

PART 1 - GENERAL

1.1 ACCESS AND
EGRESS

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

1.2 USE OF SITE AND
FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
- .2 Maintain existing services to building and provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 Departmental Representative will assign sanitary facilities for use by Contractor's personnel. Keep facilities clean.
- .5 Use only elevators, existing in building for moving workers and material.
 - .1 Protect walls of passenger elevators, to approval of Departmental Representative prior to use.
 - .2 Accept liability for damage, safety of equipment and overloading of existing equipment.
- .6 Closures: protect work temporarily until permanent enclosures are completed.

1.3 ALTERATIONS,
ADDITIONS OR
REPAIRS TO EXISTING
BUILDING

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

1.4 EXISTING
SERVICES

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum.

Carry out interruptions after normal working hours of occupants, preferably on weekends.

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

1.5 SPECIAL REQUIREMENTS

- .1 Carry out noise generating Work Monday to Friday from 18:00 to 07:00 hours and on Saturdays, Sundays, and statutory holidays.
- .2 Submit schedule in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart.
- .3 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .4 Keep within limits of work and avenues of ingress and egress.
- .5 Ingress and egress of Contractor vehicles at site is limited to the north west corner of the site as indicated on the drawings.
- .6 Deliver materials outside of peak traffic hours 17:00 to 07:00 and 13:00 to 15:00 unless otherwise approved by Departmental Representative.

1.6 SECURITY

- .1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.
- .2 Security clearances:
 - .1 Personnel employed on this project will be subject to security check. Obtain clearance, as instructed, for each individual who will require to enter premises.
 - .2 Obtain requisite clearance, as instructed, for each individual required to enter premises.
 - .3 Personnel will be checked daily at start of work shift and provided with pass which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.
- .3 Security escort:
 - .1 Personnel employed on this project must be escorted when executing work in non-public areas during normal working hours. Personnel must be escorted in all areas after normal working hours.
 - .2 Escorts to be by Corps of Commissionaires with costs carried by General Contractor.

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WORK RESTRICTIONS

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1.7 BUILDING
SMOKING ENVIRONMENT

.1 Smoking is not permitted.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 ADMINISTRATIVE

- .1 Schedule project meetings throughout the progress of the Work.
- .2 Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative.
- .3 Provide physical space and make arrangements for meetings.
- .4 Preside at, and co-chair with consultant, project meetings.
- .5 Consultant will record the meeting minutes, which will include significant proceedings and decisions and identify actions by parties.
- .6 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETING

- .1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Senior representatives of Departmental Representative, Consultant, 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 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, colour chips. 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 specified equipment in accordance with Section 01 32 16.07 - Construction

Schedule - Bar (Gantt) Chart.

- .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, holdbacks.
- .13 Appointment of inspection and testing agencies or firms.
- .14 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

- .1 Consultant will chair progress meetings.
- .2 During course of Work schedule progress meetings bi-weekly.
- .3 Contractor, major Subcontractors involved in Work and Departmental Representative, Consultant and Owner are to be in attendance.
- .4 Notify parties minimum 7 days prior to meetings.
- .5 Incorporate progress meetings into schedule.
- .6 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 7 days after meeting.
- .7 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.

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PROJECT MEETINGS

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- .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 DEFINITIONS

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.
- .3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
- .5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.
- .6 Master Plan: summary-level schedule that identifies major activities and key milestones.
- .7 Milestone: significant event in project, usually completion of major deliverable.
- .8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

- .1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.
- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative within 7 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

1.4 PROJECT MILESTONES

- .1 Project milestones form interim targets for Project Schedule.
 - .1 Interim Certificate (Substantial Completion) by September 2, 2014.
 - .2 Commissioning Completion and Final Inspection by October 14, 2014.
 - .3 Final Certificate by November 3, 2014.

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 Structural Steel.
 - .6 Interior Architecture (Walls, Floors and Ceiling).
 - .7 Plumbing.
 - .8 Lighting.
 - .9 Electrical.
 - .10 Piping.
 - .11 Controls.
 - .12 Heating, Ventilating, and Air Conditioning.
 - .13 Millwork.
 - .14 Fire Systems.
 - .15 Testing and Commissioning.
 - .16 Supplied equipment long delivery items.
 - .17 Owner supplied equipment required dates.

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 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.
- .3 The final in-service date cannot be changed.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not used.

PART 3 - EXECUTION

<u>3.1 NOT USED</u>	.1	Not used.
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END OF SECTION

PART 1 - GENERAL

1.1 ADMINISTRATIVE

- .1 Submit to Departmental Representative and/or 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/or Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Departmental Representative and/or 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 coordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's and/or 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/or Consultant review.
- .10 Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS
AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data 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 of Canada.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 7 days for Departmental Representative's and Consultant's review of each submission.
- .5 Adjustments made on shop drawings by Departmental Representative and Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Departmental Representative and/or Consultant may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .8 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including

- identified field dimensions, and clearances.
- .3 Setting or erection details.
- .4 Capacities.
- .5 Performance characteristics.
- .6 Standards.
- .7 Operating weight.
- .8 Wiring diagrams.
- .9 Single line and schematic diagrams.
- .10 Relationship to adjacent work.
- .9 After Departmental Representative's and/or Consultant's review, distribute copies.
- .10 Submit an electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .11 Submit an electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit an electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
- .13 Submit an electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- .14 Submit an electronic copy 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 an electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .17 Submit an electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .18 Delete information not applicable to project.
- .19 Supplement standard information to provide details applicable to project.
- .20 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, electronic copy will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .21 The review of shop drawings by Public Works and Government Services Canada (PWGSC) and/or Consultant is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that PWGSC or Consultant approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 SAMPLES

- .1 Submit for review samples as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Consultant's business

address.

- .3 Notify Consultant 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 and/or Consultant 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 and/or Consultant may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 MOCK-UPS

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

1.5 PHOTOGRAPHIC DOCUMENTATION

- .1 Submit electronic copy of colour digital photography in jpg format, standard resolution monthly with progress statement and as directed by Departmental Representative and/or Consultant.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints: 4 locations.
 - .1 Viewpoints and their location as determined by Departmental Representative and/or Consultant.
- .4 Frequency of photographic documentation: as directed by Departmental Representative.
 - .1 Upon completion of: framing and services before concealment, of Work, and as directed by Departmental Representative and/or Consultant.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES AND
CODES

- .1 Perform Work in accordance with the most current National Building Code of Canada (NBC) including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.

1.2 HAZARDOUS
MATERIAL DISCOVERY

- .1 Asbestos: none identified. However, if encountered: 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.
- .2 Polychlorinated Biphenyl (PCB): none identified. However, if encountered: stop work immediately when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Departmental Representative.
- .3 Mould: none identified. However, if encountered: stop work immediately when material resembling mould is encountered during demolition work. Notify Departmental Representative.

1.3 BUILDING
SMOKING ENVIRONMENT

- .1 Smoking is not permitted. Comply with smoking restrictions and municipal by-laws.

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 INSPECTION

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

1.2 INDEPENDENT
INSPECTION AGENCIES

- .1 Independent Agencies required in accordance with Section 07 84 00 - Fire Stopping and Section 03 30 00 - Cast-in-Place Concrete, or elsewhere specified. Costs of such services will be borne by the Contractor.
- .2 Additional Independent Inspection/Testing Agencies may be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work not identified in the specification. Cost of such services will be borne by Departmental Representative.
- .3 Provide equipment required for executing inspection and testing by appointed agencies.
- .4 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .5 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost

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- 1.3 ACCESS TO WORK
- .1 to Departmental Representative. Pay costs for retesting and reinspection.
Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
 - .2 Co-operate to provide reasonable facilities for such access.
- 1.4 PROCEDURES
- .1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
 - .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
 - .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.
- 1.5 REJECTED WORK
- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
 - .2 Make good other Contractor's work damaged by such removals or replacements promptly.
 - .3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.
- 1.6 REPORTS
- .1 Submit 4 copies of inspection and test reports to Departmental Representative.
 - .2 Provide copies to subcontractor of work being inspected or tested.
- 1.7 TESTS AND MIX DESIGNS
- .1 Furnish test results and mix designs as requested.
 - .2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by

<u>1.8 MOCK-UPS</u>		Departmental Representative and may be authorized as recoverable.
	.1	Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
	.2	Construct in locations acceptable to Departmental Representative.
	.3	Prepare mock-ups for Departmental Representative review with reasonable promptness and in orderly sequence, to not cause delays in Work.
	.4	Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
	.5	If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.
	.6	Remove mock-up at conclusion of Work or when acceptable to Departmental Representative.
<u>1.9 MILL TESTS</u>	.1	Submit mill test certificates as required of specification Sections.
<u>1.10 EQUIPMENT AND SYSTEMS</u>	.1	Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.
	.2	Refer to Section 23 05 93 - Testing, Adjusting, Balancing for HVAC, for definitive requirements.
<u>PART 2 - PRODUCTS</u>		
<u>2.1 NOT USED</u>	.1	Not Used.
<u>PART 3 - EXECUTION</u>		
<u>3.1 NOT USED</u>	.1	Not Used.

