## Part 1 General

### 1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract is as indicated in the Contract Documents and summarized as follows:

.1 Demolition/removal of existing interior finishes including flooring, walls, and ceiling tile. Supply and installation of new walls, doors for meeting rooms and offices. Supply and installation of floor, ceiling, and wall finishes. Supply and install of mechanical and electrical work to suit new workstation, office, and meeting room layout. Relocation of furnishings, fixtures, and equipment from existing facility to new facility.

### 1.2 CONTRACT METHOD

.1 Construct Work under single, stipulated price contract.

.2 Division of the Work among Subcontractors, suppliers, or vendors is solely the Contractor's responsibility. The Departmental Representative assumes no responsibility to act as an arbiter to establish subcontract terms between sectors or disciplines of work.

.3 Coordinate installation of Departmental Representative-supplied and vendor-supplied systems, and all associated equipment.

### 1.3 WORK BY OTHERS

.1 Cooperate with other Contractors in carrying out their respective works and carry out instructions from Departmental Representative.

.2 Coordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Departmental Representative, in writing, any defects which may interfere with proper execution of Work.

.3 Work of this Project must include provisions for co-ordinating related work, identified in Contract Documents, for following principal items.

.1 Coordinate with Departmental Representative for Departmental Representative supplied and installed furniture, identified as “new” in the Contract Documents and related electrical and IT Work.

.2 Coordinate with Shared Services Canada for IT connections and Work.

.3 Refer to the Drawings.

### 1.4 WORK SEQUENCE

.1 Coordinate with Departmental Representative Progress Schedule and Building Occupancy during construction.

.2 Coordinate with Departmental Representative’s Building Manager, requirements of ongoing Building Occupancy of other areas of the Buildings during construction.

.1 Provide sequence plan of operations and signage/partitions to be provided to allow ongoing Building Occupancy to the approval of the Departmental Representative’s Building Manager prior to commencing the Work.

.3 Maintain fire access/control.

## 1.5 DEPARTMENTAL REPRESENTATIVE FURNISHED ITEMS

.1 Department Representative Responsibilities:

- .1 Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to Contractor.
- .2 Deliver supplier's bill of materials to Contractor.
- .3 Arrange and pay for delivery to site in accordance with Progress Schedule.
- .4 Inspect deliveries jointly with Contractor.
- .5 Submit claims for transportation damage.
- .6 Arrange for replacement of damaged, defective or missing items.
- .7 Arrange for manufacturer's field services; arrange for and deliver manufacturer's warranties and bonds to Contractor.

.2 Contractor Responsibilities:

- .1 Designate submittals and delivery date for each product in progress schedule.
- .2 Review shop drawings, product data, samples, and other submittals. Submit to Departmental Representative notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.
- .3 Receive and unload products at site.
- .4 Inspect deliveries jointly with Departmental Representative; record shortages, and damaged or defective items.
- .5 Handle products at site, including uncrating and storage.
- .6 Protect products from damage, and from exposure to elements.
- .7 Assemble, install, connect, adjust, and finish products.
- .8 Provide installation inspections required by public authorities.
- .9 Repair or replace items damaged by Contractor or subcontractor on site (under their control).
- .10 Coordinate electrical and IT requirements for Departmental Representative Furnished Items.

## 1.6 ALTERATIONS, ADDITIONS, OR REPAIRS TO EXISTING BUILDING

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

.2 Use only elevators existing in building for moving workers and material.

- .1 Protect walls of passenger elevators, to approval of Departmental Representative, prior to use.
- .2 Accept liability for damage, safety of equipment, and overloading of existing equipment.

## 1.7 DOCUMENTS REQUIRED

.1 Successful bidding Contractor is to obtain required sets of Contract Documents for construction purposes, which includes two (2) sets for "as-built" and record purposes.

- .1 Contractor is responsible for costs of printing, handling, and shipping of Contract Documents.

.2 Maintain at job site, one copy each document as follows:

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Reviewed Shop Drawings.
.5 List of Outstanding Shop Drawings.
.6 Change Orders.
.7 Other Modifications to Contract.
.8 Field Test Reports.
.9 Copy of Approved Work Schedule.
.10 Health and Safety Plan and Other Safety Related Documents.
.11 Other documents as specified.

## Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 ACCESS AND EGRESS

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

### 1.2 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.

.2 Maintain existing services to building and provide for personnel and vehicle access.

.3 Where security is reduced by work provide temporary means to maintain security.

.4 Departmental Representative will assign sanitary facilities for use by Contractor's personnel. Keep facilities clean.

.5 Use only elevators existing in building for moving workers and material.

.1 Protect walls of passenger elevators to approval of Departmental Representative prior to use.

.2 Accept liability for damage, safety of equipment, and overloading of existing equipment.

.6 Closures: Protect work temporarily until permanent enclosures are completed.

### 1.3 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

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

### 1.4 EXISTING SERVICES

.1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.

.3 Provide for personnel, pedestrian, and vehicular traffic.

.4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

### 1.5 SPECIAL REQUIREMENTS

.1 Carry out disruptive work Monday to Friday between 5:30 pm to 7:00 am only. This includes:

.1 Work using odourous products, such as paints and adhesives.

.2 Noisy work.

.3 Removal of large amounts of waste.

.4 Unloading of large amounts of new building materials.

.5 Unloading of building materials or systems that must be brought in through the front entrance of the building.

.2 Obtain key to shunt alarm, and maintain building security when using loading dock after regular building hours.

.3 Submit schedule in accordance with Section 01 32 16 - Construction Progress Schedule - Bar (GANTT) Chart.

.4 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic, and security regulations.

.5 Keep within limits of work and avenues of ingress and egress.

## 1.6 SECURITY

.1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.

.2 Security clearances:

.1 Personnel will be checked daily at start of work shift and provided with pass that must be worn at all times. Pass must be returned at end of work shift and personnel checked out.

.3 After-hours work: Arrange for Commissionaire security services with Departmental Representative when performing after-hours work.

.1 Provide minimum 72 hours notice to, and coordinate with, Departmental Representative for after-hours Commissionaire service.

## 1.7 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not permitted.

## Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 ADMINISTRATIVE

.1 Schedule and administer project meetings bi-weekly throughout the progress of the work.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

.6 Record meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.7 Reproduce and distribute copies of minutes within three days after meetings and transmit to Departmental Representative.

### 1.2 PRECONSTRUCTION MEETING

.1 Within 15 days after award of Contract, request a meeting with Departmental Representative to discuss and resolve administrative procedures and responsibilities.

.2 Establish time and location of meeting minimum 5 days before meeting.

.3 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.4 Agenda to include:

.1 Appointment of official representatives of participants in the Work.

.2 Schedule of Work: In accordance with Section 01 32 16 - Construction Progress Schedules - Bar (GANTT) Chart.

.3 Schedule of submission of shop drawings, samples, colour chips. Submit in accordance with Section 01 33 00 - Submittal Procedures.

.4 Requirements for temporary facilities, offices, and utilities, in accordance with Section 01 52 00 – Construction Facilities.

.5 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.6 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements.

.7 Record drawings in accordance with Section 01 78 00 – Closeout Submittals.

.8 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.

.9 Take-over procedures, acceptance, and warranties in accordance with Section 01 78 00 - Closeout Submittals.

.10 Monthly progress claims, administrative procedures, and hold backs.

.11 Appointment of inspection and testing agencies or firms.

.12 Insurance, transcript of policies.

## 1.3 PROGRESS MEETINGS

.1 During course of Work and 2 weeks prior to project completion, schedule progress meetings bi-weekly.

.2 Contractor, major Subcontractors involved in the Work, Departmental Representative, Consultants to attend.

.3 Notify affected parties minimum 4 days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.

