

## 1 General

### 1.01 WORK COVERED BY CONTRACT DOCUMENTS

- .1 This Contract includes work, materials and procedures indicated on drawings and in specifications and other documents referenced or related to this project.
- .2 Work of this Contract, identified as Project No R.055494.001, consists of general interior renovations to a suite in the Government of Canada Building, located at 101-22nd Street East, Saskatoon, Saskatchewan.
  - .1 The interior renovations generally include selective demolition, patching and repairs, carpentry, partitions, flooring, ceiling and wall finishes, mechanical and electrical.

### 1.02 CONTRACT METHOD

- .1 Construct Work stipulated price contract.

### 1.03 WORK BY OTHERS

- .1 Co-operate with Departmental Representative and other contractors in carrying out their respective works and carry out instructions from Departmental Representative so that work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Departmental Representative.
  - .1 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.
- .2 Work that is scheduled to occur concurrently with Work of this Contract, which is specifically excluded from this Contract, but which will require coordination and cooperation:
  - .1 Shared Services Canada (SSC):
    - .1 During Work SSC will be installing voice/data structured cabling for the project.
    - .2 Coordinate with Departmental Representative and Division 27 & 28.
  - .2 Furniture:
    - .1 Departmental Representative will supply and install furniture following Substantial Completion of the Work. Coordinate with Departmental Representative for scheduling and power and data connections.

### 1.04 OWNER-FURNISHED, CONTRACTOR INSTALLED ITEMS

- .1 Owner Responsibilities:
  - .1 Deliver bill of materials to Contractor.
  - .2 Arrange and pay for delivery to site in accordance with Progress Schedule.
  - .3 Inspect deliveries jointly with Contractor.
  - .4 Submit claims for transportation damage.
  - .5 Arrange for replacement of damaged, defective or missing items.

- .2 Contractor Responsibilities:
  - .1 Designate delivery date for each product in progress schedule.
  - .2 Receive and unload products at site.
  - .3 Inspect deliveries jointly with Departmental Representative; record shortages, and damaged or defective items.
  - .4 Handle products at site, including uncrating and storage.
  - .5 Protect products from damage, and from exposure to elements.
  - .6 Assemble, install, connect, adjust, and finish products.
  - .7 Provide installation inspections required by public authorities.
  - .8 Repair or replace items damaged by Contractor or subcontractor on site (under its control).
- .3 Schedule of Owner-furnished items:
  - .1 Projection Screen
  - .2 Doors and frames salvaged from fourth floor renovation indicated in Section 08 06 00 – Door and Frame Schedule.

#### **1.05 WORK SEQUENCE**

- .1 Construct Work in single continuous phase.

#### **1.06 CONTRACTOR USE OF PREMISES**

- .1 Restrict use of site in accordance with requirements of Section 01 14 00 – Work Restrictions.
- .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.

#### **1.07 OWNER OCCUPANCY**

- .1 Owner will occupy adjacent portions of premises during entire construction period for execution of normal operations.
- .2 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.
- .3 Refer to Section 01 14 00 – Work Restrictions for additional requirements.

## 1.08 FIRE SAFETY REQUIREMENTS

- .1 Comply with both the National Building Code of Canada 2015 and the National Fire Code of Canada 2015 for safety of persons in buildings in the event of a fire and the protection of buildings from the effects of fire, as follows;
  - .1 The National Building Code (NBC): for fire safety and fire protection features that are required to be incorporated in a building during construction.
  - .2 The National Fire Code (NFC):
    - .1 The on-going maintenance and use of the fire safety and fire protection features incorporated in buildings.
    - .2 The conduct of activities that might cause fire hazards in and around buildings.
    - .3 Limitations on hazardous contents in and around buildings.
    - .4 The establishment of fire safety plans.
    - .5 Fire safety at construction and demolition sites.
- .2 Welding and cutting:
  - .1 At least one week prior to commencing cutting, welding or soldering procedure, provide to Departmental Representative:
    - .1 Notice of intent, indicating devices affected, time and duration of isolation or bypass.
    - .2 Completed welding permit as defined in NFC.
    - .3 Return welding permit to Departmental Representative immediately upon completion of procedures for which permit was issued.
  - .2 "Fire Watchers" as described in NFC shall be assigned when welding or cutting operations are carried out in areas where combustible materials within 15m may be ignited by conduction or radiation.
- .3 Where work requires interruption or cause activation of fire alarms or fire suppression, extinguishing or protection systems:
  - .1 Provide "Watchman Service" as described in NFC; In general, watchman service is defined as an individual conversant with "Fire Emergency Procedures", performing fire picket duty within an unprotected and unoccupied (no workers) area once per hour.
  - .2 Retain services of manufacturer for fire protection systems on daily basis or as approved by Departmental Representative, to isolate and protect all devices relating to:
    - .1 Modification of fire alarms, fire suppression, extinguishing or protection systems; and/or
    - .2 Cutting, welding, soldering or other construction activities that might activate fire protection systems.
  - .3 Immediately upon completion of work, restore fire protection systems to normal operation and verify that all devices are fully operational.
  - .4 Inform fire alarm system monitoring agency and local Fire Department immediately prior to isolation and immediately upon restoration of normal operation.

### 1.09 COST BREAKDOWN

- .1 Before submitting first progress claim, submit breakdown of Contract Amount in detail as directed by Departmental Representative and aggregating the Contract Amount. After approval by Departmental Representative cost breakdown will be used as the basis of progress payments.
  - .1 Refer to Section 01 32 16 – Construction Progress Schedule- Critical Path Method (CPM) for additional requirements.

### 1.10 PRECEDENCE

- .1 For Federal Government projects, Division 01 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

### 1.11 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.

### 1.12 FIELD QUALITY CONTROL

- .1 Carry out Work using qualified licensed workers or apprentices in accordance with Provincial Act respecting manpower vocational training and qualification.
- .2 Permit employees registered in Provincial apprenticeship program to perform specific tasks only if under direct supervision of qualified licensed workers.
- .3 Determine permitted activities and tasks by apprentices, based on level of training attended and demonstration of ability to perform specific duties.

### 1.13 PERMITS

- .1 Building Permit will be applied for prior to Work on behalf of Owner.
- .2 Contractor shall pick up and pay for Building Permit.
- .3 Specification Content: The *Specifications* use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

## 1.14 SPECIFICATION FORMATS AND CONVENTIONS

- .1 Specification Format: The specifications are based on MasterFormat® jointly published by Construction Specifications Canada (CSC) and Construction Specifications Institute (CSI) using the 2016 updated master list of numbers and titles that classify work results or construction practices:
  - .1 Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents.
  - .2 Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete and not intended to be read as a continuous and sequential page-by-page requirement.
  - .3 Consult Section 00 01 10 - Table of Contents at beginning of Project Manual to determine Section numbers and titles in the Contract Documents.
  - .4 Section numbers do not, and cannot indicate scope of work for individual Subcontractors (trade scope of work); rather they establish the *Work* required for the *Project*.
- .2 MasterFormat is primarily used to organize Project Manuals, organize detailed cost information and relate notations on *Drawings* to the *Specifications*.
  - .1 As described in MasterFormat, Section numbers and titles may be identified with the following precision:
    - .1 Level 2: 07 51 00 – Built-Up Bituminous Roofing
    - .2 Level 3: 07 51 13 – Built-Up Asphalt Roofing
    - .3 Level 4: 07 51 13.13 – Cold-Applied Built-Up Asphalt Roofing
- .3 Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
  - .1 Related Requirements: Related requirements listed in Specifications indicate Specifications Sections that are related to work of the Section do not create a trade scope of work:
    - .1 Related requirements are provided to indicate closely coordinated requirements during preparation of Contract Documents and that may aid the Contractor in fully incorporating components relating to trade scope of work.
      - .1 Coordinate with Sections affecting work and ensure that trade scope of work is fully accounted for, including requirements of Divisions 00 and 01 and other Sections that may not be listed in the listings associated with related requirements.
    - .2 Laws, Statutes, Codes and Reference Standards: Dated reference standards listed in the Specifications generally reflect the version used to establish the performance requirements for the work described:
      - .1 Reference to any provincial or national statutes and codes includes the full content of the code or statute including and amendment, revision or consolidation published by the Authority Having Jurisdiction.
      - .2 Dated reference standards listed in provincial or national codes or statutes apply to the Work of the Contract.

- .3 Dated reference standards listed in provincial codes or statutes govern where an older or newer version of a reference standard is listed in the Specifications.
- .3 Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated to aid interpretation of the documents:
  - .1 Words and meanings shall be interpreted as appropriate and are intended to be read as a whole, not extracted and read individually.
  - .2 Words implied but not stated, shall be inferred as the sense requires.
- .4 Imperative Mood and Streamlined Language: Generally used in the Specifications to avoid assigning specific responsibilities to the Contractor or the Subcontractor that affect trade scopes of work:
  - .1 Requirements expressed in the imperative mood are to be performed by the Contractor.
  - .2 Occasionally, the indicative or subjunctive mood may be used in the Section text for clarity to describe responsibilities that must be fulfilled by the Contractor or by others when so noted.
- .5 Use of May, Shall, Must and Will: Use of the words may, shall, must and will is minimized throughout the Specifications, but are used to indicate preferred directives to the Contractor where greater clarity to the documentation is achieved using those words:
  - .1 For the purposes of this Contract, the word “may” is indicative of a directive subject to discretion on the part of the party from whom the action is forthcoming, and the other party has an obligation to act upon when the purpose or result of the directive is identified.
  - .2 For the purposes of this Contract, the word “shall” is indicative of a directive when one party “has a duty” to another, and where a failure to do something has potential to breach an obligation under the contract; typically requiring that the Contractor undertake a specific task or assignment.
  - .3 For the purposes of this Contract, the word “must” is indicative of a directive when one party “is required to” perform an action or directive, with no other interpretation.
  - .4 For the purposes of this Contract, the word “will” is indicative of a directive that one party “has an express obligation” to the other party; typically, an action or task required by the Departmental Representative.
- .6 Use of Singular and Plural Words: The language of the Specifications is essentially plural, and usage of singular and plural words is governed as follows:
  - .1 Every attempt has been made to apply singular and plural word usage based on numbers of components required by the Project; however, it is expected that use of singular and plural words will be interpreted in context to what the Contract Documents indicate.

- .2 The use of plural words when ascribed to a singular requirement shall be reasonably interpreted as relating to a singular requirement when a count of components described by the plural word indicates a single occurrence.
- .3 The use of a singular word version when ascribed to multiple requirements shall be reasonably interpreted as relating to multiple requirements when a count of components described by the singular word indicates multiple occurrences.
- .7 Use of Gender Specific Words: The language of the Specifications is generally written as nouns arising from the Contract and that relate to the partnerships, firms or corporations involved and generally avoid the use of gender specific pronouns wherever possible:
  - .1 Words describing gender and that relate to the partnerships, firms and corporations can be interpreted as relating to the Contractor as defined by the Contract within the context of what the Contract Documents require for those parties.

## **2 Products**

**2.01 NOT USED**

## **3 Execution**

**3.01 NOT USED**

**END OF SECTION**

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## 1 General

### 1.01 ACCESS AND EGRESS

- .1 Maintain existing services to building and provide for personnel and vehicle access.
- .2 In the event temporary openings are required in exterior walls, ensure openings are weathertight, and vermin proof. Reinstate exterior walls to condition that existed prior to construction.
  - .1 Obtain approval from Departmental Representative prior to creating openings.
  - .2 Refer to Section 01 52 00 – Construction Facilities
- .3 Maintain safe occupant access, egress and internal circulation for occupied areas of the buildings, and for construction workers in the area of the Work.
  - .1 Ensure Authorities Having Jurisdiction review and approve egress routes. Do not alter egress routes without prior approval from Authorities Having Jurisdiction.
  - .2 Post egress routes as part of emergency procedures.

### 1.02 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises. Departmental Representative will provide BGIS contact information for at start up meeting.
- .2 Construction activity hours of work: Monday to Friday between 0600 and 1730 hr.
  - .1 Extended Hours: Obtain special permission from Departmental Representative to work outside of indicated Construction activity hours of Work. Refer to “Special Requirements” in this Section.
- .3 Limit use of premises for Work, for storage, and for access to allow:
  - .1 Occupancy of adjacent areas.
  - .2 Work by other contractors.
- .4 Laydown and construction staging space is not available on site outside designated construction areas within the building. Contractor to obtain and pay for space required to facilitate laydown, staging and construction office facilities.
- .5 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .6 Generally, restrict construction activities to designated work areas. Where Work must proceed outside of designated areas, arrange scheduling with Departmental Representative not less than ten working days prior to commencement of such work.
- .7 Use public circulation entrances, corridors, elevators, and stairs for access to work areas.
- .8 Existing Elevator: Use only freight elevator, existing in building, for moving materials and workers, and removal of construction debris.
  - .1 Protect walls of elevator, to approval of Departmental Representative prior to use.

- .2 Accept liability for damage, safety of equipment and overloading of existing equipment.
- .3 Coordinate use with Departmental Representative.
  - .1 Elevator is controlled by card access.
  - .2 Contractor will not have exclusive use of freight elevator.
- .9 At completion of Work, condition of existing work: equal to or better than that which existed before Work started.
- .10 Repair or replace portions of existing work which have been altered during construction to match existing or adjoining work, as approved by Departmental Representative.
- .11 Closures: protect work temporarily until permanent enclosures are completed.
- .12 Maintain life safety routes, and fire access/control.

### **1.03 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING**

- .1 Areas adjacent to the Work will remain occupied and in use during entire construction period for execution of normal operations.
- .2 Disruption to building occupants in adjacent areas of the premises may impact Contractor's hours of work. Cease disruptive activities immediately as directed by Departmental Representative, and coordinate rescheduling of disruptive activities.
- .3 Execute work with least possible interference or disturbance to building operations, occupants, and normal use of premises.
- .4 Protect infrastructure and services running through the area of the Work that supports occupied operational spaces.

### **1.04 EXISTING SERVICES**

- .1 Provide alternative routes for pedestrian traffic.
- .2 Notify Departmental Representative, and BGIS of intended interruption of services. Obtain required permission 10 Working days in advance of interruption.
- .3 Where Work involves interruption of services to occupied adjacent areas, breaking into or connecting to existing services, give Departmental Representative and BGIS minimum ten Working Days' notice for necessary interruption throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by Department Representative, or governing authorities with minimum disturbance to facility operations.
- .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 shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .6 Provide temporary services to maintain critical building systems, as directed by Departmental Representative.

- .7 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- .8 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .10 Record locations of maintained, re-routed and abandoned service lines.

#### **1.05 SPECIAL REQUIREMENTS**

- .1 Ensure that Contractor personnel employed on site become familiar with and obey regulations including safety, fire, traffic, noise, and security regulations.
- .2 Schedule delivery of materials during regular business hours, but outside of peak traffic times, unless otherwise approved by Departmental Representative.
  - .1 Deliver materials to loading dock and transport to construction area using freight elevator.
- .3 BGIS Property Management: Work occurs within a Brookfield Global Integrated Solutions (BGIS) managed facility.
  - .1 Work Permit: Complete, and submit to BGIS, Work Permit Application prior to commencement of Work.
  - .2 Job Hazard Assessment (JHA): Complete and submit to BGIS a project specific Job Hazard Assessment in conformance with BGIS requirements.

#### **1.06 SECURITY**

- .1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.
- .2 Personnel employed on this project are required to sign in and out at front reception desk each day.
  - .1 Extended Hours Security: When extended hours are acceptable to Departmental Representative, construction personnel must obtain and pay for services of Commissionaire.
    - .1 Commissionaire must be present for duration of extended hours work.

#### **1.07 CONTROL OF NOISE, VIBRATION, DUST, NOXIOUS FUMES AND SMOKE**

- .1 Be aware of locations of existing mechanical air intakes and vents. Prevent noxious fumes and smoke associated with the Work from entering surrounding occupied buildings.
- .2 Minimize noise, vibration and dust-generating activities from affecting occupied areas. Provide 72 hours' notice to Departmental Representative prior to work causing noise, vibration, and dust generation.
  - .1 Schedule noise-generating work outside of normal office hours.
    - .1 Normal Office Hours: 0800 to 1630 hr.

- .3 Be prepared to stop and reschedule Work upon verbal notice from Departmental Representative that the Work is causing detrimental effect on the operation of occupied areas.
- .4 Dust Management:
  - .1 Place sticky mat in area directly outside construction work zones in occupied areas, to trap dust from equipment and shoes of personnel leaving construction zone. Vacuum mat daily and when visibly soiled.
  - .2 Wear clean coveralls, and booties over construction footwear. Remove coveralls, and vacuum themselves with HEPA-filtered vacuum to remove dust from their clothing before leaving construction zone.
  - .3 Clean work area with HEPA-filtered vacuum at end of each work day.
  - .4 Cover and protect equipment and furnishings with clean tarpaulins.
  - .5 Seal doors, vents, and other sources of potential air leak between construction zone and adjacent occupied areas.
    - .1 Provide a minimum merv 8 filtration on existing inlets and return air ducts and systems during course of construction.
  - .6 Enclose supplies, equipment and waste in covered containers when transporting through public areas.
  - .7 Where construction/demolition dust migrates beyond construction areas, apply additional control measures as directed by Departmental Representative including but not limited to negative pressurization of construction area.

#### **1.08 BUILDING SMOKING POLICY**

- .1 Comply with smoking restrictions. Smoking is not allowed in building or on property.

#### **2 Products**

##### **2.01 NOT USED**

#### **3 Execution**

##### **3.01 NOT USED**

**END OF SECTION**

## **1 General**

### **1.01 APPOINTMENT AND PAYMENT**

- .1 Provide testing and inspection specified except where explicitly indicated to be performed by Departmental Representative.
- .2 Departmental Representative may appoint and pay for services of testing laboratory for random quality assurance testing, except follows:
  - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
  - .2 Inspection and testing performed exclusively for Contractor's convenience.
  - .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
  - .4 Mill tests and certificates of compliance.
  - .5 Tests specified in technical specifications to be carried out by Contractor.
- .3 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.

### **1.02 CONTRACTOR'S RESPONSIBILITIES**

- .1 Provide labour, equipment and facilities to:
  - .1 Provide access to Work for inspection and testing.
  - .2 Facilitate inspections and tests.
  - .3 Make good Work disturbed by inspection and test.
  - .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
- .2 Notify Departmental Representative 48 hours minimum sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
- .3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Departmental Representative.

## **2 Products**

### **2.01 NOT USED**

## **3 Execution**

### **3.01 NOT USED**

**END OF SECTION**

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## 1 General

### 1.01 ADMINISTRATIVE

- .1 Schedule and administer project meetings every two weeks, or as directed by Departmental Representative.
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting four days in advance of meeting date to the Departmental Representative, and major Subcontractors involved in the Work.
- .4 Provide for telephone and web-based conferencing. Physical meeting space is not required.
- .5 Preside at meetings.
- .6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties with associated due dates.
- .7 Distribute electronic copy of minutes within three days after meetings to meeting participants, and affected parties not in attendance.
- .8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents

### 1.02 PRECONSTRUCTION MEETING

- .1 Within 15 days after award of Contract, but before start of Work, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Departmental Representative and senior representatives of Contractor, major Subcontractors, field inspectors, and supervisors will be in attendance.
- .3 Departmental Representative will establish time and location of meeting and notify parties concerned minimum five working days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing
- .5 Agenda to include:
  - .1 Appointment of official representative of participants in the Work.
  - .2 Schedule of Work: in accordance with 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM), including critical work sequencing, long-lead items, delays, Risk management, Substantial Performance of Work, Final Completion.
  - .3 Schedule of submission of shop drawings, samples, colour chips.
  - .4 Requirements for temporary facilities in accordance with Section 01 52 00 - Construction Facilities.
  - .5 Site security
  - .6 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
  - .7 Owner provided products.

