PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

.1 In general, work of this contract consists of architectural, electrical and mechanical alterations to an existing office building. It is a one story building composed primarily of pre-engineered steel structural components, enclosed with steel cladding, steel roof and aluminum windows. A major demolition project has already been completed to remove the majority of previously existing partitions, equipment and interior finishes.

.2 The site of work is located at Endeavour Drive, Bedford Institute of Oceanography, Halifax, in the province of Nova Scotia.

1.2 SITE FAMILIARIZATION

.1 Before submitting a bid, it is recommended that bidders visit the site to review and verify the form, nature and extent of the work, materials needed, the means of access and temporary facilities required to perform the work, including demolition.

1.3 WORK SCHEDULE

.1 Submit schedule to Departmental Representative for approval within 7 days of Contract Award.

.2 Schedule work in cooperation with and to the approval of the Departmental Representative.

.3 Submit updates when requested by Departmental Representative.

1.4 CODES STANDARDS

.1 Perform work in accordance with the National Building Code of Canada (of latest edition as adopted by the province and municipality of the work location) and any other code of provincial or local application, including all amendments up to the bid closing date, provided that in any case of conflict or discrepancy the more stringent requirement shall apply.

.2 Perform electrical work in accordance with CSA C22.1-2006. Use only licensed electricians to carry out such work.

.3 Materials and workmanship must meet or exceed requirements of specified standards, codes and referenced documents.

1.5 DEPARTMENTAL REPRESENTATIVE

.1 Unless specifically stated otherwise, the term Engineer where used in the Specifications and on the Drawings shall mean the Departmental Representative as defined in the General Conditions of the Contract.

1.6 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each of the following:
.1 Contract Drawings and Specifications
.2 Work Schedule
.3 Health and Safety Plan and other safety documents related to the Work.
.4 Shop Drawings.
.5 Change Orders
.6 Field test reports.
.7 Reports received from various inspection authorities.

1.7 PERMITS

.1 Obtain and pay for building permit, compliance certificates, licenses and other applicable permits as required by municipal, provincial and federal authorities to perform the Work.

.2 Provide appropriate notifications of project to provincial and other authorities having jurisdiction.

.3 Upon request, submit copy of applications made and permits received to Departmental Representative.

1.8 PROJECT MEETINGS

.1 Project meeting will be held every week during the course of the work.

.2 Departmental Representative will arrange project meetings and assume responsibility for setting times. Contractor to record minutes.

.3 Have Superintendent and subcontractors in attendance.

1.9 SETTING OUT WORK

.1 Assume full responsibility for and execute complete layout of work.

1.10 ALTERATIONS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to Facility operations, occupants and the Public.

.2 Provide barricades, barriers and warning signs around work areas and adjacent to areas in use by Facility occupants and the Public.
.1 Signage to be professionally made with bilingual message or use internationally recognized graphic symbols.

.3 Do not block fire exits and emergency escape routes. Ensure free egress from buildings at all times during the work.

.4 Follow Departmental Representative's directives in meeting above requirements.

1.11 WORK ACCESS

.1 Use only designated roads, walkways, entrance doors and corridors designated by Departmental Representative to gain access to work areas.

.2 Restrict movement of workers to immediate work areas. Plan work to minimize need for workers to circulate inside buildings of the Facility.

.3 Contractor to be provided access to parking area behind facility for after hours work. Area provided will include space for one waste management container and two vehicles.

1.12 TEMPORARY FACILITIES

.1 Existing water and power supply may be used for construction at no cost. Departmental Representative will advise of the supply location.
.1 Be responsible for transporting such services to work areas.

.2 Store materials on site only in location(s) as directed by Departmental Representative.

.3 Assume that existing facilities at site can be used by workers unless directed otherwise by Departmental Representative.

1.13 HEATING AND VENTILATION

.1 If applicable, maintain existing heating, ventilation and air conditioning system operational during the entire course of work.

.2 Existing heating system may be used for construction

purposes.

.3 Provide suitable equipment and ventilate work areas as required to:
.1 Facilitate progress of work.
.2 Provide adequate ventilation to meet health regulations for safe working environment.
.3 Prevent accumulations of dust, fumes, mists, vapours or gases within building.
.4 Prevent harmful accumulation of hazardous substances into atmosphere.
.5 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.

.4 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.5 Maintain strict supervision of operation of temporary ventilating equipment to:
.1 Conform with applicable codes and standards.
.2 Enforce safe practices.

.6 Prevent abuse of existing services provided by Departmental Representative.

1.14 CUTTING, FITTING AND PATCHING

.1 Execute cutting fitting and patching required to make work fit properly.

.2 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work.

.3 Do not cut, bore, or sleeve load-bearing members.

.4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.

.5 Fit work airtight to pipes, sleeves, ducts, conduits and other services penetrating new or existing condition.

.6 Openings made in existing fire rated walls, floors and ceilings shall be filled with purpose made, ULC approved, fire stopping materials and smoke seals.

1.15 EXISTING SERVICES

.1 Where work involves breaking into, connecting or shutting down of existing services, obtain approval beforehand from Departmental Representative. Schedule and carry out work at time as directed by Departmental Representative with minimum of disturbance to Facility

and site operations. Adhere to approved schedule and provide notice to affected parties.

.2 Comply with electrical safety requirements specified in Section 01 35 26.

.3 Protect, relocate or maintain existing active services as required. Where inactive services are encountered, cap off in manner approved by authority having jurisdiction over service. Record location of maintained, rerouted and abandoned service lines.

1.16 MATERIALS

.1 Use new material and equipment unless otherwise specified.