.5 Agenda to include the following:

.1 Review and approval of minutes of previous meeting.
.2 Review of Work progress since previous meeting.
.3 Field observations, problems, and conflicts.
.4 Problems that impede construction schedule.
.5 Review of off-site fabrication delivery schedules.
.6 Corrective measures and procedures to regain projected schedule.
.7 Revision to construction schedule.
.8 Progress schedule, during succeeding work period.
.9 Review submittal schedules: expedite as required.
.10 Maintenance of quality standards.
.11 Review proposed changes for effect on construction schedule and on completion date.
.12 As-builts.
.13 Security issues.
.14 Other business.

## Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 DEFINITIONS

.1 Activity: Element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart): Graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.

.3 Baseline: Original approved plan (for project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: Number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.6 Master Plan: Summary-level schedule that identifies major activities and key milestones.

.7 Milestone: Significant event in project, usually completion of major deliverable.

.8 Project Schedule: Planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.9 Project Planning, Monitoring and Control System: Overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

### 1.2 REQUIREMENTS

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.

.4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

## 1.3 SUBMITTALS

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

.2 Submit to Departmental Representative within working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

.3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

## 1.4 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing, and execution of Work as Bar Chart (GANTT).

.2 Departmental Representative will review and return revised schedules within 5 working days.

.3 Revise impractical schedule and resubmit within 5 working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

## 1.5 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes, at minimum, milestone and activity types as follows:

- .1 Award.
- .2 Shop Drawings, Samples.
- .3 Permits.
- .4 Mobilization.
- .5 Interior Architecture (Walls, Floors and Ceiling).
- .6 Plumbing.
- .7 Lighting.
- .8 Electrical.
- .9 Piping.
- .10 Controls.
- .11 Heating, Ventilating, and Air Conditioning.
- .12 Millwork.
- .13 Fire Systems.
- .14 Testing and Commissioning.
- .15 Supplied equipment long delivery items.
- .16 Engineer-supplied equipment required dates.

## 1.6 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on weekly basis reflecting activity changes and completions, and activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays, and impact with possible mitigation.

### 1.7 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

.2 Weather related delays with their remedial measures to be discussed and negotiated.

## Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 ADMINISTRATIVE

.1 Submit items listed for review to Departmental Representative. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present shop drawings, product data, samples, and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units, converted values are acceptable.

.5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated, and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are co-ordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

.10 Keep one reviewed copy of each submission on site.

### 1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data that are to be provided by Contractor to illustrate details of a portion of Work.

.2 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Manitoba, Canada.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow five days for Departmental Representative's review of each submission.

.5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

.7 Accompany submissions with transmittal letter, in duplicate, containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions include:

- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.

.9 After Departmental Representative's review, distribute copies.

.10 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within 3 years of date of contract award for project.

.13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

.16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.17 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.18 Delete information not applicable to project.

.19 Supplement standard information to provide details applicable to project.

.20 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.21 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that PWGSC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

## 1.3 SAMPLES

.1 Submit samples for review in duplicate as requested 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 that 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.

## 1.4 MOCK-UPS

.1 Erect mock-ups, as required, in accordance with 01 45 00 - Quality Control.

## Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 REFERENCES AND CODES

.1 Perform Work in accordance with National Building Code of Canada (NBC) including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

### 1.2 HAZARDOUS MATERIAL DISCOVERY

.1 Asbestos: Demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately if material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify Departmental Representative.

.2 Mould: Stop work immediately if material resembling mould is encountered during demolition work. Notify Departmental Representative.

### 1.3 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions and municipal by-laws.

## Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 INSPECTION

.1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections, or approvals by Departmental Representative instructions, or law of Place of Work.

.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination, such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

### 1.2 INDEPENDENT INSPECTION AGENCIES

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

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for re-testing and re-inspection.

### 1.3 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

### 1.4 PROCEDURES

.1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

## 1.5 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.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.

## 1.6 REPORTS

.1 Submit 2 copies of inspection and test reports to Departmental Representative.

.2 Provide copies to subcontractor of work being inspected or tested and manufacturer or fabricator of material being inspected or tested.

## 1.7 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

.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.

## 1.8 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.

.2 Construct in locations as directed by Departmental Representative.

.3 Prepare mock-ups for Departmental Representative’s review with reasonable promptness and in orderly sequence, to not cause delays in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.

.6 Mock-ups may remain as part of Work.

## 1.9 MILL TESTS

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

## 1.10 EQUIPMENT AND SYSTEMS

.1 Submit adjustment and balancing reports for mechanical and electrical systems.

## Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CAN/CSA S269.2-M87, Access Scaffolding for Construction Purposes.

.2 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as of: May 14, 2004.

### 1.2 INSTALLATION AND REMOVAL

.1 Provide sequence plan of operations and signage/partitions to be provided to allow ongoing Building Occupancy to the approval of the Departmental Representative's Building Manager prior to commencing the Work. Identify:

.1 Coordinated use of building washroom facilities.

.2 Indicate use of supplemental or other staging area.

.2 Provide construction facilities in order to execute work expeditiously.

.3 Remove from site all such work after use.

### 1.3 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA S269.2.

.2 Provide and maintain scaffolding, ramps, ladders, and platforms as required.

### 1.4 SITE STORAGE/LOADING

.1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

.3 Locate tools, equipment, and materials on site in manner to cause least interference with work activities.

### 1.5 CONSTRUCTION PARKING

.1 Parking will not be provided on site.

.2 Delivery vehicles must vacate loading zone immediately after unloading.

### 1.6 SANITARY FACILITIES

.1 Departmental Representative will assign sanitary facilities for work force in accordance with governing regulations and ordinances.

### 1.7 CONSTRUCTION SIGNAGE

.1 Signs and notices for safety and instruction are to be in both official languages.

.2 Maintain approved signs and notices in good condition for duration of project, and dispose of off site upon completion of project, or earlier if directed by Departmental Representative.

### 1.8 PROTECTION AND MAINTENANCE OF ACCESS, EGRESS, AND TRAFFIC

.1 Provide measures for protection and diversion of pedestrian traffic and erection and maintenance of adequate temporary warning, danger, and direction signs as required.

.2 Protect public from damage to person and property.

.3 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of pedestrian traffic.

### 1.9 CLEAN-UP

.1 Remove construction debris, waste materials, and packaging material from work site daily.

.2 Store materials resulting from demolition activities that are salvageable.

## Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 REFERENCES

.1 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as Of: May 14, 2004.

### 1.2 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove all such work from site after use.

### 1.3 SITE ENCLOSURE AND HOARDING

.1 Provide temporary controls (including but not limited to signage and barriers) in order to execute Work expeditiously.

.2 Provide as required to maintain safety, egress, and exiting as required by governing authorities, Codes, and regulations. Erect and maintain as requested by Department Representative.

.3 Remove from site all such work after use.

### 1.4 DUST TIGHT SCREENS

.1 Provide dust tight screens or partitions to localize dust-generating activities, and for protection of workers, finished areas of Work, and building occupants.

.2 Maintain and relocate protection until such work is complete.

### 1.5 ACCESS TO SITE

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

### 1.6 ACCESS, EGRESS AND FIRE ROUTES

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

.2 Design, construct, and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

### 1.7 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.

### 1.8 PROTECTION OF BUILDING FINISHES

.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 Departmental Representative, at no increase in Contract Price or Contract Time.

.2 Protect areas of the site and building outside of the scope of Work from damage.

.3 Protect furniture and equipment to be moved from damage during removal, transportation, storage, and installation.

.4 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

.5 Provide necessary screens, covers, and hoardings.

.6 Be responsible for damage incurred due to lack of or improper protection.

## Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 REFERENCES

.1 Within text of each specifications Section, reference may be made to reference standards to which material or workmanship must conform.

.2 Conform to reference standards, in whole or in part, as specifically requested in specifications.

