

**Part 1 General**

**1.1 WORK COVERED BY CONTRACT DOCUMENTS**

- .1 Work of this Contract comprises general construction and renovation of the Emerson Port of Entry commercial, office and warehouse facility, including (but not limited to) a new warehouse building addition , new PIL booths, PIL canopy, Tertiary Garage, Emergency Generator, commercial vehicle lanes and truck parking, staff parking lot and all associated infrastructure works located at Emerson, Manitoba; and further identified as EPOE.

**1.2 CONTRACT METHOD**

- .1 Construct Work under single, stipulated price contract.

**1.3 WORK SEQUENCE**

- .1 Construct Work in stages to accommodate Owner's continued use of premises during construction. In particular, the following uses must be provided
  - 1. Uninterrupted CBSA Port of Entry operations.
  - 2. Full staff parking must be available throughout the process of construction.
  - 3. Area to accommodate parking for 6 semi-trailer trucks must be available and accessible throughout construction process.
- .2 Identify construction phases on Construction Progress Schedule. Co-ordinate Progress Schedule with owner occupancy during construction.
- .3 Potential phases: Refer to drawing G1.1 CONSTRUCTION PHASING
  - .1 Phase 1: Deconstruct and relocate storage buildings. Begin site preparation for new staff parking area.
  - .2 Phase 2: Construct south roadworks and new staff parking area (Note this phase may be combined with Phase 1).
  - .3 Phase 3: Demolition existing staff parking area and construct new warehouse addition and PIL booth foundations.
  - .4 Phase 4: Construct new Canopy and begin site preparation for north site works.
  - .5 Phase 5: Install PIL Booths 7, 8 & 9. Complete interior renovations to existing exam area.
  - .6 Phase 6: Complete north site works including utilities, site lighting, drainage, paved commercial parking, barriers and roadworks.
  - .7 Phase 7: Commission PIL lanes and commercial vehicle parking.
  - .8 Phase 8: Deconstruct PIL Booth 6 and foundations. Install new PIL Booth 6.
- .4 Construct Work in stages to provide for continuous port operations.
- .5 Maintain fire access/control at all times.

**1.4 CONTRACTOR USE OF PREMISES**

- .1 Restricted use of site and premises as directed by Contract Documents until Substantial Performance.

- .2 Limit use of premises for Work, for storage, and for access, to allow:
  - .1 Owner occupancy.
  - .2 Public usage.
- .3 Co-ordinate use of premises with Owner.
- .4 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .5 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .6 Repair or replace portions of existing work which have been altered during construction operations to match adjoining work.
- .7 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

#### **1.5 OWNER OCCUPANCY**

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

#### **1.6 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING**

- .1 Execute work with least possible interference or disturbance to building operations, occupants, public and normal use of premises.

#### **1.7 EXISTING SERVICES**

- .1 Notify, Owner 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 notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to pedestrian vehicular traffic and tenant operations.
- .3 Provide alternative routes for personnel, pedestrian and vehicular traffic.
- .4 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.
- .5 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .6 Provide temporary services to maintain critical building and tenant systems.

- .7 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .8 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by the Authorities Having Jurisdiction.
- .10 Record locations of maintained, re-routed and abandoned service lines.
- .11 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

**1.8 DOCUMENTS REQUIRED**

- .1 Maintain at job site, one copy each document as follows:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Reviewed Shop Drawings.
  - .5 List of Outstanding Shop Drawings.
  - .6 Change Orders.
  - .7 Other Modifications to Contract.
  - .8 Field Test Reports.
  - .9 Copy of Approved Work Schedule.
  - .10 Health and Safety Plan and Other Safety Related Documents.
  - .11 Other documents as specified.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**Part 1            General**

- .1     Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

**1.2                USE OF SITE AND FACILITIES**

- .1     Execute work with least possible interference or disturbance to normal use of premises.
- .2     Maintain existing services to building and provide for personnel and vehicle access.
- .3     Where security is reduced by work, provide temporary means to maintain security.
- .4     Closures: protect work temporarily until permanent enclosures are completed.

**1.3                ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING**

- .1     Execute work with least possible interference or disturbance to building operations occupants, public and normal use of premises.

**1.4                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.
- .3     Provide for personnel and pedestrian and vehicular traffic.
- .4     Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

**1.5                SPECIAL REQUIREMENTS**

- .1     Carry out noise generating Work Monday to Friday from 2400 to 0700 hours and on Saturdays, Sundays and statutory holidays from 1800 to 0700 hours if necessary.
- .2     Submit schedule in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANNT) Chart.
- .3     Ensure that Contractor personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .4     Keep within limits of work and avenues of ingress and egress.
- .5     Ingress and egress of Contractor vehicles at site is to be controlled in accordance with Contract Documents.

- .6 Personnel will be checked daily at start of work shift and provided with pass which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.

**1.6 SECURITY ESCORT**

- .1 Personnel employed on this project must be escorted when executing work in secure areas during normal working hours.
- .2 Submit an escort request to Departmental Representative at least 14 days before service is needed. Cost incurred by late request will be Contractor's responsibility.

**1.7 BUILDING SMOKING ENVIRONMENT**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1            Project Supplementary Conditions

**1.2                CASH ALLOWANCES**

- .1            Include in Contract Price specified cash allowances.
- .2            Cash allowances, unless otherwise specified, cover net cost to Contractor services, products, construction machinery and equipment, freight, handling, unloading, storage, installation and other authorized expenses incurred in performing Work.
- .3            Contract Price, and not cash allowance, includes Contractor's overhead and profit in connection with such cash allowance.
- .4            Contract Price will be adjusted by written order to provide for excess or deficit to each cash allowance.
- .5            Where costs under a cash allowance exceed amount of allowance, Contractor will be compensated for excess incurred and substantiated plus allowance for overhead and profit as set out in Contract Documents.
- .6            Include progress payments on accounts of work authorized under cash allowances in Consultant's monthly certificate for payment.
- .7            Prepare schedule jointly with Departmental Representative, Consultant and Contractor to show when items called for under cash allowances must be authorized by Consultant for ordering purposes so that progress of Work will not be delayed.
- .8            Amount of each allowance, for Work specified in respective specification Sections is as follows:
  - .1            Include allowance of \$ 100,000 for purchase of Manitoba Hydro transformer modifications and 25 KV line re-location as noted on Electrical drawings.

**END OF SECTION**

**Part 1            General**

**1.1                ADMINISTRATIVE**

- .1     Schedule and administer project meetings throughout the progress of the work.
- .2     Prepare agenda for meetings.
- .3     Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative.
- .4     Provide physical space and make arrangements for meetings.
- .5     Preside at meetings.
- .6     Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7     Distribute copies of minutes within three days after meetings to Departmental Representative for review. Following approval from Departmental Representative, and distribute to meeting participants.
- .8     Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

**1.2                PRECONSTRUCTION MEETING**

- .1     Within 7 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 (including Project Manager as well as Site Superintendent), major Subcontractors, field inspectors and supervisors will be in attendance.
- .3     Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4     Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5     Agenda to include:
  - .1     Appointment of official representative of participants in the Work.
  - .2     Construction Progress Schedule: in accordance with Section 01 32 16.07.
  - .3     Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
  - .4     Commissioning.
  - .5     Green Globes requirements and submittals.
  - .6     Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.

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

### **1.3 PROGRESS MEETINGS**

- .1 During course of Work, schedule progress meetings every two weeks.
- .2 Contractor's Project Manager and Site Superintendant, major Subcontractors involved in Work, Consultant(s), and Departmental Representative are to be in attendance.
- .3 Notify parties minimum 5 days prior to meetings.
- .4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within three 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 Construction Safety Report.
  - .4 Field observations, problems, conflicts.
  - .5 Problems which impede construction schedule.
  - .6 Review of off-site fabrication delivery schedules.
  - .7 Corrective measures and procedures to regain projected schedule.
  - .8 Revision to construction schedule.
  - .9 Progress schedule, during succeeding work period.
  - .10 Review submittal schedules: expedite as required.
  - .11 Commissioning.
  - .12 Update of Green Globes requirements and submittals.
  - .13 Maintenance of quality standards.
  - .14 Review proposed changes for effect on construction schedule and on completion date.
  - .15 Other business.

**Part 2**            **Products**

**2.1**                **NOT USED**

.1                  Not Used.

**Part 3**            **Execution**

**3.1**                **NOT USED**

.1                  Not Used.

**END OF SECTION**

## **Part 1 General**

### **1.1 DEFINITIONS**

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

### **1.4 PROJECT MILESTONES**

- .1 Project milestones provide interim targets for Project Schedule.
  - .1 Mobilization to site within 20 working days of Award of Contract Date.
  - .2 Interim Certificate (Substantial Completion) to be determined during the Project Start-up Meeting.

### **1.5 MASTER PLAN**

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 Identify Project Phases and duration of each. Refer to Section 01 11 00 – Summary of Work.
- .2 Departmental Representative will review and return revised schedules within 5 working days.
- .3 Revise 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 and Project Phasing.
- .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 Excavation.
  - .6 Backfill.
  - .7 Building footings.
  - .8 Structural Steel.
  - .9 Siding and Roofing.
  - .10 Interior Architecture
  - .11 PIL booths
  - .12 Signage

- .13 Paving
- .14 Plumbing
- .15 Lighting
- .16 Electrical
- .17 Controls
- .18 Heating, Ventilating, and Air Conditioning
- .19 Millwork
- .20 Fire Systems
- .21 Testing and Commissioning
- .22 Supplied equipment long delivery items
- .23 Substantial Completion
- .24 Warranty Inspection

**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.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                ADMINISTRATIVE**

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

**1.2                SHOP DRAWINGS:**

- .1        The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2        Submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in Province of Manitoba, Canada.
- .3        Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which

- adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 10 working days for Departmental Representative's review of each submission.
  - .5 Adjustments made on shop drawings by Departmental Representative not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
  - .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
  - .7 Accompany submissions with transmittal letter, containing:
    - .1 Date.
    - .2 Project title and number.
    - .3 Contractor's name and address.
    - .4 Identification and quantity of each shop drawing, product data and sample.
    - .5 Other pertinent data.
  - .8 Submissions include:
    - .1 Date and revision dates.
    - .2 Project title and number.
    - .3 Name and address of:
      - .1 Subcontractor.
      - .2 Supplier.
      - .3 Manufacturer.
    - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
    - .5 Details of appropriate portions of Work as applicable:
      - .1 Fabrication.
      - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
      - .3 Setting or erection details.
      - .4 Capacities.
      - .5 Performance characteristics.
      - .6 Standards.
      - .7 Operating weight.
      - .8 Wiring diagrams.
      - .9 Single line and schematic diagrams.
      - .10 Relationship to adjacent work.
  - .9 After Departmental Representative's review, distribute copies.
  - .10 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

- .11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
  - .2 Testing must have been within 3 years of date of contract award for project.
- .13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
  - .2 Certificates must be dated after award of project contract complete with project name.
- .14 Submit electronic copies of manufacturer's instructions for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .16 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .17 Delete information not applicable to project.
- .18 Supplement standard information to provide details applicable to project.
- .19 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.
- .20 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.
  - .1 This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of

responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

- .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

### **1.3 SAMPLES**

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

### **1.4 MOCK-UPS**

- .1 If mock-ups are requested, erect in accordance with 01 45 00 - Quality Control.
- .2 Reference related Specification Sections for mock-up requirements.

### **1.5 PROGRESS PHOTOGRAPHS**

- .1 Submit 24 or more monthly digital progress photographs with captions indicating construction progress since the previous submission.
  - .1 Upload photos to File Transfer (Internet) site and store each month's upload in a separate folder.

### **1.6 CERTIFICATES AND TRANSCRIPTS**

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

**Part 2            Products**

**2.1                NOT USED**

.1                Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1                Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1            Manual of Uniform Traffic Control Devices for Streets and Highways – 2002 (UTCD).

