

## **1 General**

### **1.1 WORK COVERED BY CONTRACT DOCUMENTS**

- .1 Work of this contract comprises supply and installation of equipment, devices, materials and labour required to replace the existing chiller and condenser units at the Government of Canada Building Regina, Saskatchewan.
- .2 Work is located at Government of Canada Building, 1975 Scarth Street, Regina.

### **1.2 CONTRACTOR USE OF PREMISES**

- .1 Co-ordinate use of premises under direction of Departmental Representative. The building is a Federal Government Heritage designated building. The historic front entry must not be used for any construction related activity.
- .2 Only the basement mechanical areas, subject to normal operational requirements, are available for general construction activities. All other areas of the building are only available to the Contractor where access is specifically required to complete the work. Obtain and pay for use of any additional off-site storage or work areas needed for completion of the work under this Contract.

### **1.3 DEPARTMENTAL REPRESENTATIVE OCCUPANCY**

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

## **2 Products**

Not Used.

## **3 Execution**

Not Used.

**END OF SECTION**

## **1 General**

### **1.1 EXISTING SERVICES**

- .1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions to a minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
- .3 Construct barriers in accordance with Section 01 56 00 – Temporary Barriers and Enclosures.

### **1.2 SITE ACCESS**

- .1 **ALL** people who will be accessing the site will be required to wear photo ID.
- .2 People without Departmental Representative Security Clearance Photo ID will not be granted access to the site.
- .3 Contractors will be escorted by security personnel each work day for the duration of the contract. Departmental Representative will coordinate and schedule security personnel, as well as bear the cost for this function. No work shall be executed outside of the jurisdiction of on-site security (no access to other parts of the building or site without approval).

### **1.3 HOURS OF WORK**

- .1 The construction on the project site will be performed during the full operation of the facilities. Project phasing must be planned to ensure that disruption to the daily operation of the facilities is kept to a minimum.
- .2 The work will be carried out during normal working hours, when the Building is fully occupied and operational.

### **1.4 FEDERAL GOVERNMENT HERITAGE DESIGNATED BUILDING**

- .1 The GOCB Regina building was constructed in 1935 and is a federal heritage property designated as “recognized” by the Federal Heritage Building Review Office (FHBRO). The work must comply with the Standards and Guidelines for the Conservation of Historic Places in Canada.

**2 Products**

Not Used.

**3 Execution**

Not Used.

**END OF SECTION**

## **1 General**

### **1.1 NOTICE**

- .1 The Contractor shall inform all construction personnel of security requirements and shall prominently display a copy of these requirements at the job site.
- .2 It will be responsibility of every construction employee to follow these requirements. Failure to do so will result in expulsion from the property.

### **1.2 SECURITY**

- .1 The Contractor is expected to become informed about the rules concerning security that the Departmental Representative has in place and follow those rules.
- .2 In carrying out the work, the Contractor shall co-operate with the Departmental Representative staff in matters affecting security.
- .3 Contractor to arrange for specific authorized security with Departmental Representative to enter computer room/informatics area.

### **1.3 SECURITY CLEARANCE**

- .1 All personnel employed on this project will be subject to a Departmental Representative Security Clearance check.
- .2 All personnel engaged in the execution of the work in an occupied Departmental Representative building shall have the requisite Departmental Representative Security Clearance check prior to the commencement of the on-site activities.
- .3 Immediately upon award of the contract, the Contractor shall prepare and submit the requisite forms, provided by the Departmental Representative, for each employee and subcontractor employee to be engaged in the work in a Departmental Representative occupied building. The Contractor shall mobilize on site, only once the Departmental Representative Facility Access has been granted.
- .4 The Contractor should batch the fully completed submissions, based on priority work on site and allow for an 12 working day processing time in the project schedule for the review to occur. The inability to submit the fully completed requisite forms will not be reason for an extension to the project schedule or additional compensation.
- .5 Contractor's personnel engaged in the work outside the normal working hours of Monday to Friday 06:00 to 16:30 must be escorted by the designate of the Departmental Representative. The designate will be at no cost to the Contractor.
- .6 The Contractor shall give the Departmental Representative 72 hours of notice for work to be carried out during periods outside of the above normal working hours.

**2 Products**

Not Used.

**3 Execution**

Not Used.

**END OF SECTION**

**1 General**

**1.1 APPLICATIONS FOR PROGRESS PAYMENT**

- .1 Submit to Departmental Representative, at least 14 days before first application for payment, a Cost Breakdown, in detail as directed by Departmental Representative , for parts of Work, aggregating total amount of Contract Price, so as to facilitate evaluation of applications for payment. Cost Breakdown will be used as basis for progress payments.
- .2 Support claims for products delivered to Place of Work but not yet incorporated into Work by such evidence as Departmental Representative may reasonably required to establish value and delivery of products.

**2 Products**

Not Used.

**3 Execution**

Not Used.

**END OF SECTION**

## **1 General**

### **1.1 ADMINISTRATIVE**

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

### **1.2 PRECONSTRUCTION MEETING**

- .1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Departmental Representative, Consultant, Contractor, major Sub-trades, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5 Agenda to include:
  - .1 Appointment of official representative of participants in the Work.
  - .2 Schedule of Work: in accordance with Section 01 32 16 - Construction Progress Schedules - Bar (GANTT) Chart.
  - .3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

- .4 Delivery schedule of specified equipment in accordance with Section 01 32 16.07.
- .5 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- .6 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
- .7 Departmental Representative provided products.
- .8 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .9 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
- .10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .11 Monthly progress claims, administrative procedures, photographs, hold backs.
- .12 Appointment of inspection and testing agencies or firms.
- .13 Insurances, transcript of policies.

**1.3 PROGRESS MEETINGS**

- .1 During course of Work and 2 weeks prior to project completion, schedule progress meetings weekly.
- .2 Contractor, major Sub-trades involved in Work, and Departmental Representative are to be in attendance.
- .3 Notify parties minimum 4 days prior to meetings.
- .4 Record minutes of meetings when directed by Departmental Representative and circulate to attending parties and affected parties not in attendance within 3 days after meeting.
- .5 Agenda to include the following:
  - .1 Review, approval of minutes of previous meeting.
  - .2 Review of Work progress since previous meeting.
  - .3 Field observations, problems, conflicts.
  - .4 Problems which impede construction schedule.
  - .5 Review of off-site fabrication delivery schedules.
  - .6 Corrective measures and procedures to regain projected schedule.
  - .7 Revision to construction schedule.

- .8 Progress schedule, during succeeding work period.
- .9 Review submittal schedules: expedite as required.
- .10 Maintenance of quality standards.
- .11 Review proposed changes for affect on construction schedule and on completion date.
- .12 Other business.

**2 Products**

Not Used.

**3 Execution**

Not Used.

**END OF SECTION**

## **1 General**

### **1.1 DEFINITIONS**

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

### **1.2 REQUIREMENTS**

- .1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.

- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative within 10 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

### **1.4 PROJECT MILESTONES**

- .1 Project milestones form interim targets for Project Schedule.
  - .1 Interim Certificate (Substantial Completion) within 120 working days of Award of Contract date.

### **1.5 MASTER PLAN**

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

### **1.6 PROJECT SCHEDULE**

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
  - .1 Award.
  - .2 Shop Drawings, Samples.
  - .3 Permits.
  - .4 Mobilization.
  - .5 Demolition.
  - .6 Piping.
  - .7 Controls.
  - .8 Air Conditioning.

