesive Backing and Amendment.
	.4	CSA International .1 CAN/CSA-G40.20-04(R2009)/G40.21-04(R2009), General Requirements for Rolled or Welded

- 1.3 REFERENCES (Cont'd)
- .4 (Cont'd)
 - .1 (Cont'd)
Structural Quality Steel/Structural Quality Steel.
 - .5 Green Seal Environmental Standards (GSES)
 - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
 - .6 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
- 1.4 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, including product characteristics, performance criteria, physical size, finish and limitations.
 - .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .2 Indicate items as follows:
 - .1 Sign supporting structures
 - .1 Foundation.
 - .2 Supporting Frame.
 - .2 Mounting requirements.
- 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.
 - .2 Replace defective or damaged materials with new.
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PART 2 - PRODUCTS

- 2.1 DESIGN CRITERIA .1 Sign supports to be capable of withstanding the combination of following loads:
- .1 Wind loads in any direction of 1.5 kPa on signboards and on sign supports.
 - .2 Dead load of signboards and sign supports.
 - .3 Ice load of 0.44 kPa on face of signboards and around surface of structural members.
- 2.2 MATERIALS .1 Sign supports:
- .1 Steel posts: to CAN/CSA-G40.20/G40.21, Grade 350W, flanged "U" shaped in cross section, minimum measuring 65 mm wide x 30 mm deep. Minimum metal thickness: 4.5 mm. Hot dipped galvanized: to ASTM A123/A123M, minimum zinc coating 500 g/m².
 - .2 Standard tubular supports for small signs: to ASTM B210M.
 - .3 Vertical tubular supports and connecting diagonal members: to ASTM B210M.
 - .4 Base plates for ground mounted signs: to ASTM B209M. Base plates for overhead supports: to ASTM B209M.
 - .5 Anchor and connecting bolts, 'U' clamps and miscellaneous hardware for safety sign installations: fabricate from 304 stainless steel as specified in ASTM A276 and ASTM F1554-A36.
 - .6 Fasteners: bolts, nuts, washers and other hardware for roadside signs to be cast aluminum alloy, or galvanized steel.
- .2 Signboards:
- .1 Refer to Contract Drawings.
 - .2 All signs are to be precut to required dimensions. All panels to be supplied with all mounted hardware as required for proper assembly and installation.
 - .3 T-shape stiffeners for signboards: to ASTM B210M.
 - .4 Connecting straps and brackets: to ASTM B209M.
 - .5 Aluminum materials: to ASTM B209M.
 - .6 Chemical conversion coating for aluminum:.
 - .7 Primer for aluminum: to MPI #8 , VOC limit of 250 g/L to GSES GS-11.
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- 2.2 MATERIALS .3 Retro-reflective sheeting: to ASTM D4956,
(Cont'd) Standard Specification for Retroreflective
Sheeting for Traffic Control.
.1 all adhesive sheeting shall be cut using
a computer controlled cutting system.
- 2.3 FABRICATION .1 Supports:
.1 Connect aluminum support members by
welding in accordance with CSA W47.2. Work to
be performed by Canadian Welding Bureau
qualified members only. Flame cutting of
members not permitted.
.2 Welds to be of same strength as adjacent
member or casting.
.3 Remove sharp edges and burrs.
- .2 Signboards:
.1 Aluminum blanks:
.1 Degrease, etch and bonderize with
chemical conversion coating.
.2 Clean surfaces with multi-stage
cleaning system which is compatible and
approved by pre-treatment manufacture
.3 No holes must be made in sign
faces. Holes for mounting are to be drill
on site and not to interfere with sign
graphics.
.4 For non-reflective signs, spray
face with one coat vinyl pretreatment
coating and two finish coats of required
colour.
.5 For aluminum signboards that are to
be painted before installation, spray and
bake face of signboards with two coats of
enamel in accordance with MPI-EXT 5.4A.
- .2 Reflective background sheeting and
lettering:
.1 Cut and apply in accordance with
manufacturer's instructions.
.2 Apply adhesive coated material with
heat lamp vacuum applicator or by squeeze
roll application method. Apply pressure
sensitive material with roller or
squeegee.
.3 Edge wrap sheeting on each
extrusion prior to bolting extrusions.
Match pieces of sheeting from different
rolls for each signboard to ensure
uniform appearance and brilliance by day
and night.
.4 Reflective signboard faces may be
prepared using silk screen transparent
ink.
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- 2.3 FABRICATION (Cont'd)
- .2 Signboards:(Cont'd)
- .3 Non-reflective lettering and symbols:
cut from vinyl film as specified in CGSB 62-GP-9M, or paint using required colour of finish paint maximum VOC of 350 250 g/L to SCAQMD Rule 1113 GS-11 or silk screen transparent ink.
- .4 Clean signboards completely and apply transparent tape over top edge and extending 25 mm minimum down back and front of signboard.
- .5 Protect finished signboard faces with one coat of clear varnish with maximum VOC limit of 350 g/L to SCAQMD Rule 1113.
- .3 Sign identification:
- .1 Apply sign number and date of installation with 25 mm high stencil painted black letters on lower left back face of each signboard.

PART 3 - EXECUTION

- 3.1 INSTALLATION
- .1 Sign support:
- .1 Erect supports as indicated. Permissible tolerance: 50 mm maximum departure from vertical for direct buried supports. Where separate concrete footings have been placed, erect posts with base plates resting on levelling nuts and restrained with nuts and washers. Permissible tolerance: 12 mm maximum departure from vertical.
- .2 Coat underside of base plate with corrosion protective paint before installation. Connect shoe base to shaft with inside and outside fillet welds.
- .3 Erect posts plumb and square to details as indicated and to requirements of sign manufacturer.
- .4 Single channel steel posts:
- .1 Drill hole in rock to required depth and set post in concrete or epoxy grout.
- .2 Protect from adverse conditions until cured.
- .2 Signboard:
- .1 Fasten signboards to supporting posts and brackets as indicated on Contract approved Shop drawings.
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- 3.1 INSTALLATION (Cont'd)
- .2 Signboard:(Cont'd)
- .2 Use strapping with crimped or bolted connections where signs fastened to utility poles and hand rail assembly.
- .3 Use T-shape aluminum stiffeners to join portions of sign panel on site. Cover face of T-stiffener with material identical to face of sign panel.
- 3.2 CORRECTING DEFECTS
- .1 Correct defects, identified by Departmental Representative, in sign message, consistency of reflectivity or color. Correct angle of signboard and adjust aiming angle for optimum visibility and to approval of Departmental Representative.
- 3.3 PROTECTION
- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by traffic signage installation and salvage operations.

END

PART 1 - GENERAL

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| <u>1.1 RELATED SECTIONS</u> | .1 | Section 01 33 00 - Submittal Procedures |
| | .2 | Section 01 35 43 - Environmental Procedures |
| | .3 | Section 01 45 00 - Quality Control |
| | .4 | Section 32 11 16.01 - Granular Sub-Base |
| | .5 | Section 32 11 23 - Aggregate Base Course |
| <u>1.2 REFERENCES</u> | .1 | American Society for Testing and Materials (ASTM)
.1 ASTM D4791-05e1, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate. |
| | .2 | Ontario Provincial Standard Specifications (OPSS)
.1 OPSS 1001 - Aggregate General (November 2013) |
| <u>1.3 SAMPLES</u> | .1 | Submit samples in accordance with Section 01 33 00. |
| <u>1.4 WASTE MANAGEMENT AND DISPOSAL</u> | .1 | Divert unused granular materials from landfill to local facility as approved by Departmental Representative. |

PART 2 - PRODUCTS

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| <u>2.1 MATERIALS</u> | .1 | Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended. |
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| 2.1 MATERIALS
(Cont'd) | .2 | Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
.1 Crushed rock.
.2 Gravel and crushed gravel composed of naturally formed particles of stone.
.3 Light weight aggregate, including slag and expanded shale.
.4 No reclaimed asphalt pavement or reclaimed concrete materials shall be supplied. |
| 2.2 SOURCE QUALITY
CONTROL | .1 | Inform Departmental Representative of proposed source of aggregates and provide access for sampling at least four (4) weeks prior to commencing production. |
| | .2 | At the request of the Departmental Representative submit test results, demonstrating conformance of material with the requirement of the appropriate section of these specifications. |
| | .3 | Advise Departmental Representative four (4) weeks in advance of proposed change of material source. |

PART 3 - EXECUTION

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| 3.1 PREPARATION | .1 | Aggregate source:
.1 Aggregate material is to be supplied from a Ontario Ministry of Transportation approved source or alternative approved by Departmental Representative.
.2 If requested by the Departmental Representative, submit MTO approval certificates/documentation of the proposed source of aggregates.
.3 Processing
.1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
.2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by Departmental Representative. |
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- 3.1 PREPARATION .1 (Cont'd)
- (Cont'd) .3 (Cont'd)
- .3 Wash aggregates, to meet specifications.
- .4 Handling and stockpiling.
- .1 Undertake handling and stockpiling to the requirements of OPSS 1001.
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- 3.2 CLEANING .1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .1 Stockpile height not to exceed 2.5m.
- .2 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative.

END

PART 1 - GENERAL

- 1.1 DESCRIPTION
- .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 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 Inspection Assessment (DEIA) report for species at risk interactions. Report to be provide by Departmental Representative with Contract documents.
- 1.2 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.
- 1.3 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 2011.
- .2 OPSS 805 Temporary Erosion and Sediment Control Measures, November 2010.
- .2 Erosion & Sediment Control Guideline for Urban Construction, December 2006.
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1.4 DEFINITIONS

- .1 "Clearing" consists of cutting off trees and brush vegetative 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.

1.5 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00.
 - .2 Samples:
 - .1 Submit 3 samples of each material listed below for approval prior to delivery of materials to project site.
 - .2 Tree wound paint: one liter can with manufacturer's label.
 - .3 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .4 Submit manufacturer's installation instructions.
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- 1.6 QUALITY ASSURANCE
- .1 Perform construction occupational health and safety in accordance with Section 01 35 29.06.
 - .2 Safety Requirements: worker protection.
 - .1 Workers must wear gloves, dust masks long sleeved clothing, eye protection, protective clothing.