**1.2                PROTECTION OF PUBLIC TRAFFIC**

- .1            Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.
- .2            When working on travelled way:
  - .1            Place equipment in position to present minimum of interference and hazard to travelling public.
  - .2            Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.
  - .3            Do not leave equipment on travelled way overnight.
- .3            Do not close any lanes of road without approval of Departmental Representative. Before re-routing traffic erect suitable signs and devices in accordance with instructions contained in Part D of UTCD.
- .4            Keep travelled way graded, free of pot holes and of sufficient width for required number of lanes of traffic.
  - .1            Provide minimum 7 m wide temporary roadway for traffic in two-way sections through Work and on detours.
  - .2            Provide minimum 5 m wide temporary roadway for traffic in one-way sections through Work and on detours.
- .5            As indicated, provide paved detours or temporary roads to facilitate passage of traffic around restricted construction area:
  - .1            Do grading for detour in accordance with Section 31 24 13 - Roadway Embankments.
  - .2            Place and compact granular sub-base in accordance with Section 32 11 16.01 - Granular Sub-base.
  - .3            Place and compact granular base in accordance with Section 32 11 23 - Aggregate Base Courses.
  - .4            Place and compact asphalt concrete pavement in accordance with Section 32 12 16 - Asphalt Paving.
  - .5            Place and compact mixed-in-place asphalt paving in accordance with Section 32 12 16.16 - Road Mix Asphalt Paving.
- .6            Provide and maintain road access and egress to property fronting along Work under Contract and in other areas as indicated, unless other means of road access exist that meet approval of Departmental Representative.

### **1.3 INFORMATIONAL AND WARNING DEVICES**

- .1 Provide and maintain signs, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.
- .2 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in Part D, Temporary Conditions Signs and Devices, of UTCD manual.
- .3 Place signs and other devices in locations recommended in UTCD manual.
- .4 Meet with Departmental Representative prior to commencement of Work to prepare list of signs and other devices required for project. If situation on site changes, revise list to approval of Departmental Representative.
- .5 Continually maintain traffic control devices in use by:
  - .1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.
  - .2 Removing or covering signs which do not apply to conditions existing from day to day.

### **1.4 CONTROL OF PUBLIC TRAFFIC**

- .1 Provide competent flag persons, trained in accordance with, and properly equipped as specified in, UTCD manual in following situations:
  - .1 When public traffic is required to pass working vehicles or equipment that block all or part of travelled roadway.
  - .2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.
  - .3 When workmen or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.
  - .4 Where temporary protection is required while other traffic control devices are being erected or taken down.
  - .5 For emergency protection when other traffic control devices are not readily available.
  - .6 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.
  - .7 Delays to public traffic due to contractor's operators: maximum 15 minutes.
- .2 Where roadway, carrying two-way traffic, is restricted to one lane, for 24 hours each day, provide portable traffic signal system. Adjust, as necessary, and regularly maintain system during period of restriction. Signal system to meet requirements of Part IV of Manual of Uniform Traffic Control Devices for Streets and Highways.

### **1.5 OPERATIONAL REQUIREMENTS**

- .1 Maintain existing conditions for traffic throughout period of contract except that, when required for construction under contract and when measures have been taken as specified and approved by Departmental Representative to protect and control public traffic.

- .2 Maintain existing conditions for traffic crossing right-of-way.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1        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 Manitoba
  - .1        The Workers Compensation Act RSM 1987 - Updated 2006.
  - .2        Occupational Health and Safety Act, 1993, S.S. 2005.

**1.2                SUBMITTALS**

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

**1.3 FILING OF NOTICE**

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

**1.4 SAFETY ASSESSMENT**

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

**1.5 REGULATORY REQUIREMENTS**

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

**1.6 GENERAL REQUIREMENTS**

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

**1.7 RESPONSIBILITY**

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

**1.8 COMPLIANCE REQUIREMENTS**

- .1 Comply with The Workers Compensation Act, Workplace Safety Regulation, Manitoba.
- .2 Comply with Occupational Health and Safety Regulations, 1996.
- .3 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

**1.9 UNFORSEEN HAZARDS**

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

**1.10 HEALTH AND SAFETY CO-ORDINATOR**

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
  - .1 Have working knowledge of occupational safety and health regulations.
  - .2 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.

- .3 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

**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, and in consultation with Departmental Representative.

**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.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 Definitions:
  - .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.
  - .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.
- .2 Reference Standards:
  - .1 Green Globes for New Buildings in Canada.
    - .1 Green Globes for new Construction – Technical Manual 2015
    - .2 ANSI/GBI 01-2020: Green Building Assessment Protocol for Commercial Buildings.
  - .2 U.S. Environmental Protection Agency (EPA)/Office of Water
    - .1 EPA 832/R-92-005-92, Storm Water Management for Construction Activities, Chapter 3.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures
- .2 Prior to commencing construction activities or delivery of materials to site, provide Environmental Protection Plan for review and approval by Departmental Representative.
- .3 Ensure Environmental Protection Plan includes comprehensive overview of known or potential environmental issues to be addressed during construction.
- .4 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .5 Include in Environmental Protection Plan:
  - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
  - .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
  - .3 Names and qualifications of persons responsible for training site personnel.
  - .4 Descriptions of environmental protection personnel training program.
  - .5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting

- requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .6 Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
  - .7 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Ensure plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.
  - .8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Ensure plan includes measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.
  - .9 Spill Control Plan including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
  - .10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
  - .11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.
  - .12 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
  - .13 Waste Water Management Plan identifying methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.
  - .14 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.
  - .15 Pesticide treatment plan to be included and updated, as required.

### **1.3 FIRES**

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

### **1.4 DRAINAGE**

- .1 Provide Erosion and Sediment Control Plan identifying type and location of erosion and sediment controls provided. Ensure plan includes monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.

- .3 Provide temporary drainage and pumping required to keep excavations and site free from water.
- .4 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.
- .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

## **1.5 SITE CLEARING AND PLANT PROTECTION**

- .1 Protect trees and plants on site and adjacent properties as indicated.
- .2 Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2m minimum.
- .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .4 Minimize stripping of topsoil and vegetation.
- .5 Restrict tree removal to areas indicated or designated by Departmental Representative.

## **1.6 POLLUTION CONTROL**

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 Control emissions from equipment and plant to local authorities' emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.
  - .1 Provide temporary enclosures where directed by Departmental Representative.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

## **1.7 MOULD MITIGATION**

- .1 Protect all building materials made of organic material or those that could absorb moisture are protected in transit and at the construction site from contact with moisture and from collecting organic matter such as leaves, soil or insects.

## **1.8 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)**

- .1 Contractor is to document the following EMS elements prior to and during construction:
  - .1 General Contractor's Environmental Policy.
  - .2 Regulatory Compliance and Training.
  - .3 Environmental Risk Assessment that shows sensitive environmental areas and ranks potential risks that may arise as a result of the construction.

- .4 Environmental Risk Management strategies.
- .5 Environment Management roles, responsibilities and reporting structure for the construction phase.
- .6 Site and Work instructions for site personnel outlining environmental procedures during construction.
- .7 Environmental Inspection Checklist.
- .8 Records of Compliance.

## **1.9 HISTORICAL/ARCHAEOLOGICAL CONTROL**

- .1 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative.

## **1.10 NOTIFICATION**

- .1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
  - .1 Do not take action until after receipt of written approval by Departmental Representative.
- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

## **1.11 EROSION AND SEDIMENTATION CONTROL**

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

## **1.12 CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

**Part 2            Products**

**2.1                NOT USED**

.1                Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1                Not Used.

**END OF SECTION**

**Part 1           General**

**1.1               REFERENCES AND CODES**

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

**1.2               HAZARDOUS MATERIAL DISCOVERY**

- .1     Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify Departmental Representative.
- .2     PCB: Polychlorinated Biphenyl: stop work immediately when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Departmental Representative.
- .3     Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Departmental Representative.

**1.3               BUILDING SMOKING ENVIRONMENT**

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

**Part 2           Products**

**2.1               NOT USED**

- .1     Not Used.

**Part 3           Execution**

**3.1               NOT USED**

- .1     Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                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.
- .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 will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.
- .5        All testing required to meet specifications is Quality Control (QC) testing to be conducted by contractor. Contractor will engage certified material testing laboratory. Include cost in related unit price items and lump price. No separate cost will be paid for quality control testing.

**1.2                INDEPENDENT INSPECTION AGENCIES**

- .1        Departmental Representative may engage an independent certified testing laboratory to conduct random Quality Assurance (QA) testing. Departmental Representative will pay directly to the lab for this testing
- .2        Provide equipment required for executing inspection and testing by appointed agencies.
- .3        Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4        If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection.

**1.3                ACCESS TO WORK**

- .1        Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2        Co-operate to provide reasonable facilities for such access.

#### **1.4 PROCEDURES**

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

#### **1.5 REJECTED WORK**

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

#### **1.6 REPORTS**

- .1 Submit electronic copies of inspection and test reports to Departmental Representative.
- .2 Provide copies to subcontractor of work being inspected or tested and manufacturer or fabricator of material being inspected or tested.

#### **1.7 TESTS AND MIX DESIGNS**

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

#### **1.8 MILL TESTS**

- .1 Submit mill test certificates as required by Contract Documents.

#### **1.9 EQUIPMENT AND SYSTEMS**

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

**Part 2            Products**

**2.1                NOT USED**

.1                Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1                Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                SUBMITTALS**

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

**1.2                INSTALLATION AND REMOVAL**

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

**1.3                DEWATERING**

- .1        Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

**1.4                WATER SUPPLY**

- .1        Continuous supply of potable water is available for construction use without disturbing CBSA operations. Connections and disconnections are by Contractor at their own expense.

**1.5                TEMPORARY HEATING AND VENTILATION**

- .1        Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2        Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.
- .3        Provide temporary heat and ventilation in enclosed areas as required to:
  - .1        Facilitate progress of Work.
  - .2        Protect Work and products against dampness and cold.
  - .3        Prevent moisture condensation on surfaces.
  - .4        Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
  - .5        Provide adequate ventilation to meet health regulations for safe working environment.
- .4        Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.
- .5        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.
- .6 Permanent heating system of building, not to be used when available. Be responsible for damage to heating system if use is permitted.
- .7 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
  - .1 Conform with applicable codes and standards.
  - .2 Enforce safe practices.
  - .3 Prevent abuse of services.
  - .4 Prevent damage to finishes.
  - .5 Vent direct-fired combustion units to outside.
- .8 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

## **1.6 TEMPORARY POWER AND LIGHT**

- .1 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.
- .2 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.
- .3 Departmental Representative may permit connection to existing power supply in accordance with Canadian Electrical Code without disturbing CBSA operations. Provide meters and switching if permitted. Connections and disconnections are by Contractor at their own expense.
- .4 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Departmental Representative provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than 3 months.

## **1.7 TEMPORARY COMMUNICATION FACILITIES**

- .1 Provide and pay for temporary telephone, fax, data hook up, lines and equipment necessary for own.

## **1.8 FIRE PROTECTION**

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

**1.9 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- .1 Provide temporary erosion and sedimentation control measures in accordance with the requirements of Section 01 35 43 – Environmental Procedures.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1    Canadian General Standards Board (CGSB)
  - .1        CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
  - .2        CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
- .2    Canadian Standards Association (CSA International)
  - .1        CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2        CSA-0121-M1978(R2003), Douglas Fir Plywood.
  - .3        CAN/CSA-S269.2-M1987(R2003), Access Scaffolding for Construction Purposes.
  - .4        CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.

**1.2                SUBMITTALS**

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

**1.3                INSTALLATION AND REMOVAL**

- .1    Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- .2    Identify areas which have to be gravelled to prevent tracking of mud.
- .3    Indicate use of supplemental or other staging area.
- .4    Provide construction facilities in order to execute work expeditiously.
- .5    Remove from site all such work after use.

**1.4                SCAFFOLDING**

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

**1.5                HOISTING**

- .1    Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.
- .2    Hoists and cranes to be operated by qualified operator.

**1.6 ELEVATORS**

- .1 Permanent elevators not to be used by construction personnel or transporting of materials.

**1.7 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 weight or force that will endanger Work.

**1.8 CONSTRUCTION PARKING**

- .1 Parking will be permitted on site as directed by the Departmental Representative.
- .2 Provide and maintain adequate access to project site as directed by the Departmental Representative.
- .3 Clean site access areas / routes where used by Contractor's equipment.

