

## **PART 1 GENERAL**

### **1.1 Work Covered By Contract Documents**

- .1 Work of this Contract is a replacement of the existing luminaires and lighting control systems with led luminaires and new lighting control system as indicated in the contract documents. This includes the partial demolition of existing luminaires and circuits powering them, HVAC work for those existing luminaires that are supply ducted, the removal and reinstatement of ceilings as required to perform the work, making good all ceilings that are damaged during the renovation, patching and painting of gypsum board ceilings as required with paint to match existing. The project work occurs at the Kentville Research and Development Centre in Kentville Nova Scotia.

### **1.2 Contract Method**

- .1 Construct Work under single stipulated price contract.

### **1.3 Work By Others**

- .1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from Departmental Representative.
- .2 Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Departmental Representative, in writing, any defects which may interfere with proper execution of Work.

### **1.4 Work Sequence**

- .1 Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.
- .2 Minimize disruption and disturbance.
- .3 Maintain fire access/control.
- .4 AAFC Kentville will provide site security services for this project. The Department Representative will coordinate the application for Contractor security checks. Contractors will be escorted while security checks are being processed. None of the above requirements will be the Contractor's responsibility

### **1.5 Contractor Use of Premises**

- .1 Limit use of premises for Work, for storage and for access, to allow:
  - .1 Owner occupancy.
  - .2 Work by other contractors.
- .2 Co-ordinate use of premises under direction of Departmental Representative.
- .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

- .4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .5 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.
- .6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

#### **1.6 Owner Occupancy**

- .1 Owner will fully occupy the building during operating hours throughout construction.
- .2 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

#### **1.7 Alterations, Additions and/or Repairs to Existing Building**

- .1 Execute work with least possible interference or disturbance to building operations, occupants and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.
- .2 Use only service elevator, existing in building, for moving workers and material.
  - .1 Obtain approval of Departmental Representative prior to use of passenger elevators. Protect walls of passenger elevators during use.
  - .2 Accept liability for damage, safety of equipment and overloading of existing equipment.
- .3 Where necessary for access to lighting systems, contractor to identify systems furniture that must be temporarily relocated. Removal and re-installation of the furniture will be the responsibility of PWGSC. Contractor to provide Departmental Representative three (3) working days notice of furniture to be removed.
- .4 Unless preauthorized by Departmental Representative, all areas of occupied space are to be clean and fully functional during occupied hours (i.e. Monday to Friday 06:00 to 18:00 hrs).

#### **1.8 Existing Services**

- .1 Notify the Departmental Representative of intended interruption of services and obtain required permission prior to interruption.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 72 hours advanced notice for necessary interruption of electrical service throughout the course of work. Minimize duration of interruptions. Carry out work at times as directed by the Departmental Representative with minimum disturbance to tenant operations.
- .3 Provide alternative routes for personnel.
- .4 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.

- .5 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including water, power, HVAC, and communications services. Adhere to approved schedule and provide notice to affected parties.
- .6 Provide temporary services to maintain critical building and tenant systems.
- .7 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .8 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by the Departmental Representative.
- .9 Record locations of maintained, re-routed and abandoned service lines.
- .10 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

## **1.9 Documents Required**

- .1 Maintain at job site, one copy each document as follows:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Reviewed Shop Drawings.
  - .5 List of Outstanding Shop Drawings.
  - .6 Change Orders.
  - .7 Other Modifications to Contract.
  - .8 Field Test Reports.
  - .9 Copy of Approved Work Schedule.
  - .10 Health and Safety Plan and Other Safety Related Documents.
  - .11 Other documents as specified.

## **PART 2 PRODUCTS**

### **2.1 Not Used**

- .1 Not used.

## **PART 3 EXECUTION**

### **3.1 Not Used**

- .1 Not used.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 Access and Egress**

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders, independent of finished surfaces as directed by Departmental Representative and in accordance with relevant municipal, provincial and other regulations.

### **1.2 Use of Site and Facilities**

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
- .2 Maintain existing services to building and provide for personnel and vehicle access.
- .3 The General Contractor and Sub-contractors are to be escorted by Commissionaires at all times when accessing the facility and/or working in the facility.
- .4 Departmental Representative will assign sanitary facilities for use by Contractor's personnel. Keep facilities clean.
- .5 Use only service elevator, existing in building, for moving workers and material.
  - .1 Obtain approval of Departmental Representative prior to use of passenger elevators. Protect walls of passenger elevators during use.
  - .2 Accept liability for damage, safety of equipment and overloading of existing equipment.
- .6 Closures: protect work temporarily until permanent enclosures are completed.
- .7 Parking spaces are very limited on-site. Parking of Contractor vehicles will be limited to operational vehicles only. Coordinate the number of vehicles permitted with the Department Representative.

### **1.3 Alterations, Additions or Repairs To Existing Building**

- .1 Execute work with least possible interference or disturbance to building operations, occupants, public, and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

### **1.4 Existing Services**

- .1 Notify Public Works and Government Services Canada of intended interruption of services and obtain required permission prior to the interruption.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 72 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of

interruptions minimum. Carry out interruptions at times with minimum disturbance to tenant operations.

- .3 Provide for alternative routes for personnel.
- .4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

### **1.5 Special Requirements**

- .1 Carry out noise generating Work Monday to Friday from 18:00 to 05:00 hours and on Saturdays, Sundays, and statutory holidays.
- .2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic, and security regulations.
- .3 Keep within limits of work and avenues of ingress and egress.

### **1.6 Security Clearances**

- .1 Personnel employed on this project will be subject to security check. Obtain clearance, as instructed, for each individual who will be required to enter the premises.
- .2 Personnel will be checked daily at start of work shift and provided with pass which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.

## **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.
- .2 Section 01 78 00 – Closeout Submittals.

### **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 The Contractor shall review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are co-ordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .10 Keep one reviewed copy of each submission on site.

### **1.3 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 a qualified professional engineer registered or licensed in the Province of Nova Scotia, Canada.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated,

- regardless of Section under which adjacent items will be supplied and installed.  
Indicate cross references to design drawings and specifications.
- .4 Allow five (5) work days for Departmental Representative's review of each submission upon reception of the submission.
  - .5 Adjustments or corrections 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 re-submitting, 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 Cross reference to particular details of contract drawings and specifications section number for which shop drawing submission addresses.
    - .6 Details of appropriate portions of Work as applicable:
      - .1 Fabrication.
      - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
      - .3 Setting or erection details.
      - .4 Capacities.
      - .5 Performance characteristics.
      - .6 Standards.
      - .7 Operating weight.
      - .8 Wiring diagrams.
      - .9 Single line and schematic diagrams.

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- .10 Relationship to adjacent work.
- .9 After Departmental Representative's review, distribute copies.
- .10 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .11 Submit 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 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 three (3) years of date of contract award for project.
- .13 Submit 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 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 electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .17 Submit 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 re-submission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

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

#### **1.4 Samples**

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to the Departmental Representative's office or other address as directed by Departmental Representative's. Do not drop off samples at construction site except for special circumstances previously approved by Departmental Representative.
- .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 01 45 00 - Quality Control.

