

**Part 1            General**

**1.1            TAXES**

- .1       Pay all taxes properly levied by law (including Federal, Provincial and Municipal).

**1.2            FEES, PERMITS, AND CERTIFICATES**

- .1       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.

**1.3            REGULATORY REQUIREMENTS**

- .1       References and Codes
  - .1       Materials to be new and Work to conform to minimum applicable standards of “References” indicated in specification sections, Canadian Dam Association Guidelines, and applicable Municipal and Provincial codes. In case of conflict or discrepancy, apply the most stringent requirement.
  - .2       References, Codes, and Amendments: use current version at the time of Tender.
- .2       Do Work in accordance with all applicable Federal, Provincial and Municipal Acts and Regulations for construction projects.
- .3       Ensure compliance of employees with safety requirements of Contract documents, site-specific health and safety plan(s), and all applicable regulatory requirements.

**1.4            WORK SEQUENCE**

- .1       Construct Work in stages to accommodate the Crown continued use of premises during construction.
- .2       Required Stages:
  - .1       Construct South Channel cofferdams.
  - .2       Construct South Channel Dam.
  - .3       Remove South Channel cofferdams.
  - .4       Commission new South Dam.
  - .5       Construct North Channel downstream cofferdam.
  - .6       Construct North Channel Dam.
  - .7       Remove North Channel cofferdam.
  - .8       Commission new North Dam.
  - .9       Demolition and removal of the existing dam and identified components.

**1.5            OWNER/CANADA OCCUPANCY**

- .1       Canada will use premises during entire construction period for execution of normal operations.
- .2       Cooperate with Departmental Representative on behalf of Owner/Canada in scheduling operations to minimize conflict and to facilitate Owner usage.

## **1.6 SUBMITTALS**

- .1 Submit for the Departmental Representative's review, all required shop drawings, procedures, plans, product data, samples, mock-ups, schedules and Certificates of Conformance in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Do not commence manufacture or order of materials before shop drawings are reviewed.
- .3 Do not proceed with subsequent stages of work until the appropriate Certificates of Conformance have been submitted in accordance with Section 01 45 00 – Quality Control.

## **1.7 WORK SCHEDULE**

- .1 Contractor to provide and maintain a Construction Progress Schedule in accordance with Section 01 32 16.06 - Construction Progress Schedules - Critical Path Method (CPM).
- .2 Commence or work will not be permitted until master plan and detailed schedule, as detailed in Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM), has been reviewed by the Departmental Representative, and revised and resubmitted by the Contractor.
- .3 Provide a schedule for the submission of shop drawings, plans and procedures.
- .4 If progress of work should fall behind, take steps required to bring work back to schedule. Do not change schedule without Departmental Representative's approval.

## **1.8 FIRE SAFETY REQUIREMENTS**

- .1 Comply with the National Fire Code of Canada for:
  - .1 On-going maintenance and use of fire safety in buildings and on site.
  - .2 Conduct of activities that might cause fire hazards in and around buildings and on site.
  - .3 Limitations on hazardous contents in and around buildings.
  - .4 Establishment of fire safety plans.
  - .5 Fire safety at construction and demolitions sites.

## **1.9 TEMPORARY UTILITIES**

- .1 Provide temporary utilities and controls in order to execute Work expeditiously. Remove from site all such utilities and controls after use.
- .2 Arrange and pay costs for all temporary utility installation, maintenance, and removal.
- .3 Notify Departmental Representative and utility companies of intended interruption of services and obtain requisite permission.

## **1.10 CLOSOUT SUBMITTALS**

- .1 Records:
  - .1 As work progresses, maintain accurate records to show deviations from contract drawings in red. Prior to Departmental Representative's inspection for issuance of final certificate of completion, supply Departmental Representative with two(2) sets of white prints with deviations neatly inked in. Departmental Representative to provide three sets of clean white prints for this purpose.

- .2 Record the following information:
  - .1 Field changes of dimension and detail on new and existing components affected by Work.
  - .2 Changes made by Change Order or Site Instruction.
  - .3 Horizontal and vertical location of underground utilities and appurtenances exposed or adjusted during Work.
- .3 Guarantees and Warranties:
  - .1 Before completion of work collect all manufacturers' guarantees and warranties and deposit with Departmental Representative.

#### **1.11 CLEANING**

- .1 Clean up as work progresses. At end of each work period, and more often if required or if directed by Departmental Representative, remove debris from site, stockpile and/or neatly stack material for use, and clean up generally.
- .2 Upon completion remove scaffolding, work platforms, temporary protection and surplus materials. Make good defects noted at this stage.
- .3 Clean manufactured articles in accordance with manufacturer's written instructions.
- .4 Clean areas under contract to a condition equal to what previously existed and to approval of Departmental Representative.

#### **1.12 SECURITY CHECKS**

- .1 All personnel employed on this project will be subject to security check. Obtain requisite clearance, as instructed, for each individual required to enter the premises.

#### **1.13 COST BREAKDOWN**

- .1 Within two weeks of notification of acceptance of the tender, provide a cost breakdown of lump sum items and unit price items representing the amount of the contract price to the Ministerial Representative. The cost breakdown approved by Departmental Representative will be used as the basis for payments.

#### **1.14 DOCUMENTS REQUIRED**

- .1 Maintain at job 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 Other Modifications to Contract.
  - .8 Field Test Reports.
  - .9 Copy of Approved Work Schedule.
  - .10 Health and Safety Plan and Other Safety-Related Documents.

- .11 Manufacturers' installation and application instruction.
- .12 Other documents as specified.

**1.15 DATUM**

- .1 As established by the Geodetic Survey of Canada.

**1.16 WATER LEVELS**

- .1 Information on Lake Nipissing and French River water levels is available from Public Works and Government Services Canada's website at: <http://www.tpsgc-pwgsc.gc.ca/ontario/eaux-water/index-eng.html>.
- .2 Refer to Section 31 23 19 - Unwatering/Dewatering, for more details on water levels.
- .3 The Departmental Representative cannot be held responsible for events, or the results of 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 OF SECTION**

**Part 1            General**

**1.1                SECTION INCLUDES**

- .1            Operational Constraints.

**1.2                MIGRATORY BIRD PROTECTION**

- .1            The Contractor must not destroy any active nests (nests with eggs or young birds) of bird species protected under the Migratory Birds Convention Act, 1994.
- .2            Conduct a visual inspection of the work area to confirm the presence of birds or bird nests prior to beginning work. If there are birds or bird nests present, then a qualified avian biologist will need to identify any migratory bird nests on the dam; if there is evidence of migratory birds nesting in the immediate project area, consultation must be completed with Environment Canada regarding migratory bird management options prior to commencing work. Do work so as to not disturb habitat of identified migratory bird species.
- .3            Ensure that work on the structure that might affect nesting is planned outside the nesting period of migratory and local birds, which extends between May 9 and July 31.
- .4            If work on the structure cannot be planned outside the nesting period, make sure that preventive measures (tarps or wire screens) are put in place to prevent the installation of new nests before May 9.
- .5            Inspect the structure on a daily basis to eliminate nests under construction or install other preventive measures to prevent the installation of new nests.
- .6            Maintain the preventive measures until July 31 or until the work in question are completed and remove them when they are no longer necessary.
- .7            In cases where measures are not effective in preventing the nesting of migratory and local birds in the proposed work areas, that work cannot continue and the Contractor must inform the Departmental Representative and await further instructions.

**1.3                TURTLES**

- .1            Install silt fencing to prevent turtle movement on access roads in accordance with Section 31 24 13 - Roadway Embankments.
- .2            Post signs indicating the potential presence of turtles within the site and along access roads.
- .3            If work must be conducted during nesting season for turtles (late March to June), a nest survey should be conducted by a qualified herpetologist immediately (i.e., within 2 days) prior to commencement of the works to identify and locate active nests.
- .4            A mitigation plan (which may include appropriate protective covers for the nests and establishing appropriate buffers around active nests) should then be developed to address any potential impacts.
- .5            Temporary (during the construction period) artificial turtle nesting sites may be created if it is determined that there may be some loss of nesting sites along the access roads.

Contact a qualified herpetofaunal biologist to locate ideal sites off the road and on the same side of the road as the existing nesting sites.

- .6 The temporary nest sites will be in close proximity to current nest sites.
- .7 Suspend operations from mid-September to November 1, and dismantle fencing to allow movement of turtles to potential wintering areas.

#### **1.4 ROAD ACCESS**

- .1 Road access to Canada existing North and South dams will be maintained at all time. Canada personnel must be able to access the dams for operational purposes.

#### **1.5 ROAD RESTRICTIONS**

- .1 Minimize traffic along access roads and maintain safe speeds.
- .2 Construction vehicles over 5 tonnes are not allowed to use the roads leading to the construction site on Sundays, and between the hours of 7:00 p.m. and 7:00 a.m.
- .3 The road leading to the construction site will use Dokis Bridge and First Bridge. Both bridge structures are adequate for all legal trucks in Ontario. Speed limit on First Bridge is set at 10 km/h.
- .4 Allow no truck or machinery turnarounds at the junction between the dam access road and the main access road leading to the PWGSC administration buildings.
- .5 Limit transportation activities from 8:00 a.m. to 5:00 p.m.

#### **1.6 CONSTRUCTION ACTIVITIES**

- .1 Post warning signs during construction. Enforce safe driving by construction crews.
- .2 Notify local school boards/bus operators about the construction schedule.
- .3 Provide shoreline hazard signs to boaters and canoeists and clearly mark cofferdams and other hazardous in-stream structures.
- .4 Inform the French River Provincial Park superintendent of major construction activities and schedule to allow communications with river and Park users.
- .5 Inform local cottage associations along the French River and Lake Nipissing of major construction activities and schedule.
- .6 Phase the development of the North and South structures to ensure ability to release minimum flows. Maintain minimum flows during construction (i.e., 6 to 12 m<sup>3</sup>/s during the April to July period, and 3 to 5 m<sup>3</sup>/s during other times of the year).
- .7 Maintain water levels within Lake Nipissing as per the French River/Lake Nipissing Operational Guidelines (1995) for home owners/cottagers and tour operators.
- .8 Minimize in-stream construction work (<72 hours) for such activities as cofferdam installation.

#### **1.7 EXISTING SERVICES**

- .1 Prior to commencing the work, the Contractor will arrange with the appropriate Utility authorities to stake out all underground Utilities services connections that may be affected by the Work. The Contractor will observe the location of the stake-outs prior to

commencing the Work and notify the Departmental Representative and affected Utility of any conflict with the Work so that it can be resolved.

- .2 Notify Departmental Representative and Utility companies of intended interruption of services and obtain required permission.
- .3 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions to a minimum.
- .4 Provide temporary services when directed by Departmental Representative to maintain critical systems.
- .5 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .6 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .7 Damage as a result of the Contractor's work will be repaired at the Contractor's expense.
- .8 Record locations of maintained, rerouted and abandoned service lines.
- .9 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

## **1.8 TIMING OF WORK**

- .1 The south cofferdam construction must be completed prior to commencing the construction of the new South Dam structure.
- .2 The new South Dam structure must be completed and commissioned prior to commencing the new North Dam structure.
- .3 To protect local fish populations during their migratory and spawning periods, no in-water work/activity will occur during the following time period: April 30 to July 15.

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **Part 3 Execution**

### **3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

## **Part 1 General**

### **1.1 DESCRIPTION**

- .1 The Dam is on the French River and is located on Canada land located within the Dokis First Nations Reserve. It is located about 120 km southwest of North Bay, and the nearest town to the site is North Monetteville, located on Highway 64, 1.8 km north of the intersection of Highway 64 and Dokis Reserve Road.
- .2 To get to the Dam, take Dokis Reserve Road for about 25 km. Shortly after the road surface turns from gravel to pavement, and before entering the Dokis village, turn right onto Keso Bay Road. Continue on this road for about 2.8 km, and then turn left on gravel road. Dam is located about 0.5 km from the turnoff.
- .3 The road leading to the construction site will use Dokis Bridge and First Bridge. Both bridge structures are adequate for all legal trucks in Ontario. Speed limit on First Bridge is set at 10 km/h.
- .4 The work of this Section includes, but is not limited to:
  - .1 Designing and installing all temporary access routes and temporary bridges required to access the Work areas.
  - .2 Providing construction fence and perimeter security measures around work area.
  - .3 Maintaining the work/storage area for the duration of the work.
  - .4 Removal of the temporary access routes and temporary bridges.

### **1.2 DELINEATING THE WORK/STORAGE AREA**

- .1 Supply, install, and maintain for the duration of the work a minimum 1500-mm welded-wire construction fence delineating the work area. Do not use loose rock or other site materials as counterbalance material. Obtain Departmental Representative's approval on "securing" measures for post stability before proceeding with work.
- .2 Provide secure coverings to all openings to prevent public access to the work areas at all times during construction.
- .3 Remove the fences in their entirety from the site after work is completed.

### **1.3 PARKING**

- .1 Parking will be limited to areas confined by the limits of work.

### **1.4 SNOW CLEARING**

- .1 The Contractor will 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 main access road to the Work site.



**1.5 SECURITY**

- .1 Secure the work area in an approved manner. This includes fencing off the construction site to prevent public access to all areas where construction activities occur.
- .2 Take appropriate security precautions to safeguard equipment, tools and materials on site.

**Part 2 Products**

**2.1 CONVEYANCE SYSTEM**

- .1 Materials: new or used, in good condition.
- .2 Temporary Bridge: portable, prefabricated truss bridge.

**Part 3 Execution**

**3.1 REQUIREMENTS OF REGULATORY AGENCIES**

- .1 Obtain approvals from and pay all fees to Federal or Provincial agencies for works as may be required by this Contract.

**3.2 SHOP DRAWINGS**

- .1 Contractor is 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.

**3.3 REMOVAL**

- .1 Any material placed on the river bottom for temporary access to the work is to be removed by the end of each phase of the work.