END OF SECTION

PART 1 - GENERAL

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| <u>1.1 PRECEDENCE</u> | .1 | For Federal Government Projects, Division 01 Sections take precedence over technical specifications in other Divisions of this Project Manual. |
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| <u>1.2 REFERENCES</u> | .1 | American National Standard Institute (ANSI)/American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
.1 ANSI/ASHRAE 52.2-[12], Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particulate Size (ANSI approved). |
| | .2 | Canadian General Standards Board (CGSB)
.1 CAN/CGSB-92.1-[1989], Sound Absorptive Prefabricated Acoustical Units. |
| | .3 | Carpet and Rug Institute (CRI)
.1 Green Label Program.
.2 Green Label Plus Program. |
| | .4 | CSA Group
.1 AAMA/WDMA/CSA 101/I.S.2/A440-[11], NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights.
.2 CAN/CSA-B45.0 Series-[02 (R2008)], Plumbing Fixtures.
.3 CAN/CSA-Z809-[08], Sustainable Forest Management. |
| | .5 | Environmental Choice Program
.1 CCD-016-[97 (R2005)], Thermal Insulation Materials.
.2 CCD-020-[95 (R2007)], Gypsum Wallboard.
.3 CCD-029-[96], Water Conserving Products.
.4 CCD-045-[95], Sealant and Caulking Compounds.
.5 CCD-046-[95], Adhesives.
.6 CCD-047-[98 (R2005)], Architectural Surface Coatings.
.7 CCD-048-[95 (R2006)], Surface Coatings - Recycled Water-Borne.
.8 CCD-127-[95], Recycled Plastic Products.
.9 CCD-144-[2003], Naturally-Derived Phenol Substitutes.
.10 CCD-150-[2004], Steel for Use in Construction Products.
.11 CCD-152-[2001 (R2005)], Flooring Products.
.12 CCD-167-[2007], Mosaic Tiles. |
| | .6 | Forest Stewardship Council (FSC)
.1 FSC-STD-01-001-[2004], FSC Principle and Criteria for Forest Stewardship. |

- .7 Green Seal Environmental Standards (GS)
 - .1 GS-03-[97], Environmental Criteria for Anti-Corrosive Paints.
 - .2 GS-11-[11], Standard for Paints and Coatings.
- .8 National Air Duct Cleaners Association (NADCA)
 - .1 NADCA ACR-[2006], Assessment Cleaning and Restoration.
 - .2 NADCA Standard 05-[1997], Requirements for the Installation of Service Openings in HVAC Systems.
- .9 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1113-[A2011], Architectural Coatings.
 - .2 SCAQMD Rule 1168-[A2005], Adhesives and Sealants Applications.
- .10 Scientific Certification Systems (SCS)
 - .1 FloorScore Program [2012].
- .11 Sheet Metal and Air Conditioning National Contractors Association (SMACNA)
 - .1 IAQ Guideline for Occupied Buildings Under Construction, 2007.
- .12 Sustainable Forestry Initiative (SFI)
 - .1 SFI-[2010-2014] Standard.
- .2 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .3 Material Safety Data Sheets (MSDS)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section [01 33 00 - Submittal Procedures].
- .2 Submittals required:
 - .1 Use Report indicating understanding of requirement to use materials and methods of construction, which improve energy and water efficiency, reduce hazardous by-products, and use recycled materials, or materials, which can be reused.
 - .2 Submit Chlorofluorocarbon (CFC) inventory report for all new equipment.
- .3 Submit [2] copies of WHMIS MSDS in accordance with Health Canada / Workplace Hazardous Materials Information System (WHMIS). Indicate VOC emissions, prior to installation or use:
 - .1 Adhesives.
 - .2 Caulking compounds.

- .3 Sealants.
- .4 Insulating materials.
- .5 Fireproofing or fire stopping materials.
- .6 Paints.
- .7 Carpets.
- .8 Floor and wall patching or levelling materials.
- .9 Lubricants.
- .10 Clear finishes for wood surfaces.

.4 Construction Schedule:

- .1 Submit schedule of construction prior to start of work, in co-ordination with scheduling requirements, including:
 - .1 Sequence of finish applications and allowances for curing times.
 - .2 Schedule and duration of proposed temporary ventilation.
 - .3 Delivery schedules of manufactured materials which are anticipated to off-gas in timely manner, which will allow for airing of those materials prior to their scheduled installation.
 - .4 Indicate and schedule commissioning procedures and temporary usages of building mechanical systems, identifying types of filtration and schedule for filter replacement.

.5 IAQ Management Plan:

- .1 Submit Indoor Air Quality (IAQ) Management Plan for construction and preoccupancy phases of building.

1.4 HAZARDOUS MATERIALS

- .1 Follow methods and procedures specified in Section 02 81 01 - Hazardous Materials.
- .2 Take measures to ensure chemical spills do not enter drains.

1.5 INDOOR AIR QUALITY

- .1 IAQ Performance
 - .1 Comply with minimum indoor air performance requirements. Total volatile organic compounds level requirements include formaldehyde:
 - .1 Product emission rate measured in g/L.
 - .2 4-Phenyl Cyclohexene (4-PC) Emission Rates as per the Carpet and Rug Institutes Green Label [Plus] program:
 - .1 Product emission rate measured in µg/m² hr.
 - .2 Indoor Environmental Quality
 - .1 Reduce quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant

health and comfort as indicated.

.2 Minimize cross-contamination of regularly occupied occupancy areas by chemical pollutants.

.1 Include drains plumbed for appropriate disposal of liquid waste in spaces where water and chemical concentrate mixing occurs.

.2 Construction IAQ Management Plan

.1 Develop and implement Indoor Air Quality (IAQ) Management Plan for construction and pre-occupancy phases of building as follows:

.1 During construction: meet or exceed minimum requirements of SMACNA IAQ Guideline for Occupied Buildings under Construction.

.2 Protect stored on-site or installed absorptive materials from moisture damage.

.3 Replace filtration media immediately prior to occupancy.

.1 Filtration media: in accordance with ASHRAE 52.2, Minimum Efficiency Reporting Value (MERV) of [8].

.4 Adopt IAQ management plan during construction procedures, including:

.1 Protection of HVAC system during construction to control pollutant sources, and interrupt pathways for contamination.

.2 Sequence installation of materials to allow dissipation of high emissions from finishes that off-gas high quantities of emissions during curing to avoid contamination of absorptive materials.

.3 Erect appropriate noise and dust barriers where demolition or construction procedures are to occur adjacent to occupied space.

.1 Take necessary steps to minimize interference with occupants in occupied spaces.

.4 Permanent HVAC system [may be used] as approved in writing by [Departmental Representative] to move both supply and return air during construction process. Meet following conditions:

.1 Install and maintain filters with efficiency rating of MERV 8.

.2 Do not use permanent diffusers.

.3 Do not use plenum type return air system.

.4 Seal HVAC duct system to

prevent spread of airborne particulate and other contaminants.
.5 Vacuum dust systems prior to occupancy.
.1 Use portable HEPA vacuums, certified clean in accordance with NADCA specifications.

