

Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract involves the interior renovations to create Training Rooms and new Interior Offices at the Winnipeg Tax Centre as noted on the Contract Drawings.

1.2 PRECEDENCE

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

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises the furnishing of all labour, materials, equipment and supervision required for renovation, interior office fit up and construction of 5 new Training Rooms on the main and the second floors at the CRA Winnipeg Tax Centre located at 66 Stapon Road in Winnipeg, Mb for Canada Revenue Agency (CRA).

1.4 CONTRACT METHOD

- .1 Relations and responsibilities between Contractor and subcontractors and Owner are as defined in Conditions of Contract. Assigned Subcontractors must, in addition:
 - .1 Purchase and maintain liability insurance to protect Contractor from claims for not less than limits of liability which Contractor is required to provide.

1.5 WORK BY OTHERS

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

1.6 WORK SEQUENCE

- .1 Areas under renovation must be encapsulated from adjacent occupied areas during both demolition and construction work as indicated on drawings.
- .2 Complete the work in timely fashion. Contractor to submit construction work schedule to departmental representative for review and approval.
- .3 Although construction in all building areas may occur during same time frame, contractor to prioritize work sequence as follows:
 - .1 First Priority: 2nd floor office fit-out (Rms #2-604, 2-604A, 2-605, 2-607, 2-607A) including Training Room #207 and Offices #209 and #211.
 - .2 Second Priority: Main Floor Training Room #324
 - .3 Third Priority: Remainder of Work

- .4 Security conditions in the building do apply, work sequence priorities are to be coordinated with Security Requirements.

1.7 CONTRACTOR USE OF PREMISES

- .1 Limit use of premises for Work within the designate space. Access routes to this room for bringing materials and equipment shall be coordinated with the Departmental's Representative.
- .2 Co-ordinate use of premises under direction of the Departmental Representative.
- .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .5 Repair or replace portions of existing work, which have been altered during construction operations to match existing or adjoining work, as directed by the Departmental Representative.
- .6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.8 OWNER OCCUPANCY

- .1 Co-operate with Departmental Representative in scheduling operations to minimize conflict and to facilitate Owner usage.

1.9 PRE-PURCHASED EQUIPMENT

- .1 Certain items of equipment have been pre-purchased by the Owner.
- .2 Purpose for pre-purchasing this equipment is to ensure delivery to site within required project completion schedule. Obtain necessary shop drawings from Departmental Representative and proceed to co-ordinate details for installation, by Others.

1.10 DOCUMENTS REQUIRED

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

- .11 Other documents as specified.

1.15 PERMIT AND FEES

- .1 Application and payment of building permit has been done by consultant. It is the responsibility of the contractor to pick up building permit once ready and assure that all other permits, licenses, etc which may be required to fulfill performance of the work. Contractor to obtain and pay for any of these additional fees (ie. re-inspection fees, penalties, etc.) if applicable.
- .2 Permit drawings are the property of the Owner. Contractor to forward “approved” permit drawings and a copy of the building permit to the Departmental Representative **prior** to the submission of the first request for progress payment.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

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

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 Work on weekdays: between 8:00 and 17:00 is limited to work that does not create excessive noise, dust or odour. Work deemed to be disruptive to tenants will be done afterhours on weekdays or weekends.
- .3 Maintain existing services to building and provide for personnel and vehicle access.
- .4 Where security is reduced by work provide temporary means to maintain security.
- .5 Departmental Representative will assign sanitary facilities for use by Contractor's personnel. Keep facilities clean.
- .6 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.
- .7 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 and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.
- .2 Confirm all dimensions on site. Assume all risks associated with scaling of drawings.
- .3 Maintain integrity of exits at all times.
- .4 Maintain fire access/control.
- .5 Where security has been reduced by work of Contract, provide temporary means to maintain security.
- .6 Make good any damage to existing finishes or furniture caused by work under the contract. Making good means restoration to at least original condition in terms of strength, workmanship and appearance. Protect all furniture and belongings of

tenants. Move furniture as necessary and relocate in original location upon completion of each day's work.

- .7 Where elevators, dumbwaiters, conveyors or escalators exist in building, only those assigned for Contractor's use may be used for moving personnel and material within building. Protect walls of passenger elevators, to approval of Departmental Representative before use. Accept liability for damage, safety of equipment and overloading of existing equipment.
- .8 Existing operations must remain in service without interruption during construction period.
- .9 Provide tacky mats (soil walk off type temporary carpets) to prevent traffic from carrying construction debris into other parts of the building.
- .10 Bag or otherwise protect all smoke detectors in the construction area during activities that create dust. Vacuum or otherwise clean smoke detectors on completion of each construction activity.
- .11 Provide plywood cover on carpet floors to remain. Protect these floors from damage and clear on completion.

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

1.5 SPECIAL REQUIREMENTS

- .1 Work may generally be performed during regular working hours.
- .2 Noise generating work which may be disruptive to existing building tenants shall be performed outside the hours of 08:00 to 17:00.
- .3 Submit schedule in accordance with Section 01 32 16.07 – Construction Progress Schedules – Bar (GANNT) 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.

- .6 Deliver materials between (08:00 to 16:00) only during regular work days and not on weekends or statutory holidays, unless otherwise approved by Departmental Representative.

1.6 BUILDING SMOKING ENVIRONMENT

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

1.7 SECURITY CLEARANCE REQUIREMENTS

- .1 All personnel employed on this project will be subject to security checks. Obtain clearance, as instructed by Departmental Representative, for each individual who will require entry to premises. So that mobilization of work is not delayed by the Clearance process, Delegated Security Escorts as described in this section will be an acceptable alternative until such time that all employees obtain required clearances.
- .2 Immediately upon award of the contract, the Contractor shall prepare and submit the requisite forms, provided by the Departmental Representative at time of award, for each Contractor employee and sub-contractor employee to be engaged in the work.
- .3 To eliminate delays in the clearance process, all clearance documents completed by the Contractor's employees and sub-contractor employees must be reviewed by the Contractor to ensure that all requested information has been provided, prior to submitting documents to the Departmental Representative. Incomplete forms will be returned to the Contractor.
- .4 The Contractor should batch the fully completed submissions, based on priority work on site and allow for a minimum twenty (10) working days processing time in the project schedule for the review to occur (from the date the completed documents are received by the Departmental Representative). The inability to submit the fully completed requisite forms and documents will not be reason for an extension to the project schedule or additional compensation.
- .5 The Contractor shall give the Departmental Representative 72 hours notice for work to be carried out during periods outside of the normal working hours of Monday to Friday, from 06:00 to 18:00 hours (hours subject to change at the discretion of the Departmental Representative).

.1 SECURITY ESCORT:

- .1 Personnel will be checked daily at start of work shift and provided with a pass that must be worn at all times. Each pass must be returned at end of work shift and personnel checked out.
- .2 Personnel with PWGS Reliability Status requires no security escort.
- .3 Personnel employed on this project, but without PWGSC Enhanced Reliability Status must be escorted when executing work in non-public areas.
- .4 Work performed afterhours requires security escort, regardless of reliability status.
- .5 Engage for security escort for personnel without reliability status, and for personnel performing work afterhours.

- .1 Right of first refusal for security provision is to be given to the Canadian Corps of Commissionaires.

1.8 HAZARDOUS SUBSTANCES

- .1 Work entailing use of toxic or hazardous materials, chemicals and/or explosives, or otherwise creating hazard to life, safety or health, will be in accordance with National Fire Code of Canada.
- .2 Obtain from the Departmental Representative a "Hot Work" permit for work involving welding, burning or use of blow torches, in buildings or facilities.
 - .1 Issued hot work permit must be posted by the party executing the work with notification to the Owner's maintenance supervisor 48 hours prior to commencement of work.
 - .2 See examples of Hot Work Permit Forms at the end of this Section.
- .3 When Work is carried out in dangerous or hazardous areas involving use of heat, provide fire watchers equipped with sufficient fire extinguishers. Determination of dangerous or hazardous areas along with level of protection necessary for Fire Watch is at discretion of the Departmental Representative. Contractors are responsible for providing fire watch service for work on a scale established and in conjunction with Fire Chief at pre-work conference.
- .4 Where flammable liquids, such as lacquers or urethanes are to be used, proper ventilation will be assured and all sources of ignition are to be eliminated. The Departmental Representative is to be informed prior to and at cessation of such work.

1.9 PICTURES AND CELL PHONES

- .1 Picture taking is not allowed unless approved and witnessed by Departmental Representative.
- .2 Cell phone use is restricted and must be approved by Departmental Representative-

Part 2 Products

- .1 Not used.

Part 3 Execution

- .1 Not used.

END OF SECTION

WORK PERMIT

PURPOSE: To increase safety and security, all work activities managed by Brookfield, PWGSC, or Tenants that require contractor access to any part of Brookfield managed facilities must have a Work Permit.

- INSTRUCTION**
1. Fill in all relevant fields completely. Permits with blank fields may be rejected.
 2. E-mail the completed permit to the email address listed for your region on the final page of this document.
 3. Await authorization from Brookfield GIS prior to commencing work.
 4. Retain a hard or soft copy of authorized Work Permit. An authorized Work Permit must be available on site every day for the duration of this job or project.

NOTE: To ensure timely authorization, please submit the Work Permit **at least 48 hours** prior to the anticipated start time of work activities.
Questions regarding the Work Permit process can be sent to the region-specific email address.

LOCATION OF THE WORK

Province / Territory: City:

Floor / Room Number:

Building (Name or Address):

WORK INITIATOR

Work Requested By:

Work Order # or Project # (If Applicable):

DATE & DURATION OF THE WORK

Schedule of Work		Work Hours						
<input type="checkbox"/> Day time	<input type="checkbox"/> After Hours	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Start Date	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
End Date	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

WORK DESCRIPTION (Provide a detailed description of the work to be conducted and attach a job safety plan as appropriate)

Will life safety systems be impacted or impaired (fire alarm or other)?

Will other building systems be impacted or impaired (HVAC, lighting, elevator, etc.)?

RISK ASSESSMENT

Please note, this Risk Assessment is not intended to replace a Job Safety Assessment (JSA). "Controls" as identified are intended as prompts for the permit authorizer. The permit holder is responsible for conducting a proper JSA and safety briefing to the workers prior to the commencement of the work and implementing any additional controls that may be required specific to the work task.

	Yes/ No	If Yes, See Associated Control	Control
Requires access to a secure area where escort may be needed?	<input type="checkbox"/>	1, 2	1. Workers to complete BGIS online orientation. (Available via Comply Works or through HSE Coordinator).
Requires access to a confined or restricted space?	<input type="checkbox"/>	1, 7, 9, 10, 11	2. Additional Clearance or Authorized Escort required.
Requires work from heights?	<input type="checkbox"/>	1, 7, 9, 10, 11	3. Tenant Notification or Escort required.
Requires hot work?	<input type="checkbox"/>	1,6,7,9,11,12	4. Shutdown Notice required.
Requires energy isolation?	<input type="checkbox"/>	1, 9, 10, 11	5. Security Coverage required.
Will life safety systems be impacted (fire alarm or other)?	<input type="checkbox"/>	1, 12	6. Hot Work Permit & Fire Watch required.
Workers have all licenses, training, and tools needed to perform task?	<input type="checkbox"/>	1, 10	7. Safety Barriers required.
Could generate noise or odours?	<input type="checkbox"/>	1, 3	8. Review of Asbestos Survey / BGIS Document Library required.
Requires obstruction of building access or egress?	<input type="checkbox"/>	1, 3, 5, 7	9. Additional High Hazard Permit required (Confined Space, LOTO, etc.).
Involves electrical or mechanical disruption?	<input type="checkbox"/>	1, 3, 4, 9	10. Additional License or Certifications required (Confined Space, Fall Arrest, etc.).
Have asbestos & hazardous materials surveys been reviewed by those conducting work?	<input type="checkbox"/>	1, 8	11. Specialized Personal Protective Equipment and Work Procedures required.
Will asbestos / other hazardous materials be disrupted during work activities?	<input type="checkbox"/>	1, 8, 11	12. Notify Fire Department / Fire Alarm Monitoring Company.
Involves working around or with hazardous chemicals?	<input type="checkbox"/>	1, 11, 14	13. Conservation Plan required.
			14. Ensure MSDS or SDS are available.
Work taking place at heritage site?	<input type="checkbox"/>	1, 2, 13	

PERMIT HOLDER DETAILS

Company Name:

Permit Holder (Supervisor):

Permit Holder Contact Number:

Permit Holder Email:

Names of All Workers:

BGIS SAFETY REVIEW

Name of Reviewer:

Date of Review: Authorized?