**END OF SECTION**

**Part 1            General**

**1.1            ADMINISTRATIVE**

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

**1.2            PRECONSTRUCTION MEETING**

- .1      Within 10 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2      Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3      Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4      Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5      Agenda to include:
  - .1      Appointment of official representative of participants in the Work.
  - .2      Schedule of Work: in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM).
  - .3      Schedule of submission of shop drawings, samples, and colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
  - .4      Requirements for temporary facilities, site sign, offices, storage sheds, utilities, and fences in accordance with Section 01 52 00 - Construction Facilities.
  - .5      Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
  - .6      Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements.
  - .7      Record drawings in accordance with Section 01 33 00 - Submittal Procedures.

- .8 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
- .9 Take-over procedures, acceptance, and warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .10 Monthly progress claims, administrative procedures, photographs, and hold backs.
- .11 Appointment of inspection and testing agencies or firms.
- .12 Insurances, and transcript of policies.

### **1.3 PROGRESS MEETINGS**

- .1 During course of Work and 2 weeks prior to project completion, schedule progress meetings monthly.
- .2 Contractor, major Subcontractors involved in Work and Departmental Representative are to be in attendance.
- .3 Notify parties minimum 5 days prior to meetings.
- .4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.
- .5 Agenda to include the following but not limited to:
  - .1 Review, approval of minutes of previous meeting.
  - .2 Review of Work progress since previous meeting.
  - .3 Field observations, problems, and 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.

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1            Not Used.

**END OF SECTION**

## **Part 1 General**

### **1.1 REFERENCES**

#### **.1 Definitions:**

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (Gantt chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars.
- .3 Baseline: original approved plan (for Project, work package, or activity), plus or minus approved scope changes.
- .4 Cash Flow: projection of progress payment requests based on cash loaded construction schedule.
- .5 Completion Milestones: they are firstly Interim Certificate and secondly Final Certificate.
- .6 Constraint: applicable restriction or limitation, either internal or external to project, that will affect performance of Project. Factors that affect activities can be scheduled.
- .7 Control: process of comparing actual performance with planned performance, analyzing variances, evaluating possible alternatives, and taking appropriate corrective action as needed.
- .8 Critical Activity: any activity on a critical path.
  - .1 Most commonly determined by using critical path method.
- .9 Critical Path: sequence of activities that determines duration of Project. Generally, it is the longest path through Project.
  - .1 Usually defined as those activities with float less than or equal to specified value, often zero.
- .10 Critical Path Method (CPM): network analysis technique used to determine the amount of scheduling flexibility (amount of float) on various logical network paths in Project schedule network, and to determine the minimum total Project duration.
- .11 Data Date: date through which project status and progress were last determined and reported for analyses, such as scheduling and performance measurements.
- .12 Duration: total number of work periods (not including holidays or other nonworking periods) required to complete activity or other Project element.
  - .1 Usually expressed as workdays or work weeks.
- .13 Early Finish Date: in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can finish, based on network logic and schedule constraints.

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

- .2 Project plan may be summary or detailed.
- .30 Project Planning: development and maintenance of Project Plan.
- .31 Project Planning, Monitoring and Control System: overall system operated to enable monitoring of Project Work in relation to established milestones.
- .32 Project Schedule: planned dates for performing activities and planned dates for meeting milestones.
- .33 Quantified Days Duration: working days based on 5-day work week, discounting statutory holidays.
- .34 Risk: uncertain event or condition that, if it occurs, has positive or negative effect on Project's objectives.
- .35 Start Date: point in time associated with activity's start, usually qualified by one of following: actual, planned, estimated, scheduled, early, late, target, baseline, or current.
- .36 Work Breakdown Structure (WBS): deliverable-oriented hierarchical decomposition of Work to be executed by Contractor to accomplish project objectives and create required deliverables. It organizes and defines total scope of Project. Each descending level represents an increasingly detailed definition of Project Work. WBS is decomposed into Work packages.
- .2 Reference Standards:
  - .1 Project Management Institute (PMI Standards)
    - .1 A Guide to the Project Management Body of Knowledge (PMBOK Guide) - Fifth Edition.
    - .2 Practice Standard for Scheduling - 2011.

## **1.2 ADMINISTRATIVE REQUIREMENTS**

- .1 Project Meeting:
  - .1 Meet with Departmental Representative within 5 working days of award of Contract date, to establish Work requirements and approach to project construction operations.
  - .2 Participate in regular project progress meetings with Departmental Representative specifically intended to discuss update of detailed schedule and contract changes.
- .2 Scheduling:
  - .1 Planning: ensure that planning process is iterative and results in generally top-down processing with more detail being developed as planning progresses, and decisions concerning options and alternatives are made.
  - .2 Ensure project schedule efficiencies through monitoring of Project in detail to ensure integrity of Critical Path, by comparing actual completions of individual activities with their scheduled completions, and review progress of activities that has started but are not yet completed.
  - .3 Monitor sufficiently often so that causes of delays will immediately be identified and removed.

- .3 Project Monitoring and Reporting:
  - .1 Keep team aware of changes to schedule, and possible consequences as project progresses.
  - .2 Use narrative reports to provide advice on seriousness of difficulties and measures to overcome them.
  - .3 Begin narrative reporting with statement on general status of Project followed by summarization of delays, potential problems, corrective measures and Project status criticality.
- .4 Critical Path Method (CPM) Requirements:
  - .1 Ensure Master Plan and Detail Schedule are practical and remain within specified Contract duration.
  - .2 Revise Master Schedule and Detail Schedule deemed impractical by Departmental Representative and resubmit for approval.
  - .3 Change to Contract Duration:
    - .1 Acceptance of Master Schedule and Detail Schedule showing scheduled Contract duration shorter than specified Contract duration does not constitute change to Contract.
    - .2 Duration of Contract may only be changed through bilateral Agreement.
  - .4 Consider Master Schedule and Detail Schedule deemed practical by Departmental Representative, showing Work completed in less than specified Contract duration, to have float.
  - .5 First Milestone on Master Schedule and Detail Schedule will identify start Milestone with an "ES" constraint date equal to Award of Contract date.
  - .6 Calculate dates for completion milestones from Plan and Schedule using specified time periods for Contract.
  - .7 Interim Certificate with "LF" constraint equal to calculated date.
  - .8 Calculations on updates to be such that if early finish of Interim Certificate falls later than specified Contract duration then float calculation to reflect negative float.
  - .9 Delays to non-critical activities, those with float may not be basis for time extension.
  - .10 Do not use float suppression techniques such as software constraints, preferential sequencing, special lead/lag logic restraints, extended activity times imposed dates other than required by Contract.
  - .11 Allow for and show Master Plan and Detail Schedule adverse weather conditions normally anticipated.
    - .1 Specified Contract duration has been predicated assuming normal amount of adverse weather conditions.
  - .12 Provide necessary crews and manpower to meet schedule requirements for performing Work within specified Contract duration.
    - .1 Simultaneous use of multiple crews on multiple fronts on multiple critical paths may be required.



- .13 Arrange participation on and off site of subcontractors and suppliers, as required by Departmental Representative, for purpose of network planning, scheduling, updating and progress monitoring.
  - .1 Approvals by Departmental Representative of original networks and revisions do not relieve Contractor from duties and responsibilities required by Contract.
- .14 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

### **1.3 SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative Project Control System for planning, scheduling, monitoring and reporting of project progress.
- .3 Submit Project Control System to Departmental Representative for review; failure to comply with each required submission may result in progress payment being withheld as specified elsewhere in the Contract Documents.
- .4 Include costs for execution, preparation and reproduction of schedule submittals in bid documents.
- .5 Submit letter ensuring that schedule has been prepared in coordination with major sub-contractors.
- .6 Refer to article "PROGRESS MONITORING AND REPORTING" of this specification Section for frequency of Project control system submittals.
- .7 Submit impact analysis of schedule for changes that result in extension of contract duration.
  - .1 Include draft schedule update and report as outlined in article "PROGRESS MONITORING AND REPORTING".
- .8 Submit Project planning, monitoring and control system data as part of initial schedule submission and monthly status reporting as required by Departmental Representative in the following form.
  - .1 CD files in original scheduling software containing schedule and cash flow information, labelled with data date, specific update, and person responsible for update.
  - .2 Master Schedule Bar Chart.
  - .3 Construction Detail Schedule Bar Chart.
  - .4 Listing of project activities including milestones and logical connectors, networks (subnetworks) from Project start to end. Sort activities by activity identification number and accompany with descriptions. List early and late start and finish dates together with durations, codes and float.
  - .5 Criticality report listing activities and milestones with negative, zero and up to 5 days total float used as first sort for ready identification of critical paths

through entire project. List early and late starts and finishes dates, together with durations, codes and float for critical activities.

- .6 Progress report in early start sequence, listing for each trade, activities due to start, underway, or finished within 2 months from monthly update date. List activity identification number, description and duration. Provide columns for entry of actual start and finish dates, duration remaining and remarks concerning action required.

#### **1.4 QUALITY ASSURANCE**

- .1 Use experienced personnel, fully qualified in planning and scheduling to provide services from start of construction to Final Certificate, including Commissioning.

#### **1.5 WORK BREAKDOWN STRUCTURE (WBS)**

- .1 Prepare construction Work Breakdown Structure (WBS) within 5 working days of Award of Contract date.
  - .1 Develop WBS through at least five levels: project, stage, element, sub-element and work package.

#### **1.6 PROJECT MILESTONES**

- .1 Mandatory milestones and recommended milestones form interim targets for Project Schedule.

#### **1.7 MASTER SCHEDULE**

- .1 Structure and base CPM construction networks system on WBS coding in order to ensure consistency throughout Project.
- .2 Prepare comprehensive construction Master Schedule (CPM logic diagram) and dependent Cash Flow Projection within 10 working days of finalizing Agreement to confirm validity or alternates of identified milestones.
  - .1 Master Schedule will be used as baseline.
    - .1 Revise baseline as conditions dictate and as required by Departmental Representative.
    - .2 Departmental Representative as Project progresses will review and return revised baseline within 10 work days.
- .3 Reconcile revisions to Master Schedule and Cash Flow Projections with previous baseline to provide continuous audit trail.
- .4 Initial and subsequent Master Schedule will include:
  - .1 CD containing schedule and cash flow information, clearly labelled with data date, specific update, and person responsible for update.
  - .2 Bar chart identifying coding, activity durations, early/late and start/finish dates, total float, completion as percentile, current status and budget amounts.
  - .3 Network diagram showing coding, activity sequencing (logic), total float, early/late dates, current status and durations.

- .4 Actual/projected monthly cash flow: expressed monthly and shown in both graphical and numerical form.

## **1.8 DETAIL SCHEDULE**

- .1 Provide detailed project schedule (CPM logic diagram) within 10 working days of award of Contract date showing activity sequencing, interdependencies and duration estimates. Include listed activities as follows:
  - .1 Shop drawings.
  - .2 Samples.
  - .3 Approvals.
  - .4 Procurement.
  - .5 Construction.
  - .6 Installation.
  - .7 Site works.
  - .8 Testing.
  - .9 Commissioning and acceptance.
- .2 Show remaining activities for CPM construction network system up to Final Certificate and develop complete detail as project progresses.
- .3 Detail activities completely and comprehensively throughout duration of project.
- .4 Relate Detail Schedule activities to basic activities and milestones developed and approved in Master Schedule.
- .5 Clearly show sequence and interdependence of construction activities and indicate:
  - .1 Start and completion of all items of Work, their major components, and interim milestone completion dates.
  - .2 Activities for procurement, delivery, installation and completion of each major piece of equipment, materials and other supplies, including:
    - .1 Time for submittals, resubmittals and review.
    - .2 Time for fabrication and delivery of manufactured products for Work.
    - .3 Interdependence of procurement and construction activities.
  - .3 Include sufficient detail to assure adequate planning and execution of Work. Activities should generally range in duration from 3 to 15 workdays each.
- .6 Provide level of detail for project activities such that sequence and interdependency of Contract tasks are demonstrated and allow coordination and control of project activities. Show continuous flow from left to right.
- .7 Ensure activities with no float are calculated and clearly indicated on logical CPM construction network system as being, whenever possible, continuous series of activities throughout length of Project to form "Critical Path". Increased number of critical activities is seen as indication of increased risk.
- .8 Insert Change Orders in appropriate and logical location of Detail Schedule. After analysis, clearly state and report to Departmental Representative for review effects created by insertion of new Change Order.

## **1.9 REVIEW OF THE CONSTRUCTION DETAIL SCHEDULE**

- .1 Allow 10 work days for review by Departmental Representative of proposed construction Detail Schedule.
- .2 Upon receipt of reviewed Detail Schedule make necessary revisions and resubmit to Departmental Representative for review within 5 work days.
- .3 Promptly provide additional information to validate practicability of Detail Schedule as required by Departmental Representative.
- .4 Submittal of Detail Schedule indicates that it meets Contract requirements and will be executed generally in sequence.

## **1.10 COMPLIANCE WITH DETAIL SCHEDULE**

- .1 Comply with reviewed Detail Schedule.
- .2 Proceed with significant changes and deviations from scheduled sequence of activities that cause delay, only after written receipt of approval by Departmental Representative.
- .3 Identify activities that are behind schedule and causing delay. Provide measures to regain slippage.
- .4 Submit to Departmental Representative, justification, project schedule data and supporting evidence for approval of extension to Contract completion date or interim milestone date when required. Include as part of supporting evidence:
  - .1 Written submission of proof of delay based on revised activity logic, duration and costs, showing time impact analysis illustrating influence of each change or delay relative to approved contract schedule.
  - .2 Prepared schedule indicating how change will be incorporated into the overall logic diagram. Demonstrate perceived impact based on date of occurrence of change and include status of construction at that time.
  - .3 Other supporting evidence requested by Departmental Representative.
  - .4 Do not assume approval of Contract extension prior to receipt of written approval from Departmental Representative.
- .5 In event of Contract extension, display in Detail Schedule that scheduled float time available for work involved has been used in full without jeopardizing earned float.
  - .1 Departmental Representative will determine and advise Contractor number of allowable days for extension of Contract based on project schedule updates for period in question, and other factual information.
  - .2 Construction delays affecting project schedule will not constitute justification for extension of contract completion date.