1.6 GENERAL
CONSTRUCTION
MATERIALS/PRACTICES

- .1 Materials and Resources
 - .1 Use uncontaminated demolition materials for fill and hardcore and/or granular base.
 - .2 Incorporate reused building materials as indicated.
 - .3 Provide list of non-endorsed products and services, provided the green labelled product or services are capable of meeting specified performance requirements.
- .2 Construction Waste Management
 - .1 Follow recommendations and requirements of this projects construction, renovation and demolition (CRD) waste management plan in accordance with Section 01 74 21 - Construction/ Demolition Waste Management And Disposal.
 - .2 Resource Reuse
- .3 Recycled Content
 - .1 Use materials with post-consumer and post-industrial recycled content.
- .4 Local/Regional Materials
 - .1 Use systems and materials having 10%, by cost, of total products or materials manufactured within 800 kilometers if transported by truck or 2400 kilometers if transported by rail or water of project site.
- .5 Rapidly Renewable Materials
 - .1 Use systems and materials that originate from renewable sources.
- .6 Wood
 - .1 Use lumber sourced from independently certified well-managed forests in accordance with CAN/CSA-Z809 or FSC or SFI
 - .2 Materials made from composite wood materials or agricultural products: must not contain urea-formaldehyde resins.

1.7 PAINTS,
STAINS, AND
VARNISHES

- .1 Use paints and coatings with VOC limits that do not exceed those established in Green Seal Standard GS-11, Paints, First Edition, May 20, 1993. (see table below)
- .2 Use clear wood finishes, floor coatings, stains, primers, and shellacs with VOC limits that do not exceed those established in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004. (see table below)

PRODUCT TYPE	REFERENCE STANDARD	VOC LIMIT (g/L MINUS WATER)
Interior Flat Coating or Primer	Green Seal GS-11, 1993	50
Interior Non-Flat Coating or Primer	Green Seal GS-11, 1993	150
Anti-Corrosive/Anti-Rust Paint	Green Seal GC-03, 2 nd Edition, 1997	250
Clear Wood Finishes: Lacquer	SCAQMD Rule 1113, 2004	550
Clear Wood Finishes: Sanding Sealers	SCAQMD Rule 1113, 2004	350
Clear Wood Finishes: Varnish	SCAQMD Rule 1113, 2004	350
Clear Brushing Lacquer	SCAQMD Rule 1113, 2004	680
Floor Coatings	SCAQMD Rule 1113, 2004	100
Sealers and Undercoaters	SCAQMD Rule 1113, 2004	200
Shellac: Clear	SCAQMD Rule 1113, 2004	730
Shellac: Pigmented	SCAQMD Rule 1113, 2004	550
Stain	SCAQMD Rule 1113, 2004	250
Concrete-Curing Compounds	SCAQMD Rule 1113, 2004	350

Japans/Faux Finishing Coatings	SCAQMD Rule 1113, 2004	350
Magnesite Cement Coatings	SCAQMD Rule 1113, 2004	450
Pigmented Lacquer	SCAQMD Rule 1113, 2004	550
Waterproofing Sealers	SCAQMD Rule 1113, 2004	250
Waterproofing Concrete/Masonry Sealers	SCAQMD Rule 1113, 2004	400
Wood Preservatives	SCAQMD Rule 1113, 2004	350
Low-Solids Coatings	SCAQMD Rule 1113, 2004	120*
*Note: VOC levels for Low-Solids Coatings are measured in grams of VOC per litre of material, including water.		

- .3 Use anti-corrosive and anti-rust paints applied to interior ferrous metal substrates that do not exceed VOC content limit of 250g/L established in Green Seal Standard GC-03, Anti-Corrosive Paints, Second Edition, January 7, 1997. (see table below)

COATING TYPE	(g/L) MINUS WATER
Gloss	250
Semi-Gloss	250
Flat	250

1.8 SEALANTS, ADHESIVES AND COMPOUNDS

- .1 Use adhesive and sealant products that do not exceed VOC content limits to [SCAQMD Rule 1168]. (see table below)

ARCHITECTURAL APPLICATIONS	VOC LIMIT (g/L less water)	SPECIALTY APPLICATIONS	VOC LIMIT (g/L less water)
Indoor Carpet Adhesive	50	PVC Welding	510

Carpet Pad Adhesives	50	CPVC Welding	490
Wood Flooring Adhesives	100	ABS Welding	325
Rubber Floor Adhesives	60	Plastic Cement Welding	250
Subfloor Adhesives	50	Adhesive Primer for Plastic	550
Ceramic Tile Adhesives	65	Contact Adhesive	80
VCT & Asphalt Adhesives	50	Special Purpose Contact Adhesive	250
Drywall & Panel Adhesives	50	Structural Wood Member Adhesive	140
Cove Base Adhesives	50	Sheet Applied Rubber Lining Operations	850
Multipurpose Construction Adhesive	70	Top & Trim Adhesives	250
Structural Glazing Adhesives	100		

SUBSTRATE SPECIFIC APPLICATIONS	VOC LIMIT (g/L less water)	SEALANTS	VOC LIMIT (g/L less water)
Metal to Metal	30	Architectural	250
Plastic Foams	50	Nonmembrane Roof	300
Porous materials (except wood)	50	Roadway	250
Wood	30	Single-Ply roof membrane	450

Fibreglass	80	Other (include duct sealants)	420
SEALANT PRIMERS			
Architectural , nonporous	250		
Architectural , porous	775		
Other	750		

- .2 Use aerosol adhesives that comply with Green Seal Standard for Commercial Adhesives GS-36 requirements in effect October 19, 2000. (see table below)

AEROSOL ADHESIVES:	VOC WEIGHT (g/L MINUS WATER)
General Purpose mist spray	65% VOCs by weight
General Purpose web spray	55% VOCs by weight
Special purpose aerosol adhesives (all Types)	70% VOCs by weight

1.9 FLOORING

- .1 Carpet systems: in compliance with [Carpet and Rug Institute Green Label Indoor [Plus] Air Quality Test Program] [for carpet tile Environmental Choice guideline CCD-025].
- .2 Undercushion materials: in compliance with the Carpet and Rug Institute Green Label Indoor [Plus] Air Quality Test Program.
- .3 Resilient flooring: in compliance with [FloorScore] [manufactured with recycled content].

1.10 HVAC EQUIPMENT

- .1 Identify sources of external contamination in writing to [Departmental Representative].
- .2 Include filtration system with MERV [8] to ASHRAE 52.2.

PART 2 - PRODUCTS

<u>2.1 NOT USED</u>	.1	Not Used.
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PART 3 - EXECUTION

<u>3.1 NOT USED</u>	.1	Not Used.
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END OF SECTION

PART 1 - GENERAL

1.1 ACTION AND
INFORMATIONAL
SUBMITTALS

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

1.2 INSTALLATION
AND REMOVAL

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

1.3 WATER SUPPLY

- .1 Continuous supply of potable water for construction use will be provided. Coordinate with Facility Management.
- .2 Pay for utility charges at prevailing rates.

1.4 TEMPORARY
HEATING AND
VENTILATION

- .1 Provision of temporary heating is not required during construction period.
- .2 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.
- .3 Permanent heating system of building, to be used when available. Be responsible for damage to heating system if use is permitted.
- .4 On completion of Work for which permanent heating system is used, replace filters and clean ducts and shafts.
- .5 Departmental Representative will pay utility charges when temporary heat source is existing building equipment.
- .6 Maintain strict supervision of operation of heating and ventilating equipment to:

- .1 Conform with applicable codes and standards.
- .2 Enforce safe practices.
- .3 Prevent abuse of services.
- .4 Prevent damage to finishes.
- .5 Vent direct-fired combustion units to outside.

- .7 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.5 TEMPORARY POWER
AND LIGHT

- .1 Contractor to pay for temporary power during construction for temporary lighting and operating of power tools, to a maximum supply of 230 volts 30 amps.
- .2 Temporary power for electric cranes and other equipment requiring in excess of above is responsibility of Contractor.
- .3 Where lighting is required in addition to the existing lighting, provide and maintain temporary lighting throughout project, as required. Ensure level of illumination on all floors is not less than 162 lx.
- .4 Maximum power supply of 75 kVA, at 600 V, 3 phase, 60 Hz is available and will be provided for construction use at current cost rates. Connect to existing power supply in accordance with Canadian Electrical Code and provide meters and switching.
- .5 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Departmental Representative provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than 3 months.

1.6 TEMPORARY
COMMUNICATION
FACILITIES

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

1.7 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.

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TEMPORARY UTILITIES

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Page 3

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED
REQUIREMENTS

- .1 Not used.