- .8 Record drawings.
  - .9 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
  - .10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
  - .11 Monthly progress claims, administrative procedures, photographs, hold backs, cost breakdown, cash flow.
  - .12 Appointment of inspection and testing agencies or firms.
  - .13 Insurances, transcript of policies.
  - .14 Communications.
  - .15 RFI process.
  - .16 Health and safety requirements.
  - .17 Progress review inspections, and meetings.
  - .18 Labour conditions.
  - .19 Bonds.
  - .20 Warranties and guarantees.
  - .21 Permits and by-laws.
  - .22 Material delivery.
  - .23 Certificates.
  - .24 Hazardous Materials.
  - .25 Security Requirements.
  - .26 Commissioning.
  - .27 Pre-construction document checklist.
  - .28 On-site postings.
  - .29 Contract documentation.
  - .30 Hot work permits.
  - .31 Fuel tanks.
  - .32 PSPC Project forms.
  - .33 Liability and indemnification.
- .6 Submit Construction Progress Schedule, and Shop Drawing Submittal Schedule at initial start-up meeting.

### 1.03 PROGRESS MEETINGS

- .1 Departmental Representative and senior representatives of Contractor, major Subcontractors, field inspectors, and supervisors will be in attendance.
- .2 Establish time and location of meeting and notify parties concerned minimum five working days before meeting.
- .3 Agenda:
  - .1 Review, approval of minutes of previous meeting.
  - .2 Contractor's Construction Schedule:
    - .1 Review progress since the last meeting.
    - .2 Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule.
    - .3 Determine corrective measures and procedures to regain projected schedule, and secure commitments from parties involved to do so.

- .4 Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
- .5 Review proposed changes for affect on construction schedule and on completion date.
- .6 Review progress schedule, during succeeding work period.
- .7 Review detailed 4-week look ahead schedule.
- .3 Review present and future needs of each entity present, including the following:
  - .1 Interface requirements.
  - .2 Sequence of operations.
  - .3 Status of submittal and submittal schedules.
  - .4 Safety.
  - .5 Deliveries.
  - .6 Off-site fabrication delivery schedules.
  - .7 Access.
  - .8 Site utilization.
  - .9 Noisy and otherwise disruptive work to building tenants.
  - .10 Temporary facilities and controls.
  - .11 Service interruptions, and system shutdowns.
  - .12 Progress cleaning.
  - .13 Quality and work standards.
  - .14 Status of correction of deficient items.
  - .15 Field observations, problems and conflicts.
  - .16 Status of RFIs.
  - .17 Status of proposal requests.
  - .18 Pending changes.
  - .19 Status of Change Orders.
  - .20 Documentation of information for payment requests.
- .4 Problems which impede construction schedule.
- .5 Review security measures in place, security incidents, and revisions required to respond to construction activities.
- .6 Risks and opportunities: Identify, categorize, prioritize, and mitigate or avoid risks before they occur.
- .7 Other business.

#### **1.04 PREINSTALLATION MEETINGS**

- .1 Preinstallation Meetings: Conduct a preinstallation meeting at Project site before each construction activity that requires coordination with other construction.
- .2 Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Notify Departmental Representative of scheduled meeting dates 10 working days before meeting.
- .3 Agenda: Review progress of other construction activities and preparations for the particular activity under consideration
- .4 Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

- .5 Reporting: Distribute minutes of the meeting to Departmental Representative, each party present, and to other parties requiring information, within three working days of meeting.
- .6 Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

**END OF SECTION**

## 1 General

### 1.01 DEFINITIONS

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Actual Finish Date (AF): point in time that Work actually ended on activity
- .3 Actual Start Date (AS): point in time that Work actually started on activity.
- .4 Bar Chart (Gantt chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars.
- .5 Baseline: original approved plan (for Project, work package, or activity), plus or minus approved scope changes.
- .6 Completion Milestones: they are firstly Interim Certificate and secondly Final Certificate.
- .7 Constraint: applicable restriction that will affect performance of Project. Factors that affect activities can be scheduled.
- .8 Control: process of comparing actual performance with planned performance, analyzing variances, evaluating possible alternatives, and taking appropriate corrective action as needed.
- .9 Critical Activity: any activity on a critical path. Most commonly determined by using critical path method.
- .10 Critical Path: series of activities that determines duration of Project. In deterministic model, critical path is usually defined as those activities with float less than or equal to specified value, often zero. It is longest path through Project.
- .11 Critical Path Method (CPM): network analysis technique used to predict Project duration by analyzing which sequence of activities (which path) has least amount of scheduling flexibility (least amount of float).
- .12 Data Date (DD): date at which, or up to which, Project's reporting system has provided actual status and accomplishments.
- .13 Duration (DU): number of work periods (not including holidays or other non-working periods) required to complete activity or other Project element. Usually expressed as workdays or work weeks.
- .14 Early Finish Date (EF): in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can finish, based on network logic and schedule constraints. Early finish dates can change as Project progresses and changes are made to Project plan.

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

- .33 Project Schedule: planned dates for performing activities and planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy project objectives. Monitoring and control process involves using project schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .34 Quantified days duration: working days based on 5 day work week, discounting statutory holidays.
- .35 Risk: uncertain event or condition that, if it occurs, has positive or negative effect on Project's objectives.
- .36 Scheduled Finish Date (SF): point in time that Work was scheduled to finish on activity. Scheduled finish date is normally within range of dates delimited by early finish date and late finish date.
- .37 Scheduled Start Date (SS): point in time that Work was scheduled to start on activity. Scheduled start date is normally within range of dates delimited by early start date and late start date.
- .38 Start Date: point in time associated with activity's start, usually qualified by one of following: actual, planned, estimated, scheduled, early, late, target, baseline, or current.
- .39 Work Breakdown Structure (WBS): deliverable-oriented grouping of project elements that organizes and defines total Work scope of Project. Each descending level represents increasingly detailed definition of Project Work.

## 1.02 SYSTEM DESCRIPTION

- .1 Construction Progress Schedule (Project Time Management): describes processes required to ensure timely completion of Project. These processes ensure that various elements of Project are properly co-ordinated. It consists of planning, time estimating, scheduling, progress monitoring and control.
- .2 Planning: this is most basic function of management, that of determining presentation of action and is essential.
  - .1 It involves focusing on objective consideration of future, and integrating forward thinking with analysis; therefore, in planning, implicit assumptions are made about future so that action can be taken today.
  - .2 Planning and scheduling facilitates accomplishment of objectives and should be considered continuous interactive process involving planning, review, scheduling, analysis, monitoring and reporting.
- .3 Ensure that planning process is iterative and results in generally top-down processing with more detail being developed as planning progresses, and decisions concerning options and alternatives are made. This implies progressively more reliability of scheduling data. Detail Project schedule is used for analysis and progress monitoring.
- .4 Ensure project schedule efficiencies through monitoring.
  - .1 When activities begin on time and are performed according to estimated durations without interruptions, original Critical Path will remain accurate. Changes and delays will however, create an essential need for continual monitoring of Project activities.

- .2 Monitor progress of Project in detail to ensure integrity of Critical Path, by comparing actual completions of individual activities with their scheduled completions, and review progress of activities that has started but are not yet completed.
- .3 Monitoring should be done sufficiently often so that causes of delays are immediately identified and removed if possible.
- .5 Project monitoring and reporting: as Project progresses, keep team aware of changes to schedule, and possible consequences. In addition to Bar Charts and CPM networks, use narrative reports to provide advice on seriousness of difficulties and measures to overcome them.
  - .1 Narrative reporting begins with statement on general status of Project followed by summarization of delays, potential problems, corrective measures and Project status criticality.

### 1.03 CPM REQUIREMENTS

- .1 Ensure Master Plan and Detail Schedule are practical and remain within specified Contract duration.
- .2 Revise and resubmit Master Plan and Detail Schedule deemed impractical by Departmental Representative, for approval.
- .3 Acceptance of Master Plan and Detail Schedule showing scheduled Contract duration shorter than specified Contract duration does not constitute change to Contract. Duration of Contract may only be changed through bilateral Agreement.
- .4 Consider Master Plan and Detail Schedule deemed practical by Departmental Representative, showing Work completed in less than specified Contract duration, to have float.
- .5 First Milestone on Master Plan and Detail Schedule will identify start Milestone with an "ES" constraint date equal to Award of Contract date.
- .6 Calculate dates for completion milestones from Plan and Schedule using specified time periods for Contract.
- .7 Substantial Performance with "LF" constraint equal to calculated date.
- .8 Calculations on updates to be such that if early finish of Interim Certificate falls later than specified Contract duration then float calculation to reflect negative float.
- .9 Delays to non-critical activities, those with float may not be basis for time extension.
- .10 Do not use float suppression techniques such as software constraints, preferential sequencing, special lead/lag logic restraints, extended activity times or imposed dates other than required by Contract.
- .11 Allow for and show Master Plan and Detail Schedule adverse weather conditions normally anticipated. Specified Contract duration has been predicated assuming normal amount of adverse weather conditions.

- .12 Provide necessary crews and manpower to meet schedule requirements for performing Work within specified Contract duration. Simultaneous use of multiple crews on multiple fronts on multiple critical paths may be required.
- .13 Arrange participation on and off site of subcontractors and suppliers, as required by Departmental Representative, for purpose of network planning, scheduling, updating and progress monitoring. Approvals by Departmental Representative of original networks and revisions do not relieve Contractor from duties and responsibilities required by Contract.
- .14 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

#### 1.04 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative Project Control System for planning, scheduling, monitoring and reporting of project progress.
- .3 Include costs for execution, preparation and reproduction of schedule submittals in bid documents.
- .4 Submit letter assuring that schedule has been prepared in co-ordination with major sub-contractors.
- .5 Refer to article "Progress monitoring and reporting" of this specification Section for frequency of Project control system submittals.
- .6 Submit Project planning, monitoring and control system data as part of initial schedule submission and monthly status reporting in following form.
  - .1 CD files in original scheduling software containing schedule and cash flow information, labelled with data date, specific update, and person responsible for update.
  - .2 Master Plan Bar Chart.
  - .3 Construction Detail schedule Bar Chart.
  - .4 Listing of project activities including milestones and logical connectors, networks (sub-networks) from Project start to end. Sort activities by activity identification number and accompany with descriptions. List early and late start and finish dates together with durations, codes and float.
  - .5 Criticality report listing activities and milestones with negative, zero, and up to three days total float used as first sort for ready identification of both critical and or near critical paths through entire project. List early and late starts and finishes dates, together with durations, codes and float for critical activities.
  - .6 Progress report in early start sequence, listing for each trade, activities due to start, underway, or finished within two months from monthly update date. List activity identification number, description and duration. Provide columns for entry of actual start and finish dates, duration remaining and remarks concerning action required.
  - .7 Detailed 4-week look ahead schedule.

### **1.05 QUALITY ASSURANCE**

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

### **1.06 PROJECT MEETING**

- .1 Meet with Departmental Representative within three working days of Award of Contract date, to establish Work requirements and approach to project construction operations.

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

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

### **1.08 MASTER PLAN**

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

### **1.09 DETAIL SCHEDULE**

- .1 Provide detailed Baseline project schedule (CPM logic diagram) within 15 working days of Award of Contract date showing activity sequencing, interdependencies and duration estimates. Include listed activities as follows:
  - .1 Start-up meeting.
  - .2 Hazard Assessment Site Inspection by Contractor.

- .3 Submission of Hazard Assessment and Site Specific Safety Plan (HASSSP).
- .4 Approval of HASSSP.
- .5 Site mobilization.
- .6 Required shutdowns. Each shutdown shall be treated as a milestone start and finish; include an exhaustive listing of all required shutdowns in the schedule.
- .7 Shop drawings.
- .8 Samples.
- .9 Mock-ups.
- .10 Approvals.
- .11 Procurement.
- .12 Construction Phases.
- .13 Installation.
- .14 Testing.
- .15 Commissioning start for each phase.
- .16 Commissioning completion for each phase.
- .17 Substantial Performance.
- .18 Final completion.
- .19 Warranty review walk-through.
- .2 Detail CPM schedule to cover in detail minimum period of six months beginning from Award of Contract date with each activity duration approximately 0.5 days.
  - .1 Show remaining activities for CPM construction network system up to Final Certificate and develop complete detail as project progresses.
  - .2 Detail activities completely and comprehensively throughout duration of project.
- .3 Relate Detail Schedule activities to basic activities and milestones developed and approved in Master Plan.
- .4 Clearly show sequence and interdependence of construction activities and indicate:
  - .1 Start and completion of all items of Work, their major components, and interim milestone completion dates.
  - .2 Activities for procurement, delivery, installation and completion of each major piece of equipment, materials and other supplies, including:
    - .1 Time for submittals, resubmittals and review.
    - .2 Time for fabrication and delivery of manufactured products for Work.
    - .3 Interdependence of procurement and construction activities.
    - .4 Time for preparation and review of mock-ups. Separate mock-ups from the Critical Path by a minimum of ten business days float.
  - .3 Include sufficient detail to assure adequate planning and execution of Work. Activities should generally range in duration from 3 to 15 workdays each.
- .5 Provide level of detail for project activities such that sequence and interdependency of Contract tasks are demonstrated and allow co-ordination and control of project activities. Show continuous flow from left to right.
- .6 Ensure activities with no float are calculated and clearly indicated on logical CPM construction network system as being, whenever possible, continuous series of activities throughout length of Project to form "Critical Path". Increased number of critical activities is seen as indication of increased risk.

- .7 Insert Change Orders in appropriate and logical location of Detail Schedule. After analysis, clearly state and report to Departmental Representative for review effects created by insertion of new Change Order.

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

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

#### **1.11 COMPLIANCE WITH DETAIL SCHEDULE**

- .1 Comply with reviewed Detail Schedule.
- .2 Proceed with significant changes and deviations from scheduled sequence of activities that cause delay, only after written receipt of approval by Departmental Representative.
- .3 Shutdowns not listed on the schedule shall not be permitted.
- .4 Identify activities that are behind schedule and causing delay. Provide measures to regain slippage.
  - .1 Corrective measures may include:
    - .1 Increase of personnel on site for effected activities or work package.
    - .2 Increase in materials and equipment.
    - .3 Overtime work, additional work shifts.
- .5 Submit to Departmental Representative, justification, project schedule data and supporting evidence for approval of extension to Contract completion date or interim milestone date when required. Include as part of supporting evidence:
  - .1 Written submission of proof of delay based on revised activity logic, duration and costs, showing time impact analysis illustrating influence of each change or delay relative to approved contract schedule.
  - .2 Prepared schedule indicating how change will be incorporated into the overall logic diagram. Demonstrate perceived impact based on date of occurrence of change and include status of construction at that time.
  - .3 Other supporting evidence requested by Departmental Representative.
  - .4 Do not assume approval of Contract extension prior to receipt of written approval from Departmental Representative.
  - .5 In event of Contract extension, display in Detail Schedule that scheduled float time available for work involved has been used in full without jeopardizing earned float.

- .6 Departmental Representative will determine and advise Contractor number of allowable days for extension of Contract based on project schedule updates for period in question, and other factual information.
- .7 Construction delays affecting project schedule will not constitute justification for extension of contract completion date.

#### **1.12 PROGRESS MONITORING AND REPORTING**

- .1 On ongoing basis, Detail Schedule on job site must show "Progress to Date". Arrange participation on and off site of subcontractors and suppliers, as, and when necessary, for purpose of network planning, scheduling, updating and progress monitoring. Inspect Work and send formal invitation to Departmental Representative for a walk-through minimum of twice monthly. Confirm that Works has been inspected by Contractor's own forces and is ready for review.
- .2 Update and reissue project Work Breakdown Structure and relevant coding structures as project develops and changes.
- .3 Perform Detail Schedule update every two weeks with status dated (Data Date) on last working day of month. Update to reflect activities completed to date, activities in progress, logic and duration changes.
- .4 Do not automatically update actual start and finish dates by using default mechanisms found in project management software.
- .5 Submit to Departmental Representative three copies of updated Detail Schedule. Provide electronic schedule copy in MS Project format.
- .6 Requirements for monthly progress monitoring and reporting are basis for progress payment request.
- .7 Submit every two weeks, written report based on Detail Schedule, showing Work to date performed, comparing Work progress to planned, and presenting current forecasts. Report must summarize progress, defining problem areas and anticipated delays with respect to Work schedule, and critical paths. Explain alternatives for possible schedule recovery to mitigate any potential delay. Include in report:
  - .1 Description of progress made.
  - .2 Pending items and status of: permits, shop drawings, mock-ups, Change Orders, possible time extensions, and items of note from project meetings.
  - .3 Status of Contract completion date and milestones.
  - .4 Current and anticipated problem areas, potential delays and corrective measures.
  - .5 Review of progress and status of Critical Path and Near Critical Path activities.

**END OF SECTION**

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## 1 General

### 1.01 DEFINITIONS

- .1 Action Submittals: Written and graphic information and physical samples that require Departmental Representative's responsive action. Unless specifically noted otherwise in individual sections, the following shall be considered Action Submittals:
  - .1 Product Data.
  - .2 Shop Drawings.
  - .3 Samples.
- .2 Informational Submittals: Written and graphic information and physical samples that do not require Departmental Representative's responsive action. Submittals may be rejected for not complying with requirements. Unless noted otherwise in individual sections, the following shall be considered Informational Submittals:
  - .1 Certificates.
  - .2 Maintenance Data.
  - .3 Test and Inspection Reports.
  - .4 Delegated Design Calculations.
  - .5 Closeout Submittals.
  - .6 Sample warranties.
  - .7 Manufacturer's installation instructions.
- .3 Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

### 1.02 ADMINISTRATIVE

- .1 Process submittals using electronic media. Provide submittals in electronic format, unless otherwise agreed to by Contractor and Departmental Representative.
- .2 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.
- .3 Do not proceed with Work affected by submittal until review is complete.
- .4 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .5 Where items or information is not produced in SI Metric units converted values are acceptable.
- .6 Review submittals prior to submission to 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.

- .7 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .8 Verify field measurements and affected adjacent Work are co-ordinated.
- .9 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative review of submittals.
- .10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .11 Keep one reviewed copy of each submission on site.
- .12 Submittal Schedules: Provide submittal schedules for Shop Drawings and Product Data, and Samples and Mock-Ups.
  - .1 Prepare and maintain Submittal Schedules during construction.
  - .2 Submit draft Submittal Schedules within 10 Working Days of contract award for approval by Departmental Representative.
  - .3 Update schedule weekly, or more frequently as directed by Departmental Representative.
  - .4 Indicate dates for submitting, review time, resubmission time, float time, last date for meeting fabrication schedule.
  - .5 Include dates when reviewed submittals will be required from the Departmental Representative.
  - .6 Include dates when submittals and delivery will be required for Departmental Representative -furnished items.
  - .7 Present updated schedules at each project meeting.