## **1.11 PROGRESS MONITORING AND REPORTING**

- .1 On ongoing basis, Detail Schedule on job site must show "Progress to Date". Arrange participation on and off site of subcontractors and suppliers, as, and when necessary, for purpose of network planning, scheduling, updating and progress monitoring. Inspect Work with Departmental Representative at least once monthly to establish progress on each current activity shown on applicable networks.

- .2 Update and reissue project Work Breakdown Structure and relevant coding structures as project develops and changes.
- .3 Perform Detail Schedule update biweekly with status dated (Data Date) on last working day of month. Update to reflect activities completed to date, activities in progress, logic and duration changes.
- .4 Do not automatically update actual start and finish dates by using default mechanisms found in project management software.
- .5 Submit to Departmental Representative copies of updated Detail Schedule.
- .6 Requirements for monthly progress monitoring and reporting are basis for progress payment request.
- .7 Submit monthly written report based on Detail Schedule, showing Work to date performed, comparing Work progress to planned, and presenting current forecasts. Report must summarize progress, defining problem areas and anticipated delays with respect to Work schedule, and critical paths. Explain alternatives for possible schedule recovery to mitigate any potential delay. Include in report:
  - .1 Description of progress made.
  - .2 Pending items.
  - .3 Status of Contract completion date and milestones.
  - .4 Current and anticipated problem areas, potential delays and corrective measures.
  - .5 Review of progress and status of Critical Path activities.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**Part 1            General**

**1.1               RELATED REQUIREMENTS**

- .1       This section specifies general requirements and procedures for Contractor's submissions of shop drawings, product data, samples and mock-ups to Departmental Representative review. Additional specific requirements for submissions are specified in individual sections of the Contract.

**1.2               ADMINISTRATIVE**

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

**1.3               SHOP DRAWINGS AND PRODUCT DATA**

- .1       The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2       Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, 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 coordinated, regardless of Section under which

adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

- .4 Allow 10 working days for Departmental Representative's review of each submission.
- .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, 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.
- .8 Submissions include:
  - .1 Date and revision dates.
  - .2 Project title and number.
  - .3 Name and address of:
    - .1 Subcontractor.
    - .2 Supplier.
    - .3 Manufacturer.
  - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
  - .5 Details of appropriate portions of Work as applicable:
    - .1 Fabrication.
    - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
    - .3 Setting or erection details.
    - .4 Capacities.
    - .5 Performance characteristics.
    - .6 Standards.
    - .7 Operating weight.
    - .8 Wiring diagrams.
    - .9 Single-line and schematic diagrams.
    - .10 Relationship to adjacent work.
- .9 After Departmental Representative's review, distribute copies.

- .10 Submit four printed hard copies and one electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .11 Submit four printed hard copies and one electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit four printed hard copies and one electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
  - .2 Testing must have been within 3 years of date of Contract award for project.
- .13 Submit four printed hard copies and one electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
  - .2 Certificates must be dated after award of project contract complete with project name.
- .14 Submit four printed hard copies and one electronic copy of manufacturer's instructions for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .15 Submit four printed hard copies and one electronic copy of manufacturer's field reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .16 Submit documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .17 Submit four printed hard copies and one electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .18 Delete information not applicable to project.
- .19 Supplement standard information to provide details applicable to project.
- .20 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.



- .1 This review will not mean that PWGSC approves detail design inherent in shop drawings, responsibility for which will remain with Contractor submitting same, and such review will 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 coordination of Work of subtrades.

#### **1.4 SAMPLES**

- .1 Submit for review samples in duplicates as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Departmental Representative's site office.
- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

#### **1.5 MOCK-UPS**

- .1 Erect mock-ups in accordance with Section 01 45 00 - Quality Control.

#### **1.6 CERTIFICATES AND TRANSCRIPTS**

- .1 Immediately after award of Contract, submit Workplace Safety and Insurance Board (WSIB) status.
- .2 A certificate of Conformance will be submitted to the Departmental Representative, stating that the component(s) has been installed in conformance with the approved shop drawings. The Certificate of Conformance will bear the seal and signature of a Professional Engineer licensed in the province of Ontario.
- .3 Certificate of Conformance will be required for, but not be limited to the following:
  - .1 All components where shop drawings are required (unless directed otherwise by the Departmental Representative).
  - .2 As specified elsewhere in the Contract Documents.

**Part 2            Products**

**2.1                NOT USED**

.1            Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1            Not Used.

**END OF SECTION**

## **Part 1 General**

### **1.1 REFERENCES**

- .1 Canada Labour Code, R.S.C., 1985, c. L-2.
- .2 Canadian Standards Association (CSA)
  - .1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.
- .3 National Building Code 2010 (NBC)
  - .1 NBC 2010, Division B, Part 8 Safety Measures at Construction and Demolition Sites.
- .4 Province of Ontario
  - .1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended.
  - .2 O. Reg. 490/09 Designated Substances.
  - .3 Workplace Safety and Insurance Act, 1997.
  - .4 Municipal statutes and authorities.

### **1.2 SUBMITTALS**

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
  - .1 Results of site-specific safety hazard assessment.
  - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
  - .3 A personal protection equipment (PPE) program detailing PPE including but not limited to:
    - .1 Selection criteria based on site hazards.
    - .2 Use, maintenance, inspection and storage requirements and procedures.
    - .3 Decontamination and disposal procedures.
    - .4 Inspection procedures prior to during and after use, and other appropriate medical considerations.
    - .5 Limitations during temperature extremes, heat stress and other appropriate medical consideration.
  - .4 An organizational structure establishing the specific chain of command and specify the overall responsibilities of contractor's employees at the work site.
  - .5 A hazard communication program for informing workers, visitors and individuals outside of the work area as required. This will include but not be limited to a visitor safety and orientation policy and program that will include education on hazards, required PPE and accompaniment while on site.

- .6 Provide a Fire Safety Plan, specific to the work location, in accordance with NBC, Division B, Article 8.1.1.3 prior to commencement of work. The plan will be coordinated with, and integrated into, the existing Emergency Procedures and Evacuation Plan in place at the site. Deliver two copies of the Fire Safety Plan to the Departmental Representative not later than 14 days before commencing work.
- .7 A recent (current year) inspection form for all powered mobile equipment that will be used in fulfilling the terms of the contract indicating that the equipment is in a safe operating condition.
- .8 An acceptable parking policy for all powered mobile equipment to be used on the project. The policy must, at a minimum, be based on a hazard assessment that considers factors such as equipment type, potential for roll over, load capacity of the parking area, pedestrian and vehicular traffic, and potential for equipment tampering, equipment energy, and equipment contact with power lines.
- .9 A health and safety training program which includes a safety training matrix.
- .10 General safety rules.
- .3 Submit 2 copies of Contractor's work site health and safety inspection reports to Departmental Representative.
- .4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 02 81 01 - Hazardous Materials.
- .7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 10 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.
- .8 Departmental Representative's review of Contractor's final Health and Safety Plan will not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.
- .10 On-Site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

### **1.3 FILING OF NOTICE**

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

### **1.4 SAFETY ASSESSMENT**

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

## **1.5 MEETINGS**

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

## **1.6 REGULATORY REQUIREMENTS**

- .1 Comply with the Acts and regulations of the Province of Ontario.
- .2 Comply with specified standards and regulations to ensure safe operations at site.

## **1.7 PROJECT/SITE CONDITIONS**

- .1 Work at site will involve contact with:
  - .1 Lead in paint coating the metal structures in hoisting structures, dam lifts and railings on the North and South dams and the exterior paint on the shed.
  - .2 Silica in concrete of the North and South dams, walkways, and surfaces.
  - .3 Mercury (in low concentrations) in the paint.
  - .4 Arsenic (in low concentrations) in the paint.
- .2 For more details, see Section 02 81 01 - Hazardous Materials.

## **1.8 GENERAL REQUIREMENTS**

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

## **1.9 RESPONSIBILITY**

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

## **1.10 COMPLIANCE REQUIREMENTS**

- .1 Comply with Ontario Health and Safety Act, R.S.O.
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

## **1.11 UNFORESEEN HAZARDS**

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

## **1.12 HEALTH AND SAFETY COORDINATOR**

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

## **1.13 POSTING OF DOCUMENTS**

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario and in consultation with Departmental Representative.
  - .1 Contractor's Safety Policy.
  - .2 Constructor's Name.
  - .3 Notice of Project.
  - .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.

## **1.14 CORRECTION OF NONCOMPLIANCE**

- .1 Immediately address health and safety noncompliance 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 noncompliance of health and safety regulations is not corrected.

## **1.15 BLASTING**

- .1 Blasting or other use of explosives is not permitted without prior receipt of written instruction by Departmental Representative.

**1.16 POWDER-ACTUATED DEVICES**

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

**1.17 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.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 31 25 00 - Sedimentation and Erosion Controls.

**1.2 REFERENCES**

- .1 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 humans; or degrade environment aesthetically, culturally and/or historically.
  - .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

**1.3 SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.
- .3 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.
- .4 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .5 Include in Environmental Protection Plan:
  - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
  - .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
  - .3 Names and qualifications of persons responsible for training site personnel.
  - .4 Descriptions of environmental protection personnel training program.
  - .5 Erosion and Sediment Control Plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
  - .6 Fish habitat compensation plan.
  - .7 Drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
  - .8 Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.



- .1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.
- .9 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.
  - .1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.
- .10 Spill control plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
- .11 Contractor to maintain spill control during operations and clean-up equipment at designated construction site areas. Designate refuelling areas with impermeable barriers and controlled fuel storage. No fuelling will be conducted within 100 m of the French River or on bedrock surface.
- .12 Nonhazardous solid-waste disposal plan identifying methods and locations for solid-waste disposal including clearing debris.
- .13 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.
- .14 Contaminant prevention plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- .15 Waste water management plan identifying 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.
- .16 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.
- .17 Halocarbon control plan: submit documentation specified in PWGSC Ontario Region Halocarbon Information Sheet dated March 2010 including a signed, completed copy of the information sheet.
- .6 Sustainable Design Submittals:
  - .1 Construction Waste Management:
    - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
  - .2 Regional Materials: submit evidence that project incorporates required percentage 10% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.
  - .3 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.

#### **1.4 FIRES**

- .1 Fires and burning of rubbish on site is not permitted.

- .2 Ensure that all stationary metallic equipment are properly grounded.
- .3 Provide adequate firefighting equipment and trained personnel.
- .4 Eliminate sparking equipment near explosives, refueling or fuel storage areas. Obtain all fire permits and maintain contact with local fire departments on and off Dokis First Nation reserve.

## **1.5 DRAINAGE**

- .1 Develop and submit Erosion and Sediment Control Plan identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.
- .3 Provide temporary drainage and pumping required to keep excavations and site free from water.
- .4 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.
- .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

## **1.6 SITE CLEARING AND PLANT PROTECTION**

- .1 Limit clearing, grubbing, and tree-branch removal to areas of work or access indicated on approved shop drawings.
- .2 All clearing to take place during winter season to avoid any nest abandonment.
- .3 Protect trees and plants on site and adjacent properties and allow trees to overhang where possible to minimize habitat available to exotic species.
- .4 Provide barrier around trees which may be affected by the work. Locate barrier 1 m beyond drip line. Barrier to consist of a protective wood framework covered with plastic construction fence material, extending from grade level to a height of 2 m. Maintain barriers in good repair throughout the duration of Work. Remove these upon completion of Work.
- .5 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.
  - .1 Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .6 Minimize stripping of topsoil and vegetation.
- .7 Damage to trees as a result of Contractor's operations:
  - .1 Broken branches 25 mm or greater in diameter: cut back cleanly at the break, or to within 10 mm of their base, if a substantial portion of the branch is damaged. Departmental Representative will direct.
  - .2 Exposed roots 25 mm or larger: cut back cleanly to the soil surface within 5 calendar days of exposure.

- .3 Damaged bark: neatly trim back to uninjured bark, without causing further injury, within 5 calendar days of damage.
- .4 Reduce soil displacement and compaction by using heavy machinery in designated areas and on existing vehicle paths. Replace damaged lawn to pre-construction state with topsoil and sod.
- .5 Avoid using heavy machinery on saturated ground.
- .6 Use equipment of low-bearing weight and low psi tires wherever possible.

#### **1.7 POLLUTION CONTROL**

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area by providing temporary enclosures.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
- .5 Spills of Deleterious Substances:
  - .1 Immediately contain, limit spread and clean up in accordance with provincial regulatory requirements.
  - .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.

#### **1.8 HISTORICAL/ARCHAEOLOGICAL CONTROL**

- .1 If fossils are discovered during excavation work at the site, Departmental Representative shall be notified and work at the discovery site shall halt until significance is assessed.
- .2 If stripping or excavation work leads to the discovery of artifacts from historical human settlements (stone foundations, pottery, fragments of dishes, metal, tooled stone or other materials), Departmental Representative shall be notified and work at the discovery site shall halt until significance is assessed.

#### **1.9 SEDIMENT, DUST AND EROSION PROTECTION**

- .1 Control turbidity of all water released during the Work.
- .2 Do not pump water directly into the waterway. Send all discharge to a settling pond or filtration area before being released into the waterway. Settling pond or filtration area must be located a minimum of 50 m from the water's edge.
- .3 Sediment and erosion control in accordance with Section 31 25 00 - Sedimentation and Erosion Controls.
- .4 Provide a 1-m high silt fence barrier in all areas where, due to construction activities, silt or debris may enter the water. This includes, but is not limited to, a silt barrier installed around staging and work areas.

- .5 In the event of significant silting or debris caused by construction activities, Contractor must take appropriate measures to confine work.
- .6 Control disposal or runoff of water containing other harmful substances in accordance with local authority requirements.
- .7 Sediment, debris and erosion control measures must be inspected daily to ensure that they are functioning properly and are maintained and upgraded as required.
- .8 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.
- .9 Sediment, debris and erosion control measures must be left in place until all disturbed areas within the work area has been stabilized and any sediments in the water have settled. Removal will be permitted only after written approval from the Departmental Representative.
- .10 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- .11 Maintain a standby supply of prefabricated silt fence barrier, or an equivalent ready-to-install sediment control device.
- .12 Excavation to cease during periods of heavy rainfall, unless runoff is contained from entering waterway.
- .13 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.
- .14 Use dust suppressants on gravel roads during dry periods to minimize the dusting effect.

