

Part 1 General

- .1 Work of this Contract comprises renovation of the existing heating water plants for Living Units 1 through 5, located at the Bowden Institution and further identified as the "Bowden Institution - Hot Water Systems Upgrade.

1.2 CONTRACT METHOD

- .1 Construct Work under single stipulated price contract.
 - .1 Purchase and maintain liability insurance to protect Contractor from claims for not less than limits of liability which Contractor is required to provide to Departmental Representative.

1.3 SCHEDULE

- .1 Disruption of heating and ventilation services may begin no earlier than May 01, 2015.
- .2 Work must be substantially complete with systems operating before September 30, 2015.
- .3 The Contractor will be liable for any and all damages resulting from a non-operating mechanical system outside of the construction schedule above.

1.4 SECURE STORAGE

- .1 Provide weatherproof, secure storage container(s) for all equipment shipped to site. Maintain storage for the duration of the project or as required.
 - .1 Location and Space for the storage container(s) will be provided by the Departmental Representative.
 - .2 Items stored in the secured storage remain the sole responsibility of the contractor.

1.5 WARRANTY

- .1 Contractor and Manufacturers warranty shall start on the date of Substantial Completion.

1.6 WORK SEQUENCE

- .1 Construct Work in stages to accommodate Departmental Representative's continued use of premises during construction.
- .2 Co-ordinate Progress Schedule and co-ordinate with Departmental Representative Occupancy during construction.
- .3 Maintain fire access/control.

1.7 CONTRACTOR USE OF PREMISES

- .1 Limit use of premises for Work, storage, and access, to allow Departmental Representative occupancy.
- .2 Co-ordinate use of premises under direction of Departmental Representative.
- .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

- .4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .5 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.
- .6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.8 DEPARTMENTAL REPRESENTATIVE OCCUPANCY

- .1 Departmental Representative will occupy premises during entire construction period for execution of normal operations.
- .2 Co-operate with Departmental Representative in scheduling operations to minimize conflict and to facilitate Departmental Representative usage.

1.9 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

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

1.10 EXISTING SERVICES

- .1 Submit schedule to and obtain approval from Owner for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .2 Provide temporary services to maintain critical building and tenant systems.
- .3 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .4 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .5 Record locations of maintained, re-routed and abandoned service lines.

1.11 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

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 USE OF SITE AND FACILITIES

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

1.2 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

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

1.3 EXISTING SERVICES

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

1.4 SPECIAL REQUIREMENTS

- .1 Submit schedule in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart.
- .2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .3 Keep within limits of work and avenues of ingress and egress.
- .4 Ingress and egress of Contractor vehicles at site is limited to :
 - .1 Public Parking outside the Medium Security compound.
 - .1 Vehicles required to deliver material in side the Medium Security Compound to the Living units must be removed from the site to Public parking when materials have been offloaded.
 - .2 Vehicles entering the Medium Security Compound, must be equipped with locking fuel tank lids.

1.5 SECURITY

- .1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.
- .2 Security clearances:
 - .1 Personnel employed on this project will be subject to security check. Obtain clearance, as instructed, for each individual who will require to enter premises.
 - .2 Obtain requisite clearance, as instructed, for each individual required to enter premises.
 - .3 Personnel will be checked daily at start of work shift and provided with pass which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.
 - .4 Contractor's personnel will require satisfactory CSC initiated security screening in order to complete Work in premises and on site. Clearance Forms must be submitted for this purpose
- .3 Security escort:
 - .1 Personnel employed on this project must be escorted when executing work.
 - .2 Submit an escort request to Departmental Representative at least 48 hours before service is needed. For requests submitted within time noted above, costs of security escort will be paid for by Departmental Representative. Cost incurred by late request will be Contractor's responsibility.
 - .3 Any escort request may be cancelled free of charge if notification of cancellation is given at least 24 hours before scheduled time of escort. Cost incurred by late request will be Contractor's responsibility.
 - .4 Calculation of costs will be based on average hourly rate of security officer for minimum of 4 hours per day for late service request and of 4 hours for late cancellations.

1.6 BUILDING SMOKING ENVIRONMENT

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

1.7 WORK HOURS

- .1 Per Section 01 14 10 – Security Restrictions

1.8 LAYDOWN AREAS

- .1 No laydown of material or equipment is permitted within the secure areas outside of the mechanical rooms.

1.9 PHYSICAL RESTRICTIONS

- .1 Mechanical rooms for the boiler replacement are located on the 2nd floor.
- .2 A single door (1160 Wide x 2100 Tall) access to a stairwell to get to the second floor
- .3 A hoist is available to lift heavy items up to the second floor.

1.10 SECURITY RESTRICTIONS

- .1 Per Section 01 14 10 – Security Restrictions

1.11 VEHICLE RESTRICTIONS

- .1 Per Section 01 14 10 – Security Restrictions

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 PURPOSE

- .1 To ensure that both the construction project and the institutional operations may proceed without undue disruption or hindrance and that the security of the Institution is maintained at all times.

1.2 DEFINITIONS

- .1 "Contraband" means:
 - .1 an intoxicant, including alcoholic beverages, drugs and narcotics,
 - .2 a weapon or a component thereof, ammunition for a weapon, and anything that is designed to kill, injure or disable a person or that is altered so as to be capable of killing, injuring or disabling a person, when possessed without prior authorization,
 - .3 an explosive or a bomb or a component thereof,
 - .4 currency over any applicable prescribed limit \$50.00, and
 - .5 any item not described in paragraphs (1) to (4) that could jeopardize the security of a Penitentiary or the safety of persons, when that item is possessed without prior authorization
- .2 "Unauthorized Smoking and related Items" means all smoking items including, but not limited to, cigarettes, cigars, tobacco, chewing tobacco, cigarette making machines, matches and lighters.
- .3 "Commercial Vehicle" means any motor vehicle used for the shipment of material, equipment and tools required for the construction project.
- .4 "CSC" means Correctional Service Canada.
- .5 "Director" means Director, Warden or Superintendent of the Institution as applicable.
- .6 "Construction employees" means persons working for the general contractor, the sub-contractors, equipment operators, material suppliers, testing and inspection companies and regulatory agencies.
- .7 "Departmental Representative" means the project manager from Public Works and Government Services Canada.
- .8 "Perimeter" means the fenced or walled area of the institution that restrains the movement of the inmates.
- .9 "Construction limits" means the area as shown on the contract drawings that the contractor will be allowed to work. This area may or may not be isolated from the security area of the institution. These are the immediate areas in and around the concrete pads under construction.

1.3 PRELIMINARY PROCEEDINGS

- .1 Prior to the commencement of work, the contractor will meet with the Director or his representative to:
 - .1 Discuss the nature and extent of all activities involved in the Project.
 - .2 Establish mutually acceptable security procedures in accordance with this instruction and the institution's particular requirements.
- .2 The contractor will:
 - .1 Ensure that all construction employees are aware of the security requirements.
 - .2 Ensure that a copy of the security requirements is always prominently on display at the job site.
 - .3 Co-operate with institutional personnel in ensuring that security requirements are observed by all construction employees.

1.4 CONSTRUCTION EMPLOYEES

- .1 Submit to the Director a list of the names with date of birth of all construction employees to be employed on the construction site and a security clearance form for each employee.
- .2 Allow two (2) weeks for processing of security clearances. Employees will not be admitted to the Institution without a valid security clearance in place and a recent picture identification such as a provincial driver's license. Security clearances obtained from other CSC institutions are not valid at this institution.
- .3 The Director may require that facial photographs may be taken of construction employees and these photographs may be displayed at appropriate locations in the institution or in an electronic database for identification purposes. The Director may require that Photo ID cards be provided for all construction workers. ID cards will then be left at the designated entrance to be picked upon arrival at the institution and shall be displayed prominently on the construction employees clothing at all time while employees are in the institution. Verify this requirement with the Departmental Representative
- .4 Entry to Institutional Property will be refused to any person there may be reason to believe may be a security risk.
- .5 Any person employed on the construction site will be subject to immediate removal from Institutional Property if they:
 - .1 appear to be under the influence of alcohol, drugs or narcotics.
 - .2 behave in an unusual or disorderly manner.
 - .3 are in possession of contraband.

1.5 VEHICLES

- .1 All unattended vehicles on CSC property shall have windows closed; doors and trunks shall be locked and keys removed. The keys shall be securely in the possession of the owner or an employee of the company that owns the vehicle. The Institution requires lockable gas caps on all vehicles and motorized equipment used in the construction area.

- .2 The director may limit at any time the number and type of vehicles allowed within the Institution.
- .3 Drivers of delivery vehicles for material required by the project will not require security clearances but must remain with their vehicle the entire time that the vehicle is in the Institution. The director may require that these vehicles be escorted by Institutional staff or Commissionaires while in the Institution.
- .4 If the Director permits trailers to be left inside the secure perimeter of the Institution, these trailer doors will be locked at all times. All windows will be securely locked when left unoccupied. All trailer windows shall be covered with expanded metal mesh. All storage trailers inside and outside the perimeter must be locked when not in use.

1.6 PARKING

- .1 The parking area(s) to be used by construction employees will be designated by the Director. Parking in other locations will be prohibited and vehicles may be subject to removal.

1.7 SHIPMENTS

- .1 All shipments of project material, equipment and tools shall be addressed in the Contractor's name to avoid confusion with the institution's own shipments. The contractor must have his own employees on site to receive any deliveries or shipments. CSC staff will **NOT** accept receipt of deliveries or shipments of any material equipment or tools.

1.8 TELEPHONES

- .1 There will be no installation of telephones, Facsimile machines and computers with Internet connections permitted within the perimeter of the institution unless prior approval of the Director is received.
- .2 The Director will ensure that approved telephones, Facsimile machine and computers with Internet connections are located where they are not accessible to inmates. All computers will have an approved password protection that will stop an Internet connection to unauthorized personnel.
- .3 Wireless cellular and digital telephones, including but not limited to devices for telephone messaging, pagers, BlackBerries, telephone used as 2-way radios, are not permitted within the perimeter of the Institution unless approved by the Director. If wireless cellular telephones are permitted, the user will not permit their use by any inmate.
- .4 The Director may approve but limit the use of two way radios.

1.9 WORK HOURS

- .1 Work hours within the Institution are: Monday to Friday 8:00 a.m. (0800hrs.) to 4:00 p.m. (1600 hrs).

- .2 Work will not be permitted during weekends and statutory holidays without the permission of the Director. A minimum of seven days advance notice will be required to obtain the required permission. In case of emergencies or other special circumstances, this advance notice may be waived or period shortened by the Director.

1.10 OVERTIME WORK

- .1 No overtime work will be allowed without permission of the Director. Give a minimum forty-eight (48) hours advance notice when overtime work on the construction project is necessary and approved. If overtime work is required because of an emergency such the completion of a concrete pour or work to make the construction safe and secure, the contractor will advise the Director as soon as this condition is known and follow the directions given by the Director. Costs to the Crown for such events may be attributed to the contractor.
- .2 When overtime work, weekend statutory holiday work is required and approved by the Director, extra staff members may be posted by the Director or his designate, to maintain the security surveillance. The Departmental Representative may post extra staff for inspection of construction activities. The actual cost of this extra staff may be subject to reclamation by the Crown.