Comments

BGIS FACILITIES REVIEW

Name of Reviewer:

Date of Review: Authorized?

Comments

EMAIL COMPLETED WORK PERMIT TO THE ADDRESS LISTED FOR YOUR REGION

Region	Region Description	Email Address
Atlantic Canada	Newfoundland, PEI, NB, NS	ATL-RP1workpermit@BrookfieldGIS.com
Quebec	Quebec Other Than Gatineau	QC-RP1workpermit@BrookfieldGIS.com
National Capital Area	Ottawa, Gatineau	NCA-RP1workpermit@BrookfieldGIS.com
Ontario	Ontario Other Than Ottawa	ON-RP1workpermit@BrookfieldGIS.com
Western Canada	Manitoba, Saskatchewan, Alberta	WEST-RP1workpermit@BrookfieldGIS.com
Pacific Canada	British Columbia, Yukon	PAC-RP1workpermit@BrookfieldGIS.com

Part 1 General

1.1 PRECEDENCE

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

1.2 ADMINISTRATIVE

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

1.3 PRECONSTRUCTION MEETING

- .1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5 Agenda to include:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Schedule of Work: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.
 - .3 Schedule of submission of shop drawings, samples, colours. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

- .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.
- .5 Delivery schedule of equipment.
- .6 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
- .8 Owner provided products.
- .9 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .10 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
- .11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .12 Monthly progress claims, administrative procedures, photographs, hold backs.
- .13 Appointment of inspection and testing agencies or firms.
- .14 Insurances, transcript of policies.

1.4 PROGRESS MEETINGS

- .1 During course of Work and 8 weeks prior to project completion, schedule progress meetings every 2 weeks.
- .2 Contractor, major Subcontractors involved in Work, Departmental Representative , Owner are to be in attendance.
- .3 Notify parties minimum 8 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, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule.
 - .5 Review of off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revision to construction schedule.
 - .8 Progress schedule, during succeeding work period.
 - .9 Review submittal schedules: expedite as required.
 - .10 Maintenance of quality standards.
 - .11 Review proposed changes for affect on construction schedule and on completion date.
 - .12 Other business.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

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

1.2 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.

1.3 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 5 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.

1.4 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative 20 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 5 working days of receipt of acceptance of Master Plan.

1.5 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.

1.6 PROJECT SCHEDULE

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as 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 Fire Systems.
 - .13 Testing and Commissioning.

1.7 PROJECT SCHEDULE REPORTING

- .1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as 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.

1.8 PROJECT MEETINGS

- .1 Approximately one week prior to start-up of project a pre-installation conference will be held with Departmental Representative and Consultant.
- .2 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.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 NOT USED

- .1 Not used.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

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

1.2 REFERENCES

- .1 Not Used.

1.3 ADMINISTRATIVE

- .1 Submit to Departmental Representative and Consultant submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Departmental Representative and Consultant. 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 and Consultant, 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 and Consultant's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative and Consultant review.
- .10 Keep one reviewed copy of each submission on site.

1.4 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit drawings stamped and signed by professional engineer registered or licensed in 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 7 days for Departmental Representative and Consultant'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 and Consultant prior to proceeding with Work.
- .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 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 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, electronic copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.5 SAMPLES

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid Departmental Representative.
- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

- .6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.6 MOCK-UPS

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

1.7 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcription of insurance immediately after award of Contract.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Health and safety considerations required to ensure that the General Contractor shows due diligence towards health and safety on the construction site.

1.2 PRECEDENCE

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

1.3 RELATED SECTIONS

- .1 Section 02 41 99 - Demolition for Minor Works.
- .2 Section 07 92 00 - Joint Sealing.
- .3 Section 09 91 23 – Interior Painting

1.4 REFERENCES

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Province of Manitoba
 - .1 The Workers Compensation Act RSM 1987 - Updated 2006.
 - .2 Health and Safety Act, R.S.O. 1990 Updated 2014.

1.5 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
- .3 Submit electronic copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative and Consultant weekly.
- .4 Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 3 days after receipt of plan. Revise plan

as appropriate and resubmit plan to Departmental Representative within 3 days after receipt of comments from Departmental Representative.

- .7 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .8 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.6 FILING OF NOTICE

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

1.7 SAFETY ASSESSMENT

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

1.8 MEETINGS

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

1.9 REGULATORY REQUIREMENTS

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

1.10 GENERAL REQUIREMENTS

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

1.11 RESPONSIBILITY

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

1.12 COMPLIANCE REQUIREMENTS

- .1 Comply with The Workers Compensation Act, Workplace Safety Regulation, Manitoba Regulations.
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.13 UNFORSEEN HAZARDS

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

1.14 HEALTH AND SAFETY CO-ORDINATOR

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

1.15 POSTING OF DOCUMENTS

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

1.16 CORRECTION OF NON-COMPLIANCE

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

1.17 BLASTING

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

1.18 POWDER ACTUATED DEVICES

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

1.19 WORK STOPPAGE

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

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

1.2 REFERENCES AND CODES

- .1 Perform Work in accordance with current editions of National Building Code of Canada (NBC), National Fire Code of Canada (NFC) and Manitoba Building Code 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.

1.3 HAZARDOUS MATERIAL DISCOVERY

- .1 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify Departmental Representative immediately.
- .2 PCB: Polychlorinated Biphenyl: stop work immediately when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Departmental Representative immediately.
- .3 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Departmental Representative immediately.

1.4 BUILDING SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions and municipal by-laws.
- .2 Smoking is not permitted anywhere in the building.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 05 50 00 - Metal Fabrications
- .2 Section 06 20 00 - Finish Carpentry
- .3 Section 07 92 00 - Joint Sealing
- .4 Section 08 71 00 - Door Hardware.
- .5 Section 09 51 99 - Acoustical Ceilings for Minor Works
- .6 Section 09 91 23 – Interior Painting

1.2 PRECEDENCE

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

1.3 INSPECTION

- .1 Allow Departmental Representative, Consultant and Engineering Consultants 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, Consultant, Engineering Consultants, 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.

1.4 INDEPENDENT INSPECTION AGENCIES

- .1 All testing required to meet Quality Control specifications to be conducted by a Certified Material and Testing Agencies to be engaged and paid by contractor.
- .2 Departmental Representative may engage Independent Inspection/Testing Agencies to conduct random Quality Assurance testing. Cost of such services will be borne by the Departmental Representative.
- .3 Frequency of testing for all material is to be determined and directed by Departmental Representative.

- .4 Provide equipment required for executing inspection and testing by appointed agencies.
- .5 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .6 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 at no cost to Departmental Representative. Pay costs for re-testing and re-inspection.

1.5 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.

1.6 PROCEDURES

- .1 Notify appropriate agency 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.

1.7 REJECTED WORK

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

1.8 REPORTS

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

1.9 EQUIPMENT AND SYSTEMS

- .1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.
- .2 Refer to Divisions 21, 23 for definitive requirements.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

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

1.2 SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

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

1.4 WATER SUPPLY

- .1 Departmental Representative will provide continuous supply of potable water for construction use.
- .2 Departmental Representative will pay for utility charges at prevailing rates.

1.5 TEMPORARY VENTILATION

- .1 Ventilating:
 - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
 - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
 - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
 - .4 Ventilate storage spaces containing hazardous or volatile materials.
 - .5 Ventilate temporary sanitary facilities.
 - .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
- .2 Maintain strict supervision of operation of ventilating equipment to:
 - .1 Conform to applicable codes and standards.
 - .2 Enforce safe practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes.

1.6 TEMPORARY POWER AND LIGHT

- .1 Departmental Representative will pay for temporary power during construction for temporary lighting and operating of power tools, to a maximum supply of 230 volts/15 amps.

- .2 Provide and maintain temporary lighting throughout project. Ensure level of illumination in affected area is not less than 162 lx.
- .3 Existing power supply is available and will be provided for construction use at no cost. Connect to existing power supply in accordance with Canadian Electrical Code.
- .4 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Departmental Representative provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than 3 months.

1.7 TEMPORARY COMMUNICATION FACILITIES

- .1 If required, provide and pay for temporary telephone, fax, data hook up, lines and/or equipment necessary for own use.

1.8 FIRE PROTECTION

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

END OF SECTION

Part 1 General

1.1 PRECEDENCE

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

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.189M-2000, Primer, Alkyd, for Wood, Exterior.
 - .2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
- .2 Canadian Standards Association (CSA International)
 - .1 CAN3-A23.1-/A23.2-04, Concrete Materials and Methods for Concrete Construction/Method of Test for Concrete.
 - .2 CSA-0121-08(R2013), Douglas Fir Plywood.
 - .3 CAN/CSA-Z321-96(R2006), Signs and Symbols for the Occupational Environment.

1.3 SUBMITTALS

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

1.4 INSTALLATION AND REMOVAL

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

1.5 ELEVATORS

- .1 Designated existing elevators to be used by construction personnel and transporting of materials. Co-ordinate use with Departmental Representative.
- .2 Provide protective coverings for finish surfaces of cars and entrances.

1.6 SITE STORAGE/LOADING

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

1.7 CONSTRUCTION PARKING

- .1 Parking will be permitted on site as directed by the Departmental Representative.
- .2 Provide and maintain adequate access to project site.

1.8 SECURITY

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

1.9 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

1.10 SANITARY FACILITIES

- .1 Sanitary facilities for work force shall be provided as directed by the Departmental Representative in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.11 CONSTRUCTION SIGNAGE

- .1 No signs or advertisements, other than warning signs, are permitted on site.
- .2 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .3 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.12 CLEAN-UP

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Store materials resulting from demolition activities that are salvageable.
- .3 Stack stored new or salvaged material not in construction facilities.

Part 2 Products

- .1 Not used.

Part 3 Execution

- .1 Not used.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

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

1.2 REFERENCES

- .1 Not used.

1.3 INSTALLATION AND REMOVAL

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

1.4 HOARDING

- .1 Erect temporary enclosures using either wood or steel stud framing at 400 mm centres and 1200 x 2400 x 13mm exterior grade fir plywood to CSA O121.
- .2 Provide minimum one lockable door as directed by Departmental Representative. Equip door with locks and keys.
- .3 Ensure that hoarding is adequate to control dust migration into adjacent areas.
- .4 Erect and maintain pedestrian walkways.

1.5 DUST TIGHT SCREENS

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

1.6 ACCESS TO SITE

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

1.7 FIRE ROUTES

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

1.8 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.

1.9 PROTECTION OF BUILDING FINISHES

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

1.10 GUARDRAILS AND BARRICADES

- .1 Provide as required by governing authorities.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

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

1.2 REFERENCES

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

1.3 QUALITY

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

1.4 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.5 STORAGE, HANDLING AND PROTECTION

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

1.6 TRANSPORTATION

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

1.7 MANUFACTURER'S INSTRUCTIONS

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

- .2 Notify Departmental Representative in writing of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.8 QUALITY OF WORK

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

1.9 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.

1.10 CONCEALMENT

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

1.11 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.

1.12 LOCATION OF FIXTURES

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

1.13 FASTENINGS

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.
- .7 Situate and locate flashings, membranes, and materials carefully in accordance with good practice for installation. Ensure materials are lapped in correct sequence to ensure water flows away from building envelop. Fasten components securely in place to resist high winds in Stony Mountain geographic area.

1.14 FASTENINGS - EQUIPMENT

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

1.15 PROTECTION OF WORK IN PROGRESS

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

1.16 EXISTING UTILITIES

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 All divisions.

1.2 PRECEDENCE

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

1.3 EXISTING SERVICES

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings incongruent with the construction documents.

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

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

1.2 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit written request in advance of cutting or alteration which affects:
 - .1 Structural integrity of elements of project.
 - .2 Integrity of weather-exposed or moisture-resistant elements.
 - .3 Efficiency, maintenance, or safety of operational elements.
 - .4 Visual qualities of sight-exposed elements.
 - .5 Work of Owner 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 Owner or separate contractor.
 - .7 Written permission of affected separate contractor.
 - .8 Date and time work will be executed.

1.3 MATERIALS

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

1.4 PREPARATION

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

1.5 EXECUTION

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

1.6 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

- 2.1 NOT USED

Part 3 Execution

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 All divisions.

1.2 PRECEDENCE

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

1.3 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.