- 1.7 STORAGE AND PROTECTION
- .1 Prevent damage to trees, landscaping, existing earth embankment, 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 Stockpile adjacent to site in a location as directed by the Departmental Representative.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Herbicide: 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 reused.
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PART 3 - EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, that complies with EPA 833-R-06-004 or requirements of authorities having jurisdiction, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls only after the completion of the work and restore and stabilize areas disturbed during removal.

3.2 PREPARATION

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

3.3 CLEARING

- .1 Clearing includes felling, trimming, and cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal, including existing downed timber, snags, brush, and rubbish occurring within cleared areas.
 - .1 Work includes clearing old rubbish, stockpiled timber branches, remnant beaver dam debris from past PCA removal efforts on downstream, north side of the earth embankment.
-

3.3 CLEARING (Cont'd)

- .1 (Cont'd)
- .2 Contractor to provide adequate Health and Safety Personal Protective Equipment during removals to minimize potential contamination from wildlife activities.
- .2 Clear as directed by Departmental Representative, by cutting at a height of not more than 300 mm above ground. In areas to be subsequently grubbed, height of stumps left from clearing operations to be not more than 1000 mm above ground surface.
- .3 Cut off branches and cut down trees overhanging area cleared as directed by Departmental Representative.
- .4 Cut off unsound branches by a qualified arborist, on trees designated to remain as directed by Departmental Representative.
- .5 Remove vegetation from targeted areas by non-chemical means and dispose of stripped vegetation at location approved by Departmental Representative.
- .6 Remove brush from targeted area by non-chemical means and dispose at a location approved by Departmental Representative.

3.4 CLOSE CUT CLEARING

- .1 Close cut clearing to ground level.
- .2 Cut off branches by a qualified arborist overhanging area cleared as directed by Departmental Representative.
- .3 Cut off unsound branches by qualified arborist on trees designated to remain as directed by Departmental Representative.

3.5 ISOLATED TREES

- .1 Cut off isolated trees as indicated by Departmental Representative at height of not more than 100 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
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| 3.5 ISOLATED TREES
(Cont'd) | .4 | (Cont'd)
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 4 cm in diameter with
approved tree wound paint. |
| 3.6 UNDERBRUSH
CLEARING | .1 | Clear underbrush from areas as indicated at
ground level. |
| 3.7 GRUBBING | .1 | Remove and dispose of roots larger than 7.5
cm in diameter, matted roots, and designated
stumps from indicated grubbing areas. |
| | .2 | Grub out stumps and roots to not less than
200 mm below ground surface. |
| | .3 | Fill depressions made by grubbing with
suitable material as per existing native
backfill and to make new surface conform with
existing adjacent surface and grades. |
| 3.8 REMOVAL AND
DISPOSAL | .1 | Provide Department Representative with
certificate of licensed waste receiving
station for approval of receiving site.
Alternate non-licensed locations may be
considered subject to the contractor having a
formal agreement with the related party. |
| | .2 | Remove cleared and grubbed materials off site
to disposal area as approved by Departmental
Representative. |
| | .3 | Cut timber greater than 150 mm diameter to
2400mm lengths, and stockpile outside the
active work area as directed by the
Departmental Representative. Stockpiled timber
becomes property of Contractor and/or property
owner. |
| | .4 | Burning and burial of cleared and grubbed
materials are not allowed. |
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3.9 FINISHED SURFACE	.1	Leave ground surface in condition suitable for immediate grading operations to approval of Departmental Representative.
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PART 1 - GENERAL

- 1.1 DESCRIPTION
- .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, removal and disposal of watercourse sediment and debris from the upstream side of the stoplogs, including waste and build up from past wildlife (beaver) activities to allow for rock excavation and new construction of concrete water retaining structure.
 - .2 Excavation and removal of bedrock up to a depth of 500mm (Neat Line) as indicated on the Contract Drawings, including scaling and removal of loose rock from bedrock horizontal planes.
 - .1 Saw-Cuts to a minimum depth of 75mm required as shown on the Contract Drawings.
 - .2 Preparation of all surfaces against which new concrete will be cast.
 - .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 MEASUREMENT PROCEDURES
- .1 Measurement Procedures: in accordance with Section 01 22 01.
 - .2 Payment for these items shall be included in the Unit Price Table:
 - .1 Item No. 8 - Rock Excavation: This item covers the work described in subsection 1.1.2.2.
 - .2 Item No. 9 - Common Excavation: This item covers the work described in subsection 1.1.2.1.
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1.2 MEASUREMENT
PROCEDURES
(Cont'd)

- .2 (Cont'd)
- .3 Item No. 10 - Backfilling: This item covers the work described in subsection 1.1.2.3.
- .3 Rock quantities measured will be actual volume removed within following limits:
 - .1 Depth from rock surface elevations immediately prior to excavation, to bottom elevation as indicated.
- .4 Saw-cuts: as required for Rock excavation. This item is to be included in the price of Rock Excavation.
- .5 No payment will be made for rock excavation beyond the limits shown on the drawings, which has not been authorized by the Departmental Representative; any overbreak beyond these limits shall be replaced by concrete at the Contractor's expense.
- .6 Include in the price of rock excavation the cost of rock crushing and associated work, for reuse, recycling and disposal off site.
- .7 Include in the price of the rock excavation, the preparation of all surfaces which are to accept new concrete.

1.3 RELATED
SECTIONS

- .1 Section 32 11 16 - Granular Materials.
- .2 Section 32 15 40 Crushed Stone Surface.

1.4 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
 - .1 Rock : solid material masses of igneous, sedimentary or metamorphic rock which cannot be removed or ripped by means of heavy duty mechanical excavating equipment to be considered integral with parent mass. Concrete and frozen material are not classified as rock.
 - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation or stripping.

- 1.4 DEFINITIONS
(Cont'd)
- .2 Backfilling:
.1 Supplying, placing, grading and compacting granular material (Granular A, Granular B, native fill, rip-rap).
.2 Backfilling includes filling.
.3 Supplying and placing filter fabric system as indicated.
- .3 Topsoil:
.1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
.2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.
- .4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- 1.5 REQUIREMENTS
OF REGULATORY
AGENCIES
- .1 Adhere to municipal and provincial requirements relating to safety of excavations and protection of workers.
- 1.6 SUBMITTALS
- .1 Make submittals in accordance with Section 01 33 00.
- .2 Submit to Departmental Representative written notice at least five (5) days prior to excavation work, to ensure cross sections are taken.
- .3 Submit to Departmental Representative written notice when bottom of excavation is reached.
- .4 Preconstruction Submittals:
.1 Submit construction proposed excavation method and equipment list to be used in this section prior to start of Work.
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| <u>1.7 QUALITY
ASSURANCE</u> | .1 | Health and Safety Requirements:
.1 Do construction occupational health and
safety in accordance with Section 01 35 29. |
| <u>1.8 WASTE
MANAGEMENT AND
DISPOSAL</u> | .1 | Separate waste materials for reuse and
recycling in accordance with Section 01 74 20. |
| <u>1.9 EXISTING
CONDITIONS</u> | .1 | Examine geotechnical report for concrete and
bedrock condition assessment available upon
request to Departmental Representative. |
| | .2 | Buried services:
.1 Before commencing work verify location
of buried services on and adjacent to site.
.2 Prior to commencing excavation work,
notify Departmental Representative or
authorities having jurisdiction, establish
location and state of use of buried utilities
and structures. Departmental Representative or
authorities having jurisdiction to clearly
mark such locations to prevent disturbance
during work.
.3 Confirm locations of buried utilities by
careful test excavations.
.4 Maintain and protect from damage, water,
sewer, gas, electric, telephone and other
utilities and structures encountered.
.5 Where utility lines or structures exist
in area of excavation, obtain direction of
Departmental Representative before re-routing
or removing them. Costs for such Work to be
paid as an extra to the contract.
.6 Record location of maintained, re-routed
and abandoned underground lines. |
| <u>1.10 BLASTING</u> | .1 | Blasting is not permitted. |
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PART 2 - PRODUCTS

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| <u>2.1 MATERIALS</u> | .1 | 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. |
| | .2 | Native fill: clean fill graded from earth embankment slope adjacent to structure to be replaced. |
| | .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 | Geotextiles: to Section 31 32 19.01. |
| | .5 | Rip-rap: to Section 31 37 10. |

PART 3 - EXECUTION

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| <u>3.1 TEMPORARY
EROSION AND
SEDIMENTATION
CONTROL</u> | .1 | Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, that complies with 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. |
| <u>3.2 SITE
PREPARATION</u> | .1 | Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated. |

3.3 ROCK EXCAVATION

- .1 Excavate to lines, grades, elevations and dimensions as indicated and approved by Departmental Representative.
- .2 Remove existing bedrock to minimum depths indicated on the drawings or as directed by the Departmental Representative. Excavation exceeding the limits indicated on the drawings will only be paid if authorized by the Departmental Representative in writing.
 - .1 Take special care not to damage the layer of bedrock beyond depth of excavation by using appropriate machinery and effort for the work.
- .3 Correct unauthorized over-excavation as follows:
 - .1 Fill under bearing surfaces and footings: at bedrock, with concrete specified for footings.
- .4 Notify Departmental Representative when the planned bottom of excavation is reached.
- .5 Obtain Departmental Representative approval of completed excavation.

3.4 PREPARATION/ PROTECTION

- .1 Protect existing features in accordance with 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.
- .4 Protect buried services that are required to remain undisturbed.

3.5 PREPARATION OF ROCK SURFACES

- .1 Use a stiff broom to remove loose rock.
- .2 water jet to clean the surfaces after the excavation has been completed.
- .3 Keep the surfaces clean until new concrete is cast.
- .4 Do not exceed 1200 kPa water jet pressure.