1.11 TOOLS AND EQUIPMENT

- .1 Maintain a complete list of all tools and equipment to be used during the construction project. Make this inventory available for inspection when required. Tool lists are to include the following as well as any screw & or drill bits and any disposable tool items such as disposable blades etc.
 - .1 Restricted tools (tools requiring special permission to carry on to site).
 - .1 Explosive tools (Hilti-gun, etc.)
 - .2 Bolt cutters
 - .3 Acids
 - .4 Bottle jacks (hydraulic)
 - .5 Knives (other than approved hobby knives and cutlery)
 - .6 Scissors, tailors;
 - .7 Adjustable wrenches, 10" long or more;
 - .8 Tin snips
 - .9 Linesmen pliers
 - .10 Metal cutting devices
 - .11 Hacksaw blades Wrecking or cross bars
 - .12 Files
 - .13 Vice grip pliers with cutters in jaws
 - .14 Picks
 - .15 Portable, electrically driver power tools capable of cutting or drilling (skillsaws, jigsaws and drill motors)
 - .16 Welding equipment (accessories locked up)

- .17 Rope, heavy cord
- .18 Axes
- .19 Ladders
- .20 Gasoline
- .21 Coal oil, turpentine
- .22 Lacquers and sealers
- .23 Pure ammonia
- .24 Pneumatic guns and staplers
- .25 Propane cylinders
- .2 Non restricted tools:
 - .1 Includes tools which are used daily and are not usually expected to be used to effect an escape.
- .2 Throughout the construction project maintain up-to-date the list of tools and equipment specified above.
- .3 Keep all tools and equipment under constant supervision, particularly power-driven and cartridge-driven tools, cartridges, files, saw blades, rod saws, wire, rope, ladders and any sort of jacking device.
- .4 Store all tools and equipment in approved secure locations.
- .5 Lock all tool boxes when not in use. Keys to remain in the possession of the employees of the contractor. Scaffolding shall be secured and locked when not erected and when erected, will be secured in a manner agreed upon with the Institutional designate.
- .6 All missing or lost tools or equipment shall be reported immediately to the Director.
- .7 The Director will ensure that the security staff members carry out checks of the Contractor's tools and equipment against the list provided by the Contractor. These checks may be carried out at the following intervals:
 - .1 At the beginning and conclusion of every construction project.
 - .2 Weekly, when the construction project extends longer than a one week period.
 - .3 The Contractor may be subject to random checks by security staff to ensure proper storage and security of tools throughout the project.
 - .4 Certain tools/equipment such as cartridges and hacksaw blades are highly controlled items. The contractor will be given at the beginning of the day, a quantity that will permit one day's work. Used blades/cartridges will be returned to the Director's representative at the end of each day.
- .8 .9 If propane or natural gas is used for heating the construction, the institution will require that an employee of the contractor supervise the construction site during non-working hours.

1.12 KEYS

- .1 1. Security Hardware Keys

- .1 The Contractor shall arrange with the security hardware supplier/installer to have the keys for the security hardware to be delivered directly to Institution, specifically the Security Maintenance Officer (SMO).
 - .2 The SMO will provide a receipt to the Contractor for security hardware keys.
 - .3 The contractor will provide a copy of the above-mentioned receipt to the Departmental Representative.
- .2 2. Other Keys
- .1 The contractor will use standard construction cylinders for locks for his use during the construction period.
 - .2 The contractor will issue instructions to his employees and sub-trades, as necessary, to ensure safe custody of the construction set of keys.
 - .3 Upon completion of each phase of the construction, the CSC representative will, in conjunction with the lock manufacturer:
 - .1 Prepare an operational keying schedule;
 - .2 accept the operational keys and cylinders directly from the lock manufacturer;
 - .3 Arrange for removal and return of the construction cores and install the operational core in all locks.
 - .4 Upon putting operational security keys into use, the CSC construction escort shall obtain these keys as they are required from the SMO and open doors as required by the Contractor. The Contractor shall issue instructions to his employees advising them that all security keys shall always remain with the CSC construction escort.

1.13 SECURITY HARDWARE

- .1 Turn over all removed security hardware to the Director of the Institution for disposal or for safekeeping until required for re-installation.

1.14 PRESCRIPTION DRUGS

- .1 Employees of the contractor who are required to take prescription drugs during the workday shall obtain approval of the Director to bring a one day supply only into the Institution.

1.15 SMOKING RESTRICTIONS

- .1 Contractors and construction employees are not permitted to smoke inside correctional facilities or outdoors within the perimeter of a correctional facility and must not possess unauthorized smoking items within the perimeter of a correctional facility.
- .2 Contractors and construction employees who are in violation of this policy will be requested to immediately cease smoking or dispose of any unauthorized smoking items and, if they persist, will be directed to leave the institution.
- .3 Smoking is only permitted outside the perimeter of a correctional facility in an area to be designated by the Director.

1.16 CONTRABAND

- .1 Weapons, ammunition, explosives, alcoholic beverages, drugs and narcotics are prohibited on institutional property.
- .2 The discovery of contraband on the construction site and the identification of the person(s) responsible for the contraband shall be reported immediately to the Director.
- .3 Contractors should be vigilant with both their staff and the staff of their sub-contractors and suppliers that the discovery of contraband may result in cancellation of the security clearance of the affected employee. Serious infractions may result in the removal of the company from the Institution for the duration of the construction.
- .4 Presence of arms and ammunition in vehicles of contractors, sub-contractors and suppliers or employees of these will result in the immediate cancellation of security clearances for the driver of the vehicle.

1.17 SEARCHES

- .1 All vehicles and persons entering institutional property may be subject to search.
- .2 When the Director suspects, on reasonable grounds, that an employee of the Contractor is in possession of contraband or unauthorized items, he may order that person to be searched.
- .3 All employees entering the Institution may be subject to screening of personal effects for traces of contraband drug residue.

1.18 ACCESS TO AND FROM INSTITUTIONAL PROPERTY

- .1 Construction personnel and commercial vehicles will not be admitted to the institution after normal working hours, unless approved by the Director.

1.19 MOVEMENT OF VEHICLES

- .1 Escorted commercial vehicles will be allowed to enter or leave the institution through the vehicle access gate during the following hours:
 - .1 08:00 a.m. to 0:400 p.m.(or within approved hours of work).
- .2 The contractor shall advise the Director twenty four (24) hours in advance to the arrival on the site of heavy equipment such as concrete trucks, cranes, etc.
- .3 Vehicles being loaded with soil or other debris, or any vehicle considered impossible to search, must be under continuous supervision by CSC staff or Commissionaires working under the authority of the Director.
- .4 Commercial vehicles will only be allowed access to institutional property when their contents are certified by the Contractor or his representative as being strictly necessary to the execution of the construction project.

- .5 Vehicles shall be refused access to institutional property if, in the opinion of the Director, they contain any article which may jeopardize the security of the institution.
- .6 Private vehicles of construction employees will not be allowed within the security wall or fence of medium or maximum security institutions without the permission of the Director.
- .7 With prior approval of the Director, a vehicle may be used in the morning and evening to transport a group of employees to the work site. This vehicle will not remain within the Institution the remainder of the day.
- .8 With the approval of the Director, certain equipment may be permitted to remain on the construction site overnight or over the weekend. This equipment must be securely locked, with the battery removed. The Director may require that the equipment be secured with a chain and padlock to another solid object.

1.20 MOVEMENT OF CONSTRUCTION EMPLOYEES ON INSTITUTIONAL PROPERTY

- .1 Subject to the requirements of good security, the Director will permit the Contractor and his employees as much freedom of action and movement as is possible.
- .2 However, notwithstanding paragraph above, the Director may:
 - .1 Prohibit or restrict access to any part of the institution.
 - .2 Require that in certain areas of the institution, either during the entire construction project or at certain intervals, construction employees only be allowed access when accompanied by a member of the CSC security staff.
- .3 During the lunch and coffee/health breaks, all employees will remain within the construction site. Employees are not permitted to eat in the officer's lounge and dining room.

1.21 SURVEILLANCE AND INSPECTION

- .1 Construction activities and all related movement of personnel and vehicles will be subject to surveillance and inspection by CSC security staff members to ensure that established security requirements are met.
- .2 CSC staff members will ensure that an understanding of the need to carry out surveillance and inspections, as specified above, is established among construction employees and maintained throughout the construction project.

1.22 STOPPAGE OF WORK

- .1 The director may request at any time that the contractor, his employees, sub-contractors and their employees not enter or leave the work site immediately due to a security situation occurring within the Institution. The contractor's site supervisor shall note the name of the staff member making the request and the time of the request and obey the order as quickly as possible.

- .2 The contractor shall advise the Departmental Representative within 24 hours of this delay to the progress of the work.

1.23 CONTACT WITH INMATES

- .1 Unless specifically authorized, it is forbidden to come into contact with inmates, to talk with them, to receive objects from them or to give them objects. Any employee doing any of the above will be removed from the site and his security clearance revoked.
- .2 It is forbidden to take pictures of inmates, of CSC staff members or of any part of the Institution other than those required as part of this contract.

1.24 COMPLETION OF CONSTRUCTION PROJECT

- .1 Upon completion of the construction project or, when applicable, the takeover of a facility, the Contractor shall remove all remaining construction material, tools and equipment that are not specified to remain in the Institution as part of the construction contract.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Departmental Representative/Contractor Agreement.

1.2 PROGRESS PAYMENTS

- .1 Progress payment may only include labour plus material and equipment “installed”.
Material and equipment delivered to site, but not “installed” may not be progressed.
- .2 “Installed” means placed in its permanent position and physically connected to the building structure. “Installed” does not need to be fully or partially operational, or fully connected to other building systems.

1.3 APPLICATIONS FOR PROGRESS PAYMENT

- .1 Submit to Departmental Representative at least 14 days before first application for payment; Schedule of values for parts of Work, aggregating total amount of Contract Price, so as to facilitate evaluation of applications for payment. After approval by Departmental Representative, Cost Breakdown will be used as a basis for progress payments.
- .2 Must support claims for products “installed” or incorporated into work by such evidence as Departmental Representative may reasonably require to establish value of said Products.

1.4 SCHEDULE OF VALUES

- .1 Submit to Departmental Representative at least 14 days before first application for payment; Schedule of values for parts of Work, aggregating total amount of Contract Price, so as to facilitate evaluation of applications for payment. After approval by Departmental Representative, Cost Breakdown will be used as a basis for progress payments.
- .2 Include statement based on schedule of values with each application for payment.
- .3 Must support claims for products delivered to place of Work but not yet incorporated into work by such evidence as Departmental Representative may reasonably require to establish value and delivery of said Products.

1.5 PREPARING SCHEDULE OF UNIT PRICE TABLE ITEMS

- .1 Submit separate schedule of unit price items of Work requested in Bid form.
- .2 Make form of submittal parallel to Schedule of Values, with each line item identified same as line item in Schedule of Values. Include in unit prices only:
 - .1 Cost of material.
 - .2 Delivery and unloading at site.
 - .3 Sales taxes.
 - .4 Installation, overhead and profit.

- .3 Ensure unit prices multiplied by quantities given equal material cost of that item in Schedule of Values.

1.6 PROGRESS PAYMENT

- .1 Departmental Representative will issue to Departmental Representative, no later than 10 days after receipt of an application for payment, certificate for payment in amount applied for or in such other amount as Departmental Representative determines to be due. If Departmental Representative amends application, Departmental Representative will give notification in writing giving reasons for amendment.

1.7 SUBSTANTIAL PERFORMANCE OF WORK

- .1 Prepare and submit to Departmental Representative comprehensive list of items to be completed or corrected and apply for a review by Departmental Representative to establish Substantial Performance of Work or substantial performance of designated portion of Work when. Failure to include items on list does not alter responsibility to complete Contract.
- .2 No later than 10 days after receipt of list and application, Departmental Representative will review Work to verify validity of application, and no later than 7 days after completing review, will notify Contractor if Work or designated portion of Work is substantially performed.
- .3 Departmental Representative: state date of Substantial Performance of Work or designated portion of Work in certificate.
- .4 Immediately following issuance of certificate of Substantial Performance of Work, in consultation with Departmental Representative, establish reasonable date for finishing Work.