- .9 Fire Systems.
- .10 Electrical.
- .11 Testing and Commissioning.
- .12 Supplied equipment long delivery items.

## **1.7 PROJECT SCHEDULE REPORTING**

- .1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

## **1.8 PROJECT MEETINGS**

- .1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.

## **2 Products**

Not Used.

## **3 Execution**

Not Used.

**END OF SECTION**

## **1 General**

### **1.1 ADMINISTRATIVE**

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

### **1.2 SHOP DRAWINGS AND PRODUCT DATE**

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .3 Allow 7 days for Departmental Representative's review of each submission.

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- .4 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
  - .5 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of any revisions other than those requested.
  - .6 Accompany submissions with transmittal letter containing:
    - .1 Date.
    - .2 Project title and number.
    - .3 Contractor's name and address.
    - .4 Identification and quantity of each shop drawing, product data and sample.
    - .5 Other pertinent data.
  - .7 Submissions shall include:
    - .1 Date and revision dates.
    - .2 Project title and number.
    - .3 Name and address of:
      - .1 Sub-trade.
      - .2 Supplier.
      - .3 Manufacturer.
    - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
    - .5 Details of appropriate portions of Work as applicable:
      - .1 Fabrication.
      - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
      - .3 Setting or erection details.
      - .4 Capacities.
      - .5 Performance characteristics.
      - .6 Standards.
      - .7 Operating weight.
      - .8 Wiring diagrams.
      - .9 Single line and schematic diagrams.
      - .10 Relationship to adjacent work.

- .8 After Departmental Representative's review, distribute copies.
- .9 Submit printer ready electronic copies of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .10 Submit printer ready 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.
- .11 Delete information not applicable to project.
- .12 Supplement standard information to provide details applicable to project.
- .13 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.
- .14 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept. This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting all requirements of construction and Contract Documents. Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of all sub trades.

### **1.3 CERTIFICATES AND TRANSCRIPTS**

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

### **2 Products**

Not Used.

### **3 Execution**

Not Used.

**END OF SECTION**

## **1 General**

### **1.1 SECTION INCLUDES:**

- .1 Health and safety considerations required to ensure that Departmental Representative shows due diligence towards health and safety on construction sites, and meets the requirements laid out in Departmental Representative/RPB Departmental Policy DP 073 - Occupational Health and Safety - Construction.

### **1.2 REFERENCES**

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  - .1 Material Safety Data Sheets (MSDS).
- .3 Province of Saskatchewan
  - .1 Occupational Health and Safety Act, 1993, S.S. 2005.

### **1.3 SUBMITTALS**

- .1 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.
- .2 Submit copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative.
- .3 Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.
- .4 Submit copies of incident and accident reports.
- .5 Submit WHMIS MSDS - Material Safety Data Sheets.
- .6 Departmental Representative will review Contractor's site specific Health and Safety Plan and provide comments to Contractor. Revise plan as appropriate and resubmit plan to Departmental Representative.
- .7 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

- .8 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.
- .9 On site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

#### **1.4 SAFETY ASSESSMENT**

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

#### **1.5 MEETINGS**

- .1 Schedule and administer Health and Safety meeting.

#### **1.6 GENERAL REQUIREMENTS**

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

#### **1.7 RESPONSIBILITY**

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

#### **1.8 COMPLIANCE REQUIREMENTS**

- .1 Comply with Occupational Health and Safety Regulations, 1996.
- .2 Comply with Occupational Health and Safety Act, General Safety Regulations, O.I.C.
- .3 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

## **1.9 UNFORESEEN 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.

## **1.10 HEALTH AND SAFETY COORDINATOR**

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Coordinator must:
  - .1 Have site related working experience specific to activities.
  - .2 Have working knowledge of occupational safety and health regulations.
  - .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
  - .4 Be responsible for implementing, enforcing daily and monitoring site specific Contractor's Health and Safety Plan.
  - .5 Be on site during execution of Work and report directly to and be under direction of site supervisor.

## **1.11 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.

## **1.12 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.

## **1.13 WORK STOPPAGE**

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

**2 Products**

Not Used.

**3 Execution**

- .1 Post signage at all entries to the basement mechanical work areas identifying that construction work is in progress and outlining minimum safety requirements required for access.
- .2 Place temporary warning signs at all entry points to areas where work is occurring in occupied portions of the building.

**END OF SECTION**

**1 General**

**1.1 FIRES**

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

**1.2 DISPOSAL OF WASTES**

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

**2 Products**

Not Used.

**3 Execution**

Not Used.

**END OF SECTION**

## **1 General**

### **1.1 INSPECTION**

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

### **1.2 PROCEDURES**

- .1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

### **1.3 REJECTED WORK**

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Departmental Representative.

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**1.4 REPORTS**

- .1 Submit print ready electronic copies of inspection and test reports to Departmental Representative.
- .2 Provide copies to Sub-trade of work being inspected or tested.

**1.5 TESTS**

- .1 Furnish test results as may be requested.

**1.6 EQUIPMENT AND SYSTEMS**

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

**2 Products**

Not Used.

**3 Execution**

Not Used.

**END OF SECTION**

## **1 General**

### **1.1 INSTALLATION AND REMOVAL**

- .1 Provide temporary utilities controls in order to execute work expeditiously. After use, remove from site.

### **1.2 TEMPORARY HEATING AND VENTILATION**

- .1 Ventilating:
  - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
  - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
  - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
  - .4 Ventilate storage spaces containing hazardous or volatile materials.
  - .5 Ventilate temporary sanitary facilities.
  - .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
- .2 Permanent heating system of building shall be used.

### **1.3 FIRE PROTECTION**

- .1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.
- .2 Burning rubbish and construction waste materials is not permitted on site.

## **2 Products**

Not Used.

## **3 Execution**

Not Used.

**END OF SECTION**

## **1 General**

### **1.1 INSTALLATION AND REMOVAL**

- .1 Provide construction facilities in order to execute work expeditiously.
- .2 Remove from site all such work after use.

### **1.2 SCAFFOLDING**

- .1 Provide and maintain ladders as required.

### **1.3 HOISTING**

- .1 Provide, operate and maintain hoists (cranes) required for moving of workers, materials and equipment. Make financial arrangements with Sub-trades for use thereof.
- .2 Hoists/cranes shall be operated by qualified operator.

### **1.4 SITE STORAGE/LOADING**

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.
- .3 Work laydown area will not be provided onsite. Provide suitable offsite storage of large construction equipment and arrange for delivery and transport of equipment when it can be set in its final location.

### **1.5 CONSTRUCTION PARKING**

- .1 Parking will not be provided on site.
- .2 Short term use of service parking areas will be permitted when available and as approved by the Departmental Representative.
- .3 If authorized to use existing service parking areas for access to project site, maintain such areas and make good damage resulting from Contractors' use.

### **1.6 SECURITY**

- .1 Security is provided by Departmental Representative personnel, at cost to Client.

**1.7 EQUIPMENT, TOOL AND MATERIALS STORAGE**

- .1 Provide and maintain, in a clean and orderly condition. Basement mechanical area agreed to by Departmental Representative for tools, equipment and materials.

**2 Products**

Not Used.

**3 Execution**

Not Used.

**END OF SECTION**

## **1 General**

### **1.1 INSTALLATION AND REMOVAL**

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

### **1.2 HOARDING**

- .1 Erect temporary site enclosures using 38 x 89 mm construction grade lumber framing at 600 mm centres and 1200 x 2400 x 13 mm exterior-grade fir plywood to CSA O121.
- .2 Apply plywood panels vertically, flush and butt jointed.