.3 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

.4 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.

### 1.2 QUALITY

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged nor defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source, and quality of products provided.

.2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.

.3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.4 Should disputes arise as to quality or fitness of products, decision rests strictly Departmental Representative based upon requirements of Contract Documents.

.5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.6 Permanent labels, trademarks, and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

### 1.3 AVAILABILITY

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

### 1.4 STORAGE, HANDLING, AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration, and soiling; and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store 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.

.5 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

.6 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over nameplates.

## 1.5 DELIVERY

.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 same. Unload, handle, and store such products.

## 1.6 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.

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

## 1.7 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

## 1.8 CO-ORDINATION

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

## 1.9 CONCEALMENT

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

## 1.10 REMEDIAL WORK

.1 Refer to Section 01 73 00 - Execution Requirements.

.2 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.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.

## 1.11 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.

## 1.12 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

## 1.13 REQUEST FOR SUBSTITUTION

.1 Refer requests for substitution of materials to the Departmental Representative, supported by manufacturer's test data, proof of conformance to the specified standards, samples and installation manuals as may be required to carry out an assessment of substitutes. Drawings, diagrams, and manufacturer’s literature must be legible. In no event will the substitute deviate substantially from the original specified.

## 1.14 COMPATIBILITY

.1 Compatibility of components is essential. Ensuring that all items selected to use are compatible:

.1 When materials are to be installed in permanent contact with each-other, and the possibility of chemical or electrolytic reaction exists, causing material deterioration;

.2 When a component is to be incorporated within an assembly or system and must be compatible in order to fit in size, shape, etc., without any adverse effect to integrity or appearance of that system;

.3 When there is doubt about incompatibility, verify with and obtain manufacturer's recommendations in writing;

.4 When there is incompatibility, inform Departmental Representative of manufacturer's recommendations. Departmental Representative will determine course of action.

## Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.

.2 Where unknown services are encountered, immediately advise Department Representative and confirm findings in writing.

.3 Notify Department Representative and utility companies of intended interruption of services and obtain required permission.

.4 When breaking into or connecting to existing services, give Department Representative 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities and approved by Department Representative with minimum disturbance to pedestrian, vehicular traffic, and tenant operations.

.5 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.

.6 Remove abandoned service lines within 2 metres of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

.7 Provide temporary services when approved by Department Representative to maintain critical building and tenant systems as required.

.8 Record locations of maintained, re-routed, and abandoned service lines.

.9 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

### 1.2 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures, and outlets indicated or specified are to be considered as approximate.

.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 impending installation and obtain approval for actual location. Inform Departmental Representative of conflicting installation.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

## Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 SUBMITTALS

.1 Submit 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 others.
- .7 Written permission of affected separate contractor.
- .8 Date and time when work will be executed.

## Part 2 Products

Not used.

## Part 3 Execution

### 3.1 EXAMINATION

.1 Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

.2 After uncovering existing Work, assess conditions affecting performance of work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

### 3.2 PREPARATION

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

## 3.3 EXECUTION

.1 Execute cutting, fitting, and patching to complete Work.

.2 Remove and replace defective and non-conforming Work.

.3 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.4 Employ experienced installer to perform cutting and patching for moisture-resistant elements and sight-exposed surfaces.

.5 Restore work with new products in accordance with requirements of Contract Documents.

.6 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.7 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material in accordance with authorities having jurisdiction and as indicted on the Drawings, to full thickness of the construction element.

.8 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

.9 Conceal pipes, ducts, and wiring in floor, wall, and ceiling construction of finished areas except where indicated otherwise.

## 3.4 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 74 21 – Construction Waste Management and Disposal.

**END OF SECTION**

## Part 1 General

### 1.1 REFERENCES

.1 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions "C", In Effect as of: May 14, 2004.

### 1.2 REGULATORY REQUIREMENTS

.1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

.2 Make arrangements with and obtain permits from Authorities Having Jurisdiction for disposal of waste and debris.

### 1.3 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

.3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.4 Provide and use containers for collection of waste materials and debris and marked separate bins for recycling.

.5 Dispose of waste materials and debris as directed by Departmental Representative.

.6 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.7 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.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, debris, and other contaminants will not fall on wet, newly painted surfaces, nor will contaminate building systems.

### 1.4 FINAL CLEANING

.1 When Work is Substantially Performed, remove surplus products, tools, construction machinery, and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.3 Prior to final review remove surplus products, tools, construction machinery, and equipment.

.4 Remove waste products and debris.

.5 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched, or disfigured glass.

.6 Remove stains, spots, marks, and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, floors, and ceilings.

.7 Clean lighting reflectors, lenses, and other lighting surfaces.

.8 Vacuum clean and dust building interiors, behind grilles, louvres, and screens.

.9 Prepare floor finishes, as recommended by manufacturer.

.10 Inspect finishes, fitments, and equipment, and ensure specified workmanship and operation.

.11 Sweep and wash clean paved areas soiled by construction.

.12 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.

.13 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

### 1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

## Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 STORAGE, HANDLING, AND PROTECTION

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

.2 Unless specified otherwise, materials for removal become Contractor's property.

.3 Protect, stockpile, and store salvaged items.

.4 Protect structural components not removed for demolition from movement or damage.

.5 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.

.6 Separate and store materials produced during dismantling of structures in designated areas.

.7 Prevent contamination of materials to be salvaged and recycled. Handle materials in accordance with requirements for acceptance by designated facilities.

### 1.2 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of waste, volatile materials, mineral spirits, oil, nor paint thinner into waterways, storm, or sanitary sewers.

.3 Remove materials from deconstruction as deconstruction/disassembly Work progresses.

### 1.3 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises.

.2 Coordinate with Departmental Representative for size and placement of contractor disposal bin.

.3 Building waste bin may not be used for construction waste disposal.

.4 Maintain security measures established by existing facility; where necessary, provide temporary security measures approved by Departmental Representative.

## Part 2 Products

Not used.

## Part 3 Execution

### 3.1 APPLICATION

.1 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

### 3.2 CLEANING

.1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.

.2 Clean-up work area as work progresses.

**END OF SECTION**

## Part 1 General

### 1.1 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

.1 Contractor's Inspection: Contractor: 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 submit verification that corrections have been made.

.2 Request Departmental Representative inspection.

.2 Departmental Representative Inspection:

.1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.

.2 Contractor to correct Work as directed.

.3 Completion Tasks: Submit written certificates in English, indicating that tasks have been performed as follows:

.1 Work: Completed and inspected for compliance with Contract Documents.

.2 Defects: Corrected and deficiencies completed.

.3 Equipment and systems: Tested, adjusted, balanced, and fully operational.

.4 Certificates required by Boiler Inspection Branch, Fire Commissioner, Utility companies: Submitted.

.5 Operation of systems: Demonstrated to Departmental Representative's personnel.

.6 Commissioning of mechanical systems: Completed in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and Section 01 91 31 – Commissioning (Cx) Plan, and copies of final Commissioning Report submitted to Departmental Representative.

.7 Work: Complete and ready for final inspection.

.4 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.

.2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

### 1.2 FINAL CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools, and equipment.

.2 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one week prior to contract completion with Contractor's Representative and Departmental Representative, in accordance with Section 01 31 19 – Construction Progress & Meetings to:

.1 Verify Project requirements.

.2 Review warranty requirements and manufacturer's installation instructions.

.2 Departmental Representative to establish communication procedures for:

.1 Notifying construction warranty defects.

.2 Determine priorities for type of defects.

.3 Determine 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.

### 1.2 CLOSEOUT PROCEDURES

.1 Notify Department Representative when Work is considered ready for Substantial Performance.

.2 Accompany Department Representative on preliminary review to determine items listed for completion or correction.

.3 Comply with Department Representative's instructions for correction of items of Work listed in executed certificate of Substantial Performance and for access to Departmental Representative occupied areas (as applicable).