**1.9 OFFICES**

- .1 Provide office heated to 22 degrees C, lighted 750lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors to provide their own offices as necessary. Direct location of these offices.

**1.10 EQUIPMENT, TOOL AND MATERIALS STORAGE**

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

**1.11 SANITARY FACILITIES**

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.
- .3 Permanent and existing facilities may not be used by contractor. Contractor to provide own facilities.

**1.12 CONSTRUCTION SIGNAGE**

- .1 No signs or advertisements, other than health and safety, warning and instructional signs, are permitted on site.

- .2 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .3 Maintain approved signs and notices in good condition for duration of project, and dispose off site on completion of project or earlier if directed by Departmental Representative.

### **1.13 PROTECTION AND MAINTENANCE OF TRAFFIC**

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
- .2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
- .3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
- .4 Protect travelling public from damage to person and property.
- .5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
- .7 Construct access and haul roads necessary.
- .8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.
- .9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .10 Dust control: adequate to ensure safe operation at all times.
- .11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.
- .12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
- .13 Provide snow removal during period of Work.
- .14 Remove, upon completion of work, haul roads designated by Departmental Representative.

### **1.14 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- Provide temporary erosion and sedimentation control measures in accordance with the requirements of Section 01 35 43 – Environmental Procedures.

**1.15 CLEAN-UP**

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1        Canadian General Standards Board (CGSB)
  - .1        CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
  - .2        CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
- .2        Canadian Standards Association (CSA International)
  - .1        CSA-O121-M1978(R2003), Douglas Fir Plywood.

**1.2                INSTALLATION AND REMOVAL**

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

**1.3                HOARDING**

- .1        Erect temporary site enclosures using construction fencing 2.4m high. Provide lockable truck gates. Maintain fence in good repair.
- .2        Erect and maintain pedestrian walkways complete with signs and electrical lighting as required by law.
- .3        Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

**1.4                GUARD RAILS AND BARRICADES**

- .1        Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.
- .2        Provide as required by governing authorities.

**1.5                WEATHER ENCLOSURES**

- .1        Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.
- .2        Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.
- .3        Design enclosures to withstand wind pressure and snow loading.

**1.6                DUST TIGHT SCREENS**

- .1        Provide dust tight screens or insulated partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2        Maintain and relocate protection until such work is complete.

**1.7 ACCESS TO SITE**

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

**1.8 PUBLIC TRAFFIC FLOW**

- .1 Provide and maintain competent signal flag operators, traffic signals, signage, barricades and flares, lights, or lanterns as required to perform Work and protect public.

**1.9 FIRE ROUTES**

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

**1.10 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY**

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

**1.11 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 3 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

**1.12 WASTE MANAGEMENT AND DISPOSAL**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

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

**1.2                QUALITY**

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

**1.3                AVAILABILITY**

- .1        Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2        In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental

Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

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

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

#### **1.5 TRANSPORTATION**

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

#### **1.6 MANUFACTURER'S INSTRUCTIONS**

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

**1.7 QUALITY OF WORK**

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

**1.8 CO-ORDINATION**

- .1 Ensure co-operation of workers in laying out Work. Maintain 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 Refer to Section 01 73 00 – Execution Requirements.
- .2 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
- .3 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

**1.11 LOCATION OF FIXTURES**

- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
- .2 Inform Departmental Representative of conflicting installation. Install as directed.

**1.12 FASTENINGS**

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

**1.13 FASTENINGS - EQUIPMENT**

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

**1.14 PROTECTION OF WORK IN PROGRESS**

- .1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

**1.15 EXISTING UTILITIES**

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, building occupants, and pedestrian and vehicular traffic.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by Authority Having Jurisdiction. Stake and record location of capped service.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1            Owner's identification of existing survey control points and property limits.

**1.2                QUALIFICATIONS OF SURVEYOR**

- .1            Engage a qualified registered land surveyor, licensed to practice in Place of Work, acceptable to Departmental Representative.

**1.3                SURVEYING COSTS**

- .1            Surveying costs of all construction reference points, site works layouts, and as built topographic surveys are to be borne by Contractor

**1.4                SURVEY REFERENCE POINTS**

- .1            Existing base horizontal and vertical control points are designated on drawings.
- .2            Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- .3            Make no changes or relocations without prior written notice to Departmental Representative.
- .4            Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- .5            Require surveyor to replace control points in accordance with original survey control.

**1.5                SURVEY REQUIREMENTS**

- .1            Establish two permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.
- .2            Establish lines and levels, locate and lay out, by instrumentation.
- .3            Stake for grading, fill, topsoil placement and landscaping features.
- .4            Stake slopes and berms.
- .5            Establish pipe invert elevations.
- .6            Stake batter boards for foundations.
- .7            Establish foundation column locations and floor elevations.
- .8            Establish lines and levels for mechanical and electrical work.

**1.6 EXISTING SERVICES**

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.
- .2 Remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points.

**1.7 LOCATION OF EQUIPMENT AND FIXTURES**

- .1 Location of equipment, fixtures and outlets indicated or specified are to be 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.

**1.8 RECORDS**

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.
- .3 Record locations of maintained, re-routed and abandoned service lines.

**1.9 SUBMITTALS**

- .1 Submit name and address of Surveyor to Departmental Representative.
- .2 On request of Departmental Representative, submit documentation to verify accuracy of field engineering work.
- .3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform with Contract Documents.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**1.1 General**

**1.2 SUBMITTALS**

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit written request in advance of cutting or alteration which affects:
  - .1 Structural integrity of elements of project.
  - .2 Integrity of weather-exposed or moisture-resistant elements.
  - .3 Efficiency, maintenance, or safety of operational elements.
  - .4 Visual qualities of sight-exposed elements.
  - .5 Work of Owner or separate contractor.
- .3 Include in request:
  - .1 Identification of project.
  - .2 Location and description of affected Work.
  - .3 Statement on necessity for cutting or alteration.
  - .4 Description of proposed Work, and products to be used.
  - .5 Alternatives to cutting and patching.
  - .6 Effect on Work of Owner or separate contractor.
  - .7 Written permission of affected separate contractor.
  - .8 Date and time work will be executed.

**1.3 MATERIALS**

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

**1.4 PREPARATION**

- .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering, inspect conditions affecting performance of Work.
- .3 Beginning of cutting or patching means acceptance of existing conditions.
- .4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
- .5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

**1.5 EXECUTION**

- .1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.

- .2 Fit several parts together, to integrate with other Work.
- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Remove samples of installed Work for testing.
- .6 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .7 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .8 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .9 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .10 Restore work with new products in accordance with requirements of Contract Documents.
- .11 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .12 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material in accordance with Section 07 84 00 - Firestopping, full thickness of the construction element.
- .13 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.
- .14 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

**1.6 WASTE MANAGEMENT AND DISPOSAL**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 PROJECT CLEANLINESS**

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .3 Clear snow and ice from access to building, bank/pile snow in designated areas only.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .7 Dispose of waste materials and debris off site.
- .8 Clean interior areas prior to start of finishing 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, machinery and equipment.
- .4 Remove waste products and debris other than that caused by Owner or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

- .7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.
- .9 Clean lighting reflectors, lenses, and other lighting surfaces.
- .10 Vacuum clean and dust building interiors, behind grilles, louvres and screens.
- .11 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.
- .12 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .13 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .14 Remove dirt and other disfiguration from exterior surfaces.
- .15 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .16 Sweep and wash clean paved areas.
- .17 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .18 Clean roofs, downspouts, and drainage systems.
- .19 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .20 Remove snow and ice from access to building.
- .21 Complete cleaning prior to start-up and commissioning of systems and integrated systems.

**1.3 WASTE MANAGEMENT AND DISPOSAL**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 WASTE MANAGEMENT GOALS**

- .1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PWGSC's Waste Management Plan and Goals.
- .2 PWGSC's Waste Management Goal 75 percent of total Project Waste to be diverted from landfill sites. Provide Departmental Representative documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced.
- .3 Accomplish maximum control of solid construction waste.
- .4 Preserve environment and prevent pollution and environment damage.

**1.2 DEFINITIONS**

- .1 Class III: non-hazardous waste - construction renovation and demolition waste.
- .2 Cost/Revenue Analysis Workplan (CRAW): based on information from WRW, and intended as financial tracking tool for determining economic status of waste management practices.
- .3 Demolition Waste Audit (DWA): relates to actual waste generated from project.
- .4 Inert Fill: inert waste - exclusively asphalt and concrete.
- .5 Materials Source Separation Program (MSSP): consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.
- .6 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .7 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .8 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .9 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
  - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
  - .2 Returning reusable items including pallets or unused products to vendors.
- .10 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

- .11 Separate Condition: refers to waste sorted into individual types.
- .12 Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.
- .13 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill. Refer to Schedule A.
- .14 Waste Management Co-ordinator (WMC) : contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.
- .15 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. Refer to Schedule B. WRW is based on information acquired from WA (Schedule A).

### **1.3 DOCUMENTS**

- .1 Maintain at job site, one copy of following documents:
  - .1 Waste Audit.
  - .2 Waste Reduction Workplan.
  - .3 Material Source Separation Plan.
  - .4 Schedules A, B, C, D and E completed for project.

### **1.4 SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare and submit following prior to project start-up:
  - .1 Submit 2 copies of completed Waste Audit (WA): Schedule A.
  - .2 Submit 2 copies of completed Waste Reduction Workplan (WRW): Schedule B.
  - .3 Submit 2 copies of completed Demolition Waste Audit (DWA): Schedule C.
  - .4 Submit 2 copies of Cost/Revenue Analysis Workplan (CRAW): Schedule D.
  - .5 Submit 2 copies of Materials Source Separation Program (MSSP): Schedule E.
- .3 Submit before final payment summary of waste materials salvaged for reuse, recycling or disposal by project using deconstruction/disassembly material audit form.
  - .1 Failure to submit could result in hold back of final payment.
  - .2 Provide receipts, scale tickets, waybills, and show quantities and types of materials reused, recycled or disposed of.
  - .3 For each material reused, sold or recycled from project, include amount in tonnes quantities by number, type and size of items and the destination.
  - .4 For each material land filled or incinerated from project, include amount in tonnes of material and identity of landfill, incinerator or transfer station.

### **1.5 WASTE AUDIT (WA)**

- .1 Conduct WA prior to project start-up.

- .2 Prepare WA: Schedule A.
- .3 Record, on WA - Schedule A, extent to which materials or products used consist of recycled or reused materials or products.

#### **1.6 WASTE REDUCTION WORKPLAN (WRW)**

- .1 Prepare WRW: Schedule B, prior to project start-up.
- .2 WRW should include but not limited to:
  - .1 Destination of materials listed.
  - .2 Deconstruction/disassembly techniques and sequencing.
  - .3 Schedule for deconstruction/disassembly.
  - .4 Location.
  - .5 Security.
  - .6 Protection.
  - .7 Clear labelling of storage areas.
  - .8 Details on materials handling and removal procedures.
  - .9 Quantities for materials to be salvaged for reuse or recycled and materials sent to landfill.
- .3 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.
- .4 Describe management of waste.
- .5 Identify opportunities for reduction, reuse, and recycling of materials. Based on information acquired from WA.
- .6 Post WRW or summary where workers at site are able to review content.
- .7 Set realistic goals for waste reduction, recognize existing barriers and develop strategies to overcome these barriers.
- .8 Monitor and report on waste reduction by documenting total volume and cost of actual waste removed from project.

#### **1.7 DEMOLITION WASTE AUDIT (DWA)**

- .1 Prepare DWA prior to project start-up.
- .2 Complete DWA: Schedule C.
- .3 Provide inventory of quantities of materials to be salvaged for reuse, recycling, or disposal.

#### **1.8 COST/REVENUE ANALYSIS WORKPLAN (CRAW)**

- .1 Prepare CRAW: Schedule D.