.2 Select and use products, adhesives and sealants which have:
.1 No or very low off-gassing levels.
.2 No or very little VOC content.
.3 Are least noxious and emit smallest amount of fumes, gases and strong odours during their cure period.
.4 Minimal chemical, physical or biological elements or agents in their composition which adversely affect human health and welfare or which degrades the environment.

.3 Provide material and equipment of specified design and quality, performing to published ratings and for which replacement parts are readily available.

.4 Use products of one manufacturer for equipment or material of same type or classification unless otherwise specified.

.5 Within 7 days of written request by Departmental Representative, submit following information for any materials and products proposed for supply:
.1 Name and Address of manufacturer.
.2 Trade Name, model and catalogue number.
.3 Performance, descriptive and test data indicating compliance with specified requirements.
.4 Manufacturer's installation or application instructions.
.5 Evidence of arrangements to procure.
.6 Evidence of manufacturer delivery problems or unforseen delays.

.6 Obtain manufacturer's printed installation instructions and comply by such directives for installation of materials.

.7 Notify Departmental Representative in writing of any conflict between Specifications and manufacturers instructions, so that Departmental Representative will designate which document is to be followed.

.8 Deliver, store and protect materials on site against theft, vandalism, soiling and climatic damage. Provide additional suitable cover beyond manufacturer's packaging where required.

.9 Touch-up factory finishes damaged by the Work. Use touch-up materials to match original. Do not paint over name plates.

1.17 FASTENERS

.1 Provide metal fastenings and accessories in same texture, colour and finish as base metal in which they occur unless indicated otherwise. Prevent electrolytic action between dissimilar metals.

.2 Use non-corrosive heavy duty fasteners, anchors and spacers for all fastening conditions. Space fasteners within limits of load bearing or shear capacity. Ensure positive permanent anchorage.

1.18 HAZARDOUS MATERIALS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling and storage, and disposal of hazardous materials.

.2 Do not leave and store flammable and hazardous materials on site. Remove of site at end of each workshift.

.3 Keep MSDS data sheets for all products brought on site. Provide copy to Departmental Representative.

.4 Asbestos Discovery: Demolition of spray or trowel-applied asbestos can be hazardous to health. Should material resembling spray or trowel-applied asbestos be encountered in course of work, immediately stop work and notify Departmental Representative. Do not proceed with relevant work until written instructions have been received from Departmental Representative.

1.19 ENVIRONMENTAL PROTECTION

.1 Have appropriate emergency spill response equipment and rapid clean-up kit on site. Provide personal protective equipment required for clean-up.

.2 Do not dump hazardous materials and polluted water containing suspended hazardous products into sewers and drainage systems. Dispose in accordance with federal and provincial environmental regulations and recommended procedures.

1.20 INSPECTION AND TESTING

.1 Give timely notice requesting inspection of work designated for inspections, special tests or approvals by Departmental Representative or by inspection authorities having jurisdiction.

.2 In accordance with the General Conditions, Departmental Representative may order any part of work to be examined if work is suspected to be not in accordance with Contract Documents.

.3 Rejected Work: removal and replace defective work, whether result of poor workmanship, use of defective or damaged products and whether incorporated in work or not, which has been identified by Departmental Representative as failing to conform to Contract Documents.

.4 Tests on materials and equipment, is the responsibility of the Contractor except where specified otherwise.
.1 Provide all necessary instruments, equipment and qualified personnel to perform tests.
.2 At completion of tests, turn over two sets of fully documented tests reports to the Departmental Representative.

.5 Unspecified tests may also be made by Departmental Representative. The costs of these tests will be paid for by the Departmental Representative.

.6 Where tests or inspection reveal work not in accordance with the Contract, the Contractor shall bear the cost of additional tests and inspections incurred by Departmental Representative as required to verify the acceptability of corrected work.

.7 CBCL Limited is to provide Commissioning services on the work performed. The contractor shall cooperate with CBCL Limited through the Departmental Representative

.8 If Contractor covers or permits to be covered work designated for special tests, inspections or approvals before such is made, uncover work until particular inspections or tests have been fully and satisfactorily completed and until such time as Departmental Representative gives permission to proceed. Pay costs to uncover and make good such work.

1.21 CLEANING

.1 As work progresses, maintain work areas and site in a tidy, clean and dust free condition at all times.

.2 Provide on-site containers for placement of waste and debris. Loose and scattered waste, debris and materials will not be allowed on site.

.3 Remove and dispose of waste and debris off site at end of each workday.

.4 Clean interior of building used by workers and dirtied by work.
.1 Wash walls, floors and other surfaces as needed.
.2 Vacuum carpets.
.3 Dust all furnishings.

.5 At project completion, conduct final cleaning of areas affected by work.
.1 Remove dust and dirt from all surfaces with recommended cleaning agents.
.2 Wash and polish finish surfaces.

.6 Use competent persons experienced in commercial cleaning operations.

.7 Meager attempt at controlling dust and ineffective cleaning will not be tolerated.
.1 Failure to provide effective dust control and/or perform proper cleaning by the Contractor will result in the Departmental Representative to proceed and obtain an independent commercial cleaning agency to perform all required cleaning to the satisfaction of the Facility tenant for which the costs will be charged to the Contractor in the form of a financial assessment against the Contract.

1.22 WASTE MANAGEMENT

.1 Dispose of waste, debris and product packaging in accordance with municipal and provincial laws and regulations.

.2 Plan work to minimize waste, maximize reuse and recycling of materials and to divert the greatest amount of waste from being disposed into landfill sites.

.3 Separate waste, debris, leftover material, redundant equipment and product packaging at source, place into

pre-planned waste categories during the course of the work and send to recycling facilities to maximum extent possible.