1.4 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including other than that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .3 Clear snow and ice from access to building, bank/pile snow in designated areas only.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .7 Dispose of waste materials and debris off site.
- .8 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .9 Store volatile waste in an appropriately labelled and covered metal containers. Ensure each has an appropriate Materials Safety Data Sheet supplied.
- .10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.5 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris other than that caused by Owner or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.
- .9 Clean lighting reflectors, lenses, and other lighting surfaces.
- .10 Vacuum clean and dust building interiors, behind grilles, louvres and screens.
- .11 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.
- .12 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .13 Remove dirt and other disfiguration from exterior surfaces.
- .14 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .15 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

1.6 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

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

1.2 WASTE MANAGEMENT GOALS

- .1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PWGSC's Waste Management Plan and Goals.
- .2 Accomplish maximum control of solid construction waste.
- .3 Preserve environment and prevent pollution and environment damage.

1.3 RELATED SECTIONS

- .1 All divisions.

1.4 DEFINITIONS

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

- .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
- .2 Returning reusable items including pallets or unused products to vendors.
- .11 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .12 Separate Condition: refers to waste sorted into individual types.
- .13 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.
- .14 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials.

1.5 DOCUMENTS

- .1 Maintain at job site, one copy of following documents:
 - .1 Waste Reduction Workplan.
 - .2 Material Source Separation Plan

1.6 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare and submit following prior to project start-up:
 - .1 Submit 1 electronic copy of Materials Source Separation Program (MSSP) description.
 - .2 Submit 1 electronic copy of Materials Waste Reduction Workplan (WRW).

1.7 MATERIALS SOURCE SEPARATION PROGRAM (MSSP)

- .1 As part of Waste Reduction Workplan, prepare MSSP prior to project start-up.
- .2 MSSP will detail methodology and planned on-site activities for separation of reusable and recyclable materials from waste intended for landfill.
- .3 Provide list and drawings of locations that will be made available for sorting, collection, handling and storage of anticipated quantities of reusable and recyclable materials.
- .4 Provide sufficient on-site facilities and containers in main construction staging area for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
- .5 Locate containers to facilitate deposit of materials without hindering daily operations.
- .6 Provide training for contractor, sub-contractors in handling and separation of materials for reuse and/or recycling.
- .7 Locate separated materials in areas which minimizes material damage.
- .8 Clearly and securely label containers to identify types/conditions of materials accepted and assist sub-contractors in separating materials accordingly.

- .9 Monitor on-site waste management activities by conducting periodic site inspections to verify: state of signage, contamination levels, bin locations and condition, personnel participation, use of waste tracking forms and collection of waybills, receipts and invoices.
- .10 On-site sale of salvaged materials is not permitted unless authorized in writing by Departmental Representative and provided that site safety regulations and security requirements are adhered to.

1.8 WASTE PROCESSING SITES

- .1 Contractor is responsible to research and locate waste diversion resources and service providers. Salvaged materials are to be transported off site to approved and/or authorized recycling facilities or to users of material for recycling.

1.9 STORAGE, HANDLING AND PROTECTION

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.
- .2 Unless specified otherwise, materials for removal become Contractor's property.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .5 Protect structural components not removed and salvaged materials from movement or damage.
- .6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.
- .7 Protect surface drainage, mechanical and electrical from damage and blockage.
- .8 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.
- .9 Separate and store materials produced during project in designated areas.
- .10 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
 - .1 On-site source separation is recommended.
 - .2 Remove co-mingled materials to off-site processing facility for separation.
 - .3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.

1.10 DISPOSAL OF WASTES

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste, volatile materials, mineral spirits, oil, paint thinner into waterways, storm, or sanitary sewers.
- .3 Keep records of construction waste including:

- .1 Number and size of bins.
- .2 Waste type of each bin.
- .3 Total tonnage generated.
- .4 Tonnage reused or recycled.
- .5 Reused or recycled waste destination.
- .4 Remove materials from deconstruction as deconstruction/disassembly Work progresses.
- .5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.

1.11 USE OF SITE AND FACILITIES

- .1 Execute Work with minimal interference and disturbance to normal use of premises.
- .2 Maintain security measures established by facility provide temporary security measures approved by Departmental Representative.

1.12 SCHEDULING

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 APPLICATION

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

3.2 CLEANING

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

END OF SECTION

Part 1 General

1.1 WASTE MANAGEMENT GOALS

- .1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PWGSC's Waste Management Plan and Goals.
- .2 Accomplish maximum control of solid construction waste.
- .3 Preserve environment and prevent pollution and environment damage.

1.2 RELATED SECTIONS

- .1 All divisions.

1.3 DEFINITIONS

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

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

1.4 DOCUMENTS

- .1 Maintain at job site, one copy of following documents:
 - .1 Waste Source Separation Plan.

1.5 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare and submit following prior to project start-up:
 - .1 Submit 1 electronic copy of Waste Source Separation Program (WSSP) description.

1.6 WASTE SOURCE SEPARATION PROGRAM (WSSP)

- .1 As part of Waste Reduction Workplan, prepare WSSP prior to project start-up.
- .2 WSSP will detail methodology and planned on-site activities for separation of reusable and recyclable materials from waste intended for landfill.
- .3 Provide list and drawings of locations that will be made available for sorting, collection, handling and storage of anticipated quantities of reusable and recyclable materials.
- .4 Provide sufficient on-site facilities and containers in main construction staging area for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.

- .5 Locate containers to facilitate deposit of materials without hindering daily operations.
- .6 Provide training for contractor, sub-contractors in handling and separation of materials for reuse and/or recycling.
- .7 Locate separated materials in areas which minimizes material damage.
- .8 Clearly and securely label containers to identify types/conditions of materials accepted and assist sub-contractors in separating materials accordingly.
- .9 Monitor on-site waste management activities by conducting periodic site inspections to verify: state of signage, contamination levels, bin locations and condition, personnel participation, use of waste tracking forms and collection of waybills, receipts and invoices.
- .10 On-site sale of salvaged materials is not permitted unless authorized in writing by Departmental Representative and provided that site safety regulations and security requirements are adhered to.

1.7 WASTE PROCESSING SITES

- .1 Contractor is responsible to research and locate waste diversion resources and service providers. Salvaged materials are to be transported off site to approved and/or authorized recycling facilities or to users of material for recycling.

1.8 STORAGE, HANDLING AND PROTECTION

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.
- .2 Unless specified otherwise, materials for removal become Contractor's property.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .5 Protect structural components not removed and salvaged materials from movement or damage.
- .6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.
- .7 Protect surface drainage, mechanical and electrical from damage and blockage.
- .8 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.
- .9 Separate and store materials produced during project in designated areas.
- .10 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
 - .1 On-site source separation is recommended.

- .2 Remove co-mingled materials to off-site processing facility for separation.
- .3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.

1.9 DISPOSAL OF WASTES

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

1.10 USE OF SITE AND FACILITIES

- .1 Execute Work with minimal interference and disturbance to normal use of premises.
- .2 Maintain security measures established by facility provide temporary security measures approved by Departmental Representative.

1.11 SCHEDULING

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 APPLICATION

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

3.2 CLEANING

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

3.3 DIVERSION OF MATERIALS

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

3.4 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

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

Province	Address	General Inquires	Fax
Manitoba	Manitoba Environment Building 2, 139 Tuxedo Avenue, Winnipeg, MB R3N 0H6	204-945-7100	
	The Clean Environment Commission 284 Reimer Avenue, Box 21420 Steinback MB R0A 2T3	204-326-2395	204-326-2472

END OF SECTION

Part 1 General

1.1 PRECEDENCE

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

1.2 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 that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 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 is incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

1.3 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: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1.1 PRECEDENCE

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

1.2 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 - Project Meetings to:
 - .1 Verify Project requirements.
 - .2 Review warranty requirements. .
 - .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.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental
- .3 Provide evidence, if requested, for type, source and quality of products supplied.

1.4 CONTRACTOR PREPARED MAINTAINANCE MANUAL

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings. .
 - .1 Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.

- .8 Drawings: provide with reinforced punched binder tab.
 - .1 Bind in with text; fold larger drawings to size of text pages.
- .9 Provide 1:1 scaled CAD file(s) in dwg format on CD.

1.5 CONTENTS - PROJECT RECORD DOCUMENTS

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

1.6 AS -BUILT DOCUMENTS AND SAMPLES

- .1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
 - .1 Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.

- .4 Maintain record documents in clean, dry and legible condition.
 - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

1.7 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

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

1.8 EQUIPMENT AND SYSTEMS

- .1 For each item of equipment and each system include description of unit or system, and component parts.
 - .1 Give function, normal operation characteristics and limiting conditions.
 - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
 - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
 - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls 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 specified in Section 01 45 00 - Quality Control and 01 91 13 - General Commissioning (Cx) Requirements.

1.9 MATERIALS AND FINISHES

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

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

1.11 DELIVERY, STORAGE AND HANDLING

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

1.12 WARRANTIES AND BONDS

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative for approval.
- .3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.

- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
 - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within [ten] days after completion of applicable item of work.
 - .4 Verify that documents are in proper form, contain full information, and are notarized.
 - .5 Co-execute submittals when required. .
 - .6 Retain warranties and bonds until time specified for submittal.
 - .7 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
 - .8 Respond in timely manner to oral or written notification of required construction warranty repair work.
 - .9 Written verification to follow oral instructions.
 - .10 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

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

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Demonstrate operation and maintenance of equipment and systems to Owner's personnel.
- .2 The Departmental Representative will 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 testing, adjusting, and balancing has been performed 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 agreed upon times and 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.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 QUALITY ASSURANCE

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

- .1 Instruct Owner's personnel.
- .2 Provide written report that demonstration and instructions have been completed.

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 for the static verification, start-up and functional performance testing of components, equipment, sub-systems, systems, and integrated systems.
- .2 Related Sections:
 - .1 All divisions
- .3 Acronyms:
 - .1 Cx - Commissioning.
 - .2 EMCS - Energy Monitoring and Control Systems.
 - .3 O&M - Operation and Maintenance.
 - .4 TAB - Testing, Adjusting and Balancing.

1.2 REFERENCES

- .1 CSA Z320-11: Building Commissioning

1.3 GENERAL

- .1 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:
 - .1 Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.
 - .2 Ensure appropriate documentation is compiled into the BMM.
 - .3 Effectively train O&M staff.
- .2 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
 - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
 - .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
- .3 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.

1.4 COMMISSIONING OVERVIEW

- .1 Section 01 91 31 - Commissioning (Cx) Plan.
- .2 For Cx responsibilities refer to Section 01 91 31 - Commissioning (Cx) Plan.
- .3 Cx to be a line item of Contractor's cost breakdown.
- .4 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .5 Cx is conducted to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.
- .6 Departmental Representative will issue Interim Acceptance Certificate when:
 - .1 Completed Cx documentation has been received, reviewed for suitability and approved by Consultant as engaged by the Departmental Representative.
 - .2 Equipment, components and systems have been commissioned.
 - .3 O&M training has been completed.

1.5 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

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

1.6 PRE-CX REVIEW

- .1 Before Construction:
 - .1 Review contract documents, confirm by writing to Departmental Representative.
 - .1 Adequacy of provisions for Cx.
 - .2 Aspects of design and installation pertinent to success of Cx.
- .2 During Construction:
 - .1 Co-ordinate provision, location and installation of provisions for Cx.
- .3 Before start of Cx:
 - .1 Have completed Cx Plan up-to-date.
 - .2 Ensure installation of related components, equipment, sub-systems, systems is complete.
 - .3 Fully understand Cx requirements and procedures.
 - .4 Have Cx documentation shelf-ready.

- .5 Understand completely design criteria and intent and special features.
 - .6 Submit complete start-up documentation to Departmental Representative.
 - .7 Have Cx schedules up-to-date.
 - .8 Ensure systems have been cleaned thoroughly.
 - .9 Complete TAB procedures on systems, submit TAB reports to Departmental Representative for review and approval.
 - .10 Ensure "As-Built" system schematics are available.
- .4 Inform Departmental Representative in writing of discrepancies and deficiencies on finished works.

1.7 CONFLICTS

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

1.8 SUBMITTALS

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

1.9 COMMISSIONING DOCUMENTATION

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms for requirements and instructions for use.
- .2 Consultant as engaged by the Departmental Representative to review and approve Cx documentation.
- .3 Provide completed and approved Cx documentation to Departmental Representative.

