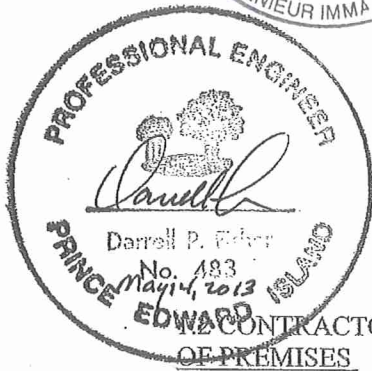
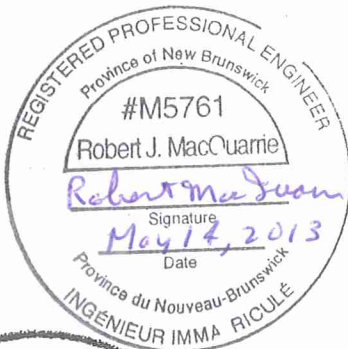


PART 1 – GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS



- .1 In general, the scope of work includes, but is not limited to the following:
 - .1 Ventilation – conversion of existing AHU-1 ventilation system from a constant volume system to a variable air volume (VAV) system. A new variable frequency drive is required along with new VAV boxes, electric duct heaters and ductwork modifications.
 - .2 Heating – provide anti-shock pump for boiler plant.
 - .3 Controls – upgrade all main digital controllers in building to new generation web/BacNet based system with associated devices and wiring. Will also require new controls for VAV boxes and reheat coils. Program modification will be required for new zoning.
 - .4 Electrical – all that required to support the mechanical work and the addition of electric radiant ceiling panels. Provision of a new electric panel will be required for the new heaters and reheat coils.
 - .5 General – Remove and reinstate ceilings where necessary for the proper installation of this work. Replace the T-Bar grid in Rooms 109 and 110 to suit the new lights, diffuser and heating panel locations. Install new ceiling tiles as required.
 - .6 Contractor is to provide a commissionaire on site at all times construction work is in progress.

- .1 Construct Work in stages to accommodate Owner’s continued use of the existing premises at all times during the construction.
 - .1 The Contractor shall have restricted use of the site location.
 - .2 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
 - .3 Remove or alter existing work to prevent injury or damage to portions of existing which will remain.

1.3 OWNER OCCUPANCY

- .1 Owner will occupy existing premises for execution of normal operations up to a point to be determined with the Contractor, and to be able to resume operations as soon as possible.
- .2 Co-operate with Owner in scheduling operations to minimize conflicts and to facilitate Owner usage.

1.4 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy each document as follows:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.

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

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

PART 1 – GENERAL

1.1 ADMINISTRATIVE

- .1 Submit to the Departmental Representative submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Work affected by submittal shall not proceed until review is complete.
- .3 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and 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 shall be considered rejected.
- .4 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .5 Verify field measurements and affected adjacent Work are coordinated.
- .6 Contractor's responsibility for errors and omissions in submission is not relieved by the Departmental Representative's and the Consultant's review of submittals.
- .7 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by the Departmental Representative's and the Consultant's review.
- .8 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 the Contractor to illustrate details of a portion of Work.
- .2 Submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in Canada where required.
- .3 Indicate materials, methods of 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 5 days for Departmental Representative's review of each submission. Allow an additional five days for the Authorized Representative's review of each submission.
- .5 Adjustments made on shop drawings by the Departmental Representative and/or the Authorized Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Departmental Representative and/or Authorized Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative, in writing, of any revisions other than those requested. Departmental Representative is to provide initial review of submittals.
- .7 Accompany submissions with transmittal letter containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .8 Submissions shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .9 After Departmental Representative's review, distribute copies to suppliers and installers as appropriate for manufacture and installation.

- .10 Submit 6 prints of shop drawings for each requirement requested in specification sections and as Departmental Representative may reasonably request.
- .11 Submit 6 hard copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit all shop drawing, product data sheets and brochures as PDF files electronically via email as well as by prints or hard copy.
- .13 Delete information not applicable to project.
- .14 Supplement standard information to provide details applicable to project.
- .15 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.3 SAMPLES

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Departmental Representative's business address.
- .3 Notify Departmental Representative, in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .3 Province of Prince Edward Island
 - .1 Occupational Health and Safety Act, R.S.P.E.I. 1988.