.4 Store, handle and dispose of hazardous waste in accordance with applicable federal, provincial and municipal laws, regulations, codes and guidelines.

.5 Submit waste management plan, including written list of items salvaged and sent to recycling facility.

1.23 COST BREAKDOWN

.1 Before submitting first progress claim, submit a breakdown of the contract price in format and detail as directed by Departmental Representative.

1.24 ACCEPTANCE

.1 Notify Departmental Representative in writing when work is complete and ready for final inspection.
.1 Make a check of all work and correct all discrepancies, defects and outstanding work before sending notification.

.2 Accompany Departmental Representative during final inspection.

.3 Rectify all defects, faults and outstanding items identified by Departmental Representative during inspection.

1.25 SITE SECURITY

.1 Contractor is responsible for all security on the site.

.2 Ensure building and other facilities on site are kept secure at all times. Ensure all doors are locked at the end of each work day.

PART 1 - GENERAL

1.1 SUBMITTAL GENERAL REQUIREMENTS

.1 Submit shop drawings, product data, samples and other items specified for review by Departmental Representative.

.2 Submit sufficient copies for own use plus 3 copies which will be kept by Departmental Representative.

.3 Include additional copies for insertion into the O&M manuals specified in Section 01 78 00.

.4 Accompany data with transmittal letter identifying project name, project number, Contractor's name and address, supplier name, description of items and quantity of drawings/data being submitted.

.5 Allow 7 calendar days for review of shop drawings by Departmental Representative.

.6 Do not proceed with work applicable to shop drawing item until relevant submission has been reviewed by Departmental Representative.

.7 Submit with reasonable promptness and in orderly sequence so as to allow for Departmental Representative's review and not cause delay in Work. Failure to submit in ample time will not be considered sufficient reason for an extension of Contract time and no claim for extension by reason of such default will be allowed.

.8 Present data, dimensions and engineering values in SI Metric units.

.9 Review submittals prior to submission. Ensure that all requirements have been addressed, field dimensions and data have been taken and submittal has been checked and coordinated with work of contract documents.

.10 Stamp and sign each item of submittal certifying contractor's review and verification of submitted data.

.11 Submittals not stamped and signed will be returned unexamined by Departmental Representative and considered rejected.

1.2 SHOP DRAWINGS

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

.2 Shop Drawings Content:
.1 Indicate materials, methods of construction, attachment, connections, explanatory notes and other information necessary for completion of work. Where items attach or connect to other items, confirm that all interrelated work has been coordinated, regardless of section or trade from which the adjacent work is being supplied and installed.
.2 Supplement manufacturer's standard drawings and literature with additional information to provide details applicable to project.

.3 Shop Drawings Format:
.1 Opaque white prints or photocopies of original drawings or standard drawings modified to clearly illustrate work specific to project requirements. Maximum sheet size to be 1000 x 707 mm.
.2 Product data from manufacturer's standard catalogue sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products, to be original full colour brochures, clearly marked indicating applicable data and deleting information not applicable to project.
.3 Non or poorly legible drawings, photocopies or facsimiles will not be accepted and returned not reviewed.
.4 Electronic copies of above are acceptable.

.4 Delete information not applicable to project on all submittals.

.5 Adjustments or corrections made on shop drawings by Departmental Representative are not intended to change contract price. If adjustments affect value of work, advise Departmental Representative in writing prior to proceeding with work.

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

.7 The review of shop drawings by Departmental Representative or by a Consultant or designated person so authorized by the Departmental Representative, is for sole purpose of ascertaining conformance with general concept. This review shall not mean that Canada approves the detail design inherent in the 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 all requirements of the construction and Contract Documents. 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 all sub-trades.

1.3 SAMPLES

.1 Submit samples for items specified in trade sections. Label with origin and intended use.

.2 Deliver samples to Departmental Representative's office. Do not drop off samples at construction site except for special circumstances pre-approved by Departmental Representative.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

PART 1 - GENERAL

1.1 ELECTRICAL SAFETY

.1 Ensure electrical power and other source of energy to equipment and electrical facilities are effectively disconnected and locked out before proceeding with work on such items.

.2 Locate power source, isolate and lockout service feed and provide a guarantee of isolation to workers before commencing any electrical work.
.1 Conduct hazard assessment as part of process.

.3 Develop and implement lockout procedures, complete with the use of lockout tags, to be followed on site to ensure that electrical power and other sources of energy are effectively disconnected and locked out in accordance with Canadian Electrical Code and Provincial and Federal health and safety regulations.
.1 Contractor's Superintendent shall issue and control the distribution of lockout tags to workers for each lockout event.

.4 Submit Contractor's written lockout procedures and sample of lockout tag to be used on project to Departmental Representative.

.5 Obtain Departmental Representative's approval before disconnecting existing services to ensure minimum disruption to Facility operations.

1.2 FIRE SAFETY

.1 Abide by National Fire Code of Canada and fire protections standards FCC 301 and FCC 302 published by Fire Protection Services, Labour Program Division of Service Canada.

.2 FCC standards may be viewed at the following web site:
.1 http://www.hrsdc.gc.ca/en/lp/lo/fp/standards/commissioner.shtml

.3 Obtain approval from Departmental Representative before conducting Hot Work inside or adjacent to building.

.4 Hot Work defined as:
.1 Welding
.2 Use of torch or other open flamed device
.3 Grinding with equipment which produces sparks

.5 Approval will be given upon receipt and confirmation that the following procedures shall be carried out by the Contractor:
.1 Hazard assessment for each hot work event and location.
.2 Fire safety procedures and work practices will be implemented and stringently followed for each event.
.3 Use of a hot work permit system, issued by Contractor's Superintendent to worker conducting the hot work.
.4 Fire watch by a designated person for a minimum of 1 hour immediately upon completion of the hot work.

