

Part 1 General

1.1 TAXES

- .1 Pay all taxes properly levied by law (including Federal, Provincial and Municipal).

1.2 FEES, PERMITS and CERTIFICATES

- .1 Pay all fees and obtain all permits. Provide authorities with plans and information for acceptance certificates. Provide inspection certificates as evidence that work conforms to requirements of Authority having jurisdiction.

1.3 CONSTRUCTION PROGRESS SCHEDULE

- .1 Submit bar chart construction schedule for work, indicating anticipated progress stages within time of completion. When the Departmental Representative has reviewed schedule, take necessary measures to complete work within scheduled time. Do not change schedule without notifying Departmental Representative.
- .2 Carry out work during "regular hour", Monday to Friday from 07:00 to 18:00 hours and on Saturdays, Sundays and statutory holidays.
- .3 Carry out interior painting in occupied areas during "off hours", Monday to Friday from 18:00 to 07:00 hours and on Saturdays, Sundays, and statutory holidays. Thoroughly ventilate areas painted during "off hours".
- .4 Carry out noise generating work during "off hours" Monday to Friday from 18:00 to 07:00 hours and on Saturdays, Sundays, and statutory holidays.
- .5 Give the Departmental Representative 48 hours notice for work to be carried out during "off hours".

1.4 REGULATORY REQUIREMENTS

- .1 References and Codes:
 - .1 Materials shall be new and work shall conform to the minimum applicable standards of the "References" indicated in the specification sections, the National Building Code of Canada 2010 (NBC) and all applicable Provincial and Municipal codes. In the case of conflict or discrepancy the most stringent requirement shall apply.
- .2 Building Smoking Environment:
 - .1 Smoking is not permitted in the Building. Obey smoking restrictions on building property.
- .3 Hazardous Material Discovery:

- .1 Stop work immediately when material resembling spray or trowel-applied asbestos, Polychlorinated Biphenyl (PCB), mould or other designated substance is encountered during demolition work.
 - .1 Take preventative measure and promptly notify Departmental Representative.
 - .2 Do not proceed until written instructions have been received from Departmental Representative.

1.5 FIRE SAFETY REQUIREMENTS

- .1 Comply with both the National Building Code of Canada 2010 and the National Fire Code of Canada 2010 for safety of persons in buildings in the event of a fire and the protection of buildings from the effects of fire, as follows;
 - .1 The National Building Code (NBC): for fire safety and fire protection features that are required to be incorporated in a building during construction.
 - .2 The National Fire Code (NFC):
 - .1 The on-going maintenance and use of the fire safety and fire protection features incorporated in buildings.
 - .2 The conduct of activities that might cause fire hazards in and around buildings.
 - .3 Limitations on hazardous contents in and around buildings.
 - .4 The establishment of fire safety plans.
 - .5 Fire safety at construction and demolition sites.
- .2 Retain all fire safety documents and standards on site.
- .3 Welding and cutting:
 - .1 Before welding, soldering, grinding and/or cutting work, obtain a permit from the Departmental Representative. Store flammable liquids in approved CSA containers. No open flame shall be used unless authorized by the Departmental Representative.
 - .2 At least 48 hours prior to commencing cutting, welding or soldering procedure, provide to Departmental Representative:
 - .1 Notice of intent, indicating devices affected, time and duration of isolation or bypass.
 - .2 Completed welding permit.
 - .3 Return welding permit to Departmental Representative immediately upon completion of procedures for which permit was issued.
 - .3 A fire watch shall be provided in accordance with the NFC 2010 edition when hot work is carried out.

- .4 Where work requires interruption or cause activation of fire alarms or fire suppression, extinguishing or protection systems:
 - .1 Provide "Watchman Service" as described in NFC 2010; In general, watchman service is defined as an individual conversant with "Fire Emergency Procedures", performing fire picket duty within an unprotected and unoccupied (no workers) area once per hour.
 - .2 Retain services for fire protection systems on daily basis or as approved by Departmental Representative, to isolate and protect all devices relating to:
 - .1 modification of fire alarms, fire suppression, extinguishing or protection systems; and/or
 - .2 cutting, welding, soldering or other construction activities that might activate fire protection systems.
 - .3 Immediately upon completion of work, restore fire protection systems to normal operation and verify that all devices are fully operational.
 - .4 Inform fire alarm system monitoring agency and local Fire Department immediately prior to isolation and immediately upon restoration of normal operation.
- .5 Designated contractor: shall hire the services of Chubb Edwards to do all the work related to the fire alarm system and AirTron for any work relating to EMCS.

1.6 QUALITY CONTROL

- .1 Testing Laboratory Services:
 - .1 Departmental Representative will appoint and pay for costs of inspection and testing services, unless indicated otherwise.
 - .2 Provide safe working areas and assist with testing procedures, including provisions for materials or services and co-ordination, as required by testing agency and as authorized by Departmental Representative.
 - .3 Where tests indicate non-compliance with specifications, contractor to pay for initial test and all subsequent testing of work to verify acceptability of corrected work.

1.7 HAZARDOUS MATERIALS

- .1 Hazardous Materials: product, substance, or organism that may cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.
- .2 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and

regarding labelling and the provision of Material Safety Data Sheets (MSDS).

- .3 For work in occupied buildings, give the Department Representative 1 week for work involving designated substances (Ontario Bill 208), hazardous substances (Canada Labour Code Part II Section 10), and before painting, caulking, installing carpet or using adhesives and other materials, that cause off gassing.

1.8 TEMPORARY UTILITIES

- .1 Existing services required for work, excluding power required for space temporary heating, may be used by the Contractor without charge. Ensure capacity is adequate prior to imposing additional loads. Connect and disconnect at own expense and responsibility.
- .2 Notify the Departmental Representative and utility companies of intended interruption of services and obtain requisite permission.
- .3 Give the Departmental Representative 48 hours to 1 week notice related to each necessary interruption of any mechanical or electrical service throughout the course of the work. Keep duration of these interruptions to a minimum. Carry out all interruptions after normal working hours of the occupants, preferably on weekends.

1.9 CONSTRUCTION FACILITIES

- .1 Designated elevators: freight elevators to be used by construction personnel and transporting of materials.
 - .1 Co-ordinate with Departmental Representative.
 - .2 Protect from damage, safety hazards and overloading of existing equipment.
- .2 Site Storage:
 - .1 No additional storage outside of the site will be provided by the Departmental Representative.
 - .2 Do not unreasonably encumber site with materials or equipment.
 - .3 Move stored products or equipment that interfere with operations of Departmental Representative or other contractors.
 - .4 Do not load or permit to load any part of work with weight or force that will endanger work.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 Sanitary facilities: will be assigned for Contractor's personnel. Others shall not be used. Keep facilities clean.
- .5 Signage:

- .1 Provide common-use signs related to traffic control, information, instruction, use of equipment, public safety devices, etcetera, in both official languages or by the use of commonly understood graphic symbols and to approval of the Departmental Representative.
- .2 No advertising will be permitted on this project.
- .3 Maintain approved signs and notices in good condition for duration of project and dispose of off site, on completion of project or earlier, as directed by Departmental Representative.