1.2 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
- .3 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative.
- .4 Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 3 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative 3 days after receipt of comments from Departmental Representative.
- .7 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .8 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.3 FILING OF NOTICE

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

1.4 SAFETY
ASSESSMENT

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

1.5 REGULATORY
REQUIREMENTS

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

1.6 GENERAL
REQUIREMENTS

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

1.7 RESPONSIBILITY

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

1.8 COMPLIANCE
REQUIREMENTS

- .1 Comply with Occupational Health and Safety Act, Occupational Safety General Regulations, R.S.P.E.I. 1988, Updated to 2008.

1.9 UNFORSEEN
HAZARDS

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

1.10 POSTING OF
DOCUMENTS

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

1.11 CORRECTION OF
NON-COMPLIANCE

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

1.12 POWDER
ACTUATED DEVICES

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

1.13 WORK STOPPAGE

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

1.14 LOCK OUT & TAG OUT

- .1 Lock Out and Tag Out (LOTO) procedures must be followed. Contractor will be required to SNC-Lavalin O&M LOTO procedures.

1.15 HOTWORK

- .1 Any Hot Work will require an SNC-Lavalin O&M Hot Work permit.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

PART 1 - GENERAL

1.1 DEFINITIONS

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2 FIRES

- .1 Fires and burning of rubbish on site not permitted.

1.3 DISPOSAL OF WASTES

- .1 Do not bury rubbish and waste materials on site.
- .2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

1.4 DRAINAGE

- .1 Do not pump water containing suspended materials into waterways, sewer or drainage systems.
- .2 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.5 POLLUTION CONTROL

- .1 Maintain temporary pollution control features installed under this contract.
- .2 Control emissions from equipment to local authorities' emission requirements.
- .3 Prevent extraneous materials from contaminating air and waterways beyond application area, by providing temporary enclosures.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.

1.6 NOTIFICATION

- .1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 After receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

PART 1 - GENERAL

1.1 REFERENCES AND
CODES

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

1.2 BUILDING
SMOKING ENVIRONMENT

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

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

PART 1 – GENERAL

1.1 INSPECTION

- .1 Allow Departmental Representative and the authorized 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 minimum 48 hour notice requesting inspection by Departmental Representative, or if Work is designated for special tests, inspections or reviews by Departmental Representative, or law of Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.2 INDEPENDENT
INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Owner for purpose of inspecting and/or testing portions of Work. Cost of such services will be paid by the Owner.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relieve responsibility to perform Work in accordance with Contract Documents.
- .5 If defects in the work of the Contractor are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Owner. Pay costs for retesting and re-inspection.

1.3 ACCESS TO WORK

- .1 Allow inspection/testing agencies access to Work.
- .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 an orderly sequence so as not to cause delay 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 may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Departmental Representative.

1.6 REPORTS

- .1 Submit 3 copies of inspection and test reports to Departmental Representative.

1.7 TESTS AND MIX
DESIGNS

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

1.8 MILL TESTS

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

1.9 EQUIPMENT AND
SYSTEMS

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

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

PART 1 – GENERAL

1.1 SUBMITTALS

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

1.2 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms and temporary stairs.

1.3 HOISTING

- .1 Provide, operate and maintain hoists required for moving workers, materials and equipment.

1.4 CONSTRUCTION
PARKING

- .1 Parking will be permitted on site provided it does not disrupt performance of Work nor the operations of the GOCB.

1.5 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 in a location other than the construction facilities.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

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 the Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 AVAILABILITY

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

1.3 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 Store sheet materials, and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .6 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.

- .7 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .8 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.

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 can 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 CO-ORDINATION

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

1.8 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 Refer to Section 01 73 03 - Execution Requirements.

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 tamper-proof 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 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

Not Used.

PART 3 - EXECUTION

Not Used.

PART 1 - GENERAL

1.1 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 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .9 Restore work with new products in accordance with requirements of Contract Documents.
- .10 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .11 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material in accordance with National Building Code full thickness of the construction element.
- .12 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.
- .13 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.
- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

1.5 WASTE
MANAGEMENT AND
DISPOSAL

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

PART 1 - GENERAL

1.1 PROJECT
CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris.
- .2 Remove waste materials from site at regularly scheduled times. Do not burn waste materials on site.
- .3 Bank/pile snow in designated areas only or if not available, remove from site.
- .4 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .5 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .6 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .7 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .8 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.