1.10 COMMISSIONING SCHEDULE

- .1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.

- .2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
 - .1 Approval of Cx reports.
 - .2 Verification of reported results.
 - .3 Repairs, retesting, re-commissioning, re-verification.
 - .4 Training.

1.11 COMMISSIONING MEETINGS

- .1 Convene Cx meetings following project meetings: Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart and as specified herein.
- .2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.
- .3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.
- .4 At 60% construction completion stage (Section 01 32 16.07 - Construction Progress Schedules - 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 70% and subsequent Cx meetings and as required.

1.12 STARTING AND TESTING

- .1 Contractor assumes liabilities and costs for inspections. Including disassembly and re-assembly after approval, starting, testing and adjusting, including supply of testing equipment.
- .2 Start-up shall include, but not be limited to, the following procedures:
 - .1 initial systems activation;
 - .2 temperature measurements for water and air systems;
 - .3 visual inspections after activation;
 - .4 voltage measurements; and
 - .5 operation of safety controls and interlocks.

1.13 WITNESSING OF STARTING AND TESTING

- .1 Provide 14 days notice prior to commencement.
- .2 Before equipment/system start-up, the following shall be completed, witnessed, and documented:
 - .1 factory tests and verification documentation;
 - .2 field visual and mechanical inspections;
 - .3 field electrical tests;
 - .4 checks of equipment and systems for proper operation;
 - .5 tests of mechanical interlock schemes;
 - .6 operation of control circuits;
 - .7 tests of safety interlocks;
 - .8 phase rotation.
- .3 Departmental Representative and/or Consultant as engaged by the Departmental Representative to witness of start-up and testing.
- .4 Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

1.14 MANUFACTURER'S INVOLVEMENT

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

1.15 PROCEDURES

- .1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.
- .2 Set up and fill out commissioning forms for static verification, setup and functional performance testing. Fill out static verification forms with completed shop drawing reviews.
- .3 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 Static Verification forms.
 - .2 Visual inspection of quality of installation.
 - .2 Start-up: follow accepted start-up procedures and complete Start Up commissioning form.
 - .3 Operational testing: document equipment performance.
 - .4 System performance verification: complete Functional Performance Testing form and include repetition of tests after correcting deficiencies.
 - .5 Post-substantial performance verification: to include fine-tuning. Changes and adjustments to be recorded on commissioning forms.
- .4 Correct deficiencies and obtain approval from Departmental Representative after distinct phases have been completed and before commencing next phase.
- .5 Document required tests on approved Functional Performance Testing forms.
- .6 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Departmental Representative. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:
 - .1 Minor equipment/systems: implement corrective measures approved by Departmental Representative.
 - .2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Departmental Representative.
 - .3 If evaluation report concludes that major damage has occurred, Departmental Representative shall reject equipment.
 - .1 Rejected equipment to be remove from site and replace with new.
 - .2 Subject new equipment/systems to specified start-up procedures.

1.16 START-UP DOCUMENTATION

- .1 Assemble start-up documentation and submit to Departmental Representative for approval before commencement of commissioning.
- .2 Start-up documentation to include:
 - .1 Static Verification report forms completed with all product information.
 - .2 Factory and on-site test certificates for specified equipment.
 - .3 Pre-start-up inspection reports.

- .4 Signed installation/start-up check lists.
- .5 Start-up reports,
- .6 Step-by-step description of complete start-up procedures, to permit Departmental Representative to repeat start-up at any time.

1.17 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

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

1.18 TEST RESULTS

- .1 If start-up, functional performance testing and/or performance results produce unacceptable results, repair, replace or repeat specified starting and/or functional performance testing procedures until acceptable results are achieved.
- .2 Provide manpower and materials, assume costs for re-commissioning.
- .3 Record performance results in Functional Performance Testing form.

1.19 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.

1.20 INSTRUMENTS / EQUIPMENT

- .1 Submit to Departmental Representative for review and approval:
 - .1 Complete list of instruments proposed to be used.
 - .2 Listed data including, serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.
- .2 Provide the following equipment as required:
 - .1 2-way radios.
 - .2 Ladders.
 - .3 Equipment as required to complete work.

1.21 COMMISSIONING PERFORMANCE VERIFICATION

- .1 Carry out Cx:

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

1.22 WITNESSING COMMISSIONING

- .1 Departmental Representative to witness activities and verify results.
- .2 All witnesses of the commissioning events to be recorded on the performance verification forms.

1.23 AUTHORITIES HAVING JURISDICTION

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

1.24 COMMISSIONING CONSTRAINTS

- .1 Since access into secure or sensitive areas will be very difficult after occupancy, it is necessary to complete Cx of occupancy, weather, and seasonal sensitive equipment and systems before issuance of the Interim Certificate, using, if necessary, simulated thermal loads.

1.25 EXTENT OF VERIFICATION

- .1 Elsewhere:
 - .1 Provide manpower and instrumentation to verify up to all reported results, unless specified otherwise in other sections.
- .2 Number and location to be at discretion of Departmental Representative.
- .3 Conduct tests repeated during verification under same conditions as original tests, using same test equipment, instrumentation.
- .4 Perform additional commissioning until results are acceptable to Departmental Representative.

1.26 REPEAT VERIFICATIONS

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

- .1 Verification of reported results fail to receive 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.

1.27 SUNDRY CHECKS AND ADJUSTMENTS

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

1.28 DEFICIENCIES, FAULTS, DEFECTS

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

1.29 COMPLETION OF COMMISSIONING

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

1.30 ACTIVITIES UPON COMPLETION OF COMMISSIONING

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

1.31 TRAINING

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

1.32 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

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

1.33 OCCUPANCY

- .1 Cooperate fully with Departmental Representative during stages of acceptance and occupancy of facility.
- .2 Refer to 01 91 31 - Commissioning (Cx) Plan for Facility Turnover Activities. Facility turnover activities to be completed before occupancy turnover.

1.34 INSTALLED INSTRUMENTATION

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

1.35 PERFORMANCE VERIFICATION TOLERANCES

- .1 Application tolerances:
 - .1 Specified range of acceptable deviations of measured values from specified values or specified design criteria.
- .2 Instrument accuracy tolerances:
 - .1 To be of higher order of magnitude than equipment or system being tested.
- .3 Measurement tolerances during verification:
 - .1 Unless otherwise specified actual values to be within +/- 2 % of recorded values.

1.36 DEPARTMENTAL REPRESENTATIVE'S PERFORMANCE TESTING

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Description of overall structure of Cx Plan and roles and responsibilities of Cx team.
- .2 Related Sections:
 - .1 Section 01 91 33 – Commissioning Forms

1.2 REFERENCES

- .1 American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE)
 - .1 ASHRAE 202-2013, Commissioning Process for Buildings and Systems.
 - .2 ASHRAE Guideline 0-2005, Commissioning Process.
- .2 Canadian Standards Association (CSA)
 - .1 CSA Z320-11, Building Commissioning Standard and Check Sheets.
- .3 National Fire Protection Association (NFPA)
 - .1 NFPA 13-07, Installation of Sprinkler Systems.
 - .2 NFPA 14-07, Installation of Standpipe and Hose Systems.
 - .3 NFPA 20-07, Installation of Stationary Fire Pumps for Fire Protection.
- .4 Underwriters' Laboratories of Canada (ULC)

1.3 GENERAL

- .1 Provide a fully functional facility:
 - .1 Cx Plan provided with specifications is provided as sample of 100% plan and provide for basis of bid only.
 - .2 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.
 - .3 Facility user and O&M personnel have been fully trained in aspects of installed systems.
 - .4 Optimized life cycle costs.
 - .5 Complete documentation relating to installed equipment and systems.
- .2 Term "Cx" in this section means "Commissioning".
- .3 Contractor's Cx Agent to be appointed by Contractor and identified as "Contractor".
- .4 Use this Cx Plan as master planning document for Cx:
 - .1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.

- .2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.
- .3 Sets out deliverables relating to O&M, process and administration of Cx.
- .4 Describes process of verification of how built works meet design requirements.
- .5 Produces a complete functional system prior to issuance of Certificate of Occupancy.
- .6 Management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:
 - .1 Overview of Cx.
 - .2 General description of elements that make up Cx Plan.
 - .3 Process and methodology for successful Cx.
- .5 Acronyms:
 - .1 Cx - Commissioning.
 - .2 BMM - Building Management Manual.
 - .3 EMCS - Energy Monitoring and Control Systems.
 - .4 MSDS - Material Safety Data Sheets.
 - .5 TAB - Testing, Adjusting and Balancing.
 - .6 WHMIS - Workplace Hazardous Materials Information System.
- .6 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 100% completed within 8 weeks of award of contract, is based on CSA Z320 Building Commissioning standard requirements and to take into account:
 - .1 Approved shop drawings and product data.
 - .2 Approved changes to contract.
 - .3 Contractor's project schedule.
 - .4 Cx schedule.
 - .5 Contractor's, sub-contractor's, suppliers' requirements.
 - .1 Identify functional performance testing requirements
 - .6 Project construction team's and Cx team's requirements.
- .2 Submit completed Cx Plan to Departmental Representative and obtain written approval.

1.5 REFINEMENT OF CX PLAN

- .1 During construction phase, revise, refine and update Cx Plan to include:
 - .1 Changes resulting from Client program modifications.
 - .2 Approved design and construction changes.

- .2 Revise, refine and update every 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, assigned by PWGSC, 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 O M personnel.
 - .4 Monitoring of Cx activities, training, development of Cx documentation.
 - .5 Work closely with members of Cx Team.
 - .3 Departmental Representative is responsible for:
 - .1 Organizing Cx.
 - .2 Monitoring operations Cx activities.
 - .3 Witnessing, certifying accuracy of reported results.
 - .4 Witnessing and certifying TAB and other tests.
 - .5 Developing BMM.
 - .6 Ensuring implementation of final Cx Plan.
 - .7 Performing verification of performance of installed systems and equipment.
 - .8 Implementation of Training Plan.
 - .4 Construction Team: Contractor, sub-contractors, suppliers and support disciplines, is responsible for construction/installation in accordance with contract documents, including:
 - .1 Testing.
 - .2 TAB.
 - .3 Performance of Cx activities.
 - .4 Delivery of training and Cx documentation.
 - .5 Assigning one person as point of contact with Consultant and PWGSC Cx Manager for administrative and coordination purposes.
 - .5 Contractor's Cx agent(s) 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 performance verification.
 - .3 Specialist subcontractor: Equipment and systems supplied and installed by specialist subcontractor.
 - .4 Specialist Cx agency:
 - .1 Possessing specialist qualifications and installations providing environments essential to client's program but are outside scope or expertise of Cx specialists on this project.
 - .5 Client: Responsible for intrusion and access security systems.
 - .6 Ensure that Cx participant:
 - .1 Could complete work within scheduled time frame.
 - .2 Available for emergency and troubleshooting service during first year of occupancy by user for adjustments and modifications outside responsibility of O M personnel, including:
 - .1 Modify ventilation rates to meet changes in off-gassing.
 - .2 Changes to heating or cooling loads beyond scope of EMCS.
 - .3 Changes to EMCS control strategies beyond level of training provided to O M personnel.
 - .4 Redistribution of electrical services.
 - .5 Modifications of fire alarm systems.
 - .6 Modifications to voice communications systems.
 - .7 Provide names of participants to Departmental Representative and details of instruments and procedures to be followed for Cx 3 months prior to starting date of Cx for review and approval.

1.8 EXTENT OF CX

- .1 Commissioning shall incorporate requirements indicated in the CSA Z320 electronic commissioning check sheets and other requirements as identified by the Departmental Representative.
- .2 Commission mechanical systems and associated equipment:
 - .1 HVAC and exhaust systems:
 - .1 HVAC systems – All noted VAV boxes, existing and new.
 - .2 HVAC systems – Confirmation of air balance report.
 - .3 Fire Dampers – confirmation of air balancer’s review.
 - .4 HVAC controls – All drawing noted controls, relocated or new. Connected to correct equipment, provides control required, located where indicated.
 - .5 Exhaust systems –exhaust fans operation
 - .6 Fire Suppression – confirmation of installation.
 - .3 Commission electrical systems and equipment:
 - .1 Lighting systems:
 - .1 Lighting equipment.
 - .2 Emergency lighting systems, including battery packs.
 - .3 Fire exit emergency signage.
 - .2 Fire alarm systems, equipment:
 - .1 Annunciators.
 - .2 Control panels.
 - .3 Devices.
 - .1 Smoke detectors.
 - .2 FA Speakers
 - .3 FA Strobes
 - .3 Other systems and equipment:
 - .1 Intrusion system.
 - .2 Sound masking system.