.6 Submit Contractor's written fire safety procedures and practises to be used on project to Departmental Representative.

1.3 FIRE PROTECTION AND ALARM SYSTEMS

.1 Fire protection and alarm systems shall not be:
.1 Obstructed.
.2 Shut-off, unless approved by Departmental Representative.
.3 Left inactive at the end of a working day or shift.

.2 Do not use fire hydrants, standpipes and hose systems for purposes other than fire fighting.

.3 Any costs incurred from the fire department and charged to the Facility owner resulting from negligently setting off false alarms will be transferred to the Contractor in the form of financial holdback assessment against the Contract.

1.4 DOCUMENTS ON SITE

.1 Keep copy of Lockout tags, Hot Work Permits and Hazard assessment documentation on site for duration of Work.

.2 Upon request, make available to Departmental Representative or to authorized safety Representative for inspection.

PART 1 - GENERAL

1.1 RELATED WORK

.1 Section 01 35 26: Electrical and fire safety requirements.

1.2 COMPLIANCE REQUIREMENTS

.1 Comply with the Occupational Health and Safety Act for the Province of Nova Scotia and the Regulations made pursuant to that Act.

.2 Comply with Canada Labour Code Part II, and the Canada Occupational Safety and Health Regulations made under Part II of the Canada Labour Code.

.3 Observe and enforce construction safety measures required by:
- .1 National Building Code of Canada;
- .2 Provincial Worker's Compensation Board;
- .3 Municipal statutes and ordinances.

.4 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.

.5 Maintain Workers Compensation Coverage for duration of Contract.

1.3 SITE SAFETY

.1 Be responsible for health and safety of persons on site, of property and for protection of persons and the general public circulating adjacent to work areas to extent that they may be affected by conduct of Work.

.2 Designate one person from own workforce as site Safety Officer to be on site at all times and be responsible for health and safety of the work site. Provide name to Departmental Representative.

.3 Assign responsibility, obligation and authority to Safety Officer to stop work as deemed necessary for reasons of health and safety.

.4 Conduct safety inspections of the work and tool box safety meetings with workers on a regular basis.

.5 Control access to work areas and grant entry only to

workers and authorized persons.
.1 Brief all persons of site hazards, safety rules and personal protective equipment (PPE) to be donned on site before entry is permitted.
.2 Enforce compliance of site safety rules by all persons granted access.

1.4 HAZARD ASSESSMENTS

.1 Perform health and safety hazard assessments as integral part of the work. Conduct:
.1 Before commencement of work and;
.2 On an on-going process during entire course of the work.

.2 Identify risks and hazards resulting from site conditions, weather conditions and work operations.

.3 Record results in Health and Safety Plan.

1.5 HEALTH AND SAFETY PLAN

.1 Develop written site-specific Project Health and Safety Plan, based on hazard assessments, prior to commencement of the work.
.1 Submit Plan to Departmental Representative for review prior to start of work.

.2 Plan shall contain three (3) parts as follows:
.1 Part 1: health risks and safety hazards identified by hazard assessments.
.2 Part 2: safety measures to prevent or mitigate identified risks and hazards.
.3 Part 3: emergency procedures and communications response to be followed for all incidents and accidents, including names and telephone numbers of persons to contact.

.3 Coordinate Plan with the Facility's Emergency Response and Evacuation Plan. Departmental Representative will provide pertinent data, including contact names of PWGSC and Facility management.

.4 Post Plan on site. Enforce compliance by all workers.

.5 As work progresses, revise Plan to reflect additional health risks and safety hazards identified by hazard assessments.

.6 Submission of the Health and Safety Plan, and updates, to the Departmental Representative is for review and information purposes only. Departmental Representative's receipt, review and any comments made of the Plan shall not be construed to imply approval in part or in whole of such Plan by Departmental

Representative and shall not be interpreted as a warranty of being complete and accurate or as a confirmation that all health and safety requirements of the Work have been addressed and that it is legislative compliant. Furthermore, Departmental Representative's review of the Plan shall not relieve the Contractor of any of his legal obligations for Occupational Health and Safety provisions specified as part of the Work and those required by provincial legislation.

1.6 ACCIDENT REPORTING

.1 Report all incidents and accidents to authorities having jurisdiction and to Departmental Representative.

1.7 SITE RECORDS

.1 Maintain on site a copy of all health and safety documentation specified to be produced as part of the work and received from authorities having jurisdiction.

PART 1 - GENERAL

1.1 GENERAL

.1 Submit closeout documents specified in this section prior to application for Certificate of Substantial Performance of the Work.

.2 Submit data in sufficient lead time to allow adequate review by Departmental Representative.

.3 Make revisions to data as directed by Departmental Representative based on review.

1.2 PROJECT RECORD DOCUMENTS

.1 Departmental Representative will provide 2 white print copies of contract drawings specifically to record "as-built" conditions.

.2 Maintain 1 set at site and record actual built conditions.

.3 Mark each drawing with up-to-date, real time as-built conditions as work progresses.

.4 Maintain drawings in good condition and make available for inspection by the Departmental Representative whenever requested.

.5 Record changes in red ink on the prints. Mark only on 1 set of drawings and transfer data to other set at completion of project.
.1 Neatly transfer notations to second set also by use of red ink.
.2 Stamp all drawings of both sets with the notation "As-Built Drawings". Also sign and date drawings.
.3 Indicate all modifications, substitutions and deviations from that shown on the Contract Drawings or in Specifications.