**1.9 MATERIALS SOURCE SEPARATION PROGRAM (MSSP)**

- .1 Prepare MSSP and have ready for use prior to project start-up.
- .2 Implement MSSP for waste generated on project in compliance with approved methods and as reviewed by Departmental Representative.
- .3 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
- .4 Provide containers to deposit reusable and recyclable materials.
- .5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
- .6 Locate separated materials in areas which minimize material damage.
- .7 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.
  - .1 Transport to approved and authorized recycling facility.
- .8 Collect, handle, store on-site, and transport off-site, salvaged materials in combined condition.
  - .1 Ship materials to site operating under premises of Owner.
  - .2 Materials must be immediately separated into required categories for reuse or recycling.

**1.10 WASTE PROCESSING SITES**

- .1 Refer to the Provincial Regulations and local Authorities Having Jurisdiction.

**1.11 STORAGE, HANDLING AND PROTECTION**

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.
- .2 Unless specified otherwise, materials for removal become Contractor's property.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non-salvageable materials from salvaged items. Transport and 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.

- .9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
  - .1 On-site source separation is recommended.
  - .2 Remove co-mingled materials to off-site processing facility for separation.
  - .3 Provide waybills for separated materials.

#### **1.12 DISPOSAL OF WASTES**

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

#### **1.13 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 provide temporary security measures approved by Departmental Representative.

#### **1.14 SCHEDULING**

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

### **Part 2 Products**

#### **2.1 NOT USED**

- .1 Not Used.

### **Part 3 Execution**

#### **3.1 SELECTIVE DEMOLITION**

- .1 Reuse of Building Elements: this project has been designed to result in end of project rates for reuse of building elements as follows: do not demolish building elements

beyond what is indicated on Drawings without approval by Departmental Representative's.

### 3.2 APPLICATION

- .1 Do Work in compliance with WRW.
- .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

### 3.3 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.

### 3.4 DIVERSION OF MATERIALS

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

#### .3 Demolition Waste:

<u>Material Type</u>	<u>Recommended Diversion %</u>	<u>Actual Diversion %</u>
Acoustic Tile	50	—
Insulation	100	—
Doors and Frames	100	—
Electrical Equipment	80	—
Furnishings	80	—
Mechanical Equipment	100	—
Metals	100	—
Rubble	100	—
Wood (uncontaminated)	100	—
Other		—

#### .4 Construction Waste:

<u>Material Type</u>	<u>Recommended Diversion %</u>	<u>Actual Diversion %</u>
Cardboard	100	—
Plastic Packaging	100	—
Rubble	100	—
Steel	100	—
Wood (uncontaminated)	100	—
Other		—

**3.5 WASTE AUDIT (WA)**

.1 Schedule A - Waste Audit (WA):

MATERIAL CATEGORY	Material Quantity (unit)	Estimated Waste (%)	Total Quantity of Waste (unit)	Generation Point (location)	Reused (%)	Recycled (%)
<b>WOOD &amp; PLASTICS</b>						
Off-cuts						
Warped Pallet Forms						
Plastic Packaging						
Cardboard Packaging						
Other						
<b>DOORS &amp; WINDOWS</b>						
Painted Frames						
Glass						
Wood						
Metal						
Other						

**3.6 WASTE REDUCTION WORKPLAN (WRW)**

.1 Schedule B – Waste Reduction Work Plan:

MATERIAL CATEGORY	Person(s) Responsible (number)	Total Quantity of Waste (unit)	Projected Reused Amount (unit)	Actual Reused Amount (unit)	Projected Recycled Amount (unit)	Actual Recycled Amount (unit)
<b>WOOD &amp; PLASTICS</b>						
Off-cuts						
Warped Pallet Forms						
Plastic Packaging						
Cardboard Packaging						
Other						
<b>DOORS &amp; WINDOWS</b>						
Painted Frames						
Glass						
Wood						
Metal						
Other						

**3.7 DEMOLITION WASTE AUDIT (DWA)**

.1 Schedule C - Demolition Waste Audit (DWA):

MATERIAL CATEGORY	Quantity	Unit	Total	Volume (cumulative)	Weight (cumulative)	Remarks & Assumptions
Wood						
Plywood						
Doors & Windows						

**3.8 COST/REVENUE ANALYSIS WORKPLAN (CRAW)**

.1 Schedule D – Cost/Revenue Analysis Workplan (CRAW):

MATERIAL DESCRIPTION	Total Quantity (unit)	Volume (cumulative)	Weight (cumulative)	Disposal Cost/Credit \$(+/-)	Category Sub-Total \$(+/-)	Cost/Revenue \$(+/-)
Wood						
Wood Stud						
Plywood						
Baseboard - wood						
Door Trim - wood						
Cabinets						
Doors & Windows						
Panel - regular						
Slab - regular						
Wood laminate						
Byfold - Closet						
Glazing						

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

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

<u>Province</u>	<u>Address</u>	<u>General Inquires</u>	<u>Fax</u>
Manitoba	Manitoba Environment Building 2 139 Tuxedo Avenue, Winnipeg, MB R3N 0H6	204-945-7100	
	The Clean Environment Commission 284 Reimer Avenue Box 21420 Steinbach, MB R0A 2T3	204-326-2395	204-326-2472

**END OF SECTION**

**Part 1 General**

**1.1 ADMINISTRATIVE REQUIREMENTS**

- .1 Acceptance of Work Procedures:
  - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
    - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
    - .2 Request Departmental Representative inspection.
  - .2 Departmental Representative Inspection:
    - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
    - .2 Contractor to correct Work as directed.
  - .3 Completion Tasks: submit written certificates that tasks have been performed as follows:
    - .1 Work: completed and inspected for compliance with Contract Documents.
    - .2 Defects: corrected and deficiencies completed.
    - .3 Equipment and systems: tested, adjusted, balanced and fully operational.
    - .4 Certificates required by Authorities Having Jurisdiction submitted.
    - .5 Operation of systems: demonstrated to Owner's personnel.
    - .6 Commissioning: completed in accordance with 01 91 13 - General Commissioning (Cx) Requirements and copies of final Commissioning Report submitted to Departmental Representative.
    - .7 Work: complete and ready for final inspection.
  - .4 Final Inspection:
    - .1 When completion tasks are done, request final inspection of Work by Departmental Representative, Engineer, Consultant, and Contractor.
    - .2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

**1.2 FINAL CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1                Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                ADMINISTRATIVE REQUIREMENTS**

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

**1.2                ACTION AND INFORMATIONAL SUBMITTALS**

- .1    Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2    Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four (4) electronic copies (each on a CD) and one (1) hard copy of the final Operating and Maintenance Manuals (O&M).
- .3    Provide Spare Parts, Maintenance Materials and Special Tools of same quality and manufacture as products provided in Work.
- .4    Provide evidence, if requested, for type, source and quality of products supplied.

**1.3                FORMAT**

- .1    Organize data as instructional manual.
- .2    Binders: extension type catalogue binders bound with heavy duty green fabric, hot stamped gold lettering on front and spine.
- .3    When multiple binders are used correlate data into related consistent groupings.
  - .1    Identify contents of each binder on spine.
- .4    Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5    Arrange content by components, systems, integrated systems, process flow, under Section numbers and sequence of Table of Contents.

- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.
  - .1 Bind in with text; fold larger drawings to size of text pages.

#### **1.4 CONTENTS - PROJECT RECORD DOCUMENTS**

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

#### **1.5 AS -BUILT DOCUMENTS AND SAMPLES**

- .1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Change Orders and other modifications to Contract.
  - .5 Reviewed shop drawings, product data, and samples.
  - .6 Field test records.
  - .7 Inspection certificates.
  - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
  - .1 Provide files, racks, and secure storage.

- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
  - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
  - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

## **1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS**

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

## **1.7 FINAL SURVEY**

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

## **1.8 EQUIPMENT AND SYSTEMS**

- .1 For each item of equipment and each system include description of unit or system, and component parts.
  - .1 Give function, normal operation characteristics and limiting conditions.
  - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
  - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
  - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control and 01 91 13 - General Commissioning (Cx) Requirements.
- .15 Additional requirements: as specified in individual specification sections.

## **1.9 MATERIALS AND FINISHES**

- .1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional requirements: as specified in individual specifications sections.

## **1.10 MAINTENANCE MATERIALS**

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

## **1.11 DELIVERY, STORAGE AND HANDLING**

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.

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

## **1.12 WARRANTIES AND BONDS**

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 60 days before planned pre-warranty conference, to Departmental Representative approval.
- .3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
  - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
  - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
  - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
  - .4 Verify that documents are in proper form, contain full information, and are notarized.
  - .5 Co-execute submittals when required.
  - .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Conduct joint 12 month warranty inspection, measured from time of acceptance with Departmental Representative.
- .9 Include information contained in warranty management plan as follows:
  - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
  - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and commissioned systems such as fire protection, alarm systems, sprinkler systems.
  - .3 Provide list for each warranted equipment, item, feature of construction or system indicating:
    - .1 Name of item.
    - .2 Model and serial numbers.

- .3 Location where installed.
- .4 Name and phone numbers of manufacturers or suppliers.
- .5 Names, addresses and telephone numbers of sources of spare parts.
- .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
- .7 Cross-reference to warranty certificates as applicable.
- .8 Starting point and duration of warranty period.
- .9 Summary of maintenance procedures required to continue warranty in force.
- .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
- .11 Organization, names and phone numbers of persons to call for warranty service.
- .12 Typical response time and repair time expected for various warranted equipment.
- .4 Contractor's plans for attendance at 4 and 9month post-construction warranty inspections.
- .5 Procedure and status of tagging of equipment covered by extended warranties.
- .6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .11 Written verification to follow oral instructions.
  - .1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

### **1.13 WARRANTY TAGS**

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

**Part 2            Products**

**2.1                NOT USED**

.1            Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1            Not Used.

**END OF SECTION**

**Part 1** General

**1.1** SUMMARY

- .1 Scope of Work Includes:
  - .1 A formal Commissioning Process will be put in place for this project to meet CSAZ320 standards.
- .2 Section Includes:
  - .1 General requirements relating to commissioning of project's components and systems, specifying general requirements to PV of components, equipment, sub-systems, systems, and integrated systems.
- .3 Related Requirements:
  - .1 Section 01 91 31 – Commissioning (Cx) Plan.
  - .2 Section 01 91 33 – Commissioning (Cx) Forms.
  - .3 Section 01 91 41 – Commissioning (Cx) Training.
  - .4 Division 07 – Thermal and Moisture Protection.
  - .5 Division 08 – Doors and Windows.
  - .6 Division 11 – Equipment.
  - .7 Division 22 – Plumbing.
  - .8 Division 23 – HVAC.
  - .9 Division 25 – Integrated Automation
  - .10 Division 26 – Electrical.
- .4 Acronyms:
  - .1 CM - Commissioning Manual.
  - .2 CVF - Component Verification Form.
  - .3 Cx - Commissioning.
  - .4 DR – Departmental Representative
  - .5 EMCS - Energy Monitoring and Control Systems.
  - .6 FPT - Functional Performance Testing.
  - .7 GC – General Contractor
  - .8 MSDS - Material Safety Data Sheets.
  - .9 O&M – Operations and Maintenance.
  - .10 ST - System Test.
  - .11 SU – Start-up
  - .12 SV – System Verification
  - .13 TAB - Testing, Adjusting and Balancing.
  - .14 WHMIS - Workplace Hazardous Materials Information System.

**1.2** REFERENCES

- .1 Canadian Standards Association (CSA)
  - .1 CSA Z320-11 (R2016) – Building Commissioning Standards and Check Sheets

### **1.3 GENERAL**

- .1 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and General Contractors Performance Verification responsibilities have been completed and approved. Objectives:
  - .1 Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.
  - .2 Ensure appropriate documentation is compiled in the CM and O&M Manuals.
  - .3 Effectively train Facility Personnel.
- .2 General Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
  - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
  - .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
- .3 Design Criteria: as per client's requirements or determined by the Departmental Representatives. To meet project functional and operational requirements.
- .4 The Commissioning Process does not replace the General Contractor and their sub-contractor's standard QA/QC program, installation, start-up, and testing requirement as defined within the specifications.