### **1.03 ELECTRONIC SUBMISSIONS**

- .1 Provide electronic submittals (excluding samples) for information and review in electronic format using the following guidelines:
  - .1 Provide in Portable Document Format (\*.pdf) with selectable text and graphics that are readable. Generally, merge documents into one bookmarked document up to 10 mb. Use hierarchical bookmarks to form a table of contents and provide hyperlinks to the subject topic.
  - .2 Break down information into documents of "like" or related materials or systems.
  - .3 Include final ratings, parameters, specifications, options, and other pertinent information. In the case where Departmental Representative returns submittal "Approved As Noted" and includes mark-ups or comments that change originally submitted ratings, parameters, specifications, options, and other pertinent information, the Sub-Contractor shall correct the documents in the original electronic document prior to submitting the final electronic documents.
  - .4 Highlight specific rating, parameter, specification, option, and other pertinent information when original document includes multiple alternatives. For instance when a range of performance parameters are given, or various sizes are shown, or various options are listed, the applicable item shall be indicated by highlight, circle, or pointer.

- .5 Do not include generalized direction from the Departmental Representative that does not relate to ordering and purchasing the equipment. For instance, notes like, "Coordinate with xxx for final motor horsepower" are not to be transferred to the electronic submittal. In that example only the final coordinated sizes would be indicated.
- .6 References within this specification that indicate sheet size will refer to electronic sheet (printing) size.

#### **1.04 SHOP DRAWINGS AND PRODUCT DATA**

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures, product data, and other data which the Contractor provides to illustrate details of a portion of the Work.
- .2 When requested for delegated-design, submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in the Province of Saskatchewan, 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 Departmental Representative will endeavour to review each submission within 10 Working Days.
- .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, containing:
  - .1 Date.
  - .2 Project title and number.
  - .3 Section Number and applicable Part 2 paragraph references to Products submitted.
  - .4 Contractor's name and address.
  - .5 Identification and quantity of each shop drawing, product data and sample.
  - .6 Other pertinent data.
- .8 Submissions include:
  - .1 Designated location for Departmental Representative's review stamp.
  - .2 Date and revision dates.
  - .3 Project title and number.
  - .4 Name and address of Subcontractor, Supplier, and Manufacturer.

- .5 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .6 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.
  - .11 Seal and signature of professional engineer if specified.
- .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 where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit electronic copy of certificates for requirements requested in specification Sections.
  - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
  - .2 Certificates must be dated after award of project contract complete with project name.
- .13 Submit electronic copy of manufacturers instructions for requirements requested in specification Sections.
  - .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.
- .14 Submit electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections.
- .15 Submit electronic documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .16 Submit electronic copy of Operation and Maintenance Data for requirements requested in specification Sections.
- .17 Delete information not applicable to project.

- .18 Supplement standard information to provide details applicable to project.
- .19 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copy will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .20 Review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.
  - .1 Review shall not mean that 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.

#### **1.05 NAMING CONVENTION**

- .1 Name electronic submittal files according to six digit MasterFormat Section number, with sequential alphanumeric identifier, and revision number.
  - .1 Examples:
    - .1 Modified bituminous membrane roofing materials, product data, first submission: 075200\_PD001\_R0.pdf
    - .2 Modified bituminous membrane roofing materials, shop drawing, first resubmission: 075200\_SD001\_R1.pdf
    - .3 Glazing materials, sample number 3, first submission: 088050\_SL003\_R0.pdf

#### **1.06 SAMPLES**

- .1 Submit for review samples in duplicate as specified in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Departmental Representative's business address.
- .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.

### 1.07 PHOTOGRAPHIC DOCUMENTATION

- .1 General: Take photographs using the maximum range of depth of field, and that are in focus. Photographs with blurry or out-of-focus areas will not be accepted.
  - .1 Maintain key plan with each set of preconstruction photographs that identifies each photographic location.
- .2 Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
  - .1 Date and Time: Include date and time in file name for each image.
  - .2 Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference.
- .3 Preconstruction Photographs: Before commencement of Work, take photographs of Project site, including existing items to remain during construction, existing items for salvage and reuse, and existing items scheduled to be relocated, from different vantage points.
  - .1 Take extensive photographs of existing conditions, finishes, to accurately record physical conditions at start of construction.
  - .2 Submit preconstruction photographs before commencing work.
- .4 Record of Construction Progress:
  - .1 Number of viewpoints: sufficient views and proximity to clearly indicate stages of completion of all work and services before concealment, including above ceiling, in-wall.
  - .2 Frequency: continually. Submit monthly with progress statement.
- .5 As-built Record:
  - .1 Number of viewpoints: all interior elevations in each room.
  - .2 Frequency: Submit with final progress statement.

### 1.08 INFORMATIONAL SUBMITTALS

- .1 Submit electronic copy of test reports for requirements requested in specification Sections.
  - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
  - .2 Testing must have been within 3 years of date of contract award for project.
- .2 Submit electronic copy of certificates for requirements requested in specification Sections.
  - .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.
- .3 Submit electronic copy of manufacturers' instructions for requirements requested in specification Sections.

- .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.
- .4 Submit electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections.
- .1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

**END OF SECTION**

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## 1 General

### 1.01 REFERENCES

- .1 Province of Saskatchewan
  - .1 The Saskatchewan Employment Act, SS 2013, c S-15.1.
  - .2 Occupational Health and Safety Regulations, 1996, RRS c O-1.1 Reg 1.
  - .3 Occupational Health and Safety (Prime Contractor) Regulations, RRS c S-15.1 Reg 2
- .2 Canadian Standards Association (CSA)
  - .1 CAN/CSA, Z462-08, Workplace Electrical Safety Standard
  - .2 CAN/CSA-Z460-05 (R2010), Control of Hazardous Energy

### 1.02 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit two hard copies and one electronic copy of Hazard Assessment and Site Specific Safety Plan (HASSSP): Within 7 days after date of Notice to Proceed and prior to commencement of Work. Hazard Assessment and Site Specific Safety Plan (HASSSP) must include:
  - .1 Results of site specific safety hazard assessment.
  - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
- .3 Based on the Building Asbestos Report available upon request from Departmental Representative, submit the following:
  - .1 Environmental Protection Plan.
  - .2 Hazardous Material Plan.
  - .3 Transportation of Hazardous Material Report.
- .4 Submit electronic copy of Contractor's authorized representative's work site health and safety inspection reports, and copy of Contractor's weekly safety talk to Departmental Representative weekly.
- .5 Submit electronic copies of reports or directions issued by Federal, and Provincial health and safety inspectors.
- .6 Submit electronic copies of incident and accident reports.
- .7 Submit electronic copies of WHMIS MSDS - Material Safety Data Sheets.
- .8 Departmental Representative will review Contractor's Hazard Assessment and Site Specific Safety Plan (HASSSP) and provide comments to Contractor within seven Working Days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within five Working Days after receipt of comments from Departmental Representative.

- .9 Departmental Representative review of Contractor's final Hazard Assessment and Site Specific Safety Plan (HASSSP) should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .10 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.
- .11 Departmental Representative will provide details of On-site Contingency and Emergency Response Plan for the facility. Incorporate details into Contractor's Hazard Assessment and Site Specific Safety Plan (HASSSP). Address standard operating procedures to be implemented during emergency situations as directed by Departmental Representative.

### **1.03 FILING OF NOTICE**

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

### **1.04 SAFETY ASSESSMENT**

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

### **1.05 MEETINGS**

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

### **1.06 REGULATORY REQUIREMENTS**

- .1 Do Work in accordance with Section 01 41 00 - Regulatory Requirements.

### **1.07 PROJECT/SITE CONDITIONS**

- .1 Work at site may involve contact with substances indicated in the Building Asbestos Report, available upon request from the Departmental Representative.

### **1.08 HAZARDOUS MATERIALS**

- .1 Hazardous Materials: product, substance, or organism that may cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.
- .2 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and the provision of Material Safety Data Sheets (MSDS).
- .3 For work in occupied buildings, give Department Representative one week notice for work involving designated substances, and before painting, caulking, installing carpet or using adhesives and other materials, that cause off gassing.

- .4 Should materials resembling spray- or trowel-applied asbestos, PCB, or mould be encountered in the course of the Work, stop work, take preventative measures, and notify Departmental Representative immediately. Do not proceed until written instructions have been received.

#### **1.09 GENERAL REQUIREMENTS**

- .1 Develop written Hazard Assessment and Site Specific Safety Plan (HASSSP) based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Hazard Assessment and Site Specific Safety Plan (HASSSP) 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.

#### **1.10 RESPONSIBILITY**

- .1 Be responsible and assume the role of "Prime Contractor" as described in Occupational Health and Safety (Prime Contractor) Regulations.
- .2 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.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, and local statutes, regulations, and ordinances, and with Hazard Assessment and Site Specific Safety Plan (HASSSP).
- .4 Construction Personnel Training Requirements: provide:
  - .1 Training and qualifications of personnel and alternates responsible for site safety and health;
  - .2 Training related to hazards present on site; and
  - .3 Training for use of personal protective equipment.

#### **1.11 COMPLIANCE REQUIREMENTS**

- .1 Comply with The Saskatchewan Employment Act.
- .2 Comply with CAN/CSA, Z462 (Workplace Electrical Safety Standard).
- .3 Comply with CAN/CSA-Z460 - Control of Hazardous Energy, for work requiring lock outs/power isolations.

#### **1.12 UNFORSEEN 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.

### **1.13 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 authority having jurisdiction, and in consultation with the Departmental Representative, including:
  - .1 Emergency procedures
  - .2 General requirements
  - .3 Health and Safety Representative
  - .4 Joint Health/Safety Committee
  - .5 Material Safety Data Sheets
  - .6 HRSDC Labour Program orders
  - .7 Notice of Project
  - .8 Occupational Health and Safety Act
  - .9 Safety Policy
  - .10 HRSDC Labour Program / MOL Safety Regulatory Officer reports and orders.

### **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 POWDER ACTUATED DEVICES**

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

### **1.16 HOT WORK PERMITS**

- .1 Request Hot Work Permits for work involving heating above 60 degrees Celsius. Provide minimum 48-hours' notice to Departmental Representative. Do not proceed with hot work until work is approved and permit is issued. Request shall include, but not be limited to:
  - .1 Location of work (as well as areas potentially affected).
  - .2 Work involved (type, extend, tools, etc.)
  - .3 Type(s) of bypass(es) required.
  - .4 Schedule (Start and end times for Hot Work).

### **1.17 FUEL STORAGE TANKS**

- .1 Register temporary and permanent fuel storage tanks located on Federal Government Property with Environment Canada.

**1.18 WORK STOPPAGE**

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.
- .2 Departmental Representative has right to stop work for health and safety reasons and is not a reason for delay of work claims.

**END OF SECTION**

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## 1 General

### 1.01 REFERENCES AND CODES

- .1 Perform Work in accordance with the National Building Code of Canada (NBCC), the National Fire Code of Canada (NFC) and other codes of provincial or local application provided that in case of conflict or discrepancy, the most applicable requirements apply in accordance with the Authority Having Jurisdiction.
- .2 Specific design and performance requirements listed in specifications or indicated on Drawings may exceed minimum requirements established by referenced Building Code; these requirements will govern over the minimum requirements listed in Building Code
  - .1 Meet or exceed requirements of:
    - .1 Contract documents.
    - .2 National Building Code of Canada 2015
    - .3 National Fire Code of Canada 2015
    - .4 National Plumbing Code of Canada 2015
    - .5 The Canadian Electrical Code.
    - .6 Specified standards, codes and referenced documents.
    - .7 CAN/CSA, Z462-08, Workplace Electrical Safety Standard
- .3 Electrical components and equipment which are not CSA approved shall be approved by the Authority Having Jurisdiction prior to connection to the electrical service. Pay for costs associated with obtaining necessary approval.

### 1.02 PERMITS AND BY-LAWS

- .1 Submit applications, documents and obtain and pay for permits and certificates required in respect to the execution of the Work.

### 1.03 HAZARDOUS MATERIAL DISCOVERY AND REMOVAL

- .1 Asbestos: Demolition of spray or trowel-applied asbestos is hazardous to health. Should material resembling spray or trowel-applied asbestos be encountered in course of demolition work, immediately stop work and notify Departmental Representative.
- .2 PCBs: includes any chlorobiphenyls referred to in Column I of item 1 of the List of Toxic Substances in Schedule I of the Canadian Environmental Protection Act. Existing transformers and ballasts may contain PCBs. Remove and dispose of PCB-containing materials in accordance with PCB Waste Export Regulations, 1996, SOR/97-109.
- .3 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Departmental Representative.
- .4 Dispose of toxic wastes generated on site in accordance with applicable federal and provincial acts, regulations, and guidelines.
- .5 Ensure toxic waste is shipped to an authorized/licensed treatment or disposal facility and that all liability insurance requirements are met.

### 1.04 QUALITY ASSURANCE

- .1 Regulatory Requirements: Except as otherwise specified, apply for, obtain, and pay fees associated with, permits, licenses, certificates, and approvals required by regulatory

requirements and Contract Documents, based on General Conditions of Contract and the following:

- .1 Regulatory requirements and fees in force on date of Bid submission, and
- .2 A change in regulatory requirements or fees scheduled to become effective after date of tender submission and of which public notice has been given before date of tender submission

#### **1.05 PERMITS**

- .1 Refer to Section 01 11 00 – Summary of Work.
- .2 Occupancy Permits:
  - .1 Apply for, obtain, and pay for occupancy permits, including partial occupancy permits where required by authority having jurisdiction.
  - .2 Departmental Representative will issue appropriate instructions for correction to Work where Contract Document deficiencies are required to be corrected in order to obtain occupancy permits, including partial occupancy permits.
    - .1 Correct deficiencies in accordance with instructions. Where deficiency is not corrected, Departmental Representative reserves the right to make correction and charge Contractor for costs incurred.
  - .3 Turn over occupancy permits to Departmental Representative.

**END OF SECTION**

## **1 General**

### **1.01 INDUSTRY STANDARDS**

- .1 Applicability of Standards: Unless Contract Documents include more stringent requirements, applicable construction industry standards have same force and effect as if bound or copied directly into Contract Documents to extent referenced. Such standards are made part of Contract Documents by reference.
- .2 Publication Dates: Comply with latest version of standards in effect at date of Bid Closing unless specifically noted otherwise or as noted below:
  - .1 Comply with version of Standards referenced specifically by the National Building Code, in effect at time of Bid and the Authorities Having Jurisdiction.
- .3 Copies of Standards: Be familiar with industry standards applicable to Work of Contract. Copies of applicable standards are not bound with Contract Documents.
  - .1 Where copies of standards are needed to perform required Work of Contract, obtain copies directly from publication source.

**END OF SECTION**

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## 1 General

### 1.01 ABBREVIATIONS

.1 Following abbreviations are used in the Contract Documents:

∠	angle
°	degree (angles)
µm	micrometre
#	number (before numerals)
A	ampere
A/C	air conditioning
AVB	air/vapour barrier
AC	alternating current
ACOUS	acoustic
ACP	acoustic ceiling panel
ACT	acoustic ceiling tile
AD	access door
ADJ	adjustable
AFF	above finished floor
ALT	alternate
ALUM	aluminum
ANOD	anodized
APPROX	approximate
ARCH	architectural
ASC	above suspended ceiling
ASM	air seal membrane
AUTO	automatic
B-ROD	backer rod
BD	board
BF	both faces
BKG	backing
BLDG	building
BLKG	blocking
BLKHD	bulkhead
BLT IN	built in
BLW	below
BM	beam
BMK	benchmark
BOL	bollard
BOT	bottom
B PL	base plate
BRKT	bracket
BS	both sides
BSMT	basement
BTWN	between
BU	built up
BW	both ways
C/C	centre to centre
C/W	complete with
CABT	cabinet

CB	catch basin
CD	concrete with densifier
CEM	cement
CG	corner guard
CGL	clear glass
CH-1	coat hook - single
CH-2	coat hook - double
CHK PL	checkered plate
CIP	cast-in-place
CJ	control joint
CL	centreline
CLG	ceiling
CLR	clear, clear finish
CMU	concrete masonry unit
CLOS	closet
COL	column
CONC	concrete
CONSTR	construction
CONT	continuous
CORR	corridor
CR	crash rail
CRX	chemical-resistant epoxy flooring
C.ROD	coat rod
CS-CI	Contractor supplied-Contractor installed
CSK	countersunk
CT	ceramic/porcelain tile
CW	curtain wall
DB	decibel
DBL	double
deg C	degree Celsius
DEMO	demolition
DEPT	department
DET	detail
DF	drinking fountain
DFT	dry film thickness
DG	double glazed
DIA	diameter
DIFF	difference
DIM	dimension
DIV	division
DN	down
DR	door
DWG	drawing
EG	end guard
EJ	expansion joint
EJC	expansion joint cover
EL	elevation
ELEC	electric
ELEV	elevator
ELF	elastomeric liquid flooring
EMERG	emergency
ENCL	enclosure
EQ	equal

EQUIP	equipment
ESE	existing slab edge
EXIST	existing
EXP	exposed
EXT	exterior
F/F	face to face
FA	fire alarm
FBD	fibreboard
FC	face
FD	floor drain
FDTN	foundation
FE	fire extinguisher
FEC	fire extinguisher cabinet
FFD	funnel floor drain
FG	foot grille
FHC	fire hose cabinet
FHV	fire hose valve
FIN	finished
FIXT	fixture
FLR	floor
FP	fireproofing
FR	fire rating
FRMG	framing
FS	firestopping
FTG	footing
FXD	fixed
g	gram
GALV	galvanized
GFI	ground fault interrupter
GL	float glass/glass/glazing
GB	grab bar
GRD	ground
GRL	grille
GRT	grout
GYP BD	gypsum board
HB	hose bib
HD	hub drain
HDBD	hardboard
HDWD	hardwood
HM	hollow metal
HMI	hollow metal insulated
HORIZ	horizontal
hp	horsepower
HPL	high pressure laminate
HR	hour
HSKPG	housekeeping
HSS	hollow structural section
HT	height
HU	heating unit
HVAC	heating, ventilating and air conditioning
ID	inside diameter

INCL	including
INSUL	insulation
INT	interior
INV	invert
IP	insulated panel
JAN	janitor, janitor's closet
JT	joint
KD	knocked down
kg	kilogram
km	kilometre
kN	kilonewton
KO	knock out
kPa	kilopascal
l	litre
l/s	litre per second
LAB	laboratory
LAM	laminate(d)
LAV	lavatory
LCMU	light weight concrete masonry unit
LEV	level
LGL	laminated glass
LH	left hand
LHR	left hand reverse
LIN	linear
LT	light
m	metre
m <sup>2</sup>	square metre
m <sup>3</sup>	cubic metre
MATL	material
MAX	maximum
MDF	medium density fibreboard
MECH	mechanical
MEZZ	mezzanine
MIN	minimum
MIR	mirror
MISC	miscellaneous
mm	millimetre
MO	masonry opening
MOD	modified
MPa	megapascal
MRW	mechanical room waterproofing
MTD	mounted
MTL	metal
N/A	not applicable
ND	napkin disposal unit
NEG	negative
NIC	Not in Contract
NO	number
NOM	nominal
NTS	not to scale

O/A	overall
O/H	overhead
O/C	on centre
OD	outside diameter
O/F	outside face
O/O	out to out
OPNG	opening
OPP	opposite
OPT	optional
OWSJ	open web steel joist
PBD	particleboard
PERF	perforated
PERP	perpendicular
PH	phase
PL	plate
PLAM	plastic laminate
PLBG	plumbing
PLYWD	plywood
PNL	panel
POS	positive
PR	pair
PREFAB	prefabricated
PREFIN	prefinished
PRELIM	preliminary
PRJS	projection screen
PS	pressed steel
PSI	pressed steel insulated
PT	paint, pressure treated
PTN	partition
PVC	polyvinyl chloride
PWR	power
QTY	quantity
R	radius, radii
RB	resilient base
RBAR	reinforcing steel bar
RBL	roller blinds
RD	roof drain
REC	recessed
REF	reference
REFURB	refurbish
REINF	reinforced
REQ'D	required
REV	revise, revision
RH	right hand
RHR	right hand reverse
RLG	railing
RM	room
RO	rough opening
RPM	revolutions per minute
RS	reducing strip
RSF	resilient sheet flooring

RT	resilient tile flooring
RVL	reveal
RVS	reverse
SAN	sanitary
SC	sealed concrete
SDT	static dissipative tile
SE	slab edge
SHF	stainless steel shelving
SIM	similar
SJ	soft joint
SPGL	spandrel glass
SPKLR	sprinkler
SPKR	speaker
SQ	square
SS	stainless steel
ST	street
STD	standard
STL	steel
STOR	storage
STRUCT	structural
SUSP	suspended
SWP	sheet wall protection
SYS	system
T/O	top of
t	tonne
T&B	top and bottom
T&G	tongue & groove
TB	tackboard
TD	trench drain
TEL	telephone
TEMP	temporary
TERR	terrazzo
TFM	thermally fused melamine
TGL	tempered glass
TL	task light
TYP	typical
U/C	undercut
U/G	underground
U/S	underside
UGND	underground
UON	unless otherwise noted
UNFIN	unfinished
V	volt
VAR	varies, variable
VARN	varnish
VB	vapour barrier
VCT	vinyl composite tile
VERT	vertical
VEST	vestibule
VR	vapour retarder

W/	with
W/O	without
W	watt
WA	washroom accessory
WB	whiteboard
WC	water closet
WD	wood, solid core wood door
WF	wide flange
WGL	wired glass
WHC	wheel chair
WM	wire mesh
WP	waterproofing
WPM	waterproof membrane
WR	washroom
WVP	wood veneer paneling
WWF	welded wide flange
WWM	welded wire mesh
WWP	wood wall panelling
XBRC	cross bracing
XPS	extruded polystyrene board
Z	zinc
ZVB	zone valve box

**END OF SECTION**

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## 1 General

### 1.01 DEFINITIONS

- .1 Mock-ups: Full-size physical assemblies that are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mock-ups are not Samples. Unless otherwise indicated, approved mock-ups establish the standard by which the Work will be judged.
- .2 Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria
- .3 Product Testing: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL), a national voluntary laboratory accreditation program (NVLAP), or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- .4 Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- .5 Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- .6 Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

### 1.02 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, or law of Place of Work. Coordinate date and time with regularly scheduled site visits performed by Departmental Representative.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

### **1.03 INDEPENDENT INSPECTION AGENCIES**

- .1 Independent Inspection/Testing Agencies may be engaged by Departmental Representative for purpose of inspecting or testing portions of Work, for quality assurance purposes. Refer to Section 01 29 83 - Payment Procedures for Testing Services.
- .2 Employment of inspection and testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .3 If defects are revealed during inspection or testing, appointed agency will request additional inspection 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 reinspection.