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| 3.5 PREPARATION OF
ROCK SURFACES
(Cont'd) | .5 | Do not discharge the water from cleaning directly to the water course. Direct the water to a settling pond, or filter before releasing to the water course. See Section 01 35 43. |
| 3.6 COMMON
EXCAVATION | .1 | Excavate materials to lines, elevations and dimensions indicated or directed by Departmental Representative. |
| 3.7 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.. |

END

PART 1 - GENERAL

- 1.1 DESCRIPTION .1 This Section specifies the materials and installation of polymeric geotextiles used in revetments, retaining wall structures, erosion protection, and filtration for permanent structures, purpose of which are:
- .1 Separate and prevent mixing of granular materials of different grading and type for site access.
 - .2 Act as hydraulic filters permitting passage of water while retaining underlying soil structure.
 - .3 Act as temporary control measures for sediment and erosion control.
- 1.2 RELATED SECTIONS .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Section 31 37 10 - Rip-Rap.
- 1.3 MEASUREMENT FOR PAYMENT .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 D3786M-09, Standard Test Method for Bursting Strength of Textile Fabrics.
 - .2 ASTM D4355-07, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat.
 - .3 ASTM D4533-11, Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
 - .4 ASTM D4491-99a(2009), Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - .5 ASTM D4632-08, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 - .6 ASTM D4751-04, Standard Test Method for Determining Apparent Opening Size of Geotextile.
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- 1.4 REFERENCES (Cont'd)
- .1 (Cont'd)
 - .7 ASTM GD4833-07, Standard Test Method for Index Puncture Resistance of Geomembrane and Related Products.
 - .8 ASTM D5261 - 10 Standard Test Method for Measuring Mass per Unit Area of Geotextiles
 - .2 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 1860-April 2012, Material Specification for Geotextiles.
- 1.5 SUBMITTALS
- .1 Submit samples in accordance with Section 01 33 00.
 - .2 Submit to Departmental Representative following samples at least four (4) weeks prior to beginning Work.
 - .1 Minimum length of 2 m of roll width of geotextile.
 - .3 Submit to Departmental Representative copies of mill test data and certificate at least four (4) weeks prior to start of Work.
- 1.6 DELIVERY, STORAGE AND HANDLING
- .1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents, and to requirements of OPSS 1860.
- 1.7 WASTE MANAGEMENT AND DISPOSAL
- .1 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
 - .2 Fold up metal banding, flatten and place in designated area for recycling.
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PART 2 - PRODUCTS

- 2.1 MATERIAL .1 Geotextile (for permanent Works): non-woven synthetic fibre fabric, supplied in rolls.
- .1 Width: To be approved by the Departmental Representative.
 - .2 Length: 100m minimum.
 - .3 Composed of: minimum 95% by mass of polypropylene, polyethylene, polyester or other polymers, excluding polyamides, with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days.
 - .4 General use:
 - .1 Physical properties:
 - .1 Mass per unit area: to ASTM D5261, minimum 200 g/m².
 - .2 Grab Tensile strength and elongation (in any principal direction): to ASTM D4632.
 - .3 Tensile strength: minimum 690 N.
 - .4 Elongation at break: minimum 50%.
 - .5 Trapezoid tear strength: to ASTM D4533, minimum 275 N.
 - .6 Puncture resistance: to ASTM D4833, minimum 400 N.
 - .7 Mullen burst: to ASTM D3786, 2.17 MPa
 - .2 Hydraulic properties:
 - .1 Permittivity: to ASTM D4991, 1.6 sec⁻¹.
 - .2 Water flow rate: to ASTM D4991, 4480 l/min/m².
 - .3 Apparent opening size (AOS): to ASTM D4751, 0.212 mm.
 - .4 UV Stability: to ASTM D4355, 70% at 500h.
 - .3 Acceptable product:
 - .1 Terrafix 360R, Terrafix Geosynthetics Inc.
 - .2 Mirafi 160N, by TenCate
 - .3 EMCO R060, by EMCO Ltd Distribution.
 - .4 or approved equivalent.
 - .5 Specified Use: Rip Rap Placement:
 - .1 Physical properties:
 - .1 Mass per unit area: to ASTM D5261, minimum 330 g/m².

2.1 MATERIAL
(Cont'd)

- .1 (Cont'd)
 - .5 Specified Use:(Cont'd)
 - .2 Grab Tensile strength and elongation (in any principal direction): to ASTM D4632.
 - .1 Tensile strength: minimum 1000N wet condition.
 - .2 Elongation at break: minimum 45%.
 - .3 Seam strength:Equal to or greater than the tensile strength of the fabric.
 - .3 Puncture resistance: to ASTM D4833, minimum 700 N.
 - .4 Mullen burst: to ASTM D3786, 3.5 MPa minimum, moist condition.
 - .2 Hydraulic properties:
 - .1 Permittivity: to ASTM D4991, 1.0-1.2 sec⁻¹.
 - .2 Apparent opening size (AOS): to ASTM D4751, 0.150 mm.
 - .3 UV Stability: to ASTM D4355, 70% at 500h.
 - .3 Acceptable product:
 - .1 Terrafix 600R-800, non-woven, Terrafix Geosunthetics Inc.
 - .2 or approved equivalent.
- .2 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m² to CAN/CSA G164.
- .3 Factory sewn seams:sewn in accordance with manufacturer's recommendations.
- .4 Thread for sewn seams: equal or better resistance to chemical and biological degradation then geotextile.
- .5 Geotextile for temporary sediment and erosion control measures shall be non-woven and as approved by the Departmental Representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with pins as per the geotextile manufacturer's recommendations or to the requirements of the Departmental Representative.
 - .1 Orientation of geotextile shall be: first in the direction of the slope and second, in the direction of channel flow. The orientation shall be approved by the Departmental Representative.
 - .2 The geotextile shall be set, into an anchor trench (0.5m depth and 0.3m wide) at the base and duly secured along the top edge and upstream edge (flow direction) as approved by the Departmental Representative.
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .4 Overlap each successive strip of geotextile to the manufacturer's recommendation , but to a minimum of 600 mm over previously laid strip. Where overlap joints are perpendicular to the channel flow, the overlap joint shall be in the flow direction.
- .5 Join successive strips of geotextile by sewing for the segments or work that include increased elevation of existing terrain directly upstream of the concrete dam structure.
- .6 Pin successive strips of geotextile with securing pins to the manufacturer's recommendations.
- .7 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .8 After installation, cover with overlying layer within 4 hours of placement.
- .9 Replace damaged or deteriorated geotextile to approval of Departmental Representative.

3.1 INSTALLATION .10 Place and compact backfill material in
(Cont'd) accordance with Section 31 23 33.01.

3.2 PROTECTION .1 Vehicular traffic or construction machinery
are not permitted directly on geotextile.

END

PART 1 - GENERAL

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| <u>1.1 DESCRIPTION</u> | .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. |
| <u>1.2 RELATED SECTIONS</u> | .1 | Section 31 23 33.01 - Excavation, Trenching and Backfilling. |
| | .2 | Section 31 32 19.01 - Geotextiles. |
| <u>1.3 MEASUREMENT PROCEDURES</u> | .1 | Item No. 11 - "Rip-rap" measured in tonnes of material placed. |
| | .2 | Supply, placement and anchoring of geotextiles in accordance to Section 31 32 19.01 to be included in the unit price of Riprap. |
| <u>1.4 REFERENCES</u> | .1 | Ontario Provincial Standard Specifications (OPSS)/Ontario Ministry of Transportation
.1 OPSS 1004 November 2006, Ontario Provincial Standard Specification, Material Specification for Aggregates - Miscellaneous.
.2 OPSS 1010, April 2004, Material Specifications for Aggregate-Base, Subbase, Select Subgrade and Backfill Material.
.3 OPSS 511, April 2011, Construction Specifications for Rip-Rap Rock Protection and Granular Sheeting. |
| | .2 | American Standards Testing Methods (ASTM)
.1 ASTM D6825-02 (2008)e1, Standard Guide for Placement of Rip Rap Revetments. |
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| <u>1.5 WASTE
MANAGEMENT AND
DISPOSAL</u> | .1 | Divert left over aggregate materials from landfill to local quarry for reuse as approved by Departmental Representative. |
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PART 2 - PRODUCTS

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| <u>2.1 STONE</u> | .1 | <p>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:</p> <p>.1 Heavy Rip-Rap (Zone 1, Upstream rip-rap):</p> <p>.1 Not more than 10% of total volume of stones with individual size less than 250 mm (D min). Minimum size shall have a mean diameter of 200 mm.</p> <p>.2 Not less than 50% of total volume of stones with individual size of 350 mm (D50).</p> <p>.3 Remaining percentage of total volume to have uniform distribution of stones between 300 mm and 350 mm size.</p> <p>.4 Stones are to have angular faces and be spherical. No one dimension shall be greater than 30% of the mean dimension.</p> <p>.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.</p> |
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| <u>2.2 GEOTEXTILE
FILTER</u> | .1 | Geotextile: in accordance with Section 31 32 19.01. |
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PART 3 - EXECUTION

3.1 PLACING

- .1 Where rip-rap is to be placed on slopes, excavate trench at toe of slope to dimensions as indicated.
- .2 Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable material comparative to existing earth embankment fill and compact to provide firm bed.
- .3 Place geotextile on prepared surface in accordance with Section 31 32 19.01 and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.
- .4 Place rip-rap to thickness and details as indicated.
 - .1 Placement shall be controlled to ensure that a uniform and continuous cover results.
- .5 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 should follow immediately after placement of geotextile filter fabric.
 - .2 Placement of rip rap so ha it forms dense, well-graded mass of stone with minimum voids.
 - .3 Place riprap to is full thickness in one operation.
 - .4 Do not place riprap by dumping through chutes or other methods that can cause segregation of stone sizes.
 - .5 Do not dislodge underlying base or filter when placing stone.
 - .6 The Finished slope should be free of pockets of small stone or clusters of large stones.
 - .7 Finished grade to blend with the surrounding area.