.6 Record following information:
.1 Field changes to dimensions and details;
.2 Any additional details produced in the course of the contract by the Departmental Representative to supplement or to change existing design drawings;
.3 All Change Orders issued, documenting accurately and consistently the changed condition as it applies to all affected drawing details.

.7 Maintain As-built documents current as the contract progresses.

.8 Submit both sets of as-builts drawings.

1.3 OPERATIONS & MAINTENANCE DATA

.1 Submit 3 copies of Operations and Maintenance (O&M) manuals.

.2 O&M manuals to be hard cover three ring binder for 215 x 280 mm size paper. Each copy shall contain:
.1 Technical data for installation, operations and maintenance of products and systems supplied in project.
.2 Nameplate information for mechanical and electrical equipment.
.3 List of spare parts and tools.
.4 Original or certified copy of warranties and manufacturer's product guarantees.
.5 Reports of any field test.
.6 Complete set of reviewed shop drawings.

.3 Provide cover sheet in each manual with:
.1 Project name and number
.2 Name and address of Contractor and subcontractors
.3 Date of submission
.4 Table of contents

.4 Manuals to be in the English language.

1.4 TOOLS AND PARTS

.1 Supply special tools, wrenches and spare parts as supplied by manufacturer to disassemble, remove and reinstall components as needed for maintenance purposes.

.2 Tag all items with name of associated equipment and function.

.3 Turn items over to Departmental Representative immediately upon completion of work.

.4 Where required, provide manufacturer's written instructions on intent and method of use.

.5 Provide name, address and telephone number of nearest supplier.

.6 Prepare and include complete inventory list of items supplied into the maintenance manuals.

1 RELATED SECTIONS

.1 Operations and Maintenance Manuals: Section 01 78 00

.2 Demonstration and Training: Section 01 79 00

2 BACKGROUND INFORMATION

.1 Commissioning (or the commissioning process), as understood by PWGSC, is a planned program of activities conducted in concert with other activities performed during each stage of project delivery.
.1 The commissioning process identifies issues during the Planning and Design stages which are addressed during the Construction and Occupancy Stages of a Facility to ensure that the built facility is constructed and proven to operate satisfactorily under all weather, environmental and occupancy conditions to meet operational and user requirements.
.2 Commissioning activities during the Construction stage incorporates a third party verification process and a transfer of critical operational knowledge to Facility personnel.

.2 Commissioning to occur during the construction stage and the early period of facility occupancy stage.

3 DEFINITIONS

.1 For the purpose of this contract, the various terms listed below, as they relate directly or indirectly to the commissioning process, shall be deemed to have the following meaning.

.2 Commissioning Process: a planned program of tasks, activities and procedures carried out systematically during the Construction and Occupancy Stages in accordance with the commissioning objectives to:
.1 Verify whether the fully installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and;
.2 Ensure that appropriate documentation is compiled to effectively train O& M staff and prepare a comprehensive Building Management Manual (BMM).

.3 Commission (i.e., to commission a building component or system): tests and checks conducted by Commissioning Agent on all systems and integrated systems of Facility; carried out only after they are fully installed, functional and Contractor's Performance Verification responsibilities have been completed and approved.
.1 Contractor provides assistance during this process by operating equipment and systems, by troubleshooting and making adjustments as may be required.

3 DEFINITIONS (Cont'd)

.3 (Cont'd)

.2 Systems are run under their full operation and under various modes to determine if they function correctly, consistently, at peak efficiency and interactively with each other as intended in accordance with Contract Documents and design criteria.

.3 During these checks, adjustments may be made enhancing performance to meet environmental or user requirements.

.4 Commissioning Agent: an appointed person, representing the Departmental Representative, responsible for the development of a Commissioning Plan and managing its implementation by overseeing and coordinating various activities and responsibilities to be performed by members of the Commissioning Team.

.1 In this project, the Commissioning Agent is part of the engineering consultant firm engaged by PWGSC to prepare the final design and contract documents for this Work.

.2 Commissioning Agent plays a lead role in support to the Departmental Representative to ensure that the commissioning objectives are achieved.

.5 Commissioning Manager: a PWGSC departmental employee providing advice and guidance on commissioning requirements to the Commissioning Agent in support to the Departmental Representative.

.1 Commissioning Plan: The document which describes the organization, scheduling, allocation of resources, required documentation, target dates, and team roles and responsibilities for verification that the built works meet Contract Document and design criteria requirements.

.2 Contractor: means the General Contractor, however it also refers to any personnel from subcontractors, including the controls and TAB specialists, suppliers and manufacturer's technical persons which Contractor employs to carry out his/her designated commissioning duties and activities. The Contractor is responsible for the performance of their subcontractors.

.3 Design Consultant: persons from the civil, architectural, mechanical and electrical design disciplines of the engineering firm(s) which have been engaged by the Departmental Representative to prepare the final design and produce the contract documents. Design Consultant also has specifically identified commissioning activities for this project.