### **1.04 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.

### **1.05 PROCEDURES**

- .1 Notify Departmental Representative sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
- .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.
  - .1 Deliver representative samples previously reviewed by Departmental Representative in required quantity to testing laboratory.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

### **1.06 CONTRACTOR'S RESPONSIBILITIES**

- .1 Tests and inspections not explicitly assigned to the Departmental Representative are the Contractor's responsibility.
- .2 Include cost of tests and inspection in Contract Price.
- .3 Provide labour, equipment material, and facilities to:
  - .1 Provide access to work to be inspected and tested.
  - .2 Facilitate inspections and tests.
  - .3 Make good work disturbed by inspection and test.
- .4 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and reviewed by Departmental Representative.

- .5 Manufacturer's Field Services: Where indicated, engage factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections.
  - .1 Report results in writing as specified in Section 01 33 00 – Submittals.
- .6 Manufacturer's Technical Services: Where indicated, engage manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in pre-installation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
  - .1 Report results in writing as specified in Section 01 33 00 – Submittals.

#### **1.07 REJECTED WORK**

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Departmental Representative, it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

#### **1.08 REPORTS**

- .1 Submit electronic copy of inspection and test reports to Departmental Representative, in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit reports within one week of testing or inspection.
- .3 Provide copies to subcontractor of work being inspected or tested.
- .4 Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
  - .1 Date of issue.
  - .2 Project title and number.
  - .3 Name, address, and telephone number of testing agency.
  - .4 Dates and locations of samples and tests or inspections.
  - .5 Names of individuals making tests and inspections.
  - .6 Description of the Work and test and inspection method.
  - .7 Identification of product and Specification Section.
  - .8 Complete test or inspection data.
  - .9 Test and inspection results and an interpretation of test results.
  - .10 Record of temperature and weather conditions at time of sample taking and testing and inspecting.

- .11 Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
- .12 Name and signature of laboratory inspector.
- .13 Recommendations on retesting and reinspecting.
- .5 Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
  - .1 Name, address, and telephone number of technical representative making report.
  - .2 Statement on condition of substrates and their acceptability for installation of product.
  - .3 Statement that products at Project site comply with requirements.
  - .4 Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  - .5 Results of operational and other tests and a statement of whether observed performance complies with requirements.
  - .6 Statement whether conditions, products, and installation will affect warranty.
  - .7 Other required items indicated in individual Specification Sections.
- .6 Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
  - .1 Name, address, and telephone number of factory-authorized service representative making report.
  - .2 Statement that equipment complies with requirements.
  - .3 Results of operational and other tests and a statement of whether observed performance complies with requirements.
  - .4 Statement whether conditions, products, and installation will affect warranty.
  - .5 Other required items indicated in individual Specification Sections.
- .7 Permits, Licenses, and Certificates: For Departmental Representative's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

#### **1.09 TESTS AND MIX DESIGNS**

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

#### **1.10 MOCK-UPS**

- .1 Mock-ups: Before installing portions of the Work requiring mock-ups, build mock-ups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work.
  - .1 Construct mock-ups in location and of size indicated or, if not indicated, as directed by Departmental Representative.
  - .2 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in orderly sequence, to not cause delays in Work.

- .3 Employ supervisory personnel who will oversee mock-up construction. Provide mock-ups using personnel assigned to the Work and Products and techniques to be used on the Work.
  - .4 Demonstrate the proposed range of aesthetic effects and workmanship.
  - .5 Prior to manufacture and delivery of Products, arrange for Departmental Representative's review and acceptance of mock-up.
    - .1 Failure to prepare, and obtain review and acceptance of mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension or extra costs by reason of such default will be allowed. Allow time for modifications and subsequent reviews.
  - .6 Maintain mock-ups during construction in an undisturbed condition as a standard for judging the completed Work.
  - .7 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.
- .2 Coordinate date and time with regularly scheduled site visits performed by the Departmental Representative.
  - .3 If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.
  - .4 Mock-ups shall be used to refine design of components. Changes to Mock-ups will be made. Allow time in schedule for revisions to be made to Mock-ups and Shop Drawings. Mock-up review and revisions will not be accepted as basis of claim for delay or additional cost.
    - .1 Modify Mock-ups in accordance with Departmental Representative's review at no additional cost.

#### **1.11 MILL TESTS**

- .1 Submit mill test certificates as specified in specification Sections.

#### **1.12 EQUIPMENT AND SYSTEMS**

- .1 Submit adjustment and balancing reports for mechanical, electrical, and building equipment systems.

#### **1.13 TEST AND INSPECTION LOG**

- .1 Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
  - .1 Date test or inspection was conducted.
  - .2 Description of the Work tested or inspected.
  - .3 Date test or inspection results were transmitted to Departmental Representative.
  - .4 Identification of testing agency or special inspector conducting test or inspection.
- .2 Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Departmental Representative's reference during normal working hours.

**1.14 REPAIR AND PROTECTION**

- .1 General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  - .1 Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 - Execution.
- .2 Protect construction exposed by or for quality-control service activities.
- .3 Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

**END OF SECTION**

## 1 General

### 1.01 INSTALLATION AND REMOVAL

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

### 1.02 WATER SUPPLY

- .1 Contractor may use without charge, existing building infrastructure for potable water required for Work.

### 1.03 TEMPORARY HEATING AND VENTILATION

- .1 Use building permanent mechanical systems during construction period to provide heating and ventilation in construction area.
  - .1 Protect permanent systems from construction damage, dust, and debris.
  - .2 Replace filters regularly throughout construction activity, and provide new filters upon substantial performance of work.
  - .3 Departmental Representative will pay utility charges when heat source is existing building equipment.
- .2 Provide temporary heat and ventilation in enclosed areas as required to:
  - .1 Facilitate progress of Work.
  - .2 Protect Work and products against dampness and cold.
  - .3 Prevent moisture condensation on surfaces.
  - .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
  - .5 Provide adequate ventilation to meet health regulations for safe working environment.
- .3 Maintain temperatures of minimum 18 degrees C in areas where construction is in progress.
- .4 Ventilating:
  - .1 Do not allow re-entrainment of exhaust air into building systems.
  - .2 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
  - .3 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
  - .4 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
  - .5 Ventilate storage spaces containing hazardous or volatile materials.
  - .6 Ventilate temporary sanitary facilities.
  - .7 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

- .5 Ensure environment (air temperature, relative humidity, air velocities, etc.) of occupied areas is not adversely affected by construction activities.
- .6 Obtain permission of Departmental Representative prior to employing temporary space heaters. Maintain strict supervision of operation of temporary heating and ventilating equipment to:
  - .1 Conform with applicable codes and standards.
  - .2 Enforce safe practices.
  - .3 Prevent abuse of services.
  - .4 Prevent damage to finishes.
  - .5 Vent direct-fired combustion units to outside.
- .7 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

#### **1.04 TEMPORARY POWER AND LIGHT**

- .1 Use building permanent electrical systems during construction period to provide power and lighting in construction area.
- .2 Where required by removal of existing systems, provide and maintain temporary lighting throughout project.
  - .1 Ensure level of illumination on all floors and stairs is not less than 162 lx.
- .3 Provide and pay for temporary power during construction for temporary lighting and operating of power tools where building electrical system is insufficient for construction activities.
- .4 For construction activities within occupied existing facilities:
  - .1 Electrical receptacles: Do not exceed 80% of rated circuit capacity. Repair damage.
  - .2 When using power extension cords outside of construction areas ensure power cords do not pose a safety hazard. Locate power cords in a manner that does not restrict fire doors from closing automatically upon fire alarm signal. Where cords are placed on floors in occupied areas secure to floor surface with non-marring tape or other suitable means acceptable to Departmental Representative, or hang from ceiling 2 400 mm above finished floor.
- .5 Provide and maintain temporary lighting throughout project. Provide level of illumination on floors and stairs not less than that required by Authorities Having Jurisdiction.
- .6 Electrical power and lighting systems installed under this Contract may be used for construction requirements, provided that warranties and guarantees are not affected.
- .7 Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than 3 months.
- .8 Refer to Section 01 14 00 – Work Restrictions, for requirements related interruption of existing services.

**1.05 TEMPORARY COMMUNICATION FACILITIES**

- .1 Provide and pay for temporary telephone, and data hook up, necessary for own use and use of Departmental Representative.

**1.06 FIRE PROTECTION**

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

**2 Products**

**2.01 NOT USED**

**3 Execution**

**3.01 NOT USED**

**END OF SECTION**

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## **1 General**

### **1.01 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-S269.2-M1987 (R2003), Access Scaffolding for Construction Purposes.
  - .2 CAN/CSA-Z321-96 (R2001), Signs and Symbols for the Occupational Environment.
- .2 Province of Saskatchewan
  - .1 The Saskatchewan Employment Act, SS 2013, c S-15.1.
  - .2 Occupational Health and Safety Regulations, 1996, RRS c O-1.1 Reg 1.
  - .3 Occupational Health and Safety (Prime Contractor) Regulations, RRS c S-15.1 Reg 2

### **1.02 SUBMITTALS**

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Informational Submittal: Submit design drawings, signed and sealed by qualified professional engineer licensed in the province of Saskatchewan, for scaffolds and work platforms.
  - .1 Additions or modifications to scaffolding must be approved by professional engineer in writing.

### **1.03 INSTALLATION AND REMOVAL**

- .1 Provide construction facilities in order to execute work expeditiously.
- .2 Remove from site all such work after use.

### **1.04 SCAFFOLDING**

- .1 Scaffolding: in accordance with CAN/CSA-S269.2, and Province of Saskatchewan, Occupational Health and Safety Regulations, 1996
- .2 Provide and maintain scaffolding, ramps, ladders, and platforms.
- .3 Erect without damage to building or finishes scheduled to remain.

### **1.05 ELEVATORS**

- .1 Refer to Section 01 14 00 – Work Restrictions.

### **1.06 SITE STORAGE/LOADING**

- .1 Refer to Section 01 14 00 – Work Restrictions.
- .2 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

- .3 Do not load or permit to load any part of Work with weight or force that will endanger Work or existing facilities.
- .4 Exterior construction staging area is not available on site for storage of materials.
  - .1 Interior spaces within defined area of construction may be used for limited construction staging.
- .5 Obtain and pay for use of additional staging, storage or work areas needed for operations.

#### **1.07 CONSTRUCTION PARKING**

- .1 Parking is not available on site.
- .2 Make own arrangements for parking with City of Saskatoon or adjacent private parking facilities at prevailing rates.

#### **1.08 OFFICES**

- .1 Construction office space is not available outside the designated construction area.
  - .1 Establish dedicated space within construction area for site office.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Provide and pay for temporary telephone, and data hook up, lines and equipment necessary for own use.

#### **1.09 EQUIPMENT, TOOL AND MATERIALS STORAGE:**

- .1 Provide and maintain, in clean and orderly condition, lockable enclosures for storage of tools, equipment and materials.
- .2 Locate enclosures within designated construction area.

#### **1.10 SANITARY FACILITIES**

- .1 Permanent facilities may be used on the second floor.
- .2 Keep area and premises in sanitary condition.

#### **1.11 CONSTRUCTION SIGNS**

- .1 Project Identification Signage: Contractor's corporate signage is not permitted.
- .2 Provide common-use signs related to information, instruction, use of equipment, public safety devices, in both official languages or by the use of commonly understood graphic symbols, and to approval of the Departmental Representative.
  - .1 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321
- .3 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

- .4 No other signs or advertisements, other than warning signs, are permitted on site.

#### **1.12 PROTECTION AND MAINTENANCE OF TRAFFIC**

- .1 Maintain and protect traffic on adjacent roads and parking areas during construction period.
- .2 Protect travelling public from damage to person and property.
- .3 Contractor's traffic on roads selected for transporting material to and from site to interfere as little as possible with public traffic.
- .4 Verify adequacy of existing roads and allowable load limit on these roads. Be responsible for repair of damage to roads caused by construction operations.
- .5 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .6 Dust control: adequate to ensure safe operation at all times.

#### **1.13 CLEAN-UP**

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

### **2 Products**

#### **2.01 NOT USED**

### **3 Execution**

#### **3.01 NOT USED**

**END OF SECTION**

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## **1 General**

### **1.01 REFERENCES**

- .1 Province of Saskatchewan
  - .1 The Saskatchewan Employment Act, SS 2013, c S-15.1.
  - .2 Occupational Health and Safety Regulations, 1996, RRS c O-1.1 Reg 1.
  - .3 Occupational Health and Safety (Prime Contractor) Regulations, RRS c S-15.1 Reg 2

### **1.02 INSTALLATION AND REMOVAL**

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

### **1.03 WEATHER ENCLOSURES**

- .1 Provide weather tight closures to temporary openings, and unfinished exterior openings, tops of shafts and other openings in floors, walls and roofs until permanently enclosed.
- .2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.
- .3 Design enclosures to withstand wind pressure and snow loading. Insulate and provide vapour barrier at enclosures at exterior openings.
- .4 Provide weatherproof, secure, closure for temporary access openings required to perform the Work.

### **1.04 DUST TIGHT SCREENS**

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

### **1.05 FIRE ROUTES AND EGRESS**

- .1 Exterior:
  - .1 Do not impede access to property including overhead clearances for use by emergency response vehicles.
  - .2 Keep fire lanes, walkways, and access routes clear at all times.
- .2 Interior:
  - .1 Provide protection to ensure safe passage of people around renovation, and selective demolition areas and to and from occupied portions of building.
  - .2 Do not close or obstruct exits, or other facilities used by occupants without written permission from authorities having jurisdiction.

- .3 Provide temporary exiting requirements as required by authorities having jurisdiction.

**1.06 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.

**1.07 PROTECTION OF NEW AND EXISTING 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 Clean existing building finishes soiled as a result of the Work to the approval of the Departmental Representative.
- .4 Be responsible for damage incurred due to lack of or improper protection.
- .5 Protect work against damage until take-over.
- .6 Protect adjacent work against the spread of dust and dirt beyond the work areas.

**2 Products**

**2.01 NOT USED**

**3 Execution**

**3.01 NOT USED**

**END OF SECTION**

## 1 General

### 1.01 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. Conform to latest date of issue of referenced standards in effect on date of submission of Tenders, except where specific date or issue is specifically noted.
- .3 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .4 Cost for such testing will be borne by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

### 1.02 QUALITY

- .1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, unless indicated otherwise, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 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.
- .7 Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

### 1.03 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

### 1.04 PRODUCT SELECTION PROCEDURES

- .1 General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
  - .1 Provide Products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  - .2 Standard Products: If available, and unless custom products or non-standard options are specified, provide standard Products of types that have been produced and used successfully in similar situations on other projects.
  - .3 Departmental Representative reserves the right to limit selection to Products with warranties not in conflict with requirements of the Contract Documents.
  - .4 Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- .2 When materials are specified only by a consensus or reference standard, select any material that meets or exceeds the specified standard.
- .3 When materials are specified by reference standard, Prescriptive or Performance specifications, upon request of Departmental Representative, obtain from manufacturer an independent testing laboratory reporting, showing that the material or equipment meets or exceeds the specified requirements.

### 1.05 DELIVERY, STORAGE, HANDLING AND PROTECTION

- .1 Deliver, handle and store products in manner to prevent damage, adulteration, deterioration, soiling, and loss, including theft and vandalism. Comply with manufacturer's instructions.
- .2 Delivery and Handling:
  - .1 Schedule delivery to minimize long-term storage at Place of the Work and to prevent overcrowding of construction spaces.
  - .2 Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  - .3 Deliver products to Place of the Work in undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  - .4 Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

- .3 Storage:
  - .1 Store materials in a manner that will not endanger Project structure.
  - .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 inside building in designated construction area.
  - .4 Store cementitious products clear of 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 protect from incidental moisture.
  - .6 Store sheet materials, and lumber on flat, solid supports.
  - .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.
- .4 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .5 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Do not paint over name plates.

#### **1.06 TRANSPORTATION**

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Departmental Representative will be paid for by Departmental Representative. Unload, handle and store such products.

#### **1.07 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 may 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.

#### **1.08 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.

#### **1.09 CO-ORDINATION**

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

#### **1.10 CONCEALMENT**

- .1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
- .2 Before installation, inform Departmental Representative if there is interference. Install as directed by Departmental Representative.
- .3 Do not obstruct access space above removable ceiling tiles or behind access doors, panels or plates.

#### **1.11 REMEDIAL WORK**

- .1 Refer to Section 01 73 00 - Execution, and as follows:
- .2 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.
- .3 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

#### **1.12 LOCATION OF FIXTURES**

- .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate, and may be moved by the Departmental Representative up to 1 800 mm from location shown without charge to Contract Price, provided notice is given to Contractor before related work has commenced.
- .2 Locate equipment fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Departmental Representative of conflicting installation. Install as directed.