1.8 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF WORK

- .1 After issuance of certificate of Substantial Performance of Work:
 - .1 Submit application for payment of holdback amount.
 - .2 Submit sworn statement that accounts for labour, subcontracts, products, construction machinery and equipment, and other indebtedness which may have been incurred in Substantial Performance of Work and for which Departmental Representative might in be held responsible have been paid in full, except for amounts properly retained as holdback or as identified amount in dispute.
- .2 After receipt of application for payment and sworn statement, Departmental Representative will issue certificate for payment of holdback amount.
- .3 Where holdback amount has not been placed in a separate holdback account, Departmental Representative shall, 10 days prior to expiry of holdback period stipulated in lien legislation applicable to Place of Work, place holdback amount in bank account in joint names of Departmental Representative and Contractor.
- .4 Amount authorized by certificate for payment of holdback amount is due and payable on day following expiration of holdback period stipulated in lien legislation applicable to Place of Work. Where lien legislation does not exist or apply, holdback amount is due and payable in accordance with other legislation, industry practice, or provisions which

may be agreed to between parties. Departmental Representative may retain out of holdback amount sums required by law to satisfy liens against Work or, if permitted by lien legislation applicable to Place of Work, other third party monetary claims against Contractor which are enforceable against Departmental Representative.

1.9 PROGRESSIVE RELEASE OF HOLDBACK

- .1 Where legislation permits, if Departmental Representative has certified that Work of subcontractor or supplier has been performed prior to Substantial Performance of Work, Departmental Representative shall pay holdback amount retained for such subcontract Work, or products supplied by such supplier, on day following expiration of holdback period for such Work stipulated in lien legislation applicable to Place of Work.
- .2 In addition to provisions of preceding paragraph, and certificate wording, ensure that such subcontract Work or products is protected pending issuance of final certificate for payment and be responsible for correction of defects or Work not performed regardless of whether or not such was apparent when such certificates were issued.

1.10 FINAL PAYMENT

- .1 Submit application for final payment when Work is completed.
- .2 Departmental Representative will, no later than 10 days after receipt of application for final payment, review Work to verify validity of application. Departmental Representative will give notification that application is valid or give reasons why it is not valid, no later than 7 days after reviewing Work.
- .3 Departmental Representative will issue final certificate for payment when application for final payment is found valid.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

Part 1 General

1.1 ADMINISTRATIVE

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

1.2 PRECONSTRUCTION MEETING

- .1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Senior representatives of the Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5 Agenda to include:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Schedule of Work: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.
 - .3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .4 Delivery schedule of specified equipment.
 - .5 Site security in accordance with Section 01 14 10 – Security Restrictions.
 - .6 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
 - .7 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .8 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.

- .9 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .10 Monthly progress claims, administrative procedures, photographs, hold backs.
- .11 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

- .1 During course of Work, prior to project completion, schedule progress meetings Bi-Weekly.
- .2 Contractor, major Subcontractors involved in Work, and Departmental Representative are to be in attendance.
- .3 Notify parties minimum 14 days prior to meetings.
- .4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.
- .5 Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule.
 - .5 Review of off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revision to construction schedule.
 - .8 Progress schedule, during succeeding work period.
 - .9 Review submittal schedules: expedite as required.
 - .10 Maintenance of quality standards.
 - .11 Review proposed changes for affect on construction schedule and on completion date.
 - .12 Other business.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 DEFINITIONS**

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

1.2 REQUIREMENTS

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

- .2 Submit to the Departmental Representative within 10 working days of Award of Contract, Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule to the Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

1.4 PROJECT MILESTONES

- .1 Project milestones form interim targets for Project Schedule.
 - .1 Demolition of existing equipment
 - .2 Rough in of new equipment
 - .3 Start-up and Testing
- .2 This project has 5 similar building components. Identify milestones for each building.

1.5 MASTER PLAN

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 Departmental Representative will review and return revised schedules within 5 working days.
- .3 Revise impractical schedule and resubmit within 5 working days.
- .4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.6 PROJECT SCHEDULE

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - .1 Award.
 - .2 Shop Drawings, Samples.
 - .3 Permits.
 - .4 Mobilization.
 - .5 Demolition
 - .6 Piping.
 - .7 Electrical.
 - .8 Controls.
 - .9 Insulating
 - .10 Testing and Commissioning.
 - .11 Supplied equipment long delivery items.

1.7 PROJECT SCHEDULE REPORTING

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

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

1.8 PROJECT MEETINGS

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

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 NOT USED

- .1 Not used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

- .1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Departmental Representative in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are co-ordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .10 Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .3 Allow 7 days Departmental Representative's review of each submission.
- .4 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

- .5 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .6 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.
- .7 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .8 After Departmental Representative's review, distribute copies.
- .9 Submit electronic copy in PDF format of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .10 Submit electronic in PDF format 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.
- .11 Submit electronic copies in PDF format of test reports for requirements requested in specification Sections and as requested by Departmental Representative.

- .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
- .12 Submit electronic copies in PDF format of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- .13 Submit electronic copies in PDF format of manufacturer's instructions for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .14 Submit electronic copies in PDF format of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .15 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .16 Submit electronic copies in PDF format of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .17 Delete information not applicable to project.
- .18 Supplement standard information to provide details applicable to project.
- .19 Original format (Not scanned) PDF documents are preferred to maintain quality. Scanned images are acceptable, however document page size may not be altered. Printing an oversized document "Scale to fit" and re-scanning is not acceptable.
- .20 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, a reviewed electronic copy will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted electronic copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .21 The review of shop drawings by the Departmental Representative is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that the Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that

pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 SAMPLES

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

1.4 PHOTOGRAPHIC DOCUMENTATION

- .1 Submit electronic copy of colour digital photography in jpg format, standard resolution monthly with progress statement.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints: 4 locations.
 - .1 Viewpoints and their location as determined by Departmental Representative.

1.5 CERTIFICATES AND TRANSCRIPTS

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .2 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.
- .3 Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 QUALITY

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

1.3 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative 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.

1.4 STORAGE, HANDLING AND PROTECTION

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

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

1.5 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.

1.6 MANUFACTURER'S INSTRUCTIONS

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.7 QUALITY OF WORK

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

1.8 CO-ORDINATION

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

1.9 REMEDIAL WORK

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

1.10 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 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.
- .4 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .5 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.11 FASTENINGS - EQUIPMENT

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

Bowden Institution - Hot Water Systems Upgrade
R.023238.001
19- DEC -2014 - Issued for Tender

Section 01 61 00
COMMON PRODUCT REQUIREMENTS
Page 4

END OF SECTION

Part 1 General

1.1 PROJECT CLEANLINESS

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

1.2 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris including that caused by Departmental Representative or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .8 Remove dirt and other disfiguration from exterior surfaces.

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

1.3 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 DEFINITIONS**

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

1.2 DISPOSAL OF WASTES

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

1.3 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises.
- .2 Maintain security measures per Section 01 14 10 - Security Restrictions.

1.4 SCHEDULING

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

Part 2 Products**2.1 NOT USED**

- .1 Not Used.

Part 3 Execution**3.1 APPLICATION**

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

3.2 CLEANING

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

3.3 DIVERSION OF MATERIALS

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

3.4 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

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

Province	Address	General Inquires	Fax
Alberta	Alberta Environmental Protection Petroleum Plaza, South Tower 9915 - 108 th Street	780-427-2739	

	Edmonton AB T5K 2G8		
	Alberta Special Waste Management Corporation Pacific Plaza, Suite 610 10909 Jasper Avenue NW Edmonton AB T5J 3L9	750-422-5029	780-428-9627

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Environmental Protection Act (CEPA)

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Departmental Representative's review.
 - .2 Departmental Representative's Review:
 - .1 Departmental Representative and Contractor to review Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Equipment and systems: tested, adjusted, balanced and fully operational.
 - .4 Certificates required by Boiler Inspection Branch: submitted.
 - .5 Operation of systems: demonstrated to Departmental Representative's personnel.
 - .6 Commissioning of mechanical systems: completed in accordance with 01 91 13 - General Commissioning (Cx) Requirements and copies of final Commissioning Report submitted to Departmental Representative.
 - .7 Work: complete and ready for final review.
 - .4 Final Inspection:
 - .1 When completion tasks are done, request final review of Work by Departmental Representative, and Contractor.
 - .2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-review.
 - .5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
 - .6 Commencement of Lien and Warranty Periods: date of Departmental Representative's acceptance of submitted declaration of Substantial Performance

to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment:

.1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.

.8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.3 FINAL CLEANING

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

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-warranty Meeting:
 - .1 Convene meeting one week prior to contract completion with contractor's representative and Departmental Representative, in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify Project requirements.
 - .2 Review warranty requirements, and manufacturer's installation instructions].
 - .2 Departmental Representative to establish communication procedures for:
 - .1 Notifying construction warranty defects.
 - .2 Determine priorities for type of defects.
 - .3 Determine reasonable response time.
 - .3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
 - .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, electronic copy in PDF format, and four final hard copies of operating and maintenance manuals in English.
- .3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .4 Provide evidence, if requested, for type, source and quality of products supplied.

1.3 FORMAT

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

- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.
 - .1 Bind in with text; fold larger drawings to size of text pages.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

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

1.5 AS -BUILT DOCUMENTS AND SAMPLES

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

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

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

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

1.7 EQUIPMENT AND SYSTEMS

- .1 For each item of equipment and each system include description of unit or system, and component parts.
 - .1 Give function, normal operation characteristics and limiting conditions.
 - .2 Include performance curves, with Departmental Representativeing data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
 - .1 Include regulation, control, stopping, shut-down, and emergency instructions.

- .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control and 01 91 13 - General Commissioning (Cx) Requirements.
- .15 Additional requirements: as specified in individual specification sections.

1.8 MATERIALS AND FINISHES

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

1.9 MAINTENANCE MATERIALS

- .1 Spare Parts:
 - .1 Provide spare parts, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to location as directed; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.
 - .5 Obtain receipt for delivered products and submit prior to final payment.

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

1.10 DELIVERY, STORAGE AND HANDLING

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

1.11 WARRANTIES AND BONDS

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative approval.
- .3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
 - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

- .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
- .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
- .4 Verify that documents are in proper form, contain full information, and are notarized.
- .5 Co-execute submittals when required.
- .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Conduct joint 4 month and 9 month warranty inspection, measured from time of acceptance, by Departmental Representative.
- .9 Include information contained in warranty management plan as follows:
 - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
 - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include pumps, motors, and commissioned systems.
 - .3 Provide list for each warranted equipment, item, feature of construction or system indicating:
 - .1 Name of item.
 - .2 Model and serial numbers.
 - .3 Location where installed.
 - .4 Name and phone numbers of manufacturers or suppliers.
 - .5 Names, addresses and telephone numbers of sources of spare parts.
 - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
 - .7 Cross-reference to warranty certificates as applicable.
 - .8 Starting point and duration of warranty period.
 - .9 Summary of maintenance procedures required to continue warranty in force.
 - .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
 - .11 Organization, names and phone numbers of persons to call for warranty service.
 - .12 Typical response time and repair time expected for various warranted equipment.
 - .4 Contractor's plans for attendance at 4 and 9 month post-construction warranty inspections.
 - .5 Procedure and status of tagging of equipment covered by extended warranties.
 - .6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

- .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .11 Written verification to follow oral instructions.
 - .1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

1.12 WARRANTY TAGS

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to Departmental Representative's personnel two weeks prior to date of final review.
- .2 Departmental Representative: provide list of personnel to receive instructions, and coordinate their attendance at agreed-upon times.
- .3 Preparation:
 - .1 Verify conditions for demonstration and instructions comply with requirements.
 - .2 Verify designated personnel are present.
 - .3 Ensure equipment has been reviewed and put into operation..
 - .4 Ensure testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and equipment and systems are fully operational.
- .4 Demonstration and Instructions:
 - .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the designated location.
 - .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
 - .3 Review contents of manual in detail to explain aspects of operation and maintenance.
 - .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.
- .5 Time Allocated for Instructions: ensure amount of time required for instruction of each item of equipment or system as follows:
 - .1 Heating Plant: 4 hours of instruction:
 - .1 Boilers 2hrs
 - .2 Pumps with VFDs: 1 hr
 - .3 Pumps without VFDs: 20min
 - .4 Filter and pot feeders: 20min
 - .5 Sensors, gauges, and valves: 20min
 - .2 Control System: 2 hours of instruction.
 - .1 Control sequence: 1.5 hrs
 - .2 Sensors locations: 30 min.
 - .3 Electrical System: 2 hours of instruction.
 - .1

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

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

1.3 QUALITY ASSURANCE

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 The Commissioning Process will comply with the PWGSC Commissioning Manual CP.1 (2006), and CSA Standard Z320-11 "Building Commissioning".
- .2 The contractor shall review all contract documents and referenced codes, or standards. If conflicts in the contract documents or referenced codes and standards is noted, the most stringent requirement will be executed unless clarified and accepted by the Departmental Representative prior to contract award.
- .3 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 PVT - 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 operate 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 Cx Documents such as the Cx Plan, PI and PV forms may require to be altered throughout construction to suit the project requirements and changes.

