

PART 1 GENERAL

1.1 PRECEDENCE

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

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises the construction of a new pump house, the installation of sea water intake and outflow pipes in Sydney Harbour and the installation of glycol pipe system between the pump house and Cabot building at the Canadian Coast Guard College, located at Sydney, Nova Scotia; and further identified as CCGC.
- .2 Perform work in accordance with the most recent versions of the National Building Code of Canada (NBC), National Fire Code of Canada (NFC), NFPA 101-2012 Life Safety Code and any other code of provincial or local application, including all amendments up to bid closing date, provided that in any case of conflict or discrepancy, the more stringent requirement shall apply.
- .3 Materials and workmanship must meet or exceed requirements of specified standards, codes and referenced documents.

1.3 CONTRACT METHOD

- .1 Construct work under lump sum contract.

1.4 COST BREAKDOWN

- .1 Within 10 days of notification of acceptance of bid furnish a cost breakdown by Section aggregating contract amount.
 - .1 Provide breakdown by specification section and sub-divide into major work components.
 - .2 Upon approval the cost breakdown will be used as basis for progress payments.
 - .3 Within 48 hours of acceptance of bid submit a list of subcontractors.

1.5 PERMITS

- .1 In accordance with the General Conditions, obtain and pay for building permit, certificates, licenses and other permits as required by municipal, provincial and federal authorities.
- .2 Provide appropriate notifications of project to municipal and provincial inspection authorities.
- .3 Obtain compliance certificates as prescribed by legislative and regulatory provisions of municipal, provincial and federal authorities as applicable to the performance of work.
- .4 Submit to Departmental Representative, copy of application forms and approval documents received from above referenced authorities.

1.6 WORK BY OTHERS

- .1 Work executed prior to start of Work of this Contract, and which is specifically excluded from this Contract:
 - .1 Mechanical and Sprinkler System Upgrades.
 - .2 Louis S Saint Laurent Mechanical System Upgrades.
 - .3 Work of this Project must include provisions for coordinating with other contractors

- .1 Other contracts as yet to be determined.

1.7 WORK SEQUENCE

- .1 Construct Work in phases to accommodate Owner's continued use of premises during construction.
- .2 Coordinate Progress Schedule and coordinate with Owners use of Marine facilities, and roadways during construction.
- .3 The CCGC is a 24 hour a day, 365 days per year operation which provides first class education for officer cadet programs for the Canadian Coast Guard. In addition, cadets live on campus throughout the year, with training programs continuing in summer months. In addition to the officer training program, the CCGC is home to training for Search and Rescue and training for Marine Communication and Traffic Services (MCTS) operation centres (marine 911 call centers), and also houses a MCTS which a 24 hour a day operations center which is life safety critical. CCGC also provides CCG and DFO career development training.
- .4 The contractor will submit a schedule for review by PSPC
- .5 Maintain fire access/control.

1.8 CONTRACTOR USE OF PREMISES

- .1 Contractor shall limit use of premises for Work to allow;
 - .1 Owner occupancy.
 - .2 Partial owner occupancy.
 - .3 Work by other contractors.
 - .4 Public usage.
 - .5 Special scheduled CCGC events.
- .2 Coordinate use of premises under direction of Departmental Representative.
- .3 Parking in campus lots will not be available to the contractor. The Contractor will not be permitted to use the campus Galley, but must furnish lunch room facilities for their own forces. Refer to Appendix

1.9 OWNER OCCUPANCY

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

1.10 ROUGHING-IN

- .1 Be responsible for obtaining manufacturer's literature and for correct roughing-in and hook-up of equipment, fixtures and appliances.

1.11 CUTTING, FITTING AND PATCHING

- .1 Ensure that cutting and patching required by all trades is included in total bid amount submitted for the work.
- .2 Execute cutting, fitting and patching required to make work fit properly.

- .3 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work. This includes patching of openings in existing work resulting from removal of existing services.
- .4 Do not cut, bore, or sleeve load-bearing members, except where specifically approved by Departmental Representative.
- .5 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.
- .6 Fit work airtight to pipes, sleeves ducts and conduits.

1.12 LOCATION OF FIXTURES

- .1 Location of equipment, fixtures and outlets, shown or specified shall be considered as approximate. Actual location shall be as required to suit conditions at time of installation and as is reasonable.
- .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 when impending installation conflicts with other new or existing components. Follow directives for actual location.
- .4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.13 EXISTING SERVICES

- .1 Where work involves breaking into or connecting to existing services, carry out work at times directed by governing authorities, with minimum of disturbance to tenant operations.
- .2 Before commencing work, establish location and extent of service lines in area of work and notify Departmental Representative of findings.
- .3 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility. This includes disconnection of electrical power and communication services to tenant's operational areas. Adhere to approved schedule and provide notice to affected parties.
- .4 Provide temporary services to maintain critical building and tenant systems.
- .5 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .6 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .7 Protect, relocate or maintain existing active services as required. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction over service. Record locations of maintained, re-routed and abandoned service lines.

1.14 Maintenance of Shipping

- .1 Liaise with the local port officials to coordinate activities such that any interference is minimized.

1.15 Cooperation & Assistance to Departmental Representative

- .1 Co-operate with *Departmental Representative* on inspection of work.
- .2 Provide assistance when requested.
- .3 Provide small motor boat with operator and sounding chain for *Departmental Representative's* use when requested.

1.16 Datum

- .1 The datum referred to in this Specification is Chart Datum. Chart Datum is, by International Agreement a plane below which the tide will seldom fall. The Canadian Hydrographic Service has adopted the plane of the lowest normal tide (L.N.T.) as Chart Datum. As the rise, fall, and range of tides varies daily, the Canadian Tide and Current Tables, as issued by the Canadian Hydrographic Service, should be consulted for tidal predictions and other tidal information relating to the work.

1.17 Contractor's Representative

- .1 Continuously maintain on the site an authorized representative to whom communication may be addressed and who will be competent to speak for the Contractor in discussing work methods.

1.18 Disposal of Debris

- .1 Debris, including construction materials not incorporated in the work, oil products and containers, and other materials of this nature will be disposed of in suitable locations off the site. This includes costs of disposing of contaminated materials such as creosote treated timber. Disposal is the responsibility of the Contractor.
- .2 Material from the work will not be permitted to go adrift or otherwise become a menace to navigation.

1.19 Existing Soils Conditions

- .1 Any information pertaining to soils and all boreholes logs are furnished by the *Departmental Representative* as a matter of general information only and borehole descriptions or logs are not to be interpreted as descriptive of conditions at locations other than those described by the boreholes themselves.

1.20 Relics and Antiquities

- .1 Protect relics, antiquities, items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tablets, and similar objects found during course of work.
- .2 Give immediate notice to *Departmental Representative* and await written instructions before proceeding with work in this area.
- .3 Relics, antiquities and items of historical or scientific interest remain her Majesty's property.

1.21 Temporary Navigational Buoys

- .1 The Contractor is to maintain temporary buoy's to mark the position of the outer end of the structure as construction proceeds. All buoys are to meet the requirements of Canadian Coast Guard Standard TP968 and be equipped with radar reflectors.
<http://www.ccg-gcc.gc.ca/folios/00020/docs/CanadianAidsNavigationSystem2011-eng.pdf>
- .2 The Contractor shall coordinate the buoy installation with the local harbour authority.
- .3 The Contractor is responsible for all costs associated with the supply, installation and removal of all temporary navigational buoys.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

PART 1 GENERAL

1.1 SUBMITTALS

- .1 Upon acceptance of bid and prior to commencement of work, submit to Departmental Representative the following work management documents:
 - .1 Work Schedule as specified herein.
 - .2 Shop Drawing Submittal Schedule specified in section 01 33 00.
 - .3 Waste Management Plan specified in section 01 74 21.
 - .4 Environmental Plan specified in section 01 35 43.
 - .5 Health and Safety Plan specified in section 01 35 29.
 - .6 Hot Work Procedures specified in section 01 35 24.
 - .7 Lockout Procedures specified in section 01 35 25.
 - .8 List of workers requiring security clearance and those to be placed on Site Security Control list as specified in section 01 35 54.
 - .9 Indigenous Engagement Plan details.
 - .10 List of employees and subcontractors who will require access to the project SharePoint site as specified in section 01 33 00.

1.2 WORK SCHEDULE

- .1 Upon acceptance of bid submit:
 - .1 Preliminary work schedule within 7 calendar days of contract award for review by Departmental Representative.
 - .2 Detailed work schedule within 7 calendar days of approval of Preliminary work schedule.
- .2 Schedule to indicate all calendar dates from commencement to completion of all work within the time stated in the accepted bid, ensuring the critical dates are considered.
- .3 Provide sufficient details in preliminary schedule to clearly illustrate entire implementation plan, depicting efficient coordination of tasks and resources, to achieve completion of work on time and permit effective monitoring of work progress in relation to established milestones.
- .4 Preliminary work schedule content to include as a minimum the following:
 - .1 Bar Charts, indicating all work activities, tasks and other project elements, their anticipated durations, planned dates for achieving key activities and major project milestones supported with;
 - .2 Written narrative on key elements of work illustrated in bar chart, providing sufficient details to demonstrate a reasonable implementation plan for completion of project within designated time.
 - .3 Bar Charts derived from commercially available computerized project management system are mandatory.
- .5 Detailed Work Schedule (Master Schedule):
 - .1 Prepare by use of Critical Path Method (CPM) indicating:
 - .1 Complete and detailed sequence of all construction activities. Show projected start and completion dates for each activity.
 - .2 Number of calendar days required to carry out each activity.
 - .3 Critical path items with resulting critical dates, non-critical activities and resulting float time.
 - .4 Actual workdays from non-working days such as weekend and statutory days etc.

- .5 Projected and actual percentage of work completed for each major work activity.
- .6 Indicate proposed off-hours, holiday and weekend work.
- .7 Prepare CPM schedule by use of well recognized and widely used electronic software.
- .8 Submit copy of schedule in paper format and one electronic version saved on SharePoint for each submission.
- .9 Accompany CPM with written narrative as required and in sufficient detail to fully describe work and demonstrate a reasonable implementation plan for completion of project within designated time.
- .10 Work schedule must take into consideration and reflect the work phasing, required sequence of work, special conditions and operational restrictions as specified below, and indicated on drawings and as identified in Appendix A, Constraints.
- .11 Schedule work in cooperation with the Departmental Representative.
- .12 Incorporate within Detailed Work Schedule, items identified by Departmental Representative during review of preliminary schedule.
- .13 Completed schedule shall be approved by Departmental Representative. When approved, take necessary measures to complete work within scheduled time. Do not change schedule without Departmental Representative's approval.
- .14 Ensure that all sub trades and subcontractors are made aware of the work restraints and operational restrictions specified.
- .15 Schedule Updates:
 - .1 Submit on a monthly basis at minimum, or when requested by Departmental Representative the following schedule products:
 1. Three month look ahead
 2. Four week detail work plan
 3. Updates to Master Schedule
 - .2 Provide information and pertinent details explaining reasons for necessary changes to implementation plan.
 - .3 Identify problem areas, anticipated delays, impact on schedule and proposed corrective measures to be taken.
 - .4 Departmental Representative will make interim reviews and evaluate progress of work based on approved schedule.
 - .1 Frequency of such reviews will be as decided by Departmental Representative.
 - .2 Address and take corrective measures on items identified by reviews and as directed by Departmental Representative.
 - .3 Update schedule accordingly.
 - .5 In every instance, change or deviation from the Work Schedule, no matter how minimal the risk or impact on safety or inconvenience to tenant or public might appear, will be subject to prior review and approval by the Departmental Representative.

1.4 OPERATIONAL RESTRICTIONS

- .1 See section 01 35 54 in regards to:
 - .1 Special security requirements which must be observed in the course of work.
- .2 Limited Manoeuvring Space on Site:

- .1 Coordinate with Departmental Representative regarding limited site access and work areas
- .3 Safety Signage:
 - .1 Provide on-site, and erect as required during progress of work, proper bilingual signage, mounted on self-supporting stands, warning the public and campus occupants and employees of construction activities in progress.
 - .2 Signage to be professionally printed and mounted on wooden backing, coloured and to express messages as directed by the Departmental Representative.
 - .3 Generally maximum size of sign should be in the order of 1.0 square meters. Number of signs required will be dependent on number of areas in facility under renovation at any one time.
 - .4 Include costs for the supply and installation of these signs in the bid amount.
- .4 Dust and Dirt Control:
 - .1 Effectively plan and implement dust control measures and cleaning activities as an integral part of all construction activities. Review all measures with the Departmental Representative before undertaking work, especially for major dust generating activities.
 - .2 Do not allow construction waste to accumulate on site and contribute to the propagation of dust.
 - .3 As work progresses, maintain construction areas in a tidy condition at all times. Remove gross dust accumulations by cleaning and vacuuming immediately following the completion of any major dust generating activity.
 - .4 Immediately remove all debris and dust from site as generated by work therein during a given work shift.
 - .6 Avoid situations and practises which results in dust and dirt being brought from the construction areas or from the exterior and tracked inside the building, into occupied areas used by others entering building.
 - .7 Stop workers with soiled footwear. Stringently enforce rules and regulations, immediately address non-compliance.
 - .8 Inform workers and make them sensitive to the need for dust control for occupants and public.

1.3 Work in Public Areas:

- .1 Where work must be carried out in an occupied (public) area beyond the boundaries of the enclosed, fenced in, construction site, perform such work during the non-operational off-hour periods of the Facility, unless approved in advance by the Departmental Representative.
- .2 Ensure that all dust, dirt, debris, construction waste, materials, tools and equipment are completely removed at the end of each work shift. Clean and reinstate area ready for use by CCGC and public.
- .3 Provide temporary dust barriers around immediate work areas and place fabric drop sheets over workstations, equipment and other furnishings located immediately adjacent to such work.

- .4 Conduct work in such a way as to minimize the creation of dust and to avoid contaminating areas beyond the immediate location.
- .5 Discuss and obtain Departmental Representative's approval beforehand on the type and extent of dust barriers, protective devices and measures needed.
- .6 Ensure that all sub-trades are made aware of and abide by the contents of this section and in particularly the work restrictions specified herein due to tenant operational requirements.

1.4 WORK COORDINATION

- .1 General Contractor is responsible for coordinating the work of the various trades and predetermining where the work of such trades interfaces with each other.
 - .1 Designate one person from own employ having overall responsibility to review contract documents and shop drawings, plan and manage such coordination.
 - .2 General Contractor shall convene meetings between trades whose work interfaces and ensure that they are fully aware of the areas and the extent of where interfacing is required.
 - .1 Provide each trade with the plans and specs of the interfacing trade, as required, to assist them in planning and carrying out their respective work.
 - .2 Develop coordination drawings when deemed required illustrating potential interference between work of various trades and distribute to all affected parties including structural trade.
 - .1 Coordination drawings to identify all building elements, services lines, rough-in points and indicate from where various services are coming.
 - .2 Review coordination drawings at purposely called meetings. Have subcontractors sign-off on drawings and publish minutes of each meeting.
 - .3 Plan and coordinate work in such a way to minimize quantity of service line offsets.
 - .4 Submit copy of coordination drawings and meeting minutes to Departmental Representative for information purposes.
 - .3 Submission of shop drawings and ordering of prefabricated equipment or prebuilt components shall only occur once coordination meeting for such items has taken place between trades and all conditions affecting the work of the interfacing trades has been made known and accounted for.
 - .4 Work Cooperation:
 - .1 Ensure cooperation between trades in order to facilitate the general progress of the work and avoid situations of spatial interference.
 - .2 Ensure that each trade provides all other trades reasonable opportunity for the completion of the work and in such a way as to prevent unnecessary delays, cutting, patching and the need to remove and replace completed work.
 - .5 No extra costs to the Contract will be considered by the Departmental Representative as a result of Contractor's failure to effectively coordinate all portions of the Work. Disputes between the various trades as a result of their not being informed of the areas and extent of interface work shall be the sole responsibility of the General Contractor to be resolved at own cost.