PART 1 - GENERAL

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| <u>1.1 DESCRIPTION</u> | .1 | This Section specifies requirements for supplying, producing and placing granular material as a sub-base for site access road. |
| | .2 | Material specification for granular sub-base material (Granular "B"). |
| <u>1.2 MEASUREMENT AND PAYMENT</u> | .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. |
| <u>1.3 REFERENCES</u> | .1 | ASTM International <ul style="list-style-type: none"> .1 ASTM C117-04, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing. .2 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine. .3 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates. .4 ASTM D422-63(2007), Standard Test Method for Particle-Size Analysis of Soils. .5 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³). .6 ASTM D1557-09, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft³) (2,700kN-m/m³). .7 ASTM D1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils. .8 ASTM D4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils. |
| | .2 | Canadian General Standards Board (CGSB) <ul style="list-style-type: none"> .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series. .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric. |

- 1.3 REFERENCES (Cont'd)
- .3 Ontario Provincial Standard Specifications (OPSS)/Ontario Ministry of Transportation
- .1 OPSS 1004 November 2006, Ontario Provincial Standard Specification, Material Specification for Aggregates - Miscellaneous.
- .2 OPSS 1010 April 2004, Ontario Provincial Standard Specification, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.
- .3 OPSS 314, November 2004, Construction Specification for Untreated Granular, Subbase, Base, Surface Shoulder and Stockpiling.
- .4 OPSS 501, November 2010, Construction Specification for Compacting.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Granular material: in accordance with Section 31 0 17 and OPSS 1010 Granular "B" Type II.

PART 3 - EXECUTION

- 3.1 PLACING
- .1 Place granular sub-base after subgrade is inspected and approved by Departmental Representative.
- .2 Construct granular sub-base to depth and grade in areas as required to meet on-site traffic demands and vehicle axle loading.
- .3 Ensure no frozen material is placed.
- .4 Place material only on clean unfrozen surface, free from snow or ice.
- .5 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
- .6 Shape each layer to smooth contour and compact to specified density before placement of a subsequent layer.
- .7 Remove and replace portion of layer in which material has become segregated during spreading.
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3.2 WINTER
GRADING

- .1 When applicable:
 - .1 All ice and snow shall be removed from all portions of the work areas. Frozen material shall not be incorporated into the work. Material shall not be placed over frozen ground, except, at the Contractor's option, a single lift may be placed, in which case, final grading and compaction shall be done after the underlying material has thawed.

3.2 COMPACTION

- .1 Compaction equipment to be suitable and capable of obtaining required material densities for the material to be compacted.
- .2 Compact to density of not less than 100% Standard Proctor maximum dry density in accordance with ASTM D698.
- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
- .4 Apply water as necessary during compaction to obtain specified density.
- .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
 - .1 Restricted compaction zones: abutments and retaining walls.
 - .1 an area within a plane extending from the base of the back face of the wall, where it contacts the footing, upwards at a slope of 1H:1.5V, to a maximum distance of 2.5m from the wall.
- .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 SITE TOLERANCES

- .1 Finished base surface to be within 20 mm of elevation as indicated but not uniformly high or low.

3.4 PROTECTION

- .1 Maintain finished base in condition conforming to this section until succeeding topsoil is placed, or until granular base is accepted by Departmental Representative.

PART 1 - GENERAL

- | | | |
|------------------------------------|----|--|
| <u>1.1 DESCRIPTION</u> | .1 | This Section specifies the requirements for supply, placement of new crushed stone pathway extension from the new concrete structure outwards along the existing earth embankment crest as indicated on the Contract Drawings.
.1 Includes subgrade preparation and final grading to blend new and existing earth embankment slope to matching grades. |
| <u>1.2 MEASUREMENT AND PAYMENT</u> | .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. |
| <u>1.3 REFERENCES</u> | .1 | ASTM International
.1 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
.2 ASTM C117-04, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
.3 ASTM D4318-05, Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
.4 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³ (600 kN-m/m ³)). |
| | .2 | Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric. |
-

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Granular sub-base: in accordance with following requirements:
- .1 Crushed, pit run or screened stone, gravel or sand consisting of hard durable particles free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
 - .2 Gradations: within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2.

- .2 Table:

Sieve Designation	% Passing
75 mm	100
4.75 mm	25-85
0.425 mm	5-30
0.075 mm	0-10

- .3 Granular base: in accordance with Section 31 05 17 and following requirements:
- .1 Crushed stone or gravel: hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
 - .2 Gradations: within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2.
 - .3 Table:

Sieve Designation	% Passing
19 mm	100
12.5 mm	70-100
4.75 mm	40-70
2.00 mm	23-50
0.425 mm	7-25
0.075 mm	3-8

- .4 Liquid limit: ASTM D4318 maximum 25.
 - .5 Plasticity index: ASTM D4318 maximum 6.
- .4 Granular topping:
- .1 Screenings: hard, durable, crushed stone particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
 - .2 Gradations: within limits specified when tested to ASTM C136 and ASTM C117.

- 2.1 MATERIALS
(Cont'd)
- .4 Granular topping:(Cont'd)
- .2 Gradations:(Cont'd)

Sieve Designation	% Passing
9.5 mm	100
4.75 mm	50-100
2.00 mm	30-65
0.425 mm	10-30
0.075 mm	5-10

- .5 Geotextile filter: Geotextile for temporary sediment and erosion control measures and staging area shall be non-woven and as approved by the Departmental Representative. Refer to Section 31 32 19.01.

PART 3 - EXECUTION

- 3.1 SUBGRADE
- .1 Ensure subgrade preparation conforms to levels and compaction required, to allow for installation of granular base.

- 3.2 GEOTEXTILE FILTER
- .1 Install geotextile filter in accordance with Section 31 32 19.01.

- 3.3 GRANULAR SUB-BASE
- .1 Granular sub-base material minimum thickness: 150 mm .
- .2 Place material in uniform layers not to exceed 150 mm compacted thickness.
.1 Compact layer to 100% Standard dry Density in accordance with ASTM D698.

- 3.4 GRANULAR BASE
- .1 Granular base material thickness: 100 mm minimum .
- .2 Spread and compact granular base material in uniform layers not exceeding 100 mm compacted thickness.
- .3 Compact to a density of not less than 100% Standard dry Density in accordance with ASTM D698.

3.5 EDGING .1 Install edging true to grade.

3.6 GRANULAR TOPPING .1 Place granular topping to compacted thickness of 75 mm minimum.

.2 Place material in uniform layers not to exceed 50 mm compacted thickness.

.1 Compact layer to 100% Standard Density in accordance with ASTM D698.

END

PART 1 - GENERAL

<u>1.1 SECTION INCLUDES</u>	.1	Materials and installation for chain link fences.
<u>1.2 RELATED SECTIONS</u>	.1	Section 05 55 00 - Metal Fabrications.
<u>1.3 MEASUREMENT AND PAYMENT PROCEDURES</u>	.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.
<u>1.4 REFERENCES</u>	.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 A53/A53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless. .3 ASTM A90/A90M-09, Standard Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings. .4 ASTM A653/A653M-08, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process. .5 ASTM C1107/C1107M-13, Standard Specification for Packaged dry, Hydraulic-Cement Grout (Non shrink). .6 ASTM A568/A568M-13, Standard Specification for Steel, Sheet, Carbon, Structural, and High-strength, low Alloy, Hot rolled and Cold-Rolled, general Requirements. .7 ASTM D7803-12, Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Powder Coating. .8 ASTM F1664-08 (2013), Standard Specification for Poly(Vinyl Chloride)(PVC) and Other Conforming Organic Polymer-Coated Steel Tension Wire Used with Chain-Link Fence.

- 1.4 REFERENCES (Cont'd)
-
- .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-138.1-96, Fabric for Chain Link Fence.
 - .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 Canadian Standards Association (CSA International).
 - .1 CSA-A23.1-09/A23.2-09, Concrete materials and methods of concrete construction/Test methods and standard practices for concrete.
 - .4 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.
 - .5 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-19.24-M90, Multicomponent, Chemical-Curing Sealing Compound.
 - .6 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 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- 1.5 SUBMITTALS
-
- .1 Submittals in accordance with Section 01 33 00.
 - .2 Shop Drawings to indicate:
 - .1 Fence profile, sizes, connections, attachments, footings, anchorage size and type of fasteners and accessories.
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|--|----|---|
| 1.5 SUBMITTALS
(Cont'd) | .2 | Shop Drawings to indicate:(Cont'd)
.2 Gate sizes, locations, footings,
connections, attachments and accessories.
.3 Submit drawings showing formwork and
falsework design to: CSA A23.1/A23.2 as
required. |
| 1.6 QUALITY
ASSURANCE | .1 | Two (2) weeks minimum prior to starting
concrete work, provide to Departmental
Representative, Product data sheets on all
manufactured materials to be used on site. |
| 1.7 DELIVERY,
STORAGE AND
HANDLING | .1 | Deliver, store and handle materials in
accordance with manufacturer's
recommendations. |
| | .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 | Divert unused metal and wiring materials from
landfill to metal recycling facility as
approved by Departmental Representative. |
| | .2 | Divert unused concrete materials from
landfill to local quarry or facility as
approved by Departmental Representative. |
| | .3 | Unused paint or coating material must be
disposed of at official hazardous material
collections site as approved by Departmental
Representative. |
| | .4 | Do not dispose of unused paint material into
sewer system, into streams, lakes, onto ground
or in other location where it will pose health
or environmental hazard. |
| | .5 | Fold up metal banding, flatten and place in
designated area for recycling. |
-

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Concrete mixes and materials for fence post footings in native soils: in accordance with CAN/CSA-A23.1/A23.2.
 - .1 Nominal coarse aggregate size: 14-20mm.
 - .2 Compressive strength: 32 MPa minimum at 28 days.
 - .3 Class of exposure: C-2.
 - .4 Water to cement ratio: 0.45
 - .5 Air Content%: 5-8%.
 - .2 Anchoring options for fence posts in concrete structures, and bedrock:
 - .1 Cementitious Grout for fence post anchoring into bedrock: In accordance with ASTM C1107.
 - .1 cement based, non metallic, non shrink grout.
 - .2 Temperature allowance: if applicable to winter construction; Winter grade, down to at least -5 degrees.
 - .3 Compressive strength: 25MPa minimum at 28 days.
 - .4 Freeze thaw resistance.
 - .5 Acceptable materials:
 - .1 'In-pakt precision CT Grout' manufactured by KING, KPM industries., 1-800-461-0566, www.kingshotcrete.com.
 - .2 '805 Construction Grout - winter Grade' manufactured by W.R. Meadows., 1-847-214-2100, www.wrmeadows.com.
 - .3 Contractor provided equivalent alternatives.
 - .2 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'.