#### **1.10 WORK ADJACENT TO WATERWAYS**

- .1 Do not release any deleterious material into waterway.
- .2 Do not use salt as a deicer near watercourse. 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.
- .3 Ensure all equipment, temporary bridges, and access structures such as scaffolding placed in waterbodies is free of earth material, and excess, loose or leaking fuel, lubricants, coolant and other deleterious material that could enter the water body.
- .4 Do not use waterway beds for borrow material.
- .5 Do not dump excavated fill, waste material or debris in waterways.
- .6 Stockpile excavated or fill materials must be stored and stabilized away from the water. Runoff from the excavated or fill material must be contained from entering the waterway.
- .7 Design and construct temporary crossings and cofferdams to minimize erosion to waterways.
- .8 Do not skid logs or construction materials across waterways.
- .9 Avoid indicated spawning beds when constructing temporary crossings of waterways.

#### **1.11 OPERATION AND MAINTENANCE OF EQUIPMENT**

- .1 Do not operate heavy equipment in waterway, except when operated from a barge or when river bottom is dewatered within area of work.

- .2 Provide drip trays to prevent the discharge of oil, grease, antifreeze, or any other materials into the ground.
- .3 Equipment and heavy machinery used to meet or exceed all applicable emission requirements.
- .4 Leave machinery running only while in actual use, except where extreme temperatures prohibit shutting machinery down.
- .5 All vehicle/equipment maintenance and refueling must be conducted over impermeable/absorptive material situated at a designated site that is located at least 100 m away from the nearest water body. Absorptive material must also be placed at the bottom of drip pan for added measure.
- .6 Ensure that all vehicles are properly maintained and install muffling devices as required.

#### **1.12 HAZARDOUS MATERIALS**

- .1 Place materials defined as hazardous or toxic waste in designated containers.
- .2 Store hazardous materials in secure areas on impermeable pads, provide berms if necessary.

#### **1.13 CLEANING OF CONCRETE EQUIPMENT**

- .1 Use trigger-operated spray nozzles for water hoses.
- .2 Departmental Representative will designate a cleaning area for equipment and tools to limit water use and runoff. The cleaning area will be sufficiently far away from the watercourse to prevent contamination. Where no safe cleaning area is available, Contractor will 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.

#### **1.14 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, recreationists, and wildlife.
- .2 Comply with municipal noise by-laws to minimize the impacts of construction noise and dust.

#### **1.15 NOTIFICATION**

- .1 Departmental Representative will notify Contractor in writing of observed non-compliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection Plan.
- .2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
  - .1 Take action only after receipt of written approval by Departmental Representative.
- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

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

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **Part 3 Execution**

### **3.1 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Do not bury rubbish and waste materials on site.
- .3 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.
- .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .5 Waste management in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .6 All concrete equipment will be cleaned at the end of each working day.

### **3.2 TRANSPORTATION OF WASTE MATERIALS**

- .1 All waste subject to Regulation 558 of the Ontario Environmental Protection Act must be transported with a valid "Certificate of Approval for a Waste Management System" to a site approved by the Ontario Ministry of the Environment to accept that waste.
- .2 Be responsible for obtaining all waste generator numbers, permits, manifests, and all other paperwork necessary to comply.

### **3.3 ENVIRONMENTAL MITIGATION MEASURES**

- .1 Execute, during the work, the environmental mitigation measures mentioned below and complete the following Table:

<b>Environmental Mitigation Measure</b>	<b>Implementation Schedule/Date</b>	<b>Person/Title/Firm Responsible</b>	<b>Compliance (Task Complete – Yes or No/Date) If No, provide reason</b>
<b>Air Quality</b>			
Use new or well-maintained heavy equipment and machinery, preferably fitted with muffler/exhaust system baffles and engine covers.			

<b>Environmental Mitigation Measure</b>	<b>Implementation Schedule/Date</b>	<b>Person/Title/Firm Responsible</b>	<b>Compliance (Task Complete – Yes or No/Date) If No, provide reason</b>
Comply with operating specifications for heavy equipment and machinery.			
Minimize operation and idling of gas-powered equipment and vehicles, in particular, during smog advisories.			
Best management practices and compliance with municipal noise by-laws will be employed to minimize the impacts of construction noise and dust.			
Use of dust suppressants on gravel roads during dry periods to minimize the dusting effect. Ensure vehicles are properly maintained and install muffling devices as required. Limit and enforce speed limits on access roads. Enforce municipal by laws regarding construction activities and associated traffic.			
<b>Bedrock/Soil Quality</b>			
Reduce soil compaction by restricting large machinery to the designated staging area.			
Stabilize any loose soils with vegetation after construction to prevent erosion and transport.			
Cover any stockpiles to prevent erosion. Maintain effective erosion and sedimentation measures until complete re-vegetation is achieved.			
Minimize the area required to be cleared Apply erosion protection measures (e.g., silt fencing, erosion control blankets, revegetation, etc) as required.			
A liner is to be placed under the tower disassembly in order to catch any debris.			
Ensure hazardous substances (including fuel) are stored, handled and applied in a manner to prevent release to the environment.			

<b>Environmental Mitigation Measure</b>	<b>Implementation Schedule/Date</b>	<b>Person/Title/Firm Responsible</b>	<b>Compliance (Task Complete – Yes or No/Date) If No, provide reason</b>
Minimize the area required for removal of bedrock for dam construction. Blast mats will be used on the stream banks to temper the effect of the blast and also minimize the movement of rock immediately following the blasting.			
Designated re-fuelling areas with impermeable barriers and controlled fuel storage. Construction contractors are to maintain spill control and clean-up equipment at designated construction site areas. Maintenance crews will also maintain spill control and maintenance equipment during operations.			
<b>Surface Water Quality</b>			
Watercourse isolation; construction erosion control measures such as silt fencing, berms and turbidity curtains will be utilized as required to stop any materials from leaving the site via ditches and entering any surface watercourses.			
Refueling and maintenance of vehicles and equipment to be carried out on pre-designated location away from the project site, and any water bodies or wetland environments.			
A spill response kit to be on site in the event of a spill. Immediately contain and clean up any spills in accordance with provincial regulatory requirements. Report spill to the Ontario Spills Action Centre (1-800-268-6060).			
Project contractor staff and maintenance crews are to be fully trained on the proper implementation of the spill prevention plan.			



<b>Environmental Mitigation Measure</b>	<b>Implementation Schedule/Date</b>	<b>Person/Title/Firm Responsible</b>	<b>Compliance (Task Complete – Yes or No/Date) If No, provide reason</b>
Water levels within Lake Nipissing to be maintained as per the French River/Lake Nipissing Operational Guidelines (1995) to maintain current water levels for home owners/cottagers and tour operators.			
Operate and store materials and equipment in a manner that prevents deleterious substances from entering water or contaminating wetland or ice surface.			
All waste materials will be collected, removed from the site and disposed of at an appropriate disposal facility.			
<b>Groundwater Quality</b>			
Protect excavation with cover when possible.			
Soils will be removed and disposed of in an appropriate manner.			
Follow “Surface Water Quality” Mitigation Measures above.			
<b>Vegetation</b>			
Minimize damage and removal of vegetation to the extent possible, including consideration of minimal road routing.			
<b>Wildlife and Wildlife Habitat, including Birds</b>			
Minimize as much as possible any disturbances to vegetation on site.			
Clearing and blasting activities and heavy truck traffic should be minimized or avoided during bird and turtle nesting, and denning periods (March to July).			
All clearing should take place in winter.			
Minimize noise, dust and vibration from construction and ongoing operations.			
Ensure proper clearing and machinery operation protocols.			

<b>Environmental Mitigation Measure</b>	<b>Implementation Schedule/Date</b>	<b>Person/Title/Firm Responsible</b>	<b>Compliance (Task Complete – Yes or No/Date) If No, provide reason</b>
Restore areas requiring temporary removals with appropriate indigenous species.			
Minimize traffic along access roads and maintain safe speeds.			
Install appropriate silt fencing around site and along access roads to discourage wildlife movement within project area.			
Minimize width of clearing for dam construction access and allow trees to overhang where possible to minimize habitat available to exotic species.			
Do not import growing medium that may contain invasives. Reuse local growing medium.			
Nesting season for migratory birds is between May 9 to July 31 and all clearing work should be conducted outside of these dates. If work must be conducted within breeding bird habitat during the identified breeding season, a nest survey will be conducted by a qualified avian biologist immediately (i.e., within 2 days) prior to commencement of the works to identify and locate active nests of species covered by the Migratory Birds Convention Act, 1994. A mitigation plan (which may include establishing appropriate buffers around active nests) should then be developed to address any potential impacts on migratory birds or their active nests, and should be reviewed by Environment Canada prior to implementation.			

<b>Environmental Mitigation Measure</b>	<b>Implementation Schedule/Date</b>	<b>Person/Title/Firm Responsible</b>	<b>Compliance (Task Complete – Yes or No/Date) If No, provide reason</b>
<b>Fish and Fish Habitat</b>			
Isolation of in-stream working areas; erosion and sediment control (e.g., sediment barriers such as slit fences, turbidity curtains, surface treatment and revegetation, energy dissipation methods); runoff control measures such as rip rap and silt fencing.			
Any fish habitat that is considered to be lost due to the construction activities and new dam footprint will be offset by compensation.			
Appropriate permits and/or authorizations from DFO will be acquired prior to initiating any in water work.			
All oils, fuels and chemicals will be stored in suitable containers and handled in accordance with regulations. Temporary berms and groundsheets should be installed at all storage areas to contain possible leaks/spills. No fuelling should be conducted within 100 m of the French River or on bedrock surfaces. Spill clean-up materials and equipment such as sorbent, skimmers, portable pumps and shovels should be accessible at all construction locations. All spills should be cleaned up immediately and contaminated materials disposed of in an approved manner.			
Phase the development of the North and South structures to ensure ability to release minimum flows. Maintain minimum flows during construction (i.e., 10 m <sup>3</sup> /s during the April to July period and 2 m <sup>3</sup> /s during other times of the year).			

<b>Environmental Mitigation Measure</b>	<b>Implementation Schedule/Date</b>	<b>Person/Title/Firm Responsible</b>	<b>Compliance (Task Complete – Yes or No/Date) If No, provide reason</b>
Spill prevention/control measures such as designated re-fuelling areas, re-fuelling pads, emergency spill kits, spill response plans. Rehabilitation of construction staging areas and areas used for fuel storage and re-fuelling during construction.			
Adhere to the in water work timing restrictions between April 1 <sup>st</sup> and July 15 <sup>th</sup> .			
Minimize in-stream construction work (<72 hours) for such activities as cofferdam installation.			
Minimize water level fluctuations upstream and downstream through regulation of the North and South dam structures.			
<b>Acoustic Environment</b>			
Ensure that blasting activities near communities are conducted within the timing restrictions dictated by the municipal by-law for such work.			
Use well-maintained heavy equipment and machinery, preferably fitted with muffler/exhaust system baffles and engine covers.			
Ensure work is completed before spring migration/mating season (May).			
<b>Species at Risk</b>			
In the event that it is determined that project will likely have unexpected adverse effects on species at risk (SAR), the respective competent Minister [i.e., Environment Canada (EC) for migratory birds SAR and the Department of Fisheries and Oceans (DFO) for aquatic SAR], should be immediately notified.			

<b>Environmental Mitigation Measure</b>	<b>Implementation Schedule/Date</b>	<b>Person/Title/Firm Responsible</b>	<b>Compliance (Task Complete – Yes or No/Date) If No, provide reason</b>
Installation of silt fencing to prevent turtle and other wildlife movement on access roads. The silt fencing must be biodegradable and designed to minimize animal entrapment such as, but not limited to BioNet® and Curlex®.			
Post signs indicating the potential presence of turtles within the site and along access roads.			
Educate workers and PWGSC staff regarding Blanding's turtle management plan as well as other SAR potentially present on site.			
Establish protocols for managing SAR sightings.			
Post reduced speeds on all access roads.			
Allow no truck or machinery turnarounds at the junction between the dam access road and the main access road leading to the PWGSC administration buildings.			
Suspension of blasting and other heavy truck traffic during spring months (May 9 to July 31).			
If work must be conducted during the identified nesting season for Blanding's turtles (late March – November), a nest survey should be conducted by a qualified herpetologist immediately (i.e., within 2 days) prior to commencement of the works to identify and locate active nests.			

<b>Environmental Mitigation Measure</b>	<b>Implementation Schedule/Date</b>	<b>Person/Title/Firm Responsible</b>	<b>Compliance (Task Complete – Yes or No/Date) If No, provide reason</b>
If identified, a mitigation plan (which may include appropriate protective covers for the nests and establishing appropriate buffers around active nests) should then be developed to address any potential impacts on the Blanding's turtle. The mitigation should follow the information provided in the Blanding's Turtle Management Plan (AMEC, 2007).			
If turtles are observed nesting, suspend operations from mid September to November 1st and dismantle fencing to allow movement of turtles to potential wintering areas.			
<b>Waste Disposal</b>			
All waste generated to be disposed in a legal manner (O. Reg. 347, as amended).			
Disposal of any hazardous substances such as any lead will be done in a legal manner (i.e., O. Reg. 347, amended).			
Fires and burning of rubbish on site is not permitted.			
<b>Accidents and Malfunctions</b>			
Implement good transportation planning and safety measures to minimize traffic-related safety concerns. On-site operation of vehicles and on-site parking will be restricted to designated areas.			
Implement a traffic management plan to address turning movements near the site access points, if required.			
Ensure all workers adhere to local and site specific speed limits, traffic signage and utilize safe defensive driving practices.			