### 1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures and as indicated below.

.2 Two weeks prior to Substantial Performance of the Work, submit two final copies of operating and maintenance manuals, in English, to the Departmental Representative. Pay costs of delivery.

.1 Copy will be returned following final review, complete with Departmental Representative's comments.

.2 Revise content of documents as required prior to final submittal and resubmit.

.3 Ensure spare parts, maintenance materials, and special tools provided are new, undamaged, and of same quality and manufacture as products provided in Work. Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.4 Provide evidence, if requested, for type, source, and quality of products supplied.

.5 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

## 1.4 CONTENTS – O&M MANUALS

.1 Binder Cover and Binder Edge

- .1 Include: Building Name, address, project name, project number (GOC#), completed date.

.2 Title Page

- .1 O&M Manual for... Building name, address, date, general contractor information: name address, phone number.
- .2 Consultant name address, phone number.
- .3 Table of contents indicates each binder's contents.

.3 Index and tabs

- .1 Dividers with permanently marked tabs separate each section and sub section.
- .2 Tab labels typed, not hand written.
- .3 Main tab for each specification section.

.4 Tab A: Signed Letter of Warranty, to include:

- .1 Date
- .2 Project name
- .3 Project number (GOC#)
- .4 Building Location
- .5 Warranty start date and end, to be from date of substantial, declared by Consultant.
- .6 Organization, names and phone numbers of persons to call for warranty services
- .7 All warranties to be included from all contractors in this section and extended warranties.

.5 Tab B: Contact Information for all Subcontractors and Suppliers, including:

- .1 Name, address, telephone number of manufacturer, installing contractor
- .2 24-hour number for emergency service for all equipment in this section identified by equipment.

.6 Tab C: All Reports and Permits

- .1 TAB reports.
- .2 Pre-functional tests.
- .3 Start up reports.
- .4 Completed performance verification forms (found in the Tender Documents).
- .5 Cabling verifications.
- .6 ESA certification.
- .7 TSSA certification.
- .8 Fire alarm certification.
- .9 Seismic certification.
- .10 All permits, including electrical, building, plumbing.

.7 Tab D: As-Built Drawings

.1 Marked up by contractor**,** changes marked in red to also be given to Consultant.

.8 Tab E: Operation and Shutdown

.1 Sequence of Operation-outline how the systems installed were designed to work.

.2 Accurate Sequence of Operation, with detailed instruction in proper sequence, for each mode of operation.

.3 Emergency Operation: Functions of equipment that can be operated while other functions disabled. Included only for alternate abnormal operations that can follow when there is a partial failure, malfunctioning of components, or other unusual condition.

.4 Shutdown Procedure: Instructions for stopping and securing the equipment after operation. If a particular sequence is required, step-by-step instructions given in that order.

.9 Tab F: CMMS Data Sheets

.1 All equipment that is to be deleted, removed, added, or replaced is to have a CMMS inventory sheet completed and included in the O&M Manual.

.10 Tab G: Shop Drawings

.1 Copy of all approved "by the Consultant" shop drawings.

.11 Tab H: Maintenance

.1 Copy of specific service and maintenance manuals.

.2 Preventative and corrective maintenance, with service procedures and schedules.

.3 Schedule for preventive maintenance in a printed format and electronic format compatible with Owner's system.

.4 Recommended frequency of performance for each preventive maintenance task, cleaning, inspection and scheduled overhauls or reconditioning.

.5 Cleaning: Instructions and schedules for all routine cleaning and inspection recommended, including recommended cleaners and lubricants.

.6 Inspection: Periodic inspection of equipment required for operation, cleaning or other reasons, with items to be inspected indicated and inspection criteria given for motors, controls, filters, and any other maintenance items.

.7 Instructions for minor repairs or adjustments required for preventive maintenance routines.

.8 Listing of any special tools required to service or maintain the equipment.

.12 Last Tab: Miscellaneous Items

.1 Health and Safety submittals including: site specific hazard assessment, safety manual TOC and company safety policy, MSDS sheets (if applicable) signed site orientations for worker, copy of first aid certificate, copy of emergency plan and muster location.

.2 Special requirements for equipment, not to be used for reports.

## 1.5 AS-BUILT DOCUMENTS AND SAMPLES

.1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative, one record copy of:

- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Change Orders and other modifications to Contract.
- .5 Reviewed shop drawings, product data, and samples.
- .6 Field test records.
- .7 Inspection certificates.
- .8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

.6 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.

## 1.6 AS-BUILT AND RECORD DOCUMENTS

.1 Record information on drawings and in designated copy of Project Manual provided by Departmental Representative.

.2 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.3 Use RED felt tip marking pens.

.4 Mark on one set of prints and at completion of project and prior to final inspection; neatly transfer notations to second set.

.5 Maintain information on project site drawings and record accurately, deviations of newly installed or existing works from Contract documents during construction.

.6 Ensure but do not limit recording of following information on original as-built drawings:

- .1 Locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.
- .2 Changes made by Change Order.
- .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
- .4 Field changes of dimension and detail.
- .5 Details not on original Contract Drawings.
- .6 References to related shop drawings and modifications.

.7 At substantial completion of project and prior to final inspection, submit as-built drawings and project manual to Departmental Representative.

.1 Departmental Representative will review and initial, to concur with content of the final mark-ups.

.8 Consultant will transcribe as-built information to electronic record drawings based on Contractor's site records.

## 1.7 EQUIPMENT AND SYSTEMS

.1 For each item of equipment and each system include description of unit or system, and component parts.

.1 Give function, normal operation characteristics, and limiting conditions.

.2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: Provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: Include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.14 Include test and balancing reports (as applicable).

.15 Additional requirements: As specified in individual specification sections.

## 1.8 MATERIALS AND FINISHES

.1 Building products, applied materials, and finishes: Include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and weather-exposed products: Include manufacturer's recommendations.

.4 Additional requirements: As specified in individual specifications sections.

## 1.9 MAINTENANCE MATERIALS

.1 Spare Parts:

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site, location as directed; place and store.

.4 Receive and catalogue items. Submit inventory listing to Departmental Representative. 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, location as directed; place and store.

.4 Receive and catalogue items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

.3 Special Tools:

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to site, location as directed; place and store.

.4 Receive and catalogue items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.

## 1.10 DELIVERY, STORAGE, AND HANDLING

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and for review by Departmental Representative.

## 1.11 WARRANTIES AND BONDS

.1 As directed by Departmental Representative.

# Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 ADMINISTRATIVE REQUIREMENTS

.1 Demonstrate scheduled operation and maintenance of equipment and systems to Departmental Representative's personnel two weeks prior to date of substantial performance.

.2 Departmental Representative: Provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.

.3 Preparation:

.1 Verify conditions for demonstration and instructions comply with requirements.

.2 Verify designated personnel are present.

.3 Ensure equipment has been inspected and put into operation.

.4 Ensure testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and equipment and systems are fully operational.

.4 Demonstration and Instructions:

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times, at the equipment location.

.2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.

.3 Review contents of manual in detail to explain aspects of operation and maintenance.

.4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

### 1.2 SUBMITTALS

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

.2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval.

.3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

.4 Give time and date of each demonstration, with list of persons present.

.5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

### 1.3 QUALITY ASSURANCE

.1 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:

.1 Instruct Departmental Representative's personnel.

.2 Provide written report that demonstration and instructions have been completed.

.1 Use Training and Orientation Record form appended to this Section.

## Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 SUMMARY

.1 Section Includes:

.1 General requirements relating to commissioning of project's components and systems, specifying general requirements to FPT of components, equipment, sub-systems, systems, and integrated systems.