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
.2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
- .2 Canadian Standards Association (CSA International)
.1 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
.2 CSA-0121-M1978(R2003), Douglas Fir Plywood.
.3 CAN/CSA-S269.2-M1987(R2003), Access Scaffolding for Construction Purposes.
.4 CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.

1.3 ACTION AND
INFORMATIONAL
SUBMITTALS

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

1.4 INSTALLATION
AND REMOVAL

- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, avenues of ingress/egress to fenced area and details of fence installation.
- .2 Indicate use of supplemental or other staging area, permitted to be located within the work area only.
- .3 Provide construction facilities in order to execute work expeditiously.
- .4 Remove from site all such work after use.

1.5 HOISTING

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

1.6 ELEVATORS

- .1 Designated existing and permanent elevators to be used by construction personnel and transporting of materials. Coordinate use with Departmental

Representative.

- .2 Provide protective coverings for finish surfaces of cars and entrances.

1.7 SITE
STORAGE/LOADING

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

1.8 CONSTRUCTION
PARKING

- .1 Parking will not be permitted on site.
- .2 Provide and maintain adequate access to project site.

1.9 OFFICES

- .1 Within the project space, provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table. Coordinate location of office with Departmental Representative.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors to provide their own offices as necessary. Direct location of these offices.

1.10 EQUIPMENT,
TOOL AND MATERIALS
STORAGE

- .1 Provide and maintain, in clean and orderly condition, lockable 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.

1.11 SANITARY
FACILITIES

- .1 Use of existing sanitary facilities in basement is permitted for work force.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition. Clean and maintain sanitary facilities.
- .3 Any damages sustained to existing sanitary facilities will be the Contractor's responsibility to fix/replace at a cost to the Contractor.

1.12 CONSTRUCTION
SIGNAGE

- .1 Provide and erect project sign, within three weeks of signing Contract, in a location designated by Departmental Representative.
- .2 Indicate on sign, name of Owner, Consultant and Contractor, of design style established by Departmental Representative.
- .3 No other signs or advertisements, other than warning signs, are permitted on site.
- .4 Locate project identification sign as directed by Departmental Representative.
- .5 Direct requests for approval to erect Consultant/Contractor signboard to Departmental Representative. For consideration general appearance of Consultant/Contractor signboard must conform to project identification site sign. Wording in both official languages.
- .6 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .7 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.

1.13 PROTECTION AND
MAINTENANCE OF
TRAFFIC

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
- .2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
- .3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
- .4 Protect travelling public from damage to person and property.
- .5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by

construction operations.

- .7 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .8 Dust control: adequate to ensure safe operation at all times.
- .9 Provide snow removal during period of Work.

1.14 CLEAN-UP

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

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Not used.

1.2 REFERENCES

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

1.3 INSTALLATION AND REMOVAL

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

1.4 GUARD RAILS AND BARRICADES

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

1.5 DUST TIGHT SCREENS

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

1.6 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 PUBLIC TRAFFIC FLOW

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

<u>1.8 FIRE ROUTES</u>	.1	Maintain access to property including overhead clearances for use by emergency response vehicles.
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<u>1.9 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY</u>	.1	Protect surrounding private and public property from damage during performance of Work.
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	.2	Be responsible for damage incurred.
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<u>1.10 PROTECTION OF BUILDING FINISHES</u>	.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.

<u>1.11 WASTE MANAGEMENT AND DISPOSAL</u>	.5	Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
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PART 2 - PRODUCTS

<u>2.1 NOT USED</u>	.1	Not Used.
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PART 3 - EXECUTION

<u>3.1 NOT USED</u>	.1	Not Used.
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END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

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

1.2 QUALITY

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

products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 STORAGE, HANDLING AND PROTECTION

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

1.4 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.

1.5 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.

1.6 QUALITY OF WORK

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

1.7 COORDINATION

- .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.

1.8 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.

1.9 REMEDIAL WORK

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

1.10 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.

1.11 FASTENINGS

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.12 FASTENINGS -
EQUIPMENT

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

1.13 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.

1.14 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. Stake and record location of capped service.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 EXISTING
SERVICES

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.
- .2 Remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

1.2 LOCATION OF
EQUIPMENT AND
FIXTURES

- .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Departmental Representative of impending installation and obtain approval for actual location.
- .4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.3 RECORDS

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 Record locations of maintained, re-routed and abandoned service lines.

1.4 ACTION AND
INFORMATIONAL
SUBMITTALS

- .3 On request of Departmental Representative, submit documentation to verify accuracy of field engineering 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 ACTION AND
INFORMATIONAL
SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit written request in advance of cutting or alteration which affects:
 - .1 Structural integrity of elements of project.
 - .2 Integrity of weather-exposed or moisture-resistant elements.
 - .3 Efficiency, maintenance, or safety of operational elements.
 - .4 Visual qualities of sight-exposed elements.
 - .5 Work of 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.

1.2 MATERIALS

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

1.3 PREPARATION

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

1.4 EXECUTION

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

1.5 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

<u>2.1 NOT USED</u>	.1	Not Used.
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PART 3 - EXECUTION

<u>3.1 NOT USED</u>	.1	Not Used.
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END OF SECTION

PART 1 - GENERAL

1.1 PROJECT
CLEANLINESS

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

1.2 FINAL CLEANING

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

tools, construction machinery and equipment.

- .4 Remove waste products and debris including 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.
- .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 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .14 Remove dirt and other disfiguration from exterior surfaces.
- .15 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .16 Sweep and wash clean paved areas.
- .17 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .18 Clean roofs, downspouts, and drainage systems.
- .19 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .20 Remove snow and ice from access to building.

<u>1.3 WASTE MANAGEMENT AND DISPOSAL</u>	.1	Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/ Demolition Waste Management And Disposal.
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PART 2 - PRODUCTS

<u>2.1 NOT USED</u>	.1	Not Used.
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PART 3 - EXECUTION

<u>3.1 NOT USED</u>	.1	Not Used.
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END OF SECTION

PART 1 - GENERAL

1.1 WASTE MANAGEMENT GOALS

- .1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PWGSC's Waste Management Plan and Goals.
- .2 PWGSC's Waste Management Goal 75% of total Project Waste to be diverted from landfill sites. Provide Departmental Representative documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced.
- .3 Accomplish maximum control of solid construction waste.
- .4 Preserve environment and prevent pollution and environment damage.

1.2 DEFINITIONS

- .1 Class III: non-hazardous waste - construction renovation and demolition waste.
- .2 Demolition Waste Audit (DWA): relates to actual waste generated from project.
- .3 Inert Fill: inert waste - exclusively asphalt and concrete.
- .4 Materials Source Separation Program (MSSP): consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.
- .5 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .6 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .7 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.
- .8 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.

.9 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

.10 Separate Condition: refers to waste sorted into individual types.

.11 Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.

.12 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill. Refer to Schedule A.

.13 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

.14 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).

1.3 DOCUMENTS

.1 Maintain at job site, one copy of following documents:

.1 Waste Audit (WA): Schedule A.

.2 Waste Reduction Workplan (WRW): Schedule B.

.3 Material Source Separation Plan.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit before final payment summary of waste materials salvaged for reuse, recycling or disposal by project using deconstruction/disassembly material audit form.

.1 Failure to submit could result in hold back of final payment.

.2 Provide receipts, scale tickets, waybills, and show quantities and types of materials reused, recycled, co-mingled and separated off-site or disposed of.

.3 For each material reused, sold or recycled

from project, include amount in tonnes and the destination.

.4 For each material land filled or incinerated from project, include amount in tonnes of material and identity of landfill, incinerator or transfer station.

1.5 WASTE AUDIT (WA)

- .1 Conduct WA throughout project duration with submittal of final audit upon project completion in accordance with 01 33 30.
- .2 Prepare WA: Schedule A.
- .3 Record, on WA - Schedule A, extent to which materials or products used consist of recycled or reused materials or products.