#### **1.6 Certificates and Transcripts**

- .1 Immediately after award of Contract, submit copies of permits, notices, compliance certificates received by Regulatory Agencies having jurisdiction and as applicable to the work.
- .2 Submission of above documents to be in accordance with Submittal – General Requirements procedures specified in this section.

**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 Procedures to isolate and lockout electrical facility or other equipment from energy source.
- .2 **Contractors who are not entirely familiar with all aspects of lock-out procedures and/or do not have any written procedures in place may be given the "PWGSC - Electrical Safety Requirements Manual" dated Sept. 1995 (prepared by the Atlantic Region A/E Services Electrical Engineering Unit) as a reference tool, modelled from the Canada Labour Code, to assist in interpreting the various codes and safety standards for ensuring electrical safety on PWGSC projects and to help in developing and implementing lock-out procedures. It should be emphasized to the Contractor that the manual shall be used for reference purposes only and that he is ultimately responsible for becoming familiar with all applicable safety regulations and developing procedures appropriate to the project circumstances.**

### **1.2 Related Work**

- .1 Section 01 35 30: Health and Safety Requirements.
- .2 Section 01 35 35: Fire Safety Requirements

### **1.3 References**

- .1 CSA C22.1-2015 - Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.
- .2 CSA C22.3 No. 1-M87 (R2001) - Overhead Systems.
- .3 CSA C22.3 No. 7-94 (R2005) - Underground Systems.
- .4 COSH, Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.

### **1.4 Definitions**

- .1 **Electrical Facility:** means any system, equipment, device, apparatus, wiring, conductor, assembly or part thereof that is used for the generation, transformation, transmission, distribution, storage, control, measurement or utilization of electrical energy, and that has an amperage and voltage that is dangerous to persons.
- .2 **Guarantee of Isolation:** means a guarantee by a competent person in control or in charge that a particular facility or equipment is isolated.

- .3 De-energize: in the electrical sense, that a piece of equipment is isolated and grounded, e.g. if the equipment is not grounded, it cannot be considered de-energized (DEAD).
- .4 Guarded: means that an equipment or facility is covered, shielded, fenced, enclosed, inaccessible by location, or otherwise protected in a manner that, to the extent that is reasonably practicable, will prevent or reduce danger to any person who might touch or go near such item.
- .5 Isolate: means that an electrical facility, mechanical equipment or machinery is separated or disconnected from every source of electrical, mechanical, hydraulic, pneumatic or other kind of energy that is capable of making it dangerous.
- .6 Live/alive: means that an electrical facility produces, contains, stores or is electrically connected to a source of alternating or direct current of an amperage and voltage that is dangerous or contains any hydraulic, pneumatic or other kind of energy that is capable of making the facility dangerous to persons.

## **1.5 Compliance Requirements**

- .1 Perform lockouts in compliance with:
  - .1 Canadian Electrical Code.
  - .2 Federal and Provincial Occupational Health and Safety Acts and Regulations as specified in section 01 35 30.
  - .3 Regulations and code of practice as applicable to mechanical equipment or other machinery being de-energized.
  - .4 Procedures specified herein.
- .2 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.

## **1.6 Submittals**

- .1 Submit copy of proposed Lockout Procedures and sample form of lockout permit and lockout tags for review.
- .2 Submit documentation within 14 calendar days of contract award. Do not proceed with work until submittal has been reviewed by Departmental Representative.
- .3 Submit above documents in accordance with the submittal - general requirements specified in section 01 33 00.
- .4 Resubmit Lockout Procedures with noted revisions as may result from Departmental Representative's review.

## **1.7 Isolation of Existing Services**

- .1 Obtain Departmental Representative's written authorization prior to conducting work on an existing active, energized service or facility required as part of the work and before proceeding with lockout of such services or facility.
- .2 To obtain authorization, submit to Departmental Representative following documentation:
  - .1 Written Request for Isolation of the service or facility and;
  - .2 Copy of Contractor's Lockout Procedures.
- .3 Make a Request for Isolation for each event, unless directed otherwise by Departmental Representative, and as follows:
  - .1 Fill-out standard forms in current use at the Facility when so directed by Departmental Representative or;
  - .2 Where no form exist at Facility, make request in writing identifying:
    - .1 Identification of system or equipment to be isolated, including its' location;
    - .2 Time duration, indicating Start time & date and Completion time & date when isolation will be in effect.
    - .3 Voltage of service feed to system or equipment being isolated.
    - .4 Name of person making the request.
  - .3 Document to be in typewritten format.
- .4 Do not proceed until receipt of written notification from Departmental Representative granting the Isolation Request and authorizing to proceed with the isolation of designated equipment or facility. Departmental Representative may designate other individual at the Facility as the person authorized to grant the Isolation Request.
- .5 Conduct safe, orderly shut down of equipment or facilities, de-energize and isolate power and other sources of energy and lockout items in accordance with requirement of clause 1.8 below.
- .6 Plan and schedule shut down of existing services in consultation with the Departmental Representative and the Facility Manager. Minimize impact and downtime of facility operations.
- .7 Determine in advance, as much as possible, in cooperation with the Departmental Representative, the type and frequency of situations which will require a Request for Isolation. Follow Departmental Representative's directives in this regard.
- .8 Conduct hazard assessment as part of the planning process of isolating existing equipment and facilities. Hazard Assessments to conform with requirements of Health and Safety Section 01 35 30.

## 1.8 **Lockouts**

- .1 Isolate and lockout electrical facilities, mechanical equipment and machinery from all potential energy sources prior to starting work on such items.
- .2 Develop and implement lockout procedures to be followed on site as an integral part of the Work.
- .3 Use energy isolation lockout devices specifically designed and appropriate for type of facility or equipment being locked out.
- .4 Use industry standard lockout tags.
- .5 Provide appropriate safety grounding and guards as required.
- .6 Prepare Lockout Procedures in writing. Describe safe work practices, work functions and sequence of activities to be followed on site to safely isolate all potential energy sources and lockout/tagout facilities and equipment.
- .7 Include within procedures a system of worker request and issuance of individual lockout permit by a person, employed by Contractor, designated to be "in-charge" and being responsible for:
  - .1 Controlling issuance of permits or tags to workers.
  - .2 Determining permit duration.
  - .3 Maintaining record of permits and tags issued.
  - .4 Submitting a Request for Isolation to Departmental Representative when required in accordance with Clause 1.7 above.
  - .5 Designating a Safety Watcher, when one is required based on type of work.
  - .6 Ensuring equipment or facility has been properly isolated, providing a Guarantee of Isolation to worker(s) prior to proceeding with work.
  - .7 Collecting and safekeeping lockout tags, returned by workers, as a record of the event.
- .8 Clearly establish, describe and allocate, within procedures, the responsibilities of:
  - .1 Workers.
  - .2 Designated person controlling issuance of lockout tags/permits.
  - .3 Safety Watcher.
  - .4 Subcontractors and General Contractor.
- .9 Procedures shall meet the requirements of Codes and Regulations specified in clause 1.5 above.
- .10 Generic procedures, if used, must be edited, supplemented with pertinent information and tailored to reflect specific project conditions. Clearly label as being the procedures applicable to this contract.
  - .1 Incorporate site specific rules and procedures established by Facility Manager and in force at site. Obtain such procedures through Departmental Representative.