<b>Environmental Mitigation Measure</b>	<b>Implementation Schedule/Date</b>	<b>Person/Title/Firm Responsible</b>	<b>Compliance (Task Complete – Yes or No/Date) If No, provide reason</b>
Provide shoreline hazard signs to boaters and canoeists and clearly mark cofferdams and other hazardous in-water structures.			
Inform the French River Provincial Park superintendent of major construction activities and schedule to allow communications with river and park users.			
Inform local cottage associations along the French River and Lake Nipissing of major construction activities and schedule.			
Implement a spill prevention program. A spill response kit to be on site in the event of a spill. Immediately contain and clean up any spills in accordance with provincial regulatory requirements. Report spill to the Ontario Spills Action Centre (1-800-268-6060).			
Ensure workers have proper training in spill control and containment, and are required to implement spill control measures.			
Ensure proper storage of materials and operation of equipment to prevent deleterious substances from entering environment.			
Refuelling of any machinery or equipment not to be done within 30 m of the water or wetlands.			
Meet or exceed the requirements of all applicable federal and/or provincial health and safety legislation, regulations, and permits.			
Workers will wear protective gear (e.g., safety work boots, hard hats, etc.) in accordance with the Occupational Health and Safety Act and regulations.			

<b>Environmental Mitigation Measure</b>	<b>Implementation Schedule/Date</b>	<b>Person/Title/Firm Responsible</b>	<b>Compliance (Task Complete – Yes or No/Date) If No, provide reason</b>
All construction areas and machinery will be stabilized, made safe and/or secure at the end of each working day to prevent accidents to people and the environment.			
Ensure that all stationary metallic equipment is properly grounded. Provide adequate firefighting equipment and trained personnel. Eliminate sparking equipment near explosives, refueling or fuel storage areas. Obtain all fire permits and maintain contact with local fire departments on and off Dokis First Nation reserve.			

**END OF SECTION**



**Part 1            General**

**1.1                DEFINITIONS**

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

**1.2                INDEPENDENT INSPECTION AGENCIES**

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

**1.3                ACCESS TO WORK**

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

**1.4                PROCEDURES**

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

**1.5 REJECTED WORK**

- .1 Remove defective work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.

**1.6 REPORTS**

- .1 Submit the original and the electronic copy of inspection and test reports to Departmental Representative.
- .2 Provide copies to subcontractor of work being inspected or tested manufacturer or fabricator of material being inspected or tested.

**1.7 TESTS AND MIX DESIGNS**

- .1 Furnish test results and mix designs as requested.  
  
Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 52 00 - Construction Facilities.
- .2 Section 01 56 00 - Temporary Barriers and Enclosures.

**1.2 REFERENCES**

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

**1.3 SUBMITTALS**

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

**1.4 INSTALLATION AND REMOVAL**

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

**1.5 DEWATERING**

- .1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

**1.6 WATER SUPPLY**

- .1 Provide potable water for construction use.
- .2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.
- .3 Pay for utility charges at prevailing rates.

**1.7 TEMPORARY HEATING AND VENTILATION**

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 Vent all construction heaters used inside building to outside or use flameless type. Solid fuel salamanders are not permitted.
- .3 Provide temporary heat and ventilation in enclosed areas as required to:
  - .1 Facilitate progress of Work.
  - .2 Protect Work and products against dampness and cold.
  - .3 Prevent moisture condensation on surfaces.
  - .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.

- .5 Provide adequate ventilation to meet health regulations for safe working environment.
- .4 Maintain temperatures of minimum 10°C in areas where construction is in progress.
- .5 Ventilating:
  - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
  - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
  - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
  - .4 Ventilate storage spaces containing hazardous or volatile materials.
  - .5 Ventilate temporary sanitary facilities.
  - .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

## **1.8 TEMPORARY POWER AND LIGHT**

- .1 Provide and pay for temporary power during construction for temporary lighting and operating of power tools.
- .2 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.
- .3 Temporary power for electric cranes and other equipment requiring power is the responsibility of the Contractor.
- .4 Provide and maintain temporary lighting throughout project. Ensure level of illumination is not less than 162 lx.
- .5 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Departmental Representative provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than 3 months.

## **1.9 TEMPORARY COMMUNICATION FACILITIES**

- .1 Provide and pay for temporary telephone/fax/data hook-up, lines and equipment necessary for own use and use of Departmental Representative.
- .2 Cell phone reception is not available at the site. Wireless communication is available only through the use of satellite phones.

## **1.10 FIRE PROTECTION**

- .1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction, governing codes, regulations and by-laws.
- .2 Burning rubbish and construction waste materials is not permitted on site.

**Part 2            Products**

**2.1                NOT USED**

.1            Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1            Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 51 00 - Temporary Utilities.

**1.2 REFERENCES**

- .1 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
  - .2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
- .2 Canadian Standards Association (CSA International)
  - .1 CSA-A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA-0121-M1978(R2008), Douglas Fir Plywood.
  - .3 CAN/CSA-S269.2-M1987(R2009), Access Scaffolding for Construction Purposes.
  - .4 CAN/CSA-Z321-96(R2006), Signs and Symbols for the Occupational Environment.
- .3 US Environmental Protection Agency (EPA)/Office of Water
  - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

**1.3 SUBMITTALS**

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

**1.4 INSTALLATION AND REMOVAL**

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

**1.5 SCAFFOLDING**

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms and temporary stairs.

**1.6 HOISTING**

- .1 Provide, operate and maintain hoists/cranes required for moving of workers, materials and equipment. Make financial arrangements with subcontractors for their use of hoists.
- .2 Hoists/cranes to be operated by qualified operator.

**1.7 SITE STORAGE/LOADING**

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

**1.8 CONSTRUCTION PARKING**

- .1 Parking will be permitted on site provided it does not disrupt performance of Work.
- .2 Provide and maintain adequate access to project site.
- .3 Provide snow removal during period of Work.
- .4 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.
- .5 Clean roads and construction areas used by Contractor's equipment.

**1.9 SECURITY**

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

**1.10 OFFICES**

- .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.
  - .1 Protect sod and concrete from damage.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors to provide their own offices as necessary. Direct location of these offices within Construction facility area.
  - .1 Protect sod and concrete/asphalt from damage.
- .4 Departmental Representative's Site office.
  - .1 Provide temporary office for Departmental Representative.
  - .2 Inside dimensions minimum 3.6 m long x 3 m wide x 2.4 m high, with floor 0.3 m above grade, complete with four 50% opening windows and one lockable door.
  - .3 Insulate building and provide heating system to maintain 22°C inside temperature at -20°C outside temperature.
  - .4 Finish inside walls and ceiling with plywood, hardboard or wallboard and paint in selected colours. Finish floor with 19-mm thick plywood.

- .5 Install electrical lighting system to provide minimum 750 lx using surface-mounted, shielded commercial fixtures with 10% upward light component.
- .6 Equip office with 1-m x 2-m table, four chairs, 1.5-m long shelving 300 mm wide, 3-drawer filing cabinet, and coat rack.
- .7 Maintain in clean condition.

#### **1.11 EQUIPMENT, TOOL AND MATERIALS STORAGE**

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

#### **1.12 SANITARY FACILITIES**

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.
- .3 Provide potable water in accordance with Section 01 51 00 - Temporary Utilities.

#### **1.13 CONSTRUCTION SIGNAGE**

- .1 No other signs or advertisements, other than warning signs, are permitted on site.
- .2 Locate project identification sign as directed by Departmental Representative and construct as follows:
  - .1 Build concrete foundation, erect framework, and attach signboard to framing.
  - .2 Paint 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.
- .3 Direct requests for approval to erect Consultant/Contractor signboard to Departmental Representative. For consideration, general appearance of Consultant/Contractor signboard must conform to project identification site sign. Wording in both official languages.
- .4 Signs and notices for safety and instruction in both official languages. Graphic symbols to CAN/CSA-Z321.
- .5 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

#### **1.14 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.



- .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 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 is 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 to 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 Location, Grade, Width, and Alignment of Construction and Hauling Roads: subject to approval by Departmental Representative.
- .12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
- .13 Provide snow removal during period of Work.
- .14 Remove, upon completion of work, haul roads designated by Departmental Representative.

**1.15 CLEAN-UP**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3            Execution**

**3.1                TEMPORARY EROSION AND SEDIMENTATION CONTROL**

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

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 51 00 - Temporary Utilities.
- .2 Section 01 52 00 - Construction Facilities.

**1.2 REFERENCES**

- .1 Canadian General Standards Board (CGSB)
  - .1 CGSB 1.59-2000, Alkyd Exterior Gloss Enamel.
  - .2 CAN/CGSB 1.189-2000, Exterior Alkyd Primer for Wood.
- .2 Canadian Standards Association (CSA International)
  - .1 CSA-O121-M1978(R2008), Douglas Fir Plywood.

**1.3 INSTALLATION AND REMOVAL**

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

**1.4 HOARDING**

- .1 Erect temporary site enclosure using modular freestanding fencing: galvanized, minimum 1.8 m high, chain link or welded steel mesh, pipe rail. Provide one lockable entrance gate and one pedestrian gate. Equip gates with locks and keys. Maintain fence in good repair.
- .2 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures in accordance with Section 01 35 43 - Environmental Procedures.

**1.5 GUARDRAILS AND BARRICADES**

- .1 Provide secure, rigid guardrails and barricades around deep excavations, open shafts, open stair wells and open edges of floors.
- .2 Provide as required by governing authorities.

**1.6 WEATHER ENCLOSURES**

- .1 Design enclosures to withstand wind pressure, rain and snow loading.

**1.7 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.

**1.8 ACCESS TO SITE**

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

**1.9 PUBLIC TRAFFIC FLOW**

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

**1.10 FIRE ROUTES**

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

**1.11 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY**

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

**1.12 PROTECTION OF BUILDING FINISHES**

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers and hoardings.
- .3 Confirm with Departmental Representative locations and installation schedule 14 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

**1.13 WASTE MANAGEMENT AND DISPOSAL**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 45 00 - Quality Control.

**1.2 REFERENCES**

- .1 Within text of each specifications section, reference may be made to reference standards.
- .2 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .3 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .4 Cost for such testing will be borne by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of nonconformance with Contract Documents.

**1.3 QUALITY**

- .1 Products, materials, equipment and articles incorporated in Work will be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Procurement policy is to acquire, in cost-effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .5 Maintain uniformity of manufacture for any particular or like item throughout Work.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

**1.4 METRIC-SIZED MATERIALS**

- .1 SI metric units of measurement are used exclusively on the drawings and in the specifications for this project.
- .2 The Contractor is required to provide metric products in the sizes called for in the Contract Documents except where a valid claim can be made that a particular product is not available on the Canadian market.

- .3 Claims for exemptions from use of metric sized products will be in writing and fully substantiated with supportive documentation. Promptly submit application to Departmental Representative for consideration and ruling. Nonmetric-sized products may not be used unless Contractor's application has been approved in writing by the Departmental Representative.
- .4 Difficulties caused by Contractor's lack of planning and effort to obtain modular metric-sized products which are available on the Canadian market will not be considered sufficient reasons for claiming that they cannot be provided.
- .5 Claims for additional costs due to provision of specified modular metric-sized products will not be considered.

## **1.5 STORAGE, HANDLING AND PROTECTION**

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

## **1.6 TRANSPORTATION**

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

## **1.7 MANUFACTURER'S INSTRUCTIONS**

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.

- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

## **1.8 QUALITY OF WORK**

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

## **1.9 COORDINATION**

- .1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

## **1.10 CONCEALMENT**

- .1 In finished areas conceal pipes, ducts and wiring in floors and walls except where indicated otherwise.
- .2 Before installation, inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

## **1.11 REMEDIAL WORK**

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

## **1.12 LOCATION OF FIXTURES**

- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated in the building drawing as approximate.
- .2 Inform Departmental Representative of conflicting installation. Install as directed by the Departmental Representative.

## **1.13 FASTENINGS**

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.

- .3 Use noncorrosive hot-dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

#### **1.14 FASTENINGS - EQUIPMENT**

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
- .3 Bolts may not project more than one diameter beyond nuts.
- .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

#### **1.15 PROTECTION OF WORK IN PROGRESS**

- .1 Prevent overloading of parts of structure. Do not cut, drill or sleeve load-bearing structural member without written approval of Departmental Representative.

#### **1.16 EXISTING UTILITIES**

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, Institution and pedestrian and vehicular traffic.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

### **Part 2 Products**

#### **2.1 NOT USED**

- .1 Not Used.

### **Part 3 Execution**

#### **3.1 NOT USED**

- .1 Not Used.



**END OF SECTION**

**Part 1 General**

**1.1 SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit written request in advance of cutting or alteration which affects:
  - .1 Structural integrity of elements of project.
  - .2 Integrity of weather-exposed or moisture-resistant elements.
  - .3 Efficiency, maintenance, or safety of operational elements.
  - .4 Visual qualities of sight-exposed elements.
- .3 Include in request:
  - .1 Identification of project.
  - .2 Location and description of affected Work.
  - .3 Statement on necessity for cutting or alteration.
  - .4 Description of proposed Work, and products to be used.
  - .5 Alternatives to cutting and patching.
  - .6 Date and time work will be executed.

**1.2 MATERIALS**

- .1 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

**1.3 PREPARATION**

- .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering, inspect conditions affecting performance of Work.
- .3 Beginning of cutting or patching means acceptance of existing conditions.
- .4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
- .5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.
- .6 Provide protection from elements for maintaining existing emergency doors in operation during construction progress.

**1.4 EXECUTION**

- .1 Execute cutting, fitting, and patching including excavation and fill to complete Work.
- .2 Fit several parts together to integrate with other Work.
- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and nonconforming Work.

- .5 Remove samples of installed Work for testing.
- .6 Provide openings in nonstructural elements of Work for penetrations of mechanical and electrical Work.
- .7 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .8 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .9 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .10 Restore work with new products in accordance with requirements of Contract Documents.
- .11 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .12 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.
- .13 Conceal pipes, ducts and wiring in floor and wall construction of finished areas except where indicated otherwise.