#### **1.13 FASTENINGS**

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

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

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Bolts may not project more than one diameter beyond nuts.
- .3 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

#### **1.15 SHEET METAL AND WIRE GAUGE INTERPRETATION**

- .1 Unless otherwise indicated, base metal thicknesses on uncoated thicknesses in accordance with the following interpretation guidelines:
  - .1 Steel sheet: manufacturer's standard gauge (msg).
  - .2 Stainless steel sheet: "United States Standard Gauge (Revised)".
  - .3 Non-ferrous sheet metal: "Brown & Sharpe Gauge".
  - .4 Ferrous wire thickness: "US Steel Wire Gauge"
  - .5 Non-ferrous wire thickness: "American Wire Gauge".
  - .6 Cold-formed light weight steel framing members: CSA S136-07

#### **1.16 PROTECTION OF WORK IN PROGRESS**

- .1 Adequately protect Work completed or in progress. Work damaged or defaced due to failure in providing such protection is to be removed and replaced, or repaired, as directed by the Departmental Representative, at no increase in Contract Price.
- .2 Protect Work against damage by on-going construction processes, vandalism, and other causes.
- .3 Prevent overloading of any part of building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

#### **1.17 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 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.

.3 Refer to Section 02 41 19.16 – Selective Interior Demolition.

**END OF SECTION**

## **1 General**

### **1.01 DEFINITIONS**

- .1 Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- .2 Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

### **1.02 ADMINISTRATIVE REQUIREMENTS**

- .1 Coordination:
  - .1 Coordinate cutting and patching work with selective demolition work specified in Section 02 41 19.16 – Selective Interior Demolition, and applicable technical sections for reinstallation of salvaged products.
- .2 Notice: Notify Departmental Representative and BGIS before disrupting building access or services in accordance with Section 01 14 00 – Work Restrictions.

### **1.03 INFORMATIONAL SUBMITTALS**

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

## 1.04 QUALITY ASSURANCE

- .1 Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
  - .1 Structural Elements: When cutting and patching structural elements, notify Departmental Representative of locations and details of cutting and await directions from Departmental Representative before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
  - .2 Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
    - .1 Primary operational systems and equipment.
    - .2 Fire separation assemblies.
    - .3 Air or smoke barriers.
    - .4 Fire-suppression systems.
    - .5 Mechanical systems piping and ducts.
    - .6 Control systems.
    - .7 Communication systems.
    - .8 Fire-detection and -alarm systems.
    - .9 Conveying systems.
    - .10 Electrical wiring systems.
    - .11 Operating systems of special construction.
  - .3 Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
    - .1 Water, moisture, or vapour barriers.
    - .2 Membranes and flashings.
    - .3 Sprayed fire-resistive material.
    - .4 Equipment supports.
    - .5 Piping, ductwork, vessels, and equipment.
    - .6 Noise- and vibration-control elements and systems.
  - .4 Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Departmental Representative's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

## 2 Products

### 2.01 MATERIALS

- .1 Required for original installation.
- .2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.
- .3 In-Place Materials: Use materials for patching identical to in-place materials, unless otherwise indicated.
  - .1 If identical materials are unavailable or cannot be used, use materials that, when installed, are acceptable to Departmental Representative for the visual and functional performance of in-place materials.
- .4 Incorporate salvaged, used material in new construction only with Departmental Representative permission, as specified, or as indicated.
  - .1 Salvaged materials for Reinstallation: Refer to schedule in Section 02 41 19.16 – Selective Interior Demolition.
- .5 Items not required for repair of existing work remain property of Departmental Representative, if so requested.

## 3 Execution

### 3.01 PREPARATION

- .1 Protect existing finishes, equipment, adjacent work scheduled to remain from damage. Provide protection from adverse weather conditions for portions of Work that might be exposed during cutting and patching operations.
- .2 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .3 After uncovering, inspect conditions affecting performance of Work.
- .4 Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
  - .1 Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  - .2 Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  - .3 Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
  - .4 Existence and location of concealed utilities and construction indicated as existing are not guaranteed. Before beginning Work, investigate and verify existence and location of mechanical and electrical systems, and other construction affecting the Work.

- .5 Beginning of cutting and patching, and construction means acceptance of existing conditions and implies dimensions have been considered, verified and are acceptable.
- .6 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
- .7 Provide protection from elements for areas which may be exposed by uncovering work.

### **3.02 EXECUTION**

- .1 Execute cutting, fitting, and patching to complete Work.
- .2 Fit several parts together, to integrate with other Work.
- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .9 Restore work with new products in accordance with requirements of Contract Documents.
- .10 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .11 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material in accordance with Section 07 84 00 - Firestopping, full thickness of the construction element.
- .12 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.
- .13 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

### **3.03 INSTALLATION**

- .1 General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - .1 Make vertical work plumb and make horizontal work level. Make work square and true to established and defined lines except as indicated.

- .2 Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
- .2 Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- .3 Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Performance.
- .4 Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- .5 Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- .6 Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- .7 Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- .8 Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
  - .1 Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Departmental Representative.
  - .2 Allow for building movement, including thermal expansion and contraction.
  - .3 Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- .9 Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- .10 Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### **3.04 CUTTING AND PATCHING**

- .1 Cutting and Patching, General: Assign work of moving, removal, cutting and patching to trades qualified to perform work in manner to cause least damage to each type of work.
  - .1 Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- .2 Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- .3 Temporary Support: Provide temporary support of work to be cut.

- .4 Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 14 00 – Work Restrictions.
- .5 Where work of this Contract affects existing structures, equipment, ceiling or floor assemblies, piping, ductwork or conduit, etc. above, below or beyond areas of scheduled work, patch and repair to standard of construction of surrounding materials. Do such work at no additional cost to the Contract.
- .6 Where penetrations through existing walls or floors result from the removal or relocation of existing equipment, piping, ductwork or conduit, repair to standard of construction of surrounding materials.
- .7 Provide means of returning surfaces to appearance of new work.
- .8 Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - .1 Keep cutting to no more than 10% larger than outside dimensions of item penetrating another material.
  - .2 Make cuts with clean, true, smooth edges to minimize patching.
  - .3 Use diamond coring drill for boring through concrete and masonry. Do not use electric or pneumatic impact hammers or hammer drills.
  - .4 Use concrete or masonry saw for cutting concrete and masonry.
  - .5 Wherever possible use equipment driven by an electric motor.
  - .6 Temporarily cover openings when not in use.
  - .7 Do not use pneumatic or vibrating equipment for removal of masonry or concrete.
  - .8 Pneumatic hammers are not permitted, except upon approval of the Departmental Representative.
  - .9 Scan concrete for in-slab services and reinforcement before cutting and coring. Do not proceed with cutting and coring until results of scan have been reviewed with Departmental Representative.
  - .10 Notify Departmental Representative minimum seven Working Days before removal, cutting, drilling or coring of structural or load-bearing members, including floor slabs. Mark out exact locations and dimensions to allow review. Do not proceed with work until Departmental Representative has reviewed and approved proposed work.
  - .11 Openings and penetrations:
    - .1 Cut openings and penetrations that exceed 150 mm diameter through walls, floors, and roofs that are required for installation of new work such as piping, conduits, ducts.
    - .2 Openings and penetrations smaller than 150 mm diameter are the responsibility of the trade requiring the opening
    - .3 Firestop penetrations through existing fire resistive rated assemblies immediately, and as specified in Section 07 84 00 – Firestopping.
  - .12 Recesses:
    - .1 Cut recesses that exceed 800 by 800 mm size in walls and floors that are required for installation of new work such as distribution boxes, panels, and cabinets.

- .2 Recesses smaller than 800 by 800 mm are responsibility of trade requiring recess.
- .13 Remove or cut openings in interior masonry partitions to accommodate new work. Remove masonry partitions completely down to structural slabs.
- .14 Cut finish surfaces, plaster, and metals by methods to terminate surfaces in straight lines, at natural points of division.
- .9 Cut, move, remove items as required for access, to allow work to proceed:
  - .1 Repair, removal of hazardous, unsanitary conditions.
  - .2 Remove abandoned items, items serving no useful purpose, abandoned piping, conduit, and wiring.
  - .3 Remove unsuitable, extraneous materials not marked for salvage, equipment, debris, rotted wood, rusted metals, deteriorated concrete.
  - .4 Cleaning of existing surfaces, removal of surface finishes required to install new Work, finishes.
- .10 Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
  - .1 Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  - .2 Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
    - .1 Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - .2 Restore damaged pipe covering to its original condition.
    - .3 Make smooth, approved transition where new work abuts, finishes flush with existing work.
  - .3 Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, colour, texture, and appearance. Remove in-place floor and wall coverings, and replace with new materials, as necessary, to achieve uniform colour and appearance.
    - .1 Terminate existing surfaces along straight lines at natural division line, provide approved trim when finished surfaces cut in manner preventing smooth transition with new work.
    - .2 Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces at a distance of 1.5 m.
  - .4 Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
    - .1 Terminate existing surface along straight lines at natural division line, provide approved trim when finished surfaces cut in manner preventing smooth transition with new work.
- .11 Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces

### **3.05 DEPARTMENTAL REPRESENTATIVE-INSTALLED PRODUCTS**

- .1 Equipment indicated as "Departmental Representative-Installed Products" will be installed after Substantial Completion of the Work, except as described in Section 01 11 00 – Summary of Work as "Work By Others"
- .2 Furniture installed by Departmental Representative requires power and data connections as indicated on drawings. Coordinate with Departmental Representative for scheduling and connection requirements.

### **3.06 PROTECTION OF INSTALLED CONSTRUCTION**

- .1 Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Performance.

### **3.07 DAMAGED SURFACES**

- .1 Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements of Article "Cutting and Patching."
  - .1 Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- .2 Restore permanent facilities used during construction to their specified condition.
- .3 Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- .4 Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- .5 Remove and replace chipped, scratched, and broken glass or reflective surfaces.

### **3.08 WASTE MANAGEMENT AND DISPOSAL**

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

**END OF SECTION**

## 1 General

### 1.01 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Departmental Representative or other contractors.
- .2 Remove waste materials from site minimum once daily at regularly scheduled times, or as often as necessary to prevent a hazardous occurrence arising, and as required by the Departmental Representative. Deposit in waste containers at end of each Work Day. Remove waste materials more frequently as directed by Departmental Representative. Do not burn waste materials on site.
- .3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .4 Provide on-site suitable containers for collection of waste materials, and debris.
  - .1 Locate waste containers on site where directed by Departmental Representative.
  - .2 Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to applicable regulations. Remove volatile waste from premises at end of each work day.
    - .1 Use containers intended for holding waste materials of type to be stored.
- .5 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .6 Dispose of waste materials and debris off site. Do not wash waste materials down sewers or into waterways.
- .7 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations
- .8 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .10 Schedule cleaning operations so that resulting dust and other contaminants will not fall on wet, newly painted surfaces, infiltrate into occupied areas, or trigger fire alarm smoke or dust detectors.
- .11 Do not damage or soil existing waste handling and housekeeping rooms. Do not plug or obstruct hoppers, toilets, sinks or drains.

## **2 Products**

### **2.01 NOT USED**

## **3 Execution**

### **3.01 PROGRESSIVE CLEANING**

- .1 Remove liquid spills promptly.
- .2 Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- .3 Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- .4 Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- .5 Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Performance.
- .6 In occupied areas, clean-up work area each day, before leaving area. Vacuum area with HEPA vacuum and leave ready for use.
  - .1 Refer to Section 01 14 00 – Work Restrictions for Dust Management.
- .7 Wet mop or vacuum immediate interior building areas when work in area is complete or ready to receive finish painting. Continue cleaning operations on an as-needed basis until all work is complete or until work is ready for Substantial Performance or occupancy. Maintain tools and equipment necessary for cleaning operations on site (i.e. pails, mops, vacuum cleaners with excellent suction capabilities, etc.).
- .8 During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Performance of Work.
- .9 Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- .10 Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### **3.02 FINAL CLEANING**

- .1 In preparation for Substantial Performance, conduct inspection of sight-exposed surfaces.
- .2 Remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .3 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

- .4 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .5 Clean and polish glass, mirrors, hardware, stainless steel, chrome, epoxy resin and phenolic resin surfaces, plastic laminate, granite surfaces, baked enamel surfaces; washroom fixtures, and toilet compartments; and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .6 Remove stains, spots, marks, grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from sight-exposed interior and exterior finished surfaces, electrical and mechanical fixtures, furniture fitments, walls.
- .7 Clean lighting reflectors, lenses, and other lighting surfaces.
- .8 Clean equipment and fixtures to sanitary condition. Clean or replace filters of mechanical filters.
- .9 Vacuum clean and dust building interiors, behind grilles, louvres and screens in area of Work. Vacuum exterior surfaces of exposed ductwork.
- .10 Prepare floor finishes as recommended by manufacturer.
- .11 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .12 Remove dirt and other disfiguration from exterior surfaces resulting from construction activities.
- .13 Remove debris and surplus materials from accessible concealed spaces including above ceiling tile.
- .14 Clean glazing of windows in area of Work.

**END OF SECTION**

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## 1 General

### 1.01 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.

### 1.02 REFERENCE STANDARDS

- .1 Public Works and Government Services Canada (PSPC)
  - .1 2002 National Construction, Renovation and Demolition Non-Hazardous Solid Waste Management Protocol.
  - .2 CRD Waste Management Market Research Report (available from PSPC's Environmental Services).
  - .3 Sustainable Development Strategy 2007-2009: Target 2.1 Environmentally Sustainable Use of Natural Resources.
    - .1 Real Property projects over \$1 million and in communities where industrial recycling is supported, implementation of CRD waste management practices will be completed, with waste materials being reused or recycled.
    - .2 Contractually ensure resources used in construction or maintenance are consumed and recovered in a sustainable manner.

### 1.03 WASTE MANAGEMENT GOALS

- .1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PSPC's waste management goal and Contractor's proposed Waste Reduction Workplan for Construction, Renovation and /or Demolition (CRD) waste to be project generated.
- .2 This Project shall generate the least amount of waste possible. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- .3 Project Waste Management Goal: minimum 75 percent of total Project Waste to be diverted from landfill sites. Provide documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced.
  - .1 Specific material target percentages for reuse and/or recycling:
    - .1 Masonry and pavement: 100 %.
    - .2 Metals: 100 %.
    - .3 Wood: 100 %.
    - .4 Glass: 100%
    - .5 Gypsum board (unpainted): 100 %
    - .6 Gypsum board (painted): 0%
    - .7 Ceramic Tile: 100%
    - .8 Ceiling materials: 100 %.
    - .9 Carpet & Carpet Pad: 100 %
    - .10 Paint: 100 %
    - .11 Electrical - 100 %.

- .12 Packaging: 90 %.
- .4 Target percentage goals are achievable for waste diversion. Contractor to review and confirm Departmental Representative's Waste Audit acceptable values.
- .5 Minimize amount of non-hazardous solid waste generated by project and accomplish maximum source reduction, reuse and recycling of solid waste produced by CRD activities.
- .6 Protect environment and prevent environmental pollution damage.

#### 1.04 DEFINITIONS

- .1 Approved/Authorized recycling facility: waste recycler approved by applicable provincial authority or other users of material for recycling approved by the Departmental Representative.
- .2 Class III: non-hazardous waste - construction renovation and demolition waste.
- .3 Construction, Renovation and/or Demolition (CRD) Waste: Class III solid, non-hazardous waste materials generated during construction, demolition, and/or renovation activities
- .4 Cost/Revenue Analysis Workplan (CRAW): based on information from Waste Reduction Workplan, and intended as financial tracking tool for determining economic status of waste management practices (Schedule E).
- .5 Inert Fill: inert waste - exclusively asphalt and concrete.
- .6 Waste Source Separation Program (WSSP): implementation and co-ordination of ongoing activities to ensure designated waste materials will be sorted into pre-defined categories and sent for recycling and reuse, maximizing diversion and potential to reduce disposal costs.
- .7 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .8 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .9 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .10 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
  - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
  - .2 Returning reusable items including pallets or unused products to vendors.
- .11 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .12 Separate Condition: refers to waste sorted into individual types.

- .13 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.
- .14 Waste Audit (WA): detailed inventory of estimated quantities of waste materials that will be generated during construction, demolition, deconstruction and/or renovation. Involves quantifying by volume/weight amounts of materials and wastes that will be reused, recycled or landfilled. Refer to Schedule A.
- .15 Waste Diversion Report: detailed report of final results, quantifying cumulative weights and percentages of waste materials reused, recycled and landfilled over course of project. Measures success against Waste Reduction Workplan (WRW) goals and identifies lessons learned.
- .16 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as co-ordinating required submittal and reporting requirements.
- .17 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials generated by project. Specifies diversion goals, implementation and reporting procedures, anticipated results and responsibilities. Waste Reduction Workplan (Schedule B) information acquired from Waste Audit.

#### 1.05 DOCUMENTS

- .1 Post and maintain in visible and accessible area at job site, one copy of following documents:
  - .1 Waste Audit (Schedule A).
  - .2 Waste Reduction Workplan (Schedule B).
  - .3 Waste Source Separation Program.
  - .4 Schedules completed for project.

#### 1.06 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare and submit following prior to construction start-up:
  - .1 Electronic copy of the completed Waste Audit (WA): Schedule A.
  - .2 Electronic copy of the completed Waste Reduction Workplan (WRW): Schedule B.
  - .3 Electronic copy of Cost/Revenue Analysis Workplan (CRAW): Schedule E.
  - .4 Electronic copy of Waste Source Separation Program (WSSP).
- .3 Prepare and submit on monthly basis, throughout project or at intervals agreed to by Departmental Representative the following:
  - .1 Receipts, scale tickets, waybills, and/or waste disposal receipts that show quantities and types of materials reused, recycled, or disposed of.
  - .2 Updated Waste Materials Tracking form (Schedule D).
  - .3 Written monthly summary report detailing cumulative amounts of waste materials reused, recycled and landfilled, and brief status of ongoing waste management activities.

- .4 Submit prior to final payment the following:
  - .1 Waste Diversion Report, indicating final quantities [in tonnes] by material types salvaged for reuse, recycling or disposal in landfill and recycling centres, re-use depots, landfills and other waste processors that received waste materials (See Schedule C).
  - .2 Provide receipts, scale tickets, waybills, waste disposal receipts that confirm quantities and types of materials reused, recycled or disposed of and destination.

#### **1.07 WASTE AUDIT (WA)**

- .1 Conduct WA prior to project start-up.
- .2 Prepare WA: Refer to Schedule A; submit to the Departmental Representative.

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

- .1 Prepare WRW (Schedule B) at least 10 days prior to project start-up.
- .2 WRW identifies strategies to optimize diversion through reduction, reuse, and recycling of materials and comply with applicable regulations, based on information acquired from WA.
- .3 WRW should include but not limited to:
  - .1 Applicable regulations.
  - .2 Specific goals for waste reduction, identify existing barriers and develop strategies to overcome them.
  - .3 Destination of materials identified.
  - .4 Deconstruction/disassembly techniques and schedules.
  - .5 Methods to collect, separate, and reduce generated wastes.
  - .6 Location of waste bins on-site.
  - .7 Security of on-site stock piles and waste bins.
  - .8 Protection of personnel, sub-contractors.
  - .9 Clear labelling of storage areas.
  - .10 Training plan for contractor and sub-contractors.
  - .11 Methods to track and report results reliably (Schedule D).
  - .12 Details on materials handling and removal procedures.
  - .13 Recycler and reclaimer requirements.
  - .14 Quantities of materials to be salvaged for reuse or recycled and materials sent to landfill.
  - .15 Requirements for monitoring on-site wastes management activities.
- .4 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.
- .5 Post WRW or summary where workers at site are able to review content.
- .6 Post WRW on site where workers are able to review content regularly.
- .7 Monitor and report on waste reduction by documenting total volume (in tonnes) and cost of actual waste removed from project (Schedule D).