- .11 Procedures to be in typewritten format.
- .12 Submit copy of Lockout Procedures to Departmental Representative, in accordance with submittal requirements of clause 1.6 herein, prior to commencement of work.

### **1.9 Conformance**

- .1 Ensure that lockout procedures, as established for project on site, are stringently followed. Enforce use and compliance by all workers.
- .2 Brief all persons working on electrical facilities, mechanical and other equipment fed by an energy source on requirements of this section.
- .3 Failure to perform lockouts in accordance with regulatory requirements or follow procedures specified herein may result in the issuance of a Non-Compliance Notification at Departmental Representative's discretion with possible disciplinary measures.

### **1.10 Documents on Site**

- .1 Post Lockout Procedures on site in common location for viewing by workers.
- .2 Keep copies of Request for Isolation submitted to Departmental Representative and lockout permits or tags issued to workers during the course of work for full project duration.
- .3 Upon request, make such data available to Departmental Representative or to authorized safety representative for inspection.

## **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 Health and safety consideration required to ensure that Departmental Representative shows due diligence towards health and safety on construction sites, and meets the requirements laid out in PWGSC/RPB Departmental Policy DP 073 – Occupational Health and Safety – Construction.

### **1.2 Related Sections**

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 35 25 – Special Procedures on Lockout Requirements
- .3 Section 01 35 35 – Fire Safety Requirements

### **1.3 References**

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  - .1 Material Safety Data Sheets (MSDS).
- .3 Province of Nova Scotia
  - .1 Occupational Health and Safety Act, S.N.S. - Updated 2013.

### **1.4 Action and Informational Submittals**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within seven (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.
- .3 Submit three (3) copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly.
- .4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS MSDS - Material Safety Data Sheets.
- .7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within seven (7) days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within seven (7) days after receipt of comments from Departmental Representative.



- .8 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.
- .10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

#### **1.5 Filing of Notice**

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

#### **1.6 Safety Assessment**

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

#### **1.7 Meetings**

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

#### **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 re-submission with correction of deficiencies or concerns.

#### **1.9 Responsibility**

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

#### **1.10 Compliance Requirements**

- .1 Comply with Occupational Health and Safety Act, General Safety Regulation, N.S. Reg..
- .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 having jurisdiction and advise Departmental Representative verbally and in writing.

### **1.12 Health and Safety Co-Ordinator**

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

### **1.13 Posting of Documents**

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

### **1.14 Correction of Non-Compliance**

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

### **1.15 Blasting**

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

### **1.16 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.

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**PART 2 PRODUCTS**

**2.1 Not Used**

.1 Not used.

**PART 3 EXECUTION**

**3.1 Not Used**

.1 Not used.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 Fire Department Briefing**

- .1 Departmental Representative will co-ordinate arrangements for contractor for briefing on Fire Safety at pre-work conference before work is commenced.

### **1.2 Reporting Fires**

- .1 Know location of nearest fire alarm box and telephone, including emergency phone number.
- .2 Report immediately fire incidents to Fire Department as follows:
  - .1 Activate nearest fire alarm box; or
  - .2 Telephone.
- .3 Person activating fire alarm box will remain at box to direct Fire Department to scene of fire.
- .4 When reporting fire by telephone, give location of fire, name or number of building and be prepared to verify location.

### **1.3 Interior and Exterior Fire Protection and Alarm Systems**

- .1 Fire protection and alarm system will not be:
  - .1 Obstructed;
  - .2 Shut-off, unless approved by Departmental Representative; and
  - .3 Left inactive at end of working day or shift.
- .2 Fire hydrants, standpipes and hose systems will not be used for other than fire-fighting.
- .3 Costs incurred, from the fire department and Departmental Representative, resulting from negligently setting off false alarms will be charged to the Contractor in the form of financial progress payment reductions and holdback assessments against the Contract.

### **1.4 Fire Extinguishers**

- .1 Supply fire extinguishers necessary to protect work in progress and contractor's physical assets/materials on site.

### **1.5 Blockage of Roadways**

- .1 Advise Departmental Representative of work that would impede fire apparatus response. This includes violation of minimum overhead clearance, erecting of barricades and digging of trenches.

### **1.6 Smoking Precautions**

- .1 Observe and abide to the on-site smoking regulations.

### **1.7 Rubbish and Waste Materials**

- .1 Keep rubbish and waste materials at minimum quantities.
- .2 Burning of rubbish is prohibited.
- .3 Removal:
  - .1 Remove rubbish from work site at end of work day or shift or as directed.
- .4 Storage:
  - .1 Store oily waste in approved receptacles to ensure maximum cleanliness and safety.
  - .2 Deposit greasy or oily rags and materials subject to spontaneous combustion in approved receptacles and remove specified.

### **1.8 Flammable and Combustible Liquids**

- .1 Handling, storage and use of flammable and combustible liquids governed by current National Fire Code of Canada.
- .2 Keep flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use in quantities not exceeding 45 litres provided they are stored in approved safety cans bearing Underwriters' Laboratory of Canada or Factory Mutual seal of approval. Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires permission.
- .3 Transfer of flammable and combustible liquids is prohibited within buildings or jetties.
- .4 Transfer of flammable and combustible liquids will not be carried out in vicinity of open flames or any type of heat-producing devices.
- .5 Do not use flammable liquids having flash point below 38 degrees C such as naphtha or gasoline as solvents or cleaning agents.
- .6 Store flammable and combustible waste liquids, for disposal, in approved containers located in safe ventilated area. Keep quantities minimum and Fire Department is to be notified when disposal is required.

### **1.9 Hazardous Substances**

- .1 Work entailing use of toxic or hazardous materials, chemicals and/or explosives, or otherwise creating hazard to life, safety or health, in accordance with National Fire Code of Canada.
- .2 Obtain from Departmental Representative a "Hot Work" permit for work involving welding, burning or use of blowtorches and salamanders, in buildings or facilities.
- .3 When Work is carried out in dangerous or hazardous areas involving use of heat, provide fire watchers equipped with sufficient fire extinguishers. Determination of dangerous or hazardous areas along with level of protection necessary for Fire Watch is at discretion of Departmental Representative. Contractors are responsible for providing fire watch service for work on scale established at pre-work conference.

- .4 Provide ventilation where flammable liquids, such as lacquers or urethanes are used, eliminate sources of ignition. Inform Departmental Representative prior to and at cessation of such work.