1.6 OTHER CONTRACTS

- .1 Other contracts will be in progress at the CCGC during the course of this work.
- .2 The project title and subject matter of these contracts are:
 - .1 Mechanical and Sprinkler System Upgrades, expected award date early December 2018
 - .2 Louis S St. Laurent Mechanical System Upgrades, expected award date early August 2018
 - .3 Other Contracts as required.
- .3 The General Contractors are yet to be determined.
- .4 Further contracts may be let during the period that this contract is in progress.
- .5 Cooperate with other Contractors in carrying out their respective works and carry out all instructions from the Departmental Representative in this regard.
- .6 Connect properly and coordinate work with that of other Contractors. If any part of the work under this Contract depends for its proper execution or result upon the work of another Contractor, report promptly to the Departmental Representative, in writing, any defects in the work of such other Contractors as may interfere with the proper execution of this work.
- .7 The schedule of the CCGC Mechanical and Sprinkler System Upgrades contract will take precedence over other construction contracts.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

PART 1 GENERAL

1.1 ADMINISTRATIVE

- .1 Schedule and administer project meetings throughout the progress of the work at the call of Departmental Representative.
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting 4 days in advance of meeting date to Departmental Representative.
- .4 Provide physical space and make arrangements for meetings. Some meetings will be WebEx and coordinated through Departmental Representative.
- .5 Preside at meetings.
- .6 Unless directed otherwise by Departmental Representative, record minutes of meetings. Minutes shall be circulated to attending parties and affected parties not in attendance within 3 days after meeting.
- .7 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETING

- .1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5 Agenda to include:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Schedule of Work: in accordance with Section 01 32 15.
 - .3 Schedule of submission of shop drawings, samples, mock-ups, colour chips. Submit submittals in accordance with Section 01 33 00.
 - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00.
 - .5 Delivery schedule of specified equipment in accordance with Section 01 32 00.
 - .6 Site security in accordance with Sections 01 35 54 and 01 56 00.
 - .7 Health and safety in accordance with Section 01 35 29.

- .8 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
- .9 Owner provided products.
- .10 Record drawings and specifications in accordance with Sections 01 33 00 and 01 78 00.
- .11 Maintenance manuals in accordance with Section 01 91 13.
- .12 Take-over procedures, acceptance, and warranties.
- .13 Monthly progress claims, administrative procedures, photographs, hold backs.
- .14 Appointment of inspection and testing agencies or firms.
- .15 Insurances, transcript of policies.
- .16 Indigenous Engagement

1.3 PROGRESS MEETINGS

- .1 During course of Work schedule progress meetings monthly or more frequently if requested by the Departmental Representative.
- .2 Contractor, major Subcontractors involved in Work and Departmental Representative and Owner 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 3 days after meeting.
- .5 Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule.
 - .5 Review of off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revision to construction schedule.
 - .8 Progress schedule, during succeeding work period.
 - .9 Review submittal schedules: expedite as required.
 - .10 Maintenance of quality standards.
 - .11 Review proposed changes for effect on construction schedule and on completion date.
 - .12 Other business.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 – Submittals.
- .2 Section 01 77 00 - Closeout Procedures.

1.2 PROGRESS PHOTOGRAPHS AND VIDEOS

- .1 Save weekly progress photos and videos in designated SharePoint folder.
- .2 Indicate date and location (building and room number) in file name.
- .3 Weekly Photos to be uploaded by end of day on the following Monday.

1.3 MONTHLY REPORTS

- .1 Submit monthly report on the 5th day of the following month.
- .2 Save monthly reports in the designated SharePoint folder
- .3 Monthly Report to include:
 - .1 Project Status including review of previous month and summary of work planned.
 - .2 Updated RFI log.
 - .3 Updated Contemplated Change Notice (CCN) and Change Order (CO) Log.
 - .4 Issues tracker.
 - .5 Schedule updates, 3 month look ahead and 4 week detail schedule.
 - .6 Safety Review
 - .7 Indigenous Engagement Report, including
 - Human Resources Plan
 - Descriptions of the positions intended to be filled by Indigenous employees, and;
 - Strategies for the recruitment and retention of Indigenous employees.
 - Skills Development Plan
 - Descriptions of on-the-job training programs intended for Indigenous employees, and;
 - Strategies for ongoing skills development for Indigenous people.
 - Indirect Benefits Plan
 - Identification of supplies or services intended to be carried out by Indigenous firms;
 - Details on how Indigenous firms will be engaged for the identified requirements;
 - Potential for the development of new or expanded Indigenous capabilities and/or capacity;
 - Commitment to work with organizations experienced with Indigenous engagement.
 - .8 Campus Impact review (i.e., water service, electrical services, traffic interruptions, after-hours work, hot work, etc.)
 - .9 Cash flow projections, monthly and annually with focus on Government of Canada fiscal year end date of 31 March.
 - .10 Any other details or summaries as requested by the Departmental Representative.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

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 Submit in electronic format as pdf files. Save to project SharePoint site in folders as directed by Departmental Representative.
- .12 Provide list of all contractors, subcontractors and suppliers personnel that require access to Shop drawings folders in SharePoint. Enable Alerts on the Shop Drawing folders so the process of approvals is tracked easily. Other folders that may require only Contractor access include monthly reports, progress payments and change management folders.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Nova Scotia of 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 14 working days for Departmental Representative's review of each submission.
- .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Amount. 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 by emailing a link to the SharePoint folder of revisions other than those requested.
- .7 Accompany submissions with email transmittal including the link to the SharePoint folder. Do not include the files as attachments to the email.
- .8 Submissions shall 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 Do not combine more than one supplier in each submission.
- .10 After Departmental Representative's review, distribute copies.
- .11 Submit one electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

- .12 Submit one electronic copy 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.
- .13 Submit one electronic copy 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.
- .14 Submit one electronic copy 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.
- .15 Submit and one electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .16 Submit one electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .17 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .18 Submit three hard copies and one electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .19 Delete information not applicable to project.
- .20 Supplement standard information to provide details applicable to project.
- .21 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, reviewed and stamped copies will be saved to SharePoint and the Contractor will be notified so 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.
- .22 The review of shop drawings by the Departmental Representative is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that the Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of

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

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

1.3 SAMPLES

- .1 Submit for review samples in duplicate 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 Amount. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 PHOTOGRAPHIC DOCUMENTATION

- .1 Save project progress photographs and videos to a designated file in SharePoint.
- .2 File name to include: building, room number and date of photograph.
- .3 Save to SharePoint weekly photos by noon on the following Monday.

1.5 FEES, PERMITS AND CERTIFICATES

- .1 Provide authorities having jurisdiction with information requested.
- .2 Pay fees and obtain certificates and permits required.
- .3 Furnish certificates and permits.
- .4 Submit acceptable certificate stating that suspended ceiling systems provide adequate support for electrical fixtures, as required by current bulletin of Electrical Safety Authority (ESA.)

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

PART 1 GENERAL

1.1 SECTION INCLUDES

- .1 Fire Safety Requirements.
- .2 Hot Work Permit.
- .3 Existing Fire Protection and Alarm Systems.

1.2 RELATED SECTIONS

- .1 Section 01 35 29: Health and Safety Requirements.

1.3 DEFINITIONS

- .1 Hot Work defined as:
 - .1 Welding work.
 - .2 Cutting of materials by use of torch or other open flame devices.
 - .3 Grinding with equipment which produces sparks.
 - .4 Use of open flame torches such as for roofing work.

1.4 SUBMITTALS

- .1 Submit copy of Hot Work Procedures and sample of Hot Work permit to Departmental Representative for review, within 14 calendar days of acceptance of bid.
- .2 Submit in accordance with Section 01 33 00.

1.5 FIRE SAFETY REQUIREMENTS

- .1 Implement and follow fire safety measures during Work. Comply with following:
 - .1 National Fire Code 2015.
 - .2 Federal and Provincial Occupational Health and Safety Acts and Regulations.
- .2 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.

1.6 HOT WORK AUTHORIZATION

- .1 Obtain Departmental Representative's written "Authorization to Proceed" before conducting any form of Hot Work on site in public areas.
- .2 To obtain authorization submit to Departmental Representative:
 - .1 Contractor's Hot Work Procedures to be followed on site as specified below.
 - .2 Description of the type and frequency of Hot Work required.
 - .3 Sample Hot Work Permit to be used.
- .3 Upon review and confirmation that effective fire safety measures will be implemented and followed during performance of hot work, Departmental Representative will give authorization to proceed as follows:

- .1 Issue one written "Authorization to Proceed" covering each isolated phase (for example work in a wing under control of contractor) or;
- .2 For work in common (public) areas and individual activities, each activity requiring a separately written authorization to proceed.
- .3 For work in isolated phases, under control of the contractor, keep record of Contractors own hot work permits and submit to Departmental Representative the following day.
- .4 Requirement for individual authorization will be based on:
 - .1 Nature or phasing of work.
 - .2 Risk to Facility operations.
 - .3 Quantity of various trades needing to perform hot work on project or.
 - .4 Other situation deemed necessary by Departmental Representative to ensure fire safety on premises.
- .5 Do not perform any Hot Work until receipt of Departmental Representative's written "Authorization to Proceed" for that portion of work.
- .6 In tenant occupied Facility, coordinate performance of Hot Work with Facility Manager through the Departmental Representative. When directed, perform Hot Work only during non-operative hours of the Facility. Follow Departmental Representative's directives in this regard.

1.7 HOT WORK PROCEDURES

- .1 Develop and implement safety procedures and work practices to be followed during the performance of Hot Work.
- .2 Hot Work Procedures to include:
 - .1 Requirement to perform hazard assessment of site and immediate work area beforehand for each hot work event in accordance with Safety Plan specified in section 01 35 29.
 - .2 Use of a Hot Work Permit system with individually issued permit by Contractor's Superintendent to worker or subcontractor granting permission to proceed with Hot Work.
 - .3 Permit required for each Hot Work event on a daily bases.
 - .4 Designation of a person on site as a Fire Safety Watcher responsible to conduct a fire safety watch for a minimum duration of 60 minutes immediately following the completion of the Hot Work.
 - .5 Compliance with fire safety codes, standards and occupational health and safety regulations specified.
 - .6 Site specific rules and procedures in force at the site as provided by the Facility Manager.
- .3 Generic procedures, if used, must be edited and supplemented with pertinent information tailored to reflect specific project conditions. Label document as being the Hot Work Procedures for this contract.
- .4 Procedures shall clearly establish responsibilities of:
 - .1 Worker performing hot work,
 - .2 Person issuing the Hot Work Permit,
 - .3 Fire Safety Watcher,
 - .4 Subcontractor(s) and Contractor.

- .5 Brief all workers and subcontractors on Hot Work Procedures and of Permit system. Stringently enforce compliance.

1.8 HOT WORK PERMIT

- .1 Hot Work Permit to include the following:
 - .1 Project name and project number.
 - .2 Building name and specific room or area where hot work will be performed.
 - .3 Date of issue.
 - .4 Description of hot work type needed.
 - .5 Special precautions to be followed, including type of fire extinguisher needed.
 - .6 Name and signature of permit issuer.
 - .7 Name of worker to which the permit is issued.
 - .8 Permit validity period not to exceed 8 hours. Indicate start time/date and termination time/date.
 - .9 Worker's signature with time/date of hot work completion.
 - .10 Stipulated time period of safety watch.
 - .11 Fire Safety Watcher's signature with time/date.
- .2 Permit to be typewritten form. Industry Standard forms shall only be used if all data specified above is included on form.
- .3 Each Hot Work Permit to be completed in full, signed and returned to Contractor's Superintendent for safe keeping on site.

1.9 FIRE PROTECTION AND ALARM SYSTEMS

- .1 Fire protection and alarm systems shall not be:
 - .1 Obstructed.
 - .2 Shut-off, unless approved by Departmental Representative.
 - .3 Left inactive at the end of a working day or shift.
- .2 Do not use fire hydrants, standpipes and hose systems for purposes other than firefighting.
- .3 Costs incurred, from the fire department, Facility owner and tenants, resulting from negligently setting off false alarms will be charged to the Contractor in the form of financial progress payment reductions and holdback assessments against the Contract.

1.10 FIRE WATCH

- .1 DFO maintains a Fire Watch throughout the campus during off hours, with specially trained Fire Watch patrolling the campus every thirty minutes. In areas under the control of the Contractor, provide Fire Watch during off hours, ensuring patrol of space (wing, building, etc.) every thirty minutes. Document observations and incidents and submit to Departmental Representative if requested.

1.11 DOCUMENTS ON SITE

- .1 Keep Hot Work Permits and Hazard assessment documentation on site for duration of Work.
- .2 Upon request, make available to Departmental Representative or to authorized safety

Representative for inspection.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 PRODUCTS

3.1 NOT USED

END

PART 1 GENERAL

1.1 SECTION INCLUDES

- .1 Procedures to isolate and lockout electrical facility and other equipment from energy sources.

1.2 RELATED SECTIONS

- .1 Section 01 35 29: Health and Safety.

1.3 REFERENCES

- .1 CSA C22.1-12, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.
- .2 CAN/CSA-C22.3 No.1-06, Overhead Systems.
- .3 CSA C22.3 No.7-06, Underground Systems.
- .4 COSH: Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.

1.4 DEFINITIONS

- .1 Electrical Facility: means any system, equipment, device, apparatus, wiring, conductor, assembly or part thereof that is used for the generation, transformation, transmission, distribution, storage, control, measurement or utilization of electrical energy, and that has an amperage and voltage that is dangerous to persons.
- .2 Guarantee of Isolation: means a guarantee by a competent person in control or in charge that a particular facility or equipment has been isolated.
- .3 De-energize: in the electrical sense, that a piece of equipment is isolated and grounded, e.g. if the equipment is not grounded, it cannot be considered de-energized (DEAD).
- .4 Guarded: means that an equipment or facility is covered, shielded, fenced, enclosed, inaccessible by location, or otherwise protected in a manner that, to the extent that is reasonably practicable, will prevent or reduce danger to any person who might touch or go near such item.
- .5 Isolate: means that an electrical facility, mechanical equipment or machinery is separated or disconnected from every source of electrical, mechanical, hydraulic, pneumatic or other kind of energy that is capable of making it dangerous.
- .6 Live/alive: means that an electrical facility produces, contains, stores or is electrically connected to a source of alternating or direct current of an amperage and voltage that is dangerous or contains any hydraulic, pneumatic or other kind of energy that is capable of making the facility dangerous to persons.

1.5 COMPLIANCE REQUIREMENTS

- .1 Comply with the following in regards to isolation and lockout of electrical facilities and

equipment:

- .1 Canadian Electrical Code.
 - .2 Federal and Provincial Occupational Health and Safety Acts and Regulations.
 - .3 Regulations and code of practice as applicable to mechanical equipment or other machinery being de-energized.
 - .4 Procedures specified herein.
- .2 In event of conflict between any provisions of above authorities the most stringent provision will apply.

1.6 SUBMITTALS

- .1 Submit copy of lockout procedures, sample of lockout permit and lockout tags proposed for use in accordance with Section [01 33 00]. Submit within [14] calendar days of acceptance of bid.