.4 Design Criteria: All those factors included in the design of a Facility prescribed by the tenant needs or as determined by the Design Consultant as

3 DEFINITIONS (Cont'd)

.5 Commissioning Manager:(Cont'd)
.4 Design Criteria:(Cont'd)
necessary in order to meet all Facility functional and user operational requirements.
.5 Installation/Start-up Checks (sometimes referred to as pre-functional checks): a written compilation of checks and inspections to be performed by Contractor during the pre-start-up and start-up of a particular equipment or system component.
.6 Checklist sheets are produced which include the following data:
.1 Product manufacturer's installation instructions and recommended checks and;
.2 Special procedures as specified in relevant sections of Specifications;
.3 Other items considered good installation and engineering industry practices deemed appropriate for proper and efficient operation.
.7 Standard Installation/Start-up Checklist sheets prepared by equipment manufacturer are acceptable for use. However, supplement with additional data representative of specific project conditions as deemed required by Commissioning Agent.
.8 Use Checklist sheets for all equipment installation. Document in writing on checklist the various checks made, deficiencies noted and corrective action taken.
.9 Installer to sign Checklist sheets upon completion, certifying that stated checks and inspections have been performed.
.10 Use of Installation/Start-up Checklists is not considered part of the commissioning process but will be stringently used for all equipment pre-start and start-up procedures.
.11 Return completed Installation/Start-up Checklist sheets after use to Commissioning Agent for retention. Checklists are required by Commissioning Agent when Facility is commissioned and will be included in the BMM manual at completion of project.
.12 Contractor to submit blank forms to Commissioning Agent before performing start-up. Sample forms (see forms 01 91 32A through H) may be used to develop equipment specific forms.

.6 Performance Verification: (sometimes referred to Functional Testing) checks, running dynamic tests and adjustments carried out by Contractor on equipment and systems, upon their installation, to ensure they operate correctly, efficiently and function independently and interactively with other systems as intended in accordance with contract documents and manufacturer's recommendations.
.1 Performance Verification will not be considered part of the commissioning process. It is however considered an essential and integral part of

3 DEFINITIONS (Cont'd)

.6 Performance Verification: (Cont'd)
.1 (Cont'd)
Contractor's responsibilities in the equipment installation process which must be stringently conducted, successfully completed and approved by Departmental Representative before a piece of equipment or system is considered fully installed and functional.
.2 Facility components and systems will not be commissioned by Commissioning Agent until performance verification has been completed and approved.

.7 Performance Verification Report Sheets (PV sheets): forms developed by Commissioning Agent for Contractor's use to record measured data and readings taken during functional testing and Performance Verification procedures. Equipment specific forms will be issued by Commissioning Agent after shop drawing review.

.8 Product Information (PI Data): a compilation of data gathered on a particular piece of equipment, typically produced by manufacturer, which includes nameplate information, installation/startup instructions, parts list, operating instructions, maintenance guidelines and other pertinent technical data and recommended checks that is necessary to prepare for start-up and functional testing and used during operation and maintenance of such equipment. This documentation is included in the Building Management Manual(BMM) at completion of work.

4 COMMISSIONING OBJECTIVES

.1 A Commissioning Plan has been prepared by the Commissioning Agent, on behalf of PWGSC, which identifies, among other issues, specific commissioning activities to be carried out by the commissioning team during the Construction of the project.

.2 The commissioning activities have the following objectives:
.1 Collect data on equipment and systems being supplied and document their installation;
.2 Conduct checks and tests on fully installed building components, equipment, systems and integrated systems to:
.1 Verify whether they operate in accordance with requirements of Contract Documents;
.2 Verify performance against design criteria and user requirements and measure peak capacities;
.3 Prepare a Building Management Manual (BMM) which contains operations and maintenance data,

4 COMMISSIONING OBJECTIVES (Cont'd)

.2 (Cont'd)
.3 (Cont'd)
as-built record documents, commissioning reports, training data and other critical information for future use by Facility operational staff;
.4 Ensure transfer of knowledge on the operations, maintenance and management of the Facility to Tenant and Operational personnel by means of appropriate training.

.3 Work to achieve the above objectives requires a collaborative effort from all members of the commissioning team.
.1 Contractor's commissioning activities and responsibilities are described in Clause 8 below.

.4 Commissioning activities performed by the Commissioning Agent and the Design Consultant does not replace checks, tests, adjustments, balancing and other performance verification procedures to be carried out by the Contractor as an integral part of performing the Work of this contract as specified in other sections of the Specifications.

5 SYSTEMS TO BE COMMISSIONED

.1 The following systems and controls, complete with associated equipment and components, will be commissioned by the Commissioning Agent and requires related commissioning activities to be performed by Contractor as specified herein and in section(s):
.1 Computer Room AC systems (CRAC-#)
.2 Air Handling Systems
.3 Heating Controls
.4 Plumbing Fixtures
.5 Fire Dampers
.6 TAB
.7 Branch Circuit Panelboards
.8 Disconnects - Fused and Unfused
.9 Dry-Type Transformers
.10 Emergency Lighting Battery Unit
.11 Exit Sign
.12 Lighting
.13 Fire Alarm
.14 Generator
.15 Wiring Devices

6 COMMISSIONING TEAM

.1 A commissioning team will be assembled to carryout various functions needed to effectively commission the Facility. Contractor will be part of this team with duties and responsibilities as specified in this section and in other sections of the Specifications.

6 COMMISSIONING TEAM (Cont'd)

.2 Members of the Commissioning Team are as described in 01 91 31 - Commissioning Plan.

7 CONTRACTOR'S COMMISSIONING ACTIVITIES

.1 Organize and arrange for the services of subcontractors, their specialists and manufacturer's technical representatives to perform Contractor's commissioning activities.

.2 Confirm personnel forming part of the Commissioning Team are qualified and knowledgeable of installed equipment and systems and with design intent.

.3 Develop in conjunction with the Commissioning Agent a commissioning schedule as specified herein.

.4 Notify Departmental Representative in writing when Facility is ready for be commissioned. Give 14 calendar day notice.

.5 Commissioning will only commence once that full documentation has been received and installed equipment and systems have undergone successful performance verification.

.6 Note that Certificate of Substantial Completion will only be issued when:
.1 All commissioning documentation has been received and found suitable by Departmental Representative;
.2 Designated equipment and systems have been commissioned and;
.3 Training has been completed.