**1.5 WASTE MANAGEMENT AND DISPOSAL**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 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 daily 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 to site, bank/pile snow in designated areas as directed by Departmental Representative.
- .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.
  - .1 Provide secure fencing around containers and inaccessible by inmates.
  - .2 Location as directed by Institution and Departmental Representative.
  - .3 Indicate location on prepared site plan in accordance with Section 01 52 00 - Construction Facilities.
- .6 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .7 Remove waste materials and debris from site at end of each working day.
- .8 Dispose of waste materials and debris off site.
- .9 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .10 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .11 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .12 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .13 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate structure systems.

**1.2 FINAL CLEANING**

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

- .4 Remove waste products and debris other than that caused by Institution or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures and walls.
- .8 Clean lighting reflectors, lenses, and other lighting surfaces.
- .9 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .10 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .11 Remove dirt and other disfiguration from exterior surfaces.
- .12 Sweep and wash clean paved areas.
- .13 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .14 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .15 Remove snow and ice from access to site.

**1.3 WASTE MANAGEMENT AND DISPOSAL**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 WASTE MANAGEMENT GOALS**

- .1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PWGSC's Waste Management Plan and Goals.
- .2 PWGSC's Waste Management Goal is that 90% for nonhazardous total Project solid waste be diverted from landfill sites. Provide Departmental Representative documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced.
- .3 Accomplish maximum control of solid construction waste.
- .4 Preserve environment and prevent pollution and environment damage.

**1.2 REFERENCES**

- .1 Environmental Protection Act, R.S.O. 1990, Chapter E.19.
- .2 R.R.O. 1990, Regulation 347, Amended to O. Reg. 326/03 Waste Management.
- .3 Environmental Quality Act (Q-2).
- .4 Regulation respecting solid waste (Q-2, r.3.2).
- .5 Regulation respecting hazardous materials (Q-2, r.15.2).

**1.3 DEFINITIONS**

- .1 Class III: nonhazardous waste - construction renovation and demolition waste.
- .2 Cost/Revenue Analysis Workplan (CRAW): based on information from Waste Reduction Plan (WRW), and intended as financial tracking tool for determining economic status of waste management practices.
- .3 Demolition Waste Audit (DWA): relates to actual waste generated from project.
- .4 Inert Fill: inert waste - exclusively asphalt and concrete.
- .5 Materials Source Separation Program (MSSP): consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.
- .6 Recyclable: ability of product or material to be recovered at end of its life cycle and remanufactured into new product for reuse.
- .7 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .8 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .9 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

- .1 Salvaging reusable materials from remodelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
- .2 Returning reusable items including pallets or unused products to vendors.
- .10 Salvage: removal of structural and nonstructural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .11 Separate Condition: refers to waste sorted into individual types.
- .12 Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.
- .13 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill. Refer to Schedule A.
- .14 Waste Management Coordinator (WMC): Contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.
- .15 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. Refer to Schedule B. WRW is based on information acquired from WA (Schedule A).

#### **1.4 DOCUMENTS**

- .1 Maintain at job site, one copy of following documents:
  - .1 Waste Audit.
  - .2 Waste Reduction Workplan.
  - .3 Material Source Separation Plan.
  - .4 Schedules A, B, C, D and E completed for project.

#### **1.5 SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare and submit following prior to project start-up:
  - .1 Submit 2 copies of completed Waste Audit (WA): Schedule A.
  - .2 Submit 2 copies of completed Waste Reduction Workplan (WRW): Schedule B.
  - .3 Submit 2 copies of completed Demolition Waste Audit (DWA): Schedule C.
  - .4 Submit 2 copies of Cost/Revenue Analysis Workplan (CRAW): Schedule D.
  - .5 Submit 2 copies of Materials Source Separation Program (MSSP) description.
- .3 Submit before final payment summary of waste materials salvaged for reuse, recycling or disposal by project using deconstruction/disassembly material audit form.
  - .1 Failure to submit could result in holdback of final payment.
  - .2 Provide receipts, scale tickets, waybills, and show quantities and types of materials reused, recycled, co-mingled and separated off-site or disposed of.

- .3 For each material reused, sold or recycled from project, include amount in tonnes and the destination.
- .4 For each material land filled or incinerated from project, include amount in tonnes of material and identity of landfill, incinerator or transfer station.

#### **1.6 WASTE AUDIT (WA)**

- .1 Conduct WA prior to project start-up.
- .2 Prepare WA: Schedule A.
- .3 Record, on WA - Schedule A, extent to which materials or products used consist of recycled or reused materials or products.

#### **1.7 WASTE REDUCTION WORKPLAN (WRW)**

- .1 Prepare WRW prior to project start-up.
- .2 WRW should include but not limited to:
  - .1 Destination of materials listed.
  - .2 Deconstruction/disassembly techniques and sequencing.
  - .3 Schedule for deconstruction/disassembly.
  - .4 Location.
  - .5 Security.
  - .6 Protection.
  - .7 Clear labelling of storage areas.
  - .8 Details on materials handling and removal procedures.
  - .9 Quantities for materials to be salvaged for reuse or recycled and materials sent to landfill.
- .3 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.
- .4 Describe management of waste.
- .5 Identify opportunities for reduction, reuse, and recycling of materials. Based on information acquired from WA.
- .6 Post WRW or summary where workers at site are able to review content.
- .7 Set realistic goals for waste reduction, recognize existing barriers and develop strategies to overcome these barriers.
- .8 Monitor and report on waste reduction by documenting total volume and cost of actual waste removed from project.

#### **1.8 DEMOLITION WASTE AUDIT (DWA)**

- .1 Prepare DWA prior to project start-up.
- .2 Complete DWA: Schedule C.



- .3 Provide inventory of quantities of materials to be salvaged for reuse, recycling or disposal.

## **1.9 COST/REVENUE ANALYSIS WORKPLAN (CRAW)**

- .1 Prepare CRAW: Schedule D.

## **1.10 MATERIALS SOURCE SEPARATION PROGRAM (MSSP)**

- .1 Prepare MSSP and have ready for use prior to project start-up.
- .2 Implement MSSP for waste generated on project in compliance with approved methods and as reviewed by Departmental Representative.
- .3 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
- .4 Provide containers to deposit reusable and recyclable materials.
- .5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
- .6 Locate separated materials in areas which minimize material damage.
- .7 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.

## **1.11 WASTE PROCESSING SITES**

- .1 Province of: Ontario.
  - .1 Name: 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.

## **1.12 STORAGE, HANDLING AND PROTECTION**

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.
- .2 Unless specified otherwise, materials for removal do not become Contractor's property.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate nonsalvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .5 Protect structural components not removed for demolition from movement or damage.
- .6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.
- .7 Protect surface drainage, mechanical and electrical from damage and blockage.
- .8 Separate and store materials produced during dismantling of structures in designated areas.

- .9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
  - .1 On-site source separation is recommended.
  - .2 Remove co-mingled materials to off-site processing facility for separation.
  - .3 Provide waybills for separated materials.

### **1.13 DISPOSAL OF WASTES**

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste, volatile materials, mineral spirits, oil, paint thinner into waterways, storm, or sanitary sewers.
- .3 Keep records of construction waste including:
  - .1 Number and size of bins.
  - .2 Waste type of each bin.
  - .3 Total tonnage generated.
  - .4 Tonnage reused or recycled.
  - .5 Reused or recycled waste destination.
- .4 Remove materials from deconstruction as deconstruction/disassembly Work progresses.
- .5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in predemolition material audit.

### **1.14 USE OF SITE AND FACILITIES**

- .1 Execute work with least possible interference or disturbance to normal use of premises.
- .2 Provide security measures approved by Departmental Representative.

### **1.15 SCHEDULING**

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

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **Part 3 Execution**

### **3.1 APPLICATION**

- .1 Do Work in compliance with WRW.
- .2 Handle waste materials not reused, salvaged or recycled in accordance with appropriate regulations and codes.

### 3.2 CLEANING

- .1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
- .2 Clean-up work area as work progresses.
- .3 Source separate materials to be reused/recycled into specified sort areas.

### 3.3 DIVERSION OF MATERIALS

- .1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Departmental Representative and consistent with applicable fire regulations.
  - .1 Mark containers or stockpile areas.
  - .2 Provide instruction on disposal practices.
- .2 On-site sale of salvaged, recovered, reusable, recyclable materials is not permitted.
- .3 Demolition Waste:

Material Type	Recommended Diversion %	Actual Diversion %
Concrete	100	_____
Electrical Equipment	80	_____
Mechanical Equipment	100	_____
Metals	100	_____
Rubble	100	_____
Wood (uncontaminated)	100	_____
Formwork	100	_____
Other		_____

- .4 Construction Waste:

Material Type	Recommended Diversion %	Actual Diversion %
Cardboard	100	_____
Plastic Packaging	100	_____
Rubble	100	_____
Steel	100	_____
Wood (uncontaminated)	100	_____
Other		_____

### 3.4 WASTE AUDIT (WA)

- .1 Schedule A - Waste Audit (WA):

(1) Material Category	(2) Material Quantity Unit	(3) Estimated Waste %	(4) Total Quantity of Waste (unit)	(5) Generation Point	(6) % Recycled	(7) % Reused
Concrete						
Electrical Equipment						
Mechanical Equipment						
Metals/Steel						

(1) Material Category	(2) Material Quantity Unit	(3) Estimated Waste %	(4) Total Quantity of Waste (unit)	(5) Generation Point	(6) % Recycled	(7) % Reused
Rubble						
Wood (uncontaminated)						
Formwork						
Cardboard						
Plastic Packaging						
Other						

### 3.5 WASTE REDUCTION WORKPLAN (WRW)

#### .1 Schedule B:

(1) Material Category	(2) Person(s) Responsible	(3) Total Quantity of Waste (unit)	(4) Reused Amount (units) Projected	Actual	(5) Recycled Amount (unit) Projected	Actual	(6) Material(s) Destination
Concrete							
Electrical Equipment							
Mechanical Equipment							
Metals/Steel							
Rubble							
Wood (uncontaminated)							
Formwork							
Cardboard							
Plastic Packaging							
Other							

### 3.6 DEMOLITION WASTE AUDIT (DWA)

#### .1 Schedule C - Demolition Waste Audit (DWA):

(1) Material Description	(2) Quantity	(3) Unit	(4) Total	(5) Volume (m <sup>3</sup> )	(6) Weight (kg)	(7) Remarks and Assumptions
Concrete						
Electrical Equipment						
Mechanical Equipment						
Metals/Steel						
Rubble						
Wood (uncontaminated)						
Formwork						

(1) Material Description	(2) Quantity	(3) Unit	(4) Total	(5) Volume (m <sup>3</sup> )	(6) Weight (kg)	(7) Remarks and Assumptions
Cardboard						
Plastic Packaging						
Other						

### 3.7 COST/REVENUE ANALYSIS WORKPLAN (CRAW)

#### .1 Schedule D - Cost/Revenue Analysis Workplan (CRAW):

(1) Material Description	(2) Total Quantity (unit)	(3) Volume (m <sup>3</sup> )	(4) Weight (kg)	(5) Disposal Cost/Credit \$(+/-)	(6) Category Sub-Total \$(+/-)
Concrete					
Electrical Equipment					
Mechanical Equipment					
Metals/Steel					
Rubble					
Wood (uncontaminated)					
Formwork					
Cardboard					
Plastic Packaging					
Other					
		(7) Cost (-) / Revenue (+)			\$

### 3.8 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

#### .1 Schedule E - Government Chief Responsibility for the Environment:

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

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 79 00 - Demonstration and Training.
- .2 Section 01 91 13 - General Commissioning (Cx) Requirements.

**1.2 SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Four weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of operating and maintenance manuals in English and French.
- .3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .4 Provide evidence, if requested, for type, source and quality of products supplied.

**1.3 FORMAT**

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf, 219 x 279 mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings:
  - .1 Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by systems under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.
  - .1 Bind in with text; fold larger drawings to size of text pages.
- .9 Provide 1:1-scaled CAD files in dwg format on CD/DVD or USB Drive.

**1.4 CONTENTS - PROJECT RECORD DOCUMENTS**

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

- .2 For each product or system:
  - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data.
  - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.
- .6 Training: refer to Section 01 79 00 - Demonstration and Training.

## **1.5 AS -BUILT DOCUMENTS AND SAMPLES**

- .1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Change Orders and other modifications to Contract.
  - .5 Reviewed shop drawings, product data and samples.
  - .6 Field test records.
  - .7 Inspection certificates.
  - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
  - .1 Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with section number listings in List of Contents of this Project Manual.
  - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
  - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.
- .6 Submit four paper copies and AutoCAD electronic copies of as-built drawings and specifications to Departmental Representative on completion of work. Mark submittal as "AS-BUILT".

## **1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS**

- .1 Record information on set of black-line opaque drawings, and in copy of Project Manual, provided by Departmental Representative.

- .2 Use felt-tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress.
  - .1 Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
  - .1 Measured depths of elements of foundation in relation to finish first floor datum.
  - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
  - .4 Field changes of dimension and detail.
  - .5 Changes made by change orders.
  - .6 Details not on original Contract Drawings.
  - .7 References to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
  - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
  - .2 Changes made by Addenda and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications and field test records, required by individual specifications sections.
- .7 Provide digital photos, if requested, for site records.

## **1.7 EQUIPMENT AND SYSTEMS**

- .1 For each item of equipment and each system include description of unit or system, and component parts.
  - .1 Give function, normal operation characteristics and limiting conditions.
  - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panelboard circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour-coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
  - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
  - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.



- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's coordination drawings, with installed colour-coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control and Section 01 91 13 - General Commissioning (Cx) Requirements.
- .15 Additional requirements: as specified in individual specification sections.

## **1.8 MATERIALS AND FINISHES**

- .1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
  - .1 Provide information for re-ordering custom-manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional requirements: as specified in individual specifications sections.

## **1.9 MAINTENANCE MATERIALS**

- .1 Spare Parts:
  - .1 Provide spare parts, in quantities specified in individual specification sections.
  - .2 Provide items of same manufacture and quality as items in Work.
  - .3 Deliver to site and location as directed; place and store.
  - .4 Receive and catalogue items.
    - .1 Submit inventory listing to Departmental Representative.
    - .2 Include approved listings in Maintenance Manual.
  - .5 Obtain receipt for delivered products and submit prior to final payment.
- .2 Extra Stock Materials:
  - .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
  - .2 Provide items of same manufacture and quality as items in Work.
  - .3 Deliver to site and location as directed; place and store.