1.3 WASTE
MANAGEMENT AND
DISPOSAL

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

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

PART 1 - GENERAL

1.1 DEFINITIONS

- .1 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.
- .2 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .3 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .4 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.
- .5 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.
- .6 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .7 Separate Condition: refers to waste sorted into individual types.
- .8 Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.

1.2 STORAGE, HANDLING AND PROTECTION

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.
- .2 Unless specified otherwise, materials for removal become Contractor's property.
- .3 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .4 Protect surface drainage, mechanical and electrical from damage and blockage.

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

1.3 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 Remove materials from deconstruction as deconstruction/disassembly Work progresses.
- .4 Provide documentation to owner that proper disposal has been completed.

1.4 SCHEDULING

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

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 APPLICATION

- .1 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and other packaging material in appropriate on-site containers for recycling in accordance with MSSP.
- .4 Divert unused metal materials from landfill to metal recycling facility if available on Prince Edward Island.
- .5 Ensure emptied containers are sealed and stored safely.
- .6 Unused paint or coating material must be disposed of at an official hazardous material collections site.

- .7 Do not dispose of unused paint material into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
 - .8 Dispose of unused sealant material at official hazardous material collections site.
 - .9 Unused sealant and caulking materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
 - .10 Dispose of unused adhesive material at official hazardous material collections site.
 - .11 Fold up metal banding, flatten and place in designated area for recycling.
- 3.2 CLEANING
- .1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
 - .2 Clean-up work area as work progresses.
-

PART 1 - GENERAL

1.1 CLEANING

- .1 Clean premises in accordance with Section 01 74 11 - Cleaning.
- .2 Remove waste and surplus materials, rubbish and construction facilities from the site in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

PART 1 - GENERAL

1.1 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures
- .2 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .3 Copy will be returned after final inspection with Departmental Representative's comments.
- .4 Revise content of documents as required prior to final submittal.
- .5 Within 1 week of Substantial Performance of the Work, submit to the Departmental Representative, four final copies of operating and maintenance manuals in English and 1 pdf copy on CD.
- .7 Furnish evidence, if requested, for type, source and quality of products provided.
- .8 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .9 Pay costs of transportation.

1.2 FORMAT

- .1 Refer to Appendix A Operations and Maintenance Manual as a guideline in preparing the manual.
 - .2 Organize data as instructional manual.
 - .3 When multiple binders are used correlate data into related consistent groupings. 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. Bind in with text; fold larger drawings to size of text pages.
-

1.3 CONTENTS

- .1 Refer to Appendix A Operations and Maintenance Manual as a guideline in preparing the manual.
- .2 Include start up reports for new Variable Frequency Drives.
- .3 Include Certificate of Origin for all new circuit breakers. Refer to drawing 2600-1 for specific requirements.
- .4 Table of Contents: provide title of project;
 - .1 Date of submission; names.
 - .2 Addresses, and telephone numbers of Departmental Representative and with name of responsible parties.
 - .3 Schedule of products and systems, indexed to content of volume.
- .5 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .6 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .7 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .8 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

1.4 RECORDING
ACTUAL SITE
CONDITIONS

- .1 Submit one set of red line drawings to engineer for review.
- .2 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.
- .3 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.

.4 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.5 FINAL SURVEY

.1 Submit final site survey certificate in accordance with Section 01 71 00 - Examination and Preparation certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.6 WARRANTIES AND BONDS

- .1 Assemble approved information in binder and submit upon acceptance of work. Organize binder as follows:
- .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, recognizing date of Substantial Completion.
 - .4 Verify that documents are in proper form, contain full information, and are notarized.
 - .5 Co-execute submittals when required.
 - .6 Retain warranties and bonds until time specified for submittal.
- .2 Conduct joint 12 month warranty inspection, measured from time of acceptance, with Departmental Representative.
- .3 Respond in a timely manner to oral or written notification of required construction warranty repair work.
- .4 Written verification will follow oral instructions. Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

1.7 ELECTRONIC DATA

.1 In addition to the above hard copy submittals, provide *all* documentation, including shop drawings, test reports, Operations and Maintenance Manuals, Record Drawings, training materials, spare parts lists, etc., as PDF format files on CDs.