.2 Acronyms:

.1 SOM - System Operation Manual.
.2 Cx - Commissioning.
.3 EMCS - Energy Management Control System.
.4 M&D – Maintenance and Data Manual.
.5 PI - Product Information.
.6 FPT - Functional Performance Testing.
.7 OPT – Optimization.
.8 CWS – Cold Water System.
.9 HWS – Hot Water System.
.10 $CO_2$ – Carbon Dioxide.

### 1.2 GENERAL

.1 Consultant Cx "Plan" and related project specific forms to be reviewed and accepted by Departmental Representative prior to commencement of construction.

.2 Commissioning will include, but not necessarily limited to, the following:

.1 Cx Structural and Architectural Systems:
.1 Door hardware.
.2 Commissioning Mechanical systems and associated equipment.
.3 Plumbing:
.1 Domestic CWS and HWS.
.2 Regular sanitary waste systems.
.3 Sanitary lift pump.
.4 Condensate pumps.
.5 Plumbing fixtures.
.4 HVAC and exhaust systems:
.1 General exhaust systems, including transfer fans.
.2 Split air conditioning systems.
.3 Test all existing fan coil and perimeter heating units.
.4 Test all new and existing variable air volume boxes.

.5 Test existing demand control ventilation systems including existing $CO_2$ sensor and ventilation supply fan.

.5 Fire and life safety systems:

.1 Wet pipe sprinkler systems.

.6 EMCS:

.1 Test all existing controls in the renovated area and verify controls are functioning as intended.

.2 Test all new controls in the renovated area and verify successful integration of all new equipment with the existing EMCS.

.7 Commissioning Electrical Systems:

.1 Lighting.

.8 Commissioning Communications Systems:

.1 Access Control System.

.2 Intrusion Alarm System.

.3 Sound Masking System.

.4 Intercom System.

.5 Classroom Audio System.

.6 Clock System.

.3 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 and functional, and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:

.1 Verify installed equipment, systems, and integrated systems operate in accordance with contract documents and design criteria and intent.

.2 Ensure appropriate documentation is compiled into the BMM.

.3 Effectively train M&D staff.

.4 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.

.1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactive with each other as intended in accordance with Contract Documents and design criteria.

.2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.

.5 Design Criteria: Per client's requirements or determined by designer. To meet Project functional and operational requirements.

## 1.3 COMMISSIONING OVERVIEW

.1 Section 01 91 31 - Commissioning (Cx) Plan.

.2 Cx activities supplement field quality and testing procedures described in relevant technical sections.

.3 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages that are addressed during Construction and Cx stages to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental, and occupancy conditions to meet functional and operational requirements. Cx activities include transfer of critical knowledge to facility operational personnel.

.4 Departmental Representative will issue Interim Acceptance Certificate when:

.1 Completed Cx documentation has been received, reviewed for suitability, and approved by Departmental Representative.

.2 Equipment, components, and systems have been commissioned.

.3 M&D training has been completed.

## 1.4 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

.1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the un-functional system, including related systems as deemed required by Departmental Representative, to ensure effective performance.

.2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by Contractor. Above costs to be in form of progress payment reductions or hold-back assessments.

## 1.5 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, and systems are complete.

.3 Fully understand Cx requirements and procedures.

.4 Have Cx documentation shelf-ready.

.5 Understand completely design criteria and intent and special features.

.6 Submit complete start-up documentation to Departmental Representative.

.7 Have Cx schedules up-to-date.

.8 Ensure systems have been cleaned thoroughly.

.9 Complete OPT procedures on systems, submit OPT 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.

## 1.6 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.

## 1.7 COMMISSIONING DOCUMENTATION

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

## 1.8 COMMISSIONING SCHEDULE

.1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 01 32 16 – Construction Progress Schedule – Bar (GANTT) Chart.

.1 Cx schedule to utilize critical path methods, identify interdependencies between contractor verifications and commissioning, and be fully integrated with the construction master 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.

## 1.9 COMMISSIONING MEETINGS

.1 Convene Cx meetings following project meetings: 01 32 16 – Construction Progress Schedule – Bar (GANTT) Chart and as specified herein.

.2 Purpose: To resolve issues, monitor progress, and identify deficiencies relating to Cx.

.3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.

.4 At 60% construction completion stage, Section 01 32 16 – Construction Progress Schedule – Bar (GANTT) Chart. Departmental Representative to call a separate Cx

scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:

.1 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.

.2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.

.5 Thereafter, Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.

.6 Meeting will be chaired by Departmental Representative, who will record and distribute minutes.

.7 Ensure subcontractors and relevant manufacturer representatives are present at 60% and subsequent Cx meetings and as required.

## 1.10 STARTING AND TESTING

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

## 1.11 WITNESSING OF STARTING AND TESTING

.1 Provide 14 days notice prior to commencement.

.2 Departmental Representative to witness of start-up and testing.

## 1.12 MANUFACTURER'S INVOLVEMENT

.1 Factory testing: Manufacturer to:

.1 Coordinate time and location of testing.

.2 Provide testing documentation for approval by Departmental Representative.

.3 Arrange for Departmental Representative to witness tests.

.4 Obtain written approval of test results and documentation from Departmental Representative before delivery to site.

.2 Obtain 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 Experience in design, installation and operation of equipment and systems.

.2 Ability to interpret test results accurately.

.3 Ability to report results in clear, concise, logical manner.

## 1.13 PROCEDURES

.1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.

.2 Conduct start-up and testing in following distinct phases:

.1 Included in delivery and installation:

.1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.

.2 Visual inspection of quality of installation.

.2 Start-up: Follow accepted start-up procedures.

.3 Operational testing: Document equipment performance.

.4 System FPT: Include repetition of tests after correcting deficiencies.

.5 Post-substantial performance verification: To include fine-tuning.

.3 Correct deficiencies and obtain approval from Departmental Representative after distinct phases have been completed and before commencing next phase.

.4 Document required 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.

.1 Field quality test result.

.3 If evaluation report concludes that major damage has occurred, Departmental Representative shall reject equipment.

.1 Rejected equipment to be removed from site and replaced with new.

.2 Subject new equipment/systems to specified start-up procedures.

## 1.14 START-UP DOCUMENTATION

.1 Assemble start-up documentation and submit to Departmental Representative for approval 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.

## 1.15 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

.1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.

.2 With assistance of manufacturer, develop written maintenance program and submit Departmental Representative for approval before implementation.

.3 Operate and maintain systems for length of time required for commissioning to be completed.

.4 After completion of commissioning, operate and maintain systems until issuance of certificate of interim acceptance.

## 1.16 TEST RESULTS

.1 If start-up, testing and/or 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.

## 1.17 START OF COMMISSIONING

.1 Notify Departmental Representative at least 21 days prior to start of Cx.

.2 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

## 1.18 INSTRUMENTS / EQUIPMENT

.1 Submit to Departmental Representative for review and approval:

.1 Complete list of instruments proposed to be used.

.2 Listed data including, serial number, current calibration certificate, calibration date, and 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.

## 1.19 COMMISSIONING PERFORMANCE VERIFICATION

.1 Carry out Cx:

.1 Under actual operating conditions, and in all operating and programmed failure modes.

.2 On independent systems and interacting systems.

.2 Cx procedures to be repeatable and reported results to be verifiable.

.3 Follow equipment manufacturer's operating instructions.

.4 EMCS trending to be available as supporting documentation for performance verification.

## 1.20 WITNESSING COMMISSIONING

.1 Departmental Representative to witness activities and verify results.

## 1.21 AUTHORITIES HAVING JURISDICTION

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

.2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.

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

## 1.22 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.

## 1.23 EXTENT OF VERIFICATION

.1 Provide personnel and instrumentation to test and verify all new and modified mechanical equipment including, but not limited to, new fans, VAV boxes, split air conditioners, existing fan coils and all associated controls.