1.3 COMMISSIONING OVERVIEW

- .1 Section 01 91 31 - Commissioning (Cx) Plan.
- .2 For Cx responsibilities refer to Section 01 91 31 - Commissioning (Cx) Plan.
- .3 Cx to be a line item of Contractor's cost breakdown, and on progress claims, refer to item 1.37 in this section.
- .4 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .5 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 installed systems are constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.
- .6 Departmental Representative will issue Interim Acceptance Certificate when:
 - .1 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.
 - .2 Equipment, component(s) and system(s) and integrated systems (s) have been fully commissioned and functional as per the design intent within the context of the Owners Project Requirements.
 - .3 Final O&M Manual received, reviewed, and approved by Department Representative for suitability.
 - .4 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, and systems are complete.
 - .3 Fully understand Cx requirements and procedures.
 - .4 Have Cx documentation shelf-ready.
 - .5 Understand completely design criteria and intent and special features.
 - .6 Submit complete start-up documentation to Departmental Representative.
 - .7 Have Cx schedules up-to-date.
 - .8 Ensure systems have been cleaned thoroughly.
 - .9 Complete 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 ACTION AND INFORMATIONAL SUBMITTALS

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

1.8 COMMISSIONING DOCUMENTATION

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification Test (PVT) Forms for requirements and instructions for use.

- .2 Departmental Representative to review and approve Cx documentation before and after execution.
- .3 Provide completed and approved Cx documentation to Departmental Representative.
- .4 Progress Claims for Commissioning Activities will only be reviewed with supporting documentation, approved by the Departmental Representative.

1.9 COMMISSIONING SCHEDULE

- .1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart
- .2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
 - .1 Approval of Cx reports.
 - .2 Verification of reported results.
 - .3 Repairs, retesting, re-commissioning, re-verification.
 - .4 Training.

1.10 COMMISSIONING MEETINGS

- .1 Convene Cx meetings following project meetings: Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart and as specified herein.
- .2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.
- .3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.
- .4 At 60% construction completion stage. Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart. Departmental Representative to call a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:
 - .1 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.
 - .2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.
- .5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.
- .6 Meeting will be chaired by Cx Agent, 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 Equipment/System 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's.
 - .2 Visual inspection of quality of installation.
 - .2 Start-up: follow accepted start-up procedures.
 - .3 Operational testing: document equipment performance.
 - .4 System PVT's: 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 PVT 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 PVT produce unacceptable results, repair, replace or repeat specified starting and/or PVT 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 and/or 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 COMMISSIONING CONSTRAINTS

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

1.24 EXTRAPOLATION OF RESULTS

- .1 Where Cx of weather, occupancy, or seasonal-sensitive equipment or systems cannot be conducted under near-rated or near-design conditions, extrapolate part-load results to design conditions when approved by Departmental Representative in accordance with equipment manufacturer's instructions, using manufacturer's data, with manufacturer's assistance and using approved formulae.

1.25 EXTENT OF VERIFICATION

- .1 Provide manpower and instrumentation to verify up to 100 % of reported results.
- .2 Conduct tests repeated during verification under same conditions as original tests, using same test equipment, instrumentation.
- .3 Perform additional commissioning until results are acceptable to Departmental Representative.

1.26 REPEAT VERIFICATIONS

- .1 **As outlined in the PWGSC's General Condition of Contract (GC-2.5), assume costs incurred by Departmental Representative for third and subsequent verifications where:**
 - .1 Verification of reported results fail to receive Departmental Representative's approval.
 - .2 Repetition of second verification again fails to receive approval.
 - .3 Departmental Representative deems Contractor's request for second verification was premature.

1.27 SUNDRY CHECKS AND ADJUSTMENTS

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

1.28 DEFICIENCIES, FAULTS, DEFECTS

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

1.29 COMPLETION OF COMMISSIONING

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

1.30 ACTIVITIES UPON COMPLETION OF COMMISSIONING

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

1.31 TRAINING

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

1.32 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

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

1.33 OCCUPANCY

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

1.34 INSTALLED INSTRUMENTATION

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

1.35 PERFORMANCE VERIFICATION TOLERANCES

- .1 Application tolerances:
 - .1 Specified range of acceptable deviations of measured values from specified values or specified design criteria. 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.

1.36 DEPARTMENTAL REPRESENTATIVE'S PERFORMANCE TESTING

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

1.37 PAYMENT FOR COMMISSIONING ACTIVITIES

- .1 The contractor is to provide a breakout for Commissioning on all progress claims.
- .2 The Contractor is to assign 10% of total Contract fee for Commissioning activities. The breakdown of the 10% total fee to be progressed will be:

- .1 2% for each of 5 Mechanical Rooms including:

- .1 1% for Boiler Replacement
- .2 1% for Air Handler upgrades
- .2 Each of the 5 Mechanical Room projects will break down to a ¼ % for each of the following items once they are Reviewed and Accepted by the Departmental Representative:
 - .1 Shop Drawing.
 - .2 Heating pipe pressure test results.
 - .3 Completed Product Information Sheets for all new equipment.
 - .4 Equipment Start up in compliance with the Manufacturer(s) equipment and start up documents.
 - .5 EMCS verification
 - .6 Water Adjusting and Balancing
 - .7 Performance Verification Test specific to each system independently and then as an integrated system.
 - .8 Training of O&M staff

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 GENERAL

- .1 Provide a fully functional heating system:
 - .1 Systems, equipment and components meet user's functional requirements before date of acceptance, and operate consistently at peak efficiencies and within specified energy budgets under normal loads.
 - .2 O M personnel have been fully trained in aspects of installed systems.
 - .3 Optimized life cycle costs.
 - .4 Complete documentation relating to installed equipment and systems.
- .2 Term "Cx" in this section means "Commissioning".
- .3 Use this Cx Plan as master planning document for Cx:
 - .1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.
 - .2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.
 - .3 Sets out deliverables relating to O M, process and administration of Cx.
 - .4 Describes process of verification of how built works meet Departmental Representative design requirements.
 - .5 Produces a complete functional system prior to issuance of Certificate of Occupancy.
 - .6 Management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:
 - .1 Overview of Cx.
 - .2 General description of elements that make up Cx Plan.
 - .3 Process and methodology for successful Cx.
- .4 Acronyms:
 - .1 Cx - Commissioning.
 - .2 BMM - Building Management Manual.
 - .3 EMCS - Energy Monitoring and Control Systems.
 - .4 MSDS - Material Safety Data Sheets.
 - .5 PI - Product Information.
 - .6 PV - Performance Verification.
 - .7 TAB - Testing, Adjusting and Balancing.
 - .8 WHMIS - Workplace Hazardous Materials Information System.
- .5 Commissioning terms used in this Section:
 - .1 Bumping: short term start-up to prove ability to start and prove correct rotation.
 - .2 Deferred Cx - Cx activities delayed for reasons beyond Contractor's control due to lack of occupancy, weather conditions, need for heating/cooling loads.

1.2 CX PLAN

- .1 The Departmental Representative shall provide a preliminary Commissioning Plan to the Contractor for updating.
- .2 The following items shall be provided to the Departmental Representative for updating into the Final Cx Plan within 12 weeks of award of contract:
 - .1 Approved shop drawings and product data.
 - .2 Approved changes to contract.
 - .3 Contractor's project schedule.
 - .4 Cx schedule based on construction including projected start up dates, system tests, and integrated system tests.
 - .5 Contractor's, sub-contractor's, suppliers' requirements.
 - .6 Project construction team's and Cx team's requirements.
- .3 The completed Cx Plan is to be submitted by the Departmental Representative and written approval obtained.
- .4 Once the completed Cx Plan is approved by the Departmental Representative, the Cx Plan will be distributed to all parties.

1.3 REFINEMENT OF CX PLAN

- .1 During construction phase, revise, refine and update Cx Plan to include:
 - .1 Changes resulting from Client program modifications.
 - .2 Approved design and construction changes.
- .2 Revise, refine and update as required during construction phase, or requested by the Departmental Representative. At each revision, indicate revision number and date.
- .3 Submit each revised Cx Plan to Departmental Representative for review and obtain written approval.
- .4 Include testing parameters at full range of operating conditions and check responses of equipment and systems.

1.4 COMPOSITION, ROLES AND RESPONSIBILITIES OF CX TEAM

- .1 Departmental Representative to maintain overall responsibility for project and is sole point of contact between members of commissioning team.
- .2 PWGSC Project Manager will select Cx Team consisting of following members:
 - .1 PWGSC Design Quality Review Team: during construction, will conduct periodic site reviews to observe general progress.
 - .2 PWGSC Quality Assurance Commissioning Manager: ensures Cx activities are carried out to ensure delivery of a fully operational project including:
 - .1 Review for performance, reliability, durability of operation, accessibility, maintainability, operational efficiency under conditions of operation.
 - .2 Monitoring of Cx activities, training, development of Cx documentation.
 - .3 Work closely with members of Cx Team.
- .3 Departmental Representative is responsible for:

- .1 Organizing Cx.
- .2 Monitoring operations Cx activities.
- .3 Witnessing, certifying accuracy of reported results.
- .4 Witnessing and certifying TAB and other tests.
- .5 Developing BMM.
- .6 Ensuring implementation of final Cx Plan.
- .7 Performing verification of performance of installed systems and equipment.
- .8 Implementation of Training Plan.
- .4 Construction Team: contractor, sub-contractors, suppliers and support disciplines, is responsible for construction/installation in accordance with contract documents, including:
 - .1 Testing.
 - .2 TAB.
 - .3 Performance of Cx activities.
 - .4 Delivery of training and Cx documentation.
 - .5 Assigning one person as point of contact with Departmental Representative and PWGSC Cx Manager for administrative and coordination purposes.
- .5 Contractor's Cx agent implements specified Cx activities including:
 - .1 Demonstrations.
 - .2 Training.
 - .3 Testing.
 - .4 Preparation, submission of test reports.
- .6 Property Manager: represents lead role in Operation Phase and onwards and is responsible for:
 - .1 Receiving facility.
 - .2 Day-To-Day operation and maintenance of facility, once Substantial Completion is granted.

1.5 CX PARTICIPANTS

- .1 Employ the following Cx participants to verify performance of equipment and systems:
 - .1 Installation contractor/subcontractor:
 - .1 Equipment and systems except as noted.
 - .2 Equipment manufacturer: equipment specified to be installed and started by manufacturer.
 - .1 To include performance verification.
 - .3 Ensure that Cx participant:
 - .1 Could complete work within scheduled time frame.

- .2 Available for emergency and troubleshooting service during first year of occupancy by user for adjustments and modifications outside responsibility of O M personnel, including:
 - .1 Changes to heating loads beyond scope of EMCS.
 - .2 Changes to EMCS control strategies beyond level of training provided to O M personnel.
- .4 Provide names of participants to Departmental Representative and details of instruments and procedures to be followed for Cx 2 months prior to starting date of Cx for review and approval.