1.7 ISOLATION OF EXISTING SERVICES

- .1 Obtain Departmental Representative's written authorization prior to working on existing live or active electrical facilities and equipment and before proceeding with isolation of such item.
- .2 To obtain authorization, submit to Departmental Representative the following documentation:
 - .1 Written request to isolate the particular service or facility and;
 - .2 Copy of Contractor's Lockout Procedures.
- .3 Make a Request for Isolation for each event, unless directed otherwise by Departmental Representative, as follows:
 - .1 Fill-out standard form in current use at the Facility as provided by Departmental Representative or;
 - .2 Where no form exist, make written request indicating:
 - .1 The equipment, system or service to be isolated and its location;
 - .2 Duration of isolation period (ie: start time & date and completion time & date).
 - .3 Voltage of service feed to system or equipment being isolated.
 - .4 Name of person making the request.
- .4 Do not proceed with isolation until receipt of written notification from Departmental Representative granting the Isolation Request and authorization to proceed with the work.
 - .1 Note that Departmental Representative may designate another person at the Facility being authorized to grant the Isolation Request.
- .5 Conduct safe, orderly shutdown of equipment or facility. De-energize, isolate and lockout power and other sources of energy feeding the equipment or facility.
- .6 Determine in advance, as much as possible, in cooperation with the Departmental Representative, the type and frequency of situations which will require isolation of existing services.
- .7 Plan and schedule shut down of existing services in consultation with the Departmental Representative and the Facility Manager. Minimize impact and downtime of Facility

operations. Follow Departmental Representative's directives in this regard.

- .8 Conduct hazard assessment as part of the process in accordance with health and safety requirements specified Section [01 35 29].

1.8 LOCKOUTS

- .1 De-energize, isolate and lockout electrical facility, mechanical equipment and machinery from all potential sources of energy prior to working on such items.
- .2 Develop and implement clear and specific lockout procedures to be followed as part of the Work.
- .3 Prepare typed written Lockout Procedures describing safe work practices, procedures, worker responsibilities and sequence of activities to be followed on site by workforce to safely isolate an active piece of equipment or electrical facility and effectively lockout and tag out it's sources of energy.
- .4 Include as part of the Lockout Procedures a system of lockout permits managed by Contractor's Superintendent or other qualified person designated by him/her as being "in-charge" at the site.
 - .1 A lockout permit shall be issued to specific worker providing a Guarantee of Isolation before each event when work must be performed on a live equipment or electrical facility.
 - .2 Duties of person managing the permit system to include:
 - .1 Issuance of permits and lockout tags to workers.
 - .2 Determining permit duration.
 - .3 Maintaining record of permits and tags issued.
 - .4 Making a Request for Isolation to Departmental Representative when required as specified above.
 - .5 Designating a Safety Watcher, when one is required based on type of work.
 - .6 Ensuring equipment or facility has been properly isolated.
 - .7 Collecting and safekeeping lockout tags returned by workers as a record of the event.
- .5 Clearly establish, describe and allocate responsibilities of:
 - .1 Workers.
 - .2 Person managing the lockout permit system.
 - .3 Safety Watcher.
 - .4 Subcontractor(s) and General Contractor.
- .6 Generic procedures, if used, must be edited and supplemented with pertinent information to reflect specific project requirements.
 - .1 Incorporate site specific rules and procedures in force at site as provided by Facility Manager through the Departmental Representative.
 - .2 Clearly label the document as being the Lockout procedures applicable to work of this contract.
- .7 Use energy isolation lockout devices specifically designed and appropriate for type of facility or equipment being locked out.

- .8 Use industry standard lockout tags.
- .9 Provide appropriate safety grounding and guards as required.

1.9 CONFORMANCE

- .1 Brief all workers and subcontractors on requirements of this section. Stringently enforce use and compliance.

1.10 DOCUMENTS ON SITE

- .1 Post Lockout Procedures on site in common location for viewing by workers.
- .2 Keep copies of Request for Isolation forms and lockout permits and tags issued to workers on site for full duration of Work.
- .3 Upon request, make available to Departmental Representative or to authorized safety representative for inspection.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 32 00: Construction Progress Documentation.
- .2 Section 01 33 00: Submittal Procedures.
- .3 Section 01 35 24: Special Procedures on Fire Safety Requirements.
- .4 Section 01 35 25: Special Procedures on Lockout Requirements.

1.2 DEFINITIONS

- .1 COSH: Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.
- .2 Competent Person: means a person who is:
 - .1 Qualified by virtue of personal knowledge, training and experience to perform assigned work in a manner that will ensure the health and safety of persons in the workplace, and;
 - .2 Knowledgeable about the provisions of occupational health and safety statutes and regulations that apply to the Work and;
 - .3 Knowledgeable about potential or actual danger to health or safety associated with the Work.
- .3 Medical Aid Injury: any minor injury for which medical treatment was provided and the cost of which is covered by Workers' Compensation Board of the province in which the injury was incurred.
- .4 PPE: personal protective equipment.
- .5 Work Site: where used in this section shall mean areas, located at the premises where Work is undertaken, used by Contractor to perform all of the activities associated with the performance of the Work.

1.3 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00.
- .2 Submit site-specific Health and Safety Plan prior to commencement of Work.
 - .1 Submit within 10 work days of notification of Bid Acceptance. Allow for 5-10 days for Department review and recommendations prior to the commencement of work.
 - .2 Departmental Representative will review Health and Safety Plan and provide comments.
 - .3 Revise the Plan as appropriate and resubmit within 5 work days after receipt of comments.
 - .4 Departmental Representative's review and comments made of the Plan shall not be construed as an endorsement, approval or implied warranty of any kind by Canada and does not reduce Contractor's overall responsibility for Occupational Health and Safety of the Work.
 - .5 Submit revisions and updates made to the Plan during the course of Work.
- .3 Submit name of designated Health and Safety Site Representative and support documentation specified in the Safety Plan.
- .4 Submit building permit, compliance certificates and other permits obtained.

- .5 Submit copy of Letter in Good Standing from Provincial Workers Compensation or other Department of Labour organization.
 - .1 Submit update of Letter of Good Standing whenever expiration date occurs during the period of Work.
- .6 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .7 Submit copies of incident reports.
- .8 Submit WHMIS MSDS - Material Safety Data Sheets.

1.4 COMPLIANCE REQUIREMENTS

- .1 Comply with Occupational Health and Safety Act for Province of Nova Scotia, and Regulations made pursuant to the Act.
- .2 Comply with Canada Labour Code - Part II (entitled Occupational Health and Safety) and the Canada Occupational Health and Safety Regulations as well as any other regulations made pursuant to the Act.
 - .1 The Canada Labour Code can be viewed at: [www.http://laws-lois.justice.gc.ca/eng/acts/L-2_fulltext.html](http://laws-lois.justice.gc.ca/eng/acts/L-2_fulltext.html).
 - .2 Canadian Occupational Health and Safety Regulations can be viewed at: <http://laws-lois.justice.gc.ca/eng/regulations/SOR-86-304/index.html>.
 - .3 A copy may be obtained at: Canadian Government Publishing Public Works & Government Services Canada Ottawa, Ontario, K1A 0S9 Tel: 819-956-4800 or 1-800-635-7943 Publication No. L31-85/2000 (E or F).
- .3 Treasury Board of Canada Secretariat (TBS):
 - .1 Treasury Board, Fire Protection Standard April 1, 2010 www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=17316§ion=text.
- .4 Canadian Standards Association (CSA):
 - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
- .5 Observe construction safety measures of:
 - .1 NBC 2010, Division B, Part 8.
 - .2 Municipal by-laws and ordinances.
- .6 In case of conflict or discrepancy between above specified requirements, the more stringent shall apply.
- .7 Maintain Workers Compensation Coverage in good standing for duration of Contract. Provide proof of clearance through submission of Letter in Good Standing.
- .8 Medical Surveillance: Where prescribed by legislation or regulation, obtain and maintain worker medical surveillance documentation.

1.5 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons and environment adjacent to the site to extent that they may be affected by conduct of Work.
- .2 Comply with and enforce compliance by all workers, sub-contractors and other persons granted access to Work Site with safety requirements of Contract Documents, applicable federal, provincial, and local by-laws, regulations, and ordinances, and with site-specific

Health and Safety Plan.

1.6 SITE CONTROL AND ACCESS

- .1 Control the Work and entry points to Work Site. Approve and grant access only to workers and authorized persons. Immediately stop and remove non-authorized persons.
 - .1 Departmental Representative will provide names of those persons authorized by Departmental Representative to enter onto Work Site and will ensure that such authorized persons have the required knowledge and training on Health and Safety pertinent to their reason for being at the site, however, Contractor remains responsible for the health and safety of authorized persons while at the Work Site.
- .2 Isolate Work Site from other areas of the premises by use of appropriate means.
 - .1 Erect fences, hoarding, barricades and temporary lighting as required to effectively delineate the Work Site, stop non-authorized entry, and to protect pedestrians and vehicular traffic around and adjacent to the Work and create a safe environment. [See Section [01 50 00] for minimum acceptable requirements].
 - .2 Post signage at entry points and other strategic locations indicating restricted access and conditions for access.
 - .3 Use professionally made signs with bilingual message in the 2 official languages or international known graphic symbols.
- .3 Provide safety orientation session to persons granted access to Work Site. Advise of hazards and safety rules to be observed while on site.
- .4 Ensure persons granted site access wear appropriate PPE. Supply PPE to inspection authorities who require access to conduct tests or perform inspections.
- .5 Secure Work Site against entry when inactive or unoccupied and to protect persons against harm. [Provide security guard where adequate protection cannot be achieved by other means].

1.7 PROTECTION

- .1 Give precedence to safety and health of persons and protection of environment over cost and schedule considerations for Work.
- .2 Should unforeseen or peculiar safety related hazard or condition become evident during performance of Work, immediately take measures to rectify situation and prevent damage or harm. Advise Departmental Representative verbally and in writing.

1.8 FILING OF NOTICE

- .1 File Notice of Project with pertinent provincial health and safety authorities prior to beginning of Work.
 - .1 Departmental Representative will assist in locating address if needed.

1.9 PERMITS

- .1 Post permits, licenses and compliance certificates, specified in section 01 10 10, at Work Site.
- .2 Where a particular permit or compliance certificate cannot be obtained, notify Departmental Representative in writing and obtain approval to proceed before carrying out applicable portion of work.

1.10 HAZARD ASSESSMENTS

- .1 Perform site specific health and safety hazard assessment of the Work and its site.
- .2 Carryout initial assessment prior to commencement of Work with further assessments as needed during progress of work, including when new trades and subcontractors arrive on site.
- .3 Record results and address in Health and Safety Plan.
- .4 Keep documentation on site for entire duration of the Work.

1.11 PROJECT/SITE CONDITIONS

- .1 Following are potential health, environmental and safety hazards at the site for which Work may involve contact with:
 - .1 Existing hazardous substances or contaminated building materials:
 - .1 Asbestos.
 - .2 Lead paint.
 - .3 Halon 1301
 - .4 Other substances
 - .2 Facility on-going operations:
 - .1 The Canadian Coast Guard College is a 24 hour a day operation in which cadets live and learn.
 - .2 Marine Communications and Traffic Services (MCTS) Operation Center operates on campus 24 hours a day, and is responsible for search and rescue for waters off Cape Breton. Operation of the MCTS without interruption is critical.
 - .3 The College will continue to operate while the contract is underway.
- .2 Above items shall not be construed as being complete and inclusive of potential health and safety hazards encountered during Work.
- .3 Include above items in the hazard assessment of the Work.
- .4 MSDS Data sheets of pertinent hazardous and controlled products stored on site can be obtained from Departmental Representative.

1.12 MEETINGS

- .1 Attend pre-construction health and safety meeting, convened and chaired by Departmental Representative, prior to commencement of Work, at time, date and location determined by Departmental Representative. Ensure attendance of:
 - .1 Superintendent of Work.
 - .2 Designated Health & Safety Site Representative.
 - .3 Subcontractors.
- .2 Conduct regularly scheduled tool box and safety meetings during the Work in conformance with Occupational Health and Safety regulations.
- .3 Keep documents on site.

1.13 HEALTH AND SAFETY PLAN

- .1 Prior to commencement of Work, develop written Health and Safety Plan specific to the Work. Implement, maintain, and enforce Plan for entire duration of Work and until final demobilization from site.

- .2 Health and Safety Plan shall include the following components:
 - .1 List of health risks and safety hazards identified by hazard assessment.
 - .2 Control measures used to mitigate risks and hazards identified.
 - .3 On-site Contingency and Emergency Response Plan as specified below.
 - .4 On-site Communication Plan as specified below.
 - .5 Name of Contractor's designated Health & Safety Site Representative and information showing proof of his/her competence and reporting relationship in Contractor's company.
 - .6 Names, competence and reporting relationship of other supervisory personnel used in the Work for occupational health and safety purposes.
- .3 On-site Contingency and Emergency Response Plan shall include:
 - .1 Operational procedures, evacuation measures and communication process to be implemented in the event of an emergency.
 - .2 Evacuation Plan: site and floor plan layouts showing escape routes, marshalling areas. Details on alarm notification methods, fire drills, location of firefighting equipment and other related data.
 - .3 Name, duties and responsibilities of persons designated as Emergency Warden(s) and deputies.
 - .4 Emergency Contacts: name and telephone number of officials from:
 - .1 General Contractor and subcontractors.
 - .2 Pertinent Federal and Provincial Departments and Authorities having jurisdiction.
 - .3 Local emergency resource organizations.
 - .5 Harmonize Plan with Facility's Emergency Response and Evacuation Plan. Departmental Representative will provide pertinent data including name of PSPC and Facility Management contacts.
- .4 On-site Communication Plan:
 - .1 Procedures for sharing of work related safety information to workers and subcontractors, including emergency and evacuation measures.
 - .2 List of critical work activities to be communicated with Facility Manager which have a risk of endangering health and safety of Facility users.
- .5 Address all activities of the Work including those of subcontractors.
- .6 Review Health and Safety Plan regularly during the Work. Update as conditions warrant to address emerging risks and hazards, such as whenever new trade or subcontractor arrive at Work Site.
- .7 Departmental Representative will respond in writing, where deficiencies or concerns are noted and may request re-submission of the Plan with correction of deficiencies or concerns.
- .8 Post copy of the Plan, and updates, prominently on Work Site.

1.14 SAFETY SUPERVISION

- .1 Employ Health & Safety Site Representative responsible for daily supervision of health and safety of the Work.
- .2 Health & Safety Site Representative may be the Superintendent of the Work or other person designated by Contractor and shall be assigned the responsibility and authority to:
 - .1 Implement, monitor and enforce daily compliance with health and safety requirements of the Work.
 - .2 Monitor and enforce Contractor's site-specific Health and Safety Plan.

- .3 Conduct site safety orientation session to persons granted access to Work Site.
- .4 Ensure that persons allowed site access are knowledgeable and trained in health and safety pertinent to their activities at the site or are escorted by a competent person while on the Work Site.
- .5 Stop the Work as deemed necessary for reasons of health and safety.
- .3 Health & Safety Site Representative must:
 - .1 Be qualified and competent person in occupational health and safety.
 - .2 Have site-related working experience specific to activities of the Work.
 - .3 Be on Work Site at all times during execution of the Work.
- .4 All supervisory personnel assigned to the Work shall also be competent persons.
- .5 Inspections:
 - .1 Conduct regularly scheduled safety inspections of the Work on a minimum weekly basis. Record deficiencies and remedial action taken.
 - .2 Conduct Formal Inspections on a minimum monthly basis. Use standardized safety inspection forms. Distribute to subcontractors.
 - .3 Follow-up and ensure corrective measures are taken.
 - .4 Include summary of inspection reports in Monthly Progress Report as per section 01 32 00
- .6 Cooperate with Facility's Occupational Health and Safety representative should one be designated by Departmental Representative.
- .7 Keep inspection reports and supervision related documentation on site.