.2 Provide manpower and instrumentation to test and verify all new and modified systems including but not limited to distribution equipment, life-safety systems, electrical power systems, including circuit testing, verifications, etc. Written certifications will be required. Commissioning will be performed by the Electrical Contractor in concert with the Commissioning Agent (Cx).

.3 Provide manpower and instrumentation to verify up to 30% of reported results, unless specified otherwise in other sections.

.4 Number and location to be at discretion of Departmental Representative.

.5 Conduct tests repeated during verification under same conditions as original tests, using same test equipment, instrumentation.

.6 Review and repeat commissioning of systems if inconsistencies found in more than 20% of reported results.

.7 Perform additional commissioning until results are acceptable to Departmental Representative.

## 1.24 REPEAT VERIFICATIONS

.1 Assume costs incurred by Departmental Representative for third and subsequent verifications where:

.1 Verification of reported results fail to receive Departmental Representative's approval.

.2 Repetition of second verification again fails to receive approval.

.3 Departmental Representative deems Contractor's request for second verification was premature.

## 1.25 SUNDRY CHECKS AND ADJUSTMENTS

.1 Make adjustments and changes that become apparent as Cx proceeds.

.2 Perform static and operational checks as applicable and as required.

## 1.26 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.

## 1.27 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.

## 1.28 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.

## 1.29 TRAINING

.1 In accordance with Section 01 79 00 – Training.

## 1.30 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

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

## 1.31 OCCUPANCY

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

## 1.32 INSTALLED INSTRUMENTATION

.1 Use instruments installed under Contract for OPT and FPT if:

.1 Accuracy complies with these specifications.

.2 Calibration certificates have been deposited with Departmental Representative.

.2 Calibrated EMCS sensors may be used to obtain performance data provided that sensor calibration has been completed and accepted.

## 1.33 PERFORMANCE VERIFICATION TOLERANCES

.1 Application tolerances:

.1 Specified range of acceptable deviations of measured values from specified values or specified design criteria. Except for special areas, to be within +/- 10% of specified values.

.2 Instrument accuracy tolerances:

.1 To be of order of magnitude higher than equipment or system being tested.

.3 Measurement tolerances during verification:

.1 Unless otherwise specified actual values to be within +/- 2 % of recorded values.

## 1.34 DEPARTMENTAL REPRESENTATIVE'S PERFORMANCE TESTING

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

## Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

# Part 1 General

## 1.1 SUMMARY

.1 Section Includes:

.1 Description of overall structure of Cx Plan and roles and responsibilities of Cx team.

## 1.2 REFERENCES

.1 American Water Works Association (AWWA)

.2 National Fire Protection Association (NFPA)

.1 NFPA 13-2007, Installation of Sprinkler Systems Handbook.

.2 NFPA 14-2007, Automatic Sprinkler Systems Handbook.

.3 NFPA 20-2007, Standard for the Installation of Stationary Fire Pumps for Fire Protection.

.3 Canadian Standards Association

.1 CSA Z320-11 Building Commissioning.

.4 Underwriters' Laboratories of Canada (ULC)

## 1.3 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 M&D 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 M&D, process and administration of Cx.

.4 Describes process of verification of how built works meet Departmental Representative's and 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 SOM - System Operation Manual.
.3 EMCS - Energy Management Control Systems.
.4 MSDS - Material Safety Data Sheets.
.5 M&D – Maintenance and Data Manual.
.6 PI - Product Information.
.7 FPT - Functional Performance Testing.
.8 OPT – Optimization.
.9 WHMIS - Workplace Hazardous Materials Information System.
.10 CWS – Cold Water System.
.11 HWS – Hot Water System.
.12 $CO_2$ – Carbon Dioxide.
.13 HVAC – Heating Ventilating and Air Conditioning.
.14 VOC – Volatile Organic Compound.

.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.

## 1.4 DEVELOPMENT OF 100% CX PLAN

.1 Cx Plan to be 99% completed before added into Project Specifications.

.2 Cx Plan to be 100% completed within 8 weeks of award of contract to take into account:

.1 Approved shop drawings and product data.
.2 Approved changes to contract.
.3 Contractor's project schedule.
.4 Cx schedule.
.5 Contractor's, sub-contractor’s, and suppliers' requirements.
.6 Project construction team's and Cx team's requirements.

.3 Submit completed Cx Plan for review and obtain Departmental Representative’s written approval.

## 1.5 REFINEMENT OF CX PLAN

.1 During construction phase, revise, refine and update Cx Plan to include:

.1 Changes resulting from Client program modifications.

.2 Approved design and construction changes.

.2 Revise, refine, and update every 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.

## 1.6 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 PWGSC Design Quality Review Team: During construction, will conduct periodic site reviews to observe general progress.

.2 PWGSC 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 M&D personnel.

.4 Monitoring of Cx activities, training, and development of Cx documentation.

.5 Work closely with members of Cx Team.

.3 Consultant is responsible for:

.1 Organizing Cx.

.2 Monitoring operations Cx activities.

.3 Witnessing, certifying accuracy of reported results.

.4 Witnessing and certifying OPT and other tests.

.5 Developing SOM.

.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 OPT.

.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.

## 1.7 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 Functional Performance Testing.

.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 M&D 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 M&D 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.

## 1.8 EXTENT OF CX

.1 Cx Structural and Architectural Systems:

.1 Architectural and structural:

.1 Accessibility and operational safety.

.2 Doors, related hardware:

.1 New door hardware.

.2 Commission mechanical systems and associated equipment:

.1 Plumbing systems:

.1 Domestic CWS and HWS.

.2 Regular sanitary waste systems.

.3 Sanitary lift pump.

.4 Condensate pumps.

.5 Plumbing fixtures.

.2 HVAC and exhaust systems:

.1 General exhaust systems, including transfer fan.

.2 Split air conditioning systems.

.3 Test all existing fan coil and perimeter heating units.

.4 Test all new and existing variable air volume boxes.

.5 Test existing demand control ventilation systems including existing $CO_2$ sensor and ventilation supply fan.

.3 Fire and life safety systems:

.1 Wet pipe sprinkler systems.

.4 EMCS:

.1 Test all existing controls in the renovated area and controls are functioning as intended.

.2 Test all new controls in the renovated area and verify successful integration of all new equipment with the existing EMCS. Commission electrical systems and equipment:

.5 Low voltage below 750 V:

.1 Low voltage equipment.

.2 Low voltage distribution systems.

.3 Voice communications systems.

.4 Electronic data and communications information systems.

.6 Lighting systems:

.1 Lighting equipment.

.2 Distribution systems.

.3 Emergency lighting systems, including battery packs.

.4 Fire exit emergency signage.

.7 Fire alarm systems, equipment:

.1 Annunciators.

.2 Control panels.

.3 Fire alarm battery banks.

.8 Other systems and equipment:

.1 Intrusion and access security and safety systems as follows:

.1 Intrusion Alarm panel and devices.

.2 Access Control panel, devices and software.

.2 Sound masking equipment and devices.

.3 Intercom system.

.4 Classroom audio system.

.5 Clock system.

## 1.9 DELIVERABLES RELATING TO M&D PERSPECTIVES

.1 General requirements:

.1 Compile English documentation.

.2 Documentation to be computer-compatible format ready for inputting of 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 Copper and fibre optic cable test results.

## 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 Functional Performance Testing tests.

.3 Deliverables: provide:

.1 Cx Specifications.

.2 Start-up, pre-Cx activities and documentation for systems, and equipment.

.3 Completed installation checklists (ICL).

.4 Completed product information (PI) report forms.

.5 Completed Functional Performance Testing (FPT) report forms.

.6 Results of Functional Performance Testing Tests and Inspections.

.7 Description of Cx activities and documentation.

.8 Description of Cx of integrated systems and documentation.

.9 Training Plans.

.10 Cx Reports.