1.6 WASTE REDUCTION WORKPLAN (WRW)

- .1 Prepare WRW throughout project duration with submittal of final audit upon project completion in accordance with Section 01 33 00 - Submittal Procedures.
- .2 WRW should include but not limited to:
 - .1 Destination of materials listed.
 - .2 Deconstruction/disassembly techniques and sequencing.
 - .3 Schedule for deconstruction/disassembly.
 - .4 Location.
 - .5 Security.
 - .6 Protection.
 - .7 Clear labelling of storage areas.
 - .8 Details on materials handling and removal procedures.
 - .9 Quantities for materials to be salvaged for reuse or recycled and materials sent to landfill.
- .3 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.
- .4 Describe management of waste.
- .5 Identify opportunities for reduction, reuse, and recycling of materials. Based on information acquired from WA.
- .6 Post WRW or summary where workers at site are able to review content.
- .7 Set realistic goals for waste reduction, recognize existing barriers and develop strategies to overcome these barriers.
- .8 Monitor and report on waste reduction by

documenting total volume and cost of actual waste removed from project.

1.7 MATERIALS SOURCE SEPARATION PROGRAM (MSSP)

- .1 Prepare MSSP and have ready for use prior to project start-up.
- .2 Implement MSSP for waste generated on project in compliance with approved methods and as reviewed by Departmental Representative.
- .3 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
- .4 Provide containers to deposit reusable and recyclable materials.
- .5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
- .6 Locate separated materials in areas which minimize material damage.
- .7 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.
 - .1 Transport to approved and authorized recycling facility.
- .8 Collect, handle, store on-site, and transport off-site, salvaged materials in combined condition.
 - .1 Ship materials to site operating under Certificate of Approval.
 - .2 Materials must be immediately separated into required categories for reuse or recycling.

1.8 WASTE PROCESSING SITES

- .1 Province of: Manitoba
 - .1 Name: Manitoba Environment Building 2
 - .2 Telephone: 204-945-7100

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 do not become Contractor's property.
- .3 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .4 Protect structural components not removed for demolition from movement or damage.

- .5 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.
- .6 Protect surface drainage, mechanical and electrical from damage and blockage.
- .7 Separate and store materials produced during dismantling of structures in designated areas.
- .8 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
 - .1 On-site source separation is recommended.
 - .2 Remove co-mingled materials to off-site processing facility for separation.
 - .3 Provide waybills for separated materials.

1.10 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 least possible interference or disturbance to normal use of premises.
- .2 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.

Project No.:	CONSTRUCTION/DEMOLITION	Section 01 74 21
R.056754.002	WASTE MANAGEMENT AND DISPOSAL	Page 6

PART 2 - PRODUCTS

<u>2.1 NOT USED</u>	.1	Not Used.
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PART 3 - EXECUTION

<u>3.1 APPLICATION</u>	.1	Do Work in compliance with WRW.
	.2	Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.
<u>3.2 CLEANING</u>	.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.
	.4	Remainder of page intentionally left blank

.1 Schedule A - Waste Audit (WA):

[illegible]

3.4 WASTE REDUCTION WORKPLAN (WRW)

[illegible]

*Consistent units must be used throughout entire project.

3.5 CANADIAN
GOVERNMENTAL
DEPARTMENTS CHIEF
RESPONSIBILITY FOR
THE ENVIRONMENT

- .1 Government Chief Responsibility for the
Environment:

Province	Address	General Inquires
Manitoba	Manitoba Environment Building 2 139 Tuxedo Avenue, Winnipeg, MB R3N 0H6	204-945-7100

END OF SECTION

PART 1 - GENERAL

1.1 ADMINISTRATIVE
REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Departmental Representative inspection.
 - .2 Departmental Representative Inspection:
 - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 New equipment and systems: tested, adjusted and balanced and fully operational.
 - .4 Certificates required by Fire Commissioner Utility companies: submitted.
 - .5 Operation of systems: demonstrated to Owner's personnel.
 - .6 Commissioning of mechanical systems: completed in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and and copies of final Commissioning Report submitted to Departmental Representative.
 - .7 Work: complete and ready for final inspection.
- .4 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.
 - .2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

1.2 FINAL CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/ Demolition Waste

Management and Disposal.

PART 2 - PRODUCTS

<u>2.1 NOT USED</u>	.1	Not Used.
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PART 3 - EXECUTION

<u>3.1 NOT USED</u>	.1	Not Used.
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END OF SECTION

PART 1 - GENERAL

1.1 ADMINISTRATIVE
REQUIREMENTS

- .1 Pre-warranty Meeting:
 - .1 Convene meeting one week prior to contract completion with contractor's representative and Departmental Representative, in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify Project requirements.
 - .2 Review manufacturer's installation instructions and 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.

1.2 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 Representative, four final copies of operating and maintenance manuals in English.
- .3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .4 Provide evidence, if requested, for type, source and quality of products supplied.

1.3 FORMAT

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings.
 - .1 Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed

title 'Project Record Documents'; list title of project and identify subject matter of contents.

- .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.
 - .1 Bind in with text; fold larger drawings to size of text pages.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

- .1 Table of Contents for Each Volume: provide title of project;
 - .1 Date of submission; names.
 - .2 Addresses, and telephone numbers of 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.

1.5 AS -BUILT
DOCUMENTS AND
SAMPLES

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

1.6 RECORDING
INFORMATION ON
PROJECT RECORD
DOCUMENTS

- .1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Departmental Representative.
- .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress.
 - .1 Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

- .4 Field changes of dimension and detail.
- .5 Changes made by change orders.
- .6 Details not on original Contract Drawings.
- .7 References to related shop drawings and modifications.

- .5 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.
- .7 Provide digital photos, if requested, for site records.

1.7 EQUIPMENT AND SYSTEMS

- .1 For each item of equipment and each system include description of unit or system, and component parts.
 - .1 Give function, normal operation characteristics and limiting conditions.
 - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 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.
- .15 Additional requirements: as specified in individual specification sections.

1.8 MATERIALS AND FINISHES

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

1.9 MAINTENANCE MATERIALS

- .1 Spare Parts:
 - .1 Provide spare parts, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.

- .3 Deliver to site; 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; 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; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.

1.10 DELIVERY,
STORAGE AND
HANDLING

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

1.11 WARRANTY TAGS

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

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 ADMINISTRATIVE
REQUIREMENTS

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of final inspection.
- .2 Owner: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.
- .3 Preparation:
 - .1 Verify conditions for demonstration and instructions comply with requirements.
 - .2 Verify designated personnel are present.
 - .3 Ensure equipment has been inspected and put into operation in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements.
 - .4 Ensure testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and equipment and systems are fully operational.
- .4 Demonstration and Instructions:
 - .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the equipment location.
 - .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
 - .3 Review contents of manual in detail to explain aspects of operation and maintenance.
 - .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.
- .5 Time Allocated for Instructions: ensure amount of time required for instruction of each item of equipment or system as follows:
 - .2 Section 23 34 00 - HVAC Fans, Section 23 36 00 - Air Terminal Units, Section 23 72 00 - Air-to-Air Energy Recovery Equipment, Section 23 73 11 - Air Handling Units - Packaged, Section 23 81 23 - Computer Room Air Conditioning, 23 82 19 - Dx Fan Coil Units: 6 hours of instruction.
 - .3 Section 25 05 01 - EMCS: General Requirements: 3 hours of instruction.
 - .4 Section 22 42 02 - Plumbing Fixtures, Section 22 42 03 - Washroom Fixtures: 1 hours of instruction.
 - .5 Section 26 32 00 - Packaged Generator Assemblies: 2 hours of instruction, Section 27 51 19 - Sound Masking System: 2 hours of instruction, and Section 28 23 00 - Video Surveillance CCTV System: 2 hours of instruction.

1.2 ACTION AND
INFORMATIONAL
SUBMITTALS

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

1.3 QUALITY
ASSURANCE

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

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Acronyms:

- .1 Cx - Commissioning
- .2 CxA - Commissioning Authority
- .3 EMCS - Energy Monitoring and Control Systems.
- .4 O&M - Operation and Maintenance.
- .5 PI - Product Information
- .6 PV - Performance Verification
- .7 BMM - Building Management Manual
- .8 TAB - Testing, Adjusting and Balancing.

1.2 GENERAL

- .1 Commissioning is a formal, systematic process intended to ensure that building systems perform interactively according to the design intent and the owner's operational needs. This is achieved starting in the design phase by documenting design intent and continuing through construction, acceptance and the warranty period with the actual verification of performance.
- .2 Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:
 - .1 Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted standards and that they receive adequate operational checkout by installing contractors.
 - .2 Verify and document proper performance of equipment and systems.
 - .3 Verify that O&M documentation left on site is complete.
 - .4 Verify that the Owner's operating personnel are adequately trained.
- .3 In cooperation with the CxA, the Contractor is responsible for demonstrating 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 tested 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.