- .4 Receive and catalogue items.
  - .1 Submit inventory listing to Departmental Representative.
  - .2 Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.
- .3 Special Tools:
  - .1 Provide special tools, in quantities specified in individual specification section.
  - .2 Provide items with tags identifying their associated function and equipment.
  - .3 Deliver to site location as directed; place and store.
  - .4 Receive and catalogue items.
    - .1 Submit inventory listing to Departmental Representative.
    - .2 Include approved listings in Maintenance Manual.

#### **1.10 DELIVERY, STORAGE AND HANDLING**

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and for review by Departmental Representative.

#### **1.11 WARRANTIES AND BONDS**

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned prewarranty conference, to Departmental Representative approval.
- .3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit warranty information made available during construction phase to Departmental Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
  - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
  - .2 List subcontractor, supplier and manufacturer, with name, address and telephone number of responsible principal.
  - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within 10 days after completion of applicable item of work.

- .4 Verify that documents are in proper form, contain full information, and are notarized.
- .5 Co-execute submittals when required.
- .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with Institution's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Conduct joint 4-month and 9-month warranty inspection, measured from time of acceptance, by Departmental Representative.
- .9 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .10 Written verification to follow oral instructions.
  - .1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

**1.12 WARRANTY TAGS**

- .1 Tag, at time of installation, each warranted item. Provide durable, oil- and water-resistant tag approved by Departmental Representative.
- .2 Attach tags with copper wire and spray with waterproof silicone coating.
- .3 Leave date of acceptance until project is accepted for occupancy.
- .4 Indicate following information on tag:
  - .1 Type of product/material.
  - .2 Model number.
  - .3 Serial number.
  - .4 Contract number.
  - .5 Warranty period.
  - .6 Inspector's signature.
  - .7 Construction Contractor.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 ADMINISTRATIVE REQUIREMENTS**

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to Departmental Representative's personnel at least 2 weeks prior to date of substantial performance.
- .2 Departmental Representative will provide list of personnel to receive instructions, and coordinate their attendance at agreed-upon times.
- .3 Preparation:
  - .1 Verify conditions for demonstration and instructions comply with requirements.
  - .2 Verify designated personnel are present.
  - .3 Ensure equipment has been inspected and put into operation in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements.
  - .4 Ensure testing, adjusting, and balancing have been performed in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and equipment and systems are fully operational.
- .4 Demonstration and Instructions:
  - .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times, at the equipment location.
  - .2 Instruct personnel in phases of operation and maintenance using approved operation and maintenance manuals as basis of instruction.
  - .3 Review contents of manual in detail to explain aspects of operation and maintenance.
  - .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

**1.2 SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit schedule of time and date for demonstration and training for each item of equipment and each system 2 weeks prior to designated dates, for Departmental Representative's approval.
- .3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .4 Give time and date of each demonstration, with list of persons present.
- .5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

**1.3 QUALITY ASSURANCE**

- .1 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:
  - .1 Instruct Departmental Representative's personnel.
  - .2 Provide written report that demonstration and instructions have been completed.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

## **Part 1 General**

### **1.1 SUMMARY**

- .1 Acronyms:
  - .1 BMM - Building Management Manual.
  - .2 Cx - Commissioning.
  - .3 EMCS - Energy Monitoring and Control Systems.
  - .4 O M - Operation and Maintenance.
  - .5 PI - Product Information.
  - .6 PV - Performance Verification.
  - .7 TAB - Testing, Adjusting and Balancing.
- .2 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's PV responsibilities have been completed and approved. Objectives:
  - .1 Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.
  - .2 Ensure appropriate documentation is compiled into the BMM.
  - .3 Effectively train O M staff.
- .3 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
  - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
  - .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
- .4 Design Criteria: as per Institution's requirements. To meet Project functional and operational requirements.

### **1.2 COMMISSIONING OVERVIEW**

- .1 Section 01 91 31 - Commissioning (Cx) Plan.
- .2 For Cx responsibilities, refer to Section 01 91 31 - Commissioning (Cx) Plan.
- .3 Cx to be a line item of Contractor's cost breakdown.
- .4 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .5 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional

and operational requirements. Cx activities include transfer of critical knowledge to facility operational personnel.

- .6 Departmental Representative will issue Interim Acceptance Certificate when:
  - .1 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.
  - .2 Equipment, components and systems have been commissioned.
  - .3 O M training has been completed.

### **1.3 NONCONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS**

- .1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, reverify equipment and components within the unfunctional system, including related systems as deemed required by Departmental Representative, to ensure effective performance.
- .2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by Contractor. Above costs to be in the form of progress payment reductions or holdback assessments.

### **1.4 PRE-CX REVIEW**

- .1 Before Construction:
  - .1 Review contract documents, confirm in writing to Departmental Representative.
    - .1 Adequacy of provisions for Cx.
    - .2 Aspects of design and installation pertinent to success of Cx.
- .2 During Construction:
  - .1 Coordinate provision, location and installation of provisions for Cx.
- .3 Before Start of Cx:
  - .1 Have completed Cx Plan up to date.
  - .2 Ensure installation of related components, equipment, subsystems, and systems are complete.
  - .3 Fully understand Cx requirements and procedures.
  - .4 Have Cx documentation shelf-ready.
  - .5 Understand completely design criteria and intent and special features.
  - .6 Submit complete start-up documentation to Departmental Representative.
  - .7 Have Cx schedules up to date.
  - .8 Ensure systems have been cleaned thoroughly.
  - .9 Complete TAB procedures on systems; submit TAB reports to Departmental Representative for review and approval.
  - .10 Ensure "As-Built" system schematics are available.
- .4 Inform Departmental Representative in writing of discrepancies and deficiencies on finished works.

## **1.5 CONFLICTS**

- .1 Report conflicts between requirements of this section and other sections to Departmental Representative before start-up and obtain clarification.
- .2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

## **1.6 SUBMITTALS**

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Submit no later than 4 weeks after award of Contract:
    - .1 Name of Contractor's Cx agent.
    - .2 Draft Cx documentation.
    - .3 Preliminary Cx schedule.
  - .2 Request in writing to Departmental Representative for changes to submittals and obtain written approval at least 8 weeks prior to start of Cx.
  - .3 Submit proposed Cx procedures to Departmental Representative where not specified and obtain written approval at least 8 weeks prior to start of Cx.
  - .4 Provide additional documentation relating to Cx process required by Departmental Representative.

## **1.7 COMMISSIONING DOCUMENTATION**

- .1 Departmental Representative to review and approve Cx documentation.
- .2 Provide completed and approved Cx documentation to Departmental Representative.

## **1.8 COMMISSIONING SCHEDULE**

- .1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM).
- .2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
  - .1 Approval of Cx reports.
  - .2 Verification of reported results.
  - .3 Repairs, retesting, recommissioning, reverification.
  - .4 Training.

## **1.9 COMMISSIONING MEETINGS**

- .1 Convene Cx meetings following project meetings: Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM) and as specified herein.
- .2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.
- .3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.



- .4 At 40% construction completion stage: Departmental Representative to call a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:
  - .1 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.
  - .2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.
- .5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.
- .6 Meeting will be chaired by Departmental Representative, who will record and distribute minutes.
- .7 Ensure subcontractors and relevant manufacturer representatives are present at 60% and subsequent Cx meetings and as required.

#### **1.10 STARTING AND TESTING**

- .1 Contractor assumes liabilities and costs for inspections including disassembly and reassembly after approval, starting, testing and adjusting, including supply of testing equipment.

#### **1.11 WITNESSING OF STARTING AND TESTING**

- .1 Provide 14 days notice prior to commencement.
- .2 Departmental Representative to witness of start-up and testing.
- .3 Contractor's Cx Agent to be present at tests performed and documented by subtrades, suppliers and equipment manufacturers.

#### **1.12 MANUFACTURER'S INVOLVEMENT**

- .1 Factory Testing: manufacturer to:
  - .1 Coordinate time and location of testing.
  - .2 Provide testing documentation for approval by Departmental Representative.
  - .3 Arrange for Departmental Representative to witness tests.
  - .4 Obtain written approval of test results and documentation from Departmental Representative before delivery to site.
- .2 Obtain manufacturer's installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with Departmental Representative.
  - .1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.
  - .2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.
- .3 Integrity of Warranties:
  - .1 Use manufacturer's trained start-up personnel where specified elsewhere in other divisions or required to maintain integrity of warranty.
  - .2 Verify with manufacturer that testing as specified will not void warranties.

- .4 Qualifications of Manufacturer's Personnel:
  - .1 Experienced in design, installation and operation of equipment and systems.
  - .2 Able to interpret test results accurately.
  - .3 To report results in clear, concise, logical manner.

### **1.13 PROCEDURES**

- .1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.
- .2 Conduct start-up and testing in following distinct phases:
  - .1 Included in delivery and installation:
    - .1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.
    - .2 Visual inspection of quality of installation.
  - .2 Start-up: follow approved start-up procedures.
  - .3 Operational testing: document equipment performance.
  - .4 System PV: include repetition of tests after correcting deficiencies.
  - .5 Post-substantial PV: to include fine-tuning.
- .3 Correct deficiencies and obtain approval from Departmental Representative after distinct phases have been completed and before commencing next phase.
- .4 Document required tests on approved PV forms.
- .5 Failure to follow approved start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Departmental Representative. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement the following:
  - .1 Minor equipment/systems: implement corrective measures approved by Departmental Representative.
  - .2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Departmental Representative.
  - .3 If evaluation report concludes that major damage has occurred, Departmental Representative will reject equipment.
    - .1 Rejected equipment to be removed from site and replaced with new.
    - .2 Subject new equipment/systems to specified start-up procedures.

### **1.14 START-UP DOCUMENTATION**

- .1 Assemble start-up documentation and submit to Departmental Representative for approval 2 weeks before commencement of commissioning.
- .2 Start-up documentation to include:
  - .1 Factory and on-site test certificates for specified equipment.
  - .2 Prestart-up inspection reports.
  - .3 Signed installation/start-up check lists.
  - .4 Start-up reports.

- .5 Step-by-step description of complete start-up procedures, to permit Departmental Representative to repeat start-up at any time.

#### **1.15 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS**

- .1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.
- .2 With assistance of manufacturer, develop written maintenance program and submit to Departmental Representative for approval before implementation.
- .3 Operate and maintain systems for length of time required for commissioning to be completed.
- .4 After completion of commissioning, operate and maintain systems until issuance of certificate of interim acceptance.

#### **1.16 TEST RESULTS**

- .1 If start-up, testing and/or PV produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.
- .2 Provide manpower and materials, assume costs for recommissioning.

#### **1.17 START OF COMMISSIONING**

- .1 Notify Departmental Representative at least 21 days prior to start of Cx.
- .2 Start Cx after elements of building affecting start-up and PV of systems have been completed.

#### **1.18 INSTRUMENTS/EQUIPMENT**

- .1 Submit to Departmental Representative for review and approval:
  - .1 Complete list of instruments proposed to be used.
  - .2 Listed data including serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.

#### **1.19 COMMISSIONING PERFORMANCE VERIFICATION**

- .1 Carry out Cx:
  - .1 Under approved simulated operating conditions, over entire operating range, in all modes.
  - .2 On independent systems and interacting systems.
- .2 Cx procedures to be repeatable and reported results are to be verifiable.
- .3 Follow equipment manufacturer's operating instructions.
- .4 EMCS trending to be available as supporting documentation for PV.

#### **1.20 WITNESSING COMMISSIONING**

- .1 Departmental Representative to witness activities and verify results.

**1.21 AUTHORITIES HAVING JURISDICTION**

- .1 Where specified start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for authority to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.
- .2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.
- .3 Provide copies to Departmental Representative within 5 days of test and with Cx report.

**1.22 EXTENT OF VERIFICATION**

- .1 Conduct tests repeated during verification under same conditions as original tests, using same test equipment and instrumentation.
- .2 Review and repeat commissioning of systems if inconsistencies found in more than 20% of reported results.
- .3 Perform additional commissioning until results are acceptable to Departmental Representative.

**1.23 REPEAT VERIFICATIONS**

- .1 Assume costs incurred by Departmental Representative for third and subsequent verifications where:
  - .1 Verification of reported results fails to receive Departmental Representative's approval.
  - .2 Repetition of second verification again fails to receive approval.
  - .3 Departmental Representative deems Contractor's request for second verification was premature.

**1.24 SUNDRY CHECKS AND ADJUSTMENTS**

- .1 Make adjustments and changes which become apparent as Cx proceeds.
- .2 Perform static and operational checks as applicable and as required.

**1.25 DEFICIENCIES, FAULTS, DEFECTS**

- .1 Correct deficiencies found during start-up and Cx to satisfaction of Departmental Representative.
- .2 Report problems, faults or defects affecting Cx to Departmental Representative in writing. Stop Cx until problems are rectified. Proceed with written approval from Departmental Representative.

**1.26 COMPLETION OF COMMISSIONING**

- .1 Upon completion of Cx leave systems in normal operating mode.
- .2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.
- .3 Cx to be considered complete when contract Cx deliverables have been submitted and approved by Departmental Representative.

**1.27 ACTIVITIES UPON COMPLETION OF COMMISSIONING**

- .1 When changes are made to baseline components or system settings established during Cx process, provide updated Cx form for affected item.

**1.28 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS**

- .1 Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in contract.

**1.29 PERFORMANCE VERIFICATION TOLERANCES**

- .1 Application Tolerances:
  - .1 Specified range of acceptable deviations of measured values from specified values or specified design criteria. Except for special areas, to be within  $\pm 5\%$  of specified values.
- .2 Instrument Accuracy Tolerances:
  - .1 To be of higher order of magnitude than equipment or system being tested.
- .3 Measurement Tolerances during Verification:
  - .1 Unless otherwise specified actual values to be within  $\pm 2\%$  of recorded values.