#### **1.10 Fire Safety and Hot Work Requirements**

- .1 Implement and follow fire safety measures during work. Comply with the following:
  - .1 National Fire Code, 2015.
  - .2 Fire Protection Standards PCC 301, Standard for Construction Operations and FCC 302, Standard for Welding and Cutting as issued by the Fire Protection Services of Human Resources Development Canada.
  - .3 Federal and Provincial Occupational Health and Safety Acts and Regulations as specified in Section 01 35 30 – Health and Safety Requirements.
- .2 In event of conflict between any provisions of above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.
- .3 Hot Work Requirements:
  - .1 Obtain Departmental Representative's written Authorization to Proceed for the performance of Hot Work on site as may be required in the course of work.
  - .2 To obtain authorization submit to Departmental Representative for review:
    - .1 Contractor's Hot Work Procedures to be followed on site in accordance with clause 1.12 below.
    - .2 Type of work and frequency of situations which will require Hot Work.
  - .3 Upon confirmation that effective fire safety measures will be implemented for hot work, Departmental Representative will grant authorization covering the entire construction project and duration of work. However in some cases, depending upon the nature of phasing of work, the quantity of various trades needing to perform welding and cutting on site, or other deemed situation, Departmental Representative might designate certain portions of the work as separate entities, each entity requiring individual written authorization to proceed. Follow Departmental Representative's directives in this regard.
- .4 Do not perform and Hot Work until receipt of Departmental Representative's written Authorization to Proceed.
- .5 In occupied areas of facility, co-ordinate performance of Hot Work with Facility Manager through the Departmental Representative. When directed perform Hot Work during non-operative hours facility is vacant of employees. Follow Departmental Representative's directives in this regard.

### **1.11 Conformance**

- .1 Ensure that Hot Work procedures, as established for project and agreed upon with Departmental Representative, are stringently followed. Enforce use and compliance by all workers.
- .2 Brief all workers and sub-contractors on Hot Work Procedures and Permit system.
- .3 Failure to comply with the established hot work procedures may result in disciplinary measures.

### **1.12 Hot Work Procedures**

- .1 Develop Hot Work Procedures, to be followed when Hot Work is required as part of the work.
- .2 Describe safe work practices and sequence of activities to be followed on site by Contractor and workers to minimize the potential occurrence of a fire resulting from Hot Work.
- .3 Hot Work Procedures to include:
  - .1 Requirement to perform hazard assessment of the site and immediate work area, based on type and extent of Hot Work required, in accordance with Hazard Assessment and Safety Plan requirements. Carry out hazard assessment for each hot work event.
  - .2 Use of a Hot Work Permit system, issued by authorized contractor, for each event when Hot Work is required, granting permission to carry out hot work.
  - .3 Provision of a designated persons to carry out a Fire Safety Watch for a minimum of thirty (30) minutes immediately upon completion of the hot work.
- .4 Procedures to comply with fire safety codes and standards specified herein and occupational health and safety regulations.
- .5 Generic procedures, if used, must be edited, supplemented with pertinent information and tailored to reflect specific project conditions. Clearly label as being the Hot Work Procedures applicable to this contract.
- .6 Include within procedures the step by step process on how to prepare and issue the Hot Work Permit.
- .7 Hot Work Procedures to be in typewritten format, listing step by step procedures and worker instructions, clearly establishing and allocating responsibilities of:
  - .1 Worker(s).
  - .2 Designated person authorized to issue the Hot Work Permit.
  - .3 Fire Safety Watcher.
  - .4 Sub-contractors and Contractor.

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**1.13 Hot Work Permit**

- .1 Develop "Hot Work Permit" form in typewritten format.
- .2 Hot Work Permit to include, as a minimum, the following data:
  - .1 Project name and project number.
  - .2 Building name, address and specific floor, room or area where hot work will be performed.
  - .3 Date when permit issued.
  - .4 Description on type of hot work to be carried out.
  - .5 Special precautions required, including type of fire extinguisher needed.
  - .6 Name and signature authorized person, designated by Contractor, to issue the permit.
  - .7 Name of worker(s) clearly printed, to which the permit is being issued.
  - .8 Time duration of permit (not to exceed 8 hours) indicating "Start" time and date and "Completion" time and date when Hot Work permit will be in effect.
  - .9 Worker signature with date and time when hot work terminated.
  - .10 Specified period of time requiring Safety Watch.
  - .11 Name and signature of person designated as Fire Safety Watcher, complete with time and date when safety watch terminated, certifying that the surrounding area was under his continual watch and inspection for the minimum time period specified in Permit and commenced immediately upon the completion of Hot Work.
- .3 Industry standard forms shall only be used if all data specified above is included on form.
- .4 Each Hot Work Permit to be completed in full and signed as follows:
  - .1 Authorized person issuing Permit before Hot Work commences.
  - .2 Worker's upon completion of Hot Work.
  - .3 Fire Safety Watcher upon termination of safety watch.
  - .4 Returned to Contractor's site superintendent for safe keeping.

**1.14 Documents On Site**

- .1 Keep work permits and hazard assessment documentation on site for duration of work.
- .2 Upon request, make available to Departmental Representative or to authorized safety representative for inspection.

**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 33 00 – Submittal Procedures.
- .2 Section 01 78 00 – Closeout Submittals.

### **1.2 Inspection**

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

### **1.3 Independent Inspection Agencies**

- .1 Independent Inspection/Testing Agencies may be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.
- .2 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.

### **1.4 Access To Work**

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

### **1.5 Procedures**

- .1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in 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.

### **1.6 Rejected Work**

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

### **1.7 Reports**

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

### **1.8 Tests and Mix Designs**

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

### **1.9 Mock-Ups**

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations acceptable to Departmental Representative.
- .3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups 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.
- .5 If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.
- .6 Remove mock-up at conclusion of Work or when acceptable to Departmental Representative.

### **1.10 Mill Tests**

- .1 Submit mill test certificates as required of specification Sections.

**1.11 Equipment and Systems**

- .1 Submit Testing, Adjusting and Balancing (TAB) reports for mechanical equipment and/or systems installed.

**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 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

### **1.2 Installation and Removal**

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

### **1.3 Temporary Heating and Ventilation**

- .1 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.
- .2 Permanent heating system of building, to be used when available. Be responsible for damage to heating system if use is permitted.
- .3 On completion of Work for which permanent heating system is used, replace filters, replace bearing and clean.
- .4 Departmental Representative will pay utility charges when temporary heat source is existing building equipment.
- .5 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
  - .1 Conform with applicable codes and standards.
  - .2 Enforce safe practices.
  - .3 Prevent abuse of services.
  - .4 Prevent damage to finishes.
  - .5 Vent direct-fired combustion units to outside.
- .6 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

**1.4 Fire Protection**

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

**PART 2 PRODUCTS**

**2.1 Not Used**

- .1 Not Used.

**PART 3 EXECUTION**

**3.1 Not Used**

- .1 Not Used.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 Related Sections**

- .1 Section 01 51 00 – Temporary Utilities.

### **1.2 References**

- .1 Canadian General Standards Board (CGSB)
  - .1 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
  - .2 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
- .2 Canadian Standards Association (CSA International)
  - .1 CSA-O121-M1978(R2003), Douglas Fir Plywood.

### **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 Guard Rails and Barricades**

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

### **1.5 Weather Enclosures**

- .1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.
- .2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.

### **1.6 Dust Tight Screens**

- .1 Provide dust tight screens or insulated partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2 Maintain and relocate protection until such work is complete.

### **1.7 Access To Site**

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

### **1.8 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.

**1.9 Fire Routes**

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

**1.10 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.

**1.11 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 three (3) days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

**1.12 Waste Management and Disposal**

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

**PART 2 PRODUCTS**

**2.1 Not Used**

- .1 Not Used.