### **1.3 GUARD RAILS AND BARRICADES**

- .1 Provide secure barricades around open shafts or open edges of floors.
- .2 Provide as required by governing authorities.

### **1.4 DUST-TIGHT SCREENS**

- .1 Provide dust-tight screens 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 Screens shall be constructed of a minimum 6 mil poly secured to wood frame. Ensure exit access is maintained.

### **1.5 ACCESS TO SITE**

- .1 Provide and maintain access roads as may be required for access to Work.

### **1.6 FIRE ROUTES**

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

### **1.7 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY**

- .1 Protect surrounding property from damage during performance of Work. Be responsible for damage incurred.

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**1.8 PROTECTION OF BUILDING FINISHES**

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Confirm with Departmental Representative locations and installation schedule, three (3) days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

**2 Products**

Not Used.

**3 Execution**

Not Used.

**END OF SECTION**

## **1 General**

### **1.1 REFERENCE STANDARDS**

- .1 Within text of each specifications section, reference may be made to reference standards.
- .2 Conform to reference standards in whole or in part as specifically requested in specifications.
- .3 If there is question as to whether any product or system is in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .4 Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.
- .5 Conform to latest date of issue of referenced standards in effect on date of submission of Tenders, except where specific date or issue is specifically noted.

### **1.2 QUALITY**

- .1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 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.
- .3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

### **1.3 AVAILABILITY**

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

### **1.4 STORAGE, HANDLING AND PROTECTION**

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .4 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 Departmental Representative 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 may establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re installation at no increase in Contract Price or Contract Time.

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## **1.7 QUALITY OF WORK**

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

## **1.8 COORDINATION**

- .1 Ensure cooperation of workers in laying out Work. Maintain efficient/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. Coordinate 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 Spec. 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 any part of building. Do not cut, drill or sleeve any 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.

## **1.16 ACCEPTABLE PRODUCTS**

- .1 “Products”, for the purpose of this Contract, means material, machinery, equipment, and fixtures forming the Work but does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the Work and normally referred to as construction machinery and equipment.
- .2 Products listed as acceptable in various sections of the specifications are to be used as a guide and does not imply exclusion of unlisted products of equivalent type. Products believed to be of equivalent type are to have data sheets submitted to Departmental Representative for review. No product will be considered acceptable unless written approval is given by Departmental Representative.
- .3 “Acceptable Products” means that products named and specified by manufacturer’s reference meet the specification in all respects and are acceptable to the Departmental Representative.
- .4 Products other than those listed in the specifications as “acceptable products” must be same type as, be capable of performing same function as, and meet or exceed standards of quality and performance of named products, and must not require revisions to Contract Documents nor to work of others.

## **1.17 NO SUBSTITUTION**

- .1 All products listed as “No Substitution” in various sections are to be supplied as specified.

### **2 Products**

Not Used.

### **3 Execution**

Not Used.

**END OF SECTION**

## **1 General**

### **1.1 EXISTING SERVICES**

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.

### **1.2 QUALITY ASSURANCE – SITE VISIT**

- .1 Before tendering, the General Contractor and all sub-trades whose work may be affected by the physical properties of the site shall make an inspection, take all necessary levels, dimensions, and fully satisfy himself of all existing conditions affecting his operations. Failure to make such an inspection shall not relieve the Contractor or sub-trades of responsibility.

### **1.3 DISCREPENCIES, OMISSIONS**

- .1 Bidders finding discrepancies in, or omissions from, the Drawings or Specifications or other documents, or having doubt as to the meaning or intent of any part thereof, shall at once notify the Departmental Representative who will send written instructions or explanations to all Bidders. Should the Contractor fail to notify the Departmental Representative of discrepancies or omissions before the deadline date preceding the close of tenders, and then the Departmental Representative shall decide the materials to be supplied.
- .2 Amendments or corrections issued prior to the close of tenders shall form part of the Contract Documents.

### **1.4 LOCATION OF EQUIPMENT AND FIXTURES**

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

### **1.5 RECORDS**

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

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**1.6 SUBMITTALS**

- .1 On request of Departmental Representative, submit documentation to verify accuracy of field work.

**2 Products**

Not Used.

**3 Execution**

Not Used.

**END OF SECTION**

## **1 General**

### **1.1 SUBMITTALS**

- .1 Submit written request in advance of cutting or alteration which affects:
  - .1 Structural integrity of any element of Project.
  - .2 Integrity of weather exposed or moisture resistant elements.
  - .3 Efficiency, maintenance, or safety of any operational element.
  - .4 Visual qualities of sight exposed elements.
  - .5 Work of Departmental Representative or separate contractor.
- .2 Include in request:
  - .1 Identification of Project.
  - .2 Location and description of affected Work.
  - .3 Statement on necessity for cutting or alteration.
  - .4 Description of proposed Work, and products to be used.
  - .5 Alternatives to cutting and patching.
  - .6 Effect on Work of Departmental Representative or separate contractor.
  - .7 Written permission of affected separate contractor.
  - .8 Date and time work will be executed.

## **2 Products**

### **2.1 MATERIALS**

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

### **2.2 PREPARATION**

- .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering, inspect conditions affecting performance of Work.
- .3 Beginning of cutting or patching means acceptance of existing conditions.
- .4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

- .5 Provide protection from elements for areas which may be exposed by uncovering work; maintain excavations free of water.

### **3 Execution**

#### **3.1 EXECUTION**

- .1 Execute cutting, fitting, and patching to complete Work.
- .2 Fit several parts together, to integrate with other Work.
- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .7 Employ original installer to perform cutting and patching for weather exposed and moisture resistant elements, and sight exposed surfaces.
- .8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .9 Restore work with new products in accordance with requirements of Contract Documents.
- .10 Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .11 At penetration of fire-rated wall, ceiling, or floor construction, completely seal voids with fire-stopping material, full thickness of the construction element.
- .12 Refinish surfaces to match adjacent finishes: For continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.

**END OF SECTION**

## **1 General**

### **1.1 PROJECT CLEANLINESS**

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including other Contractors.
- .2 Remove waste materials from site at regularly scheduled times. Do not burn waste materials on site.
- .3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .4 Clear snow and ice from access to building, where Contractor access is provided to building.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Remove waste material and debris and deposit in waste container at end of each working day.
- .7 Dispose of waste materials and debris off site.
- .8 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.
- .9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

### **1.2 FINAL CLEANING**

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

- .4 Remove waste products and debris other than that caused by other Contractors.
- .5 Remove waste materials from site at regularly scheduled times. Do not burn waste materials on site.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Remove stains, spots, marks and dirt from electrical and mechanical fixtures.
- .8 Clean lighting reflectors, lenses, and other lighting surfaces.
- .9 Remove debris and surplus materials from work areas.

**2 Products**

Not Used.

**3 Execution**

Not Used.

**END OF SECTION**

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## **1 General**

### **1.1 SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 Submittal Procedures.
- .2 Submit before final payment summary of waste materials disposal by project using deconstruction/disassembly material audit form.
  - .1 Failure to submit could result in holdback of final payment.
  - .2 Provide receipts, scale tickets, waybills, and show quantities and types of materials disposed of.
  - .3 For each material land filled or incinerated from project, include amount in tonnes of material and identity of landfill.

### **1.2 WASTE PROCESSING SITES**

- .1 Name: City of Regina Landfill – telephone: 306-777-7690.