1.15 TRAINING

- .1 Use only skilled workers on Work Site who are effectively trained in occupational health and safety procedures and practices pertinent to their assigned task.
- .2 Maintain employee records and evidence of training received. Make data available to Departmental Representative upon request.
- .3 When unforeseen or peculiar safety-related 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.

1.16 MINIMUM SITE SAFETY RULES

- .1 Notwithstanding requirement to abide by federal and provincial health and safety regulations; ensure the following minimum safety rules are obeyed by persons granted access to Work Site:
 - .1 Wear appropriate PPE pertinent to the Work or assigned task; minimum being hard hat, safety footwear, safety glasses and hearing protection.
 - .2 Immediately report unsafe condition at site, near-miss accident, injury and damage.
 - .3 Maintain site and storage areas in a tidy condition free of hazards causing injury.
 - .4 Obey warning signs and safety tags.
- .2 Brief persons of disciplinary protocols to be taken for noncompliance. [Post rules on site].

1.17 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 will stop Work if non-compliance of health and safety regulations is not corrected in a timely manner.

1.18 INCIDENT REPORTING

- .1 Investigate and report the following incidents to Departmental Representative:
 - .1 Incidents requiring notification to Provincial Department of Occupational Safety and Health, Workers Compensation Board or to other regulatory Agency.
 - .2 Medical aid injuries.
 - .3 Property damage in excess of \$10,000.00,
 - .4 Interruptions to Facility operations resulting in an operational lost to a Federal department in excess of \$5,000.00.
- .2 Submit report in writing.

1.19 HAZARDOUS PRODUCTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS).
- .2 Keep MSDS data sheets for all products delivered to site.
 - .1 Post on site.
 - .2 Submit copy to Departmental Representative.
 - .3 For interior work in an occupied Facility, post additional copy in one or more publically accessible locations.

1.20 BLASTING

- .1 Blasting or other use of explosives is not permitted on site.

1.21 POWDER ACTUATED DEVICES

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

1.22 CONFINED SPACES

- .1 Abide by occupational health and safety regulations regarding work in confined spaces.

1.23 SITE RECORDS

- .1 Maintain on Work Site copy of safety related documentation and reports stipulated to be produced in compliance with Acts and Regulations of authorities having jurisdiction and of those documents specified herein.
- .2 Upon request, make available to Departmental Representative or authorized Safety Officer for inspection.

1.24 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on Work Site in accordance with Acts and Regulations of Province having jurisdiction.
- .2 Post other documents as specified herein, including:
 - .1 Site specific Health and Safety Plan.

.2 WHMIS data sheets.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

1.1 References

- .1 Canada Shipping Act, Transport Canada, 2001, amended 2013-12-01.
- .2 Canadian Coast Guard Regulations, Fisheries and Oceans Canada
- .3 Canadian Environmental Assessment Act, 2012, amended 2013-11-25
- .4 Canadian Environmental Protection Act, 1999, amended on 2014-03-28
- .5 Fisheries Act, 1985, Fisheries and Oceans Canada, amended 2013-11-25
- .6 Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters, 1998
- .7 Migratory Birds Convention Act, 1994, Environment Canada, amended 2010-12-10
- .8 Navigation Protection Act, 1985. Transport Canada, amended 2014-04-01
- .9 Nova Scotia – Environment Act
- .10 Species at Risk Act, 2002, amended 2013-03-08
- .11 The Federal Policy on Wetland Conservation, 1991, Environment Canada
- .12 Transportation of Dangerous Goods Act, 1992, Transport Canada, amended 2009-06-16
- .13 Workplace Hazardous Materials Information System, Health Canada.

1.2 Definitions

- .1 Archaeological Resources: All tangible evidence of human activity that is of historical, cultural or scientific interest. Examples include features, structures, archaeological objects or remains at or from an archaeological site, or an object recorded as an isolated archaeological find.
- .2 Buffer zone: a vegetated land that protects watercourses from adjacent land uses. It refers to the land adjacent to watercourses, such as streams, rivers, lakes, ponds, oceans, and wetlands, including the floodplain and the transitional lands between the watercourse and the drier upland areas.
- .3 Deleterious substance: (a) any substance that, if added to any water, would degrade or alter or form part of a process of degradation *or* alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water, or (b) any water that contains a substance in such quantity or concentration, or that has been so treated, processed or changed, by heat or other means, from a natural state that it would, if added to any other water, degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water.
- .4 Fish habitat: spawning grounds and any other areas, including nursery, rearing, food supply and migration areas, on which fish depend directly or indirectly in order to carry out their life processes.

- .5 Hazardous material: Product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to the environment or adversely affect health of persons, animals, or plant life when released into the environment.
- .6 Invasive or alien species: refers to a species or subspecies introduced outside its normal distribution whose establishment and spread threaten ecosystems, habitats or species with economic or environmental harm.
- .7 Navigable water: a canal and any other body of water created or altered as a result of the construction of any work.
- .8 Surface watercourse: refers to the bed and shore of a river, stream, lake, creek, pond, marsh, estuary or salt-water body that contains water for at least part of each year.
- .9 Wetlands: land where the water table is at, near or above the surface or which is saturated for a long enough period to promote such features as wet-altered soils and water tolerant vegetation. Wetlands include organic wetlands or "peatlands," and mineral wetlands or mineral soil areas that are influenced by excess water but produce little or no peat.

1.3 Transportation

- .1 Transport hazardous materials and hazardous waste in compliance with the Transportation of Dangerous Goods Act.
- .2 Eliminate free board spillage when excavating, loading and hauling dredged material.
- .3 Trucks transporting dredged material will have watertight boxes.
- .4 Do not overload trucks when hauling dredged material.
- .5 Maintain trucks clean and free of mud, dirt and other foreign matter.
- .6 Secure contents against spillage. Avoid potential release of contents and of any foreign matter onto highways, roads and access routes used for the work. Immediately clean any ground spills and soils to extent as directed by authority having jurisdiction.
- .7 Prior to commencement of work, advise and seek approval from the *Departmental Representative* of the existing roads and temporary routes / roads proposed to be used to access work areas and to haul material to and from the site, including roads to the dredge material disposal site.
- .8 Construction material and debris is not to become waterborne.
- .9 Any tools, equipment, vehicles, temporary structures or parts thereof used or maintained for the purpose of building or placing a work in navigable water are not to remain in place after the completion of the project.

- .10 Vessels are to be permitted safe access through the worksite at all times, and assisted as necessary.
- .11 All materials and equipment used in construction must be marked in accordance with the Collision Regulations of the *Canada Shipping Act, 2001* when located on the waterway.
- .12 Advise the Canadian Coast Guard, Marine Communication and Traffic Services (MCTS) at toll free at 1-800-686-8676 sufficiently in advance of commencement of work or when deploying or removing site markings in order to allow for appropriate Notices to Shipping/Mariners action.
- .13 Work activities must comply with all / any conditions of the Navigation Protection Act (NPA) permit issued by Transport Canada. A copy of the permit is included as Appendix B.

1.4 Operation of Machinery

- .1 Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species and noxious weeds.
- .2 Whenever possible, operate machinery on land above the high water mark, on ice, or from a floating barge in a manner that minimizes disturbance to the banks and bed of the water body.
- .3 Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water.
- .4 Biodegradable fluids should be considered for use in place of petroleum products whenever possible, as a standard for best practices.

1.5 Containment and Spill Management

- .1 Comply with Federal (CEPA Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations) and Provincial regulations, codes, standards and guidelines for the storage of fuel and allied petroleum products on site.
- .2 Do not dump petroleum products or any other deleterious substances on ground or in the water.
- .3 Be diligent and take all necessary precautions to avoid spills and contaminate the soil and water (both surface and subsurface) when handling petroleum products on site and during fueling and servicing of vehicles and equipment.
- .4 Maintain on site appropriate emergency spill response equipment consisting of at least one 250-litre (55 gallon) overpack spill kit for containment and cleanup of spills.
- .5 Maintain vehicles and equipment in good working order to prevent leaks on site.
- .6 In the event of a petroleum spill, immediately notify the *Departmental Representative* and the Canadian Coast Guard (CCG) at 1-800-565-1633 (24 hour report line). Preform

cleanup in accordance with all regulations and procedures stipulated by authority having jurisdiction.

- .7 Materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, or other chemicals are not to enter the watercourse.
- .8 Develop and submit to the Departmental Representative an Emergency Response Plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance. Include Provincial Environmental Emergency Contact information, and Departmental Representative's contact information.
- .9 Ensure that building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish.
- .10 If an oiled seabird is encountered, methodology for the handling and release of marine and migratory birds outlined in Environment and Climate Change Canada (ECCC) – Canada Wildlife Service (CWS)'s Oiled Birds Protocol will be implemented. A permit application must be obtained from ECCC-CWS prior to implementation of this protocol.

1.6 Hazardous Material handling

- .1 Store and handle hazardous materials in accordance with applicable federal and provincial regulations, codes, standards and guidelines. Store in location that will prevent spillage into the environment.
- .2 Label containers to WHMIS requirements and keep MSDS data sheets on site for all hazardous materials.
- .3 Maintain inventory of hazardous materials and hazardous waste stored on site. List items by product name, quantity and date when stored.
- .4 Workers in contact with hazardous materials must be provided with, and use regulated personal protective equipment and must have the necessary training to know how to handle the different hazardous materials for Health and Safety and according to Environmental Regulations.
- .5 If any soil is discovered with suspected contamination it will be stored on site for the shortest time possible, tested, covered, and be disposed of at an approved facility if applicable.
- .6 Refuelling is done at least 30m from any water body and on impermeable surface. Each vehicle/equipment is required to have a spill kit; there will also be centrally located basic petroleum spill clean-up equipment on-site. Ensure all spills or leaks are promptly contained, cleaned up and reported to the 24-hour environmental emergencies reporting system; also inform the RPSS PA immediately.
- .7 Ensure temporary matting is installed around buildings to limit the spread of debris/waste materials; thus, will also assist in clean up through the life cycle of the project.

1.7 Disposal of Wastes

- .1 Do not bury rubbish, construction and demolition debris (i.e., concrete, creosote timbers, steel, impacted soil materials etc.) and waste materials on site.
- .2 Dispose and recycle construction and demolition debris and waste materials in accordance with Provincial Waste Management Regulations and the project waste management requirements specified in sections 02 41 23 – Demolition and Removals.
- .3 Do not dispose of hazardous waste, volatile materials (such as mineral spirits, paints, thinners etc.) and petroleum products into waterways, storm or sanitary sewers or in waste landfill sites.
- .4 Dispose of hazardous waste in accordance with applicable federal and provincial, regulations, codes, standards and guidelines.
- .5 Concrete waste:
 - .1 Do not discharge residual or rejected concrete on site.
 - .2 Immediately clean any accidental release of concrete on site prior to solidification.
 - .3 Do not wash and clean concrete vehicles on site.
 - .4 Perform dumping of residual material and truck cleaning operations only at the concrete plant. Follow environmental regulations and good practices as approved by the Provincial Department of the Environment and other authorities having jurisdiction.
- .6 Debris entering the marine environment should be immediately retrieved when it is safe to do so.
- .7 The following mitigation measures are to be in place during concrete pours
 - .1 Concrete pouring should stop in moderate to heavy rain [2.6-7.6 mm/hr or more] to prevent leaching contaminants into aquatic environment.
 - .2 When concrete replacement work is necessary on structures, timber staging will be placed next to the face to prevent concrete from falling into the water, or a cofferdam will be constructed to enclose the work area.
 - .3 During underwater concrete abutment and pier repairs, concrete shall be fully cured before forms are removed and the repair exposed to current.
 - .4 Forms will have [caulked] corners to prevent leakage.
 - .5 Splash panels will be used during the pour to prevent material from entering the aquatic environment.
 - .6 Any accidental release of concrete will be removed prior to solidification.
 - .7 Work will cease until the spill is contained and the source of the leak can be identified.
 - .8 Contractor must inform the Departmental Representative of all accidental spills of concrete into fish bearing waters and contact Regulators immediately.

1.8 Water Quality

- .1 Conduct work in such a manner to limit turbidity and reduce sediment suspension in the water to an absolute minimum at all times.

- .2 Do not wash down equipment within a 30 meter buffer zone of a wetland, watercourse or other identified environmentally sensitive area.
- .3 Where required, install effective sediment control measures before starting work to prevent the entry or re-suspension of sediment in the water body. Inspect sediment control measures regularly to ensure they are functioning properly, and make all necessary repairs if any damage occurs. Upon completion of use, remove these control measures in a way that prevents the escape of settled sediment.
- .4 Develop and implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the water body during all phases of the work. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the water body or settling basin and runoff water is clear. The plan should, where applicable, include:
 - a) Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the water body.
 - b) Measures for managing water flowing onto the site, as well as water being pumped / diverted from the site such that sediment is filtered out prior to the water entering a water body. For example, pumping / diversion of water to a vegetated area, construction of a settling basin or other filtration system.
 - c) Site isolation measures (e.g., silt boom or silt curtain) for containing suspended sediment where in-water work is required (e.g., dredging, underwater cable installation).
 - d) Measures for containing and stabilizing waste material (e.g., dredging spoils, construction waste and materials, commercial logging waste, uprooted or cut aquatic plants, accumulated debris) above the high water mark of nearby water bodies to prevent re-entry.
 - e) Regular inspection and maintenance of erosion and sediment control measures and structures during the course of the work.
 - f) Repairs to erosion and sediment control measures and structures if damage occurs.
 - g) Removal of non-biodegradable erosion and sediment control materials once site is stabilized.
- .5 Remove all blasting debris and other associated equipment / products from the blast area.**1.9 Socioeconomic Restrictions**
- .1 Abide by municipal and provincial regulations for any restrictions on work performed during the night time and on flood lighting of the site. Obtain applicable permits.
- .2 Place flood lights in opposite direction of adjacent residential and business areas.
- .3 Work equipment and machinery must be equipped with purposely designed mufflers to reduce noise on site to lowest possible level. Maintain mufflers in good operating condition at all times.
- .4 Any measures necessary to mitigate direct effects on navigation will be included as terms and conditions associated with any work approved or permitted pursuant to the Navigation Protection Act.

1.10 Bird and Bird Habitat

- .1 Become knowledgeable with and abide by the Migratory Birds Convention Act (MBCA) in regards to the protection of migratory birds, their eggs, nests and their young encountered on site and in the vicinity.
- .2 Minimize disturbance to all birds on site and adjacent areas during the entire course of the Work.
- .3 Do not approach concentrations of seabirds, waterfowl and shorebirds when anchoring equipment, accessing wharves or ferrying supplies.
- .4 During night time work, position flood lights in opposite direction of nearby bird nesting habitat.
- .5 Do not use beaches, dunes and other natural previously undisturbed areas of the site to conduct work unless specifically approved by the *Departmental Representative*.
- .6 Should nests of migratory birds in wetlands be encountered during work, immediately notify *Departmental Representative* for directives to be followed.
 - .1 Do not disturb nest site and neighbouring vegetation until nesting is completed.
 - .2 Minimize work immediately adjacent to such areas until nesting is completed.
 - .3 Protect these areas by following recommendations of Canadian Wildlife Service.
 - .4 The proponent shall ensure that if a nest or chick of a migratory bird is detected within the project area, work in the area shall be halted and Canadian Wildlife Service shall be consulted at (902) 426- 9152.
 5. Should a migratory bird or raptor nest be encountered during work, activity in the vicinity of the nest should be halted. The nest location should be protected until chicks have naturally fledged from the area, with a buffer zone appropriate to the species as determined in consultation with the appropriate regulators (ECCC-CWS for species protected under the MBCA; provincial department of natural resources for raptors). As a general guideline, for small landbirds, an appropriate buffer for clearing activities may be 10 - 50 m, or even more depending on the level of activity and on the species. The buffer shall stay in place until August 31st or the time when chicks have naturally fledged from the area. A nest shall not be marked, or the tree/shrub in which it is situated, using flagging tape or other similar material; this increases the visibility of the nest and the risk of predation.
- .7 Ensure that no litter (including food wastes) is left in coastal areas.