.7 Performance faults:
.1 Equipment and systems found not operating correctly or not performing as intended during commissioning shall be re-verified by checking 100% of all equipment and components of the un-functional system, including related controls as required to rectify the deficiencies and ensure correct performance.
.2 Costs to conduct additional tests and inspections, as deemed required by Departmental Representative, to determine acceptability and proper performance of such item to be paid for by Contractor.

.8 Prior to Facility being Commissioned:
.1 Submit commissioning documentation as specified in clause 13 below.

7 CONTRACTOR'S COMMISSIONING ACTIVITIES (Cont'd)

.8 (Cont'd)

.2 Submit the Installation/Start-up Checklist sheets to Commissioning Agent for review prior to conducting the pre-start and start-up of any piece of equipment. Incorporate additional start-up instructions onto checklist as determined by the Commissioning Agent's review.

.3 Conduct the pre-start and start-up of all equipment by following and filling out the approved Installation/Start-up Checklists.

.4 Conduct Performance Verification on all installed equipment and systems. Use and fill out the PV Report Sheets provided.

.5 Upon completion of start-up and performance verification process, submit signed copy of Checklist and PV sheets to Commissioning Agent as affidavit that required checks and tests were successfully conducted.

.6 Record performance measurements and data reading on PV sheets and return to Commissioning Agent for compilation.

.7 Give Departmental Representative and Commissioning Agent a minimum of five (5) days notice for start-up and performance verification of equipment and systems which must be witnessed by Commissioning Agent as determined by Commissioning Agent beforehand on PV sheets.

.8 Provide missing information and data as identified by Commissioning Agent and Departmental Representative during documentation review.

.9 Submit above noted documentation before Commissioning will proceed.

.10 Address deficiencies in Work identified during performance verification of equipment and systems. Conduct additional performance verification thereafter.

.11 Arrange for special tools and devices, identified at commissioning meeting(s), as deemed required to assist with commissioning.

.12 Provide access ladders, two way radios and other equipment required by Team when facility will be commissioned.

.9 When Facility is being Commissioned:

.1 Provide qualified tradespersons to be present at site to assist Commissioning Agent.

.2 Assist in commissioning systems specified and as follows:

.1 Operate designated building component, mechanical/electrical equipment and system under all modes of operation and conduct checks and tests as directed by Commissioning Agent.

.2 Check and verify that building component, equipment, systems and integrated systems, including their controls, are functioning and

7 CONTRACTOR'S COMMISSIONING ACTIVITIES (Cont'd)

.9 When Facility is being Commissioned:(Cont'd)
.2 (Cont'd)
.2 (Cont'd)
responding correctly and interactively with each other.
.3 Test systems independently and then in unison with other related systems.
.4 Conduct all Commissioning checks and tests in presence of and witnessed by Commissioning Agent and Departmental Representative.
.5 Assist Design Consultant and other members of the commissioning team who will also be present to commission Facility.
.3 Specific procedures used to commission Facility will be provided by Commissioning Agent which includes:
.1 Sequential order of building component and system to be tested.
.2 Running systems under various anticipated modes and demands (example: high and low cooling or heating loads, duplicating outside temperature conditions, fire alarm and power failure conditions).
.3 Running building controls through all sequences of operation to verify and confirm that equipment and systems are responding as designed and intended.
.4 Operating designated equipment at peak capacities, recording output data against design criteria.
.5 Run component or systems as long as necessary to effectively commission all items as deemed required by Commissioning Agent and Departmental Representative.
.6 Monitor equipment and system responses.
.7 Record test results, measurements and other data on commissioning forms provided by Commissioning Agent.
.8 Assist in analyzing results. Identify system deficiencies and components not responding as intended.
.9 Correct deficiencies and system non-conformance issues. Adjust, calibrate or fine tune system components as required. Debug system software as may be required.
.10 Retest systems when directed to confirm compliance.

.10 Upon completion of Facility Commissioning:
.1 Provide training to maintenance & operational personnel as specified.
.2 Turn over any filled-in checks sheets or reports resulting from commissioning.

8 COMMISSIONING ACTIVITIES OF OTHER TEAM MEMBERS

.1 Commissioning Agent:

.1 Represents the Departmental Representative during the commissioning process.

.2 Coordinates activities of the commissioning team members to ensure that commissioning activities are carried out properly and in a timely manner.

.3 Prepares commissioning schedule in concert with Contractor.

.4 Chairs commissioning meetings.

.5 Works with Contractor, subcontractors, equipment suppliers, Design Consultant resources, PWGSC and Tenant Representatives to resolve technical problems which may arise during the process.

.6 Witnesses Contractor's pre-start, start-up and performance verification procedures for certain equipment and systems specified when deemed required due to their critical nature and function in the Facility.

.7 Verifies that Installation/Start-up Checklists and Performance Verification checks and tests are used and stringently followed by Contractor.

.8 Assists Contractor in coordination of training activities for facility staff.

.9 Submits final commissioning report to Departmental Representative.

.2 Design Consultant (referred to as the "Departmental Representative" throughout the technical sections):

.1 Prepares in concert with Commissioning Agent the Commissioning Plan.

.2 Reviews Contractor's Installation/Start-up Checklists for completeness, incorporating supplement data not addressed on checklist. Provides to Contractor checklist for products which manufacturer does not provide installation and start-up instructions.

.3 Develops performance verifications report sheets for use by Contractor to record actual data and measurements against design data criteria.

.4 Includes, on performance verification report sheets, design data and anticipated performance values for equipment and systems to undergo verification.

.5 Compiles commissioning documentation submitted by Contractor. Prepares final Building Management Manuals.