1.6 EXTENT OF CX

- .1 HVAC and exhaust systems:
 - .1 Heating Water Systems
- .2 EMCS:
 - .1 Control of Heating Water Systems.
 - .3 Energy metering systems for hot water, natural gas, electricity.
- .2 Commission electrical systems and equipment:
 - .1 Low voltage below 750 V:
 - .1 Low voltage equipment.
 - .2 Low voltage distribution systems.

1.7 DELIVERABLES RELATING TO O M PERSPECTIVES

- .1 General requirements:
 - .1 Compile English documentation.
 - .2 Documentation to be computer-compatible format ready for inputting for data management.
- .2 Provide deliverables:
 - .1 Warranties.
 - .2 Project record documentation.
 - .3 Inventory of spare parts, special tools and maintenance materials.
 - .4 Maintenance Management System (MMS) identification system used.
 - .5 WHMIS information.
 - .6 MSDS data sheets.
 - .7 Electrical Panel inventory containing detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.
 - .8 Training Material.

1.8 DELIVERABLES RELATING TO THE CX PROCESS

- .1 General:
 - .1 Full Cooperation with Departmental Representatives leading the Cx process.

- .2 Start-up, Functional testing and all additional Cx requirements, conditions for acceptance and specifications relating to the Cx process.
- .2 Definitions:
 - .1 Cx as used in this section includes:
 - .1 Cx of components, equipment, systems, subsystems, and integrated systems.
 - .2 Factory inspections and performance verification tests.
- .3 Deliverables: provide:
 - .1 Startup, pre-Cx activities and documentation for systems, and equipment.
 - .2 Completed installation checklists (ICL).
 - .3 Completed product information (PI) report forms.
 - .4 Completed performance verification (PV) report forms.
 - .5 Results of Performance Verification Tests and Inspections.
 - .6 Update As-Built's to reflect changes during commissioning.
 - .7 Training Plans.
 - .8 Responses to Cx Reports.
 - .9 Prescribed activities during warranty period.
- .4 Departmental Representative to witness and certify tests and reports of results provided to Departmental Representative.
- .5 Departmental Representative to participate.

1.9 PRE-CX ACTIVITIES AND RELATED DOCUMENTATION

- .1 Items listed in this Cx Plan are to include the following:
 - .1 Pre-Start-Up inspections: by Departmental Representative prior to permission to start up and rectification of deficiencies to Departmental Representative's satisfaction.
 - .2 Departmental Representative to use approved check lists.
 - .3 Departmental Representative will monitor some of these pre-start-up inspections.
 - .4 Include completed documentation for Cx report.
 - .5 Conduct pre-start-up tests: conduct pressure, static, flushing, cleaning, and "bumping" during construction as specified in technical sections. To be witnessed and certified by Departmental Representative.
 - .6 Departmental Representative will monitor inspections and tests.
 - .7 Submit completed documentation for insertion into Final Cx report.
- .2 Pre-Cx activities - MECHANICAL:
 - .1 HVAC equipment and systems:
 - .1 "Bump" each item of equipment in its "stand-alone" mode.
 - .2 At this time, complete pre-start-up checks and complete relevant documentation.

- .3 After equipment has been started, test related systems in conjunction with control systems on a system-by-system basis.
- .4 Perform TAB on systems. TAB reports to be approved by Departmental Representative.
- .2 EMCS:
 - .1 EMCS trending to be available as supporting documentation for performance verification.
 - .2 Perform point-by-point testing in parallel with start-up.
 - .3 Carry out point-by-point verification.
 - .4 Demonstrate performance of systems, to be witnessed by Departmental Representative prior to start of 30 day Final Acceptance Test period.
 - .5 Perform final Cx and operational tests during demonstration period and 30 day test period.
 - .6 Only additional testing after foregoing have been successfully completed to be "Off-Season Tests".
- .3 Pre-Cx activities - ELECTRICAL:
 - .1 Low voltage distribution systems under 750 V:
 - .1 Requires independent testing agency to perform pre- energization and post-energization tests.

1.10 START-UP

- .1 Start up components, equipment and systems.
- .2 Equipment manufacturer, supplier, installing specialist sub-contractor, as appropriate, to start-up, under Contractor's direction, following equipment, systems:
 - .1 Heating Water Boilers
 - .2 Heating Water Boiler Circulation Pumps
 - .3 Heating Water Distribution Pumps
- .3 Departmental Representative to monitor some of these start-up activities.
 - .1 Rectify start-up deficiencies to satisfaction of Departmental Representative.
- .4 Performance Verification (PV):
 - .1 Contractor to perform, under the guidance of Departmental Representative.
 - .1 Repeat when necessary until results are acceptable to Departmental Representative.
 - .2 Use procedures to suit project requirements.
 - .3 Departmental Representative to witness and certify reported results using approved PI and PV forms.
 - .4 Departmental Representative to approve completed PV reports.
 - .5 Departmental Representative reserves right to verify up to 30% of reported results at random.
 - .6 Failure of randomly selected item shall result in rejection of PV report or report of system startup and testing.

1.11 CX ACTIVITIES AND RELATED DOCUMENTATION

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

1.12 CX OF INTEGRATED SYSTEMS AND RELATED DOCUMENTATION

- .1 Cx to be performed by contractor, using procedures developed by Departmental Representative, and approved by Departmental Representative.
- .2 Tests to be witnessed by Departmental Representative and documented on approved report forms.
- .3 Upon satisfactory completion, contractor to prepare Cx Report, to be certified by Departmental Representative and submitted to Departmental Representative for review.
- .4 Departmental Representative reserves right to verify percentage of reported results.
- .5 Integrated systems to include:
 - .1 Heating Water System.
 - .2 Air Systems
 - .3 BAS System
 - .4 Emergency Power
- .6 Identification:
 - .1 In later stages of Cx, before hand-over and acceptance by Departmental Representative, Contractor to co-operate to complete inventory data sheets and provide assistance to PWGSC in full implementation of MMS identification system of components, equipment, sub-systems, systems.

1.13 PRODUCT INFORMATION (PI) REPORT FORMS

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

1.14 PERFORMANCE VERIFICATION (PV) REPORT

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

1.15 DELIVERABLES RELATING TO ADMINISTRATION OF CX

- .1 General:

- .1 Because of risk assessment, complete Cx of weather and seasonal-sensitive equipment and systems in these areas before systems are required to provide service to building to maintain occupancy.

1.16 CX SCHEDULES

- .1 Prepare detailed Cx Schedule and submit to Departmental Representative for review and approval same time as project Construction Schedule. Include:
 - .1 Milestones, testing, documentation, training and Cx activities of components, equipment, subsystems, systems and integrated systems, including:
 - .1 Shop Drawing Review completion.
 - .2 Equipment order date.
 - .3 Equipment delivery to site date.
 - .4 Equipment and system install completion date.
 - .5 Completion of PI report and Equipment Start up.
 - .6 EMCS point to point verification completion.
 - .7 TAB completion.
 - .8 Performance Verification Tests
 - .9 Integrated System Tests
 - .10 Date of granted Interim Acceptance
 - .11 Start of 30 day test
 - .12 Hand-over to Departmental Representative
 - .13 Training Sessions
 - .14 Deferred Seasonal Performance Verification Tests.
 - .15 Warrantee Site Visit 10 months after Interim Acceptance.
 - .2 Detailed training schedule to demonstrate no conflicts with testing, completion of project and hand-over to Departmental Representative.
- .2 After approval, incorporate Cx Schedule into Construction Schedule.
- .3 Departmental Representatives, and Contractor, to monitor progress of Cx against this schedule.

1.17 CX REPORTS

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

1.18 ACTIVITIES DURING WARRANTY PERIOD

- .1 Cx activities must be completed before issuance of Interim Certificate, it is anticipated that certain Cx activities may be necessary during Warranty Period, including:
 - .1 Fine tuning of HVAC systems.

1.19 TESTS TO BE PERFORMED BY DEPARTMENTAL REPRESENTATIVE/USER

- .1 None is anticipated on this project.

1.20 TRAINING PLANS

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

1.21 FINAL SETTINGS

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

1.22 PAYMENTS FOR CX

- .1 Refer to Section 01 91 13, item #1.37

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 INSTALLATION/START-UP CHECK LISTS

- .1 Include the following data:
 - .1 Product manufacturer's installation instructions and recommended checks.
 - .2 Special procedures as specified in relevant technical sections.
 - .3 Items considered good installation and Engineering industry practices deemed appropriate for proper and efficient operation.
- .2 Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by Departmental Representative supplemental additional data lists will be required for specific project conditions.
- .3 Use check lists for equipment installation. Document check list verifying checks have been made, indicate deficiencies and corrective action taken.
- .4 Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to Departmental Representative. Check lists will be required during Commissioning and will be included in Building Maintenance Manual (BMM) at completion of project.
- .5 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.

1.2 PRODUCT INFORMATION (PI) REPORT FORMS

- .1 Product Information (PI) forms compiles gathered data on items of equipment produced by equipment manufacturer, includes nameplate information, parts list, operating instructions, maintenance guidelines and pertinent technical data and recommended checks that is necessary to prepare for start-up and functional testing and used during operation and maintenance of equipment. This documentation is included in the BMM at completion of work.
- .2 Prior to equipment start up and Performance Verification (PV) of systems, complete items on PI forms related to systems and obtain Departmental Representative's approval.

1.3 PERFORMANCE VERIFICATION (PV) FORMS

- .1 PV forms to be used for checks, running dynamic tests and adjustments carried out on equipment and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with project requirements.
- .2 PV report forms include those developed by Contractor records measured data and readings taken during functional testing and Performance Verification procedures.
- .3 Prior to PV of integrated system, complete PV forms of related systems and obtain Departmental Representative's approval.

1.4 SAMPLES OF COMMISSIONING FORMS

- .1 Departmental Representative will develop and provide to Contractor required project-specific Commissioning forms in electronic format complete with specification data.
- .2 Revise items on Commissioning forms to suit project requirements.
- .3 Samples of Commissioning forms and a complete index of produced to date will be attached to this section.
 - .1 Sample Boiler PI
 - .2 Sample Pump PI
 - .3 Sample Expansion Tank PI
 - .4 Sample Heating System PV
 - .5 Sample Air Handler System Start up
 - .6 Sample Air Handler System PI
 - .7 Sample Air Handler System PV

1.5 CHANGES AND DEVELOPMENT OF NEW REPORT FORMS

- .1 When additional forms are required, but are not available from Departmental Representative develop appropriate verification forms and submit to Departmental Representative for approval prior to use.
 - .1 Additional commissioning forms to be in same format as provided by Departmental Representative

1.6 COMMISSIONING FORMS

- .1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.
- .2 Strategy for Use:
 - .1 Departmental Representative provides Contractor project-specific Commissioning forms with Specification data included.
 - .2 Contractor will provide required shop drawings information and verify correct installation and operation of items indicated on these forms.
 - .3 Confirm operation as per design criteria and intent.
 - .4 Identify variances between design and operation and reasons for variances.
 - .5 Verify operation in specified normal and emergency modes and under specified load conditions.
 - .6 Record analytical and substantiating data.
 - .7 Verify reported results.
 - .8 Form to bear signatures of recording technician and reviewed and signed off by Departmental Representative.
 - .9 Submit immediately after tests are performed.
 - .10 Reported results in true measured SI unit values.
 - .11 Provide Departmental Representative with originals of completed forms.
 - .12 Maintain copy on site during start-up, testing and commissioning period.

- .13 Forms to be both hard copy and electronic format with typed written results in Building Management Manual in accordance with Section 01 91 51 - Building Management Manual (BMM).