1.11 Fish Protection

- .1 Avoid wet, windy and rainy periods that may increase erosion and sedimentation.
- .2 Ensure that all in-water activities, or associated in-water structures, do not interfere with fish passage, constrict the channel width, or reduce flows.
- .3 Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish. Entrainment occurs when a fish is drawn into a water intake and cannot escape.

Impingement occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself.

- .4 Screens should be located in areas and depths of water with low concentrations of fish throughout the year.
- .5 Screens should be located away from natural or artificial structures that may attract fish that are migrating, spawning, or in rearing habitat.
- .6 The screen face should be oriented in the same direction as the flow or perpendicular to the substrate.
- .7 Screens should be located a minimum of 300 mm above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area.
- .8 Be aware of the risk for contamination of the fish habitat at the site as a result of alien species being introduced in the water.
- .9 To minimize the possibility of fish habitat contamination and the spread of aquatic invasive (alien species), all construction equipment which will be immersed into the water of a watercourse, or has the possibility of coming into contact with such water during the course of the work, must be cleaned and washed to ensure that they are free of marine growth and alien species.
 - .1 Equipment shall include boats, barges, cranes, excavators, haul trucks, pumps, pipe lines and other all miscellaneous tools and equipment previously used in a marine environment.
- .10 Cleaning and washing of equipment shall be performed immediately upon their arrival at the site and before use in or over the body of water.
- .11 Conduct cleaning and washing operations as follows:
 - .1 Scrape and remove heavy accumulation of mud and dispose appropriately.
 - .2 Wash all surfaces of equipment by use of a pressurized fresh water supply.
 - .3 Immediately follow with application of a heavy sprayed coating of undiluted vinegar or other environmentally approved cleaning agent to thoroughly remove all plant matter, animals and sediments.
 - .4 Check and remove all plant, animal and sediment matter from the all bilges and filters.
 - .5 Drain standing water from equipment and let fully dry before use.
 - .6 Upon removal from the water, drain standing water from equipment and let fully dry before removal off the site.
- .12 Do not perform cleaning and washdown within a 30 metre buffer zone of a wetland, watercourse or other identified environmentally sensitive area.
- .13 Record of Assurance Logbook:
 - .1 Maintain an on-going log of past and present usage and washdowns of all equipment to illustrate mitigation measures undertaken against fish habitat contamination by alien species.

- .2 Write data in a hard cover bound logbook to include the following:
 - .1 Date and location where equipment was previously used in a watercourse or wetland;
 - .2 Type of work performed.
 - .3 Dates of wash down for each piece of equipment;
 - .4 Cleaning method and cleaning agent(s) used.
- .14 Keep Record of Assurance Logbook updated from project to project. Upon request, submit logbook to *Departmental Representative* for review.
- .15 Abide by requirements and recommendations from Fisheries and Oceans Canada – Fisheries Protection Program in cleaning and wash down of equipment.
- .16 Time work in water to protect fish, including their eggs, juveniles, spawning adults and / or the organisms upon which they feed. Ensure loss or disturbance to aquatic habitats are avoided.
- .17 Ensure regular maintenance and repair of cleaning apparatus, seals, and screens is carried out to prevent debris-fouling and impingement of fish.
- .18 Pumps should be shut down when fish screens are removed for inspection and cleaning.
- .19 Activities must be completed in such a way as to minimize the amount of fines and organic debris that may enter nearby aquatic environments.
- .20 Visual monitoring of the turbidity will be required in the vicinity of the project to ensure that the turbidity is limited. If excessive change occurs in the turbidity that differs from the existing conditions of the surrounding water body (i.e., distinct colour difference) as a result of the project activities, the work must stop immediately to determine if further mitigation measures are required.
- .21 Post-operational inspection of the intake and discharge lines will be undertaken. The program will focus on the disturbance of sediments and possible entrainment of fish on the screens. A drain valve will be installed on the sea water line downstream of the heat exchanger as a water sample source inside the pump house to collect water samples for basic water chemistry such as dissolved gases and temperature.
- .22 Weather conditions are to be assessed on a daily basis to determine the risk of extreme weather in the project areas. Avoid work during periods which Environment and Climate Change Canada has issued rainfall or wave warning for the work area.
- .23 Onsite crews must have emergency spill clean-up equipment, adequate for the activity involved, must be on-site. Spill equipment will include, as a minimum, at least one 250L (i.e., 55 gallon) overpak spill kit containing items to prevent a spill from spreading; absorbent booms, pillows, and mats; rubber gloves; and plastic disposal bags. All spills or leaks must be promptly contained, cleaned up, and reported to the 24-Hour Environmental Emergencies Report System (1-800-565-1633).

1.12 Invasive Species

- .1 To minimize the possibility of fish habitat contamination and the spread of aquatic invasive species, all construction equipment which will be immersed into the water of a watercourse, or has the possibility of coming into contact with such water during the course of the work, must be cleaned and washed to ensure that they are free of marine growth and alien species.
- .2 Equipment shall include boats, barges, cranes, excavators, haul trucks, pumps, pipe lines and other all miscellaneous tools and equipment previously used in a marine environment.
- .3 Cleaning and washing of equipment shall be performed immediately upon their arrival at the site and before use in or over the body of water.

1.13 Air Quality

- .1 Keep airborne dust and dirt resulting from the work on site to an absolute minimum.
- .2 Dust suppression by the application of water must be employed, when required. Apply dust control measures to roads, parking lots and work areas. The *Departmental Representative* shall determine locations where water is to be applied, the amount of water to be applied, and the times at which it shall be applied. Waste oil must not be used for dust control under any circumstances.
- .3 Spray surfaces with water or other environmentally approved product. Use purposely suited equipment or machinery and apply in sufficient quantity and frequency to provide effective result and continued dust control during the entire course of the work.
- .4 Do not use oil or any other petroleum products for dust control.
- .5 Construction activities must be carried out during hours agreed upon with the departmental representative and times acceptable to local authorities to mitigate disturbance to harbour users and residents. Smaller, less disturbing equipment will be used where possible.
- .6 To reduce emissions of air contaminants and Greenhouse Gas, implement a vehicle idling policy.

1.14 Fires

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

1.15 Archaeological

- .1 All construction personnel are responsible for reporting any unusual materials unearthed during construction to the construction supervisor. If the find is believed to be an archaeological resource, the Construction Supervisor will immediately stop work in the vicinity of the find and notify the Departmental Representative.

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- .2 If an archaeological and / or historically significant item is discovered during the work activities, work in the area will be stopped immediately and the *Departmental Representative* will be contacted as well as the provincial Archaeological Services unit. Nova Scotia – NS Department of Communities, Culture and Heritage, Special Places Program, telephone: (902) 424-6475
 - .3 Work can only resume in the vicinity of the find when authorized by the Departmental Representative and Construction Supervisor, after approval has been granted by the Nova Scotia Department of Communities, Culture and Heritage.
 - .4 In the event of the discovery of human remains or evidence of burials, excavation work will immediately cease and nearest law enforcement agency will be contacted immediately by the Departmental Representative and/or the Construction Supervisor.

PART 1 GENERAL

1.1 GENERAL

- .1 Due to nature of this Facility, and client operations therein, security regulations pertaining to site will be in place during the work resulting in need for:
 - .1 Control and limit movement of construction workers inside buildings.
 - .2 Escort and continuous supervision of workers by security personnel.
 - .3 Specific rules and regulations as specified in this section and as directed by the Departmental Representative to be stringently followed.
- .2 It is the Contractor's responsibility to:
 - .1 Become familiar with and abide by security rules and regulations.
 - .2 Brief all workers and subcontractors in respect of the security regulations and ensure that they abide by all rules and directives.
- .3 The Departmental Representative will coordinate a pre-construction meeting between Contractor, Facility Management and Security Personnel who will provide details and directives on control and movement on site.
 - .1 Note that building's custodial responsibilities are currently being managed by DFO Real Property.
- .4 Any infraction of site security regulations on the part of the Contractor, members of work force or any Subcontractor in his employ, could result in:
 - .1 Demand immediate removal of offending party from the site and;
 - .2 Financial penalties levied against the Contractor.

1.2 SECURITY PERSONNEL

- .1 The Departmental Representative will obtain and pay for the services of security personnel, employed by the Canadian Corps of Commissionaires to provide escort and security supervision of all workers during the work of this contract.
- .2 Commissionaires employed on this project must have a current Enhanced Security Clearance status issued by PWGSC.
- .3 The Departmental Representative will provide minimum of 1 Commissionaire to be on site at all times when work is carried out, having the following responsibilities:
 - .1 Limit movement of workers to within the boundaries established by the Departmental Representative for each work phase.
 - .2 Maintain security control list of workers authorized to be on site as determined by Contractor and the Departmental Representative.
 - .3 Manage the distribution and control of worker ID tags.
 - .4 Escort workers who need to circulate on site beyond the established boundaries of work, including the corridors, stairwells and elevators used for access to and from work areas.
 - .5 Escort and supervise short term visitors who need access to the work site such as for material deliveries or to conduct inspections.
- .4 Provide 24 hour notice when additional commissionaires are required to perform supervision or escort function as may be needed due to Contractor's work operations in order that no worker is left unsupervised inside building.
- .5 Commissionaire(s) are to be present on site for entire work shift including work breaks and time period after work shifts until all workers have left site.

- .6 Commissionaire will stay within the actual construction area and provide surveillance of all workers ensuring that security rules and requirements are obeyed and to limit movement to approved work areas of site.
- .7 Commissionaire must also escort workers from approved entrance doors and work area(s).
- .8 Escort of workers by Commissionaire is required at all times regardless as to whether work shifts are in the daytime or during Facility off hours.
- .9 Commissionaire shall report directly to the Departmental Representative and ensure that site security directives are obeyed by all workers.
 - .1 Commissionaire will have the authority to remove any worker deemed non-compliant with security directives.
- .10 Ensure Commissionaire wears approved safety hard hat, safety footwear and other personnel protective equipment appropriate to work in accordance with applicable Occupational Health and Safety requirements specified.

1.3 SECURITY PASSES

- .1 Visitor or worker ID Tags are required for all personnel requiring access on site.
- .2 ID Tags will be provided by the Facility Security, issued to Contractor for distribution to authorized workers which shall also be placed on the Security Control List specified below.
- .3 All persons while on site, must wear the ID Tag issued to him regardless of daytime or nighttime work.
- .4 Be responsible to obtain ID Tags before work commences, including those required by subcontractors, and continually control their distribution and use by workers. Submit request for tags as early as possible prior to commencement of work.
- .5 For the duration of this contract, anyone not in possession of the ID Tag will not be allowed access on site.
- .6 At end of project, return to Departmental Representative all tags issued to workers and to subcontractors.
 - .1 The Departmental Representative will levy a financial penalty in the form of a holdback assessment against the Contract for each pass not returned regardless of the reason the pass is not returned.
- .7 Immediately report any lost, stolen or destroyed ID Tags to the Departmental Representative.

1.4 SECURITY CONTROL LIST

- .1 Provide a list of employee names from workforce and from subcontractors who will be present at site during the course of work.
- .2 List to include each person's name, address and telephone number.
- .3 Submit copy of list to Departmental Representative for control of workers.
- .4 Update list as work progresses.
- .5 Ensure that each worker can provide proof of identity upon demand, when requested by Facility Personnel or Departmental Representative.

1.5 SITE SECURITY

- .1 Where work of this contract requires use of a permanently locked door, it is Contractor's responsibility to ensure that door is unlocked and locked after each use or provide a competent security guard, posted at door, when door must remain open for an elongated period of time during a particular work shift.
 - .1 Notify Departmental Representative when security doors will be used and stringently follow all directives to ensure building security is effectively maintained.
- .2 When work must be carried out during Off Hours or beyond the work hours previously agreed upon at start of work, provide notice within 48 hours beforehand to minimize impact on Facilities' security and tenant operations.
- .3 Off Hours are defined in section 01 14 10.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

PART 1 GENERAL

1.1 SECTION INCLUDES

- .1 Inspection and testing, administrative and enforcement requirements.
- .2 Tests and mix designs.
- .3 Mock-ups.
- .4 Mill tests.
- .5 Equipment and system adjust and balance.

1.2 RELATED SECTIONS

- .1 Section 01 91 13 - Commissioning - General Requirements.

1.3 INSPECTION

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

1.4 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work, above and beyond those required of the Contractor. Cost of such services will be borne by Departmental Representative.
- .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.

1.5 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.

1.6 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 an orderly sequence so as not to cause delay in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.7 REJECTED WORK

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

1.8 REPORTS

- .1 Submit inspection and test reports to Departmental Representative in designated folder in SharePoint
- .2 Provide copies to Subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.

1.9 TESTS AND MIX DESIGNS

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

1.10 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of all Sections required to provide mock-ups.
- .2 Construct in all locations acceptable to Departmental Representative.
- .3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 If requested, Departmental Representative will assist in preparing a schedule fixing dates for preparation.
- .6 Remove mock-up at conclusion of Work or when acceptable to Departmental Representative.

1.11 MILL TESTS

- .1 Submit mill test certificates as requested.

1.12 EQUIPMENT AND SYSTEMS

- .1 Submit testing, adjusting and balancing reports for mechanical, electrical and building equipment systems.
- .2 Submit Commissioning Documentation in accordance with Section 01 91 13.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

PART 1 GENERAL

1.1 SECTION INCLUDES

- .1 Temporary utilities on campus (work site).
- .2 Temporary utilities in contractor's laydown area (site trailers).

1.2 RELATED SECTIONS

- .1 Section 01 52 00 - Construction Facilities.
- .2 Section 01 56 00 - Temporary Barriers and Enclosures.

1.3 REFERENCES

- .1 Not used

1.4 SUBMITTALS

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

1.5 INSTALLATION AND REMOVAL

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

1.6 WATER SUPPLY

- .1 Arrange for connection with appropriate utility company for connections in contractors lay down area and pay all costs for installation, maintenance and removal.

1.7 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°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, may be used when available. Be responsible for damage to heating system if use is permitted.
- .7 In site trailers provide heat and AC as required.
- .8 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.
- .9 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.8 TEMPORARY POWER AND LIGHT

- .1 Departmental Representative will provide temporary power during construction for temporary lighting and operating of power tools, on worksite.
- .2 For Site trailers in the contractors' laydown area arrange for connection with appropriate utility company. Pay all costs for installation, usage, maintenance and removal.
- .3 Temporary power for electric cranes and other equipment requiring in excess of above is responsibility of Contractor.
- .4 Maximum power supply of existing kVA, at 120/208 volts, 3 phase, 60 Hz is available and will be provided for construction use at no cost when working on campus. Connect to existing power supply in accordance with Canadian Electrical Code.
- .5 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.

1.9 TEMPORARY COMMUNICATION FACILITIES

1.10 FIRE PROTECTION

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

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

PART 1 GENERAL

1.1 SECTION INCLUDES

- .1 Construction aids.
- .2 Office and sheds.
- .3 Parking.
- .4 Project identification.

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB) latest edition:
 - .1 CAN/CGSB-1.189, Exterior Alkyd Primer for Wood.
 - .2 CAN/CGSB-1.59, Alkyd Exterior Gloss Enamel.
 - .3 Canadian Standards Association (CSA International)
 - .1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CSA 0121-17, Douglas Fir Plywood.
 - .3 CSA Z797-09(R2014), Code of practice for Access Scaffold.
 - .4 CAN/CSA-Z321-, Signs and Symbols for the Occupational Environment, withdrawn but still available from CSA, CCOHS and Techstreet.