**1.09 COST/REVENUE ANALYSIS WORKPLAN (CRAW)**

- .1 Prepare CRAW (see Schedule E) and include the following:
  - .1 Cost of current waste management practices.
  - .2 Implementation cost of waste diversion program.
  - .3 Savings and benefits resulting from waste diversion program.

**1.10 WASTE SOURCE SEPARATION PROGRAM (WSSP)**

- .1 As part of Waste Reduction Workplan, prepare WSSP prior to project start-up.
- .2 WSSP will detail methodology and planned on-site activities for separation of reusable and recyclable materials from waste intended for landfill.
- .3 Provide list and drawings of locations that will be made available for sorting, collection, handling and storage of anticipated quantities of reusable and recyclable materials.
- .4 Provide sufficient on-site facilities and containers for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
- .5 Locate containers to facilitate deposit of materials without hindering daily operations.
- .6 Provide training for construction personnel in handling and separation of materials for reuse and/or recycling.
- .7 Locate separated materials in area which minimizes material damage.
- .8 Clearly and securely label containers to identify types/conditions of materials accepted and assist construction personnel in separating materials accordingly.
- .9 Monitor on-site waste management activities by conducting periodic site inspections to verify: state of signage, contamination levels, bin locations and condition, personnel participation, use of waste tracking forms and collection of waybills, receipts and invoices.
- .10 On-site sale of salvaged materials is not permitted.

**1.11 WASTE PROCESSING SITES**

- .1 Research and locate waste diversion resources and service providers. Transport salvaged materials off site to approved and/or authorized recycling facilities or to users of material for recycling.

**1.12 QUALITY ASSURANCE**

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

- .2 Waste Management Meeting: Waste Management Co-ordinator is to provide an update on status of waste diversion and management activities at each meeting. Written monthly Waste Diversion Report summary to be provided by Waste Management Coordinator (refer to the Waste Diversion Report form in Schedule C and Waste Materials Tracking form in Schedule D).

### 1.13 STORAGE, HANDLING AND PROTECTION

- .1 Store, materials to be reused, recycled, or salvaged in locations as approved by the Departmental Representative.
- .2 Unless specified otherwise, materials for removal become the property of the Contractor.
- .3 Retain packaging products for reuse when possible.
- .4 Protect, stockpile, store, and catalogue all salvaged items.
- .5 Separate non-salvageable items from salvageable items. Transport and deliver non-salvageable items to licensed disposal/recycling facility.
- .6 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.
- .7 Separate and store materials produced during project in designated areas.
- .8 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
  - .1 On-site source separation is recommended.
  - .2 Remove co-mingled materials to off site processing facility for separation.
  - .3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.
  - .4 Materials reused on-site are considered to be diverted from landfill and as such are to be included in all reporting.

### 1.14 DISPOSAL OF WASTES

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

### **1.15 SCHEDULING**

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

## **2 Products**

### **2.01 NOT USED**

## **3 Execution**

### **3.01 APPLICATION**

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

### **3.02 CLEANING**

- .1 General Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

### **3.03 WASTE DIVERSION REPORT**

- .1 At completion of Project, prepare written Waste Diversion Report indicating quantities of materials reused, recycled or disposed of as well as the following:
  - .1 Identify final diversion results and measure success against goals from Waste Reduction Workplan.
  - .2 Compare final quantities/percentages diverted with initial projections in Waste Audit and Waste Reduction Workplan and explain variances.
    - .1 Supporting documentation.
    - .2 Waybills and tracking forms.
    - .3 Description of issues, resolutions and lessons learned.

**3.04 WASTE AUDIT (WA)**

.1 Schedule A - Waste Audit (WA): The following has been provided as an example of the minimum requirements of a waste audit:

(1) Material Category	(2) Material Quantity Unit	(3) Estimated Waste %	(4) Total Quantity of Waste (unit)	(5) Generation Point	(6) % Recycled	(7) % Reused
Wood and Plastics						
Material Description						
Off-cuts						
Warped Pallet Forms						
Plastic Packaging						
Cardboard Packaging						
Other						
Doors and Windows						
Material Description						
Painted Frames						
Glass						
Wood						
Metal						
Other						

**3.05 WASTE REDUCTION WORKPLAN (WRW)**

.1 Schedule B – Waste Reduction Workplan (WRW): The following has been provided as an example of the minimum requirements of a waste reduction workplan:

(1) Material Category	(2) Person(s) Respon- sible	(3) Total Quantity of Waste (unit)	(4) Reused Amount (units) Projected	Actual	(5) Recycled Amount (unit) Projected	Actual	(6) Material(s) Destina- tion
Wood and Plastics Material Description							
Chutes							
Warped Pallet Forms							
Plastic Packag ing							
Card- board Packag ing							
Other							
Doors and Windows Material Description							
Painted Frames							
Glass							
Wood							
Metal							
Other							

**3.06 COST/REVENUE ANALYSIS WORKPLAN (CRAW)**

.1 Schedule E - Cost/Revenue Analysis Workplan (CRAW)

(1) Material Description	(2) Total Quantity (unit)	(3) Volume (cum)	(4) Weight (cum)	(5) Disposal Cost/Credit \$(+/-)	(6) Category Sub-Total \$(+/-)
Wood					
Wood Stud					
Plywood					
Baseboard - Wood					
Door Trim - Wood					
Cabinet					\$
Doors and Windows					
Panel Regular					
Slab Regular					
Wood Laminate					
Byfold - Closet Glazing					\$
		(7) Cost (-) / Revenue (+)			\$

**3.07 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT**

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

Province	Address	General Inquires	Fax
Saskatchewan	Saskatchewan Environment and Resource Management 3211 Albert Street Regina SK S4S 5W6	306-787-2700	306-787-3941

**END OF SECTION**

## 1 General

### 1.01 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
  - .1 Contractor's Inspection: 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.
    - .2 Request Departmental Representative's Inspection.
  - .2 Departmental Representative's Substantial Performance Inspection:
    - .1 Departmental Representative, and Contractor will perform inspection of Work to identify defects or deficiencies.
    - .2 Contractor shall correct Work as directed. Coordinate with Departmental Representative to establish a date for completion of deficiencies.
  - .3 Completion Tasks: submit written certificates in English that the following tasks have been performed:
    - .1 Work: completed and inspected for compliance with Contract Documents.
    - .2 Defects: corrected and deficiencies completed.
    - .3 Equipment and systems: tested, adjusted, and balanced, and fully operational.
    - .4 Certificates required by authorities having jurisdiction: submitted.
    - .5 Operation of systems: demonstrated to facility personnel.
    - .6 Commissioning of building systems: completed in accordance with 01 91 13 - General Commissioning Requirements, and technical specifications.
- .2 Prior to Substantial Performance of the Work, or start of operation and instruction period, whichever is earlier, provide:
  - .1 Draft Operation and Maintenance Manuals for mechanical systems, electrical systems, and laboratory equipment prior to start up for reference purposes.
  - .2 Record and "as-built" drawings.
  - .3 Keys for equipment and building as specified, including related keying information and keying charts.
  - .4 Test reports for mechanical and electrical systems, as specified in Divisions 21, 22, 23 25, 26, 27, and 28.
  - .5 Equipment and systems operating instructions and orientation for facility personnel.
  - .6 Spare parts.
  - .7 Written agreement on Service/Maintenance Contracts identified in project specifications.
  - .8 Warranty and Bond Certificates.
  - .9 Commissioning and Commissioning Reports.
  - .10 Work: complete and ready for final inspection.

- .3 Final Inspection:
  - .1 When completion tasks and deficiencies are completed, request final inspection of Work by Departmental Representative.
  - .2 If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.
- .4 Declaration of Substantial Performance: when Departmental Representative advises Contractor that deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for Substantial Certificate of Performance.
- .5 Commencement of Warranty Periods: date of Departmental Representative's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period.
- .6 Final Payment:
  - .1 When Departmental Representative considers final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment.
  - .2 If Work is deemed incomplete by Departmental Representative, complete outstanding items and request reinspection.
- .7 Payment of Holdback: after issuance of Substantial Certificate of Performance, submit an application for payment of holdback amount in accordance with General Conditions.

## **1.02 FINAL CLEANING**

- .1 In accordance with Section 01 74 11 – Cleaning.

## **2 Products**

### **2.01 NOT USED**

## **3 Execution**

### **3.01 NOT USED**

**END OF SECTION**

## **1 General**

### **1.01 DEFINITIONS**

- .1 As-Builts: a set of Contract Drawings marked up by the Contractor during construction, to record changes in the Work and to illustrate actual locations of hidden utilities or concealed elements.
- .2 Record Documents: a collection of construction documents, including Shop Drawings, Product Data sheets, operation and maintenance information, field test records, inspection certificates, manufacturer's certificates, as well as a revised set of the Contract Drawings recording the actual placement, configuration and nature of the various Products used in the construction of a Project.

### **1.02 ADMINISTRATIVE REQUIREMENTS**

- .1 Pre-warranty Meeting:
  - .1 Convene meeting one week prior to contract completion with Departmental Representative in accordance with Section 01 31 19 – Project Meetings to:
    - .1 Verify Project requirements.
    - .2 Review warranty requirements.
  - .2 Departmental Representative will establish communication procedures for:
    - .1 Notifying Contractor for construction warranty defects.
    - .2 Determining priorities for type of defects.
    - .3 Determining reasonable response time.
  - .3 Contact information for bonded and licensed company for warranty work action: Provide name, telephone number and address of company authorized for construction warranty work action.
  - .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

### **1.03 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit Operating and Maintenance Manuals per Article "Operation and Maintenance Manuals".
- .3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .4 Provide evidence, if requested, for type, source and quality of products provided.

## 1.04 OPERATION AND MAINTENANCE MANUALS

- .1 Submission:
  - .1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
  - .2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, initial copies of operating and maintenance manuals in English.
    - .1 Format: two hard copies and one electronic copy (PDF).
  - .3 One initial copy will be returned after Substantial Performance, with Departmental Representative's comments.
  - .4 Revise content of documents as required prior to final submittal.
  - .5 Should comments be extensive, the Departmental Representative may require the Initial Submission to be repeated prior to Substantial Performance.
  - .6 Two weeks prior to final inspection of the Work, submit to the Departmental Representative, one electronic copy (PDF) and one hard copy of final operating and maintenance manuals in English.
- .2 Format:
  - .1 Organize data in the form of an instructional manual.
  - .2 Binders: extension type catalogue binders with telescoping posts, metal hinges, heavy duty green fabric covering, with hot stamped gold lettering on spine and front.
  - .3 When multiple volumes are used, correlate data into related consistent groupings.
    - .1 Identify contents of each volume on cover and spine of binder.
    - .2 Identify contents of each electronic volume on cover and in file name.
  - .4 Cover: Identify each volume with printed title 'Operations and Maintenance Manual'; list title of project and identify subject matter of contents.
  - .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
  - .6 Provide tabbed fly leaf in binder and bookmark in electronic copy, for each separate product and system, with description of product and major component parts of equipment.
  - .7 Text:
    - .1 Hard copy: Manufacturer's printed data.
    - .2 Electronic copy: Provide electronic documents in accordance with requirements for electronic submissions in Section 01 33 00 – Submittal Procedures.
  - .8 Drawings:
    - .1 Hard copy: provide hard copies with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
    - .2 Electronic copy: Provide PDF copies of drawings in size appropriate for legibility and clarity of information illustrated.
  - .9 Provide full size drawings in 1:1 scaled CAD files in dwg format on CD.

- .3 Contents – Each Volume:
  - .1 Table of Contents: provide title of project;
    - .1 date of submission; names,
    - .2 names, addresses, and telephone numbers of Departmental Representative and Contractor with name of responsible parties;
    - .3 schedule of products and systems, indexed to content of volume.
    - .4 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
  - .2 For Each Item of Equipment and Each System:
    - .1 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. Update existing panel directories for changes to existing circuitry.
    - .3 Include installed colour coded wiring diagrams.
    - .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
      - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
      - .2 Include summer, winter, and any special operating instructions.
    - .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
    - .6 Provide servicing and lubrication schedule, and list of lubricants required.
    - .7 Include manufacturer's printed operation and maintenance instructions.
    - .8 Include sequence of operation by controls manufacturer.
    - .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
    - .10 Provide installed control diagrams by controls manufacturer.
    - .11 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
    - .12 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
    - .13 Include test and balancing reports.
    - .14 Completed BGIS CMMS Equipment Data Collection Form (DCF) included as appendix to this section
      - .1 Complete DCF for all equipment installed, removed and replaced in Project.
      - .2 Include copies of each DCF in O&M manual and provide electronic copies of each DCF to BGIS.
    - .15 Additional requirements: As specified in individual specification sections.

- .3 Product Data: mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.
  - .1 Include product data, with catalogue number, size, composition, and colour and texture designations.
  - .2 Provide information for re-ordering custom manufactured products.
  - .3 Provide instructions 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.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Text: as required to supplement product data.
  - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.
- .6 Training: Refer to Section 01 91 41 – Commissioning Training.

#### **1.05 RECORD DOCUMENTS AND SAMPLES**

- .1 Maintain at the site for Departmental Representative, one record copy of:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Change Orders and other modifications to the Contract.
  - .5 Reviewed shop drawings, product data, and samples.
  - .6 Field test records.
  - .7 Inspection certificates.
  - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
  - .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. Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

#### **1.06 AS-BUILT DOCUMENTS**

- .1 Record as-built information on two sets of white prints, and in copy of the Project Manual, provided by the Departmental Representative.

- .2 Clearly mark both sets of drawings, 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: legibly 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, and other documentation required by individual specifications sections.
- .7 As part of the Work, submit to Departmental Representative, upon Substantial Performance of the Work, before occupancy, one set of marked up as-built drawings and one copy of the marked up Project Manual which reflect as-built information.
- .8 Payment on the Contract will not be made until correct as-built documents are received.

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

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

**1.08 DELIVERY, STORAGE AND HANDLING**

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

**1.09 WARRANTIES AND BONDS**

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

- .6 Retain warranties and bonds until time specified for submittal.
- .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 10 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, subcontractors, manufacturers or suppliers involved.
  - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include HVAC balancing, pumps, motors, transformers, and commissioned systems such as, but not limited to, laboratory equipment, fire protection, and alarm systems.
  - .3 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 Summary of 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.
  - .4 Contractor's plans for attendance at 10 month post-construction warranty inspection.
  - .5 Procedure and status of tagging of equipment covered by extended warranties.
  - .6 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.

**1.10 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.

**END OF SECTION**

**SECTION A - GENERAL INFORMATION**

<b>GENERAL INFORMATION</b>	BUILDING NAME: _____	PROJECT NAME: _____
	GOC BUILDING NUMBER: _____	PROJECT NUMBER: _____
	BUILDING ADDRESS: _____	PROJECT MGR: _____
	<input type="checkbox"/> NEW EQUIPMENT	<input type="checkbox"/> REMOVED EQUIPMENT
<input type="checkbox"/> UPDATED EQUIPMENT	<input type="checkbox"/> CRITICAL SPARES	<input type="checkbox"/> TENANT

**SECTION B - EQUIPMENT INFORMATION**

<b>SYSTEM ( PLEASE CIRCLE THE BOX WHICH APPLIES)</b>									
05-Electrical Low Voltage	06 -Electrical High Voltage	10 - Electrical Auxiliary & Standby Power	15 - Control Monitoring System	20 - Heating	25 - Refrigeration	30 - Ventilation	40 -Compress Air, Auxiliary & Process	50 - Water Supply	55- Plumbing & Drainage
60 - Fire Protection	65 -Transportation Device	70 - Security	72 - Environmental	75 - Special Purpose	79 - Energy	80 - Architectural Structural	85 - Grounds	90 - Cafeteria (Excluding Refrigeration)	
EQUIPMENT DESCRIPTION _____									
LOCATION FLOOR: _____					ROOM: _____				
SPECIFIC LOCATION: _____									
MANUFACTURER: _____					MODEL NUMBER: _____				
SERIAL NUMBER: _____					CMMS LABEL ON EQUIPMENT BEING REPLACED: _____				
DATE OF INSTALLATION (YY/MM/DD): _____			PURCHASE PRICE (without GST): _____			PURCHASE DATE (YY/MM/DD): _____			

**SECTION C - SPECIFIC EQUIPMENT INFORMATION**

<b>SPECIFIC EQUIPMENT INFORMATION</b>	ELECTRICAL VOLTS: _____ PHASE: _____ AMPS/FLA: _____ PARENT NUMBER: _____
	MECHANICAL C.F.M/G.P.M _____ Capacity _____ Belt Size _____ Quantity: _____ Filter Size _____ Quantity _____ Type _____
	FIRE SUPPRESSION TYPE: _____ CAPACITY: _____ MANUFACTURER DATE: _____
	COOLING CAPACITY: _____ REFRIGERANT TYPE: _____ CHARGE (KG): _____
	FUEL STORAGE TANKS: _____ ABOVEGROUND _____ UNDERGROUND STORAGE VOLUME: _____ DOUBLE WALLED: YES _____ NO _____
	ENERGY SOURCE: <input type="checkbox"/> NATURAL GAS <input type="checkbox"/> OIL <input type="checkbox"/> PROPANE <input type="checkbox"/> ELECTRIC <input type="checkbox"/> STEAM <input type="checkbox"/> HOT WATER <input type="checkbox"/> COLD WATER
	ENVIRONMENT DOCUMENTS ATTACHED: YES _____ NO _____

**SECTION D - WARRANTY**

<b>WARRANTY</b>	WARRANTOR NAME: _____	WARRANTY START DATE (YY/MM/DD): _____
	<b>COMMENTS</b>	

<b>COMMENTS</b>	_____
	_____
	_____

**FOR CMMS USE ONLY**

<b>FOR CMMS USE ONLY</b>	SCHEDULING: ANNUAL _____ NEW EQUIPMENT NUMBER: _____
	EQUIPMENT NUMBER LABEL PROVIDED: _____ TENANT WA# _____
	EQUIPMENT ADDED TO ASSET GROUP: <input type="checkbox"/> YES <input type="checkbox"/> NO

**A) PLEASE SEND COMPLETED FORMS TO YOUR CMMS COORDINATOR FOR PROCESSING  
B) PLACE COMPLETED FORM IN PROJECT O&M BINDER IF APPLICABLE**

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## 1 General

### 1.01 SUMMARY

- .1 Section Includes:
  - .1 General requirements relating to commissioning of project's components and systems, specifying general requirements to FPT of components, equipment, sub-systems, systems, and integrated systems.
- .2 Acronyms:
  - .1 BMM - Building Management Manual.
  - .2 Cx - Commissioning.
  - .3 EMCS - Energy Monitoring and Control Systems.
  - .4 O M - Operation and Maintenance.
  - .5 SV - Static Verification.
  - .6 FPT - Functional Performance Testing.
  - .7 TAB - Testing, Adjusting and Balancing.

### 1.02 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 Functional Performance Testing 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 interactively with each other as intended in accordance with Contract Documents and design criteria.
  - .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
- .3 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.

### 1.03 COMMISSIONING OVERVIEW

- .1 Section 01 91 31 - Commissioning (Cx) Plan.
- .2 For Cx responsibilities refer to Section 01 91 31 - Commissioning (Cx) Plan.
- .3 Cx to be a line item of Contractor's cost breakdown.
- .4 Cx activities supplement field quality and testing procedures described in relevant technical sections.