### **1.3 STORAGE, HANDLING AND PROTECTION**

- .1 Store, materials to be reused and salvaged in locations as directed by Departmental Representative.
- .2 Unless specified otherwise, materials for removal become Contractor's property.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non salvageable materials from salvaged items. Transport & deliver non salvageable items to licensed disposal facility.
- .5 Protect structural components not removed for demolition from movement or damage.
- .6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.
- .7 Protect surface drainage, mechanical and electrical from damage and blockage.
- .8 Separate and store materials produced during dismantling of structures in designated areas.

### **1.4 DISPOSAL OF WASTES**

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

- .3 Keep records of construction waste including:
  - .1 Number and size of bins.
  - .2 Waste type of each bin.
  - .3 Total tonnage generated.
- .4 Remove materials from deconstruction as deconstruction/disassembly work progresses.

## **1.5 USE OF SITE AND FACILITIES**

- .1 Execute work with least possible interference or disturbance to normal use of premises.
- .2 Maintain security measures established by existing facility.

## **1.6 SCHEDULING**

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

## **2 Products**

Not Used.

## **3 Execution**

### **3.1 APPLICATION**

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

### **3.2 CLEANING**

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

**3.3 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT**

.1 Schedule E Government Chief Responsibility for the Environment

<b>Province</b>	<b>Address</b>	<b>General Inquires</b>	<b>Fax</b>
Saskatchewan	Saskatchewan Environment and Resource Management, 3211 Albert Street, Regina, SK S4S 5W6	(306) 787-2700	(306) 787-3941

**END OF SECTION**

## **1 General**

### **1.1 INSPECTION AND DECLARATION**

- .1 Contractor's Inspection: Contractor and all Sub-trades shall conduct an inspection of Work, identify deficiencies/defects, and repair as required to conform to Contract Documents.
  - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
  - .2 Request Departmental Representative's Inspection.
- .2 Departmental Representative's Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.
- .3 Completion: submit written certificate that following have been performed:
  - .1 Work has been completed and inspected for compliance with Contract Documents.
  - .2 Defects have been corrected and deficiencies have been completed.
  - .3 Equipment and systems have been tested, adjusted and are fully operational.
  - .4 Certificates required by Technical Safety Authority, Fire Commissioner, Corrections, Public Safety, and Policing have been submitted.
  - .5 Operation of systems have been demonstrated to Departmental Representative's personnel.
  - .6 Work is complete and ready for Final Inspection.
- .4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative and Contractor. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.
- .5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance.
- .6 Commencement of Lien and Warranty Periods: date of Departmental Representative's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

- .7 Final Payment: When Departmental Representative considers final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.
- .8 Payment of Holdback: After issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback amount.

**2 Products**

Not Used.

**3 Execution**

Not Used.

**END OF SECTION**

## **1 General**

### **1.1 SUBMISSION**

- .1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .2 Copy will be returned after final inspection, with Departmental Representative's comments.
- .3 Revise content of documents as required prior to final submittal.
- .4 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four (4) final copies of Operating and Maintenance Manuals in English.
- .5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.
- .6 If requested, furnish evidence as to type, source and quality of products provided.
- .7 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .8 Pay costs of transportation.

### **1.2 FORMAT**

- .1 Organize data in the form of an instructional manual.
- .2 Binders: vinyl, hard covered, three (3) D-ring, loose leaf, with spine and face pockets.
- .3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.
- .4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content using Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

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### **1.3 CONTENTS – EACH VOLUME**

- .1 Table of Contents:
  - .1 Title of project.
  - .2 Date of submission.
  - .3 Names, addresses, and telephone numbers of Engineer and Contractor with name of responsible parties.
  - .4 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 clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions as specified in Section 01 45 00 – Quality Control.

### **1.4 AS-BUILTS**

- .1 In addition to requirements in General Conditions, maintain at the site for Engineer, one (1) record copy of:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Change Orders and other modifications to the Contract.
  - .5 Reviewed shop drawings, product data, and samples.
  - .6 Field test records.
  - .7 Inspection certificates.
  - .8 Manufacturer's certificates.
- .2 Store record documents in field office apart from documents used for construction. 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. Label each document "PROJECT RECORD" in neat, large, printed letters.

- .4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Engineer.
- .6 Supplement hard copy manual with print ready electronic copy of all shop drawings, project reports, and record drawings.

## **1.5 RECORDING ACTUAL SITE CONDITIONS**

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

## **1.6 EQUIPMENT AND SYSTEMS**

- .1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

- .2 Panelboard 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. Include regulation, control, stopping, shut down, and emergency instructions. 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 coordination drawings, with installed colour-coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00 – Quality Control.

## **1.7 WARRANTIES AND BONDS**

- .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
- .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
- .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.
- .4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.

- .5 Verify that documents are in proper form, contain full information, and are notarized.
- .6 Co-execute submittals when required.
- .7 Retain warranties and bonds until time specified for submittal.

**2 Products**

Not Used.

**3 Execution**

Not Used.

**END OF SECTION**

## **1 General**

### **1.1 DESCRIPTION**

- .1 Demonstrate operation and maintenance of equipment and systems to Departmental Representative's personnel prior to date of substantial performance.
- .2 Departmental Representative will provide list of personnel to receive instructions, and will co-ordinate their attendance at agreed upon times.

### **1.2 QUALITY CONTROL**

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

### **1.3 SUBMITTALS**

- .1 Submit schedule of time and date for demonstration of each item of equipment and each system prior to designated dates. Submit reports after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .2 Give time and date of each demonstration, with list of persons present.

### **1.4 CONDITIONS FOR DEMONSTRATIONS**

- .1 Equipment has been inspected and put into operation.
- .2 Testing and adjusting has been performed and equipment and systems are fully operational.
- .3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

### **1.5 PREPARATION**

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

### **1.6 DEMONSTRATION AND INSTRUCTIONS**

- .1 Demonstrate start up, operation, control, adjustment, trouble shooting, servicing, and maintenance of each item of equipment at scheduled times, at the equipment location.
- .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.

- .3 Review contents of manual in detail to explain aspects of operation and maintenance.
- .4 Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instructions.

**2 Products**

Not Used.

**3 Execution**

Not Used.

**END OF SECTION**

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## **1 General**

### **1.1 QUALITY ASSURANCE**

- .1 Provide testing organization services under provisions specified in Section 01 45 00 - Quality Control.
- .2 Comply with applicable procedures and standards of the certification sponsoring association.
- .3 Perform services under direction of supervisor qualified under certification requirements of sponsoring association.

### **1.2 SUBMITTALS**

- .1 Prior to start of Work, submit name of organization proposed to perform services. Designate who has managerial responsibilities for coordination of entire testing, adjusting and balancing.
- .2 Submit documentation to confirm organization compliance with quality assurance provision.
- .3 Submit three (3) preliminary specimen copies of each of report forms proposed for use.
- .4 Fifteen (15) days prior to Substantial Performance, submit three (3) copies of final reports on applicable forms.

### **1.3 PROCEDURES – GENERAL**

- .1 Comply with procedural standards of certifying association under whose standard services will be performed.
- .2 Notify Departmental Representative three (3) days prior to beginning of operations.
- .3 Accurately record data for each step.
- .4 Report to Departmental Representative any deficiencies or defects noted during performance of services.

### **1.4 FINAL REPORTS**

- .1 Organization having managerial responsibility shall make reports.
- .2 Ensure each form bears signature of recorder, and that of supervisor of reporting organization.
- .3 Identify each instrument used, and latest date of calibration of each.