1.3 SUBMITTALS

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

1.4 INSTALLATION AND REMOVAL

- .1 Prepare site plan indicating layout of site to be used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details temporary construction fencing installation.
- .2 Indicate proposed use of supplemental or other staging areas.
- .3 Provide construction facilities in order to execute work expeditiously.
- .4 Remove from site all such work after use.

1.5 SCAFFOLDING

- .1 Scaffolding in accordance with CSA Z797.
- .2 Provide and maintain any scaffolding, ramps, ladders, swing staging, platforms, temporary stairs as required.

1.6 HOISTING

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

1.7 SITE STORAGE/LOADING

- .1 Confine work and operations of employees to areas defined by Contract Documents. Do not unreasonably encumber premises with products. Off Site storage may be provided for use by Contractor
- .2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.
- .3 Coordinate deliveries to site with Departmental Representative. Schedule deliveries for after 16:00 in preparation for installation on the following day or for installation during off-hours.

1.8 CONSTRUCTION PARKING

- .1 Parking will not be permitted on site except in area identified.
- .2 Provide and maintain adequate access to project site.
- .3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.9 SECURITY

- .1 Ensure Site trailers and equipment are locked when not in use.

1.10 OFFICES

- .1 Provide office heated to 22°C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table. Provide internet connectivity.
- .2 Provide a clearly marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors should share Contractors office.

1.11 EQUIPMENT, TOOL AND MATERIALS STORAGE

- .1 Provide and maintain, in a 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 a manner to cause least interference with work activities.

1.12 SANITARY FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.13 CONSTRUCTION SIGNAGE

- .1 No signs or advertisements, other than warning signs, are permitted on site.
- .2 Signs and notices for safety and instruction shall be in both official languages. Graphic symbols shall conform to [CAN/CSA-Z321](#).
- .3 Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project or earlier if directed by Departmental Representative.

1.14 PROTECTION AND MAINTENANCE OF TRAFFIC

- .1 Provide access 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 moving equipment to and from site to interfere as little as possible with public traffic. Schedule deliveries after 16:00.
- .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 temporary access roads if necessary and as approved by Departmental Representative.
- .8 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .9 Dust control: adequate to ensure safe operation at all times.
- .10 Lighting: to assure full and clear visibility for work areas during night work operations.
- .11 Provide snow removal during period of Work in laydown area and approaches.

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 in designated area.
- .4 Stack stored new or salvaged material.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

PART 1 GENERAL

1.1 SECTION INCLUDES

- .1 Barriers.
- .2 Environmental Controls.
- .3 Traffic Controls.
- .4 Fire Routes.

1.2 RELATED SECTIONS

- .1 Section 01 51 00 - Temporary Utilities.
- .2 Section 01 52 00 - Construction Facilities.

1.3 REFERENCES

- .1 Canadian General Standards Board (CGSB) latest edition:
 - .1 CAN/CGSB-1.189, Exterior Alkyd Primer for Wood.
 - .2 CAN/CGSB-1.59-97, Alkyd Exterior Gloss Enamel.
- .2 Canadian Standards Association (CSA) latest edition:
 - .1 CSA O121-17, Douglas Fir Plywood.

1.4 INSTALLATION AND REMOVAL

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

1.5 HOARDING

- .1 Erect temporary site enclosures using 38 x 89 mm construction grade lumber framing at 600 mm o.c. and 1200 x 2400 x 13 mm plywood to CSA O121.
- .2 Apply plywood panels vertically flush and butt jointed.
- .3 Provide lockable entrance interior doors. Access controlled by contractor, with one key available for Departmental Representative access.
- .4 If required when tunnel work is underway Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.
- .5 Paint public side of site enclosure in selected colours with approved low VOC paint. Maintain public side of enclosure in clean condition.
- 6 Minimize noise impacts to operation of campus by insulating hoarding walls using sound proofing.
- .7 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.
- .8 Erect temporary site enclosure for Contractors parking lot using gates to match existing fencing. Equip gates with locks and keys. Maintain fence in good repair. Remove gates at completion of contract.

1.6 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, and as required by code.

1.7 WEATHER ENCLOSURES

- .1 Provide weather tight closures to unfinished door, 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.

1.8 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.

1.9 ACCESS TO SITE

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

1.10 PUBLIC TRAFFIC FLOW

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

1.11 FIRE ROUTES

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.
- .2 Do not block fire access roads.

1.12 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.

1.13 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 5 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

PART 1 GENERAL

1.1 SECTION INCLUDES

- .1 Product quality, availability, storage, handling, protection, and transportation.
- .2 Manufacturer's instructions.
- .3 Quality of Work, coordination and fastenings.
- .4 Existing facilities.

1.2 RELATED SECTIONS

- .1 Section 01 45 00 - Quality Control.

1.3 REFERENCES

- .1 Within text of specifications, reference may be made to reference standards.
- .2 Conform to these standards, in whole or in part as specifically requested in specifications.
- .3 If there is question as to whether any product or system is in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .4 The 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.
- .5 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.

1.4 QUALITY

- .1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of Products provided.
- .2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.5 AVAILABILITY

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

1.6 METRIC SIZED MATERIALS

- .1 SI metric units of measurement are used exclusively on the drawings and in the specifications for this project.
- .2 The Contractor is required to provide metric products in the sizes called for in the Contract Documents except where a valid claim can be made that a particular product is not available on the Canadian market.
- .3 Claims for exemptions from use of metric sized products shall be in writing and fully substantiated with supportive documentation. Promptly submit application to Departmental Representative for consideration and ruling. Non-metric sized products may not be used unless Contractor's application has been approved in writing by the Departmental Representative.
- .4 Difficulties caused by the Contractor's lack of planning and effort to obtain modular metric sized products which are available on the Canadian market will not be considered sufficient reasons for claiming that they cannot be provided.
- .5 Claims for additional costs due to provision of specified modular metric sized products will not be considered.

1.7 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 warehouse space provided.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials and lumber on flat, solid supports and keep clear of ground. 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.

1.8 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.

1.9 MANUFACTURER'S INSTRUCTIONS

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

1.10 QUALITY OF WORK

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

1.11 CO-ORDINATION

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

1.12 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.

1.13 REMEDIAL WORK

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

1.14 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.

1.15 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.

1.16 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.

1.17 PROTECTION OF WORK IN PROGRESS

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

1.18 EXISTING UTILITIES

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants 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****PART 3 EXECUTION****3.1 NOT USED**

END

PART 1 GENERAL

1.1 SECTION INCLUDES

- .1 Progressive cleaning.
- .2 Final cleaning.

1.2 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner or other Contractors.
- .2 Remove waste materials from site at 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 clearly marked separate bins for recycling. Refer to Section 01 74 21.
- .7 Remove waste material and debris from site and deposit in waste container at end of each working day.
- .8 Dispose of waste materials and debris off site.
- .9 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.
- .10 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .11 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .12 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .13 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 FINAL CLEANING

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

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 35 43: Environment Procedures.

1.2 GENERAL

- .1 Carry out work placing maximum emphasis on the areas of:
 - .1 Waste reduction;
 - .2 Diversion of waste from landfill and;
 - .3 Material Recycling.
- .2 In the future, PSPC will be specifying targets for waste disposal directed to recycling facilities on all projects. For this project the contractor is asked to report on percentages of materials sent to recycling facilities and municipal landfills.

1.3 WASTE MANAGEMENT PLAN

- .1 Prior to commencement of work, prepare waste Management Workplan.
- .2 Workplan to include:
 - .1 Waste audit.
 - .2 Waste reduction practices.
 - .3 Material source separation process.
 - .4 Procedures and for sending recyclables to recycling facilities.
 - .5 Procedures for sending non-salvageable items and waste to approved waste processing facility or landfill site.
 - .6 Training and supervising workforce on waste management at site.
- .3 Workplan to incorporate waste management requirements specified herein and in other sections of the Specifications.
- .4 Develop Workplan in collaboration with all subcontractors to ensure all waste management issues and opportunities are addressed.
- .5 Submit copy of Workplan to Departmental Representative for review and approval.
 - .1 Make revisions to Plan as directed by Departmental Representative.
- .6 Implement and manage all aspects of Waste Management Workplan for duration of work.
- .7 Revise Plan as work progresses addressing new opportunities for diversion of waste from landfill.

1.4 WASTE AUDIT

- .1 At project start-up, conduct waste audit of:
 - .1 Site conditions identifying salvageable and non-salvageable items and waste resulting from demolition and removal work.
 - .2 Projected waste resulting from product packaging and from material leftover after installation work.
- .2 Develop written list. Record type, composition and quantity of various salvageable items and waste anticipated, reasons for waste generation and operational factors which

contribute to waste.

1.5 WASTE REDUCTION

- .1 Based on waste audit, develop waste reduction program.
- .2 Structure program to prioritize actions, with waste reduction as first priority, followed by salvage and recycling effort, then disposal as solid waste.
- .3 Identify materials and equipment to be:
 - .1 Protected and turned over to Departmental Representative when indicated.
 - .2 Salvaged for resale by Contractor.
 - .3 Sent to recycling facility.
 - .4 Sent to waste processing/landfill site for their recycling effort.
 - .5 Disposed of in approved landfill site.
- .4 Reduce construction waste during installation work. Undertake practices which will minimize waste and optimize full use of new materials on site, such as:
 - .1 Use of effective and strategically placed facilities on site for storage and staging of left-over or partially cut materials (such as gypsum board, plywood, ceiling tiles, insulation etc.) to allow for easy incorporation into work whenever possible avoiding unnecessary waste.
- .5 Develop other strategies and innovative procedures to reduce waste such as minimizing the extent of packaging used for delivery of materials to site etc.

1.6 MATERIAL SOURCE SEPARATION PROCESS

- .1 Develop and implement material source separation process at commencement of work as part of mobilization and waste management at site.
- .2 Provide on-site facilities to collect, handle and store anticipated quantities of reusable, salvageable and recyclable materials.
 - .1 Use suitable containers for individual collection of items based on intended purpose.
 - .2 Locate to facilitate deposit but without hindering daily operations of existing building tenants.
 - .3 Clearly mark containers and stockpiles as to purpose and use.
- .3 Perform demolition and removal of existing building components and equipment following a systematic deconstruction process.
 - .1 Separate materials and equipment at source, carefully dismantling, labelling and stockpiling alike items for the following purposes:
 - .1 Reinstallation into the work where indicated.
 - .2 Salvaging reusable items not needed in project which Contractor may sell to other parties. Sale of such items not permitted on site.
 - .3 Sending as many items as possible to locally available recycling facility.
 - .4 Segregating remaining waste and debris into various individual waste categories for disposal in a "non-mixed state" as recommended by waste processing/landfill sites.
- .4 Isolate product packaging and delivery containers from general waste stream. Send to recycling facility or return to supplier/ manufacturer.
- .5 Send leftover material resulting from installation work for recycling whenever possible.

- .6 Establish methods whereby hazardous and toxic waste materials, and their containers, encountered or used in the course work are properly isolated, stored on site and disposed in accordance with applicable laws and regulations from authorities having jurisdiction.
- .7 Isolate and store existing materials and equipment identified for re-incorporation into the Work. Protect against damage.

1.7 WORKER TRAINING AND SUPERVISION

- .1 Provide adequate training to workforce, through meetings and demonstrations, to emphasize purpose and worker responsibilities in carrying out the Waste Management Plan.
- .2 Waste Management Coordinator: designate full-time person on site, experienced in waste management and having knowledge of the purpose and content of Waste Management Plan to:
 - .1 Oversee and supervise waste management during work.
 - .2 Provide instructions and directions to all workers and subcontractors on waste reduction, source separation and disposal practices.
- .3 Post a copy of Plan in a prominent location on site for review by workers.

1.8 CERTIFICATION OF MATERIAL DIVERSION

- .1 Submit to Departmental Representative, copies of certified weigh bills from authorized waste processing sites and sale receipts from recycling/reuse facilities confirming receipt of building materials and quantity of waste diverted from landfill.
- .2 Submit data at pre-determined project milestones as determined by Departmental Representative.
- .3 Compare actual quantities diverted from landfill with projections made during waste audit.

1.9 DISPOSAL REQUIREMENTS

- .1 Burying or burning of rubbish and waste materials is prohibited.
- .2 Disposal of waste, volatile materials, mineral spirits, oil, or paint thinner into waterways, storm, or sanitary sewers is prohibited.
- .3 Dispose of waste only at approved waste processing facility or landfill sites approved by authority having jurisdiction.
- .4 Contact the authority having jurisdiction prior to commencement of work, to determine what, if any, demolition and construction waste materials have been banned from disposal in landfills and at transfer stations. Take appropriate action to isolate such banned materials at site of work and dispose in strict accordance with provincial and municipal regulations.
- .5 Transport waste intended for landfill in separated condition, following rules and recommendations of Landfill Operator in support of their effort to divert, recycle and reduce amount of solid waste placed in landfill.
- .6 Collect, bundle and transport salvaged materials to be recycled in separated categories and condition as directed by recycling facility. Ship materials only to approved recycling facilities.
- .7 Sale of salvaged items by Contractor to other parties not permitted on site.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

PART 1 GENERAL

1.1 INSPECTION AND DECLARATION

- .1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an 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 that corrections have been made.
 - .2 Request Departmental Representative's Inspection.
- .2 Departmental Representative's Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly. Refer to Appendix B – Procedure for Space sign off.
- .3 Completion: submit written certificate that following have been performed:
 - .1 Work has been completed and inspected for compliance with Contract Documents.
 - .2 Defects have been corrected and deficiencies have been completed.
 - .3 Equipment and systems have been tested, adjusted and balanced and are fully operational.
 - .4 Certificates required by Utility companies have been submitted.
 - .5 Operation of systems have been demonstrated to Owner's personnel.
 - .6 Work is complete and ready for final inspection.
- .4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative, and Contractor. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

1.2 CLEANING

- .1 In accordance with Section 01 74 11.
- .2 Remove waste and surplus materials, rubbish and construction facilities from the site in accordance with Section 01 74 21.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

PART 1 GENERAL

1.1 SECTION INCLUDES

- .1 As-built, samples, and specifications.
- .2 Equipment and systems.
- .3 Product data, materials and finishes, and related information.
- .4 Operation and maintenance data.
- .5 Spare parts, special tools and maintenance materials.
- .6 Warranties and bonds.
- .7 Final drawings.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 – Submittals
- .2 Section 01 91 13 - Commissioning – General Requirements.
- .3 Section 01 91 31 – Commissioning Plan
- .4 Section 01 91 33 – Commissioning Forms
- .5 Section 01 91 41 – Commissioning Training.

1.3 SUBMISSION

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

1.4 FORMAT

- .1 Organize data in the form of an instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.
- .4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: Manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- .9 Provide scaled CAD files in dwg format. Forward pdf, MS Word, MS Excel, [MS Project] and Autocad dwg files to designated SharePoint as directed by Departmental Representative.

1.5 CONTENTS - EACH VOLUME

- .1 Table of Contents: provide title of project;
 - .1 Date of submission; names,
 - .2 Addresses, and telephone numbers of [Contractor] [Design-Builder] 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 clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00.
- .6 Training: Refer to Section 01 91 41.

1.6 AS-BUILTS AND SAMPLES

- .1 In addition to requirements in General Conditions, maintain at the site for Departmental Representative one record copy of:
 - .1 Contract Drawings.