2.1 MATERIALS (Cont'd)

- .2 (Cont'd)
- .2 (Cont'd)
 - .3 Contractor provided equivalent alternatives.
 - .3 Use winter grade epoxy and cementitious grout when temperatures are below freezing (<0 degrees). Refer to Manufacturer's recommendations for applications.
- .3 Adhesive anchors:
 - .1 16mm Dia. threaded galvanized anchor rod to ASTM A307 or A36,
- .4 Chain-link fence fabric: to CAN/CGSB-138.1, 50 mm diamond pattern mesh.
 - .1 Type 1, Class A, medium style, Grade 2.
 - .2 Height of fabric: 1.37 m as indicated.
- .5 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe. For chain-link fence, line post are to be 60.3 mm dia, terminal post to be 88.9 mm dia and top/bottom rails are to be 42.2 mm dia. as indicated on OPSD 972.130.
- .6 Tie wire fasteners: galvanized steel wire.
- .7 Tension/truss bar: to ASTM A653/A653M, 5 x 20 mm minimum galvanized steel.
- .8 Gates: to CAN/CGSB-138.4.
- .9 Fittings and hardware: to CAN/CGSB-138.2, galvanized steel malleable ductile cast iron.
 - .1 Tension bar bands: 5 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.
- .10 Organic zinc rich coating: to CAN/CGSB-1.181.

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: 550 g/m² minimum to ASTM A90.
- .2 Powder Coating:
 - .1 For Chain link fabric: all mesh to be black vinyl coated in accordance with ASTM D7803.

- 2.2 FINISHES
(Cont'd)
- .2 Powder Coating:(Cont'd)
- .2 All frame work and other fence components shall be finished with black gloss enamel by powder coat application.
- .3 Prior to powder coating, all surfaces to be chemically cleaned and treated and prepared in accordance to ASTM D7803 and ASTM F1664. Powder coating must be a polyester 2000 series applied to a dry film thickness of 0.05mm minimum by electrostatic coat and oven cured to a smooth and even surface.

PART 3 - EXECUTION

- 3.1 GRADING
- .1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.
- .1 Provide clearance between bottom of fence and ground surface a minimum of 30 mm to a maximum of 70 mm.

- 3.2 ERECTION OF
FENCE
- .1 Erect fence along lines as indicated and as approved by Departmental Representative and to CAN/CGSB-138.3 latest edition.
- .2 All posts shall be installed plumb and to the depth specified in the drawings as per footing type determined by anchoring base material and location.
- .3 Excavate, drill or core and clean post holes as required to dimensions indicated.
- .1 For Cementitious grout and Epoxy drill/core holes, clean out holes in accordance with manufacturer's recommendations (drill, brush, blow out and repeat as required).
- .2 For excavated post holes, excavate to dimensions indicated on Contract drawings. Minimum depth of post holes to be 1200mm.
- .4 Space line posts 3 m apart (maximum), measured parallel to ground surface.
- .5 Space straining posts at equal intervals not to exceed 150 m if distance between end or corner posts on straight continuous lengths of

3.2 ERECTION OF
FENCE
(Cont'd)

- .5 (Cont'd)
fence over reasonably smooth grade, is greater than 150 m.
- .6 Install additional straining posts at sharp changes in grade or vertical alignment of the fence exceeds 30 degrees and where approved by Departmental Representative.
- .7 Install corner post where change in alignment exceeds 10 degrees.
- .8 Install end posts at end of fence and at buildings and other structures.
 - .1 Install gate posts on both sides of gate openings.
 - .2 Provide base plate with anchorages for mounting to concrete.
- .9 Fence Post anchoring:
 - .1 Place concrete/cementitious/epoxy grout in post holes then embed posts into holes to depths as indicated.
 - .2 Extend anchoring material 50 mm above ground level and slope to drain away from posts.
 - .3 Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.
- .10 Do not install fence fabric until appropriate cure times have been met for anchoring materials used to reach 75% of their total strength or minimum of 5 days.
- .11 Install brace between end and gate posts and nearest line post, placed in centre of panel and parallel to ground surface at inclination as indicated.
 - .1 Install braces on both sides of corner and straining posts in similar manner.
- .12 Install caps.
- .13 Install top and bottom rails between posts and fasten securely to posts and secure waterproof caps and overhang tops.
- .14 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 top and bottom.

3.2 ERECTION OF
FENCE
(Cont'd)

- .15 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.
- .16 Secure fabric to top rails, bottom rails, and line posts with tie wires at intervals as indicated.
 - .1 Give tie wires minimum three full twists.

3.3 TOUCH UP

- .1 Clean and repair damaged surfaces as per manufacturer's recommendations removing loose and cracked coatings.
 - .1 Pre-treat damaged surfaces according to manufacturers' instructions.

END

PART 1 - GENERAL

- | | | |
|---|----|--|
| <u>1.1 DESCRIPTION</u> | .1 | This section specifies the requirements for reinstating damaged landscaped areas within the work and staging areas, access route and areas disturbed by the work and consists of:
.1 Restoring residential concrete curbs.
.2 Restoring existing access pathway and municipal grounds to their original state.
.3 Supplying, placing, and finish grading of a topsoil bed.
.4 Supplying and placing nursery sod
.5 Restoring lawn by seeding grass.
.6 Maintaining sodded and seeded areas until acceptance.
.7 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 existing sodded areas, to be covered with topsoil, smoothed to the finish grade, and re-sodded at Contractor's expense. |
| | .3 | All disturbed sodded areas, outside the limits of immediate staging areas, as shown on the drawings, to be covered with topsoil, smoothed to the finish grade, and restored by seeding at Contractor's expense. |
| | .4 | All disturbed riparian areas (interface zone between land and stream), 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. |
| <u>1.2 MEASUREMENT
AND PAYMENT
PROCEDURES</u> | .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 sodded and vegetated areas in conjunction with Departmental Representative before commencement of work. |
| 1.5 REFERENCES | .1 | Agriculture and Agri-Food Canada (AAFC).
.1 The Canadian System of Soil Classification, Third Edition, 1998.
.2 Plant Hardiness Zones in Canada-2000. |
| | .2 | Canadian Nursery Landscape Association (CNLA).
.1 Canadian Standards for Nursery Stock, 8th Edition, 2006. |
| | .3 | Ontario Provincial Standard Specification (OPSS).
.1 OPSS 804 (Nov 2013), Construction Specification for Seed Cover. |
| 1.6 SUBMITTALS | .1 | Provide submittals in accordance with Section 01 33 00. |
| | .2 | Quality control submittals :
.1 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL.
.2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements |
| | .3 | 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 At least two (2) weeks before starting final topsoil work, advise Departmental Representative of proposed sources of topsoil and grass seeds. Provide Departmental Representative with access to the sources for inspection, sampling and testing.
- .2 When proposed sources are approved, use no other sources for sod or seed without written authorization from Departmental Representative.
- .3 Provide name of plant material supplier and obtain approval from Departmental Representative of plant material at source prior to shipping to site.
- .4 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 AND
STORAGE

- .1 Schedule deliveries in order to keep storage at the job site to a minimum without causing delays.
 - .2 Deliver, unload and store rolled sod on pallets only.
 - .3 Deliver sod to site within 24 hours of being lifted and lay sod within 36 hours of being lifted.
-

- 1.9 DELIVERY AND STORAGE
(Cont'd)
- .4 Do not deliver small, irregular, or broken pieces of sod. Departmental Representative will reject these.
 - .5 During wet weather, allow sod to dry sufficiently to prevent tearing during lifting and handling.
 - .6 During dry weather, protect sod and from drying. Water sod as necessary to ensure its vitality and prevent dropping soil in handling. The Departmental Representative will reject dried-out sod.
 - .7 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 in accordance to suppliers recommendations.
- 1.10 SCHEDULING OF SODDING AND SEEDING WORK
- .1 Schedule sod laying and seeding to coincide with final topsoil operations.
 - .2 Obtain Departmental Representative's approval of the schedule for seeding before proceeding.

PART 2 - PRODUCTS

- 2.1 TOPSOIL .1 New topsoil to be a friable sandy-clayish loam of good humus content, suitable for supporting 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 SOD .1 Nursery sod: Quality and source to comply with standards outlined in "Guide Specification for Nursery Stock", Section 17, 1978 edition, published by Canadian Nursery Trades Association.
- .1 Number 1 Kentucky Bluegrass/Fescue sod" sod grown from minimum 40% Kentucky Bluegrass, 30% Creeping Red Fescue.
- 2.3 SEEDS .1 Mixture composition for terrain with slopes less than 1V:2.5H;
- .1 Mix A - Within existing sodded area: seeds to produce Number 1 Kentucky Bluegrass Fescue sod with minimum 40% Kentucky Bluegrass, 30% Creeping Red Fescue.
 - .2 Mix B - Outside existing sodded area: seeds to produce rapid germination sod with following composition:
 - .1 15% Creeping Red Fescue,
 - .2 15% Chewing Fescue,
 - .3 48% Perennial Ryegrass Mixture,
 - .4 22% Kentucky Blue Grass Mixture.