1.10 TEMPORARY BARRIERS AND ENCLOSURES

- .1 Maintain existing services to building and provide for personnel and vehicle access. The contractor shall agree to install proper site separation and identification in order to maintain "Time and Space" at all times throughout the life of the project. When Building Operations staff requires access to equipment in order to operate the building, proper coordination and communication must exist between all parties involved
- .2 Dust Control:
 - .1 Provide dust tight screens or partitions to localize dust-generating activities, and for protection of workers, finished areas of work and public.
 - .2 Maintain and relocate protection until such work is complete.
 - .3 Protect all furnishings within work area with 0.102mm thick polyethylene film during construction. Remove film during non-construction hours and leave premises in clean, unencumbered and safe manner for normal daytime function.
- .3 Protection:
 - .1 Protect work against damage until take-over.
 - .2 Protect adjacent work against the spread of dust and dirt beyond the work areas.
 - .3 Protect operatives and other users of site from all hazards.

1.11 EXAMINATION and PREPARATION

- .1 Examine site and conditions likely to affect work and be familiar and conversant with existing conditions.
- .2 Before commencing work, establish location and extent of services lines in area of work and notify Departmental Representative of findings.

1.12 FIELD QUALITY CONTROL

- .1 Carry out Work using qualified licensed workers or apprentices in accordance with Provincial Act respecting manpower vocational training and qualification.

- .2 Permit employees registered in Provincial apprenticeship program to perform specific tasks only if under direct supervision of qualified licensed workers.
- .3 Determine permitted activities and tasks by apprentices, based on level of training attended and demonstration of ability to perform specific duties.

1.13 SIGNS

- .1 Provide common-use signs related to traffic control, information, instruction, use of equipment, public safety devices, etc., in both official languages or by the use of commonly-understood graphic symbols to the Departmental Representative's approval.

1.14 EXECUTION

- .1 Cut, Patch and Make Good:
 - .1 Cut existing surfaces as required to accommodate new work.
 - .2 Remove all items so shown or specified.
 - .3 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish and texture.
- .2 Firestop and smoke seal systems: in accordance with CAN-ULC-S115-05 - Standard Method of Fire Test of Firestop Systems. Install around pipe, ductwork, cables, and other objects penetrating fire separations to provide fire resistance not less than the fire resistance rating of surrounding floor, ceiling, and wall assembly.
- .3 Sleeves, Hangers and Inserts: co-ordinate setting and packing of sleeves and supply and installation of hangers and inserts. Obtain Departmental Representative's approval before cutting into structure.
- .4 Unless otherwise specified, materials for removal become the Contractor's property and shall be taken from site.

1.15 WASTE MANAGEMENT

- .1 Comply with Environmental Protection Act, Ontario Regulations: O. Reg. 102/94 - Waste Audits and Waste Reduction Work Plans; and O. Reg. 103/94 - Industrial, Commercial and Institutional Source Separation Programs; for waste management on construction and demolition projects.
- .2 Conduct "waste audit" to determine what waste will be generated during construction and demolition operations. Prepare written "waste reduction work plan" and implement the principles to reduce, reuse and recycle materials to the extent that is possible.
- .3 Provide a "source separation program" to disassemble and collect in an orderly fashion the following "materials

designated for alternative disposal" from the "general waste" stream:

- .1 brick and Portland cement concrete;
 - .2 cardboard (corrugated);
 - .3 gypsum board (unfinished);
 - .4 steel; and
 - .5 wood (not including painted, treated or laminated wood).
- .4 Submit complete records of all removals from site for both "materials designated for alternative disposal" and "general waste" including:
- .1 time and date of removal;
 - .2 description of material and quantities; and
 - .3 proof that materials have been received at an approved Waste Processing Site or certified Waste Disposal Site as required.

1.16 CLEANING

- .1 Clean up as work progresses. At the end of each work period, and more often if ordered by the Departmental Representative, remove debris from site, neatly stack material for use, and clean up generally.
- .2 Upon completion remove scaffolding, temporary protection and surplus materials. Make good defects noted at this stage.
- .3 Clean and polish glass, mirrors, ceramic tile, aluminum, chrome, stainless steel, baked or porcelain enamel, plastic laminate and other plastic surfaces, floors, hardware and washroom fixtures. Clean manufactured articles in accordance with manufacturer's written instructions.
- .4 Clean areas within the area of Work to a condition equal to what previously existed and to approval of Departmental Representative.

1.17 SECURITY CHECK

- .1 All personnel employed on this project must hold a current Reliability Security Clearance and will be subject to security check.
- .2 Personnel will be checked daily at start of work shift and given a pass, which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.

1.18 SECURITY ESCORT

- .1 All personnel employed on this project shall be escorted when executing work in non-public areas during normal working hours. Personnel shall be escorted in all areas after normal working hours.

- .2 Submit an escort request to Departmental Representative at least 14 days before the service is needed. For requests submitted within the time mentioned above, the Departmental Representative will pay for the costs of the security escort. The cost incurred by a late request will be charged to the Contractor.
- .3 Any escort request may be cancelled free of charge if notification of cancellation is given at least 4 hours before the scheduled time of the escort. The cost incurred by a late cancellation will be charged to the Contractor.
- .4 The calculation of costs will be based on the average hourly rate of a security officer for a minimum of 8 hours per day for a late service request and 4 hours for late cancellations.

1.19 COST BREAKDOWN

- .1 Before submitting first progress claim, submit billing breakdown in detail as directed by Departmental Representative. After approval by Departmental Representative cost breakdown will be used as the basis of progress payments.

1.20 PRECEDENCE

- .1 For Federal Government projects, Division 01 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

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 REGULATORY REQUIREMENTS

- .1 An investigation into the presence of designated substances for the New Training Facility Centre Project, at the Phase IV Building, located at 140 Promenade du Portage, in Gatineau, Québec, was performed in order to meet the requirements of the Canada Labour Code under Part II, Section 124 that every employer shall ensure that the health and safety at work of every person employed by the employer is protected. Furthermore, Section 125(1) (z.14) of the *Canada Labour Code* stipulates that the employer, to the extent that he controls the activity, will take all reasonable care to ensure that all persons granted access to the work place, other than the employer's employees, are informed of every known or foreseeable health and safety hazard to which they are likely to be exposed in the work place. In addition, it was performed to meet the requirements of the Province of Québec's *An Act Respecting Occupational Health and Safety* Section 51 whereby, "Every employer must take the necessary measures to protect and ensure the safety and physical well-being of his or her worker. He/she must, in particular, subsection (5) use methods and techniques intended for the identification, control and elimination of risks to the safety or health of the worker, subsection (8) see that no contaminant emitted or dangerous substance used adversely affects the health or safety of any person at a workplace; and subsection (13) give, to the workers, the health and safety committee, the certified association, the public health director and the Commission, the list of dangerous substances used in the establishment and of the contaminants that may be emitted". In addition, section 42 of the *Québec Regulation respecting occupational health and safety* states that when a worker is exposed to a substance identified in Schedule I as having a known or suspected carcinogenic effect on humans or being diisocyanate or isocyanate oligomers, such exposure shall be reduced to a minimum, even when it remains within the standards in that Schedule. By having a Designated Substances Report (DSR) conducted, the PWGSC Departmental Representative will be able to inform his or her employees, contractors, and tenants of any designated substances that may be present and possibly disturbed throughout the duration of the project. The informed Departmental Representative will then be able to impose appropriate health and safety precautions for all applicable personnel as required.