- .2 Specifications.
 - .3 Amendments and addenda.
 - .4 Change Orders and other modifications to the Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.
 - .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
 - .4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.
 - .5 Keep record documents and samples available for inspection by Departmental Representative.
 - .6 Turn one set, paper copy and electronic copy, of AS-BUILT drawings and specifications over to Departmental Representative on completion of work. Submit files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.
 - .7 If project is completed without significant deviations from Contract drawings and specifications submit to Departmental Representative one set of drawings and specifications marked "AS-BUILT".

1.7 RECORDING ACTUAL SITE CONDITIONS

- .1 Record information on set of black line opaque drawings, [and in copy of Project Manual,] provided by Departmental Representative.
- .2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measured 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: legibly mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Amendments and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.8 **FINAL SURVEY**

- .1 Submit final site survey certificate in accordance with Section 01 91 41, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.9 **EQUIPMENT AND SYSTEMS**

- .1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 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. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's coordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 91 41.

- .15 Additional requirements: As specified in individual specification sections.

1.10 MATERIALS AND FINISHES

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

1.11 SPARE PARTS

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

1.12 MAINTENANCE MATERIALS

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

1.13 SPECIAL TOOLS

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

1.14 STORAGE, HANDLING AND.

- .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.

1.15 WARRANTIES AND BONDS

- .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
- .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
- .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within 14 days after completion of the applicable item of work.
- .4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Certificate of Substantial Performance is determined.
- .5 Verify that documents are in proper form, contain full information, and are notarized.
- .6 Co-execute submittals when required.
- .7 Retain warranties and bonds until time specified for submittal.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

PART 1 GENERAL

1.1 SUMMARY

- .1 Related Requirements
 - .1 Section 01 91 31 Commissioning Plan
 - .2 Section 01 91 33 Commissioning Forms
 - .3 Section 01 91 41 Commissioning Training
 - .4 Preliminary Commissioning Plan
 - .5 Commissioning requirements outlined in Division 21, 22, 23, 25, 26 and 28.

1.2 ABBREVIATIONS

- .1 The following are common abbreviations used in this document.

A/E	Design Team Consultants
BOD	Basis of Design
CC	Controls Contractor
Cx	Commissioning
CxA	Commissioning Agent
EC	Electrical Contractor
FPT	Functional Performance Test
FPTF	Functional Performance Test Form
GC	General Contractor
MC	Mechanical Contractor
Mfr	Manufacturer
PC	Plumbing Contractor
OPR	Owner's Project Requirements
RFI	Request for Information
SUF	Start-Up Form
SVF	Static Verification Form
TAB	Test and Balance Contractor

1.3 DESCRIPTION OF WORK

- .1 Provide material, tools, labour and supervision necessary to assist the CxA in the verification of commissioning of the equipment and systems as outlined in this and related Sections.
- .2 Coordinate, cooperate, and harmonize efforts with the CxA.
- .3 Commissioning shall be done in accordance with this and related Sections and the Commissioning Plan.
- .4 Once the contractor's commissioning is completed as outlined in the Contract Documents, provide material, tools, labour and supervision to verify in detail with the CxA that the

equipment and systems have been commissioned in accordance with this and related Sections.

1.4 GENERAL

- .1 Commissioning is a planned program of tests, procedures and checks systematically carried out on equipment, systems and integrated systems of the finished Project to verify that they meet the Owner's Project Requirements. Commissioning is performed after systems and integrated systems are completely installed, functional and the Contractor's responsibilities have been completed and approved.
- .2 Objectives:
 - .1 Verify installed equipment, systems and integrated systems operate in accordance with the Owner's Project Requirements, the contract documents and design criteria and intent.
 - .2 Verify that O&M personnel have been fully trained in all aspects of the installed equipment and systems.
 - .3 Proper documentation relating to the commissioned equipment and systems are compiled and provided to the Departmental Representative.
- .3 Contractor participates in the 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 operated 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.
- .4 Design Criteria: as per the Owner's Project Requirements or determined by Departmental Representative. To meet the Project's functional and operational requirements.

1.5 COMMISSIONING OVERVIEW

- .1 Refer to Section 01 91 31 - Commissioning Plan for overview of the Cx process and list of equipment to be commissioned.
- .2 For Cx responsibilities refer to Section 01 91 31 - Commissioning Plan.
- .3 Cx to be a line item of Contractor's cost breakdown.
- .4 Pay costs associated with starting, testing, adjusting and relevant instruments and supplies required to perform duties outlined in this and related Sections.
- .5 Cx activities supplement field quality and testing procedures described in relevant technical sections of the Contract Documents. Cx activities do not relieve the Contractor from the contractual requirements outlined in other specification sections of the Contract Documents. Cx activities do not circumvent or relieve the Contractor from warranty requirements, responsibilities or obligations.
- .6 Cx is conducted in concert with other activities performed during various stages of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the Project is constructed and proven to operate satisfactorily under various weather, environmental and occupancy conditions to meet the functional and operational requirements. Cx activities include transfer of critical knowledge to facility operational personnel.

- .7 Contractor to ensure all commissioning related requirements outlined in this and other commissioning related specification sections have been met.
- .8 Ensure all systems have been started, adjusted to design criteria, and are functionally operational, ready for independent testing. The CxA will not begin Functional Performance Testing until satisfied that all requirements have been met. The CxA reserves right to request inspection reports and sign-off from Contractor or Consultant that equipment and systems are ready for Functional Performance Testing.
- .9 Employ experienced personnel for equipment start up and commissioning, who are able to interpret results of readings and tests, and report the system status in a clear and concise manner.
- .10 Provide all equipment required to perform testing, balancing, and commissioning of systems. Calibrate instruments used in start-up; provide calibration certificates if requested by the CxA.
- .11 Utilize equipment check certificates and other commissioning documents required by the CxA.
- .12 Verify that equipment is installed in accordance with Contract Documents, and reviewed shop drawings. Sign and date Static Verification forms and Start-Up Forms.
- .13 Do not start up equipment unless Static Verification forms have been completed and submitted.
- .14 Commissioning will be considered complete once:
 - .1 Completed Cx documentation has been received, reviewed for suitability and approved by the CxA and the Departmental Representative.
 - .2 Equipment, components and systems have been commissioned and all issues have been addressed to the satisfaction of the Departmental Representative.
 - .3 O&M training has been completed.

1.6 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 the CxA to ensure effective performance.
- .2 Costs for corrective work, additional tests and inspections to determine acceptability and proper performance of such items to be borne by the Contractor.

1.7 PRE-CX REVIEW

- .1 Before Construction:
 - .1 Review contract documents, confirm in writing to CxA:
 - .1 Adequacy of provisions for Cx.
 - .2 Aspects of design and installation pertinent to success of Cx.
- .2 During Construction:
 - .1 Co-ordinate provision, location and installation of provisions for Cx.
- .3 Before start of Cx:
 - .1 Have completed Cx Plan up-to-date.
 - .2 Ensure installation of related components, equipment, sub-systems, and systems are complete.

- .3 Fully understand Cx requirements and procedures.
- .4 Understand completely design criteria and intent and special features.
- .5 Submit complete start-up documentation to CxA and Departmental Representative for review.
- .6 Have Cx schedule up-to-date.
- .7 Ensure systems have been cleaned thoroughly.
- .8 Complete TAB procedures on systems; submit TAB reports to CxA and Departmental Representative for review.
- .9 Ensure "As-Built" system schematics are available.
- .4 Inform CxA and Departmental Representative, in writing, of discrepancies and deficiencies on finished works.

1.8 CONFLICTS

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

1.9 COMMISSIONING DOCUMENTATION

- .1 Refer to Section 01 91 31 Commissioning Plan and Section 01 91 33 - Commissioning Forms for requirements and instructions for use.
- .2 CxA to review and approve Cx documentation prepared by Contractor.
- .3 Provide completed and approved Cx documentation to CxA.
- .4 Contractor to provide cut sheets, shop drawings, installation and start-up checklists and O&M and troubleshooting procedures as requested by the CxA. CxA may request information prior to normal O&M manual submission process.

1.10 COMMISSIONING SCHEDULE

- .1 General sequence of events:
 - .1 Equipment is not "temporarily" started until pre-start checklist items and all manufacturers' pre-start procedures are completed and moisture, dust and other environmental and building integrity issues have been addressed.
 - .2 Functional testing is not begun until Static Verification, Pre-Functional, Start-Up and TAB is completed, for a given system (this does not preclude a phased approach).
 - .3 The controls system and equipment it controls are not functionally tested until all points have been calibrated and pre-functional testing is completed.
 - .4 TAB is not performed until the controls system has been sufficiently functionally tested and approved by the CxA for TAB work
 - .5 TAB is not performed until the envelope is completely enclosed and ceiling complete, unless the return are is ducted.
- .2 Provide detailed Cx schedule as part of the construction schedule and in accordance with the Contract Documents.
- .3 A general overview of activities is provided in the Cx Plan.
- .4 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:

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

1.11 COMMISSIONING MEETINGS

- .1 Purpose: to identify and resolve issues and monitor progress relating to Cx.
- .2 Participate in and cooperate fully in the Cx meetings, chaired by the CxA.
- .3 The CxA will convene an initial Cx meeting to:
 - .1 Review the Cx Plan and Cx schedule
 - .2 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.
 - .3 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.
 - .4 Review activities, requirements and expectations during the Cx process.
- .4 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.
- .5 Meetings will be chaired by CxA who will record and distribute minutes.
- .6 Ensure subcontractors and relevant manufacturer representatives are present at initial and subsequent Cx meetings and as required.

1.12 STARTING AND TESTING

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

1.13 WITNESSING OF START-UP, TESTING AND BALANCING

- .1 Provide 14 days' notice prior to commencement.
- .2 Allow Cx team members to witness start-up, testing, adjusting and balancing procedures.
- .3 CxA reserves the right to witness start-up and testing.
- .4 Contractor to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

1.14 ACCESS TO THE SITE

- .1 Allow CxA free access to the site for scheduled and un-scheduled visits, inspections and other Cx activities.

1.15 MANUFACTURER'S INVOLVEMENT

- .1 Factory testing: Manufacturer to:
 - .1 Coordinate time and location of testing.
 - .2 Provide testing documentation for approval by Departmental Representative.
 - .3 Arrange for Departmental Representative to witness tests.
 - .4 Obtain written approval of test results and documentation from Departmental Representative before delivery to site.

- .2 Obtain Manufacturer's installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with Departmental Representative and CxA.
 - .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.

1.16 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 and Cx in following distinct phases:
 - .1 Included in delivery and installation:
 - .1 Verification of conformity to specification, approved shop drawings and completion of Static Verification forms.
 - .2 Visual inspection of quality of installation.
 - .2 Start-up: follow accepted start-up procedures and complete Start-Up forms.
 - .3 Operational testing: document equipment performance.
 - .4 Conduct Functional Performance Testing in presence of CxA, including repetition of tests after correcting issues identified during initial FPT.
 - .5 Conduct fine-tuning as required by Departmental Representative and CxA.
- .3 Correct issues and obtain approval from CxA and Departmental Representative after distinct phases have been completed and before commencing next phase.
- .4 Document required tests on approved Cx forms.
- .5 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency, selected by the Departmental Representative. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:
 - .1 Minor equipment/systems: implement corrective measures approved by Departmental Representative.
 - .2 Major equipment/systems:
 - .1 If evaluation report concludes that damage is minor, implement corrective measures approved by Departmental Representative.
 - .2 If evaluation report concludes that major damage has occurred, Departmental Representative shall reject equipment.
 - .1 Rejected equipment to be removed from site and replace with new.
 - .2 Subject new equipment/systems to specified start-up procedures.

1.17 START-UP DOCUMENTATION

- .1 Assemble start-up documentation and submit to Departmental Representative, Consultant and CxA for review and approval before commencement of Functional Performance Testing.
- .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 Owner to repeat start-up at any time.

1.18 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 acceptance.

1.19 TEST RESULTS

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

1.20 START OF COMMISSIONING

- .1 Notify Departmental Representative and CxA at least 21 days prior to start of Cx.
- .2 Start Cx after elements of building affecting start-up and FPT verification of systems have been completed.

1.21 INSTRUMENTS / EQUIPMENT

- .1 Submit to Departmental Representative and CxA 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.

1.22 PRE-REQUISITES FOR FUNCTIONAL PERFORMANCE TESTING

- .1 Prerequisites for functional testing are as follows:
 - .1 All related equipment has been started up and start-up reports and pre-functional

- checklists are submitted and approved ready for functional testing.
- .2 All control system functions for this and all interlocking systems are programmed and operable per contract documents, including final setpoints and schedules with debugging, loop tuning and sensor calibrations completed.
- .3 Piping system flushing complete and required report approved.
- .4 Water treatment system complete and operational.
- .5 Vibration control report approved (if required).
- .6 Test and balance (TAB) complete and approved for the air and hydronic systems.
- .7 All A/E deficiency list items for the equipment specified are corrected.
- .8 Functional test procedures have been reviewed and approved by installing contractor.
- .9 Safeties and operating ranges reviewed by the CxA and the Contractor.
- .10 Test requirements and sequences of operation provided.
- .11 Schedules and setpoints provided.
- .12 False loading equipment, system and procedures ready.
- .13 Crankcase heaters have been on long enough for start-up.
- .14 Sufficient clearance around equipment for servicing.
- .15 Record of all values for pre-test setpoints changed to accommodate testing has been made and a check box provided to verify return to original values (control parameters, limits, delays, lockouts, schedules, etc.)
- .16 Other miscellaneous checks of the pre-functional checklist and start-up reports completed successfully.
- .17 Points verification report from Control Contractor has been provided.

1.23 COMMISSIONING FUNCTIONAL PERFORMANCE TESTING

- .1 Carry out Cx:
 - .1 Under actual or accepted simulated operating conditions, over entire operating range, in all modes.
 - .2 On independent systems and interacting systems.
- .2 Cx procedures to be repeatable and reported results are to be verifiable.
- .3 Follow equipment manufacturer's operating instructions.
- .4 EMCS trending to be available as supporting documentation for performance verification.
- .5 Ensure all systems have been started, adjusted to design criteria, and are functionally operational, ready for independent testing. The CxA will not begin Functional Performance Testing until satisfied that all requirements have been met. The Departmental Representative reserves right to request inspection reports and sign-off from Contractor or Consultant that equipment and systems are ready for Functional Performance Testing.

1.24 WITNESSING COMMISSIONING

- .1 CxA and Departmental Representative and delegates to witness activities and verify results.

1.25 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 CxA and Departmental Representative within 5 days of test and with Cx report.

1.26 EXTRAPOLATION OF RESULTS

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

1.27 EXTENT OF VERIFICATION

- .1 Provide manpower and instrumentation to verify reported results based on the sampling strategy outlined in the Project Specifications and the Commissioning Plan.
- .2 Number and location to be at discretion of CxA.
- .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 10% of reported results.
- .5 Perform additional commissioning until results are acceptable to Departmental Representative.

1.28 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 approval.
 - .2 Repetition of second verification again fails to receive approval.
 - .3 Departmental Representative deems Contractor's request for second verification was premature.

1.29 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.

1.30 DEFICIENCIES, FAULTS, DEFECTS

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

1.31 O&M MANUALS

- .1 Provide copy of O&M Manual for review by CxA, as requested.

1.32 WARRANTY PERIOD

- .1 During the warranty period, required seasonal testing and other deferred testing is completed according to the Specifications. The CxA coordinates this activity. Contractor to cooperate fully with the CxA. Tests are executed and issues are corrected by the appropriate Sub-Contractors, witnessed by facilities staff and the CxA. Any final adjustments to the O&M manuals and as-builts due to the testing are to be made by the Sub-Contractor.
- .2 At the discretion of the Departmental Representative, the CxA and the Contractor will return to the project approximately 10 months into the 12 month warranty period. During this visit(s) the CxA will review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal commissioning.
- .3 Contractor to cooperate fully with CxA for Cx activities during the Warranty Period.