<u>2.3 SEEDS</u> (Cont'd)	.2	Mix C - 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.
	.3	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.
<u>2.4 MULCH</u>	.1	Straw Mulch shall be oat or wheat straw. Straw shall be supplied in bales, dry, and free of weeds and other foreign materials.
<u>2.5 PLANT MATERIAL</u>	.1	Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.
<u>2.6 WATER</u>	.1	Free of impurities that would inhibit plant growth.
<u>PART 3 - EXECUTION</u>		
<u>3.1 EXAMINATION</u>	.1	Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for planting installation in accordance with manufacturer's written instructions.
<u>3.2 PREPARATION OF TOPSOIL SUB-GRADE</u>	.1	Verify that grades are correct. If discrepancies occur, notify Departmental Representative and do not start other landscape work in that area until instructed to do so in writing by Departmental Representative.
	.2	Grade soil, eliminating uneven areas and low spots, ensuring that new sodded surface will

3.2 PREPARATION OF
TOPSOIL SUB-GRADE
(Cont'd)

- .2 (Cont'd)
be faired-off to the existing sodded areas
with no sharp transition.
- .3 Remove debris, roots, branches, stones in
excess of 50 mm diameter and other deleterious
materials.
 - .1 Remove debris which protrudes more than
75 mm above surface.
 - .2 Dispose of removed material off site.
- .4 Cultivate entire area which is to receive
topsoil to depth of 100 mm.
 - .1 Cross cultivate those areas where
equipment used for hauling and spreading has
compacted soil.

3.3 PLACING AND
SPREADING OF
TOPSOIL

- .1 Place topsoil after Departmental
Representative has accepted sub-grade.
- .2 Spread topsoil to 150 mm minimum depth after
settlement and 80% compaction. For sodded
areas, keep final elevation 15 mm below
finished grade to allow room for sod.
- .3 Spread topsoil to following minimum depths
after settlement.
 - .1 150 mm for seeded areas.
 - .2 150 mm for sodded areas.
 - .3 500 mm for shrub beds.
- .4 Manually spread topsoil around trees, shrubs
and obstacles.
- .5 Grade to eliminate rough spots and low areas
and ensure positive drainage. Prepare loose
friable bed by means of cultivation and
subsequent raking.
- .6 Consolidate topsoil to required bulk density
using equipment approved by Departmental
Representative. Leave surfaces smooth, uniform
and firm enough to resist deep footprints.

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 SURPLUS
TOPSOIL MATERIAL

- .1 Dispose of materials not required off site.

3.6 SODDING AND
SEEDING

- .1 Obtain Departmental Representative's approval of topsoil grade and depth before starting sodding and seeding lawn.
- .2 Loosen surface of topsoil where it has become compacted.
- .3 Protect all sodded and seeded areas against any damage until sod has been fully established. Supply and install required protective apparatus.

3.7 SOD PLACEMENT

- .1 Lay sod within 18 hours of being lifted if air temperature exceeds 20 degrees C.
- .2 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.
- .3 Roll sod as directed by Departmental Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.8 SEED PLACEMENT

- .1 Contractor shall ensure that the seeding methods and equipment are calibrated to provide appropriate coverage.
 - .1 Mix A, B and C: 130 kg/10,000m2
- .2 Contractor shall ensure proper uniform dispersal of mixed material over entire area designated for seeding.
- .3 All cover materials shall be applied as a separate operation immediately following seed application.
- .4 Mulch application shall be applied to form a uniform, cohesive mat over 100% of seeded area and applied to a minimum depth of 25mm and a maximum depth of 50mm measured at time of placement.

- 3.9 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.

- 3.10 MULCHING .1 Ensure soil settlement has been corrected prior to mulching.
- .2 Spread mulch as indicated.

- 3.11 MAINTENANCE OF SODDED AND SEEDED AREAS .1 Perform following maintenance operations from time of placement to acceptance by Departmental Representative.
- .1 Maintain soil moisture conditions for optimum establishment, growth and health of sod/seed/plant material without causing erosion.
- .1 Apply sufficient water to ensure moisture penetration of 200 mm into soil below sod.
- .2 Cut grass when it reaches a height of 80 mm. Cut grass thereafter frequently enough to be kept at a height of 80 to 100 mm. Allow clippings to remain

- 3.12 ACCEPTANCE OF SODDED AND SEEDED AREAS .1 Approval of material at its source does not prevent subsequent rejection on job site.
- .2 Sodded and seeded lawn will be approved when:
- .1 Growth of sodded and seeded areas has been properly established;
- .2 Turf is free of bare and dead spots;
- .3 No surface soil is visible when grass has been mowed to a height of 80 mm; and,
- .4 Grass has been cut a minimum of 4 times.

- 3.13 SODDING ON SLOPES GREATER THAN THREE TO ONE .1 Lay sod sections perpendicular to slopes greater than 3:1 (run/rise) and secure with stakes. Place 3 stakes per m², 100 mm below top edge to prevent shifting of sod and drive stakes flush with top of sod soil.
- 3.14 SUBGRADE COMPACTION .1 Break material down to sizes suitable for compaction and mix for uniform moisture to full depth of layer.
- 3.15 FINISHING .1 Hand finish slopes that cannot be finished satisfactorily by machine.
- 3.16 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 DESCRIPTION
- .1 This section specifies requirements for Dewatering and Water Diversion Works described by drawings and specifications.
 - .2 These temporary measures shall be designed to accomodate:
 - .1 navigation operating levels;
 - .2 seasonal flows and winter conditions.
 - .3 Work includes but is not limited to:
 - .1 The design, construction and maintenance of a upstream and downstream cofferdam system as required to facilitate the Work as described in Section 01 11 00 and as indicated on the Contract Drawings.
 - .2 Design, provision and maintenance of a dewatering system for removal of water from the designated Work spaces and to maintain these areas in a dry state for the duration of the work, which meet Work and environmental regulation requirements. This shall include;
 - .1 Methodology for removal of temporary works and for maintaining stability of new and existing Works during the recharging (filling) of the waterway;
 - .3 Design, supply, construction of water diversion channel through work area including:
 - .1 Related structures and components to allow passage of current existing environmental flows to Thompson's Creek. Refer to Section 01 35 43 for allowable flow ranges.
 - .2 Methodology and related structures to control flows;
 - .4 Implementation of dewatering and diversion works according to the Professional Engineer's design.
 - .5 Providing and maintaining all dewatering equipment for the duration of the Work.
 - .6 Supply of standby equipment to replace dewatering equipment which malfunctions.
 - .7 Removing temporary dewatering and diversion structures at the end of the Work.
 - .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 35 43 - Environmental Procedures.
- .4 Section 01 48 00 - Construction Control and Monitoring.

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 The design, details for the construction and installation and removal of cofferdams must be approved by Department of Fisheries & Oceans in accordance with Fisheries Act prior to commencement of the Work. Include details for dewatering and diversion systems describing: methodology of construction, operation, monitoring, decommissioning; schedule of work; the design of all works duly certified by a qualified professional engineer; environmental controls (sediment and erosion control, and protection of existing watercourse beyond the active work area; and for the fish capture and release as part of the dewatering; and such other information required by DFO and as identified in this Section.
 - .3 DFO will assess the documentation provided in accordance with Section 35 of the Fisheries Act to determine if the work results in Harmful Alteration, Disruption and Destruction (HADD) of fish habitat. Upon obtaining approval from DFO for the dewatering and diversion plans, implement the designed works.
 - .1 If a HADD is determined due to the need for the construction of the dewatering and
-

1.4 REGULATORY
REQUIREMENTS

(Cont'd)

- .3 (Cont'd)
 - .1 (Cont'd)
diversion work, the cost of the HADD compensation will be borne by the PCA / PWGSC.
 - .2 If a HADD is determined due to the extent, quality and/or schedule of the proposed works including the sediment and erosion control measures, or for the methodology of capture and release of fish within the working area, the contractor shall modify their design and/or methodology to address the identified deficiencies and make a resubmission.
 - .3 If a HADD is still determined after all identified deficiencies have been addressed, the cost of the HADD compensation will be borne by the Agency / PWGSC.
- .4 Where a HADD has been identified by DFO, the contractor shall prepare a compensation plan in consultation with the D.R. and the Agency. Upon acceptance by the D.R. and Agency, this plan shall be submitted to DFO for consideration. The cost of the HADD compensation plan preparation shall be borne by the PWGSC and Agency as set out in the contingency allowance. There shall be no claims for delays for obtaining approval from DFO for the dewatering and diversion works.
- .5 Pumping water out of cofferdam enclosure: to Section 01 35 43.
- .6 Obtain and pay costs of all required permits.

1.5 SUBMITTALS

- .1 Shop drawings of all cofferdams, flow diversion, and other dewatering systems, including seepage control, stability of structures and slopes within the work area.
 - .1 Shop drawings shall be complete with Professional Engineer's seal & signature.
 - .2 Submit design criteria and calculations of (for each stage of construction):
 - .1 flow capacity of diversion works to maintain downstream environmental flow ranges;
 - .2 flow characteristics at intake, conveyance and outlet of diversion works to mitigate scouring and erosion, and to address environmental concerns;

1.5 SUBMITTALS
(Cont'd)

- .1 (Cont'd)
- .2 (Cont'd)
 - .3 stability of cofferdams and existing structures and slopes during dewatering;
 - .4 measures to control seepage, and surface drainage into the Work area.
- .2 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 QUALIFICATIONS

- .1 Cofferdam, dewatering system, diversion system and associated structures to be designed by a Professional Engineer licensed to practice in the Province of Ontario with considerable experience and expertise in design of similar systems and structures.
- .2 Design Engineer shall: Make, check and sign all calculations; check, sign and seal all drawings; inspect and verify conformance and safety of construction of dewatering structures and system on site; provide written notice to Departmental Representative stating that the temporary works have been constructed as per requirements and are ready for operation.