1.7 LANGUAGE

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

FORCED DRAFT WATER BOILER

Product Information



REVISION #: _____

NAME: Commissioning Team
COMPANY: Hemisphere Engineering Inc.
ADDRESS: 10950 - 119 Street
Edmonton, AB - Alberta T5H 3P5

CUSTOMER: PWGSC
PROJECT: Bowden Boiler Replacement
FILE NUMBER: E13059
DATE: DD / MM / YYYY

NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	
SERVICE		LOCATION	

FORCED DRAFT WATER BOILER	SPECIFIED	SHOP DRAWINGS	INSTALLED
MANUFACTURER			
MODEL NO.			
SIZE			
SERIAL NO.			
INPUT (KW)			
CAPACITY (KW)			
FLOW RATE (L/S)			
MAXIMUM OPERATING PRESSURE (KPA)			
MAXIMUM OPERATING TEMPERATURE (°C)			
WORKING PRESSURE (KPA)			
PRESSURE-REDUCING VALVE SETTING (KPA)			
HEATED MEDIUM			
FUEL			
BURNER TYPE			
DRAFT TYPE			
FLUE SIZE			
BLOWER MOTOR SIZE (KW)			

FORCED DRAFT WATER BOILER	STATUS	COMMENTS	
INSTALLATION AND MOUNTING			
SERVICE SPACE			
PIPING LAYOUT AND SUPPORT			
ISOLATING/BALANCING VALVES			
PRESSURE AND TEMPERATURE GAUGES			
WATER LEVEL GAUGE GLASS			
DRAIN VALVES			
BLOW DOWN VALVES			
RELIEF VALVES			
SAFETY CONTROLS			
OPERATING CONTROLS			
CHEMICAL TREATMENT			

FORCED DRAFT WATER BOILER

Product Information



REVISION #: _____

NAME: Commissioning Team
COMPANY: Hemisphere Engineering Inc.
ADDRESS: 10950 - 119 Street
Edmonton, AB - Alberta T5H 3P5

CUSTOMER: PWGSC
PROJECT: Bowden Boiler Replacement
FILE NUMBER: E13059
DATE: DD / MM / YYYY

NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	
SERVICE		LOCATION	

FORCED DRAFT WATER BOILER	STATUS	COMMENTS
AIR SEPARATOR		
OPERATION OF GAS VALVES		
BURNER OPERATION		
PROGRAMMER OPERATION		
FLAME DETECTOR		
FLUE PIPING		
DRAFT FAN		
PIPE INSULATION		
VIBRATION AND NOISE		
STARTERS AND DISCONNECTS		
MANUFACTURER'S START-UP REPORT ATTACHED		
HIGH AND LOW GAS PRESSURE SWITCH		
OPERATION AND SEQUENCE OF CONTROLS		
BOILER BRANCH INSPECTION REPORT ATTACHED		

START-UP	STATUS	COMMENTS
INSTALLED AS PER DRAWINGS AND SPECIFICATIONS		
INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS		
UNIT IS LEVEL		
NO DAMAGE TO FLUES, CHIMNEYS, AND BOILER JACKET		
NO DAMAGE TO REFRACTORY OR COMBUSTION CHAIN		
BOILER SAFETIES – INSTALLATION AND OPERATION		
PRESSURE AND TEMPERATURE GAUGES INSTALLED		
PIPE CONNECTIONS FLANGED		
ISOLATING/BALANCING VALVES INSTALLED		
ALL LABELS VISIBLE		
BURNER SET TO MANUFACTURER'S SPECIFICATIONS		
BOILER, BURNER, AND FLUE CLEAN AND FREE OF DEBRIS		
BOILER FLUID AT CORRECT LEVEL		

Product Information



NAME:	Commissioning Team
COMPANY:	Hemisphere Engineering Inc.
ADDRESS:	10950 - 119 Street
	Edmonton, AB - Alberta T5H 3P5

CUSTOMER:	PWGSC
PROJECT:	Bowden Boiler Replacement
FILE NUMBER:	E13059
DATE:	DD / MM / YYYY

NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	
SERVICE		LOCATION	

START-UP	STATUS	COMMENTS
PUMPS STARTED		
BOILER STARTED AS PER MANUFACTURER'S REQUIREMENTS		
MANUFACTURER'S START-UP REPORT ATTACHED		
OPERATED FOR 12 H CONTINUOUSLY		
STRAINERS CLEANED		
WORN PARTS AND SEALS REPLACED IN PUMPS USED FOR CLEANING		
NO LEAKAGE FROM MECHANICAL SEALS		
NET POSITIVE SUCTION HEAD CHECKED/CALCULATED (KPA)		
AIR FLOW FOR MOTOR COOLING		

POSITION/TITLE	SIGNATURE	DATE

PUMP

Product Information



REVISION #: _____

NAME: Commissioning Team
COMPANY: Hemisphere Engineering Inc.
ADDRESS: 10950 - 119 Street
Edmonton, AB - Alberta T5H 3P5

CUSTOMER: PWGSC
PROJECT: Bowden Boiler Replacement
FILE NUMBER: E13059
DATE: DD / MM / YYYY

NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	
SERVICE		LOCATION	

PUMP	SPECIFIED	SHOP DRAWINGS	INSTALLED
MANUFACTURER			
MODEL			
SERIAL NO.			
PUMP CAPACITY (USGPM)			
PUMP HEAD (FT)			
PUMP RPM			
PUMP CURVE NO.			

PUMP	STATUS	COMMENTS
SPECIFICATIONS		
RECOMMENDATIONS		
PUMP IS LEVEL		
MOTOR & PUMP ALIGNED (ALIGNMENT REPORT ATTACHED)		
PUMP BASE GROUTED		
PUMP HAS ADEQUATE SERVICE SPACE		
RECOMMENDED		
PRESSURE GAUGES INSTALLED		
OF FLOW CORRECT		
VALVES & STRAINERS INSTALLED		
BEARINGS LUBRICATED		
NAMEPLATE IS VISIBLE		
VIBRATION ISOLATORS CORRECT		
PIPE ARRANGEMENT & SUPPORT		
CUNO FILTER FULL AND VALVES OPEN		
PIPING IDENTIFICATION INSTALLED		
STRAINERS / PARTICLE FILTERS		
CHEMICAL FEEDER		
COUPLING GUARD		
LIFTING HOOKS FOR MOTOR INSTALLED		
NAMEPLATE HEAD (FT)		
OPERATION TYPE (PARALLEL/SINGLE)		
OPERATION & MAINTENANCE		

MOTOR	SPECIFIED	SHOP DRAWINGS	INSTALLED
MANUFACTURER			

Product Information



REVISION #: _____

NAME:	Commissioning Team
COMPANY:	Hemisphere Engineering Inc.
ADDRESS:	10950 - 119 Street
	Edmonton, AB - Alberta T5H 3P5

CUSTOMER:	PWGSC
PROJECT:	Bowden Boiler Replacement
FILE NUMBER:	E13059
DATE:	DD / MM / YYYY

MODEL			
SERIAL NO.			
MOTOR HORSEPOWER			
VOLTAGE / PHASE / FREQUENCY			
AMPERAGE			
HEADER SIZE AND RATE			
EFFICIENCY			
MOTOR RPM			

START-UP	STATUS	COMMENTS
IMPELLER & MOTOR ROTATION CORRECT		
OPERATION FROM ECMS VERIFIED		
OPERATED FOR 12 HOURS CONTINUOUSLY		
WORN PART & SEALS REPLACED IN PUMPS USED FOR CLEANING		
NO LEAKAGE FROM MECHANICAL SEALS.		
NET POSITIVE SUCTION HEAD CHECKED/CALCULATED		
AIR FLOW FOR MOTOR COOLING		

GENERAL COMMENTS:	
-------------------	--

POSITION/TITLE	SIGNATURE	DATE

EXPANSION TANK

Product Information



REVISION #: _____

NAME: Commissioning Team
COMPANY: Hemisphere Engineering Inc.
ADDRESS: 10950-119 Street NW
Edmonton, AB - Alberta T5H 3P5

CUSTOMER: PWGSC
PROJECT: Bowden Boiler Replacement
FILE NUMBER: E13059
DATE: DD / MM / YYYY

NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	
SERVICE		LOCATION	

EXPANSION TANK	SPECIFIED	SHOP DRAWINGS	INSTALLED
MANUFACTURER			
MODEL NO.			
TYPE			
CRN NUMBER			
TOTAL VOLUME (L)			
ACCEPTANCE VOLUME (L)			
MAXIMUM OPERATING PRESSURE (KPA)			
MAXIMUM OPERATING TEMPERATURE (EC)			
FILL PRESSURE (KPA)			
PRV SET-POINT (KPA)			
LABELS			

EXPANSION TANK	STATUS	COMMENTS
INSTALLATION AND MOUNTING CORRECT		
SERVICE SPACE ADEQUATE		
PIPING SUPPORT AND LAYOUT		
ISOLATING VALVES INSTALLED		
RELIEF VALVE INSTALLED		
COMPRESSED AIR FILL SYSTEM INSTALLED		
PRESSURE GAUGE INSTALLED		
GAUGE GLASS INSTALLED		
BACKFLOW PREVENTOR INSTALLED		
AIR SEPARATOR INSTALLED		
MAKEUP VALVE INSTALLED		
SYSTEM CONNECTION (SUCTION / DISCHARGE OF PUMPS)		
BACKFLOW PREVENTOR INSTALLED, CERTIFIED AND TAGGED		
PRV INSTALLED		
COMPRESSED AIR INLET INSTALLED		
PRESSURE RELIEF VALVE INSTALLED		

Product Information



NAME:	Commissioning Team
COMPANY:	Hemisphere Engineering Inc.
ADDRESS:	10950-119 Street NW Edmonton, AB - Alberta T5H 3P5

CUSTOMER:	PWGSC
PROJECT:	Bowden Boiler Replacement
FILE NUMBER:	E13059
DATE:	DD / MM / YYYY

NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	
SERVICE		LOCATION	

EXPANSION TANK	STATUS	COMMENTS
PRESSURE GAUGE INSTALLED		
INLET/OUTLET PIPE SIZES CORRECT		
DRAIN LINE OPERATION		
GAUGE GLASS OPERATION		
PRESSURE RELIEF VALVE SET		
BACKFLOW PREVENTOR OPERATION CHECKED		
EXPANSION TANK LEVEL AND SYSTEM PRESSURE SET		
EXPANSION TANK LEVELS VERIFIED FOR COLD TO HOT WATER TEMPERATURE		
PIPE LAYOUT PERMITS TANK REMOVAL		

GENERAL COMMENTS:	
-------------------	--

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		
Building Operations and Maintenance Staff		
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		
Manufacturer's Representatives		
Independent Testing Specialists		

HOT WATER HEATING SYSTEM TEST

Performance Verification



REVISION #: _____

NAME: Commissioning Team
COMPANY: Hemisphere Engineering Inc.
ADDRESS: 10950-119 Street NW
Edmonton, AB - Alberta T5H 3P5

CUSTOMER: PWGSC
PROJECT: Bowden Boiler Replacement
FILE NUMBER: E13059
DATE: _____

Testing Procedure

Equipment Being Tested

Boilers B-1, B-2

Pumps

Boilers Circulating Pumps P-B1, P-B2

Primary Hot Water Pumps P-1, P-2

Prerequisites

Required before Commissioning starts	Confirmed (Date)
Boilers start up reports completed, approved by consultant and received by commissioning authority	
Test and Balance complete and approved for the Hydronic system. Test and Balance reports received	
All controls are complete, calibrated, and operational. I/O point check out sheets are complete and submitted	
Normal Power Confirmed	
One week of normal operation trend logs provided (no alarms during this time)	
Test and Balance reports received	
Manufacturer has reviewed the installation and submitted a report confirming that the installation has met his requirements	
All outstanding items, construction deficiencies have been rectified and completed. Provide list.	
No visible damage found.	
All gas piping is complete and operational.	
Sequences of operation provided	
Record made of all values of current setpoints, control parameters, limits, delays, lockouts, schedules, etc. that may be required for operation	
All piping and ducting insulation complete	
All breeching complete	
Reduce all time delays for both operational and alarms to 1 minute	

HOT WATER HEATING SYSTEM TEST

Performance Verification



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CUSTOMER: PWGSC
 PROJECT: Bowden Boiler Replacement
 FILE NUMBER: E13059
 DATE: _____