- .2 In the absence of applicable legislation in the Province of Québec, the following Regulations pertaining to designated substances have been referenced from the Ontario *Occupational Health and Safety Act and Regulations*. The designated substances identified in the Ontario *Occupational Health and Safety Act* and its corresponding regulations are:
 - .1 **Acrylonitrile:**
 - .1 *Province of Québec's Regulation Respecting Occupational Health and Safety (as amended)*
 - .2 *Ontario Regulations 490/09 "Designated Substances" (as amended)*
 - .2 **Arsenic:**
 - .1 *Province of Québec's Regulation Respecting Occupational Health and Safety (as amended)*
 - .2 *Ontario Regulations 490/09 "Designated Substances" (as amended)*
 - .3 **Asbestos:**
 - .1 *Province of Québec's Safety Code for the Construction Industry*
 - .2 *Province of Québec's Regulation Respecting Occupational Health and Safety*
 - .3 *Ontario Regulations 278/05 "Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations" (as amended)*
 - .4 *PWGSC Departmental Policy DP 057 – "Asbestos Management"*
 - .4 **Benzene:**
 - .1 *Province of Québec's Regulation Respecting Occupational Health and Safety (as amended)*
 - .2 *Ontario Regulations 490/09 "Designated Substances" (as amended)*
 - .5 **Coke Oven Emissions:**
 - .1 *Province of Québec's Regulation Respecting Occupational Health and Safety (as amended)*
 - .2 *Ontario Regulations 490/09 "Designated Substances" (as amended)*

- .6 **Ethylene Oxide:**
 - .1 *Province of Québec's Regulation Respecting Occupational Health and Safety (as amended)*
 - .2 *Ontario Regulations 490/09 "Designated Substances" (as amended)*
- .7 **Isocyanates:**
 - .1 *Province of Québec's Regulation Respecting Occupational Health and Safety (as amended)*
 - .2 *Ontario Regulations 490/09 "Designated Substances" (as amended)*
- .8 **Lead:**
 - .1 *Province of Québec's Regulation Respecting Occupational Health and Safety (as amended)*
 - .2 *Ontario Regulations 490/09 "Designated Substances" (as amended)*
 - .3 *Canada Consumer Product Act's Surface Coating Materials Regulations SOR/2005-109 (as amended)*
 - .4 *Regulation Respecting Hazardous Materials (O.C. 1310-97), under the Environmental Quality Act, R.S.Q., c. Q-2 - (21)*
- .9 **Mercury:**
 - .1 *Province of Québec's Regulation Respecting Occupational Health and Safety (as amended)*
 - .2 *Ontario Regulations 490/09 "Designated Substances" (as amended)*
 - .3 *Regulation Respecting Hazardous Materials (O.C. 1310-97), under the Environmental Quality Act, R.S.Q., c. Q-2 - (21)*
- .10 **Silica:**
 - .1 *Province of Québec's Regulation Respecting Occupational Health and Safety (as amended)*
 - .2 *Ontario Regulations 490/09 "Designated Substances" (as amended)*
- .11 **Vinyl Chloride:**
 - .1 *Province of Québec's Regulation Respecting Occupational Health and Safety (as amended)*

.2 *Ontario Regulations 490/09
"Designated Substances" (as
amended)*

- .3 All contractors requesting tenders from subcontractors shall furnish this report to subcontractors. **This report must be read in its entirety, including text and tables.**

1.2 VALIDITY DATE

- .1 DST Consulting Engineers, Inc. conducted the on-site survey for this report on 2014/01/15.

- .2 The work areas (hereafter referred to as 'the project areas' are located on the 2nd floor office space and the Mechanical Floor where Cooling Tower 1 is located, at the Phase IV Building, 140 Promenade du Portage, in Gatineau, Québec. The scope of the work proposed consists of the construction of a new training facility centre on the 2nd floor of the Phase IV Building, and an upgrade of the existing Cooling Tower 1, to supply cooling for new air conditioning units. As per an onsite PWGSC representative, the washrooms within the project area on the 2nd floor were not included in the planned refurbishments; as such, the survey did not include the washrooms. However, the pipe chase that is accessible via the washrooms in this area was included.

- .1 The scope of work for this report involved a visual inspection of building materials and contents for the presence of suspected designated substances in the project areas on 2014/01/15.

- .2 From the visual inspection suspect materials were sampled and analyzed, where appropriate, for the above substances. On the basis of the visual inspection, a total of ten (10) bulk samples of suspected asbestos-containing materials (ACMs), and one (1) bulk sample of suspected lead-containing paint were collected. Bulk ACM samples were collected in order to satisfy the requirements of *O. Reg. 278/05* (as amended).

The samples were then submitted for analysis to Paracel Laboratories Inc. (accredited by the Canadian Association for Laboratory Accreditation), located in Ottawa, Ontario.

The bulk asbestos samples were analyzed using Polarized Light Microscopy (PLM). This analytical method complies with the United States Environmental Protection Agency (U.S. EPA) Method 600/R-93/116.

- The lead analysis of the paint samples was completed using Inductively Coupled Plasma – Mass Spectrometry (ICP-MS) in accordance with U.S. EPA Method 6010-C.
- .3 The visual inspection and sampling was limited to readily accessible areas. Destructive testing was not included in the investigation, but is recommended prior to any major demolition. Due to the nature of building construction, some inherent limitations exist as to the possible thoroughness of the designated substance survey. The survey did not include the demolition of floors, floor finishes, plaster ceilings or walls or other areas to examine concealed conditions. No confined space was accessed for the purpose of this report.
 - .4 It is possible that the designated substances aforementioned are present in non-accessible areas and concealed spaces (i.e., wall and ceiling cavities), or confined spaces. No other areas outside the defined work boundaries have been assessed.
 - .5 Prior to beginning work, it must be confirmed with the Departmental Representative that no additional designated substances have been brought to the project area.
 - .6 In addition, the survey refers to polychlorinated biphenyls (PCBs) and halocarbons; however, it does not refer to other substances that may be present in the day-to-day usage for specialized equipment or areas in buildings (i.e. lead shields, fume hoods, etc.).
 - .7 There is a possibility that materials which could not be reasonably identified within the scope of this assessment or which were not apparent during previous site visits may exist. Should any designated substance be encountered in the course of demolition, work must be stopped, precautionary measures taken, and the Departmental Representative must be notified immediately. **Do not proceed until written instructions have been received.**

PART 2 - DESIGNATED SUBSTANCES

2.1 SURVEY RESULTS

- .1 **ACRYLONITRILE:** Not Identified

.2 **ARSENIC:** Not Identified

.3 **ASBESTOS: Identified**

Asbestos is a naturally occurring material. In general, it has historically been intentionally added to many building materials in the construction industry to increase thermal or chemical resistance properties. More common uses are thermal insulation for pipes and boilers, structural steelwork fireproofing, floor tiles and in-wall and ceiling plasters. There are two classes of asbestos-containing materials: friable and non-friable. Friable asbestos-containing materials are loose in composition or can be easily crumbled using hand pressure. Non-friable asbestos-containing materials are more durable and are held together by a binder such as cement, vinyl or asphalt.