**PART 3 EXECUTION**

**3.1 Not Used**

- .1 Not Used.

**END OF SECTION**



## **PART 1 GENERAL**

### **1.1 References**

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

### **1.2 Quality**

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 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 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .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.

### **1.3 Availability**

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

- .2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

#### **1.4 Storage, Handling and Protection**

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

#### **1.5 Transportation**

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

#### **1.6 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.

### **1.7 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.

### **1.8 Co-ordination**

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

### **1.9 Concealment**

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

### **1.10 Remedial Work**

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

### **1.11 Location of Fixtures**

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

### **1.12 Fastenings**

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

#### **1.13 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
- .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.

#### **1.14 Protection of Work In Progress**

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

#### **1.15 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, and/or building occupants.
- .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 Project Cleanliness**

- .1 Maintain the work site and building entrances, corridors, stairwells, etc. designated for use by construction work force in tidy condition, free from accumulation of waste products and debris. Clean areas on a daily basis.
- .2 Daily and/or nightly clean up is required after work shift which includes sweeping dirt and debris, light mopping or work area and a wipe down of affected work station work surfaces and window sills.
- .3 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.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Use separate collection bins, clearly marked as to purpose for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .7 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .9 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .10 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.
- .12 Employ dust barriers, dividers, seal doors with tape and provide other means required, and as approved by Departmental Representative, to ensure dust and dirt generated by construction operations are not transmitted to occupied areas of the building. Should dust accidentally migrate to occupied areas of the building, employ such means as may be necessary to immediately clean the area(s) to the satisfaction of the Departmental Representative.
- .13 Be responsible to immediately clean construction dust and dirt transferred by foot traffic, or by other means, into lobbies, corridors, stairwells, and office areas in use by facility employees. Carry out cleaning operations, including floor washing as necessary to thoroughly clean all soiled surfaces.

## **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.
- .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 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured items.
- .8 Remove stains, spots, marks and dirt.
- .9 Clean lighting reflectors, lenses, and other lighting surfaces.
- .10 Vacuum clean and dust building interiors, behind grilles, louvres and screens.
- .11 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .12 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .13 Remove dirt and other disfiguration from exterior surfaces.
- .14 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .15 Sweep and wash clean paved areas.
- .16 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .17 Clean roofs, downspouts, and drainage systems.
- .18 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

## **1.3 Waste Management And Disposal**

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

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**PART 2 PRODUCTS**

**2.1 Not Used**

.1 Not Used.

**PART 3 EXECUTION**

**3.1 Not Used**

.1 Not Used.

**END 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: to divert eighty (80) percent of total Project Waste 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 Related Sections**

- .1 Section 01 33 00 – Submittal Procedures.

### **1.3 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 minimizes material damage.
- .7 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.
  - .1 Transport to approved and authorized recycling facility to users of material for recycling.
- .8 Collect, handle, store on-site, and transport off-site, salvaged materials in combined condition.
  - .1 Ship materials to site operating under Certificate of Approval premises of Departmental Representative.
  - .2 Materials must be immediately separated into required categories for reuse or recycling.

### **1.4 Storage, Handling and Protection**

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



- .2 Unless specified otherwise, materials for removal become Contractor's property.
- .3 Protect, stockpile, store, and catalogue salvaged items.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .5 Protect structural components not removed 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 structure 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.

#### **1.5 Disposal of Wastes**

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste, volatile materials, mineral spirits, oil or 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 pre-demolition material audit.

#### **1.6 Use Of Site and Facilities**

- .1 Execute Work with least possible interference or disturbance to normal use of premises.
- .2 Maintain security measures established by existing facility.

### **1.7     Scheduling**

- .1     Co-ordinate 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     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 areas as work progresses.
- .3     Source separate materials to be reused/recycled into specified sort areas.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 Related Sections**

- .1 Section 01 78 00 – Closeout Submittals.

### **1.2 Inspection and Declaration**

- .1 Contractor's Inspection: Contractor and Sub-contractors: conduct inspection of work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
  - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made and deficiencies rectified.
  - .2 Request Departmental Representative's Inspection.
- .2 Departmental Representative's Inspection: Departmental Representative and Contractor will perform inspection of work to identify obvious defects or deficiencies. Contractor to correct work accordingly.
- .3 Completion: submit written certificate that following have been performed:
  - .1 Work has been completed and inspected for compliance with Contract Documents.
  - .2 Defects have been corrected and deficiencies have been completed.
  - .3 Equipment and systems have been tested, adjusted and balanced and are fully operational.
  - .4 Certificates required by the various Authorities Having Jurisdiction (AHJ)
  - .5 Operation of systems have been demonstrated to Departmental Representative.
  - .6 Work is complete and ready for final inspection.
- .4 Final Inspection: When items noted above are completed, request final inspection of work by Departmental Representative. If work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.
- .5 Notwithstanding the General Conditions, the Contractor's attention is drawn to the fact that the Departmental Representative will not issue an Interim Certificate of completion until such time that Contractor performs following work and/or turns over to Departmental Representative specified documents.
  - .1 Project record as-built documents.
  - .2 Final operations and maintenance manuals.
  - .3 Maintenance materials, parts and tools.
  - .4 Certificates of test and test results.
  - .5 Training complete with related manuals.
  - .6 Manufacturer's Guarantee Certificates.

.7 Commissioning and support documents.

**1.3 Cleaning**

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

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 79 00 – Demonstration and Training.

### **1.2 Action and Informational Submittals**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .3 Copy will be returned with Departmental Representative's comments.
- .4 Revise content of documents as required prior to final submittal.
- .5 Three (3) weeks prior to application for Interim Certificate of Completion of project, submit to Departmental Representative, four (4) final copies of operating and maintenance manuals and one (1) electronic PDF copy on a flash drive, all in English.
- .6 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.
- .7 Furnish evidence, if requested, for type, source and quality of products provided.
- .8 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .9 Pay costs of transportation.

### **1.3 Format**

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf sized 215 x 280 mm paper, 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, process flow, under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.

- .1 Bind in with text; fold larger drawings to size of text pages.
- .9 Provide 1:1 scaled CAD files in dwg format on CD.

#### **1.4 Contents - Project Record Documents**

- .1 Table of Contents for Each Volume: provide full table of contents in each binder, clearly indicate which contents are in each binder.
- .2 Cover sheet containing:
  - .1 Date of submission.
  - .2 Project title, location and project number.
  - .3 Names, addresses and telephone numbers of Contractor and all sub-contractors.
  - .4 Schedule of products and systems, indexed to content of volume.
- .3 For each product or system:
  - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .4 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .5 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .6 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.
- .7 Training: refer to Section 01 79 00 - Demonstration and Training.

#### **1.5 As -Built Documents and Samples**

- .1 Maintain, 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.

#### **1.6 Recording Information on Project Record Documents**

- .1 Record information on set of 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 locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
  - .2 Field changes of dimension and detail.
  - .3 Changes made by change orders.
  - .4 Details not on original Contract Drawings.
  - .5 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, field test records, required by individual specifications sections.