1.9 DELIVERABLES RELATING TO O&M PERSPECTIVES

- .1 General requirements:
 - .1 Compile English documentation.
 - .2 Documentation to be computer-compatible format ready for inputting for data management.
- .2 Provide deliverables:
 - .1 Warranties.
 - .2 Project record documentation.

- .3 Inventory of spare parts, special tools, and maintenance materials.
- .4 Maintenance Management System (MMS) identification system used.
- .5 WHMIS information.
- .6 MSDS data sheets.
- .7 Electrical Panel inventory containing detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.

1.10 DELIVERABLES RELATING TO THE CX PROCESS

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

1.11 PRE-CX ACTIVITIES AND RELATED DOCUMENTATION

- .1 Items listed in this Cx Plan include the following:
 - .1 Contractor to complete Static Verification forms.
 - .2 Pre-Start-Up inspections: by Departmental Representative prior to permission to start up and rectification of deficiencies to Departmental Representative's satisfaction.
 - .3 Departmental Representative to use approved check lists.

- .4 Departmental Representative will monitor some of these pre-start-up inspections.
- .5 Include completed documentation with Cx report.
- .6 Conduct pre-start-up tests: Conduct pressure, static, flushing, cleaning, and "bumping" during construction as specified in technical sections. To be witnessed and certified by Departmental Representative and does not form part of Cx specifications.
- .7 Departmental Representative will monitor some of these inspections and tests.
- .8 Include completed documentation in Cx report.
- .2 Pre-Cx activities - MECHANICAL:
 - .1 HVAC equipment and systems:
 - .1 "Bump" each item of equipment in its "stand-alone" mode.
 - .2 At this time, complete pre-start-up checks and complete relevant documentation.
 - .3 After equipment has been started, test related systems in conjunction with control systems on a system-by-system basis.
 - .4 Perform TAB on systems. TAB reports to be approved by Departmental Representative.
 - .3 Pre-Cx activities - ELECTRICAL:
 - .1 Lighting systems:
 - .1 Emergency lighting systems:
 - .1 Tests to include verification of lighting levels and coverage, initially by disrupting normal power.
 - .2 Fire alarm systems: Test after other safety and security systems are completed. Testing to include a complete verification in accordance with ULC requirements. Departmental Representative has witnessed and certified report, demonstrate devices and zones to Departmental Representative.
 - .3 Intrusion alarm systems: to include verification by Departmental Representative.

1.12 START-UP

- .1 Contractor's Cx Agent to assist or provide services to start up components, equipment and systems. Record results in Start-up activities form.
- .2 Departmental Representative to monitor some of these start-up activities.
- .3 Rectify start-up deficiencies to satisfaction of Departmental Representative.

1.13 FUNCTIONAL PERFORMANCE VERIFICATION:

- .1 Approved Cx Agent to perform performance verification.
 - .1 Repeat when necessary until results are acceptable to Departmental Representative.
 - .2 Record of participants to be indicated on performance verification documentation.
- .2 Use procedures modified generic procedures to suit project requirements.

- .3 Departmental Representative to witness and certify reported results using approved Commissioning Check List forms.
- .4 Departmental Representative to approve completed Functional Performance Verification reports and provide to Departmental Representative.
- .5 Departmental Representative reserves right to verify up to 30% of reported results at random.
- .6 Failure of randomly selected item shall result in rejection of Functional Performance Testing report or report of system start-up and testing.

1.14 CX ACTIVITIES AND RELATED DOCUMENTATION

- .1 Perform Cx by specified Cx agency using procedures developed by Departmental Representative and approved by Departmental Representative.
- .2 Departmental Representative to monitor Cx activities.
- .3 Upon satisfactory completion, Cx agency performing tests to prepare Cx Report using approved Commissioning Checklist forms.
- .4 Departmental Representative to witness, certify reported results of, Cx activities and forward to Departmental Representative.
- .5 Departmental Representative reserves right to verify a percentage of reported results at no cost to contract.

1.15 CX OF INTEGRATED SYSTEMS AND RELATED DOCUMENTATION

- .1 Cx to be performed by specified Cx specialist, using procedures developed by Departmental Representative and approved by Departmental Representative.
- .2 Tests to be witnessed by Departmental Representative and documented on approved report forms.
- .3 Upon satisfactory completion, Cx specialist to prepare Cx Report, to be certified by Departmental Representative and submitted to Departmental Representative for review.
- .4 Departmental Representative reserves right to verify percentage of reported results.
- .5 Integrated systems to include:
 - .1 HVAC and associated systems forming part of integrated HVAC systems: VAV boxes.
 - .2 Emergency lighting systems.
 - .3 Fire alarm system.
- .6 Identification:
 - .1 In later stages of Cx, before hand-over and acceptance Consultant 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.

1.16 COMMISSIONING FORMS

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms

- .2 Commissioning forms refer to

1.17 DELIVERABLES RELATING TO ADMINISTRATION OF CX

- .1 General:
 - .1 Consistent verified operation of mechanical systems before occupancy.

1.18 CX SCHEDULES

- .1 Prepare detailed critical path Cx Schedule and submit to Departmental Representative for review and approval same time as project Construction Schedule. Include:
 - .1 Milestones, testing, documentation, training and Cx activities of components, equipment, subsystems, systems and integrated systems, including:
 - .1 Design criteria, design intents.
 - .2 Pre-TAB review: 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 TAB: 21 days before start of TAB.
 - .9 TAB: After successful start-up, correction of deficiencies and verification of normal and safe operation.
 - .10 Notification of intention to start Cx: 14 days before start of Cx.
 - .11 Notification of intention to start Cx of integrated systems: After Cx of related systems is completed 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 reports: Immediately upon successful completion of Cx.
 - .2 Detailed training schedule to demonstrate no conflicts with testing, completion of project and hand-over to Departmental Representative.
 - .3 6 months in Cx schedule for verification of performance in all seasons and wear conditions.
- .2 After approval, incorporate Cx Schedule into Construction Schedule.
- .3 Consultant, Contractor, Contractor's Cx agent, and Departmental Representative will monitor progress of Cx against this schedule.

1.19 CX REPORTS

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

1.20 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.

1.21 TRAINING PLANS

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

1.22 INTERIM ACCEPTANCE

- .1 When interim acceptance is required, the commissioning team shall
 - .1 identify the systems and equipment being accepted;
 - .2 specify the responsibilities and authority of each party (contractor, owner, etc.);
 - .3 document the warranty periods;
 - .4 verify the ownership of equipment;
 - .5 outline maintenance responsibilities;
 - .6 outline operational responsibilities for the buildings;
 - .7 identify outstanding work;
 - .8 provide owner's training;
 - .9 provide maintenance and data manuals, and operational manuals, as applicable; and
 - .10 provide an interim commissioning report.
- .2 Interim acceptance is valid on approval from Departmental Representative.

1.23 FINAL SETTINGS

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

1.24 FACILITY TURNOVER ACTIVITIES

- .1 The Departmental Representative shall ensure all activities referenced in the commissioning plan are completed by the Cx Agent prior to facility turnover. These activities shall include the following:

- .1 confirmation that all commissioning requirements of interim acceptance have been completed and documented;
- .2 confirmation that inspection, registration, and verification certificates have been provided or applied for;
- .3 verification of the completion of the record drawings; and
- .4 completion of the commissioning manual.

Part 2 Products

Not used.

Part 3 Execution

Not used.

END OF SECTION

Commissioning Plan

PWGSC Project: R.078618.008
Project: Winnipeg Tax Centre Fit-up
Version Date: 2017-04-24
Version Number: 0

Contents

1. Importance of the Commissioning Plan
2. Roles and responsibilities
3. Revisions to this Commissioning Plan
4. Risk assessment
5. Objectives of commissioning
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7. Deliverables relating to O&M perspectives
8. Deliverables relating to the commissioning process
9. Deliverables relating to the administration of commissioning
10. Payments for commissioning
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12. Training Plan

1. Importance of the Commissioning Plan

The Commissioning Plan is the master planning, management and communications tool relating to commissioning, setting out scope, standards, roles and responsibilities, expectations, deliverables, etc., and is addressed to all members of the Commissioning Team. It provides an overview of commissioning, and sets out the process and the methodology for successful commissioning of the above-mentioned project.

2. Roles and responsibilities

The Commissioning Plan is intended to be used by the:

- .1 PWGSC Project Manager:** who has the overall responsibility for the project and is the sole point of contact between the Client, the Designer, the PWGSC Commissioning Manager and all other members of the project team.
 - .2 Departmental Representative:** a designate as appointed by the PWGSC Project Manager to provide confirmation of the commissioning documents and processes. The designate may be more than one person based on the type of work to commission.
 - .3 PWGSC design Quality Review Team:** conducts detailed reviews during all stages of the design to ensure appropriate design criteria, design intents, design solutions, that designs are well-developed, commissioning specifications are appropriate to this laboratory, transmits technical design information to the Designer. During construction, may conduct periodic site reviews to observe general progress.
 - .4 PWGSC Commissioning Manager:** ensures that all commissioning activities are carried out so as to ensure the delivery of a fully operational project complete in every respect.. This includes reviews of all commissioning documentation, reviews for performance, reliability, durability of operation, accessibility, maintainability, operational efficiency under all conditions of operation, protection of health, welfare, safety and comfort of occupants and O&M personnel.
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- .5 Designer (i.e.. Consultant):** designs the facility to meet the Client's functional and operational requirements and budget, prepares all working documents, including incorporation of commissioning specifications in to construction specifications, monitoring commissioning activities, witnessing and certifying the accuracy of reported results, witnessing and certifying TAB and other tests, commissioning checklist forms, develops the Building Management Manual, ensures the implementation of this Commissioning Plan, performing verification of performance of all installed systems, implementation of Training Plan.
- .6 Construction Team:** consists of Contractor, sub-contractors, suppliers and other support disciplines, and is responsible for construction/installation in accordance with the contract documents, including testing and the delivery of training, required documentation.
- .7 Contractor's Commissioning Agent:** to implement all commissioning activities required by the specifications, including demonstrations, training, testing, preparation and submission of test reports.. This is a responsibility that is distinct from that of the Contractor's site supervisor. Commissioning Agent to be available for emergency and troubleshooting service during the first year of occupancy by the User for adjustments and modifications outside the responsibility of the O&M personnel.
- .8 Commissioning Agencies:** will include:
- .1 The installing contractor** or installing sub-contractor.
 - .2 Equipment manufacturer:** e.g.. elevators, emergency generators.
 - .3 Specialist sub-contractor:** e.g.. EMCS.
 - .4 Specialist commissioning agency:** e.g., environmental space conditions, indoor air quality and other installations providing environments which are essential to the Client's program but are outside the scope or expertise of other Commissioning Agencies on this project. If not specified in the commissioning specifications, the identity of this specialist will be provided at a later date.
 - .5 TAB agency:** equipment and systems involving the measurement and adjusting of flow rates and pressures to meet indicated or specified values (e.g. ducted air and hydronic systems, fans, pumps).
- All Commissioning Agencies will be available for emergency service during the first year of occupancy by the User for adjustments and modifications outside the responsibility of the O&M personnel. These include changes to ventilation rates to meet changes in off-gassing, changes to heating or cooling loads beyond the ranges of the EMCS, and changes to EMCS control strategies beyond the training level provided to the O&M personnel.
- The names of commissioning personnel, details of the instruments which will be used and commissioning procedures which will be followed will be provided at least three months prior to the scheduled starting date so as to permit proper review and approvals.
- .9 Client's move:** the move from the existing accommodation into the new location, although not part of commissioning should be given serious consideration by the Designer so as to ensure only very minor interruption in his program activities.
- .10 Property Manager:** has responsibility for receiving the renovated facility and is responsible for day-to-day operation and maintenance of the facility and represents the lead role in the Operation Phase and onwards.
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3. **Revisions to this Commissioning Plan**

This Commissioning Plan will be reviewed, revised, refined and updated as detailed design and production of the Working Documents proceeds and, if required, during construction.

Each time it is revised, the revision number and date will also be revised. The revised Commissioning Plan shall be submitted to the PWGSC Project Manager and PWGSC Commissioning Manager for review and approval.

4. **Risk assessment**

The modifications to mechanical systems will require maintaining existing conditions. Adjustments may be required to maintain existing system settings.