Representative bulk samples, collected on 2014/01/15 from materials located within the project areas have been analyzed for asbestos. Analytical results indicate that ACMs in the project areas contain Chrysotile asbestos. The results are shown in Table 1 below.

Table 1: Asbestos Sample Results (Method of Detection Limit – 0.1%)

Sample number	Material	Location	Asbestos Type	Asbestos content (%)
18122- 01	12"x12" Vinyl floor tile, orange	Reception area	Chrysotile	0.73%
18122- 02	Drywall joint compound	Reception area	n/a	n/d
18122- 03	Drywall joint compound	Reception area	n/a	n/d
18122- 04	Drywall joint compound	Central hallway	n/a	n/d
18122- 05	Patching material	former doorway (patched over)	n/a	n/d
18122- 06	Drywall joint compound	Hallway to washrooms	n/a	n/d
18122- 07	Caulking on metal panel seams	Cooling Tower 1	Chrysotile	6.21%
18122- 08	Black tar	Pipe elbows, Cooling Tower 1	Chrysotile	17.53%
18122- 09	Caulking at pipe penetration	Cooling Tower 1	n/a	n/d
18122- 10	Parging/caulking on black foamglass	Endcaps, Cooling Tower 1	Chrysotile	14.90%

Bold items exceed the 0.1% regulated concentration of asbestos, as per Quebec's Safety Code for the Construction Industry

n/d = none detected, n/a = not applicable

Based on analytical sampling and limited observations noted during the survey, the following friable asbestos-containing material was identified in the Cooling Tower 1 project area:

- Three (3) Steel-jacketed pipe elbows associated with the exterior piping of Cooling Tower 1 are suspected of containing more than 0.1% asbestos. The steel jacketing was impenetrable using handtools only, preventing verification of the materials concealed beneath.

Based on analytical sampling and limited observations noted during the survey, the following non-friable asbestos-containing materials were identified in the project areas:

- 12"x12" Vinyl floor tiles, orange contain 0.73% Chrysotile asbestos. Eight (8) square metres (m2) of these floor tiles were observed in a storage room in the reception area, and 8 m2 in the electrical room near the reception area, behind the elevators. All floor tiles were observed to be in good condition.
- Grey caulking applied to the seams of the metal panels comprising the outer walls of Cooling Tower 1 contains 6.21% Chrysotile asbestos. Visibly accessible occurrences of this ACM were identified to be in good condition.
- Black tar applied to fibreglass insulation on ten (10) pipe elbows associated with the exterior piping of Cooling Tower 1 contains 17.53% Chrysotile asbestos. All occurrences of this ACM were identified to be in good condition.
- A parging/caulking material applied to foamglass insulation on ten (10) pipe end-cap reducers associated with the exterior piping of Cooling Tower 1 contains 14.90% Chrysotile asbestos.

.4 **BENZENE:** Not Identified

.5 **COKE OVEN EMISSIONS:** Not Identified

.6 **ETHYLENE OXIDE:** Not Identified

.7 **ISOCYANATES:** Not Identified

.8 **LEAD: Identified**

Lead is a naturally occurring metal. It was used primarily in paint prior to the 1980's to increase the drying process. Lead in paint becomes a danger

when it is old or damaged, as it creates lead dust and chips. Lead can also be found in soldered joints installed on piping up to the mid 1990s and in older cast iron bell and spigot joints.

- .1 According to the *Canada Consumer Product Act's Surface Coating Materials Regulations SOR/2005-109* (as amended) allowable concentration of lead in surface coatings is 0.009 percent by weight (weight of lead to weight of paint), which is equivalent to 90 parts per million (ppm).
- .2 Even at very low concentrations, there may be potential for exposure to very high levels of lead depending on the activities performed that disturb the lead-containing materials. At low lead concentrations, conducting a risk assessment to assess the potential for exposure is required to determine the need to follow precautionary measures.
- .3 A representative paint sample, taken on 2014/01/15 from the Cooling Tower 1 project area, have been analyzed for lead content. Analytical results indicate that paints in the project area have a lead content above/below the 90ppm threshold outlined in the *Canada Consumer Product Act's Surface Coating Materials Regulations SOR/2005-109* (as amended). The result is shown in Table 2 below.

Table 2: Lead Sample Results

Sample Number	Description / Location	Lead Content (ppm)
18122-LP01	Red paint on handrail, adjacent to Cooling Tower 1	31,400 ppm

Bold items exceed the 90 ppm limit for lead, as per *Canada Consumer Product Act's Surface Coating Materials Regulations SOR/2005-109* (as amended)

The red painted metal hand rail paint (Sample LP01) was in good/fair condition at the time of the survey.

All paints other were observed to be in good condition. As such, samples of these paints were not collected as sampling without matrix interference (i.e. removing paint without also removing non-paint substrate) would likely prove difficult. Older interior paint finishes throughout the project areas are suspected to contain detectable concentrations of lead.

Lead is expected to be present within the solder on copper piping throughout the project area.

.9 **MERCURY: Identified**

Mercury-containing fluorescent light tubes were identified within the 2nd Floor project area. Should the disturbance or removal of fluorescent light tubes be required, the Occupational Health and Services (OHS) Branch of the Ontario Ministry of Labour (MoL) publication The Safe Handling of Mercury: A Guide for the Construction Industry, should be followed during the disturbance of materials containing mercury.

.10 SILICA: Identified

Free crystalline silica is present in concrete and other cementing materials such as masonry, mortar, and drywall at various locations within the project areas.

.11 VINYL CHLORIDE MONOMER: Not Identified

.12 POLYCHLORINATED BIPHENYLS (PCBs): Not Identified

.13 HALOCARBONS: Not Identified

.14 FOAMGLASS INSULATION: Identified

(NOT RECOGNIZED AS A DESIGNATED SUBSTANCE)

The pipe end-cap reducers associated with the exterior piping of Cooling Tower 1 Chilled Water lines are insulated with black foamglass insulation, with asbestos-containing parging/caulking applied to the exposed areas. A Material Data Safety Sheet¹ (MSDS) prepared for the foamglass insulation product indicated that this product composition was approximately (% by volume):

- Hydrogen Sulfide (H₂S) : < 1.2%
- Carbon Monoxide (CO): 0 – 4%
- Carbon Dioxide (CO₂) : 85 – 95%
- Glass Dust: Varies

The MSDS also indicated that cutting, crushing, or breaking the cells of the product will result in the release of these gases and dust. General or local ventilation as needed is recommended when disturbing this material. Furthermore, the MSDS states that supplied air or self-contained breathing

¹ Foamglass Insulation – Material Safety Data Sheet, February 11, 2009, Prepared by Pittsburgh Corning corp. (Manufacturer/Supplier).

apparatus in poorly ventilated areas is required when cutting or crushing of foamglass insulation causes Permissible Exposure Limit (PEL) of hydrogen sulphide and carbon monoxide gases to be exceeded.