.11 Prescribed activities during warranty period.

.4 Consultant 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 Consultant prior to permission to start up and rectification of deficiencies to Departmental Representative's satisfaction.

.2 Consultant 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 Consultant 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 - ARCHITECTURAL AND STRUCTURAL:

.1 Door hardware.

.3 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 OPT on systems. OPT reports to be approved by Consultant.

.3 EMCS:

.1 EMCS trending to be available as supporting documentation for Functional Performance Testing.

.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 Consultant 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".

.4 Pre-Cx activities - LIFE SAFETY SYSTEMS:

.1 Include equipment and systems identified above, including but not limited to the following:

.1 Fire Alarm.

.2 Emergency Lighting.

.3 Exit Signage.

.2 Reports of test results to be witnessed and certified by Consultant before verification.

.5 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 of all devices and components belonging or not to the area of renovation but wired to corresponding loops serving the area of renovation in accordance with ULC requirements. Consultant to witness and certify report and submit to Departmental Representative.

.3 Low voltage systems: These include but is not limited to the following:

.1 Clock, communications, low voltage lighting control systems and data communications systems.

.2 Sound Masking system.

.3 Classroom audio system.

.4 Intercom system.

.4 Security, surveillance and intrusion alarm systems: To include verification by Consultant.

.5 Grounding system.

## 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 Electric Motors.

.2 Lighting Control System.

.3 Fire Alarm System.

.3 Consultant to monitor all of these start-up activities.

.1 Rectify start-up deficiencies to satisfaction of Departmental Representative.

.4 Functional Performance Testing (FPT):

.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 Consultant to witness and certify reported results using approved PI and FPT forms.

.4 Consultant to approve completed FPT reports and provide to Departmental Representative.

.5 Departmental Representative serves the right to verify up to 30% of reported results at random.

.6 Failure of randomly selected item shall result in rejection of FPT report or report of system start-up and testing.

## 1.13 CX ACTIVITIES AND RELATED DOCUMENTATION

.1 Perform Cx by specified Cx agency using procedures developed by Consultant 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 FPT forms.

.4 Consultant to witness and 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 Consultant and approved by Departmental Representative.

.2 Tests to be witnessed by Consultant and documented on approved report forms.

.3 Upon satisfactory completion, Cx specialist to prepare Cx Report, to be certified by Consultant 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.

.2 Fire alarm systems.

.3 Emergency lighting systems.

.6 Identification:

.1 In later stages of Cx, before hand-over and acceptance, Departmental Representative, Consultant, Contractor, Project Manager, Property Manager, 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) / Functional Performance Testing (FPT) 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) / Functional Performance Testing (FPT) Forms.

## 1.17 FUNCTIONAL PERFORMANCE TESTING (FPT) REPORT

.1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Functional Performance Testing (FPT) 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-OPT review: 28 days 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: 3 months 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 OPT: 21 days before start of OPT.

.9 OPT: 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 14 days 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 stair shaft pressurization systems: Before issuance of occupancy certificate.

.16 Cx reports: Immediately upon successful completion of Cx.

.17 Emergency evacuation exercises: After 80% occupancy and at same time as Cx of stair shaft pressurization systems.

.2 Detailed training schedule to demonstrate no conflicts with testing, completion of project and hand-over to Property Manager.

.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 Consultant to Departmental Representative who will verify reported results.

.2 Include completed and certified FPT reports in properly formatted Cx Reports.

.3 Before reports are accepted, reported results to be subject to verification by Consultant.

## 1.21 ACTIVITIES DURING WARRANTY PERIOD

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

.3 Full-scale emergency evacuation exercises.

## 1.22 TESTS TO BE PERFORMED BY DEPARTMENTAL REPRESENTATIVE/USER

.1 Audio/Video Conferencing Equipment, Wireless Access points, network switches.

### 1.23 TRAINING PLANS

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

### 1.24 FINAL SETTINGS

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

### 1.25 PAYMENTS FOR CX

.1 All payment required for Cx to be borne by the contractor.

## Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 SUMMARY

.1 Section Includes:

.1 Commissioning forms to be completed for equipment, system and integrated system.

### 1.2 INSTALLATION/START-UP CHECK LISTS

.1 Include the following data:

.1 Product manufacturer's installation instructions and recommended checks.

.2 Special procedures as specified in relevant technical sections.

.3 Items considered good installation and engineering industry practices deemed appropriate for proper and efficient operation.

.2 Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by Departmental Representative, supplemental additional data lists will be required for specific project conditions.

.3 Use check lists for equipment installation. Document check list, verifying checks have been made. Indicate deficiencies and corrective action taken.

.4 Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to Consultant. Check lists will be required during Commissioning and will be included in System Operation Manual (SOM) at completion of project.

.5 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.

### 1.3 PRODUCT INFORMATION (PI) REPORT FORMS

.1 Product Information (PI) forms compile gathered data on items of equipment produced by equipment manufacturer, including nameplate information, parts list, operating instructions, maintenance guidelines, pertinent technical data, and recommended checks necessary to prepare for start-up and functional testing, and to be used during operation and maintenance of equipment. This documentation is included in the SOM at completion of work.

.2 Prior to Functional Performance Testing (FPT) of systems, complete items on PI forms related to systems and obtain Departmental Representative's approval.

### 1.4 FUNCTIONAL PERFORMANCE TESTING (FPT) FORMS

.1 PV forms to be used for checks, running dynamic tests, and adjustments carried out on equipment and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with project requirements.

.2 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 approval.

## 1.5 SAMPLES OF COMMISSIONING FORMS

.1 Consultant will develop and provide to Contractor required project-specific Commissioning forms in electronic format complete with specification data.

.1 Intrusion alarm system.

.2 Access control system.

.3 Sound masking system.

.4 Intercom system.

.5 Classroom audio system.

.6 Clock system.

.2 Revise items on Commissioning forms to suit project requirements.

.3 Samples of Commissioning forms and a complete index of produced to date will be attached to this section.

## 1.6 CHANGES AND DEVELOPMENT OF NEW REPORT FORMS

.1 When additional forms are required, but are not available from Consultant 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 Consultant.

## 1.7 COMMISSIONING FORMS

.1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.

.2 Strategy for Use:

.1 Consultant 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 Consultant.

.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 System Operation Manual in accordance with Section 01 91 51 - System Operation Manual (SOM).

### 1.8 LANGUAGE

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

## Part 2 Products

Not used.

## Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 SUMMARY

.1 Section Includes:

.1 This Section specifies roles and responsibilities of Commissioning Training.

.2 Related Requirements;

Provide training for the following Sections:

.1 Section 27 51 16 Public Address and Mass Notification.
.2 Section 27 51 19 Sound Masking System.
.3 Section 27 51 23 Intercommunication and Program Systems.
.4 Section 27 53 13 Clock System.
.5 Section 28 13 23 Access Control System.
.6 Section 28 16 19 Intrusion Alarm System.
.7 Section 28 23 00 Video Surveillance.

### 1.2 TRAINEES

.1 Trainees: Personnel selected for operating and maintaining this facility. Includes Facility Manager, building operators, maintenance staff, security staff, and technical specialists as required.

.2 Trainees will be available for training during later stages of construction for purposes of familiarization with systems.

### 1.3 INSTRUCTORS

.1 Consultant 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, and shut-down of equipment, components, and systems.
.2 Control features, reasons for, results of, implications on associated systems of, and 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 with certified installation, started up and carried out FPT tests.

### 1.4 TRAINING OBJECTIVES

.1 Training to be detailed and duration to ensure:

.1 Safe, reliable, cost-effective, energy-efficient operation of systems in normal and emergency modes under all conditions.

.2 Effective on-going inspection, measurements of system performance.

.3 Proper preventive maintenance, diagnosis, and trouble-shooting.

.4 Ability to update documentation.