### **1.4 COMMISSIONING OVERVIEW**

- .1 Section 01 91 31 – Commissioning (Cx) Plan.
- .2 For Cx responsibilities refer to Section 01 91 31 – Commissioning (Cx) Plan.
- .3 Cx to be a line item of General Contractors cost breakdown and subdivided into all systems and equipment that requires commissioning. A line identifying 1/4 % of the contract value shall be allotted for completed Record drawings and O&M Manuals.
- .4 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .5 Cx is conducted in concert with activities performed during each stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities include transfer of critical knowledge to the Departmental Representative and operators.

- .6 The Departmental Representative will issue Interim Acceptance Certificate when:
  - .1 Completed Cx documentation has been received, reviewed for suitability and approved by the Departmental Representative.
  - .2 Equipment, components and systems have been commissioned.
  - .3 Facility personnel training has been completed.

## **1.5 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS**

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

## **1.6 PRE-CX REVIEW**

- .1 Before Construction:
  - .1 Review contract documents, confirm by writing to the Departmental Representative.
    - .1 Adequacy of provisions for Cx.
    - .2 Aspects of design and installation pertinent to success of Cx.
- .2 During Construction:
  - .1 Co-ordinate provision, location and installation of provisions for Cx.
- .3 Before start of Cx:
  - .1 Provide information to Departmental Representative to ensure Cx Plan is up-to-date.
  - .2 Ensure installation of related components, equipment, sub-systems, systems is complete, including Controls system.
  - .3 Fully understand Cx requirements and procedures.
  - .4 Have Cx documentation shelf-ready.
  - .5 Understand completely design criteria and intent and special features.
  - .6 Submit complete start-up documentation to Departmental Representative.
  - .7 Have Cx schedules up-to-date.
  - .8 Ensure systems have been cleaned thoroughly.
  - .9 Complete TAB procedures on systems, submit TAB reports to Departmental Representative for review and approval.
  - .10 Ensure "As-Built" system schematics are available.
- .4 Inform the Departmental Representative in writing of discrepancies and deficiencies on finished works.

## **1.7 CONFLICTS**

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

## **1.8 SUBMITTALS**

- .1 Submittals: in accordance with Section 01 33 00 – Submittal Procedures.
  - .1 Submit no later than 4 weeks after award of Contract:
    - .1 Preliminary Cx schedule.
    - .2 Request in writing to the Departmental Representative for changes to submittals and obtain written approval at least 8 weeks prior to start of Cx.
    - .3 Submit proposed Cx procedures to Departmental Representative where not specified and obtain written approval at least 8 weeks prior to start of Cx.
    - .4 Provide additional documentation relating to Cx process required by Departmental Representative.

## **1.9 COMMISSIONING DOCUMENTATION**

- .1 Refer to Section 01 91 33 – Commissioning (Cx) Forms for requirements and instructions for use.
- .2 Cx Authority will generate and submit Cx documentation to project team for completion by contractors.
- .3 Contractor is to complete and submit Cx documentation to Departmental Representative for approval and subsequent incorporation into CM.

## **1.10 COMMISSIONING SCHEDULE**

- .1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 013216.07 - Construction Progress Schedules.
- .2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
  - .1 Approval of Cx reports.
  - .2 Verification of reported results.
  - .3 Repairs, retesting, re-commissioning, re-verification.
  - .4 Training.

## **1.11 COMMISSIONING MEETINGS**

- .1 Convene Cx meetings following scheduled project construction meetings: Section 01 32 16.07 Construction Progress Schedule and as specified herein.
- .2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.

- .3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.
- .4 At 50-60% construction completion stage (according to Section 01 32 16 – Construction Schedules), the Departmental Representative will initiate a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:
  - .1 Review duties and responsibilities of the General Contractor team and addressing delays and potential problems.
  - .2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.
- .5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.
- .6 Meeting will be chaired by the General Contractor, who will record and distribute minutes.
- .7 Ensure General Contractor team and relevant sub-contractors are present at start up and subsequent Cx meetings and as required.

#### **1.12 STARTING AND TESTING**

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

#### **1.13 WITNESSING OF STARTING AND TESTING**

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

#### **1.14 MANUFACTURER'S INVOLVEMENT**

- .1 Factory testing (if deemed required by Departmental Representative): manufacturer to:
  - .1 Coordinate time and location of testing.
  - .2 Provide testing documentation for approval by Departmental Representative.
  - .3 Arrange for Departmental Representative to witness tests.
  - .4 Obtain written approval of test results and documentation from Departmental Representative before delivery to site.
- .2 Obtain manufacturer's installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with Departmental Representative.
  - .1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.
  - .2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.

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

### **1.15 PROCEDURES**

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

### **1.16 START-UP DOCUMENTATION**

- .1 Assemble start-up documentation and submit to Departmental Representative for approval before commencement of commissioning.
- .2 Start-up documentation to include:

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

**1.17 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS**

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

**1.18 TEST RESULTS**

- .1 If Static Verification, Start-up and/or Functional Performance Testing produce unacceptable results, repair, replace or repeat specified SU and/or PFT procedures until acceptable results are achieved.
- .2 Provide manpower and materials, assume costs for re-commissioning.

**1.19 START OF COMMISSIONING**

- .1 Notify all members of Cx Team at least 14 days prior to start of Cx.
- .2 Start Cx after elements of building affecting Start-up and Functional Performance Testing of systems have been completed.

**1.20 INSTRUMENTS / EQUIPMENT**

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

**1.21 COMMISSIONING PERFORMANCE VERIFICATION**

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

**1.22 WITNESSING COMMISSIONING**

- .1 Cx Authority to witness activities and verify results.

**1.23 AUTHORITIES HAVING JURISDICTION**

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

**1.24 EXTENT OF VERIFICATION**

- .1 Provide manpower and instrumentation to verify up to 30% of reported results, unless specified otherwise in other sections.
- .2 Number and location to be at discretion of the Departmental Representative.
- .3 Conduct tests repeated during verification under same conditions as original tests, using same test equipment, instrumentation.
- .4 Review and repeat commissioning of systems if inconsistencies found in more than 20% of reported results.
- .5 Perform additional commissioning until results are acceptable to Departmental Representative.

**1.25 REPEAT VERIFICATIONS**

- .1 Assume costs incurred by Departmental Representative for third and subsequent verifications where:
  - .1 Verification of reported results fail to receive Departmental Representative's approval.
  - .2 Repetition of second verification again fails to receive approval.
  - .3 Cx Authority deems General Contractor request for second verification was premature.

**1.26 SUNDRY CHECKS AND ADJUSTMENTS**

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

**1.27 DEFICIENCIES, FAULTS, DEFECTS**

- .1 Correct deficiencies found during start-up and Cx to satisfaction of Departmental Representative.
- .2 Report problems, faults or defects affecting Cx to the Departmental Representative in writing. Stop Cx until problems are rectified. Proceed with written approval from the Departmental Representative.
- .3 Commissioning Issues Log to be maintained until the end of the warrantee review period.

**1.28 COMPLETION OF COMMISSIONING**

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

**1.29 ACTIVITIES UPON COMPLETION OF COMMISSIONING**

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

**1.30 TRAINING**

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

**1.31 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS**

- .1 Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in contract.
- .2 Have materials & spare parts itemized and signed by the Departmental Representative to document they have been received.

**1.32 OCCUPANCY**

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

**1.33 INSTALLED INSTRUMENTATION**

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

- .2 Calibration certificates have been deposited with Departmental Representative.
- .2 Calibrated EMCS sensors may be used to obtain performance data provided that sensor calibration has been completed and accepted.

**1.34 PERFORMANCE VERIFICATION TOLERANCES**

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

**1.35 DEPARTMENTAL REPRESENTATIVE PERFORMANCE TESTING**

- .1 Performance testing of equipment or system by the Departmental Representative will not relieve General Contractor from compliance with specified start-up and testing procedures. This includes intentional failure of equipment to ensure integrated systems operate correctly, and EMCS alarms are initiated.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 GENERAL**

**1.1 SUMMARY**

- .1 Section Includes:
  - .1 Description of overall structure of Cx Plan and roles and responsibilities of Cx team.
- .2 Related Sections:
  - .1 Section 01 91 13 – General Commissioning (Cx) Requirements
  - .2 Section 01 91 33 – Commissioning (Cx) Forms.
  - .3 Section 01 91 41 – Commissioning (Cx) Training.
  - .4 Division 07 – Thermal and Moisture Protection
  - .5 Division 08 – Doors and Windows
  - .6 Division 11 – Equipment.
  - .7 Division 22 – Plumbing.
  - .8 Division 23 – HVAC.
  - .9 Division 25 – Integrated Automation
  - .10 Division 26 – Electrical.

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA)
  - .1 CSA Z320-11 (R2016) – Building Commissioning Standards and Check Sheets.
- .2 Underwriters' Laboratories of Canada (ULC)

**1.3 GENERAL**

- .1 Provide a fully functional facility:
  - .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 Departmental Representative and personnel have been fully trained in aspects of installed systems.
  - .3 Optimized life cycle costs.
  - .4 Complete documentation relating to installed equipment and systems.
- .2 Use this Cx Plan as master planning document for Cx:
  - .1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.
  - .2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.

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- .3 Sets out deliverables relating to O&M, process and administration of Cx.
- .4 Describes process of verification of how built works meet design intent and Departmental Representative's requirements.
- .5 Produces a complete functional system prior to issuance of Practical Completion.
- .6 Management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:
  - .1 Overview of Cx.
  - .2 General description of elements that make up Cx Plan.
  - .3 Process and methodology for successful Cx.
- .3 Acronyms:
  - .1 CM - Commissioning Manual.
  - .2 CVF - Component Verification Form.
  - .3 Cx - Commissioning.
  - .4 DR – Departmental Representative
  - .5 EMCS - Energy Monitoring and Control Systems.
  - .6 FPT - Functional Performance Testing.
  - .7 GC – General Contractor
  - .8 MSDS - Material Safety Data Sheets.
  - .9 O&M – Operations and Maintenance.
  - .10 ST - System Test.
  - .11 SU – Start-up
  - .12 SV – System Verification
  - .13 TAB - Testing, Adjusting and Balancing.
  - .14 WHMIS - Workplace Hazardous Materials Information System.
- .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 General Contractor's control due to lack of occupancy, weather conditions, need for heating/cooling loads.

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

- .1 Cx Plan to be 100% completed by Cx Authority, with assistance from Commissioning Team, 12 weeks prior to Commissioning Kickoff Meeting, and shall include:
  - .1 Approved shop drawings and product data inserted into CFV forms.
  - .2 Approved changes to contract.
  - .3 General Contractor's project schedule.
  - .4 Cx schedule.
  - .5 Contractor's, suppliers' requirements.
  - .6 General Contractor team and Cx team's requirements.
- .2 Completed Cx Plan to be submitted to the Departmental Representative for review and comment, then written approval.

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## **1.5 REFINEMENT OF CX PLAN**

- .1 During construction phase, revise, refine and update Cx Plan to include:
  - .1 Changes resulting from Owner program modifications.
  - .2 Approved design and construction changes.
  - .3 Changes in key personnel for the Commissioning Team
- .2 Revise, refine and update every 8 weeks during construction phase after Commissioning Kick off meeting. At each revision, indicate revision number and date.
- .3 Submit each revision of Cx Plan to the Departmental Representative for review and comment, and obtain written approval.
- .4 Include testing parameters at full range of operating conditions and check responses of equipment and systems.

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

- .1 General Contractor to maintain overall responsibility for project and is sole point of contact between members of commissioning team.
- .2 Cx Team will consist of the following members:
  - .1 Departmental Representative and Design Consultant team is responsible for:
    - .1 Organizing Cx.
    - .2 Create CVF and ST forms to be used by Cx Team
    - .3 Monitoring operations for Cx activities.
    - .4 Witnessing, verifying accuracy of reported results.
    - .5 Witnessing and verifying TAB and other tests.
    - .6 Developing Commissioning Manual (CM).
    - .7 Ensuring implementation of final Cx Plan.
    - .8 Performing verification of performance of installed systems and equipment.
    - .9 Witnessing implementation of Training Plan.
  - .2 Design Consultant Team: Architect, Mechanical, Electrical, Structural, Civil consultants, are responsible for the Design Intent and Operational design of the facility and it's systems, by following the Owners Project Requirements and implementing the intent into the Contract Documents.
  - .3 General Contractor Team: contractors, sub-contractors, suppliers and support disciplines, are responsible for construction/installation in accordance with contract documents, including:
    - .1 Installation of fully functional building systems
    - .2 Testing.
    - .3 TAB.