5. **Objectives of commissioning**

Commissioning will provide a fully functional facility:

- .1 whose systems, equipment and components have been proven to meet all Client's functional requirements before the date of acceptance, and operate consistently at peak efficiencies and within specified energy budgets under all normal loads.
- .2 in which the Client and O&M personnel will have been fully trained in all aspects of all installed systems,
- .3 having optimized life cycle costs,
- .4 having complete documentation relating to all installed equipment and systems.

6. **Extent of commissioning**

Systems to be commissioned shall include:

.1 **Architectural and Structural**

- None

.2 **Mechanical**

- Environmental control systems, indoor space conditions, IAQ, noise & vibration
- Exhaust systems
- Fire suppression and fire protection systems **

.3 **Electrical**

- Emergency lighting **
- Lighting equipment and distribution systems **
- Fire exit emergency signage **
- Fire alarm systems **

** These systems are identified as life safety systems.

7. **Deliverables relating to O&M perspectives**

The following list of deliverables is a brief overview. The Designer shall utilize a computer - based data management system. This will include the cost of all labour, material and EDP equipment to deliver the program (e.g. "as-built" drawings and specifications, commissioning documentation, Building Manual, Training Plan). Manuals will be required with electronic and hard copy versions. All documentation shall be required to be transferred to the Property

Manager in a computer-compatible format that can be readily inputted for data management.

- .1 **Facility Operation and Maintenance Report:** This is a study to show how the facility will be operated. It will include the number of O&M personnel, security staff, janitorial staff, O&M spatial requirements, organization relating to flow of materials into and out of the facility, etc. It will be prepared by the Designer with input from the PWGSC Commissioning Manager and the Property Manager.
 - .2 **Operation and maintenance budget:** This will be based upon the Facility O&M Report. As the design develops, it will include breakdowns to show the various elements of operations and maintenance (e.g. cleaning, service contracts), etc. It will be prepared by the Designer with input from the PWGSC Design Quality Review Team, the PWGSC Commissioning Manager and Property Manager and Client.
 - .3 **Building Management Manual:** This will provide comprehensive information relating to the design, implementation, operation and maintenance of the entire project. It will include, but not necessarily limited to the following:
 - .1 **Standard Operating Procedures (SOP) Manual:** To include description of each system together with a description of all operating modes. It will be produced by the Designer as the design develops. It shall be 90% complete prior to Tender Call.
During the commissioning phase, revisions and refinements will be incorporated by the Designer, so that it will be 100% complete prior to issuance of the Interim Certificate. It will be further refined during the Warranty Period when all systems undergo fine tuning, set-point adjustments are made, etc.
 - .2 **Operating and Maintenance (O&M) Manual:** This will be produced by the Contractor as construction/installation proceeds and reviewed by the Designer. It will be 90% complete prior to start-up inspections. During the commissioning stage, all missing data will be added, so that it will be 100% complete prior to issuance of the Interim Certificate. During the Warranty Period, it will be refined as required. This manual will be organized so that keeping it up-to-date will require minimum time and resources.
 - .3 **Life Safety Compliance (LSC):** Emergency information relating to all possible emergencies such as the presence of smoke, fire, floods, gas, failure of electrical power, water supply, heating, cooling, elevators, escalators, emergency evacuation, refrigerant release, chemical spills, heating and cooling generation plant emergencies, failure of fuel supplies and breach of security. Information is to be immediately available and comprehensible to technical and non-technical users.
This manual is to be based upon the PWGSC LSC Manual, but enhanced to be made facility specific. Samples of existing LSC Manuals are available from the PWGSC Commissioning Manager for reference purposes.
 - .4 **Warranties:** A complete inventory will be provided by the Contractor to the Designer who will review same before submission to the PWGSC Commissioning Manager who, in turn, recommends acceptance by the PWGSC Project Manager.
 - .5 **"As-built" Drawings and Specifications:** These will be produced by the
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Designer from the project record documents maintained on the site and kept up-to-date with all changes marked thereon by the Contractor. Accuracy will be verified by the Designer and the PWGSC Commissioning Manager before preparation and after submission by the Designer. They shall be completed in time to be used during pre-start-up inspections.

- .6 **Training Plan:** This will be produced by the Designer and approved by the PWGSC Commissioning Manager to meet project-specific requirements. It will include details provided by the Property Manager relating to numbers and prerequisite qualifications and skills of trainees, type of training (i.e. observation, hands -on, classroom), etc. Instructors will include the Designer, Contractor, specialist sub-contractors, equipment suppliers or manufacturers. Duration of training for each system, instruction aids, etc. will depend on complexity and PFM needs. It will also include provisions for long-term ongoing training needs (e.g. video taping), etc. Training will be under the direction of the Designer and monitored by the PWGSC Commissioning Manager.
- .7 **Inventory of spare parts, special tools, maintenance materials:** Inventory will be identified during the design stage by the Designer with input from the PWGSC Commissioning Manager and the Property Manager, based upon consideration of the complexity of the project and immediacy of availability; specified by the Designer; checked by the Contractor immediately upon delivery to ensure each is complete with instructions for use; inventoried, packaged and identified by the Contractor; and stored by the Contractor in facilities to be designated by the PWGSC Project Manager and the PWGSC Commissioning Manager.

8. Deliverables relating to the commissioning process

- .1 **Description of pre-commissioning activities** and production of related documentation: For every item, the extent of involvement of the members of the Commissioning Team will be determined (e.g. who reviews, performs, monitors, certifies). This schedule will be prepared by the Designer with input from the PWGSC Commissioning Manager and will include items such as:
 - .1 **Pre-start-up tests:** These will include pressure, static, flushing, cleaning, "bumping", etc. conducted during construction and will be performed by the Contractor and witnessed and certified by the Designer. The completed documentation will be included in the Commissioning Report.
 - .2 **Pre-start-up inspections** conducted by the Designer prior to start-up and rectification of deficiencies, using approved installation check lists. The completed documentation will be included with the Commissioning Report.
 - .3 **Start-up:** This will be by the Contractor, equipment manufacturer, supplier and/or installing specialist sub-contractor under the direction of the Designer. It will also include rectification of all start-up deficiencies by the Contractor to the satisfaction of the Designer and PWGSC Commissioning Manager.
 - .4 **TAB and Functional Performance Testing** will be performed by the
-

approved Commissioning Agencies, repeated where necessary until results are acceptable to the Designer. Procedures may have to be modified to suit project requirements.

Reported results will be witnessed and certified by the Designer using approved commissioning check lists. The completed Commissioning Reports will be approved by the Designer and provided to the PWGSC Commissioning Manager who reserves the right to verify up to 30% of all reported results. Any failure of randomly selected item shall result in the rejection of the TAB report or the report of system startup and testing.

- .2 Schedule of commissioning of integrated systems** and production of related documentation will be prepared conjointly by the Designer and the PWGSC Commissioning Manager. It will also identify integrated systems to be commissioned over and above those listed herein:

- Fire alarm systems
- Emergency lighting systems
- Environmental space condition and IAQ
- Fire suppression systems

Commissioning will be performed by the Contractor or specified Commissioning Agencies, using procedures developed by the Designer and approved by the PWGSC Commissioning Manager. They will be witnessed by, and results certified by, the Designer. Reported results will be witnessed and certified by the Designer using approved PV forms. Upon satisfactory completion, the Commissioning Agency performing the tests will prepare the required Commissioning Report which will be certified by the Designer and forwarded to the PWGSC Commissioning Manager who reserves the right to verify a percentage of all reported results at no cost to the contract.

- .3 Identification:** The PWGSC Commissioning Manager, in cooperation with the Property Manager, will establish an identification system for all systems and equipment which will reflect final MMS (Maintenance Management System) identification requirements. This will be reflected in the identification system used in the working documents by the Designer.

During commissioning and before hand-over and acceptance, the Designer, Contractor, Property Manager and PWGSC Commissioning Manager will cooperate to complete inventory data sheets and provide assistance to PWGSC forces in the full implementation of the MMS identification system.

- .4 Commissioning specifications:** Commissioning specifications will be developed and submitted at the same time as the Design Development Report. Final versions will be prepared by the Designer during the working document stage and inserted into the project specifications. PWGSC generic commissioning specifications will be provided and will be edited by the Designer so as to become project-specific. They may have to be supplemented by project-specific commissioning specifications prepared by the Designer, reviewed by the PWGSC Project Manager and approved by the PWGSC Commissioning Manager. They will also include samples of commissioning check list forms.

- .5 Installation Start-up Check Lists:** These are required to inform the PWGSC Commissioning Manager of those systems which are ready for commissioning. A generic list is provided by the PWGSC Commissioning Manager to the Designer, who will tailor them to meet the requirements of the project.. Where these are not available, they will be
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developed by the Designer and approved by the PWGSC Commissioning Manager.

- .6 **Static Verification report forms:** All product information relating to equipment and components supplied and installed on this project will be reported on approved Static Verification report forms similar to the samples attached to the commissioning specifications. Forms to be based on the CSA Z320-11 standard. Some Static Verification report forms already exist. Others will be prepared by the Designer, reviewed by the discipline specialists and approved by the PWGSC Commissioning Manager no later than 8 weeks after approval of shop drawings for the equipment concerned. Instructions for use will be included in the commissioning specifications. All completed Static Verification report forms will be certified by the Designer. After review and verification by the PWGSC Commissioning Manager, these report forms will be included in the Building Management Manual.
- .7 **Functional Performance Testing report forms:** All results of tests and commissioning will be entered on approved Functional Performance Testing report forms similar to the samples attached to the commissioning specifications. Forms to be based on the CSA Z320-11 standard. Others will be prepared by the Designer, reviewed by the discipline specialists and approved by the PWGSC Commissioning Manager no later than 8 weeks after approval of shop drawings for the equipment concerned. Instructions for use will be included in the commissioning specifications. All completed PV report forms will be certified by the Designer. After review and verification by the PWGSC Commissioning Manager, these report forms will be included in the relevant Commissioning Reports.
- .8 **Commissioning Reports:** The completed Functional Performance Testing report forms will be included in properly formatted Commissioning Reports. Before any reports are accepted, all reported results will be subject to verification by the PWGSC Commissioning Manager.
- .9 **Activities during the Warranty Period:** While all commissioning activities must be completed before the issuance of the Interim Certificate, it is anticipated that certain commissioning activities will be necessary during the Warranty Period, including:
 - fine tuning of environmental control systems.
 - adjustment of ventilation rates to promote good indoor air quality and reduce the deleterious effects of VOCs generated by off-gassing from construction materials and furnishings, etc..
- .10 **Tests to be performed by the Client:** Will be identified at a later stage.

9. Deliverables relating to the administration of commissioning

The Commissioning checklists will be revised to include provisions for testing all parameters to the full range of operating conditions and to check responses of all such equipment and systems under all conditions. This is required because the operation of all systems are of paramount importance to health, safety, comfort and welfare of occupants and users.

The completion of the renovations to the existing facilities within the stipulated time frame is essential to the continuance of Client's operations with minimum interruption.

Since access into secure or sensitive areas will be difficult after take-over, it is necessary to complete commissioning of occupancy equipment and systems in these areas before the

building is occupied.

- .1 **Commissioning Schedules:** Commissioning will be organized so that there will be no delays in the review and approvals process. The required milestones in the review, approval and commissioning process will be included in the commissioning specifications.
- .2 **Commissioning activities scheduling:** A detailed critical path schedule will be prepared by the Commissioning Agent and submitted to the Designer, PWGSC Commissioning Manager and PWGSC Project Manager for review and approval at the same time as the Construction and Completion Schedule. After approval, it will be incorporated into the Contractor's Construction and Completion Schedule. The Designer, Commissioning Agent, Contractor and PWGSC Commissioning Manager will monitor progress of commissioning against this schedule.
A separate detailed schedule in day-by-day format will be provided by the Commissioning Agent for commissioning of all systems and equipment. This schedule will include a detailed training schedule so as to demonstrate that there will be no conflicts with testing.

10. **Payments for commissioning**

The Contractor's commissioning will be included in the Contractor's base price.

11. **Commissioning process**

- .1 **General:** The Contractor shall perform the role of Commissioning Agent. This includes the responsibility for managing the commissioning process including monitoring, training, warranties, etc. The Project Commissioning Team and the Designer will be involved in the process, during their regular reviews, comment on the acceptability of the installations as they are installed, and in particular, witnessing tests of completed systems. The Commissioning Agent is not empowered to determine acceptability of installations. Contractor testing remains the responsibility of the individual sub-trades. However, tests will be witnessed by the Commissioning Agent and the Departmental Representative at their discretion. Acceptance of equipment and or systems lies solely with the parties normally granted this authority within the contract.