1.3 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

- .1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, the Contractor shall correct deficiencies, re-verify equipment and components within the non-functional system, including related systems as deemed required by the CxA and/or related design authority, to ensure effective performance.
- .2 Contractor costs for corrective work, additional tests, and inspections to ensure proper performance of such items to be borne by Contractor.

1.4 COORDINATION

- .1 The following are members of the commissioning team:
 - .1 PWGSC Commissioning Authority
 - .2 Commissioning Agent (CxA)
 - .3 Project Manager (PM)
 - .4 Architect and Sub-consultants (Departmental Representative)
 - .5 General Contractor (Contractor)
 - .6 Mechanical Contractor (MC)
 - .7 Electrical Contractor (EC)
 - .8 TAB representative (TAB)
 - .9 Controls Contractor (CC)
 - .10 Any other installing subcontractors or suppliers of equipment.
- .2 The CxA will provide the General Contractor with Cx schedule input for inclusion in the project schedule.

1.5 COMMISSIONING PROCESS

- .1 Commissioning during construction begins with a scope meeting conducted by the CxA and Commissioning Authority where the commissioning process is reviewed with the commissioning team members.
- .2 Additional meetings will be scheduled by the CxA with necessary parties to coordinate Cx activities and resolve problems.

- .3 Equipment documentation is submitted to the CxA and Commissioning Authority during normal submittals, including detailed start-up procedures.
 - .4 The CxA develops and keeps up-to date a Commissioning Plan throughout all aspects of the design, construction and occupancy phases.
 - .5 The CxA reviews the Contractor's start-up plans and start-up documentation formats.
 - .6 The CxA provides PI forms, to be completed by the Contractor.
 - .7 The Contractors, under their own direction, execute and document the PI form checklists and perform start-up and initial checkout. The CxA documents that the checklists and start-up were completed according to the approved plans. This may include the CxA witnessing start-up of selected equipment.
 - .8 The CxA, in conjunction with the Contractor, coordinates specific equipment and system functional performance test procedures.
 - .9 The procedures are executed by the Contractors, and witnessed and documented by the CxA.
 - .10 The CxA reviews the O&M documentation for completeness.
 - .11 The CxA will review the training program provided by the Contractors and verifies that it was completed.
 - .12 Seasonal testing will be deferred as required, and remains the responsibility of Contractor and CxA.
- 1.6 CONFLICTS (BETWEEN SPECIFICATION SECTIONS)
- .1 Report conflicts between requirements of this section and other specification sections to the General Contractor before start-up and obtain clarification.
 - .2 Failure to report conflict and obtain clarification (through RFI process) will result in application of the Departmental Representative's intent on the issue.
- 1.7 SUBMITTALS
- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 The CxA shall provide the following prior to start of Cx:
Cx:

- .1 Cx plan, PI forms
- .2 Upon completion of Cx, the CxA shall provide the following documentation:
 - .1 Review of BMM, to enhance O & M manual, including information on system design, operation schedules, training documentation, commissioning results and re-commissioning requirements. The development of the BMM is the responsibility of the Contractor and Departmental Representative.
 - .2 Plan for occupant concern reporting and subsequent investigation process.
 - .3 Final Cx report.

1.8 COMMISSIONING SCHEDULE

- .1 The CxA will provide Cx schedule requirements for inclusion in the construction schedule.
- .2 The General Contractor will provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
 - .1 Verification of reported results.
 - .2 Repairs, retesting, re-commissioning, re-verification.
 - .3 Training.
- .3 The CxA will work with the Contractor according to established protocols to schedule the commissioning activities.
- .4 All parties are responsible to address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

1.9 SYSTEMS TO BE COMMISSIONED

- .1 The following systems will be commissioned for this project (if applicable):

Equipment and System

Lighting control
Standby power generation system relating to renovation
Exhaust Fans
Supply Fans
Perimeter Radiation
Fan Coils
VAVs
Electric Reheat Coils
Transfer Fans
Force Flow/Unit Heaters
Rooftop Unit
Unit Heaters

Electric Humidifiers
Domestic Hot Water System relating to
renovation
Split System A/C
Energy Recovery Ventilation
Central Building Automation System

1.10 RESPONSIBILITIES

- .1 The responsibilities of various parties in the commissioning process are provided in this section.
- .2 It is noted that the services for the Commissioning Authority, Departmental Representatives, and Commissioning Agent are not provided for in this contract: that is, the Contractor is not responsible for providing their services. Their responsibilities are listed here to clarify commissioning responsibilities.

Note: The contractors are responsible for their part in the commissioning and testing; the Owner is not paying as extra.

- .3 All parties:
 - .1 Attend commissioning scope meeting and additional meetings, as necessary.
- .4 Commissioning Authority
 - Construction and Acceptance Phase*
 - .1 Champion and support the commissioning process.
 - .2 Provide final acceptance of Contractor test results, test and balance work and of the project.
 - .3 Attend commissioning specific pre-construction, planning and coordination meetings. Work with the Commissioning Agent to review and update, if necessary, the Commissioning Plan.
 - .4 Work with Contractor and the Commissioning Agent to prepare a comprehensive training program for the systems being commissioned.
 - .5 Work with Contractor and the Commissioning Agent to schedule each training session with the appropriate O&M personnel.

Warranty Period

- .6 Assist the CxA as necessary in the seasonal or deferred testing and deficiency corrections required by the specifications.
- .7 Make O&M personnel available for CxA to assist in reviewing operation of the facility.
- .8 Participate in the resolution of issues identified during the commissioning process.

.5 Departmental Representative (Architect)

Construction and Acceptance Phase

- .1 Review Contractor submittals for compliance with contract documents and support Commissioning Agent's submittal review for commissioning issues.
- .2 Update Design Intent Document to reflect any changes made to the systems being commissioned during the construction phase.
- .3 Attend the commissioning scoping meeting and selected commissioning specific pre-construction, planning and coordination meetings.
- .4 Provide any design narrative documentation requested by the CxA.
- .5 Coordinate resolution of system deficiencies identified during commissioning, according to the contract documents.

Warranty Period

- .6 Coordinate resolution of design non-conformance and design deficiencies identified during warranty-period commissioning.

.6 Departmental Representatives (Design Consultants)

Construction and Acceptance Phase

- .1 Support Commissioning Agents's submittal review for commissioning issues.
- .2 Provide any design narrative and sequences documentation requested by the CxA. The Departmental Representative shall assist (along with the contractors) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
- .3 Attend commissioning scope meetings and other selected commissioning team meetings.
- .4 Update Design Intent Document to reflect any changes made to the system being commissioned during the construction phase.
- .5 Primary responsibility to witness, and to the greatest extent possible, participates in the following Contractor activities:
 - .1 Initial equipment start up
 - .2 Testing and Balancing
 - .3 Contractor's Performance Verification tests.
- .6 Review the Shop Drawings for all equipment for sufficiency prior to their use.

- .7 Review Performance Verification (PV) and System PV Test procedure forms for major pieces of equipment for sufficiency prior to their use.
- .8 Participate in the System PV Tests as an advisor when issues arise.
- .9 Develop BMM with Contractor.

Warranty Period

- .10 Participate in the resolution of non-compliance, non-conformance and design deficiencies identified during commissioning and warranty-period commissioning.

.7 Commissioning Agent (CxA)

The CxA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. The CxA may assist with problem-solving non-conformance or deficiencies, but ultimately that responsibility resides with the Contractor and Departmental Representatives. The primary role of the CxA is to develop and coordinate the execution of a testing plan, observe and document performance and verify that systems are functioning in accordance with the documented design intent and in accordance with the Contract Documents. The Contractors will provide all tools or the use of tools to start, checkout and functionally test equipment and systems.