- .4 Performance of Cx activities.
- .5 Delivery of training and Cx documentation.
- .6 Assigning one person as point of contact with Departmental Representative for administrative and coordination purposes. Referred to in other areas as the General Contractor's Cx Agent. This is typically the General Contractors M&E Coordinator.
- .4 General Contractor's Cx agent implements and coordinates specified Cx activities with the sub-contractors, including:
  - .1 Demonstrations.
  - .2 Training.
  - .3 Testing.
  - .4 Preparation, submission of test reports.
- .5 Departmental Representative: represents lead role in Operation Phase and onwards and is responsible for:
  - .1 Receiving facility.
  - .2 Day-to-day operation and maintenance of facility.
- .3 Cx Team to establish a Communication Protocol and Responsibilities Matrix, and make available to all team members.

## 1.7 ADDITIONAL CX PARTICIPANTS

- .1 Employ the following Cx participants to verify performance of equipment and systems:
  - .1 Installation contractor/subcontractor: for equipment and systems except as noted.
  - .2 Equipment manufacturer: for equipment specified to be installed and started by manufacturer; to include performance verification.
  - .3 Specialist subcontractor: for equipment and systems supplied and installed by specialist subcontractor.
  - .4 Specialist Cx agency: possessing specialist qualifications and installations providing environments essential to client's program but are outside scope of Cx specialists on this project.
  - .5 Departmental Representative: responsible for intrusion and access security systems.
- .2 Ensure that above noted Cx participants:
  - .1 Could complete work within scheduled time frame.
  - .2 Available for emergency and troubleshooting service during first year of occupancy by user for adjustments and modifications outside responsibility of Facility 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 Facility personnel.
    - .4 Redistribution of electrical services.
    - .5 Modifications of fire alarm systems.
    - .6 Modifications to voice communications systems.

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- .3 Provide names of participants to Departmental Representative and details of instruments and procedures to be followed for Cx 3 months prior to starting date of Cx for review and approval.

## **1.8 EXTENT OF CX**

- .1 Commissioning Architectural Systems:
  - .1 Exterior Systems
    - .1 Wall Assemblies
    - .2 Roofing
  - .2 Windows, Doors & Related Hardware
    - .1 Windows
    - .2 Doors
    - .3 Door Hardware (including Electric)
    - .4 Overhead Doors and Sensors
  - .3 Equipment
    - .1 Dock Levellers
    - .2 Elevating Platforms
- .2 Commissioning Mechanical Systems and associated equipment:
  - .1 Plumbing systems:
    - .1 Domestic Cold Water.
    - .2 Domestic Hot Water.
    - .3 Plumbing Fixtures.
    - .4 Regular sanitary waste systems.
    - .5 Storm water systems.
    - .6 Sump pumps.
    - .7 Natural Gas Distribution.
  - .2 HVAC systems:
    - .1 Heating systems.
    - .2 Cooling systems
    - .3 Ventilation systems.
    - .4 Humidification systems
    - .5 Heat recovery systems.
  - .3 Fire and life safety systems. (Fire Alarm Verification Inspection by others)
  - .4 Noise and vibration control systems for mechanical systems.
  - .5 Seismic restraint and control measures.

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- .6 EMCS.
- .3 Commissioning Electrical Systems and associated equipment:
  - .1 Low voltage below 750 V:
    - .1 Low voltage equipment.
    - .2 Low voltage distribution systems.
    - .3 Voice communication systems.
    - .4 Electronic data and communication information systems
  - .2 Lighting systems:
    - .1 Site lighting equipment.
    - .2 Interlocking distribution systems.
    - .3 Emergency lighting systems, including battery packs.
    - .4 Fire exit emergency signage.
  - .3 Fire alarm systems and equipment:
    - .1 Annunciators
    - .2 Control panels
    - .3 Fire alarm battery boxes
  - .4 Other systems and equipment:
    - .1 Generator and transfer switches.
    - .2 CCTV Systems.
    - .3 Lighting protection and control system.
    - .4 F.A.S.T. System.
- 1.9 DELIVERABLES RELATING TO DEPARMENTAL REPRESENTATIVE PERSPECTIVES**
  - .1 General requirements:
    - .1 Compile English documentation.
    - .2 Documentation to be computer-compatible format ready for inputting for data management.
  - .2 Provide deliverables:
    - .1 Warranties.
    - .2 Project record documentation.
    - .3 Inventory of spare parts, special tools and maintenance materials.
    - .4 Maintenance Management System (MMS) identification system used.
    - .5 WHMIS information.
    - .6 MSDS data sheets.
    - .7 Electrical Panel inventory containing detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.

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## **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.
- .3 Provide the following deliverables:
  - .1 Start-up, pre-Cx activities and documentation for systems and equipment.
  - .2 Completed Component Verification Forms (CVF).
  - .3 Completed Functional Performance Testing – System Test report forms.
  - .4 Results of Functional Performance Testing (FPT) tests and inspections.
  - .5 Description of Cx activities and documentation.
  - .6 Description of Cx of integrated systems and documentation.
  - .7 Tests performed by Cx Authority.
  - .8 Training Plans.
  - .9 Cx Reports.
  - .10 Prescribed activities during warranty period.
- .4 Departmental Representative to witness and certify tests and reports of results, for inclusion into the Operating and Maintenance Manuals.
- .5 Design Consultants to participate when appropriate.

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

- .1 Items listed in this Cx Plan include the following:
  - .1 Pre-Start-Up inspections: by Departmental Representative prior to permission to start-up and rectification of deficiencies to the Departmental Representative's satisfaction.
  - .2 General Contractor team to use approved check lists.
  - .3 Departmental Representative will monitor some of these pre-start-up inspections.
  - .4 Include completed documentation with Cx report.
  - .5 Conduct pre-start-up tests: conduct pressure, static, flushing, cleaning, and "bumping" during construction as specified in technical sections. To be witnessed and certified by Departmental Representative and does not form part of Cx specifications.
  - .6 Departmental Representative will monitor some of these inspections and tests.
  - .7 Include completed documentation in Cx report.
- .2 Pre-Cx activities - ARCHITECTURAL AND STRUCTURAL:

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- .1 Exterior walls: conduct thermographic surveys to ensure appropriate level of tightness after exterior envelope has been completed. Permanent HVAC systems are able to provide appropriate negative or positive pressure, a temperature of at 20 degrees C can be maintained between inside and outside and wind speed is less than 10 kph.
- .2 Equipment:
  - .1 Dock levellers.
  - .2 Elevating Platform.
- .3 Doors, windows, related hardware:
  - .1 Overhead doors.
  - .2 Door and window hardware.
  
- .3 Pre-Cx activities - MECHANICAL:
  - .1 Plumbing systems:
    - .1 Pressure tests on piping systems completed.
    - .2 "Bump" each item of equipment in its "stand-alone" mode.
    - .3 Complete pre-start-up checks and complete relevant documentation.
    - .4 After equipment has been started, test related systems in conjunction with control systems on a system-by-system basis.
  - .2 HVAC equipment and systems:
    - .1 "Bump" each item of equipment in its "stand-alone" mode.
    - .2 At this time, complete pre-start-up checks and complete relevant documentation.
    - .3 After equipment has been started, test related systems in conjunction with control systems on a system-by-system basis.
    - .4 Perform TAB on systems. TAB reports to be approved by the Design Consultant and Departmental Representative.
  - .3 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 and calibration.
    - .4 Demonstrate performance of systems, to be witnessed by Departmental Representative prior to start of 7 day Final Acceptance Test period.
    - .5 Perform final Cx and operational tests during demonstration period and 7 day test period.
    - .6 Only additional testing after preceding work has been successfully completed to be "Off-Season Tests".
  
- .4 Pre-Cx activities - ELECTRICAL:

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- .1 High voltage distribution systems over 750V:
  - .1 Required to perform pre-energization and post-energization tests.
- .2 Low voltage distribution systems under 750 V:
  - .1 Required to perform pre-energization and post-energization tests.
- .3 Lighting systems:
  - .1 Emergency and exit lighting systems:
  - .2 Tests to include verification of lighting levels and coverage.
  - .3 CCTV System.
  - .4 F.A.S.T. System.
- .4 Fire Alarm Verification Inspection (FAVI) to be completed and approved documentation received.

### **1.12 START-UP**

- .1 Start-up components, equipment and systems.
- .2 Equipment manufacturer, supplier, installing specialist sub-contractor, as appropriate, to start-up, under the General Contractor's direction, their respective equipment.
- .3 Departmental Representative to monitor all of these start-up activities.
  - .1 Rectify start-up deficiencies to satisfaction of Cx Authority.
- .4 Functional Performance Testing (FPT):
  - .1 General Contractor to perform, and repeat when necessary until results are acceptable to Cx Authority.
  - .2 Use accepted procedures and control sequences submitted by the Controls contractor as basis of System Test (ST) forms.
  - .3 Departmental Representative to witness and certify reported results using approved ST forms.
  - .4 Departmental Representative to approve completed FPT reports and provide to the Commissioning Authority.
  - .5 The Departmental Representative and/or Commissioning Authority reserves the right to verify up to 30% of reported results at random.
  - .6 Failure of randomly selected item shall result in rejection of FPT report or report of system start-up and testing.

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

- .1 Include Cx Activities Schedule with sufficient details in a quantifiable and biddable format acceptable by Departmental Representative.
- .2 Cx to be performed by the General Contractor team members using procedures developed by Cx Authority.
- .3 Departmental Representative to monitor Cx activities.

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- .4 Upon satisfactory completion, specified Cx agency performing tests to prepare Cx Report using approved FPT forms.
- .5 Departmental Representative to witness, certify reported results of Cx activities and forward progress reports to the Commissioning Authority for review.
- .6 The Departmental Representative reserves the right to re-verify 30% of reported results at no additional cost to contract.

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

- .1 Cx to be performed by the General Contractor Team Cx agent using procedures developed by the Cx Authority.
- .2 Tests to be witnessed by Departmental Representative and documented on approved report forms.
- .3 Upon satisfactory completion, General Contractor team Cx agent to prepare Cx Report, to be certified by Design Consultant and submitted to the Departmental Representative for review.
- .4 The Departmental Representative reserves the right to verify 30% of reported results at no additional cost to contract.
- .5 Integrated systems to include:
  - .1 HVAC and associated systems forming part of integrated HVAC systems.
  - .2 Indoor air quality
  - .3 Environmental space conditions.
  - .4 Fire alarm systems.
  - .5 Transfer switch and controllers.
  - .6 Emergency lighting systems.
- .6 Identification:
  - .1 In later stages of Cx, before hand-over and acceptance, General Contractor team and Design Consultant to co-operate to complete inventory data sheets and provide assistance to the Departmental Representative in full implementation of identification system of components, equipment, sub-systems, systems.

**1.15 COMPONENT VERIFICATION FORMS**

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

**1.16 FUNCTIONAL PERFORMANCE TESTING – SYSTEM TEST (ST) FORMS**

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Functional Performance Testing – System Test (ST) Forms.

### **1.17 CX SCHEDULES**

- .1 Prepare detailed Cx Schedule and submit to Departmental Representative for review and approval at same time as project Construction Schedule. Include:
  - .1 Milestones, testing, documentation, training and Cx activities of components, equipment, subsystems, systems and integrated systems, including:
    - .1 Cx procedures: Commissioning Kick off meeting.
    - .2 Cx Report format: Commissioning Kick off meeting.
    - .3 Pre-TAB review: 4 weeks prior to scheduled balancing.
    - .4 Submission of list of instrumentation with relevant certificates: 21 days before start of Cx.
    - .5 Notification of intention to start TAB: 6 weeks before start of TAB.
    - .6 TAB: after successful start-up, correction of deficiencies and verification of normal and safe operation.
    - .7 Notification of intention to start Functional Cx Testing: 14 days before start of Cx.
    - .8 Notification of intention to start Cx of integrated systems: after Cx of related systems is completed, 14 days before start of integrated system Cx.
    - .9 Identification of deferred Cx.
    - .10 Implementation of training plans.
    - .11 Cx reports: immediately upon successful completion of Cx.
  - .2 Detailed training schedule to demonstrate no conflicts with testing, completion of project and hand-over to Departmental Representative.
- .2 After approval, incorporate Cx Schedule into Construction Schedule.
- .3 Departmental Representative, and Design Consultant will monitor progress of Cx against this schedule.