**1.30 OWNER'S PERFORMANCE TESTING**

- .1 Performance testing of equipment or system by Departmental Representative will not relieve Contractor from compliance with specified start-up and testing procedures.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 91 13 - General Commissioning (Cx) Requirements.
- .2 Section 01 91 33 - Commissioning Forms.

**1.2 REFERENCES**

- .1 Public Works and Government Services Canada (PWGSC)
  - .1 PWGSC - Commissioning Guidelines CP.4 -3rd edition-03.

**1.3 GENERAL**

- .1 Provide a fully functional facility:
  - .1 Systems, equipment and components have been proven to meet all PWGSC's functional requirements before the date of acceptance, and operate according to design criteria and requirements under all normal loads.
  - .2 Fully train all PWGSC dam keepers in all aspects of all installed systems.
  - .3 Complete documentation relating to all installed equipment and systems.
- .2 Term "Cx" in this section means "Commissioning".
- .3 Use this Cx Plan as master planning document for Cx:
  - .1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.
  - .2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.
  - .3 Sets out deliverables relating to operation and maintenance, process and administration of Cx.
  - .4 Describes process of verification of how built works meet Institution's design requirements.
  - .5 Produces a complete functional system prior to issuance of Certificate of Occupancy.
- .4 Acronyms:
  - .1 Cx - Commissioning.
  - .2 BMM - Building Management Manual.
  - .3 EMCS - Energy Monitoring and Control Systems.
  - .4 O M - operation and maintenance.
  - .5 PI - Product Information.
  - .6 PV - Performance Verification.
  - .7 TAB - Testing, Adjusting and Balancing.
  - .8 WHMIS - Workplace Hazardous Materials Information System.

- .5 Commissioning terms used in this Section:
  - .1 Bumping: short-term start-up to prove ability to start and prove correct rotation.
  - .2 Deferred Cx - Cx activities delayed for reasons beyond Contractor's control.

#### **1.4 DEVELOPMENT OF 100% CX PLAN**

- .1 Cx Plan to be 95% completed before added into Project Specifications.
- .2 Cx Plan to be 100% completed within 8 weeks of award of contract to take into account:
  - .1 Approved shop drawings and product data.
  - .2 Approved changes to contract.
  - .3 Contractor's project schedule.
  - .4 Cx schedule.
  - .5 Contractor's, subcontractor's, suppliers' requirements.
  - .6 Project construction team's and Cx team's requirements.
- .3 Submit completed Cx Plan to Departmental Representative and obtain written approval.

#### **1.5 REFINEMENT OF CX PLAN**

- .1 During construction phase, revise, refine and update Cx Plan to include:
  - .1 Changes resulting from Client program modifications.
  - .2 Approved design and construction changes.
- .2 Revise, refine and update every 3 months during construction phase. At each revision, indicate revision number and date.
- .3 Submit each revised Cx Plan to Departmental Representative for review and obtain written approval.
- .4 Include testing parameters at full range of operating conditions and check responses of equipment and systems.

#### **1.6 COMPOSITION, ROLES AND RESPONSIBILITIES OF CX TEAM**

- .1 Departmental Representative: who has the overall responsibility for the project and is the sole point of contact with the members of the CX team.
- .2 Departmental Representative will select Cx Team consisting of following members:
  - .1 Consultant and PWGSC Design Quality Review Team: during construction, will conduct periodic site reviews to observe general progress.
  - .2 Consultant and PWGSC Quality Assurance Commissioning Manager: ensures Cx activities are carried out to ensure delivery of a fully operational project.
  - .3 Construction Team: contractor, sub-contractors, suppliers and support disciplines, is responsible for construction/installation in accordance with contract documents.
  - .4 Contractor's Cx agent implements specified Cx activities.

#### **1.7 EXTENT OF CX**

- .1 Civil/structural instrumentation.

- .2 Commission Mechanical Systems and Associated Equipment:
  - .1 Hydraulic gate.
  - .2 Hoist equipment.
  - .3 Unit heaters.
- .3 Commission Electrical Systems and Equipment:
  - .1 High voltage:
    - .1 High-voltage pole-mounted fuse cutout, surge arrester and transformation equipment.
    - .2 High-voltage overhead distribution systems.
  - .2 Low voltage below 750 V:
    - .1 Low-voltage equipment.
    - .2 Gate hoist control systems.
    - .3 Gate gain heater control systems.
    - .4 Low-voltage distribution systems.
    - .5 Electronic data and communications information systems.
  - .3 Emergency power generation systems:
    - .1 Generators.
    - .2 Fuel systems.
    - .3 Transfer switch.
  - .4 Lighting systems:
    - .1 Lighting equipment.
    - .2 Distribution systems.
    - .3 Emergency lighting systems, including battery packs.
    - .4 Fire exit emergency signage.
  - .5 Other systems and equipment:
    - .1 Intrusion and fire safety systems.
    - .2 Lightning protection system.

## **1.8 DELIVERABLES RELATING TO O M PERSPECTIVES**

- .1 General Requirements:
  - .1 Compile English documentation.
  - .2 Documentation to be computer-compatible format ready for inputting for data management.
- .2 Provide Deliverables:
  - .1 Warranties.
  - .2 Project record documentation.
  - .3 Inventory of spare parts, special tools and maintenance materials.
  - .4 Maintenance Management System (MMS) identification system used.
  - .5 WHMIS information.
  - .6 MSDS data sheets.



- .7 Electrical panel inventory containing detailed inventory of electrical circuitry for each panelboard. Duplicate of inventory inside each panel.

## **1.9 DELIVERABLES RELATING TO THE CX PROCESS**

- .1 General:
  - .1 Start-up, testing and Cx requirements, conditions for acceptance and specifications form part of relevant technical sections of these specifications.
- .2 Definitions:
  - .1 Cx as used in this section includes:
    - .1 Cx of components, equipment, systems, subsystems, and integrated systems.
    - .2 Factory inspections and performance verification tests.
- .3 Deliverables: provide:
  - .1 Cx Specifications.
  - .2 Start-up, pre-Cx activities and documentation for systems, and equipment.
  - .3 Completed installation checklists (ICL).
  - .4 Completed PI report forms.
  - .5 Completed PV report forms.
  - .6 Results of PV tests and inspections.
  - .7 Description of Cx activities and documentation.
  - .8 Description of Cx of integrated systems and documentation.
  - .9 Tests witnessed by Departmental Representative.
  - .10 Training Plans.
  - .11 Cx Reports.
  - .12 Prescribed activities during warranty period.
- .4 Departmental Representative to witness and certify tests and reports of results provided to Departmental Representative.
- .5 Departmental Representative to participate.

## **1.10 PRE-CX ACTIVITIES AND RELATED DOCUMENTATION**

- .1 Items listed in this Cx Plan include the following:
  - .1 Prestart-up inspections: by Departmental Representative prior to permission to start-up and rectification of deficiencies to Departmental Representative's satisfaction.
  - .2 Departmental Representative to use approved check lists.
  - .3 Departmental Representative will monitor all of these prestart-up inspections.
  - .4 Include completed documentation with Cx report.
  - .5 Conduct prestart-up tests: to be witnessed and certified by Departmental Representative and does not form part of Cx specifications.
  - .6 Departmental Representative will monitor all of these inspections and tests.

- .7 Include completed documentation in Cx report.

#### **1.11 START-UP**

- .1 Start-up components, equipment and systems.
- .2 Equipment manufacturer, supplier, installing specialist subcontractor, as appropriate, to start-up, under Contractor's direction.
- .3 Departmental Representative to monitor all of these start-up activities.
  - .1 Rectify start-up deficiencies to satisfaction of Departmental Representative.
- .4 Performance Verification (PV):
  - .1 Approved Cx Agent to perform.
    - .1 Repeat when necessary until results are acceptable to Departmental Representative.
  - .2 Use procedures modified generic procedures to suit project requirements.
  - .3 Departmental Representative to witness and certify reported results using approved PI and PV forms.
  - .4 Departmental Representative to approve completed PV reports.
  - .5 Departmental Representative reserves right to verify up to 40% of reported results at random.
  - .6 Failure of randomly selected item shall result in rejection of PV report or report of system start-up and testing.

#### **1.12 CX ACTIVITIES AND RELATED DOCUMENTATION**

- .1 Perform Cx using procedures approved by Departmental Representative.
- .2 Departmental Representative to monitor Cx activities.
- .3 Upon satisfactory completion, prepare Cx Report using approved PV forms.
- .4 Departmental Representative to witness, certify reported results of, Cx activities.
- .5 Departmental Representative reserves right to verify a percentage (30%) of reported results at no cost to contract.

#### **1.13 CX OF INTEGRATED SYSTEMS AND RELATED DOCUMENTATION**

- .1 Cx to be performed using procedures approved by Departmental Representative.
- .2 Tests to be witnessed by Departmental Representative and documented on approved report forms.
- .3 Upon satisfactory completion, prepare Cx Report, to be certified by Departmental Representative.
- .4 Departmental Representative reserves right to verify percentage (30%) of reported results.
  - .1 Inventory data sheets and provide assistance to PWGSC in full implementation of MMS identification system of components, equipment, subsystems, and systems.

**1.14 INSTALLATION CHECK LISTS (ICL)**

- .1 Refer to Section 01 91 33 - Commissioning Forms: Installation Check Lists and Product Information (PI)/Performance Verification (PV) Forms.

**1.15 PRODUCT INFORMATION (PI) REPORT FORMS**

- .1 Refer to Section 01 91 33 - Commissioning Forms: Installation Check Lists and Product Information (PI)/Performance Verification (PV) Forms.

**1.16 PERFORMANCE VERIFICATION (PV) REPORT**

- .1 Refer to Section 01 91 33 - Commissioning Forms: Installation Check Lists and Product Information (PI)/Performance Verification (PV) Forms.

**1.17 CX SCHEDULES**

- .1 Prepare detailed critical path Cx Schedule and submit to Departmental Representative for review and approval at same time as project Construction Schedule. Include:
  - .1 Milestones, testing, documentation, training and Cx activities of components, equipment, subsystems, systems and integrated systems.
  - .2 Detailed training schedule to demonstrate no conflicts with testing, completion of project.
  - .3 6 months in Cx schedule for verification of performance in all seasons and wear conditions.
- .2 After approval, incorporate Cx schedule into Construction Schedule.

**1.18 CX REPORTS**

- .1 Submit reports of tests to Departmental Representative who will verify reported results.
- .2 Include completed and certified PV reports in properly formatted Cx Reports.
- .3 Before reports are accepted, reported results to be subject to verification by Departmental Representative.

**1.19 ACTIVITIES DURING WARRANTY PERIOD**

- .1 Cx activities must be completed before issuance of Interim Certificate, it is anticipated that certain Cx activities may be necessary during Warranty Period.

**1.20 FINAL SETTINGS**

- .1 Upon completion of Cx to satisfaction of Departmental Representative lock control devices in their final positions, indelibly mark settings marked and include in Cx Reports.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1            Not Used.

**END OF SECTION**

## **Part 1            General**

### **1.1            INSTALLATION/START-UP CHECK LISTS**

- .1    Include the following data:
  - .1    Product manufacturer's installation instructions and recommended checks.
  - .2    Special procedures as specified in relevant technical sections.
  - .3    Items considered good installation and engineering industry practices deemed appropriate for proper and efficient operation.
- .2    Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by Departmental Representative, supplemental additional data lists will be required for specific project conditions.
- .3    Use check lists for equipment installation. Document check list verifying checks have been made, indicate deficiencies and corrective action taken.
- .4    Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to Departmental Representative.
- .5    Use of check lists will not be considered part of commissioning process but will be stringently used for equipment prestart and start-up procedures.

### **1.2            PRODUCT INFORMATION (PI) REPORT FORMS**

- .1    Product Information (PI) form compiles gathered data on items of equipment produced by equipment manufacturer, includes nameplate information, parts list, operating instructions, maintenance guidelines and pertinent technical data and recommended checks that is necessary to prepare for start-up and functional testing and used during operation and maintenance of equipment.
- .2    Prior to Performance Verification (PV) of systems, complete items on PI forms related to systems and obtain Departmental Representative's approval.

### **1.3            PERFORMANCE VERIFICATION (PV) FORMS**

- .1    PV forms to be used for checks, running dynamic tests and adjustments carried out on equipment and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with project requirements.
- .2    PV report forms include those developed by Contractor records measured data and readings taken during functional testing and PV procedures.
- .3    Prior to PV of integrated system, complete PV forms of related systems and obtain Departmental Representative's approval.

### **1.4            SAMPLES OF COMMISSIONING FORMS**

- .1    Departmental Representative will develop and provide to Contractor required project-specific Commissioning forms in electronic format complete with specification data.
- .2    Revise items on Commissioning forms to suit project requirements.

## **1.5 CHANGES AND DEVELOPMENT OF NEW REPORT FORMS**

- .1 When additional forms are required, but are not available from Departmental Representative, develop appropriate verification forms and submit to Departmental Representative for approval prior to use.
  - .1 Additional commissioning forms to be in same format as provided by Departmental Representative.

## **1.6 COMMISSIONING FORMS**

- .1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.
- .2 Strategy for Use:
  - .1 Departmental Representative provides Contractor project-specific Commissioning forms with Specification data included.
  - .2 Contractor will provide required shop drawings information and verify correct installation and operation of items indicated on these forms.
  - .3 Confirm operation as per design criteria and intent.
  - .4 Identify variances between design and operation and reasons for variances.
  - .5 Verify operation in specified normal and emergency modes and under specified load conditions.
  - .6 Record analytical and substantiating data.
  - .7 Verify reported results.
  - .8 Form to bear signatures of recording technician and reviewed and signed off by Departmental Representative.
  - .9 Submit immediately after tests are performed.
  - .10 Reported results in true measured SI unit values.
  - .11 Provide Departmental Representative with originals of completed forms.
  - .12 Maintain copy on site during start-up, testing and commissioning period.
  - .13 Forms to be both hard copy and electronic format.

## **1.7 LANGUAGE**

- .1 To suit the language profile of the awarded Contract.

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **Part 3 Execution**

### **3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**