.15 **GLYCOL: Identified**

(NOT RECOGNIZED AS A DESIGNATED SUBSTANCE)

Pipe systems carrying glycol are associated with the cooling tower, and are also present in the washroom pipe chase on the 2nd floor.

.16 **MICROBES: Suspected**

(NOT RECOGNIZED AS A DESIGNATED SUBSTANCE)

The interior of the cooling tower was subject to a limited visual via an exterior access hatch, as confined entry would have been required to fully enter the cooling tower. Based on limited observations, no standing water was observed within the cooling tower.

.17 **SCALE DEPOSITS: Identified**

(NOT RECOGNIZED AS A DESIGNATED SUBSTANCE)

Many of the coil elements of the cooling tower were covered by scale. This scale is likely from general cooling operating conditions, and likely consists of precipitated mineral deposits. Minor amounts of rust and scale debris may be present on the ground in some areas.

2.2 RECOMMENDATIONS

1. **ASBESTOS**

PWGSC's Departmental Policy *DP 057, Asbestos Management*, sets policy, establishes roles and responsibilities and provides a code of practice for the management of and working with asbestos-containing materials. All work must be done in accordance with this directive, as well as all other applicable legislation. As per section 3.23.3 of the *Québec Safety Code for the Construction Industry*, the employer shall determine the types of asbestos present in the materials before undertaking work liable to generate asbestos dust. In the case of asbestos removal work or demolition work involving asbestos, the methods and procedures used, as well as an attestation to the existence of a training and information program that complies with section 3.23.7 of the *Québec Safety Code* for the

Construction Industry, shall be abided by. Sections 3.23.7, 3.23.8, 3.23.9, 3.23.10, 3.23.11, and 3.23.13 of the code shall be duly carried out with respect to construction practices involving asbestos-containing materials. Sections 3.23.14, 3.23.15, and 3.23.16 stipulate that in a work environment where asbestos dust is present or expected to be produced, workers shall wear respirators suitable for such asbestos work in accordance with *CSA Standard Z94.4-93* "Selection, Use, and Care of Respirators".

The following recommendations are provided for identified and suspected ACMs:

The removal or disturbance of friable suspected asbestos containing pipe fittings (concealed under steel jacketing) must be conducted using a minimum of Moderate Risk asbestos work procedures. It should be noted that the removal of good condition asbestos-containing pipe fitting insulation can be conducted using glove bag procedures (Moderate Risk), provided the material is in good condition, and a proper seal can be maintained.

The removal or disturbance of non-friable asbestos containing materials (12"x12" vinyl floor tiles, caulking, tar and parging/caulking) can be conducted using Low Risk asbestos work procedures, provided the materials remain in a non-friable condition. If these conditions cannot be met, more stringent work procedures would be required.

Requirements for allowable asbestos exposure levels (depending on asbestos type), as outlined in *Regulation c. S-2.1, r. 11 of An Act respecting occupational health and safety*, must be met.

In the event of conflict between DP-057 and the *Québec Safety Code for the Construction Industry*, the more stringent shall apply.

Although there is no specific legislation for asbestos waste disposal in Québec, as a better management practice landfills receiving asbestos waste should be informed of the nature of the waste prior to transport.

2. LEAD

If lead-containing materials are disturbed (i.e. during dry sanding, grinding, polishing and sawing operations), then proper precautions, as outlined under the *Ontario Regulations 490/09 "Designated Substances" (as amended)* of the Occupational Health and Safety Act, must be followed. Contractors performing work that requires disturbance of lead-based materials are responsible to ensure that the workers are not exposed to airborne lead dust levels in excess of the time-weighted average and Maximum Exposure

Concentration for lead paint. It should be noted that the use of mechanically-powered tools or torches on lead-based materials increases the concentration of airborne lead dust or fumes and thereby requiring more stringent respiratory protection and controlled work procedures.

.1 Ontario Ministry of Labour (MoL) has published the document entitled "*Guideline: Lead on Construction Projects*". This document classifies all disturbances of lead-containing materials as Type 1, Type 2a, Type 2b, Type 3a or Type 3b work, based on presumed airborne concentrations of lead generated during the work each of which will have defined work practices. Although this document is not a regulation, Ministry of Labour Inspectors use it as guidance during site inspections.

.2 Under Regulation c. S-2.1, r. 11 of An Act respecting occupational health and safety, regulatory limits have been established for occupational exposure limits to airborne lead that may be present in a workplace. The Time Weighted Average Exposure Values to airborne lead dust or fumes should not exceed 0.15 milligram per cubic metre (mg/m^3) limit during the removal of paints and products containing any concentration of lead. The work procedure outlined below can be used as a guide.

Type 1 Operations, as defined in the MoL Guideline, applies to work that includes applying coating containing lead by means of brush or roller; installing or removing lead or lead-alloy sheet materials; installing or removing lead packing, Babbitt metal or similar material; removing coating containing lead using hand powered tools and soldering materials containing lead. Type 1 work practices outline that where workers request a respirator, the employer must provide at minimum a half-face piece air purifying respirator. Dust and waste must be cleaned up at least daily, and removed at completion of the operation.

Type 2 Operations, as defined in the MoL Guideline, applies to work that includes removing or repairing ventilation system where dust containing lead is present within the system; applying coating containing lead by means of spraying; removing coating containing lead using mechanically-powered tools; and outdoor welding or high temperature cutting of lead-containing coating, other than during dismantling or demolishing. Type 2 work practices outline that employers must provide workers at minimum a half-face piece respirator

with dust, fume and mist cartridges (plus solvent protection during spray-coating applications).

Type 3 Operations, as defined in the MoL Guideline, applies to work that includes sandblasting of lead-containing coating; indoor welding or high-temperature cutting of lead-containing coating; outdoor high temperature cutting of material with lead-containing coating done in the course of dismantling or demolishing a machine, building, structure, or plant and burning of a surface with lead-containing coating. Type 3 work practices outline that warning signs, in sufficient numbers, must be posted to warn the public of the hazards. Before any indoor sandblasting operation is conducted, signs shall be posted at least at each entrance to the work area. For indoor or confined space burning, cutting or welding, local exhaust ventilation must be provided with sufficient velocity to capture fumes (minimum 0.5 cubic metres per second). Where local exhaust does not have HEPA filter, air must be discharged to the exterior. If local exhaust ventilation is not available, workers and all persons entering the work shall wear a positive pressure supplied air respirator. When cutting during demolition or burning outdoors, workers shall wear tight-fitting powered air purifying respirators (PAPR).