### **1.18 CX REPORTS**

- .1 Submit reports of tests, witnessed and certified by Design Consultant, to Departmental Representative, who may verify reported results before accepting the reports.
- .2 Include completed and certified PV reports in properly formatted Cx Reports.

### **1.19 ACTIVITIES DURING WARRANTY PERIOD**

- .1 Cx activities must be completed before issuance of Practical Completion; it is anticipated that certain Cx activities may be necessary during Warranty Period, including:
  - .1 Fine tuning of HVAC systems.
  - .2 Adjustment of ventilation rates to promote good indoor air quality and reduce deleterious effects of VOCs generated by off-gassing from construction materials and furnishings.
  - .3 Full-scale emergency evacuation exercises.

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**1.20 TESTS TO BE PERFORMED BY DEPARTMENTAL REPRESENTATIVE**

- .1 None are anticipated on this project.

**1.21 TRAINING PLANS**

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

**1.22 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.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                SUMMARY**

- .1    Section Includes:
  - .1        Description of commissioning forms to be completed for equipment, system and integrated system.
- .2    Related Sections:
  - .1        Section 01 91 13 – Commissioning (Cx) Requirements.
  - .2        Section 01 91 31 – Commissioning (Cx) Plan.
  - .3        Section 01 91 41 – Commissioning (Cx) Training.
  - .4        Division 07 – Thermal and Moisture Protection.
  - .5        Division 08 – Doors and Windows.
  - .6        Division 11 – Equipment.
  - .7        Division 22 – Plumbing.
  - .8        Division 23 – HVAC.
  - .9        Division 25 – Integrated Automation.
  - .10      Division 26 – Electrical.

**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 actions 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 Commissioning Manual (CM) 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 COMPONENT VERIFICATION FORMS (CVF)**

- .1 Component Verification Forms (CVF) compile 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 CM at completion of work.
- .2 Prior to Functional Performance Testing (FPT) of systems complete items on CVF forms related to systems and obtain Departmental Representative's approval.

### **1.4 SYSTEM TEST (ST) AND INTEGRATED SYSTEM TEST (IST) FORMS**

- .1 ST and IST 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 ST and IST report forms are to include recorded measured data and readings taken during Functional Performance Testing (FPT) procedures.
- .3 Prior to FPT of integrated system, complete ST and IST forms of related systems and obtain Departmental Representative's approval.

### **1.5 SAMPLES OF COMMISSIONING FORMS**

- .1 Departmental Representative will develop and provide to the General Contractor team the required project-specific Commissioning forms in electronic format complete with specification data.
- .2 Revise items on Commissioning forms to suit project requirements.
- .3 Samples of Commissioning forms can be found annexed to CSA Z320-11 – Building Commissioning; as Tables 1, B.1 and G.1, and as further described in this Standard, as well as to the end of this Specification Section.

### **1.6 CHANGES AND DEVELOPMENT OF NEW REPORT FORMS**

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

### **1.7 COMMISSIONING FORMS**

- .1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.

- .2 Strategy for Use:
  - .1 Departmental Representative provides the General Contractor Team project-specific Commissioning forms with Specification data included.
  - .2 General Contractor team will provide required shop drawings information to the Departmental Representative for inclusion in the Commissioning Forms 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 Forms to bear signatures of recording technician and reviewed and signed off by Departmental Representative .
  - .9 Submit immediately after tests are performed.
  - .10 Reported results in true measured SI unit values.
  - .11 Provide departmental Representative with originals of completed forms.
  - .12 Maintain copy on site during start-up, testing and commissioning period.
  - .13 Forms to be both hard copy and electronic format with typed written results in Commissioning Manual (CM).

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**Part 4 Sample Forms**

PROJECT NAME: EXPANSION REDEVELOPMENT OF THE EMERSON PORT OF ENTRY

FILE NO. 10605

<b>FLOOR DRAIN</b>	
<b>EQUIPMENT NO.</b>	
<b>LOCATION:</b>	

	<b>Specified</b>	<b>Shop Drawings</b>	<b>Installed</b>
Manufacturer			
Model No.			
Material			

**REMARKS:**

	<b>SIGNATURE</b>	<b>DATE</b>
Owners Representative		
Architects Representative		
Mechanical Consultant Representative		
General Contractors Representative		
Mechanical Contractors Representative		
Commissioning Representative		

	<b>YES</b>	<b>NO</b>	<b>N/A</b>		<b>YES</b>	<b>NO</b>	<b>N/A</b>
Fixture Installed				Water leaks			
Fixture rigidly fastened				Check traps			
Drain Installation Complete				Valves in place			
	<b>YES</b>	<b>NO</b>	<b>N/A</b>		<b>YES</b>	<b>NO</b>	<b>N/A</b>
Trim installation Complete				Escutcheon in place			
Hot/Cold Piping Correct				Valve shut off water			
Mix Valve Working				Sensors working			
				Water flow adequate			
				Stall clean			

PROJECT NAME: EXPANSION REDEVELOPMENT OF THE EMERSON PORT OF ENTRY

FILE NO. 10605

<b>FLOOR DRAIN</b>	
<b>EQUIPMENT NO.</b>	
<b>LOCATION:</b>	

<b>REMARKS:</b>
-----------------

	<b>SIGNATURE</b>	<b>DATE</b>
Owners Representative		
Architects Representative		
Mechanical Consultant Representative		
General Contractors Representative		
Mechanical Contractors Representative		
Commissioning Representative		

PROJECT NAME: EXPANSION REDEVELOPMENT OF THE EMERSON PORT OF ENTRY

FILE NO. 10605

<b>MIXING VALVES</b>	
<b>EQUIPMENT NO.</b>	
<b>LOCATION:</b>	
<b>SERVICE:</b>	

<b>VERIFICATION PROGRAM</b>			
	<b>Specified</b>	<b>Shop drawings</b>	<b>Installed</b>
Manufacturer			
Model No.			
Size			
Flow Rate			
Adjustment Range			
Set Point			
Compensation			
Type			
Type			

**Remarks:**

	<b>Signature</b>	<b>Date</b>
Owners Representative		
Architects Representative		
Mechanical Consultant Representative		
General Contractors Representative		
Mechanical Contractors Representative		
Commissioning Representative		

PROJECT NAME: EXPANSION REDEVELOPMENT OF THE EMERSON PORT OF ENTRY

FILE NO. 10605

<b>MIXING VALVES</b>	
<b>EQUIPMENT NO.</b>	
<b>LOCATION:</b>	
<b>SERVICE:</b>	

<b>PERFORMANCE EVALUATION</b>		
	<b>Status</b>	<b>Comments</b>
High Flow - Supply Temperature Upset		
High Flow - Supply Pressure Upset		
Low Flow - Supply Temperature Upset		
Low Flow - Supply Pressure Upset		
Steady-State Operation		

**Remarks:**

	<b>SIGNATURE</b>	<b>DATE</b>
Owners Representative		
Architects Representative		
Mechanical Consultant Representative		
General Contractors Representative		
Mechanical Contractors Representative		
Commissioning Representative		

<b>CONTRACTOR START-UP PROGRAM</b>		
	<b>STATUS</b>	<b>COMMENTS</b>
Pipe Connections		
Access		
Shutoff Valves		
Backflow Preventors		

PROJECT NAME: EXPANSION REDEVELOPMENT OF THE EMERSON PORT OF ENTRY

FILE NO. 10605

<b>MIXING VALVES</b>	
<b>EQUIPMENT NO.</b>	
<b>LOCATION:</b>	
<b>SERVICE:</b>	

**Remarks:**

	<b>Signature</b>	<b>Date</b>
Owners Representative		
Architects Representative		
Mechanical Consultant Representative		
General Contractors Representative		
Mechanical Contractors Representative		
Commissioning Representative		

PROJECT NAME: EXPANSION REDEVELOPMENT OF THE EMERSON PORT OF ENTRY

FILE NO. 10605

<b>PUMPS</b>	
<b>EQUIPMENT NO.</b>	
<b>LOCATION:</b>	
<b>SERVICE:</b>	

<b>VERIFICATION PROGRAM</b>			
<b>PUMP</b>	<b>SPECIFIED</b>	<b>SHOP DRAWINGS</b>	<b>INSTALLED</b>
Manufacturer			
Model No.			
Manufacturer Serial No.			
Pump Capacity (usgpm)			
Pump Head (ft)			
Pump rpm			
Pump Curve No.			

<b>MOTOR</b>	<b>SPECIFIED</b>	<b>SHOP DRAWINGS</b>	<b>INSTALLED</b>
Manufacturer			
Model No.			
Manufacturer Serial No.			
Motor Horsepower			
Voltage/Phase/Frequency			
Amperage			
Header Size and Rate			
Efficiency			
Motor RPM			

	<b>STATUS</b>	<b>COMMENTS</b>
Installed as per Drawings and Specifications		
Installed as per Manufacturer's Recommendations		
Pump is Level		
Motor and Pump Aligned (Alignment Report Attached)		
Pump Base Grouted		
Pump has Adequate Service Space		
Straight Length on suction as recommended		
Pressure Gauges Installed		
Discharge Valve Location and Direction of Flow correct		
	<b>STATUS</b>	<b>COMMENTS</b>
Valves and Strainers Installed		
Bearings Lubricated		
Nameplate is visible		

PROJECT NAME: EXPANSION REDEVELOPMENT OF THE EMERSON PORT OF ENTRY

FILE NO. 10605

<b>PUMPS</b>	
<b>EQUIPMENT NO.</b>	
<b>LOCATION:</b>	
<b>SERVICE:</b>	

	<b>STATUS</b>	<b>COMMENTS</b>
Vibration Isolators correct		
Pipe Arrangement and Support		
Cuno filter full and valves open		
Piping identification installed		
Strainers/Particle Filters		
Chemical Feeder		
Coupling Guard		
Lifting Hooks for Motor Installed		
Nameplate Head (ft)		
Operation type (Parallel/Single)		

<b>REMARKS:</b>
-----------------

PROJECT NAME: EXPANSION REDEVELOPMENT OF THE EMERSON PORT OF ENTRY

FILE NO. 10605

<b>PUMPS</b>	
<b>EQUIPMENT NO.</b>	
<b>LOCATION:</b>	
<b>SERVICE:</b>	

<b>CONTRACTOR'S START-UP PROGRAM</b>		
<b>PRE START-UP CHECKS</b>	<b>STATUS</b>	<b>COMMENTS</b>
Installed as per Drawings and Specifications		
Installed as per Manufacturer's Recommendations		
Pump is Level		
Motor and Pump Aligned (Alignment Report Attached)		
Pump Base Grouted		
<b>PRE START-UP CHECKS</b>	<b>STATUS</b>	<b>COMMENTS</b>
Pump has Adequate Service Space		
Straight Length on suction as recommended		
Pressure Gauges Installed		
Discharge Valve Location and Direction of Flow correct		
Valves and Strainers Installed		
<b>PRE START-UP CHECKS</b>	<b>STATUS</b>	<b>COMMENTS</b>
Bearings Lubricated		
Nameplate is visible		
Vibration Isolators correct		
Pipe Arrangement and Support		
Cuno filter full and valves open		
Piping identification installed		
Chemical Feeder		
Coupling Guard in		
Lifting Hooks for Motor Installed		
<b>START-UP CHECKS</b>	<b>STATUS</b>	<b>COMMENTS</b>
Started as per Manufacturer's Data and Operation and Maintenance Requirements		
Impeller and Motor Rotation Correct		
Operation from ECMS Verified		
<b>POST START-UP CHECKS</b>	<b>STATUS</b>	<b>COMMENTS</b>
Operated for 12 hours continuously		
Worn part and seals replaced in pumps used for cleaning		
no leakage from mechanical seals		
Net positive suction head checked/calculated		
Air flow for motor cooling		

PROJECT NAME: EXPANSION REDEVELOPMENT OF THE EMERSON PORT OF ENTRY

FILE NO. 10605

<b>PUMPS</b>	
<b>EQUIPMENT NO.</b>	
<b>LOCATION:</b>	
<b>SERVICE:</b>	

<b>REMARK:</b>
----------------

	<b>Signature</b>	<b>Date</b>
Owners Representative		
Architects Representative		
Mechanical Consultant Representative		
General Contractors Representative		
Mechanical Contractors Representative		
Commissioning Representative		

PROJECT NAME: EXPANSION REDEVELOPMENT OF THE EMERSON PORT OF ENTRY

FILE NO. 10605

<b>PUMPS</b>	
<b>EQUIPMENT NO.</b>	
<b>LOCATION:</b>	
<b>SERVICE:</b>	

<b>BALANCING REPORT</b>	
<b>Pump</b>	<b>Installed</b>
Manufacturer	
Model No.	
Manufacturer Serial No.	
Pump Capacity (usgpm)	
Pump Head (ft)	
Pump rpm	
Pump Curve No.	