Setpoint	Value Before Testing	Value After Testing	Confirmed (Date)
Primary Hot Water Heating Supply Temperature Setpoint			
Primary Hot Water Heating High Temp. Alarm Setpoint			
Primary Hot Water Heating Low Temp. Alarm Setpoint			
OAT Enable/Disable Setpoint			
Primary Hot Water Heating System Differential High Pressure Setpoint			
Primary Hot Water Heating System Differential Low Pressure Setpoint			
Domestic Hot Water Supply Setpoint			
Primary Hot Water Heating System Setpoint Domestic Hot Water Mode			

1	Normal Off Operation	Confirmed (Date)
	Boilers off (2)	
	Pumps off (3)	
	Two way & three valves in normal position	

2	System Seasonal Start	Confirmed (Date)
	Adjust the boiler enable setpoint to a level higher than the current outdoor air temperature (if required)	
	Confirm that the boiler system cycles on with associated circulating pump on	
	Adjust the boilers enable setpoint to a level lower than the current outdoor air temperature (if required)	
	Confirm that the boilers system cycles off and circulating pump is off	
	Confirm that the boiler system cycles on/off on demand for domestic hot water regardless of OAT	

3	Normal Start up	Confirmed (Date)
	Primary Pumps P-1 or P-2 are enabled on a demand for domestic hot water or on OAT enable setpoint	
	Boiler Circulating Pump P-B1 or P-B2 is enabled by Boiler	
	On proof of primary pump operation the lead boiler will start up (P-B1 is enabled by boiler control panel)	
	The lead boiler will ramp up and cycle to maintain the heating water supply temperature at setpoint.	
	Upon 100% capacity of lead boiler, the lag boiler will ramp up and cycle to maintain the heating water supply temperature at setpoint.	
	The Primary Pump VFD will modulate to maintain primary heating water pressure differential at setpoint	

Performance Verification



NAME: Commissioning Team

CUSTOMER: PWGSC

COMPANY: Hemisphere Engineering Inc.

PROJECT: Bowden Boiler Replacement

ADDRESS: 10950-119 Street NW

FILE NUMBER: E13059

Edmonton, AB - Alberta T5H 3P5

DATE:

[illegible]

HOT WATER HEATING SYSTEM TEST

Performance Verification



REVISION #: _____

NAME: Commissioning Team
 COMPANY: Hemisphere Engineering Inc.
 ADDRESS: 10950-119 Street NW
 Edmonton, AB - Alberta T5H 3P5

CUSTOMER: PWGSC
 PROJECT: Bowden Boiler Replacement
 FILE NUMBER: E13059
 DATE: _____

8	Alarm Testing - Boilers	Confirmed (Date)
	Change OAT Boiler Enable Setpoint 5C above current outdoor air temperature.	
	Verify Primary Heating Water system is enabled	
	Change the heating water high temperature alarm setpoint to 5C below the current temperature.	
	Verify that the heating water high temperature alarm activates.	
	Reset the alarm setpoint to normal operating settings.	
	Change the heating water low alarm setpoint to a point 5C above the current temperature.	
	Verify that the heating water low temperature alarm activates.	
	Reset the alarm setpoint to normal operating settings.	
	Change the heating water high differential pressure alarm setpoint to 50 Pa below the current pressure.	
	Verify that the heating water high differential pressure alarm activates.	
	Reset the alarm setpoint to normal operating settings.	
	Change the heating water low differential pressure alarm setpoint to 50 Pa above the current pressure.	
	Verify that the heating water low differential pressure alarm activates.	
	Turn off the power to the lead boiler pump	
	Verify that the boiler cycles off	
	Verify that the lag boiler pumps and boiler cycles on.	
	Verify that a lead boiler pump alarm is generated	
	Reset the power to the lead boiler pump	
	Turn off the power to the operational boiler	
	Verify that the lag boiler pumps and boiler cycles on.	
	Verify that a lea boiler alarm is generated	
	Reset the power to the boiler	
	Stop the flow through the boiler (using an isolation valve)	
	Verify that a boiler alarm is generated	
	Verify that the lead boiler pumps and boiler cycles off.	
	Verify that the lag boiler pumps and boiler cycles on.	
	Open the valve to allow flow.	
	Verify that all alarm points are currently cleared.	

9	Alarm Testing - Pumps P-1, P-2	Confirmed (Date)
	Change OAT Boiler Enable Setpoint 5C above current outdoor air temperature (if required).	
	Turn off the power to the lead primary hot water pump P-1.	
	Verify that the lag primary hot water pump cycles on.	
	Verify that the lead hot water pump alarm is generated	
	Reset the power to the lead primary hot water pump	
	Repeat test with primary hot water pump P-2	

HOT WATER HEATING SYSTEM TEST

Performance Verification



REVISION #: _____

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ADDRESS: 10950-119 Street NW
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CUSTOMER: PWGSC
PROJECT: Bowden Boiler Replacement
FILE NUMBER: E13059
DATE: _____

Safe Completion	Confirmed (Date)
Verify all setpoints are at normal operating conditions and not overridden	
Verify that all safeties are enabled and not bypassed	
Verify that all switches are in the auto position	
Verify that power is on to all components	
Reset the power to the lead hot water pump	
Cycle off the power to the lead glycol pump	
Verify that the lag glycol pump cycles on.	
Verify that a glycol pump alarm is generated	
Reset the power to the lead glycol pump	
Verify that all alarm points are currently cleared.	
Reset all time delays for both operational and alarms to normal settings.	

GENERAL COMMENTS: Boiler Capacity tests to be completed in winter

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		
Building Operations and Maintenance Staff		
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		
Manufacturer's Representatives		
Independent Testing Specialists		

AIR HANDLING UNIT

Start-Up

ENGINEERING
HEMISPHERE

REVISION #: _____

NAME: Commissioning Team
COMPANY: Hemisphere Engineering Inc.
ADDRESS: 10950 - 119 Street
Edmonton, AB - Alberta T5H 3P5

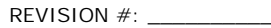
CUSTOMER: PWGSC
PROJECT: Bowden Boiler Replacement
FILE NUMBER: E13059
DATE: DD / MM / YYYY

NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	
SERVICE		LOCATION	

EVALUATION			
AIR HANDLING CABINET AND GENERAL INSTALLATION	VALUE	COMPLIES: Y /N	COMMENT REFERENCE NUMBER
AIR HANDLING CABINET AND GENERAL INSTALLATION			
CONNECTION BETWEEN DUCTS AND UNIT TIGHT AIRTIGHT			
SHIPPING BLOCKS REMOVED (IN PARTICULAR FAN SECTION)			
ALL CONSTRUCTION AND INSTALLATION DEBRIS CLEANED UP INSIDE UNIT			
UNIT INSTALLED ON ELEVATED AND LEVEL BASE AS SPECIFIED			
INSPECTION OF UNIT CASING: MINIMAL AIR LEAKAGE THROUGH DOORS AND POUNTS			
SUPPLY AND RETURN DUCTS CORRECTLY INSTALLED			
FLEXIBLE CONNECTIONS INSTALLED AS REQUIRED			
FLEXIBLE CONNECTIONS CONTAIN ADEQUATE SLACK			
NO TEARS IN FLEXIBLE CONNECTIONS			

FAN	VALUE	COMPLIES: Y /N	COMMENT REFERENCE NUMBER
FANS ROTATES FREELY			
FLEX CONNECTIONS INSTALLED CORRECTLY ACCORDING TO BLOWER PRESSURE (SUCTION/DISCHARGE)			
CORRECT TYPE OF VIBRATION ISOLATORS INSTALLED UNDERNEATH FAN/MOTOR BASE			
SPRING ISOLATION LOAD DISTRIBUTED EQUALLY			
PROPER FAN BELT TENSION AND DRIVE ALIGNMENT			
FAN BEARINGS ADEQUATELY LUBRICATED			
DRAIN PLUG IN FAN REMOVED			
FAN GUARDS PROVIDED WHERE NECESSARY			
CORRECT FAN ROTATION			
NO UNUSUAL VIBRATION OR NOISE DURING SUPPLY FAN OPERATION			
ALIGNMENT IS CORRECT			
FAN CASING CLEANED			
INLET & OUTLET GUARDS INSTALLED			
DUCT AND FAN GEOMETRY CORRECT			
VIBRATION ISOLATORS INSTALLED AND ADJUSTED			
STARTERS & DISCONNECTS INSTALLED			
DISCONNECT LOCATION CORRECT			
INTERLOCKS INSTALLED			

Start-Up



CUSTOMER: PWGSC
PROJECT: Bowden Boiler Replacement
FILE NUMBER: E13059
DATE: DD / MM / YYYY

GENERAL COMMENTS:	
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AIR HANDLING UNIT

Start-Up



REVISION #: _____

NAME: Commissioning Team
COMPANY: Hemisphere Engineering Inc.
ADDRESS: 10950 - 119 Street
Edmonton, AB - Alberta T5H 3P5

CUSTOMER: PWGSC
PROJECT: Bowden Boiler Replacement
FILE NUMBER: E13059
DATE: DD / MM / YYYY

Building Operations and Maintenance Staff		
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		
Manufacturer's Representatives		
Independent Testing Specialists		

AIR HANDLING UNIT

Static Verification

ENGINEERING
HEMISPHERE

REVISION #: _____

NAME: Commissioning Team
COMPANY: Hemisphere Engineering Inc.
ADDRESS: 10950 - 119 Street
Edmonton, AB - Alberta T5H 3P5

CUSTOMER: PWGSC
PROJECT: Bowden Boiler Replacement
FILE NUMBER: E13059
DATE: DD / MM / YYYY

NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	
SERVICE		LOCATION	

SUPPLEMENTAL INFORMATION	

SYSTEM COMPONENTS			
SYSTEM /EQUIPMENT DATA	SPECIFIED	SHOP DRAWINGS	INSTALLED
MANUFACTURER			
MODEL NO.			
SERIAL NO.			

SUPPLY FAN INFO	SPECIFIED	SHOP DRAWINGS	INSTALLED
MANUFACTURER			
MODEL NO.			
SERIAL NO.			
FAN CFM			
FAN RPM			
FAN ESP/TSP			
BELT SIZE/QUANTITY			

RETURN FAN INFO	SPECIFIED	SHOP DRAWINGS	INSTALLED
MANUFACTURER			
MODEL NO.			
SERIAL NO.			
FAN CFM			
FAN RPM			
FAN ESP/TSP			
BELT SIZE/QUANTITY			

SUPPLY FAN MOTOR INFO	SPECIFIED	SHOP DRAWINGS	INSTALLED
MOTOR MANUFACTURER			
MODEL NO.			
SERIAL NO.			
HORSEPOWER/VOLTAGE/NO. OF PHASES/FULL LOAD AMPS			
INSULATION CLASS			
FRAME SIZE			

AIR HANDLING UNIT

Static Verification

ENGINEERING
HEMISPHERE

REVISION #: _____

NAME: Commissioning Team
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ADDRESS: 10950 - 119 Street
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CUSTOMER: PWGSC
PROJECT: Bowden Boiler Replacement
FILE NUMBER: E13059
DATE: DD / MM / YYYY

RPM			
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RETURN FAN MOTOR INFO	SPECIFIED	SHOP DRAWINGS	INSTALLED
MOTOR MANUFACTURER			
MODEL NO.			
SERIAL NO.			
HORSEPOWER/VOLTAGE/NO. OF PHASES/FULL LOAD AMPS			
INSULATION CLASS			
FRAME SIZE			
RPM			

COILS	SPECIFIED	SHOP DRAWINGS	INSTALLED
MODEL NO.			
EAT/LAT			
EWT/LWT			
FINS PER INCH			
NUMER OF ROWS			
GPM			

FILTER	SPECIFIED	SHOP DRAWINGS	INSTALLED
MANUFACTURER			
MODEL NO.			
AIR VOLUME			
STATIC PRESSURE DROP			
TYPE/EFFICIENCY			
SIZE/QTY			
FACE VELOCITY			