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**1.5 CONTRACTOR RESPONSIBILITIES**

- .1 Prepare each system for testing.
- .2 Cooperate with testing organization and provide access to equipment and systems.
- .3 Provide personnel and operate systems at designated times, and under conditions required for proper testing and adjusting.
- .4 Notify testing organization seven (7) days prior to time project will be ready for testing, and adjusting.

**1.6 PREPARATION**

- .1 Provide instruments required for testing and adjusting.
- .2 Verify systems installation is complete and in continuous operation.

**2 Products**

Not Used.

**3 Execution**

Not Used.

**END OF SECTION**

## **1 General**

### **1.1 SUMMARY**

- .1 Related Sections:
  - .1 Section 01 91 00 – Commissioning.
  - .2 Section 01 91 33 - Commissioning Forms.
  - .3 Section 01 91 41- Commissioning: Training.
  - .4 Section 23 05 93 – Testing, Adjusting, Balancing for HVAC.
  - .5 Section 23 08 01 – Performance Verification of Mechanical Piping Systems.

### **1.2 REFERENCES**

- .1 Departmental Representative
  - .1 Departmental Representative - Commissioning Guidelines CP.4 -3rd edition.
- .2 Underwriters' Laboratories of Canada (ULC).

### **1.3 GENERAL**

- .1 Acronyms:
  - .1 Cx - Commissioning.
  - .2 BMM - Building Management Manual.
  - .3 EMCS - Energy Monitoring and Control Systems.
  - .4 MSDS - Material Safety Data Sheets.
  - .5 PI - Product Information.
  - .6 CV – Component Verification.
  - .7 PV - Performance Verification.
  - .8 TAB - Testing, Adjusting and Balancing.
  - .9 WHMIS - Workplace Hazardous Materials Information System.
- .2 The purpose of this Cx Plan is to ensure that a fully functional facility, meeting the following general requirements, is provided:
  - .1 Systems, equipment and components meet user's functional requirements before date of acceptance, and operate consistently at peak efficiencies and within specified energy budgets under normal loads.
  - .2 O&M personnel have been fully trained in aspects of installed systems.
  - .3 Complete documentation relating to installed equipment and systems.

- .3 This Cx Plan:
  - .1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.
  - .2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.
  - .3 Sets out deliverables relating to O&M, process and administration of Cx.
  - .4 Describes process which verifies that built works meet Departmental Representative's design requirements.
  - .5 Produces a complete functional system prior to issuance of Certificate of Occupancy.
  - .6 Is a management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:
    - .1 Overview of Cx.
    - .2 General description of elements that make up Cx Plan.
    - .3 Process and methodology for successful Cx.
- .4 Commissioning terms used in this Section:
  - .1 Bumping: short term start-up to prove ability to start and prove correct rotation.
  - .2 Deferred Cx - Cx activities delayed for reasons beyond Contractor's control due to lack of occupancy, weather conditions, need for heating/cooling loads.

#### **1.4 DEVELOPMENT OF 100% CX PLAN**

- .1 The 100% Complete revision of this Cx Plan shall take into account:
  - .1 Approved shop drawings and product data.
  - .2 Approved changes to contract.
  - .3 Contractor's project schedule.
  - .4 Cx schedule.
  - .5 Contractor's, subcontractor's, suppliers' requirements.
  - .6 Project construction team's and Cx team's requirements.
- .2 Upon completion, the Cx Plan shall be submitted to the Departmental Representative for written approval.

#### **1.5 REFINEMENT OF CX PLAN**

- .1 During construction phase this Cx Plans shall be revised, refined and updated to include:
  - .1 Changes resulting from Client program modifications.
  - .2 Approved design and construction changes.

- .2 Revise, refine and update every 6 months during construction phase. At each revision, indicate revision number and date.
- .3 Submit each revised Cx Plan to Departmental Representative for review and obtain written approval.

## **1.6 COMPOSITION, ROLES AND RESPONSIBILITIES OF CX TEAM**

- .1 Departmental Representative to maintain overall responsibility for project and is sole point of contact between members of Cx Team.
- .2 Project Manager will select Cx Team consisting of following members:
  - .1 Departmental Representative Design Quality Review Team: during construction, will conduct periodic site reviews to observe general progress.
  - .2 Departmental Representative Quality Assurance Commissioning Manager: ensures Cx activities are carried out to ensure delivery of a fully operational project including:
    - .1 Review of Cx documentation from operational perspective.
    - .2 Review for performance, reliability, durability of operation, accessibility, maintainability, efficiency under conditions of operation.
    - .3 Protection of health, safety and comfort of occupants and O&M personnel.
    - .4 Monitoring of Cx activities, training, development of Cx documentation.
    - .5 Work closely with members of Cx Team.
  - .3 Departmental Representative is responsible for:
    - .1 Organizing Cx.
    - .2 Monitoring operations Cx activities.
    - .3 Witnessing, certifying accuracy of reported results (discretionary).
    - .4 Witnessing and certifying TAB and other tests (discretionary).
    - .5 Ensuring implementation of final Cx Plan.
    - .6 Ensuring performance verification of installed systems and equipment is completed.
  - .4 Design-Builder consists of two groups, each with designated but overlapping responsibilities:
    - .1 Design Consultants: Engineer and/or Departmental Representative(s) of Record are responsible for:
      - .1 Preparing all working construction documents including specification of commissioning activities.

- .2 Organizing, monitoring, witnessing, and certifying the accuracy of reported commissioning results.
- .3 Witnessing and certifying TAB.
- .4 Ensuring the implementation of this Cx plan.
- .5 Implementing training plan.
- .2 Construction Team: Contractor, sub-trades, suppliers and support disciplines are responsible for construction/installation in accordance with the contract documents, including:
  - .1 Testing.
  - .2 TAB.
  - .3 Completion and delivery of all required Cx documentation, including component verification (CV) sheets, and performance verification tests (PVTs).
  - .4 Delivery of training.
  - .5 The Contractor shall assign on person to be the point of contact with the Design Consultant(s) and Departmental Representative Cx Manager, for administrative and coordination purposes.
- .5 Contractor's Cx Agent is responsible for implementing all specified Cx activities including:
  - .1 Development of Cx Schedule(s).
  - .2 Demonstrations.
  - .3 Training.
  - .4 Testing.
  - .5 Preparation, submission of test reports.
- .6 Property Manager: represents lead role in Operation Phase and onwards and is responsible for:
  - .1 Receiving facility.
  - .2 Day-To-Day operation and maintenance of facility.
- .7 Independent Commissioning Agent (Site Advisory Consultant) shall be responsible for:
  - .1 Final compilation of this Cx Plan.
  - .2 Review and comment CVs and PVT submitted by Design-Builder.
  - .3 Observing the quality and progress of the construction with respect to contract documents and the Cx schedule.
  - .4 Monitoring and reporting on contract commissioning activities.
  - .5 Recommend of substantial completion acceptance.