1.8 EQUIPMENT INFORMATION FORM (CMMS)

.1 Reference Appendix B for Equipment Information Form (CMMS). A CMMS data sheet is required to be filled out by the general contractor for each new piece of equipment installed. CMMS data sheets are required as a minimum for each Variable Air Volume (VAV), Electric Heater, Disconnect Switch, Variable Frequency Drive (VFD), Direct Digital Control (DDC) panel, Electric distribution Panel. Any equipment being removed also requires a filled out CMMS data sheet so these items can be removed from active inventory.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

Part 1 General

1.1 DESCRIPTION

- .1 Demonstrate operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of final inspection.
- .2 Owner will provide list of personnel to receive instructions, and will co-ordinate their attendance at agreed-upon times.

1.2 QUALITY CONTROL

- .1 When specified in individual Sections require manufacturer to provide authorized representative to demonstrate operation of equipment and systems, instruct Owner's personnel, and provide written report that demonstration and instructions have been completed.

1.3 SUBMITTALS

- .1 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 Consultant's approval.
- .3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .4 Give time and date of each demonstration, with list of persons present.

1.4 CONDITIONS FOR DEMONSTRATIONS

- .1 Equipment has been inspected and put into operation in accordance with Section 01 11 00 – Summary of Work.
- .2 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.
- .3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.5 PREPARATION

- .1 Verify that conditions for demonstration and instructions comply with requirements.
- .2 Verify that designated personnel are present.

1.6 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 need for additional data becomes apparent during instructions.

1.7 TIME ALLOCATED FOR INSTRUCTIONS

- .1 Ensure amount of time required for instruction of each item of equipment or system as follows:
 - .1 Heating Plant: 1 hours of instruction.
 - .2 Cooling and Ventilation System: 3 hours of instruction.
 - .3 Control System: 3 hours of instruction.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 General requirements relating to commissioning of project's components and systems, specifying general requirements to PV of components, equipment, sub-systems, systems, and integrated systems.
- .2 Acronyms:
 - .1 AFD - Alternate Forms of Delivery, service provider.
 - .2 BMM - Building Management Manual.
 - .3 Cx - Commissioning.
 - .4 EMCS - Energy Monitoring and Control Systems.
 - .5 O&M - Operation and Maintenance.
 - .6 PI - Product Information.
 - .7 PV - Performance Verification.
 - .8 TAB - Testing, Adjusting and Balancing.

1.2 GENERAL

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

1.3 COMMISSIONING OVERVIEW

- .1 Cx to be a line item of Contractor's cost breakdown.
- .2 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .3 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.
- .4 Departmental Representative will issue Interim Acceptance Certificate when:
 - .1 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.
 - .2 Equipment, components and systems have been commissioned.
 - .3 O&M training has been completed.

1.4 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

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

1.5 PRE-CX REVIEW

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

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

1.6 CONFLICTS

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

1.7 SUBMITTALS

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

1.8 COMMISSIONING DOCUMENTATION

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

1.9 COMMISSIONING SCHEDULE

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

1.10 COMMISSIONING MEETINGS

- .1 Convene Cx meetings following project meetings and as specified herein.
- .2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.
- .3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.
- .4 At 60% construction completion stage. Departmental Representative to call a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:
 - .1 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.
 - .2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.
- .5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.
- .6 Meeting will be chaired by Contractor, who will record and distribute minutes.
- .7 Ensure subcontractors and relevant manufacturer representatives are present at 60% and subsequent Cx meetings and as required.

1.11 STARTING AND TESTING

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

1.12 WITNESSING OF STARTING AND TESTING

- .1 Provide 14 days notice prior to commencement.
- .2 Departmental Representative to witness of start-up and testing.
- .3 Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

1.13 MANUFACTURER'S INVOLVEMENT

- .1 Factory testing; manufacturer to:
 - .1 Coordinate time and location of testing.
 - .2 Provide testing documentation for approval by Departmental Representative.
 - .3 Arrange for Departmental Representative to witness tests.
 - .4 Obtain written approval of test results and documentation from Departmental Representative before delivery to site.
- .2 Obtain manufacturers installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with Departmental Representative.