Construction and Acceptance Phase

- .1 Coordinates the commissioning activities in a logical, sequential and efficient manner.
- .2 Coordinate the commissioning work and with the Contractor, ensure that commissioning activities are being scheduled into the master schedule.
- .3 Coordinate, track and archive commissioning Queries, Memos and Reports.
- .4 Conduct and document commissioning scoping meeting and commissioning specific pre-construction planning and coordination meetings.
- .5 Request and review additional information required to perform commissioning tasks, including O&M materials, contractor start-up and checkout procedures.
- .6 Before start-up, gather and review the current control sequences and work with contractors and design authority to establish performance verification requirements.
- .7 Receive and review construction documentation such as Request for Information, Architectural Supplemental Instructions, Bulletins, Change Orders, etc., for impact on commissioned systems.

- .8 Review Contractor submittals applicable to systems being commissioned for compliance with design documents and operational requirements. This Cx review is concurrent with design authority review and does not supercede said review.
- .9 Develop and distribute PI forms.
- .10 In conjunction with Contractor, ensure adequate PV testing.
- .11 Perform site visits, as necessary, to observe component and system installations.
- .12 Attend selected planning and job-site meetings to obtain information on construction progress.
- .13 Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving any discrepancies.
- .14 Review and comment on the test and balance report, Contractor's training plans and test reports for conformance with specification requirements.
- .15 Verify, track and log component test completion, with support of Contractor and Sub-Contractors.
- .16 Review PI forms and PV checklist completion by selected site observation and spot-checking.
- .17 Review start-up reports by selected site observation.
- .18 Review TAB execution plan.
- .19 Ensure complete PV testing of the control system.
- .20 In conjunction with Contractor, the CxA will assist in developing comprehensive PV test plan and procedures.
- .21 The CxA will witness and document selected construction milestones, such as:
 - .1 Component testing (PI)
 - .2 Initial equipment start up
 - .3 Contractor's tests for individual system and integrated tests (PV)
- .22 The CxA will witness the following Contractor activities:
 - .1 PV Tests
- .23 Periodically report on commissioning process status to Commissioning Authority and Contractor.
- .24 Analyze any PV trend logs and monitoring data to verify performance.
- .25 Coordinate and document PV tests performed by installing contractors. Coordinate retesting as necessary until satisfactory performance is achieved.
- .26 Prepare regular commissioning reports that include noted deficiencies and status of corrective actions.

- .27 Update and maintain, in real time, a corrective action log and status.
- .28 Support the Contractor to prepare a comprehensive training program for the systems being commissioned.
- .29 Witness training of the Owner's operating personnel.
- .30 Review submitted O&M manuals.
- .31 Review Building Management Manual (BMM).
- .32 Provide a final commissioning report.

Warranty Period

- .33 Coordinate required seasonal or deferred testing and deficiency corrections.

.8 General Contractor:

Construction and Acceptance Phase

- .1 Facilitate the coordination of the commissioning work by the CxA.
- .2 With the CxA, ensure that commissioning activities are being scheduled into the master schedule.
- .3 Include the cost of commissioning in the total contract price. Ensure Contractor role in Cx is a line item on contractors cost breakdown and progress claims.
- .4 Ensure that all Contractors execute their commissioning responsibilities according to the Contract Documents and schedule.
- .5 The Commissioning Authority shall attend a commissioning scoping meeting and other necessary meetings scheduled by the CxA to facilitate the commissioning process.
- .6 Ensure Sub-Contractors complete Product Information (PI) forms and verify completion.
- .7 Provide input into the master scheduling process with regards to timing and duration of the commissioning activities.
- .8 Develop, coordinate and schedule training plan with Commissioning Authority and CxA.
- .9 Develop BMM with Departmental Representative.
- .10 Facilitate the following Contractor activities:
 - .1 Component testing
 - .2 Initial equipment start up testing
 - .3 System readiness checks
 - .4 Contractor's tests, PV Tests, and System PV Tests.
 - .5 Testing and Balancing
 - .6 All regulatory approvals.

- .11 Ensure all contractor-related deficiencies are corrected, that are identified during any stage of the commissioning process.

Warranty Period

- .12 Ensure that Contractors execute seasonal or deferred functional performance testing, witnessed by the CxA.
- .13 Ensure that Contractors correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

.9 Sub-Contractors (SC)

Construction and Acceptance Phase

- .1 Execute and complete PI form checklists for each piece of equipment.
- .2 Execute, document and complete PV and System PV tests for all applicable systems as listed in Section 1.10.
- .3 In conjunction with the CxA, develop system PV test procedures.
- .4 Provide list of test instruments that will be used as part of testing activities.
- .5 Correct all deficiencies identified during any stage of the commissioning process.
- .6 Provide a General Contractor approved start up plan to the CxA.
- .7 Provide all pre-test and start up documentation to the CxA.
- .8 Provide training plan to General Contractor and CxA for approval.

Warranty Period

- .9 Execute seasonal or deferred PV testing, witnessed by the CxA, according to the specifications.

Part 2 Products

2.1 Not used.

Part 3 Execution

3.1 MEETINGS

- .1 Scoping Meeting. The CxA will schedule, plan and conduct a commissioning scoping meeting with the entire commissioning

team in attendance. Meeting minutes will be distributed to all parties by the CxA.

- .2 Miscellaneous Meetings. Other meetings will be planned and conducted by the CxA as construction progresses. These meetings will cover coordination, deficiency resolution and planning issues with particular Contractors. The CxA will plan these meetings and will minimize unnecessary time being spent by Contractors.

3.2 SUBMITTALS

- .1 The CxA requires submittal documentation for facilitating the commissioning work. These requests will be integrated into the normal submittal process and protocol of the construction team. At minimum, the request will include the manufacturer and model number, the manufacturer's printed installation and detailed start-up procedures, full sequences of operation, O&M data, performance data, and any PV test procedures.
- .2 The Commissioning Agent will review submittals related to the commissioned equipment for conformance to the Contract Documents as it relates to the commissioning process, to the functional performance of the equipment and adequacy for developing test procedures. This review is intended primarily to aid in the development of PV testing procedures and only secondarily to verify compliance with equipment specifications. The CxA will notify the Departmental Representative as requested, of items missing or areas that are not in conformance with Contract Documents and which require resubmission.
- .3 The CxA may request additional design narrative from the Departmental Representative and Controls Contractor, depending on the completeness of the design intent documentation and sequences provided within the Specifications.
- .4 These submittals to the CxA do not constitute compliance for O&M manual documentation. The O&M manuals are the responsibility of the Contractor, though the CxA will review them and provide feedback, where in the opinion of the CxA, correction is required.

3.3 PRODUCT INFORMATION CHECKLISTS and INITIAL CHECKOUT

- .1 The following procedures apply to all equipment to be commissioned (see Section 1.10 for list of equipment and systems). Some systems that are not comprised so much of actual dynamic machinery may not require a PI form.
- .2 Product Information (PI) form checklists are important to ensure that the equipment and systems are installed as

intended. It ensures that system performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full system checkout. PI forms for a given system must be successfully completed prior to formal Performance Verification (PV) Tests of equipment or subsystems of the given system, leading into final System Performance Verification (PV) Tests.

- .1 PI forms will be developed by the CxA. Contractors are responsible to execute and document the PI form checklist on site. The CxA will verify the installation and accuracy of the PI forms.
- .2 PI forms are used to track and document that the proper equipment has been specified, submitted and installed. The forms capture typical maintenance information such as tag #, model, service, location, nameplate data, static submittal data, etc.
- .3 CxA will track and report PI form completion status.
- .4 A Sample PI form has been attached (Section 3.6) for bid purposes.
- .5 REMAINDER OF PAGE LEFT INTENTIONALLY BLANK

3.4 SAMPLE PRODUCT INFORMATION FORM

IDI Template - Component Verification

rev 2013-06-25

Line #	Test	Expectation	First Test Status	Re-Test Status (if required)	Completed By	Date
HP-____.C01	Confirm unit installed	Manufacturer and Model match approved shop drawings				
HP-____.C02	Confirm unit is in good condition	No apparent damage from storage or installation				
HP-____.C03	Confirm silencer installed (if applicable)	Silencer installed in accordance with manufacturer's				
HP-____.C04	Confirm unit duct connections complete	Duct connections are complete, tight, and sealed appropriately.				
HP-____.C05	Confirm unit power installation complete	Wiring to unit run, terminated, appropriately supported, with all access covers/panels closed.				
HP-____.C06	Confirm unit label installed	Permanent lamacoid label affixed to unit				
HP-____.C07	Confirm control cable installed	Cable run, properly supported, wiring terminated.				
HP-____.C08	Confirm unit control cable labelled	Permanent label affixed to control wiring at unit and field controller.				
HP-____.C09	Confirm unit accessible for service and maintenance	Unit can be accessed without removing other equipment, piping, wiring, or conduit. Controller access panel can be easily removed.				
HP-____.C10	Confirm thermostat	Thermostat type matches approved shop drawings				
HP-____.C11	Confirm thermostat location	Thermostat is located as indicated on plans, or on an internal wall out of direct sun.				
HP-____.C12	Thermostat is labelled	Thermostat is permanently labelled to indicate associated heat pump.				
HP-____.C13	Confirm hydronic piping complete	Piping to unit complete, insulated, appropriately supported, with isolation, control and balancing valves installed per contract documents				
HP-____.C14	Confirm filter	Filter is correct type, shipping brackets removed and accessible for replacement				
HP-____.C15	Confirm mounting/hanging integrity	Appropriate vibration isolation installed (springs are not fully compressed) and hangers are double-nutted.				