<b>MOTOR</b>	<b>INSTALLED</b>
Manufacturer	
Model No.	
Manufacturer Serial No.	
Motor Horsepower	
Voltage/Phase/Frequency	
Amperage	

<b>MOTOR</b>	<b>INSTALLED</b>
Header Size and Rate	
Efficiency	
Motor rpm	

<b>SINGLE</b>	<b>DESIGN</b>	<b>ACTUAL</b>	<b>PARALLEL</b>	<b>DESIGN</b>	<b>ACTUAL</b>
Shutoff Head (ft)			Pump Head (Ft)		
Discharge Static Head			Discharge Static Head		
- Suction Static head			- Suction Static head		
= Total Static head			= Total Static head		
Pump off			Measured Pump Flow (L/s)		

PROJECT NAME: EXPANSION REDEVELOPMENT OF THE EMERSON PORT OF ENTRY

FILE NO. 10605

<b>PUMPS</b>	
<b>EQUIPMENT NO.</b>	
<b>LOCATION:</b>	
<b>SERVICE:</b>	

<b>SINGLE</b>	<b>RATED</b>	<b>ACTUAL</b>	<b>PARALLEL</b>	<b>RATED</b>	<b>ACTUAL</b>
Amps T-1			Amps T-1		
Amps T-2			Amps T-2		
Amps T-3			Amps T-3		
Pump rpm			Pump rpm		

<b>REMARKS:</b>
-----------------

PROJECT NAME: EXPANSION REDEVELOPMENT OF THE EMERSON PORT OF ENTRY

FILE NO. 10605

<b>PUMPS</b>	
<b>EQUIPMENT NO.</b>	
<b>LOCATION:</b>	
<b>SERVICE:</b>	

	<b>SIGNATURE</b>	<b>DATE</b>
Owners Representative		
Architects Representative		
Mechanical Consultant Representative		
General Contractors Representative		
Mechanical Contractors Representative		
Commissioning Representative		

<b>PERFORMANCE EVALUATION</b>		
<b>PRE START-UP CHECKS</b>	<b>STATUS</b>	<b>COMMENTS</b>
Installed as per Drawings and Specifications		
Installed as per Manufacturer's Recommendations		
Pump is Level		
Motor and Pump Aligned (Alignment Report Attached)		
Pump Base Grouted		
Pump has Adequate Service Space		
Straight Length on suction as recommended		
Pressure Gauges Installed		
Discharge Valve Location and Direction of Flow correct		
<b>PRE START-UP CHECKS</b>	<b>STATUS</b>	<b>COMMENTS</b>
Valves and Strainers Installed		
Bearings Lubricated		
Nameplate is visible		
Vibration Isolators correct		
Pipe Arrangement and Support		
Cuno filter full and valves open		
Piping identification installed		
Chemical Feeder		
Coupling Guard in		
Lifting Hooks for Motor Installed		
<b>START-UP CHECKS</b>	<b>STATUS</b>	<b>COMMENTS</b>
Started as per Manufacturer's Data and Operation and Maintenance Requirements		
Impeller and Motor Rotation Correct		
Operation from ECMS Verified		

PROJECT NAME: EXPANSION REDEVELOPMENT OF THE EMERSON PORT OF ENTRY

FILE NO. 10605

<b>PUMPS</b>	
<b>EQUIPMENT NO.</b>	
<b>LOCATION:</b>	
<b>SERVICE:</b>	

<b>POST START-UP CHECKS</b>	<b>STATUS</b>	<b>COMMENTS</b>
Operated for 12 hours continuously		
Worn part and seals replaced in pumps used for cleaning		
no leakage from mechanical seals		
Net positive suction head checked/calculated		
Air flow for motor cooling		

PROJECT NAME: EXPANSION REDEVELOPMENT OF THE EMERSON PORT OF ENTRY

FILE NO. 10605

<b>SPRINKLER PIPING SYSTEM</b>	
<b>EQUIPMENT NO.</b>	
<b>LOCATION:</b>	
<b>SERVICE:</b>	

<b>VERIFICATION PROGRAM</b>			
<b>PIPING SYSTEMS</b>	<b>SPECIFIED</b>	<b>SHOP DRAWINGS</b>	<b>INSTALLED</b>
Frequency of Hangers			
Slope of Pipe			
Isolation Valves			
Expansion Provisions			
Date Accepted			
System Degreased From			
System Degreased To			
Chemical Treatment Applied			

**REMARKS:**

	<b>SIGNATURE</b>	<b>DATE</b>
Owners Representative		
Architects Representative		
Mechanical Consultant Representative		
General Contractors Representative		
Mechanical Contractors Representative		
Commissioning Representative		

PROJECT NAME: EXPANSION REDEVELOPMENT OF THE EMERSON PORT OF ENTRY

FILE NO. 10605

<b>SPRINKLER PIPING SYSTEM</b>	
<b>EQUIPMENT NO.</b>	
<b>LOCATION:</b>	
<b>SERVICE:</b>	

<b>CONTRACTOR START-UP PROGRAM</b>		
<b>PIPING SYSTEMS</b>	<b>STATUS</b>	<b>COMMENTS</b>
Standing Pressure Test		
Pressurized/Filled		
Pressure (kPa)		

**REMARKS:**

	<b>SIGNATURE</b>	<b>DATE</b>
Owners Representative		
Architects Representative		
Mechanical Consultant Representative		
General Contractors Representative		
Mechanical Contractors Representative		
Commissioning Representative		

PROJECT NAME: EXPANSION REDEVELOPMENT OF THE EMERSON PORT OF ENTRY

FILE NO. 10605

VERIFICATION PROGRAM		
<b>SUBJECT:</b>	<b>DDC FIELD PANELS</b>	<b>EQUIPMENT NO.</b>
<b>SERVICE:</b>		<b>LOCATION:</b>

DDC FIELD PANELS	SPECIFIED	SHOP DRAWING	INSTALLED
Manufacturer			
Model No.			
Type			
I/O Interface			
Battery Backup			
Spare Point Capacity			
DDC FIELD PANELS	STATUS	COMMENTS	
Proper Location			
Properly Labelled			
Securely Mounted			
Access Adequate			
Power Wiring			
Control Wiring			
Calibrated/Adjusted			
Lock And Keys			
Operating Manual Attached			
Points List Attached			

**REMARKS:**

Owner Representative		Date:
Architects Representative		Date:
Mechanical Consultant Representative		Date:
General Contractors Representative		Date:
Mechanical Contractors Representative		Date:
Commissioning Representative		Date:

PROJECT NAME: EXPANSION REDEVELOPMENT OF THE EMERSON PORT OF ENTRY

FILE NO. 10605

VERIFICATION PROGRAM		
<b>SUBJECT:</b>	<b>SPLIT SYSTEM AIR CONDITIONING UNIT</b>	<b>EQUIPMENT NO.</b>
<b>SERVICE:</b>		<b>LOCATION:</b>

SPLIT SYSTEM CONDENSER	SPECIFIED	SHOP DRAWINGS	INSTALLED
Manufacturer			
Model No.			
Location			
Type			
Serial No.			
Motor MCA			
Voltage/Phase/Frequency			
Refrigerant (Type) Installed			
Line Set			
SPLIT SYSTEM CONDENSER	STATUS	COMMENTS	
Installation & Mounting			
Piping Connections			
Access for Servicing			
Piping Connections			
Piping Insulation			
Isolating/Balancing Valves			
Thermostat Installed			
Vibration & Noise			

**REMARKS:**

Owners Representative		Date:
Architects Representative		Date:
Mechanical Consultant Representative		Date:
General Contractors Representative		Date:
Mechanical Contractors Representative		Date:
Commissioning Representative		Date:

**Part 1            General**

**1.1                SUMMARY**

- .1        Section Includes:
  - .1            This Section specifies roles and responsibilities of Commissioning Training to be completed by the General Contractor.
- .2        Related Sections:
  - .1            Section 01 91 13 – Commissioning (Cx) Requirements.
  - .2            Section 01 91 31 – Commissioning (Cx) Plan.
  - .3            Section 01 91 33 – Commissioning (Cx) Forms.
  - .4            Division 07 – Thermal and Moisture Protection.
  - .5            Division 08 – Doors and Windows.
  - .6            Division 11 – Equipment.
  - .7            Division 22 – Plumbing.
  - .8            Division 23 – HVAC.
  - .9            Division 25 – Integrated Automation
  - .10          Division 26 – Electrical.
- .3        Acronyms:
  - .1            CM - Commissioning Manual.
  - .2            CVF - Component Verification Form.
  - .3            Cx - Commissioning.
  - .4            DR – Departmental Representative
  - .5            EMCS - Energy Monitoring and Control Systems.
  - .6            FPT - Functional Performance Testing.
  - .7            GC – General Contractor
  - .8            MSDS - Material Safety Data Sheets.
  - .9            O&M – Operations and Maintenance.
  - .10          ST - System Test.
  - .11          SU – Start-up
  - .12          SV – System Verification
  - .13          TAB - Testing, Adjusting and Balancing.
  - .14          WHMIS - Workplace Hazardous Materials Information System.

**1.2                TRAINEES**

- .1        Trainees: personnel as appointed by Departmental Representative for operating and maintaining this facility. Includes 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 Design Consultants are to provide:
  - .1 Descriptions of systems.
  - .2 Instruction on design philosophy, design criteria, and design intent.
- .2 General Constructors Team, including 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 General Contractor Team and equipment manufacturer to provide instruction on:
  - .1 Start-up, operation, maintenance and shut-down of equipment they have installed, 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 O&M Manual(s).
  - .3 TAB and PV Reports.
- .3 Departmental Representative and Design Consultant 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 Submit a proposed Training Schedule 3 months prior to Substantial Performance for coordination and approval by Departmental Representative.
- .2 Include time for training in Commissioning Schedule.
- .3 Deliver training during regular working hours, sessions to be at least 3 hours in length.
- .4 Training to be completed prior to acceptance of facility.

## **1.7 RESPONSIBILITIES**

- .1 Include training material, training and classroom time, etc.
- .2 General Contractor Team responsible for:
  - .1 Implementation of training activities,
  - .2 Coordination among instructors,
  - .3 Quality of training, training materials,
- .3 Departmental Representative will evaluate training and materials.
- .4 Upon completion of training, provide written report, signed by Instructors, witnessed by Cx Authority.
- .5 Departmental Representative is responsible to ensure personnel attend the training sessions according to an approved schedule.

## **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 Interaction 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 review and written approval 3 months prior to commencement of scheduled training.
- .2 On-Site training videos:
  - .1 General Contractor to make the training sessions suitable to Video Recording.
  - .2 The Departmental Representative is to Video Record training sessions for use during future training.
  - .3 To be performed after systems are fully commissioned.
  - .4 Organize into several short modules to permit incorporation of changes.
  - .5 Training Sessions to be two part sessions with Classroom style training first, followed immediately by in-field training at equipment.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**