- .1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.
- .2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.
- .3 Integrity of warranties:
 - .1 Use manufacturer's trained start-up personnel where specified elsewhere in other divisions or required to maintain integrity of warranty.
 - .2 Verify with manufacturer that testing as specified will not void warranties.
- .4 Qualifications of manufacturer's personnel:
 - .1 Experienced in design, installation and operation of equipment and systems.
 - .2 Ability to interpret test results accurately.
 - .3 To report results in clear, concise, logical manner.

1.14

PROCEDURES

- .1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.
- .2 Conduct start-up and testing in following distinct phases:
 - .1 Included in delivery and installation:
 - .1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.
 - .2 Visual inspection of quality of installation.
 - .2 Start-up: follow accepted start-up procedures.
 - .3 Operational testing: document equipment performance.
 - .4 System PV: include repetition of tests after correcting deficiencies.
 - .5 Post-substantial performance verification: to include fine-tuning.
- .3 Correct deficiencies and obtain approval from Departmental Representative after distinct phases have been completed and before commencing next phase.
- .4 Document require tests on approved PV forms.
- .5 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Departmental Representative. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:
 - .1 Minor equipment/systems: implement corrective measures approved by Departmental Representative.
 - .2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Departmental Representative.
 - .3 If evaluation report concludes that major damage has occurred, Departmental Representative shall reject equipment.
 - .1 Rejected equipment to be remove from site and replace with new.
 - .2 Subject new equipment/systems to specified start-up procedures.

1.15 START-UP DOCUMENTATION

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

1.16 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

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

1.17 TEST RESULTS

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

1.18 START OF COMMISSIONING

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

1.19 INSTRUMENTS / EQUIPMENT

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

- .2 Ladders.
- .3 Equipment as required to complete work.

1.20 COMMISSIONING PERFORMANCE VERIFICATION

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

1.21 WITNESSING COMMISSIONING

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

1.22 AUTHORITIES HAVING JURISDICTION

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

1.23 EXTENT OF VERIFICATION

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

1.24 REPEAT VERIFICATIONS

- .1 Assume costs incurred by Departmental Representative for third and subsequent verifications where:
 - .1 Verification of reported results fail to receive Departmental Representative.
 - .2 Repetition of second verification again fails to receive approval.

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

1.25 SUNDRY CHECKS AND ADJUSTMENTS

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

1.26 DEFICIENCIES, FAULTS, DEFECTS

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

1.27 COMPLETION OF COMMISSIONING

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

1.28 ACTIVITIES UPON COMPLETION OF COMMISSIONING

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

1.29 TRAINING

- .1 In accordance with Section 01 79 00 – Demonstration and Training.

1.30 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

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

1.31 OCCUPANCY

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

1.32 INSTALLED INSTRUMENTATION

- .1 Use instruments installed under Contract for TAB and PV if:
 - .1 Accuracy complies with these specifications.

1.33 PERFORMANCE VERIFICATION TOLERANCES

- .1 Application tolerances:
 - .1 Specified range of acceptable deviations of measured values from specified values or specified design criteria. Except for special areas, to be within +/- 10% of specified values.
- .2 Instrument accuracy tolerances:
 - .1 To be of higher order of magnitude than equipment or system being tested.
- .3 Measurement tolerances during verification:
 - .1 Unless otherwise specified actual values to be within +/- 2 % of recorded values.

1.34 OWNER'S PERFORMANCE TESTING

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Appendix A

Operations and Maintenance Manual

Operations and Maintenance Manual

Building Name: _____

Project #: _____

Project Name: _____

The commissioning process requires detailed O&M documentation as identified in the project specifications.