## 1.7 CX PARTICIPANTS

- .1 Employ the following Cx participants to verify performance of equipment and systems as indicated:
  - .1 Installing contractor:
    - .1 Equipment and systems except as noted.
  - .2 Equipment manufacturer shall be responsible for:
    - .1 equipment specified to be installed and started by manufacturer, and shall include:
  - .3 Contractor's specialist sub-trade:
    - .1 equipment and systems supplied and installed by specialist sub-trade.
  - .4 Specialist Cx agency:
    - .1 Possessing specialist qualifications and installations providing environments essential to client's program but are outside scope or expertise of Cx agents on this project.
  - .5 Contractor's TAB agency:
    - .1 Equipment and systems involving the measurement and adjusting of flow rates and pressures to meet indicated or specified values (e.g. including, but not limited to, ducted air and hydronic system, fans, pumps).
  - .6 Departmental Representative:
    - .1 Responsible for intrusion and access security systems.
- .2 Each Cx participant will:
  - .1 have a work force sufficient to complete work (including all necessary remedial work) within scheduled time frame,
  - .2 be Available for emergency and troubleshooting service during first year of occupancy by user for adjustments and modifications outside responsibility of O&M personnel, including:
    - .1 Modify ventilation rates to meet changes in off-gassing.
    - .2 Changes to heating or cooling loads beyond scope of EMCS.
    - .3 Changes to EMCS control strategies beyond level of training provided to O&M personnel.
    - .4 Redistribution of electrical services.
    - .5 Modifications of fire alarm systems.
    - .6 Modifications to voice communications systems.
- .3 Contractor shall provide names of Cx participants to Departmental Representative, and details of instruments and procedures to be followed for Cx, at least 1 month prior to starting date of Cx, for review and approval.

## **1.8 EXTENT OF CX**

- .1 Ventilation systems:
  - .1 Exhaust fans.
  - .2 Boiler room ventilation system.
- .2 Refrigeration systems:
  - .1 Chillers.
  - .2 Condensers.
  - .3 Chilled water pumping.
- .3 Noise and vibration control systems for mechanical systems.
- .4 EMCS.
- .5 Commission electrical systems and equipment:

## **1.9 DELIVERABLES RELATING TO O&M PERSPECTIVES**

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

## **1.10 DELIVERABLES RELATING TO THE CX PROCESS**

- .1 General:
  - .1 Start-up, testing and Cx requirements, conditions for acceptance and specifications form part of relevant technical sections of these specifications.
- .2 Definitions:
  - .1 Cx as used in this section includes:
    - .1 Cx of components, equipment, systems, subsystems, and integrated systems.

- .2 Factory inspections and performance verification tests as required.
- .3 Deliverables: provide:
  - .1 Cx Specifications.
  - .2 Startup, pre-Cx activities and documentation for systems, and equipment.
  - .3 Completed installation checklists (ICL).
  - .4 Completed product information (PI) report forms.
  - .5 Completed performance verification test (PVT) report forms.
  - .6 Results of PVTs and Inspections.
  - .7 Description of Cx activities and documentation.
  - .8 Description of Cx of integrated systems and documentation.
  - .9 Tests witnessed by Departmental Representative Design Quality Review Team:
  - .10 Tests performed by Departmental Representative/User.
  - .11 Training Plans.
  - .12 Cx Reports.
  - .13 Prescribed activities during warranty period.
- .4 Departmental Representative to witness and certify tests and reports on results provided.

## **1.11 PRE-CX ACTIVITIES AND RELATED DOCUMENTATION**

- .1 Items listed in this Cx Plan include the following:
  - .1 Pre-Start-Up inspections: by Design Consultant(s).
    - .1 Prior to permission to start up, rectification of deficiencies to satisfaction of Designer and Commissioning Manager.
    - .2 Design Consultant(s) to use approved check lists.
    - .3 Departmental Representative will monitor some of these pre-start-up inspections.
    - .4 Include completed documentation with Cx report.
  - .2 Conduct pre-start-up tests: conduct pressure, static, flushing, cleaning, and "bumping" during construction as specified in technical sections.
    - .1 Departmental Representative will monitor some of these inspections and tests.
    - .2 Include completed documentation in Cx report.
- .2 Pre-Cx activities - MECHANICAL:
  - .1 Pumping systems:
    - .1 "Bump" each item of equipment in its "stand-alone" mode.

- .2 Complete pre-start-up checks and complete relevant documentation.
- .3 After equipment has been started, test related systems in conjunction with control systems on a system-by-system basis.
- .2 Ventilation equipment and systems:
  - .1 "Bump" each item of equipment in its "stand-alone" mode.
  - .2 At this time, complete pre-start-up checks and complete relevant documentation.
  - .3 After equipment has been started, test related systems in conjunction with control systems on a system-by-system basis.
  - .4 Perform TAB on systems. TAB reports to be approved by Design Consultant.
- .3 Refrigeration equipment and systems:
  - .1 At this time, complete pre-start-up checks and complete relevant documentation.
  - .2 After equipment has been started, test related systems in conjunction with control systems on a system-by-system basis.
  - .3 Perform TAB on systems. TAB reports to be approved by Design Consultant.
- .4 EMCS:
  - .1 EMCS trending to be available as supporting documentation for performance verification.
  - .2 Perform point-by-point testing in parallel with start-up.
  - .3 Carry out point-by-point verification.
  - .4 Demonstrate performance of systems, to be witnessed by Design Consultant and Commissioning Manager prior to start of 30-day Final Acceptance Test period.
  - .5 Final Cx and operational tests to be completed during the demonstration period and the 30-day test period.
  - .6 The only additional testing after the foregoing have been successfully completed shall be the "Off-Season Tests".
- .3 Pre-Cx activities - ELECTRICAL:
  - .1 Low voltage distribution systems under 750 V:
    - .1 Perform pre- energization and post-energization tests.

## **1.12 START-UP**

- .1 Start-up of components, equipment and systems shall be by Contractor.
  - .1 Equipment manufacturer, supplier, installing specialist sub-trade, as appropriate, to start-up, under Contractor's direction.
- .2 Departmental Representative to monitor some of these start-up activities.

- .1 Rectify start-up deficiencies to satisfaction of Departmental Representative.
- .3 Performance Verification (PV):
  - .1 Approved Cx Agent to perform.
    - .1 Repeat when necessary until results are acceptable to Departmental Representative.
    - .2 Use generic procedures modified to suit project requirements.
    - .3 Departmental Representative to witness and certify reported results using approved PI and PV forms.
    - .4 Design Consultant to approve completed PV reports and provide to Departmental Representative.
    - .5 Departmental Representative reserves right to verify reported results at random at no cost to contract.
    - .6 Failure of randomly selected item shall result in rejection of PV report or report of system startup and testing.

#### **1.13 CX ACTIVITIES AND RELATED DOCUMENTATION**

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

#### **1.14 CX OF INTEGRATED SYSTEMS AND RELATED DOCUMENTATION**

- .1 Cx to be performed by specified Cx specialist, using procedures developed by Design-Builder and approved by Departmental Representative.
- .2 Tests to be witnessed by Departmental Representative and documented on approved report forms.
- .3 Upon satisfactory completion, Cx specialist to prepare Cx Report, to be certified by Design Consultant and submitted to Departmental Representative for review.
- .4 Departmental Representative reserves right to verify percentage of reported results at no cost to contract.
- .5 Integrated systems to include:

- .1 Fans and associated systems forming part of integrated ventilation systems.
- .2 Chillers, condensers and associated systems forming part of integrated refrigeration system.
- .6 Identification:
  - .1 In later stages of Cx, before hand-over and acceptance, Departmental Representative, Contractor, Project Manager, Property Manager, and Cx Manager to co-operate to complete inventory data sheets and provide assistance to Departmental Representative in full implementation of MMS identification system of components, equipment, sub-systems, systems.

#### **1.15 INSTALLATION CHECK LISTS (ICL)**

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms.