.3 The disposal of construction waste containing lead is controlled by the *Regulation Respecting Hazardous Materials (O.C. 1310-97)*, under the *Environmental Quality Act, R.S.Q., c. Q-2 - (21)*. The classification of the waste is dependent upon the result(s) of leachate test(s). The waste can be classified as "hazardous", "non-hazardous" or "registerable solid waste", depending on the results of the leachate test. Prior to disposal, the concentration of leachable lead must be determined for waste materials with elevated lead contents following the Toxicity Characteristic Leaching Procedure (TCLP).

3. MERCURY

The Québec *Regulation respecting Hazardous Materials (O.C. 1310-97)*, under the *Environmental Quality Act, R.S.Q., c. Q-2 - (21)* stipulates that fluorescent light tubes, in quantities where it is anticipated that a leachable extract could have a concentration higher than 0.1 mg/L or ppm, is considered hazardous waste and should be treated as such. Environment Canada states that a 2-8 foot lamp can contain between 10 and 50 ppm of mercury. Since the number of fluorescent light tubes

required to exceed the hazardous materials threshold for mercury leachate content is so low, as stipulated in this regulation, it is recommended that the regulation and its requirements be applied in all cases of fluorescent tube disposal.

Fluorescent lamp tubes are considered hazardous material in the Province of Québec and should be recycled if removed from service. For information regarding the collection of fluorescent lamp tubes, please consult the Departmental Representative.

Requirements for allowable mercury exposure levels, as outlined in *Regulation c. S-2.1, r. 11 of An Act respecting occupational health and safety*, must be met. The Time Weighted Average Exposure Values to mercury vapour should not exceed 0.025 milligram per cubic metre (mg/m³).

4. SILICA

The Québec *Regulation Respecting Occupational Health and Safety* defines crystalline silica in the form of respirable dust as a suspected carcinogen.

.1 Silica dust can be generated through such processes as blasting, grinding, crushing, and sandblasting silica-containing material. Since silica is presumed present in concrete, masonry, mortar and drywall within the project areas, appropriate respiratory protection and ventilation must be donned during the demolition and modifications of these structures, as per the "*Guide des appareils de protection respiratoire utilisés au Québec*", published by the *Institut de recherche Robert-Sauvé en santé et en sécurité du travail*. Personal protective equipment shall be selected, adjusted, used and cared for in accordance with the *CSA Standard Z94.4-93* entitled "*Selection, Use and Care of Respirators*".

.2 The exposure of workers to silica should be reduced to a minimum as defined under Schedule 1 of the Québec *Regulation Respecting Occupational Health and Safety*.

5. FOAMGLASS INSULATION

(NOT RECOGNIZED AS A DESIGNATED SUBSTANCE)

Appropriate work practices including adequate ventilation and respiratory protection must be utilized during the disturbance and/or removal of foamglass insulation.

Previous foamglass abatement operations with which DST have been involved have shown that given adequate ventilation of the work area and

proper foamglass removal technique (i.e. minimal disturbance/breaking/cutting) occupational exposure limits for hydrogen sulphide and carbon monoxide were not exceeded. However, DST recommends that precautions appropriate to the scope of demolition work be applied to foamglass demolition on a case-by-case basis as conditions may vary. Furthermore, workplan and monitoring plans specific to foamglass demolition should be prepared by appropriate Health and Safety professionals (e.g. Certified Industrial Hygienist) on a case-by-case basis.

6. GLYCOL

(NOT RECOGNIZED AS A DESIGNATED SUBSTANCE)

If any glycol is to be handled as part of this project, this material should be handled in accordance with the associated Material Safety Data Sheet (MSDS) for the project.

7. MICROBES

(NOT RECOGNIZED AS A DESIGNATED SUBSTANCE)

As per the PWGSC Standard MD 15161 – 2013 Control of Legionella in Mechanical Systems, Standard for Building Owners, Design Professionals, and Maintenance Personnel, 2013, “Components of HVAC systems that may have risks associated with Legionella include air filters, humidifiers, condensate pans, and any other areas where water may be present”. Should any standing water be present at the time of the Project, the above mentioned PWGSC standard should be consulted prior to work.

8. SCALE DEPOSITS

(NOT RECOGNIZED AS A DESIGNATED SUBSTANCE)

PPE such as protective clothing and respiratory protection should be considered if disturbance of the scale and rust produces significant amounts of particulates.

9. CONTRACTORS DUTIES

The contractor must review the designated substance report and take the necessary precautions to protect the health and safety of the workers and the environment. As per the Province of Québec’s *An Act Respecting Occupational Health and Safety* Section 51 whereby, “Every employer must take the necessary measures to protect and ensure the safety and physical well-being of his or

her worker. He/she must, in particular, (5) use methods and techniques intended for the identification, control and elimination of risks to the safety or health of the worker, (8) see that no contaminant emitted or dangerous substance used adversely affects the health or safety of any person at a workplace; and (13) give, to the workers, the health and safety committee, the certified association, the public health director and the Commission, the list of dangerous substances used in the establishment and of the contaminants that may be emitted.” In addition, section 300 (a) of the Québec Regulation respecting occupational health and safety, also states that before any work or task is carried out in an enclosed area, that the categories of contaminants likely to be present in the area need to be made available in writing. The party hiring the contractor (i.e., The Departmental Representative) shall ensure that the contractor and subcontractor (if any) for the project has received a copy of the designated substance report prior to entering a binding contract for the supply of work on the project. If you have any questions about the designated substance report, please contact the Departmental Representative.

END OF SECTION

PART 1 - GENERAL1.1 RELATED
REQUIREMENTS

- .1 Section 01 00 10 - General Instructions.

1.2 ADMINISTRATIVE

- .1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work.
- .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 the drawings and specifications. 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 drawings and specifications 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 The drawings and specifications is not relieved by Departmental Representative review.
- .10 Keep one reviewed copy of each submission on site.

1.3 SHOP DRAWINGS
AND PRODUCT DATA

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

- .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .9 After Departmental Representative's review, distribute copies.
- .10 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of project start up.
- .13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project complete with project name.
- .14 Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .15 Submit electronic copies of Manufacturer's Field

Reports for requirements requested in specification Sections and as requested by Departmental Representative.

- .16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .17 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .18 Delete information not applicable to project.
- .19 Supplement standard information to provide details applicable to project.
- .20 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .21 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that PWGSC 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 The drawings and specifications.
 - .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.

1.4 SAMPLES

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Departmental Representative's business address.
- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from

requirements of the drawings and specifications.