1.7 DESIGN CRITERIA

- .1 Design cofferdams to ensure maintenance of work spaces in a dry state for duration of work.
 - .1 The Contract drawings show a location for the cofferdam to undertake the Works.
 - .2 The Contractor may choose an alternative location for cofferdams to be able to undertake Work.
 - .2 Design flow diversion to pass environmental flow through the work area.
 - .1 The Contract drawings show a location for the Diversion Works. This location has been approved by Parks Canada Agency. The Diversion system channel shall not impact the adjacent earth embankment and buried concrete core wall.
-

1.7 DESIGN CRITERIA .2
(Cont'd)

(Cont'd)

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

.3 Plan and design dewatering systems considering:

.1 Safe access to cofferdam, for diversion operation control and access to any portion of the Work.

.2 Provide measures to protect public from temporary works (inlet, outlet and open conveyance), including warning and advisory signage, safety boom and buoys, and fencing.

.3 Provide erosion control measures at the inlet, conveyance and outlet works as necessary.

.4 Provide measures to prevent blockage by debris at inlet works.

.5 Sufficient and safe space required for crews to complete work in dewatered areas.

.6 Sequence of Work.

.7 Site constraints including stability and protection of the adjacent earth embankments, the existing dam structure, and proposed excavated embankment for the work. Do not operate heavy construction equipment within the immediate vicinity of the existing structure and earth embankment without approved temporary access designs such that additional loading to earth embankment is limited. Refer to Dam Safety Review (DSR) for current slope stability analysis as provided by Departmental Representative.

.8 The foundation level for the Works.

.4 At all times, maintain environmental quality of water to Section 01 35 43 and permits and approval stipulation as set out in Section 01 41 00.

.5 Ensure that no phase of Work threatens safe performance of cofferdam.

.6 Provide a minimum of 300mm freeboard above listed water levels and associated ice levels for winter work to prevent overtopping of downstream and upstream cofferdams or diversion.

1.8 WATER LEVELS &
FLOW RECORDS

- .1 Refer to Section 01 11 00 - Summary of Work and Section 01 14 00 - Work Restrictions.
- .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 channel banks.
- .2 Prior to dewatering the work area, remove any aquatic species (fish and turtles) according to approved environmental plan including fish capture and relocation condition as approved by DFO. 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 and Section 01 41 00.
- .4 Turbidity limit: to Section 01 35 43.
- .5 During the installation of 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 and removal of cofferdams and diversion system.

1.10 PROTECTION

- .1 Protect cofferdam and dewatered work spaces from damage due to floods, rain, ice, snow or other adverse climatic conditions.
 - .2 Carry out monitoring of earth embankments to the requirements of Section 01 48 00.
 - .3 Train staff for safe operation of dewatering and diversion works.
 - .4 For the winter period, when Thompson's bay reach is frozen, additional 1.8m construction fencing will be required to separate the work area from potential public access from the
-

1.10 PROTECTION .4
(Cont'd)

(Cont'd)
ice. Fence to be located 2m from cofferdam crest.

PART 2 - PRODUCTS

2.1 MATERIALS .1

Only use material in good condition, approved 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 and Section 01 41 00 Regulatory Requirements.

.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 & 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 cofferdam and flow diverters.

.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.

.6 Note that Fisheries & Oceans prefers gravel/rockfill dams with rubber membrane, caissons, interlocking concrete blocks, rubber dams, sand bags and bulkbags, bolted pre-engineered frame-type structures or other types of cofferdams which do not generate turbidity.

PART 3 - EXECUTION

3.1 GENERAL

- .1 Evaluate, plan and execute Work 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 diversion system and other equipment.
 - .6 Environmental requirements.
 - .7 Clearance requirements for Work.
 - .8 Irregularities of adjacent surfaces.
 - .9 Changes in water levels.
 - .10 Resolving site issues in a timely manner.

3.2 CONSTRUCTION OF
COFFERDAMS, AND
STABILITY WORKS

- .1 Sufficiently watertight to permit Work to proceed in the dry.
- .2 To address all Phases of the Work.
- .3 Install temporary works of Cofferdam and Flow Diverters to not unduly compromise the existing structures and works. Provide Stability measures to protect existing structures and works during the installation of temporary works and site preparation including excavation for the Works.
- .4 Install temporary works including stability measures in a progressive manner without delays according to the approved schedule.
- .5 Operate temporary measures to minimize potential environmental damage.

3.3 DIVERSION
CONTROL OPERATIONS

- .1 Provide a communication protocol with Parks Canada Agency acceptable to all parties including the Departmental representative.
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3.3 DIVERSION
CONTROL OPERATIONS
(Cont'd)

- .2 Maintain a record of date/time/setting/calculated flow and submit to PCA and Departmental representative weekly.
- .3 Operate diversion structure to maintain environmental flow volume to downstream reach of Thompson's Creek as given in Section 01 14 00.
- .4 Operation of diversion structure to be maintained and operators made available or on call at all times throughout the entire project.
- .5 Confirm diversion system settings do not impact localized aquatic habitat and environs at outlet structures.
 - .1 Changes in flow discharge through system to be down gradually.

3.4 DEWATERING

- .1 Dewater work spaces involved with the Work and maintain them in a fully dewatered state until Work is finished.
- .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.

3.5 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.
-

3.6 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.
- .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-water shall meet all environmental requirements.
 - .3 Equipment shall be inspected and service 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.

3.7 REMOVALS OF
COFFERDAMS, AND
STABILITY WORKS

- .1 At approved stages in Work, remove all cofferdams, temporary improvements, and dewatering systems to original bottom level.
 - .2 Remove all stability works other those approved to remain. Restore the site to the original condition or better.
 - .3 Remove all temporary measures. Restore the site to the original condition or better to the satisfaction of the Departmental Representative.
 - .4 Dispose of all unwanted materials off-site as approved by the Departmental Representative.
 - .5 Do not dispose of any materials in Creek or Bay.
 - .6 Undertake removals to the requirements of the regulatory permits and approvals, and to Section 01 35 43.
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3.7 REMOVALS OF COFFERDAMS, AND STABILITY WORKS (Cont'd)	.7	Turbidity Curtain is to only be removed once cofferdam and diversion system is removed.
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3.8 CLEAN-UP AND RECTIFICATION	.1	In accordance with Section 01 74 11 and Section 32 94 00.
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END

PART 1 - GENERAL

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| <u>1.1 DESCRIPTION</u> | .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 The work under this section also includes the design, installation of the safety boom anchor system and in-water anchor system along with all new hardware components, connection hardware, and associated cable/chain link components. |
| <u>1.2 RELATED SECTIONS</u> | .1 | Section 01 56 00 - Temporary Barriers and Enclosures. |
| | .2 | Section 05 55 00 - Metal Fabrications |
| <u>1.3 MEASUREMENT PROCEDURES</u> | .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. |
| <u>1.4 REFERENCES</u> | .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.
.4 ASTM A572/A572M-13a, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
.5 ASTM C578, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation. |

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|----------------------------|----|---|
| 1.4 REFERENCES
(Cont'd) | .1 | (Cont'd)
.6 ASTM D1505-10, Standard Test Method for Density of Plastics by the Density-Gradient Technique
.7 ASTM D4883-08, Standard Test Method For Density of Polyethylene by the Ultrasound Technique. |
|----------------------------|----|---|
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- | | | |
|----------------|----|---|
| 1.5 SUBMITTALS | .1 | Submit in accordance with Section 01 33 00. |
| | .2 | Submit manufacturer's instructions, printed product literature and data sheets for the flotation logs, and associated hardware and include product characteristics, performance criteria, physical size, finish and limitations. |
| | .3 | Shop Drawings: Submit for approval prior to commencing any Work within this section:
.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.
.3 Provide floating unit assembly details including log to log connection, shore and in-water anchor connections.
.4 Provide drawing of total assembly indicating number of units required between each anchor.
.5 Shop drawings are to include details of english and french text/graphics with description of application method, location, text size, format, colour selection. |
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- | | | |
|---|----|---|
| 1.6 DESCRIPTION
OF SAFETY BOOM
SYSTEM | .1 | Flotation units shall be new units, not previously used. |
| | .2 | Flotation units to be of Modular construction for simplified handling, assembly and, deployment. |
| | .3 | Flotation units shall consist of an external encasement, internal core foam fill and internal structural steel member through which |
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1.6 DESCRIPTION OF SAFETY BOOM SYSTEM

(Cont'd)

- .3 (Cont'd)
all external inter boom connections are attached.
- .4 Each flotation unit shall be approximately cylindrical in shape and possess the ability to self-right if upturned.
- .5 The nominal diameter shall be 406 mm diameter and total length including ballast steel member to be 3.05m in length.
- .6 Modular unit design such that each barrier with full connection hardware attached weigh between 54-68kg.
- .7 Each flotation log shall be designed to have a minimum buoyancy of 300kg.
- .8 Each flotation unit shall be designed to maintain it's original buoyancy even if it is structurally damaged or punctured.
- .9 Each flotation unit shall be designed to maintain a minimum freeboard of 305 mm in any structural state (intact, damaged or punctured).
- .10 Boom unit to have a minimum tensile capacity of 240KN.
- .11 Connecting links (including exposed strength member length) between units shall not exceed 508mm.