- .5 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.
- .6 Departmental Representative will issue Substantial Completion Certificate when:
  - .1 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.
  - .2 Equipment, components, systems and integrated systems have been fully commissioned and functional as per design intent within the context of the Owner Requirement.
  - .3 Final O&M and Training Manuals have been received, reviewed and approved by Departmental Representative for suitability.
  - .4 Training session to Operational and Maintenance staffs has been completed.

#### **1.04 NON-CONFORMANCE TO FUNCTIONAL PERFORMANCE TESTING 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 unfunctional system, including related systems as deemed required by Departmental Representative, to ensure effective performance.
- .2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by Contractor. Above costs to be in form of progress payment reductions or hold-back assessments.

#### **1.05 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 Have completed Cx Plan up-to-date.
  - .2 Ensure installation of related components, equipment, sub-systems, systems is complete.
  - .3 Fully understand Cx requirements and procedures.
  - .4 Have Cx documentation shelf-ready.
  - .5 Understand completely design criteria and intent and special features.
  - .6 Submit complete start-up documentation to Departmental Representative.
  - .7 Have Cx schedules up-to-date.
  - .8 Ensure systems have been cleaned thoroughly.
  - .9 Complete TAB procedures on systems, submit TAB reports to Departmental Representative for review and approval.
  - .10 Ensure "As-Built" system schematics are available.

- .4 Inform Departmental Representative in writing of discrepancies and deficiencies on finished works.

#### **1.06 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.

#### **1.07 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Submit no later than 4 weeks after award of Contract:
    - .1 Name of Contractor's Cx agent.
    - .2 Draft Cx documentation.
    - .3 Preliminary Cx schedule.
  - .2 Request in writing to Departmental Representative for changes to submittals and obtain written approval at least 5 weeks prior to start of Cx.
  - .3 Submit proposed Cx procedures to Departmental Representative where not specified and obtain written approval at least 5 weeks prior to start of Cx.
  - .4 Provide additional documentation relating to Cx process required by Departmental Representative.

#### **1.08 COMMISSIONING DOCUMENTATION**

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Static Verification (SV) / Functional Performance Testing (FPT) Forms for requirements and instructions for use.
- .2 Departmental Representative to review and approve Cx documentation.
- .3 Provide completed and approved Cx documentation to Departmental Representative.

#### **1.09 COMMISSIONING SCHEDULE**

- .1 Provide detailed Cx schedule as part of construction schedule.
- .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.

#### **1.10 COMMISSIONING MEETINGS**

- .1 Convene Cx meetings following project meetings and as specified herein.
- .2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.
- .3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.

- .4 At 50% 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 Cx Agent, who will record and distribute minutes.
- .7 Ensure subcontractors and relevant manufacturer representatives are present at 50% and subsequent Cx meetings and as required.

#### **1.11 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.

#### **1.12 WITNESSING OF STARTING AND TESTING**

- .1 Provide 14 days notice prior to commencement.
- .2 Departmental Representative to witness of start-up and testing.

#### **1.13 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.

#### 1.14 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 SV 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 FPT: include repetition of tests after correcting deficiencies.
  - .5 Post-substantial Functional Performance Testing: 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 FPT 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 removed from site and replace with new.
    - .2 Subject new equipment/systems to specified start-up procedures.

#### 1.15 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.

#### 1.16 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 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.

#### **1.17 TEST RESULTS**

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

#### **1.18 START OF COMMISSIONING**

- .1 Notify Departmental Representative at least 14 days prior to start of Cx.
- .2 Start Cx after elements of building affecting start-up and Functional Performance Testing of systems have been completed.

#### **1.19 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.

#### **1.20 COMMISSIONING FUNCTIONAL PERFORMANCE TESTING**

- .1 Carry out Cx:
  - .1 Under 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 Functional Performance Testing.

#### **1.21 WITNESSING COMMISSIONING**

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

#### **1.22 AUTHORITIES HAVING JURISDICTION**

- .1 Where specified start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for authority to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.
- .2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.

- .3 Provide copies to Departmental Representative within 5 days of test and with Cx report.

### **1.23 COMMISSIONING CONSTRAINTS**

- .1 Since access into secure or sensitive areas will be very difficult after occupancy, 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.

### **1.24 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.

### **1.25 EXTENT OF VERIFICATION**

- .1 Provide manpower and instrumentation to verify up to 100 % 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 25% of reported results.
- .5 Perform additional commissioning until results are acceptable to Departmental Representative.

### **1.26 REPEAT VERIFICATIONS**

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

### **1.27 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.

### **1.28 DEFICIENCIES, FAULTS, DEFECTS**

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

---

**1.29 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.

**1.30 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.

**1.31 TRAINING**

- .1 In accordance with Section 01 91 41 - Commissioning (Cx) - Training.

**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 FPT if:
  - .1 Accuracy complies with these specifications.
  - .2 Calibration certificates have been deposited with Departmental Representative.
- .2 Where permitted by the Departmental Representative, calibrated EMCS sensors may be used to obtain performance data provided that sensor calibration has been completed and accepted.

**1.35 FUNCTIONAL PERFORMANCE TESTING TOLERANCES**

- .1 Application tolerances:
  - .1 Specified range of acceptable deviations of measured values from specified values or specified design criteria. Except for special areas, to be within +/- 10% of specified values, unless otherwise noted.
- .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 OWNER'S PERFORMANCE TESTING**

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

**2 Products**

**2.01 NOT USED**

.1 Not Used.

**3 Execution**

**3.01 NOT USED**

.1 Not Used.

**END OF SECTION**

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## 1 General

### 1.01 SUMMARY

- .1 Section Includes:
  - .1 Description of overall structure of Cx Plan and roles and responsibilities of Cx team.

### 1.02 REFERENCES

- .1 American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE)
  - .1 ASHRAE 202-2013, Commissioning Process for Buildings and Systems.
  - .2 ASHRAE Guideline 0-2005, Commissioning Process.
- .2 Canadian Standards Association (CSA)
  - .1 CSA Z320-11, Building Commissioning Standard and Check Sheets.
- .3 Underwriters' Laboratories of Canada (ULC)

### 1.03 GENERAL

- .1 Provide a fully functional facility:
  - .1 Systems, equipment and components meet user's functional requirements before date of acceptance, and operate consistently at peak efficiencies and within specified energy budgets under normal loads.
  - .2 Facility user and O M personnel have been fully trained in aspects of installed systems.
  - .3 Optimized life cycle costs.
  - .4 Complete documentation relating to installed equipment and systems.
- .2 Term "Cx" in this section means "Commissioning".
- .3 Use this Cx Plan as master planning document for Cx:
  - .1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.
  - .2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.
  - .3 Sets out deliverables relating to O M, process and administration of Cx.
  - .4 Describes process of verification of how built works meet design requirements.
  - .5 Produces a complete functional system prior to issuance of Certificate of Occupancy.
  - .6 Management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:
    - .1 Overview of Cx.
    - .2 General description of elements that make up Cx Plan.
    - .3 Process and methodology for successful Cx.
- .4 Acronyms:
  - .1 Cx - Commissioning.
  - .2 BMM - Building Management Manual.

- .3 EMCS - Energy Monitoring and Control Systems.
- .4 MSDS - Material Safety Data Sheets.
- .5 PI - Product Information.
- .6 PV - Performance Verification.
- .7 TAB - Testing, Adjusting and Balancing.
- .8 WHMIS - Workplace Hazardous Materials Information System.
- .5 Commissioning terms used in this Section:
  - .1 Bumping: short term start-up to prove ability to start and prove correct rotation.
  - .2 Deferred Cx - Cx activities delayed for reasons beyond Contractor's control due to lack of occupancy, weather conditions, need for heating/cooling loads.

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

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

#### **1.05 REFINEMENT OF CX PLAN**

- .1 During construction phase, revise, refine and update Cx Plan to include:
  - .1 Changes resulting from Client program modifications.
  - .2 Approved design and construction changes.
- .2 Revise, refine and update every 6 weeks during construction phase. At each revision, indicate revision number and date.
- .3 Submit each revised Cx Plan to Departmental Representative for review and obtain written approval.
- .4 Include testing parameters at full range of operating conditions and check responses of equipment and systems.

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

- .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 Design Quality Review Team: during construction, will conduct periodic site reviews to observe general progress.
  - .2 Departmental Representative 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 Performance of Cx activities.
  - .4 Delivery of training and Cx documentation.
  - .5 Assigning one person as point of contact with Consultant 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.

#### 1.07 CX PARTICIPANTS

- .1 Employ the following Cx participants to verify performance of equipment and systems:
  - .1 Installation contractor/subcontractor:
    - .1 Equipment and systems except as noted.
  - .2 Equipment manufacturer: equipment specified to be installed and started by manufacturer.
    - .1 To include performance verification.
  - .3 Specialist subcontractor: equipment and systems supplied and installed by specialist subcontractor.
  - .4 Specialist Cx agency:

- .1 Possessing specialist qualifications and installations providing environments essential to client's program but are outside scope or expertise of Cx specialists on this project.
- .5 Client: responsible for intrusion and access security systems.
- .6 Ensure that Cx participant:
  - .1 Could complete work within scheduled time frame.
  - .2 Available for emergency and troubleshooting service during first year of occupancy by user for adjustments and modifications outside responsibility of O M personnel, including:
    - .1 Modify ventilation rates to meet changes in off-gassing.
    - .2 Changes to heating or cooling loads beyond scope of EMCS.
    - .3 Changes to EMCS control strategies beyond level of training provided to O M personnel.
    - .4 Redistribution of electrical services.
    - .5 Modifications of fire alarm systems.
    - .6 Modifications to voice communications systems.
- .7 Provide names of participants to Departmental Representative and details of instruments and procedures to be followed for Cx 3 months prior to starting date of Cx for review and approval.

#### 1.08 EXTENT OF CX

- .1 Commission mechanical systems and associated equipment:
  - .1 Plumbing systems:
    - .1 New sink/fixtures and hardware.
  - .2 HVAC and exhaust systems:
    - .1 HVAC systems – New VAV boxes.
    - .2 HVAC systems – New inline fan.
  - .3 EMCS:
    - .1 All new and existing thermostats within scope of work.
    - .2 All new points within graphical user interface.
- .2 Commission electrical systems and equipment:
  - .1 Lighting systems:
    - .1 Lighting equipment
    - .2 Emergency lighting systems, including battery packs
    - .3 Fire exit emergency signage
    - .4 Lighting levels
  - .2 Fire alarm systems, equipment:
    - .1 Annunciators
    - .2 Control panels
    - .3 Devices:
      - .1 Smoke detectors
      - .2 FA Speakers
      - .3 FA Strobes
  - .3 Other systems and equipment:

- .1 Intrusion system
  - .2 Sound masking system.
  - .3 Panels
  - .4 Switches and receptacles
- .3 Commission architectural systems and equipment:
- .1 Doors and windows

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

- .1 General requirements:
  - .1 Compile English documentation.
  - .2 Documentation to be computer-compatible format ready for inputting for data management.
- .2 Provide deliverables:
  - .1 Warranties.
  - .2 Project record documentation.
  - .3 Inventory of spare parts, special tools and maintenance materials.
  - .4 Maintenance Management System (MMS) identification system used.
  - .5 WHMIS information.
  - .6 MSDS data sheets.
  - .7 Electrical Panel inventory containing detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.
  - .8 Preventative maintenance program
  - .9 Standard operating procedures (SOP)
  - .10 Contractors and sub-contractors as-built drawings

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

- .1 General:
  - .1 Start-up, testing and Cx requirements, conditions for acceptance and specifications form part of relevant technical sections of these specifications.
- .2 Definitions:
  - .1 Cx as used in this section includes:
    - .1 Cx of components, equipment, systems, subsystems, and integrated systems.
    - .2 Factory inspections and performance verification tests.
- .3 Deliverables: provide:
  - .1 Cx Specifications.
  - .2 Startup, pre-Cx activities and documentation for systems, and equipment.
  - .3 Completed installation checklists (ICL).
  - .4 Completed product information (PI) report forms.
  - .5 Completed performance verification (PV) report forms.
  - .6 Results of Performance Verification Tests and Inspections.
  - .7 Description of Cx activities and documentation.
  - .8 Description of Cx of integrated systems and documentation.

- .9 Tests performed by Owner/User.
- .10 Training Plans.
- .11 Cx Reports.
- .12 Prescribed activities during warranty period.
- .4 Departmental Representative to witness and certify tests and reports of results provided to Departmental Representative.
- .5 Departmental Representative to participate.

#### 1.11 PRE-CX ACTIVITIES AND RELATED DOCUMENTATION

- .1 Items listed in this Cx Plan include the following:
  - .1 Pre-Start-Up inspections: by Departmental Representative prior to permission to start up and rectification of deficiencies to Departmental Representative's satisfaction.
  - .2 Departmental Representative to use approved check lists.
  - .3 Departmental Representative will monitor some of these pre-start-up inspections.
  - .4 Include completed documentation with Cx report.
  - .5 Conduct pre-start-up tests: conduct pressure, static, flushing, cleaning, and "bumping" during construction as specified in technical sections. To be witnessed and certified by Departmental Representative and does not form part of Cx specifications.
  - .6 Departmental Representative will monitor some of these inspections and tests.
  - .7 Include completed documentation in Cx report.
- .2 Pre-Cx activities - MECHANICAL:
  - .1 Plumbing systems:
    - .1 "Bump" each item of equipment in its "stand-alone" mode.
    - .2 Complete pre-start-up checks and complete relevant documentation.
    - .3 After equipment has been started, test related systems in conjunction with control systems on a system-by-system basis.
  - .2 HVAC equipment and systems:
    - .1 "Bump" each item of equipment in its "stand-alone" mode.
    - .2 At this time, complete pre-start-up checks and complete relevant documentation.
    - .3 After equipment has been started, test related systems in conjunction with control systems on a system-by-system basis.
    - .4 Perform TAB on systems. TAB reports to be approved by Departmental Representative.
  - .3 EMCS:
    - .1 EMCS trending to be available as supporting documentation for performance verification.
    - .2 Perform point-by-point testing in parallel with start-up.
    - .3 Carry out point-by-point verification.
    - .4 Demonstrate performance of systems, to be witnessed by Departmental Representative prior to start of 30 day Final Acceptance Test period.
    - .5 Perform final Cx and operational tests during demonstration period and 30 day test period.

- .6 Only additional testing after foregoing have been successfully completed to be "Off-Season Tests".
- .3 Pre-Cx activities - ELECTRICAL:
  - .1 Lighting systems:
    - .1 Emergency lighting systems:
      - .1 Tests to include verification of lighting levels and coverage, initially by disrupting normal power.
    - .2 Fire alarm systems: test after other safety and security systems are completed. Testing to include a complete verification in accordance with ULC requirements. Departmental Representative has witnessed and certified report, demonstrate devices and zones to Departmental Representative.
    - .3 Intrusion alarm systems: to include verification by Departmental Representative.
    - .4 Demonstrate performance of lighting switches, receptacles and panels.

### 1.12 START-UP

- .1 Start up components, equipment and systems.
- .2 Equipment manufacturer, supplier, installing specialist sub-contractor, as appropriate, to start-up, under Contractor's direction, following equipment, systems:
  - .1 Air Terminal Units
  - .2 Controls
  - .3 Lighting Controls
  - .4 Sound Masking
- .3 Departmental Representative to monitor some of these start-up activities.
  - .1 Rectify start-up deficiencies to satisfaction of Departmental Representative.
- .4 Performance Verification (PV):
  - .1 Approved Cx Agent to perform.
    - .1 Repeat when necessary until results are acceptable to Departmental Representative.
  - .2 Use procedures modified generic procedures to suit project requirements.
  - .3 Departmental Representative to witness and certify reported results using approved PI and PV forms.
  - .4 Departmental Representative to approve completed PV reports and provide to Departmental Representative.
  - .5 Departmental Representative reserves right to verify up to 30% of reported results at random.
  - .6 Failure of randomly selected item shall result in rejection of PV report or report of system startup and testing.

### 1.13 CX ACTIVITIES AND RELATED DOCUMENTATION

- .1 Perform Cx by specified Cx agency using procedures developed by Departmental Representative and approved by Departmental Representative.
- .2 Departmental Representative to monitor Cx activities.
- .3 Upon satisfactory completion, Cx agency performing tests to prepare Cx Report using approved PV forms.

- .4 Departmental Representative to witness, certify reported results of, Cx activities and forward to Departmental Representative.
- .5 Departmental Representative reserves right to verify a percentage of reported results at no cost to contract.

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

- .1 Cx to be performed by specified Cx specialist, using procedures developed by Departmental Representative and approved by Departmental Representative.
- .2 Tests to be witnessed by Departmental Representative and documented on approved report forms.
- .3 Upon satisfactory completion, Cx specialist to prepare Cx Report, to be certified by Departmental Representative and submitted to Departmental Representative for review.
- .4 Departmental Representative reserves right to verify percentage of reported results.
- .5 Integrated systems to include:
  - .1 HVAC and associated systems forming part of integrated HVAC systems: Air Terminal Units, Force Flow Heaters.
  - .2 Emergency Lighting Systems.
  - .3 Fire Alarm System.
- .6 Identification:
  - .1 In later stages of Cx, before hand-over and acceptance Departmental Representative and Cx Manager to co-operate to complete inventory data sheets and provide assistance to PWGSC in full implementation of MMS identification system of components, equipment, sub-systems, systems.

#### **1.15 INSTALLATION CHECK LISTS (ICL)**

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

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

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

#### **1.17 PERFORMANCE VERIFICATION (PV) REPORT**

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

#### **1.18 DELIVERABLES RELATING TO ADMINISTRATION OF CX**

- .1 General:
  - .1 Because of risk assessment, complete Cx of occupancy, weather and seasonal-sensitive equipment and systems in these areas before building is occupied.

#### **1.19 CX SCHEDULES**

- .1 Prepare detailed [critical path] Cx Schedule and submit to Departmental Representative for review and approval same time as project Construction Schedule. Include:
  - .1 Milestones, testing, documentation, training and Cx activities of components, equipment, subsystems, systems and integrated systems, including:

- .1 Design criteria, design intents.
  - .2 Pre-TAB review: 28days after contract award, and before construction starts.
  - .3 Cx agents' credentials: 60 days before start of Cx.
  - .4 Cx procedures: 3 months after award of contract.
  - .5 Cx Report format: 3months after contract award.
  - .6 Discussion of heating/cooling loads for Cx: 3 months before start-up.
  - .7 Submission of list of instrumentation with relevant certificates: 21 days before start of Cx.
  - .8 Notification of intention to start TAB: 21 days before start of TAB.
  - .9 TAB: after successful start-up, correction of deficiencies and verification of normal and safe operation.
  - .10 Notification of intention to start Cx: 14 days before start of Cx.
  - .11 Notification of intention to start Cx of integrated systems: after Cx of related systems is completed 14days before start of integrated system Cx.
  - .12 Identification of deferred Cx.
  - .13 Implementation of training plans.
  - .14 Cx of smoke management/control systems: after Cx of related systems is completed and 7 days before proposed date of Cx these systems.
  - .15 Cx reports: immediately upon successful completion of Cx.
- .2 Detailed training schedule to demonstrate no conflicts with testing, completion of project and hand-over to Departmental Representative.
  - .3 6 months in Cx schedule for verification of performance in all seasons and wear conditions.
- .2 After approval, incorporate Cx Schedule into Construction Schedule.
  - .3 Consultant, Contractor, Contractor's Cx agent, and Departmental Representative will monitor progress of Cx against this schedule.