DAMPERS	SPECIFIED	SHOP DRAWINGS	INSTALLED
MANUFACTURER			
MODEL NO.			
BLADE TYPE			
BLADE INSULATION			

EVALUATION			
AIR HANDLING CABINET AND GENERAL INSTALLATION	VALUE	COMPLIES: Y / N	COMMENT REFERENCE NUMBER
PERMANENT AND DURABLE NAMEPLATE LABELS AFFIXED TO UNIT			
CASING CONDITION GOOD: NO DENTS, DOOR GASKETS INSTALLED			

AIR HANDLING UNIT

Static Verification

ENGINEERING
HEMISPHERE

REVISION #: _____

NAME: _____ Commissioning Team
COMPANY: _____ Hemisphere Engineering Inc.
ADDRESS: _____ 10950 - 119 Street
_____ Edmonton, AB - Alberta T5H 3P5

CUSTOMER: PWGSC
PROJECT: _____ Bowden Boiler Replacement
FILE NUMBER: E13059
DATE: _____ DD / MM / YYYY

NO HOLES IN THE UNIT, I.E., MISSING SCREWS OR CAPS			
ACCESS DOORS CLOSE TIGHTLY, AND OPEN EASILY			
ACCESS DOORS OPEN ACCORDING TO THE PRESSURE IN CORRESPONDING SECTION AS REQUIRED			
VIEWING WINDOWS INSTALLED AS SPECIFIED			
MARINE VAPOR PROOF LIGHTS INSTALLED AS SPECIFIED			
SPECIFIED INSULATION PROPERLY ADHERED TO INTERIOR WALL			

MOTORIZED DAMPER	VALUE	COMPLIES: Y /N	COMMENT REFERENCE NUMBER
CORRECT BLADE ORIENTATION (PARALLEL/OPPOSED)			
DAMPER INSULATED AS REQUIRED			
CORRECT NON-ENERGIZED DAMPER POSITION			
DAMPERS CLOSE TIGHTLY			
DAMPER LINKAGES HAVE MINIMUM PLAY			
DAMPER STROKES 100% WITHOUT BINDING			
SPRING RETURN ACTION IS FUNCTIONAL			
DAMPER MODULATES CORRECTLY ACCORDING TO CONTROL SIGNAL			

AIR FILTRATION	VALUE	COMPLIES: Y /N	COMMENT REFERENCE NUMBER
CORRECT FILTER TYPE(S) USED			
FILTERS INSTALLED IN CORRECT ORIENTATION			
CORRECT QUANTITY			
CORRECT SEALS INSTALLED BETWEEN DOOR AND FILTER TRACK			
NO GAPS BETWEEN FILTERS			
BLANK-OFF PLATES INSTALLED AS REQUIRED			

GENERAL COMMENTS:

AIR HANDLING UNIT

Static Verification



REVISION #: _____

NAME: _____ Commissioning Team
COMPANY: _____ Hemisphere Engineering Inc.
ADDRESS: _____ 10950 - 119 Street
_____ Edmonton, AB - Alberta T5H 3P5

CUSTOMER: PWGSC
PROJECT: _____ Bowden Boiler Replacement
FILE NUMBER: E13059
DATE: _____ DD / MM / YYYY

POSITION/TITLE		DATE
Building Owner/Representative		
Building Operations and Maintenance Staff		
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		
Manufacturer's Representatives		
Independent Testing Specialists		

AIR HANDLING UNIT

Functional Performance Testing



REVISION #: _____

NAME: _____
Commissioning Team
COMPANY: _____
Hemisphere Engineering Inc.
ADDRESS: _____
10950 - 119 Street
Edmonton, AB - Alberta T5H 3P5

CUSTOMER: _____
PWGSC
PROJECT: _____
Bowden Boiler Replacement
FILE NUMBER: _____
E13059
DATE: _____
DD / MM / YYYY

SHEET INTENTIONALLY LEFT BLANK FOR INDIVIDUAL TO POPULATE AS NEEDED

GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		
Building Operations and Maintenance Staff		
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		
Manufacturer's Representatives		
Independent Testing Specialists		

Part 1 General

1.1 TRAINEES

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

1.2 INSTRUCTORS

- .1 Departmental Representative will provide:
 - .1 Descriptions of systems.
 - .2 Instruction on design philosophy, design criteria, and design intent.
- .2 Contractor and certified factory-trained manufacturers' personnel: to provide instruction on the following:
 - .1 Start-Up, operation, shut-down of equipment, components and systems.
 - .2 Control features, reasons for, results of, implications on associated systems of, adjustment of set points of control and safety devices.
 - .3 Instructions on servicing, maintenance and adjustment of systems, equipment and components.
- .3 Contractor and equipment manufacturer to provide instruction on:
 - .1 Start-up, operation, maintenance and shut-down of equipment they have certified installation, started up and carried out PV tests.

1.3 TRAINING OBJECTIVES

- .1 Training to be detailed and duration to ensure:
 - .1 Safe, reliable, cost-effective, energy-efficient operation of systems in normal and emergency modes under all conditions.
 - .2 Effective on-going inspection, measurements of system performance.
 - .3 Proper preventive maintenance, diagnosis and trouble-shooting.
 - .4 Ability to update documentation.
 - .5 Ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives.

1.4 TRAINING MATERIALS

- .1 Instructors to be responsible for content and quality.
- .2 Training materials to include:
 - .1 "As-Built" Contract Documents.
 - .2 Operating Manual.
 - .3 Maintenance Manual.

- .4 Management Manual.
- .5 TAB and PV Reports.
- .3 Departmental Representatives will review training manuals. Departmental Representative will forward reviewed training manuals to the PWGSC Project Manager, and Facility Manager for acceptance.
- .4 Training materials to be in a format that permits future training procedures to same degree of detail.
- .5 Supplement training materials:
 - .1 Transparencies for overhead projectors.
 - .2 Multimedia presentations.
 - .3 Manufacturer's training videos.
 - .4 Equipment models.

1.5 SCHEDULING

- .1 Include in Commissioning Schedule time for training.
- .2 Deliver training during regular working hours, schedule training sessions to be 3 hours in length each.
- .3 Training to be completed prior to acceptance of facility.

1.6 RESPONSIBILITIES

- .1 Be responsible for:
 - .1 Implementation of training activities,
 - .2 Coordination among instructors,
 - .3 Quality of training, training materials,
- .2 Departmental Representative will evaluate training and materials.
- .3 Upon completion of training, provide written report, signed by Instructors, witnessed by Departmental Representative.

1.7 TRAINING CONTENT

- .1 Provide a combination of in-class style formal training followed immediately by demonstrations by Instructors using the installed equipment and systems.
 - .1 2 hour in in-class formal training
 - .2 1 hour in field demonstration using installed equipment.
- .2 Content includes:
 - .1 Review of facility and occupancy profile.
 - .2 Functional requirements.
 - .3 System philosophy, limitations of systems and emergency procedures.
 - .4 Review of system layout, equipment, components and controls.
 - .5 Equipment and system start-up, operation, monitoring, servicing, maintenance and shut-down procedures.

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

1.8 VIDEO-BASED TRAINING

- .1 Manufacturer's videotapes to be used as training tool with Departmental Representative's review and written approval 2 months prior to commencement of scheduled training.
- .2 On-Site training videos:
 - .1 Videotape in-class and in field training sessions for use during future training.
 - .2 To be performed after systems are fully commissioned.
 - .3 Organize into several short modules to permit incorporation of changes.
- .3 Production methods to be of professional quality.
 - .1 Submit sample of Video Based Training to be provided by contractor for Departmental Representative review and approval prior to providing proposed training schedule.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Acronyms:
 - .1 BMM - Building Management Manual.
 - .2 Cx - Commissioning.
 - .3 HVAC - Heating, Ventilation and Air Conditioning.
 - .4 PI - Product Information.
 - .5 PV - Performance Verification.
 - .6 TAB - Testing, Adjusting and Balancing.
 - .7 WHMIS - Workplace Hazardous Materials Information System.

1.2 GENERAL REQUIREMENTS

- .1 Standard letter size paper 216 mm x 279 mm.
- .2 Methodology used to facilitate updating.
- .3 Drawings, diagrams and schematics to be professionally developed.
- .4 Electronic copy of data to be in a format accepted and approved by Departmental Representative.

1.3 APPROVALS

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

1.4 GENERAL INFORMATION

- .1 Provide Departmental Representative the following for insertion into appropriate Part and Section of BMM:
 - .1 Complete list of names, addresses, telephone and fax numbers of contractor, sub-contractors that participated in delivery of project.
 - .2 Summary of mechanical and electrical systems installed and commissioned.
 - .1 Including sequence of operation as finalized after commissioning is complete.
 - .3 Description of building operation under conditions of heightened security and emergencies if applicable.
 - .4 System, equipment and components Maintenance Management System (MMS) identification.
 - .5 Information on operation and maintenance of Mechanical and Electrical equipment installed and commissioned.
 - .6 Operating and maintenance manual information and data.
 - .7 Final commissioning plan as actually implemented.
 - .8 Completed commissioning checklists.

- .9 Commissioning test procedures employed.
- .10 Completed Product Information (PI) and back up for all Performance Verification (PV) report forms, approved and accepted by Departmental Representative.
- .11 Commissioning reports.
- .12 All Training material

1.5 CONTENTS OF OPERATING AND MAINTENANCE MANUAL

- .1 For detailed requirements refer to Section 01 78 00 - Closeout Submittals.
- .2 Departmental Representative to review and approve format and organization within 12 weeks of award of contract.
- .3 Include original manufactures brochures and written information on products and equipment installed on this project.
- .4 Record and organize for easy access and retrieval of information contained in BMM.
- .5 Include completed PI report forms, data and information from other sources as required.
- .6 Inventory directory relating to information on installed systems, equipment and components.
- .7 Approved project shop-drawings, product and maintenance data.
- .8 Manufacturer's data and recommendations relating: manufacturing process, installation, commissioning, start-up, O M, shutdown and training materials.
- .9 Inventory and location of spare parts, special tools and maintenance materials.
- .10 Warranty information.
- .11 Inspection certificates with expiration dates, which require on-going re-certification inspections.
- .12 Maintenance program supporting information including:
 - .1 Recommended maintenance procedures and schedule.
 - .2 Information to removal and replacement of equipment including, required equipment, points of lift and means of entry and egress.

1.6 SUPPORTING DOCUMENTATION FOR INSERTION INTO SUPPORTING APPENDICES

- .1 Provide Departmental Representative supporting documentation relating to installed equipment and system, including:
 - .1 General:
 - .1 Finalized commissioning plan.
 - .2 WHMIS information manual.
 - .3 Approved "as-built" drawings and specifications.
 - .4 Procedures used during commissioning specific to each component(s), system(s), and integrated system(s).
 - .5 Cross-Reference to specification sections.

- .2 Mechanical:
 - .1 Installation permits, inspection certificates.
 - .2 Piping pressure test certificates.
 - .3 Ducting leakage test reports.
 - .4 TAB and PV reports.
 - .5 Charts of valves and steam traps.
 - .6 Copies of posted instructions.
- .3 Electrical:
 - .1 Installation permits, inspection certificates.
 - .2 TAB and PV reports.
 - .3 Electrical work log book.
 - .4 Charts and schedules.
 - .5 Locations of cables and components.
 - .6 Copies of posted instructions.
- .2 Assist Departmental Representative with preparation of BMM.

1.7 LANGUAGE

- .1 English.

1.8 USE OF CURRENT TECHNOLOGY

- .1 Use current technology for production of documentation. Emphasis on ease of accessibility at all times, maintain in up-to-date state, compatibility with user's requirements.
- .2 Obtain Departmental Representative's approval before starting Work.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 NOT USED

- .1 Not used.

END OF SECTION