#### **1.16 PRODUCT INFORMATION (PI) REPORT FORMS**

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms.

#### **1.17 COMPONENT VERIFICATION (CV) FORMS**

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms.

#### **1.18 PERFORMANCE VERIFICATION (PV) REPORT**

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms.

#### **1.19 DELIVERABLES RELATING TO ADMINISTRATION OF CX**

- .1 General:
  - .1 This Cx Plan will be revised to include provisions for testing all parameters to the full range of operating conditions and to check responses of all such equipment and systems under all conditions.
  - .2 Detailed requirements relating to the timing of the various commissioning activities relative to the commissioning of other systems will be included in the commissioning specifications.
- .2 CX SCHEDULES
  - .1 A detailed Cx Schedule will be prepared by the Contractor's Cx Agent and submit to Departmental Representative for review and approval same time as project Construction Schedule.
  - .2 After Approval, incorporate Cx Schedule into Construction Schedule.
  - .3 The Design Consultant, the Contractor, and the Independent Commissioning Agent will monitor progress of Cx against this schedule.
  - .4 A separate detailed schedule in day-by-day format will be provided by the Contractor for Cx of all components, equipment, subsystems, systems, and

integrated systems. This schedule will include a detailed training schedule so as to demonstrate that there will be no conflicts with testing.

- .5 The Cx Schedule will include the following milestones:
  - .1 Design criteria, design intents.
  - .2 Cx agents' credentials: 60 days before start of Cx.
  - .3 Cx procedures: 3 months after award of contract.
  - .4 Cx Report format: 3 months after contract award.
  - .5 Submission of list of instrumentation with relevant certificates: 21 days before start of Cx.
  - .6 Notification of intention to start TAB: 21 days before start of TAB.
  - .7 TAB: after successful start-up, correction of deficiencies and verification of normal and safe operation.
  - .8 Notification of intention to start Cx: 14 days before start of Cx.
  - .9 Notification of intention to start Cx of integrated systems: after Cx of related systems is completed 14 days before start of integrated system Cx.
  - .10 Identification of deferred Cx.
  - .11 Implementation of training plans.
  - .12 Cx reports: immediately upon successful completion of Cx.
  - .13 6 months in Cx schedule for verification of performance in all seasons and wear conditions.

### .3 CX SCHEDULES FOR MECHANICAL SYSTEMS

- .1 The schedule of Cx activities will be produced in a bar chart format to a scale that will ensure legibility. This bar chart will show sequences of testing equipment and systems, interrelationship between tests, and duration of tests and training periods. It will also show commissioning resources which will be committed to this projects to ensure completion by prescribed dates.
- .2 Ventilation systems:
  - .1 Ventilation systems will be initially started up, “bumped” in a stand-alone mode and pre-start-up inspections completed.
  - .2 Ventilation systems will be started only after all dust-producing construction procedures have been completed and all areas are dust-free.

- .3 The ventilation systems will be operated so as to permit TAB and to ensure full compliance with contract documents.
- .3 Refrigeration systems:
  - .1 Chilled water system will be filled, pumps “bumped” in a stand-alone mode and pre-start-up inspections completed.
  - .2 They will be commissioned only after the water quality has been verified.
- .4 EMCS:
  - .1 Testing and commissioning will be outlined in the EMCS specifications and conditions for acceptance will be clearly defined therein.
  - .2 Point-by-point and end-to-end testing will be carried out by the installing Contractor, monitored by the Designer and verified as part of the system verification.
  - .3 Demonstration of operation of all systems under all operating conditions and over the full operating range will take place prior to the 30-day test period and will be witnessed by the Design Consultant and Departmental Representative.
  - .4 EMCS programming and operation will be verified after HVAC systems have been TAB’d and will include the 30-day test period.
- .5 Integrated Systems:
  - .1 Performance of all ventilation systems, refrigeration, and EMCS, forming part of integrated systems will be verified after all systems have been TAB’d to ensure full compliance with prescribed requirements.
- .6 Final commissioning activities:
  - .1 Upon completion of commissioning to the satisfaction of the Commissioning Manager, all control devices will be locked in their final positions, settings will be indelibly marked and included in TAB and PV reports.

**1.20 CX REPORTS**

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

**1.21 ACTIVITIES DURING WARRANTY PERIOD**

- .1 Cx activities must be completed before issuance of Interim Certificate, it is anticipated that certain Cx activities may be necessary during Warranty Period, including:
  - .1 Fine tuning of ventilation and refrigeration systems.
  - .2 Adjustment of ventilation rates to ensure room temperature and gas concentration limits are maintained.
  - .3 Calibration of temperature and gas monitoring devices.

**1.22 TRAINING PLANS**

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

**1.23 FINAL SETTINGS**

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

**2 Products**

Not Used.

**3 Execution**

Not Used.

**END OF SECTION**

## **1 General**

### **1.1 SUMMARY**

- .1 Section Includes:
  - .1 Commissioning forms to be completed for equipment, system and integrated system.
- .2 Related Sections:
  - .1 Section 01 91 31 – Commissioning (Cx) Plan.

### **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) 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 COMPONENT VERIFICATION (CV) FORMS**

- .1 CV forms are developed by the Design-Builder and used to monitor and track the status of components, as indicated on the shop drawings, and the respective installation requirements associated with each component.
- .2 The Design-Builder must verify that the components being installed in the built works are acceptable to their design, and as per the approved shop drawings.

#### **1.5 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.

#### **1.6 SAMPLES OF COMMISSIONING FORMS**

- .1 Design-Builder will develop and provide project-specific Commissioning forms to Departmental Representative for Contractor in electronic format complete with specification data.
- .2 Contractor shall revise items on Commissioning forms to suit project requirements.
- .3 Samples of Commissioning forms and a complete index of produced to date will be provided.

#### **1.7 CHANGES AND DEVELOPMENT OF NEW 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.

#### **1.8 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.

**1.9 LANGUAGE**

- .1 English.

**2 Products**

Not Used.

**3 Execution**

**3.1 SAMPLE SYSTEM PERFORMANCE VERIFICATION FORMS**

- .1 Sample commissioning forms as follows:

**SYSTEM PERFORMANCE VERIFICATION  
 FORM**

**FAN VERIFICATION  
 FORM**

Date: \_\_\_\_\_

**Equipment ID** \_\_\_\_\_

**Equipment Data:** \_\_\_\_\_ **Location**  
**Data**

Manufacturer: \_\_\_\_\_ Building: \_\_\_\_\_

Model Number: \_\_\_\_\_ Area: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Floor: \_\_\_\_\_

Room: \_\_\_\_\_

**Operation**

		Specified	Shop	Installed	Verified
Airflow Rate	Supply				
	Return				
External Static Pressure	Supply				
	Return				
Volts/Amps/Phase	Supply				
	Return				
Rotation Direction	Supply				
	Return				

**Inspection**

**Check List:**

**Belts:**

- Size \_\_\_\_\_ Clean
- Quantity  Not Damaged
- Tensioned  Service Space
- Alignment  Lubricated:
- Product