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

## 1.5 TRAINING MATERIALS

.1 Instructors to be responsible for content and quality.

.2 Training materials to include:

.1 "As-Built" Contract Documents.

.2 Operating Manual.

.3 Maintenance Manual.

.4 Management Manual.

.5 TAB and PV Reports.

.3 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 Transparencies for overhead projectors.

.2 Multimedia presentations.

.3 Manufacturer's training videos.

.4 Equipment models.

## 1.6 SCHEDULING

.1 Include in Commissioning Schedule time for training.

.2 Deliver training during regular working hours, training sessions to be 3 hours in length.

.3 Training to be completed prior to acceptance of facility.

## 1.7 RESPONSIBILITIES

.1 Be responsible for:

.1 Implementation of training activities,

.2 Coordination among instructors,

.3 Quality of training, training materials,

.2 Departmental Representative will evaluate training and materials.

.3 Upon completion of training, provide written report, signed by Instructors, witnessed by Departmental Representative.

## 1.8 TRAINING CONTENT

.1 Training to include demonstrations by Instructors using the installed equipment and systems.

.2 Content includes:

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

.3 Provide specialized training as specified in relevant Technical Sections of the construction specifications.

## 1.9 VIDEO-BASED TRAINING

.1 Manufacturer's videotapes to be used as training tool with Departmental Representative's review and written approval 3 months prior to commencement of scheduled training.

.2 On-Site training videos:

- .1 Videotape training sessions for use during future training.
- .2 To be performed after systems are fully commissioned.
- .3 Organize into several short modules to permit incorporation of changes.

.3 Production methods to be professional and high quality.

# Part 2 Products

Not used.

# Part 3 Execution

Not used.

**END OF SECTION**

## Part 1 General

### 1.1 SUMMARY

.1 Acronyms:

.1 Cx - Commissioning.

.2 FPT - Functional Performance Testing.

.3 HVAC - Heating, Ventilation and Air Conditioning.

.4 M&D – Maintenance and Data Manual.

.5 OPT – Optimization.

.6 PI - Product Information.

.7 SOM - System Operation Manual.

.8 WHMIS - Workplace Hazardous Materials Information System.

### 1.2 GENERAL REQUIREMENTS

.1 Standard letter size paper 216 mm x 279 mm.

.2 Methodology used to facilitate updating.

.3 Drawings, diagrams, and schematics to be professionally developed.

.4 Electronic copy of data to be in a format accepted and approved by Departmental Representative.

### 1.3 APPROVALS

.1 Prior to commencement, co-ordinate requirements for preparation, submission, and approval with Departmental Representative.

### 1.4 GENERAL INFORMATION

.1 Provide Departmental Representative the following for insertion into appropriate Part and Section of SOM:

.1 Complete list of names, addresses, telephone and fax numbers of contractor, sub-contractors that participated in delivery of project - as indicated in Section 1.2 of SOM.

.2 Summary of architectural, structural, fire protection, mechanical and electrical systems installed and commissioned - as indicated in Section 1.4 of SOM.

.1 Including sequence of operation as finalized after commissioning is complete as indicated in Section 2.0 of SOM.

.3 Description of building operation under conditions of heightened security and emergencies as indicated in Section 2.0 of SOM.

.4 System, equipment and components Maintenance Management System (MMS) identification - Section 2.1 of SOM.

.5 Information on operation and maintenance of architectural systems and equipment installed and commissioned - Section 2.0 of SOM.

.6 Information on operation and maintenance of fire protection and life safety systems and equipment installed and commissioned - Section 2.0 of SOM.

.7 Information on operation and maintenance of mechanical systems and equipment installed and commissioned - Section 2.0 of SOM.

.8 Operating and maintenance manual - Section 3.2 of SOM.

.9 Final commissioning plan as actually implemented.

.10 Completed commissioning checklists.

.11 Commissioning test procedures employed.

.12 Completed Product Information (PI) and Performance Verification (PV) report forms, approved and accepted by Departmental Representative.

.13 Commissioning reports.

## 1.5 CONTENTS OF OPERATING AND MAINTENANCE MANUAL

.1 For detailed requirements refer to Section 01 78 00 - Closeout Submittals.

.2 Departmental Representative to review and approve format and organization within 12 weeks of award of contract.

.3 Include original manufactures brochures and written information on products and equipment installed on this project.

.4 Record and organize for easy access and retrieval of information contained in SOM.

.5 Include completed PI report forms, data and information from other sources as required.

.6 Inventory directory relating to information on installed systems, equipment and components.

.7 Approved project shop-drawings, product and maintenance data.

.8 Manufacturer's data and recommendations relating: manufacturing process, installation, commissioning, start-up, M&D, shutdown and training materials.

.9 Inventory and location of spare parts, special tools and maintenance materials.

.10 Warranty information.

.11 Inspection certificates with expiration dates, which require on-going re-certification inspections.

.12 Maintenance program supporting information including:

.1 Recommended maintenance procedures and schedule.

.2 Information to removal and replacement of equipment including, required equipment, points of lift and means of entry and egress.

## 1.6 LIFE SAFETY COMPLIANCE (LSC) MANUAL

.1 Samples of LSC Manual will be available from Departmental Representative.

.2 Content of Manual:

.1 All possible Emergency situations modes including: presence of fire and smoke, power failure, loose of water or pressure, chemical spills and refrigerant release.

.2 Failure of elevators and escalators.

.3 HVAC emergencies and fuel supply failures.

.4 Intrusion and security breach.

.5 Emergency provisions for natural disasters, bomb threats and other disruptive situations.

.6 Dedicated emergency generators for high security projects, medical facilities and computer systems.

.7 Emergency control procedures for fire, power and major equipment failure.

.8 Emergency contacts and numbers.

.9 Manual to be readily available and comprehensible to non- technical readers.

## 1.7 SUPPORTING DOCUMENTATION FOR INSERTION INTO SUPPORTING APPENDICES

.1 Provide Departmental Representative supporting documentation relating to installed equipment and system, including:

.1 General:

.1 Finalized commissioning plan.

.2 WHMIS information manual.

.3 Approved "as-built" drawings and specifications.

.4 Procedures used during commissioning.

.5 Cross-reference to specification sections.

.2 Architectural and structural:

.1 Inspection certificates, construction permits.

.2 Roof anchor log books.

.3 PV reports.

.3 Fire prevention, suppression and protection:

.1 Test reports.

.2 Smoke test reports.

.3 PV reports.

.4 Mechanical:

.1 Installation permits, inspection certificates.

.2 Piping pressure test certificates.

.3 Ducting leakage test reports.

.4 TAB and PV reports.

.5 Charts of valves and steam traps.

.6 Copies of posted instructions.

.5 Electrical:

.1 Installation permits, inspection certificates.

.2 TAB and PV reports.

.3 Electrical work log book.

.4 Charts and schedules.

.5 Locations of cables and components.

.6 Copies of posted instructions.

.7 Copper and fibre optic cable test report.

.8 Product cut-sheets, installation and maintenance manual, software.

.2 Assist Departmental Representative with preparation of SOM.

## 1.8 LANGUAGE

.1 English Language to be in separate binders.

## 1.9 IDENTIFICATION OF FACILITY

.1 When submitting information to Departmental Representative for incorporation into SOM, use following system for identification of documentation:

.1 Canada School of Public Service (CSPS) Fit-up, Stanley Knowles Bldg., Winnipeg, Manitoba Project No. R.060508.003

## 1.10 USE OF CURRENT TECHNOLOGY

.1 Use current technology for production of documentation. Emphasis is ease of accessibility at all times, maintainenance of up-to-date state, and compatibility with user's requirements.

.2 Obtain Departmental Representative's approval before starting Work.

# Part 2 Products

Not used.

# Part 3 Execution

Not used.

**END OF SECTION**