- .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 the value of Work. 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 the drawings and specifications.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.5 CERTIFICATES AND TRANSCRIPTS

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

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

PART 1 - GENERAL

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| <u>1.1 RELATED
REQUIREMENTS</u> | .1 | Section 01 00 10 - General Instructions. |
| | .2 | Section 01 14 25 - Designated Substances Report. |
| <u>1.2 REFERENCES</u> | .1 | Province of Quebec
.1 An Act respecting occupational health and
safety, L.R.Q. c.S-2.1.
.2 Safety code for the construction industry,
c.S-2.1,r.4. |
| <u>1.3 ACTION AND
INFORMATIONAL
SUBMITTALS</u> | .1 | Make submittals in accordance with Section 01 33 00 -
Submittal Procedures. |
| | .2 | Submit site-specific Health and Safety Plan: Within 7
days after date of Notice to Proceed and prior to
commencement of Work. Health and Safety Plan must
include:
.1 Results of site specific safety hazard
assessment.
.2 Results of safety and health risk or hazard
analysis for site tasks and operation found in work
plan. |
| | .3 | Submit a copy of Contractor's authorized
representative's work site health and safety
inspection reports to Departmental Representative
weekly. |
| | .4 | Submit copies of reports or directions issued by
Federal and Provincial health and safety inspectors. |
| | .5 | Submit copies of incident and accident reports within
24 hours. |
| | .6 | Submit WHMIS MSDS - Material Safety Data Sheets in
accordance with Section 01 00 10 - General
Instructions. |
| | .7 | Departmental Representative will review Contractor's
site-specific Health and Safety Plan and provide
comments to Contractor within 7 days after receipt of
plan. Revise plan as appropriate and resubmit plan to
Departmental Representative within 7 day s after
receipt of comments from Departmental Representative. |
| | .8 | Departmental Representative's review of Contractor's
final Health and Safety plan should not be construed
as approval and does not reduce the Contractor's |

overall responsibility for construction Health and Safety.

- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

1.4 FILING OF NOTICE

- .1 File Notice of Project with Provincial Authorities (CSST) prior to beginning of work.
- .2 File a written "Principal Contractor" acknowledgement letter within three (3) weeks of project award. This letter will acknowledge that the contractor will be responsible and assume the "Principal Contractor" role for this project and not the entire complex. Written acknowledgement shall be submitted to CSST along with the Notice of Project.

1.5 SAFETY ASSESSMENT

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

1.6 MEETINGS

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

1.7 PROJECT/SITE CONDITIONS

- .1 Work at site will involve contact with the following materials. Refer to Section 01 14 25 - Designated Substances Report.
 - .1 Lead.
 - .2 Mercury
 - .3 Silica
 - .4 Halocarbons.

1.8 GENERAL REQUIREMENTS

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

1.9 RESPONSIBILITY

- .1 Contractor shall be the "Principal Contractor" as described in the Quebec Act respecting occupational health and safety and the Safety Code for the

Construction Industry for only their scope and areas of work as defined and described within this project specification.

1.10 COMPLIANCE REQUIREMENTS

- .1 Comply with An Act respecting occupational health and safety, L.R.Q., c.S-2.1
- .2 Comply with Safety Code for the Construction Industry, c.S-2.1, r.4.
- .3 Comply with CAN/CSA, Z462-12 (Workplace Electrical Safety Standard)
- .4 Comply with CAN/CSA-Z460-05 (R2010) - Control of Hazardous Energy.

1.11 UNFORSEEN HAZARDS

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

1.12 RESERVED

1.13 POSTING OF DOCUMENTS

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

1.14 CORRECTION OF NON-COMPLIANCE

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

1.15 POWDER ACTUATED DEVICES

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

1.16 WORK STOPPAGE

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

PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

PART 1 - GENERAL

1.1 RELATED
REQUIREMENTS

- .1 Section 01 00 10 - General Instructions.

1.2 REFERENCES

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

1.3 QUALITY

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 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 the drawings and specifications.

1.4 STORAGE,
HANDLING AND
PROTECTION

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

1.5 TRANSPORTATION

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

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 value of the Work or schedule.

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.

1.7 CO-ORDINATION

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

1.9 CONCEALMENT

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

1.10 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.

1.11 LOCATION OF FIXTURES

- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

- .2 Inform Departmental Representative of conflicting installation. Install as directed.
- 1.12 FASTENINGS
- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.
- 1.13 FASTENINGS - EQUIPMENT
- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
- .3 Bolts may not project more than one diameter beyond nuts.
- .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.
- 1.14 PROTECTION OF WORK IN PROGRESS
- .1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Departmental Representative.
- 1.15 EXISTING UTILITIES
- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

PART 2 - PRODUCTS

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

<u>3.1 NOT USED</u>	.1	Not Used.
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PART 1 - GENERAL

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| <u>1.1 RELATED REQUIREMENTS</u> | .1 | Section 01 00 10 - General Instructions. |
| <u>1.2 REFERENCES</u> | .1 | Canadian Environmental Protection Act (CEPA)
.1 SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations. |
| <u>1.3 ADMINISTRATIVE REQUIREMENTS</u> | .1 | Pre-warranty Meeting:
.1 Convene meeting one week prior to project completion with Departmental Representative, in accordance with to:
.1 Verify Project requirements.
.2 Review manufacturer's installation instructions and warranty requirements.
.2 Departmental Representative to establish communication procedures for:
.1 Notifying construction warranty defects.
.2 Determine priorities for type of defects.
.3 Determine reasonable response time.
.3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
.4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action. |
| <u>1.4 ACTION AND INFORMATIONAL SUBMITTALS</u> | .1 | Provide submittals in accordance with Section 01 33 00 - Submittal Procedures. |
| | .2 | Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative , four final copies of operating and maintenance manuals in English. |
| | .3 | Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work. |
| | .4 | Provide evidence, if requested, for type, source and quality of products supplied. |
| <u>1.5 FORMAT</u> | .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.

1.6 CONTENTS - PROJECT RECORD DOCUMENTS

- .1 Table of Contents for Each Volume: provide title of project;
 - .1 Date of submission; names.
 - .2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
 - .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

1.7 AS -BUILT DOCUMENTS AND SAMPLES

- .1 Maintain, at site for Departmental Representative one record copy of:
 - .1 Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to the Work.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.

1.8 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

- .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 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 Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Drawings.
 - .7 References to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.

1.9 EQUIPMENT AND SYSTEMS

- .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 For each item of equipment and each system include description of unit or system, and component parts.
 - .1 Give function, normal operation characteristics and limiting conditions.
 - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
 - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
 - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

-
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
 - .14 Include test and balancing reports as specified.
 - .15 Additional requirements: as specified in individual specification sections.
- 1.10 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.
- 1.11 MAINTENANCE MATERIALS
-
- .1 Spare Parts:
 - .1 Provide spare parts, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to site; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.
 - .5 Obtain receipt for delivered products and submit prior to final payment.
 - .2 Extra Stock Materials:
 - .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to site; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.
 - .5 Obtain and submit receipt for delivered

products.

- .3 Special Tools:
 - .1 Provide special tools, in quantities specified in individual specification section.
 - .2 Provide items with tags identifying their associated function and equipment.
 - .3 Deliver to site; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.

1.12 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.