**Dampers:**

- Size  x
- Seals
- Operation – Close
- - Open

**Operating Controls:**

Start / Stop From \_\_\_\_\_

Test:  \_\_\_\_\_

**Comments**


Sign Off

\_\_\_\_\_  
 Contractor

\_\_\_\_\_  
 Engineer

\_\_\_\_\_  
 Owner

**SYSTEM PERFORMANCE VERIFICATION FORM**

**4 MOTORIZED DAMPER**

**Equipment ID**

MD - \_\_\_\_\_

**Equipment Data:**

Manufacturer: \_\_\_\_\_

Model Number: \_\_\_\_\_

\_\_\_\_\_  
 Serial Number: \_\_\_\_\_

**Location Data:**

Building: \_\_\_\_\_

Area: \_\_\_\_\_

Floor: \_\_\_\_\_

Room: \_\_\_\_\_

**Operation:**

	Normal Condition	Alternate Condition	Remarks
Airflow			
Static Pressure Drop			

**Inspection Check List:**

Dampers

- Size   x
- Seals
- Operation – close
- – open

Operating Controls

- Open/Close from \_\_\_\_\_
- Test
- 

Clean

Not Damaged

Service Space

Comments


Sign Off

\_\_\_\_\_  
 Contractor                                      Engineer                                      Owner

**SYSTEM PERFORMANCE VERIFICATION  
 FORM**

***CHILLER VERIFICATION  
 FORM***

Date: \_\_\_\_\_

**Equipment ID** \_\_\_\_\_  
**Equipment Data:** \_\_\_\_\_ **Location**  
**Data**

Manufacturer: \_\_\_\_\_ Building: \_\_\_\_\_  
 Model Number: \_\_\_\_\_ Area: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_ Floor: \_\_\_\_\_  
 Room: \_\_\_\_\_

Operation

		Specified	Shop Drawings/	Installed	Verified By:
Chilled Water					
Chilled Water Temp.	Entering				
	Leaving				
Chilled Water Pressure	Entering				
	Leaving				
Refrigerant Pressure at	Inlet				
	Discharge				
Refrigerant Temp. at	Inlet				
	Discharge				
Refrigerant Pressure at	Liquid				
	Gas				
Refrigerant Temp. at	Liquid				
	Gas				
Volts					

Full Load Amps					
Hertz (VFD only)					

Inspection

Check List:

Belts:

- Size \_\_\_\_\_ Clean
  - Quantity  Not Damaged
  - Tensioned  Service Space
  - Alignment  Lubricated:
- Product

Dampers:

- Size  x
- Seals
- Operation – Close
- - Open

Operating Controls:

Start / Stop From \_\_\_\_\_

Test:  \_\_\_\_\_

Comments


Sign Off

\_\_\_\_\_  
Contractor

\_\_\_\_\_  
Engineer

\_\_\_\_\_  
Owner

**SYSTEM PERFORMANCE VERIFICATION  
 FORM**

**CONDENSER VERIFICATION  
 FORM**

Date: \_\_\_\_\_

**Equipment ID** \_\_\_\_\_

**Equipment Data:** \_\_\_\_\_ **Location**  
**Data**

Manufacturer: \_\_\_\_\_ Building: \_\_\_\_\_

Model Number: \_\_\_\_\_ Area: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Floor: \_\_\_\_\_

Room: \_\_\_\_\_

**Operation**

		Specified	Shop Drawings/	Installed	Verified By:
Ambient Temp.					
Circuit #1 Temp.	Gas				
	Liquid				
Circuit #1 Pressure	Gas				
	Liquid				
Circuit #2 Temp.	Gas				
	Liquid				
Circuit #2 Pressure	Gas				
	Liquid				
Circuit #3 Temp.	Gas				
	Liquid				
Circuit #3 Pressure	Gas				
	Liquid				
Circuit #4 Temp.	Gas				
	Liquid				
Circuit #4 Pressure	Gas				
	Liquid				
Volts					
Full Load Amps					
Hertz (VFD only)					

**Inspection**

Check List:

Belts:

- Size \_\_\_\_\_
- Quantity
- Tensioned
- Alignment

- Clean
- Not Damaged
- Service Space
- Lubricated:
- Product

Dampers:

- Size 

--

 x 

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- Seals
- Operation – Close 

--
- - Open 

--

Operating Controls:

Start / Stop From \_\_\_\_\_  
Test: 

--

 \_\_\_\_\_

Comments


Sign Off

\_\_\_\_\_  
Contractor

\_\_\_\_\_  
Engineer

\_\_\_\_\_  
Owner

**END OF SECTION**

## **1 General**

### **1.1 SUMMARY**

- .1 Section Includes:
  - .1 This Section specifies roles and responsibilities of Commissioning Training.
- .2 Related Sections:
  - .1 Section 01 91 31 – Commissioning (Cx) Plan.

### **1.2 TRAINEES**

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

### **1.3 INSTRUCTORS**

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

### **1.4 TRAINING OBJECTIVES**

- .1 Training to be detailed and duration to ensure:
  - .1 Safe, reliable, cost-effective, energy-efficient operation of systems in normal and emergency modes under all conditions.
  - .2 Effective on-going inspection, measurements of system performance.

- .3 Proper preventive maintenance, diagnosis and trouble-shooting.
- .4 Ability to update documentation.
- .5 Ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives.

## **1.5 TRAINING MATERIALS**

- .1 Instructors to be responsible for content and quality.
- .2 Training materials to include:
  - .1 "As-Built" Contract Documents.
  - .2 Operating Manual.
  - .3 Maintenance Manual.
  - .4 Management Manual.
  - .5 TAB and PV Reports.
- .3 Project Manager, Commissioning Manager and Facility Manager will review training manuals.
- .4 Training materials to be in a format that permits future training procedures to same degree of detail.
- .5 Supplement training materials:
  - .1 Transparencies for overhead projectors.
  - .2 Multimedia presentations.
  - .3 Manufacturer's training videos.
  - .4 Equipment models.

## **1.6 SCHEDULING**

- .1 Include in Commissioning Schedule time for training.
- .2 Deliver training during regular working hours, training sessions to be not more than 3 hours in length.
- .3 Training to be completed prior to acceptance of facility.

## **1.7 RESPONSIBILITIES**

- .1 Be responsible for:
  - .1 Implementation of training activities.
  - .2 Coordination among instructors.
  - .3 Quality of training, training materials.

- .2 Departmental Representative will evaluate training and materials.
- .3 Upon completion of training, provide written report, signed by Instructors, witnessed by Departmental Representative.

## **1.8 TRAINING CONTENT**

- .1 Training to include demonstrations by Instructors using the installed equipment and systems.
- .2 Content includes:
  - .1 Review of facility and occupancy profile.
  - .2 Functional requirements.
  - .3 System philosophy, limitations of systems and emergency procedures.
  - .4 Review of system layout, equipment, components and controls.
  - .5 Equipment and system start-up, operation, monitoring, servicing, maintenance and shut-down procedures.
  - .6 System operating sequences, including step-by-step directions for starting up, shut-down, operation of valves, dampers, switches, adjustment of control settings and emergency procedures.
  - .7 Maintenance and servicing.
  - .8 Trouble-shooting diagnosis.
  - .9 Inter-Action among systems during integrated operation.
  - .10 Review of O&M documentation.
- .3 Provide specialized training as specified in relevant Technical Sections of the construction specifications.

## **1.9 VIDEO-BASED TRAINING**

- .1 Manufacturer's videotapes to be used as training tool with Departmental Representative's review and written approval 3 months prior to commencement of scheduled training.
- .2 On-Site training videos:
  - .1 Videotape training sessions for use during future training.
  - .2 To be performed after systems are fully commissioned.
  - .3 Organize into several short modules to permit incorporation of changes.
- .3 Production methods to be high quality.

**2**            **Products**  
                 Not Used.

**3**            **Execution**  
                 Not Used.

**END OF SECTION**