#### **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 Panel board 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 contractor.
- .11 Provide Contractor's co-ordination 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 Testing, Adjusting and Balancing (TAB) reports.
- .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, store in location as directed by Departmental Representative.
- .4 Receive and catalogue items. Prepare and submit inventory listing indicating the following:
  - .1 Part number.
  - .2 Identification of equipment or system for which parts are applicable
  - .3 Installation instruction as applicable.
  - .4 Name, address and telephone number of nearest supplier.
- .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. Store in location as directed by Department Representative.
  - .4 Receive and catalogue items.
    - .1 Submit inventory listing to Departmental Representative.
    - .2 Include approved listings in Operations and Maintenance Manuals.
  - .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 Provide instructions on intended use of tool.
  - .4 Deliver to site. Store in location as directed by Departmental Representative.
  - .5 Receive and catalogue items.
    - .1 Submit inventory listing to Departmental Representative.
    - .2 Include approved listings in Operations and Maintenance Manuals.

#### **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 Clearly mark on each container or packaging as to content and quantity.
- .4 Store components subject to damage from weather in weatherproof enclosures.

- .5 Store paints and freezable materials in a heated and ventilated room.
- .6 Remove and replace damaged products during handling or delivery at own expense to satisfaction of Departmental Representative.

#### **1.11 Warranties and Bonds**

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, thirty (30) days before planned pre-warranty 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 sub-contractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
  - .3 Obtain warranties and bonds, executed in duplicate by sub-contractors, suppliers, and manufacturers, within ten (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 Departmental Representative's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Conduct joint four (4) month and nine (9) month warranty inspection, measured from time of acceptance, by Departmental Representative.
- .9 Include information contained in warranty management plan as follows:
  - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, sub-contractors, manufacturers or suppliers involved.
  - .2 Provide list for each warranted equipment, item, feature of construction or system indicating:
    - .1 Name of item.
    - .2 Model and serial numbers.

- .3 Location where installed.
- .4 Name and phone numbers of manufacturers or suppliers.
- .5 Names, addresses and telephone numbers of sources of spare parts.
- .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
- .7 Cross-reference to warranty certificates as applicable.
- .8 Starting point and duration of warranty period.
- .9 Maintenance procedures required to continue warranty in force.
- .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
- .11 Organization, names and phone numbers of persons to call for warranty service.
- .12 Typical response time and repair time expected for various warranted equipment.
- .3 Procedure and status of tagging of equipment covered by extended warranties.
- .4 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .11 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.

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**PART 2**      **Products**

**2.1**      **Not Used**

.1      Not Used.

**PART 3**      **Execution**

**3.1**      **Not Used**

.1      Not Used.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 Administrative Requirements**

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to Departmental Representative prior to date of final inspection.
- .2 Departmental Representative will provide list of personnel to receive instructions, and will co-ordinate their attendance at agreed-upon times.
- .3 Prior to carrying out Demonstration and Training, ensure that equipment is fully operational, and all testing, adjusting and balancing (TAB) has been carried out.
- .4 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.
- .5 Preparation:
  - .1 Verify conditions for demonstration and instructions comply with requirements.
  - .2 Verify designated personnel are present.
- .6 Demonstration and Instructions:
  - .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment.
  - .2 Instruct personnel in phases of operation and maintenance using 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.
  - .5 Provide other specific training and instructions as specified in trade sections.
  - .6 Allow minimum four (4) day on site for instruction time.

### **1.2 Action and Informational Submittals**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit schedule of time and date for demonstration of each item of equipment and each system a minimum of two 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.

### **1.3 Quality Assurance**

- .1 Ensure that only personnel from own forces, sub-contractor or suppliers competent and fully knowledgeable in the particular material component,

equipment or system installation are used to provide training and demonstrations.

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

## **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 Section Includes:
  - .1 General requirements relating to commissioning of project's components and systems, specifying general requirements to performance verification (PV) of components, equipment, sub-systems, systems, and integrated systems.
- .2 Commission all Electrical equipment and systems installed.
- .3 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.

### **1.2 References**

- .1 American Water Works Association (AWWA)
- .2 Public Works and Government Services Canada (PWGSC)
  - .1 PWGSC - Commissioning Manual (CP.1) -4th edition-06.
- .3 Underwriters' Laboratories of Canada (ULC)
- .4 Z320-11 (R2016) – Building Commissioning Standard

### **1.3 General**

- .1 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 Performance Verification 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.
- .2 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

- interactive 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.
- .3 Design Criteria: as per client's requirements or determined by designer to meet Project functional and operational requirements.

#### **1.4 Commissioning Overview**

- .1 Departmental Representative to maintain overall responsibility for project and is sole point of contact between members of commissioning team.
- .2 Project Manager will select Cx Team consisting of following members:
  - .1 Departmental Representative's Design Quality Review Team: during construction, will conduct periodic site reviews to observe general progress.
  - .2 Departmental Representative's Quality Assurance Commissioning Manager: ensures Cx activities are carried out to ensure delivery of a fully operational project including:
    - .1 Review of Cx documentation from operational perspective.
    - .2 Review for performance, reliability, durability of operation, accessibility, maintainability, operational efficiency under conditions of operation.
    - .3 Protection of health, safety and comfort of occupants and O&M personnel.
    - .4 Monitoring of Cx activities, training, development of Cx documentation.
    - .5 Work closely with members of Cx Team.
  - .3 Departmental Representative is responsible for:
    - .1 Organizing Cx.
    - .2 Monitoring operations Cx activities.
    - .3 Witnessing, certifying accuracy of reported results.
    - .4 Witnessing and certifying TAB and other tests.
    - .5 Developing BMM.
    - .6 Ensuring implementation of final Cx Plan.
    - .7 Performing verification of performance of installed systems and equipment.
    - .8 Implementation of Training Plan.
  - .4 Construction Team: contractor, sub-contractors, suppliers and support disciplines, is responsible for construction/installation in accordance with contract documents, including:
    - .1 Testing.
    - .2 TAB.
    - .3 Start-up and Commissioning.
    - .4 Delivery of training and Cx documentation.



- .5 Assigning one person as point of contact with Departmental Representative and PWGSC Cx Manager for administrative and coordination purposes.
- .5 Contractor's Cx agent implements specified Cx activities including:
  - .1 Demonstrations.
  - .2 Training.
  - .3 Testing.
  - .4 Preparation, submission of test reports.
- .6 Property Manager: represents lead role in Operation Phase and onwards and is responsible for:
  - .1 Receiving facility.
  - .2 Day-To-Day operation and maintenance of facility.
- .3 The Contractor shall be responsible to commission all Mechanical and Electrical systems and/or equipment installed. The Contractor shall be responsible for all sub-contractors, suppliers/manufacturers' representatives and/or support staff.
- .4 Cx to be a line item of Contractor's cost breakdown.
- .5 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .6 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 Facility is proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.
- .7 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.

#### **1.5 Non-Conformance To Performance Verification Requirements**

- .1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the non-functional 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 form of progress payment reductions or hold-back assessments.