1.7 ANCHOR SYSTEM DESIGN PARAMETERS

- .1 Thompson's Bay Characteristics & Parameters for Safety boom design; All Elevation references are to the Existing Dam Sill Elevation of 191.50m.
 - .1 Location Type: controlled navigational body of water,
 - .2 Purpose: Safety Barrier,
 - .3 Water depth (Avg.)@ boom location: ~3.0m,
 - .4 Terrain type: glacial till - sandy silt to silty sand and gravel deposits, and Bedrock (Weathered, Highly Fractured Limestone a approximately EL. m).
 - .5 Average water operating level: 212.48 - 212.58m,
 - .6 Design Low water Level: 212.48m,
 - .7 Design High water level: 212.58m,
 - .8 Design capacity flow of D/S dam: 4CMS,

- 1.7 ANCHOR SYSTEM DESIGN PARAMETERS (Cont'd)
- .1 (Cont'd)
 - .9 Design Surface water velocity at boom:
Approx. 1.8m/s
 - .10 Water type: fresh water,
 - .11 Design wind velocity:
 - .1 70 km/h (1 in 100yr),
 - .12 Wave condition:
 - .1 Significant wave height: 0.7m,
 - .2 Wave period: not available,
 - .3 Channel width is less than ~350m in front of the dam and the longest fetch length is ~700m.
 - .13 Ice conditions: N/A,
 - .14 Seasonal barrier only, no winter use,
 - .15 Position of Booms to flow: Inverted "V" with self rescue angle, refer to Contract Drawings.
 - .16 Distance between shoreline and anchors (Average); ~3.0m
 - .17 Boom line maximum design sag ratio: 0.15

- 1.8 DELIVERY
- .1 Flotation units and all connection assemblies to be delivered to Site.
 - .2 Delivery is requested within 12 weeks from contract award.
 - .3 Delivery, store and handle in accordance with manufacturer's written instructions.

- 1.9 WARRANTY
- .1 For the Work of this Section 35 20 22 - Safety Boom, the warranty period shall be in accordance with General Conditions "C", twelve (12) months from the date of Substantial Performance of the Work.

PART 2 - PRODUCTS

- 2.1 FLOTATION UNIT ENCASEMENT
- .1 The encasement shall be composed of molding grade linear low density polyethylene (LLDPE) or linear medium grade polyethylene.
 - .2 The polyethylene encasement shall be manufactured with antioxidants for corrosion protection, abrasive resistant, be UV-stabilized for long-term environmental exposure and have a minimum density of 0.926 g/cm³ by ASTM D1505-10 or ASTM D4883-08.
-

2.1 FLOTATION UNIT
ENCASEMENT
(Cont'd)

- .3 The nominal wall thickness of the polyethylene encasement shall be a minimum of 4.0 mm.
- .4 The standard encasement color shall be yellow (FS-13655) per Transport Canada requirements, unless otherwise noted by Departmental Representative.

2.2 FLOTATION
GRAPHICS

- .1 Message /graphic, integrally molded into flotation unit polyethylene encasement and:
 - .1 be black in colour;
 - .2 lettering shall be 100 mm high Helvetica Bold font or Arial Font or approved alternative;
 - .3 message to be centered on the front face;
 - .4 message to read:
 - .1 "DANGER - DAM AHEAD - KEEP OUT" for 50% of the boom units, and
 - .2 "DANGER - BARRAGE DEVANT - NE PAS APPROCHER" for 50% of the boom units; and
 - .5 Parks Canada Agency (PCA) logo shall be 75 mm high and located on the upper left of the unit, on opposite face. Logo to meet Federal Identification Program requirements. Refer to Contract drawings.

2.3 FLOATING UNIT
INTERNAL CORE

- .1 The internal core of the floating log shall be polystyrene or polyurethane closed cell foam with a minimum/maximum in-place density of 14.4 kg/m³ and 35.24 kg/m³ respectively.
 - .2 Water absorption of closed cell foam core shall not exceed 3% by volume as tested per ASTM C-272.
 - .3 Closed cell foam core fill shall take up a minimum of 95% of the interior volume of the boom. Under no circumstances will the percentage of foam fill be less than 95% of the interior of the boom.
-

- 2.4 FLOTATION UNIT BALLAST
- .1 Each flotation unit shall be reinforced and ballasted with a steel member. Size and steel grade of the member shall be in accordance to the manufacturer's recommendation.
 - .2 Primary strength member to weigh no less than 8kg/m.
 - .3 The ballast steel member can be either integrated/encapsulated through the full length of the flotation body or secured to the flotation unit encasement by galvanized ASTM A325 bolts and a heavy wall external galvanized flat plates. The member shall be positioned on the bottom interior surface to provide anti-rolling or self-righting features to the boom unit.
- 2.5 INTER BOOM AND ANCHOR CONNECTION HARDWARE
- .1 All connecting hardware between flotation units and anchor shall consist of, but not limited to:
 - .1 bottom steel connector plate,
 - .2 load-rated safety clevis (shackle) and
 - .3 load-rated welded links (chain).
 - .2 The connections between flotation units shall be designed to meet design operational conditions and engineered to minimize wear and maximize load-bearing capacity.
 - .3 Structural steel: ASTM 572, Grade 50 steel, or approved equivalent.
 - .4 Galvanizing: all fabricated component and hardware under this section are to have hot dipped galvanizing to ASTM A123/A123M. Galvanization grade and weight to be in accordance with the manufacturer's recommendation.
 - .1 The use of non-metallic materials such as PVC belting or other materials that can be easily torn, cut, ripped or subject to environmental degradation are not acceptable.
 - .5 All assembly connections between inter module units to allow for:
 - .1 Minimum 45 degree vertical and rotational movement between units.
 - .2 Minimum 90 degree horizontal movement between units.
-

2.5 INTER BOOM AND
ANCHOR CONNECTION
HARDWARE
(Cont'd)

- .6 Bolts, nuts and washers: to ASTM A325/A325M, hot dipped galvanized to ASTM A153/A153M, unless otherwise approved.
- .7 Connection clevis (shackle) shall:
 - .1 have a minimum pin diameter of 3/4-inch, be of a safety type with a heavy-hex style castle nut, lock washer and cotter pin.
 - .2 have a Working Load Limit of not less than 4.3 tonnes. The Working Load Limit rating shall be clearly identified on the body of each clevis.
- .8 Chain: Hot dipped galvanized, grade 30 proof coil, size as indicated on the contract drawings.
- .9 manufacturer's alternative connection assemblies can be submitted for proposal and review.

2.6 SAFETY BOOM
ANCHORAGE

- .1 Contractor to provide anchorage designs for Safety Boom based on waterway characteristics. Design and Shop drawings to be stamped and signed by a licensed Engineer in the Province of Ontario, Canada.
- .2 Anchorage design to include a minimum Factor of Safety of 2, comparable to the minimum ultimate tensile strength of the safety boom structural ballast sections.
- .3 Anchorage connection to Safety Boom link to be located above existing terrain elevation such that safety boom anchorage point limits abrasion and wear on surrounding terrain and tension link between anchor connection point and first flotation unit.

2.7 IN-WATER ANCHOR
NAVIGATION WARNING
MARKINGS

- .1 Navigation warning applique: 320 mm X 535 mm Self-adhesive vinyl marker label, fade resistant. Navigation Hazard marking to be in conformance with Transport Canada TP 14799, Private Buoys, and CDA technical Bulletin Signage - Public Safety Around Dams, and have a white coloured background and an orange diamond on two opposite sides and two orange horizontal bands, one above and one below the diamond symbols.
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2.7 IN-WATER ANCHOR .2
NAVIGATION WARNING
MARKINGS

(Cont'd)

- minimum above-water (freeboard) dimensions of 305 mm in height.
- .3 In-water anchor: Minimum submerged weight of 2000kg is required for deadweight anchor, unless otherwise indicated by engineered in-water anchor design. Multiple blocks may be used to provide cumulative deadweight minimum. Application under semi-taut conditions (watch circle radius 1.5:1).
 - .1 Geometry of concrete blocks:
 - .1 Frustum pyramid or Trapezoidal in shape is preferred with built-in bottom surface cavity for suction development.
 - .4 Minimum design factor of safety with respect to holding capacity of the anchor to not be less than 1.5 loading on anchor from safety boom lines.
 - .5 Submit Shop drawings with in-water anchor and connection system to Departmental Representative for approval prior to fabrication.
 - .6 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 PREPARATION

- .1 Contractor/Manufacturer with reference to Contract drawings and measurements, to confirm and verify quantities for appropriate coverage.

3.2 INSTALLATION

- .1 Safety Boom:
 - .1 Contractor to communicate with PCA Dam operators during works to assure full closure of the downstream dam gates.
 - .2 Install in accordance with manufacturer's instructions and as indicated on the Contract drawings.
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| 3.2 INSTALLATION
(Cont'd) | .1 | <p>Safety Boom:(Cont'd)</p> <p>.3 Do not make alteration to system components without written permission of Departmental Representative.</p> <p>.4 Individual section of boom shall be connected to shoreline anchor or in-water anchor with separate clevis (shackle), unless otherwise indicated.</p> <p>.5 Ensure that all warning messages are facing upstream. Alternatively place boom units with English and French warning messages.</p> |
| | .2 | <p>Safety Boom Anchors:</p> <p>.1 The Contractor shall be responsible to supply, transport and install and align all field placed shoreline and in water anchors</p> <p>.2 Contractor to install in accordance with anchor design and manufacturer's instructions and as indicated on Contract drawings.</p> |
| 3.3 CONSTRUCTION | .1 | <p>Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.</p> |
| | .2 | <p>For Installation of anchors, provide sediment control measures acceptable to Department Representative. Do not spill concrete into open waterways.</p> |
| 3.4 NAVIGATION
WARNING MARKING | .1 | <p>In-water anchor to be marked with appropriate Navigational marker and connected with separate clevis (Shackle) and swivel link to new safety boom line. Refer to contract drawings for navigation buoy description general layout.</p> |
| | .2 | <p>Two (2) navigation warning signage appliques, shall be mounted on in-water anchor.</p> |
| 3.5 FIELD QUALITY
CONTROL | .1 | <p>Site Tests/Inspections:</p> <p>.1 Safety boom constructed in whole or in part without inspection will not be accepted.</p> <p>.2 Final inspection of safety boom will be made in place. Contractor to assist with access for inspection.</p> |
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- 3.5 FIELD QUALITY .1 (Cont'd)
- CONTROL .2 (Cont'd)
- (Cont'd)
- .1 Individual units are to be inspected by Departmental Representative prior to installation.
- .3 Evidence of units having a lack of buoyancy, or are damaged, as determined by the Departmental Representative will be cause for rejection.

END