1.13 WARRANTIES

- .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, 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 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, to include HVAC balancing, pumps, motors, transformers, and commissioned systems such as fire protection, alarm systems, sprinkler systems, lightning protection 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.
 - .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 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.

1.14 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.

PART 1 - GENERAL

- | | | |
|--|----|--|
| 1.1 RELATED
<u>REQUIREMENTS</u> | .1 | Section 01 00 10 - General Instructions. |
| | .2 | Section 01 33 00 - Submittal Procedures. |
| 1.2 ADMINISTRATIVE
<u>REQUIREMENTS</u> | .1 | Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of substantial performance. |
| | .2 | Preparation:
.1 Verify conditions for demonstration and instructions comply with requirements.
.2 Verify designated personnel are present.
.3 Ensure equipment has been inspected and put into operation.
.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. |
| | .3 | 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. |
| 1.3 ACTION AND
INFORMATIONAL
<u>SUBMITTALS</u> | .1 | Provide submittals in accordance with Section 01 33 00 - Submittal Procedures. |
| | .2 | Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval. |
| | .3 | Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed. |
| | .4 | Give time and date of each demonstration, with list of persons present. |

- .5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.4 QUALITY ASSURANCE

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

PART 1 - GENERAL

1.1 SUMMARY

- .1 Section Includes:
 - .1 General requirements relating to commissioning of project's components and systems, specifying general requirements to PV of components, equipment, sub-systems, systems, and integrated systems.
- .2 Related Requirements
 - .1 Section 01 00 10 - General Instructions.
- .3 Acronyms:
 - .1 BMM - Building Management Manual.
 - .2 Cx - Commissioning.
 - .3 EMCS - Energy Monitoring and Control Systems.
 - .4 O&M - Operation and Maintenance.
 - .5 PI - Product Information.
 - .6 PV - Performance Verification.
 - .7 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 drawings and specifications and design criteria and intent.
 - .2 Ensure appropriate documentation is compiled into the BMM.
 - .3 Effectively train O&M staff.
- .2 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
 - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with the drawings and specifications and design criteria.
 - .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
- .3 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.

1.3 COMMISSIONING OVERVIEW

- .1 For Cx responsibilities refer to Section 01 91 33
- .2 Cx to be a line item of Contractor's cost breakdown.
- .3 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .4 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.
- .5 Departmental Representative will issue Interim Acceptance Certificate when:
 - .1 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.
 - .2 Equipment, components and systems have been commissioned.
 - .3 O&M training has been completed.

1.4 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

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

1.5 PRE-CX REVIEW

- .1 Before Construction:
 - .1 Review the drawings and specifications, confirm by writing to Departmental Representative.
 - .1 Adequacy of provisions for Cx.
 - .2 Aspects of design and installation pertinent to success of Cx.
- .2 During Construction:
 - .1 Co-ordinate provision, location and installation of provisions for Cx.
- .3 Before start of Cx:
 - .1 Have completed Cx Plan up-to-date.
 - .2 Ensure installation of related components,

equipment, sub-systems, systems is complete.

.3 Fully understand Cx requirements and procedures.

.4 Have Cx documentation shelf-ready.

.5 Understand completely design criteria and intent and special features.

.6 Submit complete start-up documentation to Departmental Representative.

.7 Have Cx schedules up-to-date.

.8 Ensure systems have been cleaned thoroughly.

.9 Complete TAB procedures on systems, submit TAB reports to Departmental Representative for review and approval.

.10 Ensure "As-Built" system schematics are available.

.4 Inform Departmental Representative in writing of discrepancies and deficiencies on finished works.

1.6 CONFLICTS

.1 Report conflicts between requirements of this section and other sections to Departmental Representative before start-up and obtain clarification.

.2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

1.7 ACTION AND INFORMATIONAL SUBMITTALS

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

.1 Submit no later than 4 weeks after project award:

.1 Name of Contractor's Cx agent.

.2 Draft Cx documentation.

.3 Preliminary Cx schedule.

.2 Request in writing to Departmental Representative for changes to submittals and obtain written approval at least 8 weeks prior to start of Cx.

.3 Submit proposed Cx procedures to Departmental Representative where not specified and obtain written approval at least 8 weeks prior to start of Cx.

.4 Provide additional documentation relating to Cx process required by Departmental Representative.

1.8 COMMISSIONING DOCUMENTATION

.1 Departmental Representative to review and approve Cx documentation.

.2 Provide completed and approved Cx documentation to Departmental Representative.

1.9 COMMISSIONING SCHEDULE

.1 Provide detailed Cx schedule as part of construction schedule.

.2 Provide adequate time for Cx activities prescribed in

technical sections and commissioning sections including:

- .1 Approval of Cx reports.
- .2 Verification of reported results.
- .3 Repairs, retesting, re-commissioning, re-verification.
- .4 Training.

1.10 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.

1.11 WITNESSING OF STARTING AND TESTING

- .1 Provide 14 days notice prior to commencement.
- .2 Departmental Representative to witness of start-up and testing.

1.12 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.

1.13 PROCEDURES

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

1.14 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.

1.15 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.

1.16 TEST RESULTS

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

1.17 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.

1.18 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.

1.19 COMMISSIONING
PERFORMANCE
VERIFICATION

- .1 Carry out Cx:
 - .1 Under actual operating conditions, over entire operating range, in all modes.
 - .2 On independent systems and interacting systems.

	.2	Cx procedures to be repeatable and reported results are to be verifiable.
	.3	Follow equipment manufacturer's operating instructions.
	.4	EMCS trending to be available as supporting documentation for performance verification.
<u>1.20 WITNESSING COMMISSIONING</u>	.1	Departmental Representative to witness activities and verify results.
<u>1.21 AUTHORITIES HAVING JURISDICTION</u>	.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.
<u>1.22 EXTRAPOLATION OF RESULTS</u>	.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.
<u>1.23 SUNDRY CHECKS AND ADJUSTMENTS</u>	.1	Make adjustments and changes which become apparent as Cx proceeds.
	.2	Perform static and operational checks as applicable and as required.
<u>1.24 DEFICIENCIES, FAULTS, DEFECTS</u>	.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.
<u>1.25 COMPLETION OF COMMISSIONING</u>	.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 Cx deliverables have been submitted and accepted by Departmental Representative.

1.26 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.

1.27 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

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

1.27 OCCUPANCY

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

1.29 INSTALLED INSTRUMENTATION

- .1 Use instruments installed under project for TAB and PV 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.

1.30 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.

1.31 OWNER'S PERFORMANCE TESTING

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

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL1.1 SUMMARY

- .1 Section Includes:
 - .1 Commissioning forms to be completed for equipment, system and integrated system.
- .2 Related Requirements:
 - .1 Section 01 91 13 - General Commissioning (CX) Requirements.

1.2 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.

1.3 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 Performance Verification (PV) of systems complete items on PI forms related to systems and obtain Departmental Representative's approval.

1.4 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.

1.5 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.

1.6 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.

1.7 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.

PART 2 - PRODUCTS

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

<u>3.1 NOT USED</u>	.1	Not Used.
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