#### **1.6 Pre-Cx Review**

- .1 Before Construction:

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

## **1.7 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.

## **1.8 Submittals**

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Submit no later than four (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 eight (8) weeks prior to start of Cx.
  - .3 Submit proposed Cx procedures to Departmental Representative where not specified and obtain written approval at least eight (8) weeks prior to start of Cx.
  - .4 Provide additional documentation relating to Cx process required by Departmental Representative.

### **1.9 Commissioning Documentation**

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

### **1.10 Commissioning Schedule**

- .1 Provide detailed Cx schedule as part of construction schedule in accordance with Sections 01 11 00 – Summary of Work and 01 14 00 – Work Restrictions.
- .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, re-commissioning, re-verification.
  - .4 Training.

### **1.11 Commissioning Meetings**

- .1 Convene Cx meetings following project meetings 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 60% 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.

### **1.12 Starting And Testing**

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

### **1.13 Witnessing of Starting and Testing**

- .1 Provide fourteen (14) day 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 sub-trades, suppliers and equipment manufacturers.

### **1.14 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 manufacturers 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 Ability to interpret test results accurately.
  - .3 To report results in clear, concise, logical manner.

### **1.15 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 accepted start-up procedures.

- .3 Operational testing: document equipment performance.
- .4 System PV: include repetition of tests after correcting deficiencies.
- .5 Post-substantial performance verification: 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 require tests on approved PV forms.
- .5 Failure to follow accepted 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 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 shall reject equipment.
    - .1 Rejected equipment to be remove from site and replace with new.
    - .2 Subject new equipment/systems to specified start-up procedures.

#### **1.16 Start-Up Documentation**

- .1 Assemble start-up documentation and submit to Departmental Representative for approval before commencement of commissioning.
- .2 Start-up documentation to include:
  - .1 Factory and on-site test certificates for specified equipment.
  - .2 Pre-start-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.

#### **1.17 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.

### **1.18 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 re-commissioning.

### **1.19 Start of Commissioning**

- .1 Notify Departmental Representative at least twenty-one (21) days prior to start of Cx.
- .2 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

### **1.20 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.
- .2 Provide the following equipment as required:
  - .1 2-way radios.
  - .2 Ladders.
  - .3 Equipment as required to complete work.

### **1.21 Commissioning Performance Verification**

- .1 Carry out Cx:
  - .1 Under actual (preferable) and/or accepted 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 performance verification.

### **1.22 Witnessing Commissioning**

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

### **1.23 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 five (5) days of test and with Cx report.

#### **1.24 Commissioning Constraints**

- .1 It is necessary to complete Cx of occupancy, weather, and seasonal sensitive equipment and systems before issuance of the Interim Certificate, using, if necessary, simulated thermal loads.

#### **1.25 Extrapolation of Results**

- .1 Where Cx of weather, occupancy, or seasonal-sensitive equipment or systems cannot be conducted under near-rated or near-design conditions, extrapolate part-load results to design conditions when approved by Departmental Representative in accordance with equipment manufacturer's instructions, using manufacturer's data, with manufacturer's assistance and using approved formulae.

#### **1.26 Extent of Verification**

- .1 Provide manpower and instrumentation to verify up to 30% of reported results, unless specified otherwise in other sections.
- .2 Number and location to be at discretion of Departmental Representative.
- .3 Conduct tests repeated during verification under same conditions as original tests, using same test equipment, instrumentation.
- .4 Review and repeat commissioning of systems if inconsistencies found in more than 20% of reported results.
- .5 Perform additional commissioning until results are acceptable to Departmental Representative.

#### **1.27 Repeat Verifications**

- .1 Assume costs incurred by Departmental Representative for third and subsequent verifications where:
  - .1 Verification of reported results fail 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.

#### **1.28 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.

**1.29 Deficiencies, Faults, Defects**

- .1 Correct deficiencies found during start-up and Cx to satisfaction of Departmental Representative. Provide 'signed off' copy of Cx deficiency list upon request.
- .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.

**1.30 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 accepted by Departmental Representative.

**1.31 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.

**1.32 Maintenance Materials, Spare Parts, Special Tools**

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

**1.33 Occupancy**

- .1 Cooperate fully with Departmental Representative during stages of acceptance and occupancy of facility.

**1.34 Installed Instrumentation**

- .1 Use instruments installed under Contract for TAB and PV if:
  - .1 Accuracy complies with these specifications.
  - .2 Calibration certificates have been deposited with Departmental Representative.
- .2 Calibrated EMCS sensors may be used to obtain performance data provided that sensor calibration has been completed and accepted.

**1.35 Performance Verification Tolerances**

- .1 Application tolerances:
  - .1 Specified range of acceptable deviations of measured values from specified values or specified design criteria to be within +/- 10% of specified values, except for special areas.
- .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 +/- 2% of recorded values.

**1.36 Departmental Representative'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 Summary**

- .1 Section Includes:
  - .1 Commissioning forms to be completed for equipment, system and integrated system.
- .2 Related Requirements
  - .1 Section 099141

### **1.2 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. Check lists will be required during Commissioning and will be included in Building Maintenance Manual (BMM) at completion of project.
- .5 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.

### **1.3 Product Information (PI) Report Forms**

- .1 Product Information (PI) forms 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. This documentation is included in the BMM at completion of work.
- .2 Prior to Performance Verification (PV) of systems complete items on PI forms related to systems and obtain Departmental Representative's approval.

### **1.4 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 Performance Verification procedures.
- .3 Prior to PV of integrated system, complete PV forms of related systems and obtain Departmental Representative's approval.

### **1.5 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.
  - .1
  - .2
- .2 Revise items on Commissioning forms to suit project requirements.
- .3 Samples of Commissioning forms and a complete index of produced to date will be attached to this section.

### **1.6 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

### **1.7 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 with typed written results in Building Management Manual in accordance with Section 01 91 51- Building Management Manual (BMM).

#### **1.8 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**

## FUNCTIONAL PERFORMANCE TEST

FPT-26 09 24-001

PROJECT: **UPGRADE LIGHTING RETROFIT, AAFC, Kentville, Nova Scotia**

DATE:

TRADE: **ELECTRICAL - DIVISION 26** CONTRACTOR:

A) WORK TO BE FUNCTIONALLY TESTED: *Lighting Controls.*

B) DESCRIPTION:

Functional testing of the low voltage control system shall consist of the following:

- .1 Confirm the operation of the local low voltage switches.
- .2 Confirm the operation of the master low voltage switch.
- .3 Confirm the operation of relay programming.
- .4 Confirm the operation of the interface to the building automation system.
- .5 Confirm the operation of the occupancy sensors.
- .6 Confirm the operation of the exterior photocell.

C) EQUIPMENT NEEDED:

D) FUNCTIONAL PERFORMANCE PROCEDURES:

.1 LOCAL SWITCHING OPERATION:

- Confirm that the switch movements are smooth, quiet and definite.
- Confirm that each switch operates those fixtures as indicated on the drawings.
- Any switch operating incorrectly shall be corrected.

RESULTS:

Indicate below any problems discovered and the corrective action taken.