Legend	
	Expected Result
X	Re-Test Required
Pass	Complete
n/a	Not Applicable
inc	Incomplete

3.5 START-UP AND TESTING

- .1 Start-up and Initial Checkout Plan. The CxA will review the Contractor's start up plans for all commissioned equipment. The primary role of the CxA in this process is to ensure that there is written documentation that each of the manufacturer-recommended procedures have been completed.
- .2 Execution of Start-Up
 - .1 7 days prior to start-up, the Contractor and vendors schedule start-up and checkout with the Contractor and CxA.
 - .2 The CxA may attend startups at their discretion to ensure that startup documentation and procedures are being followed as required.
 - .3 The Contractors and vendors shall execute start-up and provide the CxA with a signed and dated copy of the completed start-up and PI tests and checklists.
 - .4 Only individuals that have direct knowledge and witnessed that a line item task on the PI checklist shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.
- .3 General Acceptance Requirements
 - .1 Equipment or systems installed per the contract drawings, contract specifications, submittals, vendor requirements, standard practices, etc.
 - .2 Equipment and system documentation provided per specifications.
 - .3 Equipment and system properly labelled and/or tagged.
 - .4 Materials used for installation per contract drawings, contract specifications, submittals, vendor requirements, standard practices, etc.
 - .5 All equipment, systems, and ancillary equipment installed with proper support, vibration isolation and seismic constraints.
 - .6 Equipment, systems and ancillaries, flushed, cleaned and inspected.
 - .7 Support services and utilities installed and verified
 - .8 Controls, instrumentation and monitoring installed, calibrated and verified.

3.6 START-UP DOCUMENTATION

- .1 Contractor to assemble start-up documentation and submit to Departmental Representative for approval and copy to CxA before commencement of performance verification.
- .2 Start-up documentation to include:
 - .1 Factory and on-site test certificates for specified equipment.
 - .2 Pre-start-up inspection reports.
 - .3 Signed installation/start-up check lists.
 - .4 Start-up reports,
 - .5 Step-by-step description of complete start-up procedures, to permit Departmental Representative to repeat start-up at any time.

3.7 PERFORMANCE VERIFICATION TESTING

- .1 The general list of systems to be commissioned is found in Section 1.9.
- .2 The objective of performance verification (PV) testing is to demonstrate that each system is operating according to the documented design intent and Contract documents. (PV) testing facilitates bringing the systems together from a state of substantial completion to full dynamic operation. During the testing process, areas of deficient performance are identified and corrected, improving the operation of the systems. Each system should be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part and full load) where there is a specified system response. Verifying each sequence in the sequences of operation is required. Proper responses to such modes and conditions as power failure, freeze conditions, fire alarm conditions, equipment failure, etc. may also be tested. The PI forms for a given system must be completed prior to the formal PV Test.
- .3 The Contractors and/or vendors shall execute PV Tests and provide the CxA with a signed and dated copy of the completed checklists. The Contractor is responsible to ensure that all appropriate parties are included.
- .4 In conjunction with the Contractor, the CxA will ensure the execution of planned PV Tests is completed.
- .5 The Contractors shall clearly list items that were not completed successfully on the form. The installing Sub-contractors or vendors shall correct these items. The CxA will recommend solutions to problems found; however, the burden of responsibility to solve, correct and retest problems is with the Contractors and/or Departmental Representatives.

- .6 General Acceptance requires that the systems operate as intended and that documentation is provided indicating such.

3.8 PERFORMANCE VERIFICATION SYSTEM TESTING

- .1 Performance Verification (PV) System Tests are to demonstrate that each system is operating in concert with every other system according to the documented design intent and Contract Documents.
- .2 In conjunction with the Contractor, the CxA will ensure the execution of planned PV System Tests is completed.
- .3 The Contractors and/or vendors shall execute PV System Tests under the direction of the CxA. The Contractors will provide CxA with a signed and dated copy of the completed checklists. The Contractor is responsible to ensure that all appropriate parties are included.
- .4 A Performance Verification 7-Day Test will be completed to ensure proper building performance and operation. An additional test will be completed during seasonal testing.
- .5 General Acceptance requires that the systems operate as one entity as intended and that documentation is provided indicating such.

3.9 OWNER TRAINING

- .1 The Contractor is responsible for training of O & M staff to ensure they have all information necessary to operate and maintain commissioned features and systems.
- .2 Submit a training plan and schedule to CxA for review and approval.
- .3 Training plan will address the following topics (at a minimum)
 - .1 Design intent
 - .2 Use of Operations and Maintenance (O&M) Manuals
 - .3 Control Drawings and Schematics
 - .4 Startup and Shutdown
 - .5 Unoccupied operations
 - .6 Seasonal changeover
 - .7 Manual operations
 - .8 Alarms
 - .9 System interactions
 - .10 Energy conservation optimizations
 - .11 Health and safety

- .12 Preventative maintenance, diagnosis, and trouble-shooting
- .13 Special maintenance or replacement
- .14 Occupant interaction
- .15 Systems response to operating conditions
- .16 Emergency operation procedures
- .4 Training materials to include:
 - .1 "As-Built" Contract Documents.
 - .2 Operating Manual.
 - .3 Maintenance Manual.
 - .4 Management Manual.
 - .5 TAB and PV Reports.
- .5 Recording of training (audio and video) are required unless waived by the Owner. The Contractor is responsible for recording of training.
 - .1 Videotape training sessions for use during future training
 - .2 To be performed after systems are fully commissioned.
 - .3 Organize into several short modules to permit incorporation of changes.
- .6 Training verification forms shall be completed during the training sessions and submitted to CxA and Commissioning Authority for review.
- .7 A sample training verification form has been attached for bid purposes.
- .8 THE REMAINDER OF THIS PAGE LEFT INTENTIONALLY BLANK

3.10 SAMPLE TRAINING VERIFICATION FORM



Commissioning Training Requirements

Project:	
Date:	
Facility:	
Location:	

Along with a complete demonstration of the system/equipment, the following items have been reviewed at the demonstration and shall be included under the appropriate specification sections in the O&M manuals:

1. Written operating instructions.
2. Test data and performance verification information as required by the installer and/or manufacturer.
3. Operation and maintenance information published by manufacturer.
4. Printed warranties by manufacturer of equipment/system.
5. Explanation of warranty/guarantee on the system.
6. Drawings showing "as-built" conditions.
7. Original attendance/sign-in sheet are attached to this exhibit.

Approvals. This completed checklist has been reviewed. Its completion is approved with the exceptions noted below. Signature below by the owner's representative signifies that the specified training required by the contract documents has been completed.

Training Participant	Date	Owner's Representative	Date
Training Participant	Date	Owner's Representative	Date
Training Participant	Date	Owner's Representative	Date
Training Participant	Date	Owner's Representative	Date
Commissioning Authority	Date	Owner's Representative	Date

3.11 SAMPLE TRAINING SIGN IN SHEET



This form verifies that the owner's personnel has been given the appropriate instructions, training, and/or demonstration of the proper operation on the system(s) or equipment noted below.

Spec	Equipment	Training Requirement	Completion Date

Comments:

- 3.12 AUTHORITIES HAVING JURISDICTION (I.E. GOVERNMENT AND UTILITY AUTHORITIES)
- .1 Where specified start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for CxA 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 and CxA within 5 days of test.

END OF SECTION