As defined in the specifications, there are a number of phases to commissioning - documentation, installation, testing and verification of the installed equipment and systems. Static, or pre-start, tests are defined for all equipment. These include duct and pipe pressure test and "megger" testing. Sign-off of the equipment by way of pre-start check sheets is outlined in the specifications. Once individual pieces of equipment or systems have been checked for conformance, start-up will be able to commence.

- .2 **Systems to be tested as required by codes:** Where testing is required as part of a regulatory process and where commissioning procedures are fully developed and are appropriate to the project, the PWGSC Commissioning Manager shall ensure that all tests as required by such codes are performed. The PWGSC Commissioning Manager will witness these tests as part of the Quality Assurance role.

.3 **Systems to be commissioned:**

.1 **Mechanical**

- .1 **HVAC System Testing:** It is envisaged that each piece of HVAC
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equipment will be initially started up, "bumped", in their "stand-alone" mode, i.e. without mechanical control and fire alarm interfaces being complete. During this period, pre-start checks will be completed and the relevant documentation completed. In the case of hydronic systems, after the pumps have been bumped and the pre-start checks completed, the cleaning process can commence. Items covered at this stage will be those which might have a detrimental effect on the operation of the particular item of equipment, such as noise and vibration, it is realized that the system balancing can have an effect on some parameters. Once individual pieces of equipment have been started up, the systems will be checked out in parallel with the control systems. System documentation will be completed by the Commissioning Agent before verification or training begins.

- .2 **Controls:** Testing and commissioning is specified in the specifications, and the acceptance of the control system is well defined. It is envisaged that the contractor testing i.e. point-by-point testing will be performed in parallel with contractor start up. A complete point-by-point verification will be done as part of system verification and will be witnessed by the Designer and PWGSC Commissioning Controls Specialist. The PWGSC Commissioning Manager may elect to participate. Demonstration of the controls systems will be witnessed by both the EMCS Commissioning Agent and the Contractor's Commissioning Agent prior to the thirty day Final Acceptance test. The final Commissioning is considered to be performed during these two stages and the only additional testing required at the end of the "Final Operational Test" would be the off seasonal test. System documentation will be completed by the Commissioning Agent and submitted for review before verification or training begins.

.2 **Electrical**

- .1 **Low Voltage Systems:** These systems, including Communication Systems, and low voltage lighting controls, will be checked out in accordance with the contract documents. Designer to witness system test.
- .2 **Alternate Power Systems:** Emergency lighting level outlined in the specification will be initially checked by switching off normal power feeds and checking coverage. Power availability will be checked at all required equipment requiring emergency power (e.g.. Lights).
- .3 **Electrically connected equipment:** Designer to witness all systems test.

.4 **Life Safety Systems:**

- .1 **Sprinkler / Standpipe:** Wet and Dry pipe station and sprinkler flow testing will be performed as part of the Fire Alarm System ULC 537 and 536 checks. Designer and Commissioning Agent to witness all
-

tests.

- .5 Fire Alarm Systems:** Fire Alarm System cannot be fully verified until all aspects of the life safety and security are completed. Contractor testing will include a complete verification in accordance with ULC-CAN-SS37-M90. Once the commissioning Agent has submitted a certification report all devices and zones will be demonstrated as to ULC 536. Designer and PWGSC Commissioning Manager to witness all tests.
- .6 Designer's commissioning verification:** The Designer is to witness all system and integrated system tests.
- .7 Documentation:**
 - .1** Building Management Manual will be compiled as separate manuals in English and French. The Designer will review and accept manuals.
 - .2** Record drawings will be provided for the Designer to produce "As Built" drawings. These drawings will comprise a combination of marked up contracts print information and updated contractor working drawings.
 - .3** Spare parts and maintenance materials: A comprehensive list of all spare parts and maintenance material provided under the contract is to be provided. This will become more detailed as recommended parts/tools are identified by the various manufacturers.
- .8 Training:** A comprehensive training plan will be provided by the Commissioning Agent to the operations staff in the final stages of commissioning. Specific requirements are to be included in the specification.
- .9 Warranty/Service Contracts:** A comprehensive list of all warranties and service contracts will be provided by the Contractor. This list will include standard one year warranties and any non-standard warranties.. Information on service contracts will provide a complete description of all items included in the contract.
- .10 Commissioning Schedule:** A critical path Commissioning Schedule to be provided by the Commissioning Agent within three (3) months after award of contract and incorporated in the main construction schedule. It will monitor progress of installation and the sequence of testing, commissioning, documentation, training. A separate detailed schedule in day by day format to be provided by the Commissioning Agent for commissioning of all equipment and systems. Training should be indicated on this schedule to ensure that that training does not conflict with testing.

12. Training Plan

- .1 General:** The following is the preliminary Training Plan and will be developed in greater detail as design progresses and as the working documents are developed. The commissioning schedule will indicate in detail how training will be implemented, the duration of each training session, the trainers, trainees, etc.
-

- .2 Development of the Training Plan:** The Training Plan shall be complete within 3 months after award of Contract.
- .3 Responsibilities:** The Designer will be responsible for training and will monitor all training activities including:
1. Preparation of agenda and outlines
 2. Videotaping of all sessions
- The Contractor will be responsible for implementation of training activities, quality of instruction and training materials and for coordination among the instructors.
- .4 Instructors:** Instructors and trainers will include the Designer, Contractor, factory-trained and certified equipment suppliers and manufacturers, factory-trained and certified maintenance specialist personnel and the service contractors holding service contracts for the following:
- EMCS
 - fire alarm systems and emergency systems
 - lighting control systems
 - and any other service contracts that may be implemented during this project.
- .5 Trainees:** These will include the Property Manager, building operators, maintenance staff, security staff, technical specialists as necessary and facility occupants as necessary.
- The following is a list of O&M personnel, property management staff and others requiring requisite training, and the PWGSC Commissioning Manager will coordinate their attendance at agreed-upon times.
- | | Number |
|--|--------|
| Facility Property Manager (already in place) | 1 |
| Operating staff: Building operators (already in place) | 2 |
| Maintenance staff: | N/A |
| Building Maintenance (already in place) | N/A |
| Service contractors (e.g. cleaning) | N/A |
| Security staff: (already in place): | N/A |
- .6 Prerequisite skills and qualifications:** To be identified.
- .7 Scheduling of training:** Training sessions relating to the design philosophy are to be given by the Designer and shall be presented within three months after award of contract. This will permit all involved in the construction and future operation of this facility to become familiar with all aspects of the design philosophy. If the O&M personnel have not been identified or are not available at this time, these sessions will be repeated during the Contractor-led training sessions. All training will be completed prior to issuance of the Interim Certificate.
- .8 Details of training:** Training will meet all identified qualification requirements of installed equipment and systems. Training will include:
1. All aspects of operation under all normal, emergency and "what-if" modes, over the full range of operating ranges.
 2. Detailed maintenance, troubleshooting, regular, preventive and Emergency maintenance.
 3. training will consist of the following elements, to be completed, with demonstration of completeness, before date of acceptance:
-

- .1 Random on-site familiarization and observations during construction, installation, layout of equipment, systems and components, start-up and testing of the work, access to approved shop drawings, equipment operating and maintenance data. On-site observations will include still-photo records as deemed necessary by the O&M personnel – particularly of concealed elements.
- .2 Hands-on instruction relating to start-up; shut-down; emergency procedures; features of controls; monitoring; servicing; maintenance; performance verification and commissioning; reasons for, results of and implications on associated systems of adjustment of set points of control, limit and safety devices; interaction among systems during integrated operation; and troubleshooting diagnostics. Other elements will include system operating sequences, step-by-step directions for operation of valves, dampers, switches, adjustment of control settings and other specialized training relating to installed systems. Duration will be as specified in the commissioning specifications.
- .3 Formal classroom sessions relating to functional and operational requirements, system philosophy, limitations of each system, and operation and use of Building Management Manual. Duration of these sessions will be as specified in the commissioning specifications, using space to be identified.
4. Training sessions on design philosophy, organized around the Building Management Manual and will include:
 1. overview of how each system is intended to operate
 2. description of design parameters and operating requirements
 3. description of operating strategies
 4. information to assist in troubleshooting system operating problems

.9 Training materials: Training materials will be in a form permitting future training procedures to be in the same degree of detail and will include at least the following:

- .1 "As-built" contract documents
- .2 Building Management Manual
- .3 TAB and Commissioning Check List reports
- .4 Digital photos
- .5 Manufacturers' training videos (after prior screening for suitability)
- .6 Equipment models

The number of hours for these training sessions must be identified – by equipment, systems, etc.

.10 Videotaping: Hands-on and classroom sessions may be videotaped for future reference and retraining but will be held only after all systems have been fully commissioned and value of taping has been determined. Production to be of professional quality and organized into several short modules to permit incorporation of changes. Videotaping shall be in digital format suitable for network storage using a standard Windows and Macintosh compatible format.

.11 Standard of training: Training will be in sufficient detail and of sufficient duration to ensure:

- .1. Safe, reliable, cost-effective, energy-efficient operation of all systems in normal and emergency modes and under all conditions,
 - .2. Effective ongoing inspection, measurements of system performance,
 - .3. Proper preventive maintenance diagnosis, troubleshooting,
 - .4. Ability to update documentation,
-

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

.12 Limitations: Long-term ongoing training will not be included. However, the training courses and training materials will permit further ongoing training as well as training of new personnel.

.13 Demonstrations: Training will include demonstrations by the trained personnel to show their confidence in, and depth of understanding of, all installed systems and equipment and to demonstrate completeness of their training.

.14 Manufacturers' video-based training: Where available from the manufacturer, video will be used as training tool after Engineer's review of videos and written approval at least three months prior to static completion. To be included in Construction and Completion Schedule.

- END OF SECTION -

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Commissioning forms to be completed for equipment, system and integrated system.
- .2 Related Sections:
 - .1 All applicable divisions

1.2 REFERENCES

- .1 CSA Z320: Building Commissioning

1.3 INSTALLATION/START-UP CHECK LISTS

- .1 Installation and startup checklists to be produced from the CSA Z320 checklist software. Where forms are not available through the software, produce independent checklists.
- .2 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.
- .3 Equipment manufacturer's installation/start-up check lists are acceptable for use as supplementary to the CSA Z320 forms. As deemed necessary by Consultant as engaged by the Departmental Representative supplemental additional data lists will be required for specific project conditions.
- .4 Use check lists for equipment installation and verification. Document check list verifying checks have been made, indicate deficiencies and corrective action taken.
- .5 Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to Departmental Representative. Check lists will be required during Commissioning and will be included in Operations and Maintenance Manual (OMM) at completion of project.
- .6 Use of check lists will be stringently used for equipment pre-start and start-up procedures.