Location	Corrective Action
----------	-------------------

.2 SEQUENCE OF OPERATION PROGRAMMING:

- Confirm that the programmed input or control (as detailed in the sequence of operation) operates those fixtures as indicated on the drawings and in accordance with the Owner-defined time schedule.

RESULTS:

Indicate below any problems discovered and the corrective action taken.

Location	Corrective Action
----------	-------------------

.3 OCCUPANCY SENSOR OPERATION:

- In each room whose lighting is turned OFF by an occupancy sensor, manually turn on the lights and confirm that the lights turn off in the absence of motion after the pre-set time delay.

RESULTS:

Indicate below any problems discovered and the corrective action taken.

Location	Corrective Action
----------	-------------------

E) COMMENTS AND EVALUATION:

F) ACCEPTANCE:

CONTRACTOR: Avant-Garde Construction and Management Inc.  
SIGNATURE: DATE:

ELECTRICAL CONTRACTOR: J&D Electric Ltd.  
SIGNATURE: DATE:

COMMISSIONING AGENT: F.C. O'Neill, Scriven and Assoc's. Limited  
SIGNATURE: DATE:

## FUNCTIONAL PERFORMANCE TEST

FPT-26 50 00-001

PROJECT: **UPGRADE LIGHTING RETROFIT, AAFC, Kentville, Nova Scotia**  
DATE:  
TRADE: **ELECTRICAL - DIVISION 26** CONTRACTOR:

A) WORK TO BE FUNCTIONALLY TESTED: *Interior LED Lighting Fixtures.*

B) DESCRIPTION:

Functional testing of interior lighting fixtures shall consist of:

- .1 Verifying the operation of each and every fixture.
- .2 Checking each fixture for lamp burnout.

C) EQUIPMENT NEEDED:

D) FUNCTIONAL PERFORMANCE PROCEDURES:

.1 FIXTURE OPERATION:

The confirmation of acceptable operation for all interior lighting fixtures can be carried out the same time that the functional tests are performed on the various lighting controls. Refer to FPT-26 09 24-001 (Lighting Controls). Any fixture which fails to operate when turned ON is to be recorded in the Table to follow, investigated, corrected, and then retested.

With respect to lamp burn out, any fixtures identified as having lamp burn out are to be recorded in the Table to follow and are to have the lamp(s) replaced. Should more than 10% of any one type of fixture exhibit lamp burn out, then all lamps in all fixtures of that type are to be replaced.

RESULTS:

In the following table, indicate the acceptability or value for each item:

<u>Location</u>	<u>Fixture Type</u>	<u>Fixture Problem</u>	<u>Corrective Measure</u>
-----------------	---------------------	------------------------	---------------------------



E) COMMENTS AND EVALUATION:

F) ACCEPTANCE:

CONTRACTOR:  
SIGNATURE:

DATE:

ELECTRICAL CONTRACTOR:  
SIGNATURE:

DATE:

COMMISSIONING AGENT: F.C. O'Neill, Scriven and Assoc's. Limited  
SIGNATURE:

DATE:

## **PART 1 GENERAL**

### **1.1 Summary**

- .1 Section Includes:
  - .1 This Section specifies roles and responsibilities of Commissioning Training.
- .2 Related Requirements
  - .1 Section 019133

### **1.2 Trainees**

- .1 Trainees: personnel selected for operating and maintaining this facility. Includes Facility Manager, building operators, maintenance staff, security staff, and technical specialists as required.
- .2 Trainees will be available for training during later stages of construction for purposes of familiarization with systems.

### **1.3 Instructors**

- .1 Departmental Representative will provide:
  - .1 Descriptions of systems.
  - .2 Instruction on design philosophy, design criteria, and design intent.
- .2 Contractor and certified factory-trained manufacturers' personnel: to provide instruction on the following:
  - .1 Start-Up, operation, shut-down of equipment, components and systems.
  - .2 Control features, reasons for, results of, implications on associated systems of, adjustment of set points of control and safety devices.
  - .3 Instructions on servicing, maintenance and adjustment of systems, equipment and components.
- .3 Contractor and equipment manufacturer to provide instruction on:
  - .1 Start-up, operation, maintenance and shut-down of equipment they have certified installation, started up and carried out PV tests.

### **1.4 Training Objectives**

- .1 Training to be detailed and duration to ensure:
  - .1 Safe, reliable, cost-effective, energy-efficient operation of systems in normal and emergency modes under all conditions.
  - .2 Effective on-going inspection, measurements of system performance.
  - .3 Proper preventive maintenance, diagnosis and trouble-shooting.
  - .4 Ability to update documentation.

- .5 Ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives.

## **1.5 Training Materials**

- .1 Instructors to be responsible for content and quality.
- .2 Training materials to include:
  - .1 "As-Built" Contract Documents.
  - .2 Operating Manual.
  - .3 Maintenance Manual.
  - .4 Management Manual.
  - .5 TAB and PV Reports.
- .3 Departmental representative will review training manuals.
- .4 Training materials to be in a format that permits future training procedures to same degree of detail.
- .5 Supplement training materials:
  - .1 Transparencies for overhead projectors.
  - .2 Multimedia presentations.
  - .3 Manufacturer's training videos.
  - .4 Equipment models.

## **1.6 Scheduling**

- .1 Include in Commissioning Schedule time for training.
- .2 Deliver training during regular working hours, training sessions to be 3 hours in length.
- .3 Training to be completed prior to acceptance of facility.

## **1.7 Responsibilities**

- .1 Be responsible for:
  - .1 Implementation of training activities,
  - .2 Coordination among instructors,
  - .3 Quality of training, training materials,
- .2 Departmental Representative will evaluate training and materials.
- .3 Upon completion of training, provide written report, signed by Instructors, witnessed by Departmental Representative.

## **1.8 Training Content**

- .1 Training to include demonstrations by Instructors using the installed equipment and systems.
- .2 Content includes:

- .1 Review of facility and occupancy profile.
  - .2 Functional requirements.
  - .3 System philosophy, limitations of systems and emergency procedures.
  - .4 Review of system layout, equipment, components and controls.
  - .5 Equipment and system start-up, operation, monitoring, servicing, maintenance and shut-down procedures.
  - .6 System operating sequences, including step-by-step directions for starting up, shut-down, operation of valves, dampers, switches, adjustment of control settings and emergency procedures.
  - .7 Maintenance and servicing.
  - .8 Trouble-shooting diagnosis.
  - .9 Inter-Action among systems during integrated operation.
  - .10 Review of O& M documentation.
- .3 Provide specialized training as specified in relevant Technical Sections of the construction specifications.

#### **1.9 Video-Based Training**

- .1 Manufacturer's videotapes to be used as training tool with Departmental Representative's review and written approval 3 months prior to commencement of scheduled training.
- .2 On-Site training videos:
  - .1 Videotape training sessions for use during future training.
  - .2 To be performed after systems are fully commissioned.
  - .3 Organize into several short modules to permit incorporation of changes.
- .3 Production methods to be professional quality.

### **PART 2 PRODUCTS**

#### **2.1 Not Used**

- .1 Not Used.

### **PART 3 EXECUTION**

#### **3.1 Not Used**

- .1 Not Used.

**END OF SECTION**