Initial Review of O&M manuals must take place 2 weeks prior to Substantial Completion or training

The contractor shall compile O&M manuals for every piece of equipment and building operating or electrical system being commissioned and as required by the project specifications with the following format:

- **Binder:** Must be in a "D" Ring binder no larger than 2" and no more than 2/3 full. The binder must be labeled on the front cover and on the binder edge with the following information: "Building Name", "Address", "Project Name", "Project Number", "Completed Date" i.e. October 2006, and "Submitted By". Dividers with permanently marked tabs shall separate each section and sub section. Tab labels shall not be hand written. Four copies are required. An electronic format that is compatible with the owner's system is required.
- **Title Page** : O&M manual for building name, address, date
- **Project Information:** building name, address, date, principal contractor's information: name, address & phone numbers, consultant: name, address & phone numbers. If the binder is one of many for the project, the volume must be noted i.e. Volume 1 of 3
- **Table of Contents:** Table of contents of first binder to include all sections in all binders (volumes). Each binder shall contain a table of contents for that binder's. Sections are to be as follows;
- **A - Signed Letter of warranty'** for each piece of equipment carrying a warranty. General contractor to provide a "letter of Warranty " to cover workmanship as defined in the specification. Warranties to be: dated, identify project by name, project number, location as well as warranty period. Any extended warranty of equipment only must be identified also.

- **B** - Contact information for all sub-contractors & suppliers.
- **C** - Reports: copy of all TAB reports, pre-functional tests, startup reports, functional test reports, completed performance verification forms, cabling verifications, ESA (Electronic Systems Associate) certification, pressure vessel certification, fire alarm certifications and all other required certifications required by National Building Code or Provincial Regulations. Reports to be organized together by piece of equipment i.e. TAB, pre-functional, start-up etc to be together for a specific piece of equipment
- **D** – As built drawings
- **E** - Sequence of operation: outline how the system is designed to work.
- **F** – CMMS Data Sheets: All equipment which is to be deleted, removed, added or replaced from site is to have a CMMS inventory sheet completed and included in the O&M manual. If this equipment is a pressure vessel and is included in the annual inspection, the certification tag that is attached to the equipment must be removed prior to demolition and forwarded to the commissioning manager.
- **G, H, I ...** – Tab for each piece of new equipment to include:
 - Copy of approved shop drawing – all drawings must note which model has been installed if several are shown on one sheet
 - Copy of Specific Service and Maintenance manual for each.
- **Last Tab** : misc.

Appendix B

Equipment Information Form CMMS

EQUIPMENT INFORMATION FORM CMMS

Rev. date: 7/19/2011

Building ID / Name

Equipment Description

Equipment Group **Equipment Category** **Uni**

Parent equipment Number

Location ("Floor number" - "Room number" - "Section/Wing")

Location (Specific Details)

Project Number **Project Name**

This piece of equipment replaces equipment number:

Supplier **Purchase Price**

Model Number **Manufacturer**

Serial Number **Purchase Date**

Certification Expiry **Installation Date**

Estimated Service Life (in years) **Warranty Expiry Date**

Is the Equipment Regulated? **Tenant Owned**
 Yes No Yes No

Electrical Specifications

Volts **HP**

Amps or KVA **RPM**

Phases **No. of Circuit (Panels)**

Fuse size **Fuse Quantity**

Mechanical Specifications

C.F.M. / G.P.M **Capacity**

Belts Size **Belts Quantity**

Pre-Filters Size **Pre-Filters Quantity**

Main Filters Size **Main Filters Quantity**

Fire Suppression

Type

Capacity (kg/lbs)

Actuation Type (Auto/Man)

Sprinkler System/

Year of Installation

Environmental

Refrigerant Glycol

Type **Capacity**
Quantity **ton/kw**

Storage Tanks **Secondary containment**

1 Ext. above ground Double Wall
 2 Ext. underground Berm
 3 Interior

Capacity **Litres**

Fuel type

Seasonal Maintenance: Start _____ Finish _____

Deleted Equipment

Equipment Number	Reason / Justification

Notes / Specific Maintenance Requirements during Warranty Period:

Preventive Maintenance Set Up

Frequency	Required		Job Plan No	Schedule Date
	Yes	No		Month/Year
Weekly	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
Monthly	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
Bi-Monthly	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
Quarterly	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
Semi-Annual	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
Annual	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
Warranty	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____

Equipment No. Label Provided: Yes N/A

Warranty Card Provided

PM Included in Route:

Asset No:

Submitted by: (Print Name) **Date**

CMMS Use Only
 Equipment Created PM's Attached or Equipment Added to List