.6 Assists Commissioning Agent in witnessing pre-start, start-up and performance verification activities.

.7 Approves type and method of calibration for instruments used by Contractor to conduct performance verification and commissioning tests.

.8 Assists Commissioning Agent in reviewing and analyzing tests results.

8 COMMISSIONING ACTIVITIES OF OTHER TEAM MEMBERS (Cont'd)

.2 (Cont'd)
.9 Participate in the training sessions provided by Contractor to tenant O&M staff by giving introductory information on design philosophy, design intent and systems designs,
.10 Assist in the resolution of issues relating to commissioning.

.3 Tenant Representative:
.1 Participates with other team members to ensure that systems as installed meet the operational and functional requirements.
.2 Periodically attends commissioning meetings as required.
.3 Attends final commissioning activities.
.4 Assists in resolving technical problems by providing additional details on operational requirements.

.4 Facility Operations and Maintenance Staff:
.1 Participates in the commissioning process to obtain early introduction to the facility systems and to provide early operator feedback.
.2 Prime interest is in the familiarization and training of appropriate maintenance staff.
.3 Staff may attend certain critical equipment start-up and performance verification activities and provide comments and practical suggestions on issues which may arise during actual operation, maintenance and repair of the equipment and systems.
.4 Attends commissioning meetings periodically, depending on issues being discussed.
.5 Identifies the appropriate staff which must receive the O & M training.

9 COMMISSIONING MEETINGS

.1 General briefing on commissioning will be conducted at first project construction meeting at commencement of work.
.1 Issues discussed will include scope and extent of commissioning and clarify responsibilities of commissioning team members.
.2 All team members must attend, including subcontractors of equipment and systems to be commissioned.

.2 Include commissioning as one agenda item at each construction meeting held and chaired by Contractor during construction. Give subject due consideration for each material and equipment supplied and for all matters of Work.

.3 Whenever possible meetings will be held immediately following the construction meetings.

9 COMMISSIONING MEETINGS (Cont'd)

.4 Meeting will be chaired by Contractor, who will record and distribute minutes.

.5 Confirm all subcontractors and relevant manufacturer representatives are present at meetings as deemed required.

10 COMMISSIONING SCHEDULE

.1 Address commissioning activities within the construction work schedule. Clearly identify allocated time period for commissioning and training activities.

.2 Develop commissioning schedule in conjunction with Commissioning Agent. Indicate allocated time period and anticipated dates for:
.1 Submission of commissioning documentation, including O&M Manuals.
.2 Equipment and system start-up and performance verification, making them ready to be commissioned.
.3 Allocated period to commission designated building components and systems.
.4 Training period.
.5 Work during Warranty period.

.3 Submit schedule to Departmental Representative for review.

11 TRAINING

.1 Commence process of familiarizing Tenant and O&M personnel in the early stages of work on purpose and operation of various equipment and systems. Continue process throughout the entire construction duration.
.1 Provide informal briefings during occasional site visits, at planned commissioning meetings and during the final commissioning site activities.

.2 Conduct formal demonstration and training sessions only after all identified systems have been commissioned by Commissioning Agent and Departmental Representative has given approval to proceed with the training process.

.3 Provide training and demonstration on all new equipment, sub-systems, systems and integrated systems.

.4 Carry out training in accordance with requirements of section 01 79 00.

.5 Submit written agenda of training session(s) four (4) weeks beforehand for review by Commissioning Agent and Departmental Representative.

11 TRAINING (Cont'd)

.6 Coordinate content with Commissioning Agent. Design Consultant will provide introductory presentation giving general outline of each system design and intended function.

.7 Submit training manuals for review two (2) weeks prior to actual training.

.8 Keep required tools and O&M Manual on site for training and system demonstration.

.9 As a minimum, the training sessions to cover the following information:
.1 Introduction.
.2 Description of the system with factory personnel being involved at appropriate times.
.3 Instructions on start-up procedures including seasonal procedures, system check-lists and emergency procedures.
.4 Operational procedures, including occupancy considerations, seasonal change-over, manual and automatic operations and emergency modes.
.5 Instruction on system shutdowns, including checklists.
.6 Instructions on all aspects of system maintenance, including routine servicing, lubrication, overhaul and factory servicing.
.7 Information concerning the scope of warranties and their use.
.8 A description of spare parts in stock and their service.
.9 A description of normal tools required for servicing the systems/equipment.

.10 Submit typewritten record of training sessions given and list of attendees. Use forms of format approved by Departmental Representative.

12 COMMISSIONING DOCUMENTATION

.1 Submit the following documentation for use during commissioning and for incorporation thereafter into a Building Management Manual (BMM):
.1 Operations and Maintenance Manuals, Project Record Documents and other data as specified in Section 01 78 00. Data to include:
.1 Equipment Product Information (PI Data) complete with:
.1 Nameplate info,
.2 Installation instructions,
.3 Operating procedures and
.4 Maintenance guidelines.
.2 Reviewed shop drawings,
.3 As-built record drawings and Specifications.

12 COMMISSIONING DOCUMENTATION (Cont'd)

.1 (Cont'd)
.2 Completed Installation/Start-up Checklist sheets used.
.3 Performance Verifications checks and tests procedures and completed report sheets used.
.4 Copy of any static and dynamic test and reports conducted.
.5 TAB report and other reports as specified in various trade sections.

.2 Above documentation is required by Commissioning Agent to commission Facility. Submit data minimum three (3) weeks before commencement of commissioning.

.3 Documentation to include detailed information and number of copies as specified for maintenance manuals of section 01 78 00.

.4 Commissioning Agent and Design Consultant will compile above documentation and produce a BMM manuals for operation/maintenance staff and tenant use.

END