## 1.20 CX REPORTS

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

## 1.21 ACTIVITIES DURING WARRANTY PERIOD

- .1 Cx activities must be completed before issuance of Substantial Completion Certificate, it is anticipated that certain Cx activities may be necessary during Warranty Period, including:
  - .1 Fine tuning of HVAC systems.
  - .2 Adjustment of ventilation rates to promote good indoor air quality and reduce deleterious effects of VOCs generated by off-gassing from construction materials and furnishings.

---

**1.22 TRAINING PLANS**

- .1 Refer to Section 01 91 41 - Commissioning (Cx) - Training.

**1.23 FINAL SETTINGS**

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

**2 Products**

**2.01 NOT USED**

- .1 Not Used.

**3 Execution**

**3.01 NOT USED**

- .1 Not Used.

**END OF SECTION**

## **1 General**

### **1.01 SUMMARY**

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

### **1.02 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.

### **1.03 STATIC VERIFICATION (SV) REPORT FORMS**

- .1 Static Verification (SV) 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 Functional Performance Testing (FPT) of systems complete items on SV forms related to systems and obtain Departmental Representative's and Commissioning Manager approval.

### **1.04 FUNCTIONAL PERFORMANCE TESTING (FPT) FORMS**

- .1 FPT 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 FPT report forms include those developed by Contractor records measured data and readings taken during functional testing and Performance Verification procedures.
- .3 Prior to FPT of integrated system, complete FPT forms of related systems and obtain Departmental Representative's and Commissioning Managers approval.

---

### **1.05 SAMPLES OF COMMISSIONING FORMS**

- .1 Project specific Forms provided at the end of the section.
- .2 Revise items on Commissioning forms to suit project requirements.
- .3 Project specific Commissioning forms and a complete index of produced to date will be attached to this section.

### **1.06 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

### **1.07 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.

### **1.08 LANGUAGE**

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

## **2 Products**

### **2.01 NOT USED**

- .1 Not Used.

**3 Execution**

**3.01 NOT USED**

.1 Not Used.

**END OF SECTION**

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# Commissioning Systems Components List



NAME: Travis Defoort  
 COMPANY: Epp Siepman Engineering  
 ADDRESS: 400-136 Market Avenue  
 Winnipeg, MB – R3B 0P4

CUSTOMER: PWGSC  
 PROJECT: ESDC OFFICE RENOVATION  
 FILE NUMBER: R.055494.001  
 DATE: 16-02-2018

Item	Item Description	Status
VAV-1	Variable air volume terminal unit – Operation based on space temperature and CO2 concentration	
VAV-2	Variable air volume terminal unit – Operation based on space temperature and CO2 concentration	
VAV-3	Variable air volume terminal unit – Operation based on space temperature	
VAV-4	Variable air volume terminal unit – Operation based on space temperature	
VAV-5	Variable air volume terminal unit – Operation based on space temperature	
EF-1	Transfer air fan – Operation based on occupied/unoccupied schedule	
EF-2	Transfer air fan – Operation based on occupied/unoccupied schedule	
EF-3	Transfer air fan – Operation based on occupied/unoccupied schedule	
EF-4	Transfer air fan – Operation based on occupied/unoccupied schedule	
EF-5	Transfer air fan – Operation based on space temperature	
SK-1	Kitchenette sink and trim	
DDC User Interface	Building automation system user graphical interface	

# Commissioning Systems Components List



Lighting Fixtures	Installed, operational	
Lighting Controls	Switches, dimmers, sensors, room control installed & programmed	
Exit Signs	Installed, operational	
Power Distribution	Electrical panels with updated label, schedule	
Mechanical Equipment	Feeder connected, disconnect installed	
Structured wiring	Data outlet rough-in with conduit to ceiling space, cable tray & J hooks installed	
A/V & Floor Box	Device installed with AV cables	
Sound Masking	Control panel and speakers, volume control, programming	
Fire Alarm	Horn/strobes, smoke detector, heat detector, verification report	
Security	Rough-in for intrusion detector, access control & duress	







# VAV BOX -

Start-Up



REVISION #: \_\_\_\_\_

NAME: Travis Defoort  
COMPANY: Epp Siepman Engineering  
ADDRESS: 400-136 Market Avenue  
Winnipeg, MB - Manitoba R3B 0P4

CUSTOMER: PWGSC  
PROJECT: ESDC OFFICE RENOVATION  
FILE NUMBER: R.055494.001  
DATE: 16-02-2018

Operation	Yes	No
Thermostat is operational		
CO2 sensor is operational		

GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE

**VAV BOX -**  
**Functional Performance Testing**



REVISION #: \_\_\_\_\_

NAME: Travis Defoort  
 COMPANY: Epp Siepman Engineering  
 ADDRESS: 400-136 Market Avenue  
Winnipeg, MB - Manitoba R3B 0P4

CUSTOMER: PWGSC  
 PROJECT: ESDC OFFICE RENOVATION  
 FILE NUMBER: R.055494.001  
 DATE: 16-02-2018

**SEQUENCE OF OPERATIONS VERIFICATION**

Operation	Yes	No	N/A
VAV damper modulates when space temperature is above/below setpoint			
VAV damper modulates open on rising CO2 concentration			
Night setback sequence is operational			
Alarm point is provided on DDC screen if high zone temperature is reached			
Alarm point is provided on DDC screen if low zone temperature is reached			
Alarm point is provided on DDC screen if high zone CO2 concentration is reached			

**GENERAL COMMENTS:**

POSITION/TITLE	SIGNATURE	DATE

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# EXHAUST FAN -

## Static Verification



REVISION #: \_\_\_\_\_

NAME: Travis Defoort  
 COMPANY: Epp Siepman Engineering  
 ADDRESS: 400-136 Market Ave  
Winnipeg, MB - Manitoba R3B 0P4

CUSTOMER: PWGSC  
 PROJECT: ESDC Office Relocation  
 FILE NUMBER: R.055494.001  
 DATE: 16-02-2018

NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	
SERVICE		LOCATION	

EXHAUST FAN	SPECIFIED	SHOP DRAWINGS	INSTALLED
MANUFACTURER			
TYPE/ SIZE			
MODEL NO.			
MOTOR CONTROL CENTRE NO.			
MOTOR HP			
VOLTAGE / PHASE / FREQUENCY			
STATIC PRESSURE AIR (PA)			
FAN RPM			
AIR VOLUME (L/S)			
VIBRATION ISOLATOR TYPE			

EXHAUST FAN	STATUS	COMMENTS
INSTALLED AS PER DRAWINGS & SPECIFICATIONS		
INSTALLED AS PER MANUFACTURER'S REQUIREMENTS		
FAN BEARINGS LUBRICATED		
GREASE EXTENSION LEADS REQUIRED		
FAN ROTATION CORRECT		
FAN CASING CLEANED		
BELT GUARDS INSTALLED		
ALIGNMENT REPORT ATTACHED		
INLET & OUTLET GUARDS INSTALLED		
DUCT GEOMETRY CORRECT		
FLEXIBLE CONNECTORS CORRECT		
VIBRATION ISOLATORS CORRECT		
STARTER & DISCONNECT COMPLETE		
DISCONNECT LOCATION CORRECT		
FAN WHEEL CLEARANCE		
FAN INTERLOCKS CORRECT		
VARIABLE SPEED DRIVE/VOLUME CONTROLS		

# EXHAUST FAN -

## Static Verification



REVISION #: \_\_\_\_\_

NAME: Travis Defoort  
COMPANY: Epp Siepman Engineering  
ADDRESS: 400-136 Market Ave  
Winnipeg, MB - Manitoba R3B 0P4

CUSTOMER: PWGSC  
PROJECT: ESDC Office Relocation  
FILE NUMBER: R.055494.001  
DATE: 16-02-2018

NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	
SERVICE		LOCATION	

AIR DISTRIBUTION SYSTEM	STATUS	COMMENTS
QUALITY OF DUCT CONSTRUCTION		
SUITABILITY OF DUCT FITTINGS		
DUCTWORK INSULATION		
WALL PENETRATIONS SEALED		
ACCESS FOR INSPECTION & SERVICING		

START-UP	STATUS	COMMENTS
ALL SYSTEM COMPONENTS STARTED AS DETAILED ON EQUIPMENT START-UP SHEETS.		
DUCTWORK PRESSURE TESTED		
NOISE & VIBRATION		
AIR BALANCING COMPLETE		
AIR BALANCE REPORT ATTACHED		

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NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	

# EXHAUST FAN -

## Static Verification



REVISION #: \_\_\_\_\_

NAME: Travis Defoort  
 COMPANY: Epp Siepman Engineering  
 ADDRESS: 400-136 Market Ave  
Winnipeg, MB - Manitoba R3B 0P4

CUSTOMER: PWGSC  
 PROJECT: ESDC Office Relocation  
 FILE NUMBER: R.055494.001  
 DATE: 16-02-2018

SERVICE	LOCATION
---------	----------

MOTORIZED DAMPER	STATUS		
	NO. 1	NO. 2	NO. 3
LINKAGE CONNECTIONS INSTALLED			
FREE MOVEMENT & STROKE			
ACCESS TO DAMPER			
ACTUATOR NOT IN AIR STREAM			
NORMAL POSITIONS AS SPECIFIED			
DAMPER CONTROL SEQUENCES			
MIXING DAMPERS STROKE IN UNISON			
LINKAGE CONNECTIONS INSTALLED			
FREE MOVEMENT & STROKE			
ACCESS TO DAMPER			
ACTUATOR NOT IN AIR STREAM			
NORMAL POSITIONS AS SPECIFIED			
DAMPER CONTROL SEQUENCES			
MIXING DAMPERS STROKE IN UNISON			

**GENERAL COMMENTS:**

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		
Building Operations and Maintenance Staff		
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		

# EXHAUST FAN -

## Start-Up



REVISION #: \_\_\_\_\_

NAME: Travis Defoort  
COMPANY: Epp Siepman Engineering  
ADDRESS: 400-136 Market Ave  
Winnipeg, MB - Manitoba R3B 0P4

CUSTOMER: PWGSC  
PROJECT: ESDC Office Relocation  
FILE NUMBER: R.055494.001  
DATE: 16-02-2018

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**GENERAL COMMENTS:**

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		
Building Operations and Maintenance Staff		
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		

**EXHAUST FAN -**  
**Functional Performance Testing**



REVISION #: \_\_\_\_\_

NAME: Travis Defoort  
 COMPANY: Epp Siepman Engineering  
 ADDRESS: 400-136 Market Ave  
Winnipeg, MB - Manitoba R3B 0P4

CUSTOMER: PWGSC  
 PROJECT: ESDC Office Renovation  
 FILE NUMBER: R.055494.001  
 DATE: 16-02-2018

**SEQUENCE OF OPERATIONS VERIFICATION**

Operation	Yes	No	N/A
Fan is in operation during building occupied hours as set by the DDC			
Fan is disabled after occupied hours as set by the DDC			
Fan is enabled on a rise in space temperature			
Fan is disabled when space temperature is satisfied			
Alarm point is provide on DDC screen if fan is manually turned off when called to be on			
Alarm point is provide on DDC screen if fan is manually turned on when called to be off			
Alarm point is provide on DDC screen if space temperature is above allowable limit			

**GENERAL COMMENTS:**

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		
Building Operations and Maintenance Staff		
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		

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# BUILDING SYSTEM INTEGRATION

Static Verification



REVISION #: \_\_\_\_\_

NAME: Travis Defoort  
COMPANY: Epp Siepman Engineering  
ADDRESS: 400-136 Market Avenue  
Winnipeg, MB - Manitoba R3B 0P4

CUSTOMER: PWGSC  
PROJECT: ESDC OFFICE RENOVATION  
FILE NUMBER: R.055494.001  
DATE: 16-02-2018

NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	
SERVICE	ALL RELATED EQUIPMENT AND SYSTEMS	LOCATION	

DESCRIPTION	RELATED SYSTEMS	POWER REQUIREMENTS	OPERATION TESTED & VERIFIED

**GENERAL COMMENTS:**

POSITION/TITLE	SIGNATURE	DATE

# BUILDING SYSTEM INTEGRATION

Start-Up



REVISION #: \_\_\_\_\_

NAME: Travis Defoort  
COMPANY: Epp Siepman Engineering  
ADDRESS: 400-136 Market Avenue  
Winnipeg, MB - Manitoba R3B 0P4

CUSTOMER: PWGSC  
PROJECT: ESDC OFFICE RENOVATION  
FILE NUMBER: R.055494.001  
DATE: 16-02-2018

Operation	Yes	No	N/A
Graphics are updated to show current floor plan			
Graphics are updated to show new thermostat locations and zones			
Graphics are updated to show VAV's			
Graphics are updated to show transfer air fans			

**GENERAL COMMENTS:**

POSITION/TITLE	SIGNATURE	DATE

# BUILDING SYSTEM INTEGRATION

## Functional Performance Testing



REVISION #: \_\_\_\_\_

NAME: Travis Defoort  
COMPANY: Epp Siepman Engineering  
ADDRESS: 400-136 Market Avenue  
Winnipeg, MB - Manitoba R3B 0P4

CUSTOMER: PWGSC  
PROJECT: ESDC OFFICE RENOVATION  
FILE NUMBER: R.055494.001  
DATE: 16-02-2018

Operation	Yes	No	N/A
Alarms for VAV's are functioning			
VAV position is live for all zones			
Alarms for Exhaust Fans are functioning			
Exhaust fan status is live for all fans			
Space temperature and space temperature setpoint are live for all zones			
Space CO2 concentration is live for all relevant zones			
Links between zones and equipment are functioning			

**GENERAL COMMENTS:**

POSITION/TITLE	SIGNATURE	DATE

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# PLUMBING FIXTURE

## Static Verification



REVISION #: \_\_\_\_\_

NAME: Travis Defoort  
 COMPANY: Epp Siepman Engineering  
 ADDRESS: 400-136 Market Avenue  
Winnipeg, MB - Manitoba R3B 0P4

CUSTOMER: PWGSC  
 PROJECT: ESDC OFFICE RENOVATION  
 FILE NUMBER: R.055494.001  
 DATE: 16-02-2018

NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	
SERVICE		LOCATION	

START-UP	SPECIFIED	COMMENTS
INSTALLED AS PER DRAWINGS & SPECIFICATIONS		
INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS		
COLD WATER FEED CLEAN		
COLD WATER FEED PRESSURE		
HOT WATER FEED CLEAN		
HOT WATER FEED PRESSURE		
FIXTURE CLEAN		
PIPE ARRANGEMENT & SUPPORT		
NO LEAKAGE FROM SEALS		
FIXTURE WORKS CORRECTLY		

**GENERAL COMMENTS:**

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		
Cx Authority/ Commissioning Provider		
Contractors/Subcontractor		

# PLUMBING FIXTURE -

## Start-Up



REVISION #: \_\_\_\_\_

NAME: Travis Defoort  
COMPANY: Epp Siepman Engineering  
ADDRESS: 400-136 Market Avenue  
Winnipeg, MB - Manitoba R3B 0P4

CUSTOMER: PWGSC  
PROJECT: ESDC OFFICE RENOVATION  
FILE NUMBER: R.055494.001  
DATE: 16-02-2018

Operation	Yes	No
Water flows when taps are turned on		
No leaks are present when taps are turned off		

### GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		
Cx Authority/ Commissioning Provider		
Contractors/Subcontractor		

# PLUMBING FIXTURE -

## Functional Performance Testing



REVISION #: \_\_\_\_\_

NAME: Travis Defoort  
COMPANY: Epp Siepman Engineering  
ADDRESS: 400-136 Market Avenue  
Winnipeg, MB - Manitoba R3B 0P4

CUSTOMER: PWGSC  
PROJECT: ESDC OFFICE RENOVATION  
FILE NUMBER: R.055494.001  
DATE: 16-02-2018

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Operation	Yes	No
Cold water flows when tap is turned on		
Hot water flows when tap is turned on		

**GENERAL COMMENTS:**

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		
Cx Authority/ Commissioning Provider		
Contractors/Subcontractor		





# DRAINAGE SYSTEM

Start-Up



REVISION #: \_\_\_\_\_

NAME: Travis Defoort  
COMPANY: Epp Siepman Engineering  
ADDRESS: 400-136 Market Avenue  
Winnipeg, MB - Manitoba R3B 0P4

CUSTOMER: PWGSC  
PROJECT: ESDC OFFICE RENOVATION  
FILE NUMBER: R.055494.001  
DATE: 16-02-2018

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GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		
Cx Authority/ Commissioning Provider		
Contractors/Subcontractor		

# DRAINAGE SYSTEM

## Functional Performance Testing



REVISION #: \_\_\_\_\_

NAME: Travis Defoort  
COMPANY: Epp Siepman Engineering  
ADDRESS: 400-136 Market Avenue  
Winnipeg, MB - Manitoba R3B 0P4

CUSTOMER: PWGSC  
PROJECT: ESDC OFFICE RENOVATION  
FILE NUMBER: R.055494.001  
DATE: 16-02-2018

Operation	Yes	No
Fixture drains properly		

**GENERAL COMMENTS:**

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		
Cx Authority/ Commissioning Provider		
Contractors/Subcontractor		



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# Lighting Controls

## Static Verification



REVISION #: \_\_\_\_\_

NAME: Jun Fan  
 COMPANY: Epp Siepman Engineering  
 ADDRESS: 400-136 Market Ave  
 Winnipeg, MB - Manitoba R3B 0P4

CUSTOMER: PWGSC  
 PROJECT: ESDC OFFICE RENOVATION  
 FILE NUMBER: R.055494.001  
 DATE: 16-02-2018

<b>FIXTURE NAMEPLATE</b>			
<b>LIGHT FIXTURE NUMBER:</b>			
MANUFACTURER		Model Number	
SERIAL NO.		Voltage:	
Color:		Wattage	

	Yes	NO	N/A	
Wall Mount				
Ceiling Mount				
Suspended Down				
Nameplate Match Spec				
Mfgr's test sheets complete				
Wiring Complete				
Test Sheets Attached				

\* ACCEPTANCE TESTING ONLY

**GENERAL COMMENTS:**

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		
Cx Authority/ Commissioning Provider		
Contractors/Subcontractor		
Manufacturer's Representatives		

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## 1 General

### 1.01 SUMMARY

- .1 Section Includes:
  - .1 This Section specifies roles and responsibilities of Commissioning Training.
- .2 Related Requirements
  - .1 Section 22 42 16 – Commercial Lavatories and Sinks
  - .2 Section 25 05 01 – EMCS – General Requirements
  - .3 Section 23 36 00 – Air Terminal Unit
  - .4 Section 26 50 00 – Lighting
  - .5 Section 27 51 19 – Sound Masking System
  - .6 Section 28 31 00 – Fire Detection and Alarm

### 1.02 TRAINEES

- .1 Trainees: personnel selected for operating and maintaining this facility. Includes Property Facility Manager, building operators, BGIS operations staff, 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.

### 1.03 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.

### 1.04 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.

#### **1.05 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 Project Manager, Commissioning Manager and Property Manager 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 Multimedia presentations.
  - .2 Manufacturer's training videos.
  - .3 Equipment models.

#### **1.06 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.

#### **1.07 RESPONSIBILITIES**

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

#### **1.08 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.

**1.09 VIDEO-BASED TRAINING**

- .1 Manufacturer's videotapes to be used as training tool with Departmental Representative's review and written approval 1 month 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 high quality.

**2 Products**

**2.01 NOT USED**

- .1 Not Used.

**3 Execution**

**3.01 NOT USED**

- .1 Not Used.

**END OF SECTION**

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