1.4 COMMISSIONING FORMS

- .1 The Commissioning forms are generated by CSA Z320 commissioning Check Sheet software. Where a Z320 commissioning check sheet is not available for the equipment, provide the information required as follows:
 - .1 Static Verification

- .1 Equipment manufacturer information, includes nameplate information, parts list, layout confirmation
- .2 StartUp
 - .1 Operating instructions, maintenance guidelines and pertinent technical data and recommended checks that is necessary to prepare for start-up and functional testing and used during operation and maintenance of equipment.
- .3 Functional Performance Testing
 - .1 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 Contractor records of measured data and readings, separate from the information recorded on the forms taken during the functional testing of components and equipment to be provided with the completed commissioning checklists.
- .3 Strategy for Commissioning form use:
 - .1 Consultant as engaged by the Departmental Representative provides Contractor project-specific commissioning forms with Specification data included. Forms are included at the end of this section.
 - .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 as engaged by the Departmental Representative.
 - .9 Submit immediately after tests are performed.
 - .10 Reported results in true measured SI unit values.
 - .11 Provide Departmental Representative with originals of completed forms.
 - .12 Maintain copy on site during start-up, testing and commissioning period.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

EXHAUST FANS

Static Verification



REVISION #: _____

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

CUSTOMER: PWGSC
PROJECT: CRA Winnipeg Tax Centre Fit Up
FILE NUMBER: R.078618
DATE: DD / MM / YYYY

NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	
SERVICE		LOCATION	

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

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

EXHAUST FANS

Static Verification



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PROJECT: CRA Winnipeg Tax Centre Fit Up
FILE NUMBER: R.078618
DATE: DD / MM / YYYY

NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	
SERVICE		LOCATION	

AIR DISTRIBUTION SYSTEM	STATUS	COMMENTS
QUALITY OF DUCT CONSTRUCTION		
SUITABILITY OF DUCT FITTINGS		
DUCTWORK INSULATION		
WALL PENETRATIONS SEALED		
ACCESS FOR INSPECTION & SERVICING		
DUCT MOUNTED ACCESS DOORS CLOSED		
FIRE DAMPERS OPEN		

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

MOTORIZED DAMPER	SPECIFIED	SHOP DRAWINGS	INSTALLED
MANUFACTURER			
TYPE OR MODEL NO.			
SUPPLY DAMPER SIZE			
RETURN DAMPER SIZE			

MOTORIZED DAMPER	STATUS		
	NO. 1	NO. 2	NO. 3
DAMPERS			
DAMPER LOCATION			
AIR LEAKAGE AT SHUTOFF			
NO CRACKS AROUND DAMPER FRAME			
BLADES CLOSE FULLY, SEAL TIGHTLY			

EXHAUST FANS

Static Verification



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MOTORIZED DAMPER STROKES FULLY OPEN TO FULLY CLOSED			
DAMPER ACCESSIBLE & IDENTIFIED			

NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	
SERVICE		LOCATION	

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

GENERAL COMMENTS:

EXHAUST FANS

Static Verification



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CUSTOMER: PWGSC
PROJECT: CRA Winnipeg Tax Centre Fit Up
FILE NUMBER: R.078618
DATE: DD / MM / YYYY

POSITION/TITLE	SIGNATURE	DATE
Design Consultants		
Contractors/Subcontractor		

EXHAUST FANS

Start-Up



REVISION #: _____

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

CUSTOMER: PWGSC
PROJECT: CRA Renovations
FILE NUMBER: 17016
DATE: DD / MM / YYYY

SHEET INTENTIONALLY LEFT BLANK FOR INDIVIDUAL TO POPULATE AS NEEDED

GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE
Design Consultants		
Contractors/Subcontractor		

EXHAUST FANS
Functional Performance Testing



REVISION #: _____

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

CUSTOMER: PWGSC
PROJECT: CRA Renovations
FILE NUMBER: 17016
DATE: DD / MM / YYYY

SHEET INTENTIONALLY LEFT BLANK FOR INDIVIDUAL TO POPULATE AS NEEDED

GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE
Design Consultants		
Contractors/Subcontractor		

INSULATED MOLDED CASE CIRCUIT BREAKERS

Static Verification



REVISION #: _____

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

CUSTOMER: PWGSC
 PROJECT: CRA Winnipeg Tax Centre Fit Up
 FILE NUMBER: R.078618
 DATE: DD / MM / YYYY

BREAKER NAMEPLATE			
MANUFACTURER		TYPE	
SERIAL NO.		CATALOG NO.	
FRAME SIZE (F)		MOUNTING	B.I. <input type="checkbox"/> D.O. <input type="checkbox"/>

TRIP UNIT NAMEPLATE			
MANUFACTURER		SENSOR TAP	
TYPE		THERMAL MEMORY	ON <input type="checkbox"/> OFF <input type="checkbox"/>
CT RATIO		ZONE INTLK	
RATING PLUG(R)		TARGETS	

FUSE DATA	
MANUFACTURER	TYPE
SIZE	

ADDITIONAL NAMEPLATE			

DESCRIPTION	INSPECTED	N/A	COMMENTS
* BREAKER DATA COMPARES WITH DRAWINGS & SPECIFICATIONS			
PHYSICAL & MECHANICAL CONDITION			
ANCHORAGE & ALIGNMENT			
CLEANLINESS			
MECHANICAL OPERATION			
OPERATING MECHANISM			
CONTACTS			
ARC CHUTES			
CHARGING MECHANISM			
TRIP UNIT BATTERY			
TRIP & PICKUP INDICATORS			
ZONE INTERLOCKING			

* ACCEPTANCE TESTING ONLY

ELECTRICAL CONNECTIONS VERIFIED BY:	
<input type="checkbox"/>	CONNECTION TIGHTNESS
<input type="checkbox"/>	THERMOGRAPHIC SURVEY
<input type="checkbox"/>	MEASURED RESISTANCE

GENERAL COMMENTS:

INSULATED MOLDED CASE CIRCUIT BREAKERS

Static Verification



REVISION #: _____

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

CUSTOMER: PWGSC
PROJECT: CRA Winnipeg Tax Centre Fit Up
FILE NUMBER: R.078618
DATE: 24 / 02 / 2017

POSITION/TITLE	SIGNATURE	DATE
Building Operations and Maintenance Staff		
Contractors/Subcontractor		

THERMOSTATS

Static Verification



REVISION #: _____

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

CUSTOMER: PWGSC
PROJECT: CRA Renovations
FILE NUMBER: 17016
DATE: DD / MM / YYYY

ROOM	BMS TAG	VAV	CONTROLLER	MAKE	MODEL	SERIAL NUMBER

GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		
Cx Authority/ Commissioning Provider		
Design Consultants		

VAV BOX
Static Verification



REVISION #: _____

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

CUSTOMER: PWGSC
 PROJECT: CRA Winnipeg Tax Centre Fit Up
 FILE NUMBER: R.078618
 DATE: DD / MM / YYYY

NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	
SERVICE		LOCATION	

VARIABLE AIR VOLUME BOX						
MANUFACTURER, MODEL & TYPE	VAV-1	VAV-2	VAV-3	VAV-4	VAV-5	VAV-6
LOCATION						
SIZE						
FLOW (L/S) (DESIGN/ACTUAL)						
INLET DUCT LENGTH (MIN. 4 X DUCT I)						
SILENCER/ACOUSTIC DUCT INSTALLED						
VAV BOX UNDAMAGED						
VAV BOX SUPPORTED CORRECTLY						
IDENTIFICATION TAGS VISIBLE						
CONTROLS ACCESSIBLE						

REHEAT COILS	VAV-1	VAV-2	VAV-3	VAV-4	VAV-5	VAV-6
PIPING CORRECT						
PIPING IDENTIFIED						
PIPING INSULATED						
DRAIN INSTALLED						
AIR VENT INSTALLED						
SHUT OFF VALVE INSTALLED						
ACCESS DOORS INSTALLED						

REHEAT COILS	VAV-1	VAV-2	VAV-3	VAV-4	VAV-5	VAV-6
CONTROL VALVE OPERATION						
CONTROLS VERIFIED						
ENTERING AIR TEMPERATURE AT MAXIMUM AIR FLOW						
EXITING AIR TEMPERATURE AT MAXIMUM AIR FLOW						

GENERAL COMMENTS:

VAV BOX
Static Verification



REVISION #: _____

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

CUSTOMER: PWGSC
PROJECT: CRA Winnipeg Tax Centre Fit Up
FILE NUMBER: R.078618
DATE: DD / MM / YYYY

POSITION/TITLE	SIGNATURE	DATE
Design Consultants		
Contractors/Subcontractor		

VAV BOX

Start-Up



REVISION #: _____

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

CUSTOMER: PWGSC
PROJECT: CRA Renovations
FILE NUMBER: 17016
DATE: DD / MM / YYYY

SHEET INTENTIONALLY LEFT BLANK FOR INDIVIDUAL TO POPULATE AS NEEDED

GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE
Design Consultants		
Contractors/Subcontractor		

VAV BOX
Functional Performance Testing



REVISION #: _____

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

CUSTOMER: PWGSC
PROJECT: CRA Renovations
FILE NUMBER: 17016
DATE: DD / MM / YYYY

SHEET INTENTIONALLY LEFT BLANK FOR INDIVIDUAL TO POPULATE AS NEEDED

GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE
Design Consultants		
Contractors/Subcontractor		

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 This Section specifies roles and responsibilities of Commissioning Training.
- .2 Related Sections:
 - .1 Section 01 79 00 Training

1.2 TRAINEES

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

1.3 INSTRUCTORS

- .1 Departmental Representative will provide:
 - .1 Descriptions of systems.
 - .2 Instruction on design philosophy, design criteria, and design intent.
- .2 Contractor and certified factory-trained manufacturers' personnel: to provide instruction on the following:
 - .1 Start-Up, operation, shut-down of equipment, components and systems.
 - .2 Control features, reasons for, results of, implications on associated systems of, adjustment of set points of control and safety devices.
 - .3 Instructions on servicing, maintenance and adjustment of systems, equipment and components.
- .3 Contractor and equipment manufacturer to provide instruction on:
 - .1 Start-up, operation, maintenance and shut-down of equipment they have certified installation, started up and carried out functional performance 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 Static Verification Reports.
- .3 Project Manager, Commissioning Manager and Facility Manager will review training manuals.
- .4 Training materials to be in a format that permits future training procedures to same degree of detail.
- .5 Supplement training materials:
 - .1 Multimedia presentations.
 - .2 Manufacturer's training videos.
 - .3 Equipment models.

1.6 SCHEDULING

- .1 Include in Commissioning Schedule time for training.
- .2 Deliver training during regular working hours, training sessions to be 4 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, as applicable:
 - .1 Review of facility and occupancy profile.
 - .2 Functional requirements.

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 This section is limited to portions of the Building Management Manual (BMM) provided to Departmental Representative by Contractor.
- .2 Related Requirements
 - .1 All sections
- .3 Acronyms:
 - .1 BMM - Building Management Manual.
 - .2 Cx - Commissioning.
 - .3 HVAC - Heating, Ventilation and Air Conditioning.
 - .4 TAB - Testing, Adjusting and Balancing.
 - .5 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 BMM:
 - .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 BMM.
 - .2 Summary of architectural, structural, fire protection, mechanical and electrical systems installed and commissioned - as indicated in Section 1.4 of BMM.
 - .1 Including sequence of operation as finalized after commissioning is complete as indicated in Section 2.0 of BMM.
 - .3 Description of building operation under conditions of heightened security and emergencies as indicated in Section 2.0 of BMM.
 - .4 System, equipment and components Maintenance Management System (MMS) identification - Section 2.1 of BMM..

- .5 Information on operation and maintenance of architectural systems and equipment installed and commissioned - Section 2.0 of BMM.
- .6 Information on operation and maintenance of fire protection and life safety systems and equipment installed and commissioned - Section 2.0 of BMM.
- .7 Information on operation and maintenance of mechanical systems and equipment installed and commissioned - Section 2.0 of BMM.
- .8 Operating and maintenance manual - Section 3.2 of BMM.
- .9 Final commissioning plan as actually implemented.
- .10 Commissioning test procedures employed.
- .11 Completed commissioning check list forms, approved and accepted by Departmental Representative.
- .12 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 BMM.
- .5 Include completed commissioning checklist 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, O M, 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 Existing LSC Manual will be provided by Departmental Representative.
- .2 Content of Manual:
 - .1 Provide updates as applicable.

- .2 Manual content to be 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 Commissioning checklist forms.
 - .3 Fire prevention, suppression and protection:
 - .1 Test reports.
 - .2 Installing contractors functional performance testing reports.
 - .4 Mechanical:
 - .1 Installation permits, inspection certificates.
 - .2 TAB and Commissioning checklist forms.
 - .3 Charts of valves.
 - .4 Copies of posted instructions.
 - .5 Electrical:
 - .1 Installation permits, inspection certificates.
 - .2 TAB and Commissioning checklist forms.
 - .3 Electrical work log book.
 - .4 Charts and schedules.
 - .5 Locations of cables and components.
 - .6 Copies of posted instructions.
- .2 Assist Departmental Representative with preparation of BMM.

1.8 LANGUAGE

- .1 English and French Language to be in separate binders.

1.9 IDENTIFICATION OF FACILITY

- .1 When submitting information to Departmental Representative for incorporation into BMM, use following system for identification of documentation:
 - .1 CRA Winnipeg Tax Center Fit Up Project R.078618

1.10 USE OF CURRENT TECHNOLOGY

- .1 Use current technology for production of documentation. Emphasis on ease of accessibility at all times, maintain in up-to-date state, compatibility with user's requirements.
 - .1 Provide bookmarked and indexed PDF copy of Manual.
 - .2 Update Owner's AutoCad DWG files.
- .2 Obtain Departmental Representative's approval before starting Work.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 NOT USED

- .1 Not used.

END OF SECTION