1.33 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.

1.34 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.

1.35 FINAL COMMISSIONING REPORT AND SYSTEMS MANUALS

- .1 CxA responsible for completion of Commissioning Report and Systems Manual, as applicable.
- .2 Contractor to cooperate fully and provide all documentation required by CxA to complete the Final Commissioning Report and System manuals.

1.36 TRAINING

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

1.37 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

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

1.38 OCCUPANCY

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

1.39 INSTALLED INSTRUMENTATION

- .1 Use instruments installed under Contract for TAB and FPT if:
 - .1 Accuracy complies with these specifications.
 - .2 Calibration certificates have been deposited with the Departmental Representative.

- .2 Calibrated EMCS sensors may be used to obtain performance data provided that sensor calibration has been completed and accepted.

1.40 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.

1.41 OWNER'S PERFORMANCE TESTING

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

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

PART 1 GENERAL

1.1 SUMMARY

- .1 Related Requirements
 - .1 Section 01 91 13 General Commissioning Requirements.
 - .2 Section 01 91 33 Commissioning Forms.
 - .3 Section 01 91 41 Commissioning Training.
 - .4 Preliminary Commissioning Plan.

1.2 ABBREVIATIONS

- .1 The following are common abbreviations used in this document.

A/E	Design Team Consultants
BOD	Basis of Design
CC	Controls Contractor
Cx	Commissioning
CxA	Commissioning Agent
EC	Electrical Contractor
FPT	Functional Performance Test
FPTF	Functional Performance Test Form
GC	General Contractor
MC	Mechanical Contractor
Mfr	Manufacturer
PC	Plumbing Contractor
OPR	Owner's Project Requirements
RFI	Request for Information
SUF	Start-Up Form
SVF	Static Verification Form
TAB	Test and Balance Contractor

1.3 GENERAL

- .1 The Cx Plan aids the building design, construction and operations team in verifying that the project will meet the Owner's Project Requirements. It sets out the process and methodology for the successful commissioning of the project during the design and construction phases. The Cx Plan also acts as a communication tool to facilitate each team member's understanding of their roles and responsibilities in the commissioning process.
- .2 The Cx Plan is a living document in that information is added and modified as the project progresses.
- .3 The Cx Plan does not relieve the project team from contractual requirements outlined in the other specification sections of this project. The project specifications may include

special testing requirements for equipment. These tests are mutually exclusive of the verification and functional procedures outlined in the Cx Plan.

- .4 The Project Specifications will take precedence in the event of a contradiction or conflict between the Project Specification and the Cx Plan.

1.4 PURPOSE OF THE COMMISSIONING PLAN

- .1 The purpose of the Cx Plan is to provide direction for the commissioning process during construction by:
 - .1 Outlining the organization, scheduling, allocation of resources, documentation, pertaining to the implementation of Cx.
 - .2 Communicating the responsibilities of the team members involved in Cx scheduling, activities, documentation requirements, and verification procedures.
 - .3 Setting out the deliverables relating to the process and administration of Cx.
 - .4 Describes the process for the verification of how the equipment and systems meet the Owner's Project Requirements and the design intent.
 - .5 Producing a complete functional system prior to issuance of Certificate of Occupancy.
 - .6 Acting as a management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:
 - .1 Overview of Cx.
 - .2 General description of elements that make up Cx Plan.
 - .3 Process and methodology for successful Cx.

1.5 DEVELOPMENT OF FINAL CX PLAN

- .1 The CxA is responsible for developing the preliminary and final Cx Plan.
- .2 Cx Plan provided as part of the project specifications is preliminary only and is subject to change as project progresses.
- .3 Cx Plan to be finalized by the CxA to take into account:
 - .1 Approved shop drawings and product data.
 - .2 Approved changes to contract.
 - .3 Contractor's project schedule.
 - .4 Cx schedule.
 - .5 Contractor's, sub-contractor's, suppliers' requirements.
 - .6 Project construction team's and Cx team's requirements.
- .4 The CxA will provide a final commissioning plan prior to the start of the commissioning activities.

1.6 REFINEMENT OF CX PLAN

- .1 During the construction phase, the CxA will revise, refine and update the Cx Plan to include:
 - .1 Changes resulting from Client program modifications.
 - .2 Approved design and construction changes.
- .2 Departmental Representative will distribute revised Cx Plan accordingly.

1.7 COMPOSITION, ROLES AND RESPONSIBILITIES OF CX TEAM

- .1 The CxA will coordinate the commissioning process on behalf of the Departmental Representative. The GC and all sub-contractors are expected to cooperate fully with the CxA.
- .2 All members of the Cx Team will work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents.
- .3 A general description of the commissioning roles is as follows:
 - .1 CxA:
 - .1 Reports to the Departmental Representative.
 - .2 Develops and updates the Commissioning Plan.
 - .3 Coordinates the Commissioning Process on behalf of the Departmental Representative.
 - .4 Reviews commissioning documentation and other test reports for compliance with the Contract Documents. Commissioning documentation includes, but is not limited to SVF, SUF and FPTF.
 - .5 Prepares, oversees and documents Functional Performance Tests.
 - .6 Verifies that the systems are performing in accordance with Contract Documents.
 - .7 Reviews Training Plan and helps coordinate training.
 - .8 Prepares a final Commissioning Report, with the assistance of the Commissioning Team.
 - .2 GC:
 - .1 Facilitates and supports the Commissioning Process.
 - .2 Coordinates the response to RFIs throughout the commissioning process.
 - .3 Ensures that all subcontractors fulfill their commissioning responsibilities.
 - .4 Integrates Commissioning into the Construction Process and Schedule.
 - .5 Coordinates and provides Training.
 - .6 Includes the CxA on the distribution lists for project documents such as shop drawings and start-up reports.
 - .3 Subcontractors (MC, EC, PC, CC, TAB and others):
 - .1 Completes all required start-up and testing activities, as outlined in the project specifications, prior to commencement of the FPT by the CxA.
 - .2 Demonstrates proper system performance and perform the actual testing as designated by the Commissioning Team.
 - .3 Coordinates with manufacturers and suppliers to provide documentation requested by the Commissioning Team.
 - .4 Completes commissioning documentation as outlined in the Commissioning Plan.
 - .5 Conducts training and coordinates with Manufacturers.
 - .4 A/E:
 - .1 Develops Basis of Design document, project specifications and drawings.
 - .2 Provides clarification on the design intent to the Cx Team, as required.
 - .3 Responds to RFIs relating to the commissioning process.
 - .4 Reviews or inspects installed equipment and systems for compliance with the project specifications prior to commencement of the FPT by the CxA.
 - .5 Participates in the training process, as required.
 - .5 Departmental Representative:
 - .1 Approves the Owner's Project Requirements developed by the CxA.
 - .2 Gives final approval of the Commissioning work.

- .3 Coordinates the involvement of user representatives in the commissioning and training process.

1.8 OTHER CX PARTICIPANTS

- .1 The General Contractor and Sub-contractors are expected to employ the following Cx participants to verify performance of equipment and systems, as required:
 - .1 Installation contractor/subcontractor:
 - .1 Equipment and systems except as noted.
 - .2 Equipment manufacturer: equipment specified to be installed and started by manufacturer.
 - .1 To include performance verification.
 - .3 Specialist subcontractor: equipment and systems supplied and installed by specialist subcontractor.
 - .4 Specialist Cx agency:
 - .1 Possessing specialist qualifications and installations providing environments essential to client's program but are outside scope or expertise of Cx specialists on this project.
 - .5 Owner: equipment for which the Owner is the specialist.
- .2 Ensure that Cx participant:
 - .1 Complete work within scheduled time frame.
 - .2 Available for emergency and troubleshooting service during first year of occupancy by user for adjustments and modifications outside responsibility of O&M personnel, including:
 - .1 Modify ventilation rates to meet changes in off-gassing.
 - .2 Changes to heating or cooling loads beyond scope of EMCS.
 - .3 Changes to EMCS control strategies beyond level of training provided to O M personnel.
 - .4 Redistribution of electrical services.
 - .5 Modifications of fire alarm systems.
 - .6 Modifications to voice communications systems.
- .3 Provide names of participants to the CxA prior to starting date of Cx for review and approval.

1.9 COMMISSIONING PROCESS

- .1 General overview of Commissioning Process is included in Project Specifications and Commissioning Plan.
- .2 CxA to lead the Commissioning Team during the Commissioning Process.
- .3 Contractor and other Commissioning Team members shall cooperate fully with the CxA.

1.10 EQUIPMENT AND SYSTEMS TO BE COMMISSIONED

- .1 Commissioning and training for the following systems and equipment will be verified as part of the commissioning process. Multiple, identical pieces of non-life-safety or otherwise non-critical equipment may be functionally tested using a sampling strategy. The CxA will provide the sampling strategy as required. Note that the final list of commissioned equipment and systems for each building will be provided in the final commissioning plan. The list below is a sample only.
 - .1 Mechanical Systems:
 - .1 Air Handling Units

- .2 Energy Recovery Ventilators
- .3 Water to Water Heat Pumps
- .4 Boiler Plant and Hydronic Pumps, Heat Exchangers, Loops and Accessories
- .5 Solar Wall
- .6 Panel Radiators, Hydronic Pumps, Loops and Accessories
- .7 Convactor Radiators, Hydronic, Loops and Accessories
- .8 Wall Fin Radiation, Hydronic Pumps, Loops and Accessories
- .9 Cabinet and Unit Heaters, Hydronic Pumps, Loops and Accessories
- .10 Heating and Cooling Coils, Hydronic Pumps, Loops and Accessories
- .11 Fan Coil Units, Hydronic Pumps, Loops and Accessories.
- .12 Variable Air Volume Boxes.
- .13 Wall and Floor Mounted A/C Units Hydronic Pumps, Loops and Accessories.
- .14 Split Systems A/C Fan Coils and Condensers.
- .15 Computer Room Air Conditioning Units.
- .16 Infrared Radiant Heaters.
- .17 Electric Heating Coils and Unit Heaters.
- .18 Sea Water Pumps.
- .19 HVAC Zones.
- .20 Humidifiers.
- .21 Return and Exhaust Fans.
- .22 TAB Work.
- .23 Energy Management Control System / Building Automation System
- .24 DHW Systems (tanks, pre-heat tanks, heaters, pumps, heat exchangers and accessories) .
- .25 Sump Pumps.
- .26 Trap Primers.
- .27 Energy and Water Meters.
- .28 Variable Frequency Drives.
- .29 Wet Pipe Sprinkler System.
- .30 Pre-Action Sprinkler System.
- .31 Dry Pipe Sprinkler System.
- .32 Wet Chemical Fire Extinguishing System.
- .33 Fire Extinguishers.
- .2 Electrical Systems:
 - .1 Electrical Panel Boards and Breakers (including modifications to existing panels).
 - .2 Transformers.
 - .3 Wiring Devices.
 - .4 Interior Lighting Modifications and Additions.
 - .5 Emergency and Exit Lighting.
 - .6 Fire Alarm System.
 - .7 Motor Starters.
 - .8 Communications Systems.

1.11 DELIVERABLES RELATING TO THE CX PROCESS

- .1 Contractors to provide:
 - .1 Completed installation and pre-start-up checklists
 - .2 Completed Static Verification Forms
 - .3 TAB reports

- .4 Factory test reports
- .5 Reports for testing, inspections and quality control activities specified in the Contract Documents or request by the Design Engineer.
- .6 Completed Start-up Forms
- .7 Completed Functional Performance Testing forms
- .8 Training Plans
- .9 O&M Manuals
- .10 Prescribed activities during warranty period
- .2 Contractors are to sign the documentation confirming that they conducted the testing required.
- .3 Documentation is to be submitted to the CxA for review.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

PART 1 GENERAL

1.1 SUMMARY

- .1 Related Requirements
 - .1 Section 01 91 13 General Commissioning Requirements
 - .2 Section 01 91 31 Commissioning Plan
 - .3 Section 01 91 41 Commissioning Training
 - .4 Preliminary Commissioning Plan

1.2 COMMISSIONING FORMS

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

1.3 STATIC VERIFICATION FORMS

- .1 Static Verification Forms compile data on equipment or system components including nameplate information, performance requirements and other pertinent technical data.
- .2 Prior to Start-up and Functional Performance Testing of equipment or systems, Installer to complete the Static Verification Forms related to systems and equipment and submit to Departmental Representative and CxA for review and acceptance.
- .3 Installer to sign forms after completion certifying that the information provided on the forms is correct and matches the equipment and systems installed. Forms will be required during the commissioning process and will be included in the Commissioning Report at completion of project.

1.4 START-UP FORMS / INSTALLATION CHECKLISTS

- .1 Start-up forms and installation checklists ensure that manufacturer's instructions and good installation practices are adhered to during the installation and start-up process.
- .2 Start-up / installation forms, checklists and reports include the following:
 - .1 Equipment 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.
- .4 TAB reports, points verification reports.
- .5 Other documents as outlined in the Commissioning Plan.
- .3 Equipment manufacturer's start-up forms and installation checklists are acceptable for use. Submit to Departmental Representative and CxA for review and approval prior to use. If manufacturer start-up forms or checklists are not available, Contractor to advise Departmental Representative and CxA early in the project. Departmental Representative and CxA reserves right to develop equipment specific checklists should none be available from the manufacturer.
- .4 As deemed necessary by Departmental Representative and CxA, supplemental forms, checklists and reports will be required for specific project conditions.
- .5 Prior to Functional Performance Testing of equipment or systems, use checklists to verify equipment installation. Document checklist verifying checks have been made, indicate deficiencies and corrective action taken.
- .6 Submit documentation to Departmental Representative and CxA for review and acceptance prior to the start of Functional Performance Testing.
- .7 Installer and Manufacturer Representative to sign checklists and/or forms upon completion, certifying stated checks and inspections have been performed. Return completed checklists and/or forms to Departmental Representative and CxA for review and approval. Forms and checklists will be required during Commissioning process and will be included in the Commissioning Report at completion of project.

1.5 FUNCTIONAL PERFORMANCE TEST FORMS

- .1 FPT forms to be used for checks, running dynamic tests and adjustments carried out on equipment and systems to ensure correct and efficient operation, and that equipment and systems function independently and interactively with other systems as intended in the Owner's project requirements and the design documents.
- .2 FPT forms include those developed by Contractor to record measured data and readings taken during functional testing procedures and those developed by the Departmental Representative and CxA.
- .3 Prior to Functional Performance Testing of integrated system, complete FPT forms of related systems and submit to Departmental Representative and CxA for review and acceptance.
- .4 Participants and Witnesses to the Functional Performance Testing to sign forms acknowledging their presence at the testing.
- .5 Forms provide in electronic format will not require signatures. Departmental Representative and CxA reserves the right to prepare separate attendance form for signature by all Participants and Witnesses.

1.6 SAMPLES OF COMMISSIONING FORMS

- .1 Departmental Representative and CxA will develop and provide to Contractor required project-specific Commissioning forms in hard copy or electronic format complete with specification data.
- .2 A Preliminary Commissioning Plan and Commissioning Forms will be provided prior to commencement of commissioning.

1.7 CHANGES AND DEVELOPMENT OF NEW REPORT FORMS

- .1 When additional forms are required, the Departmental Representative and CxA will develop appropriate verification forms.

1.8 LANGUAGE

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

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END

PART 1 GENERAL

1.1 SUMMARY

- .1 Related Requirements
 - .1 Training and Demonstration requirements from other Sections.
 - .2 Section 01 91 13 General Commissioning Requirements.
 - .3 Section 01 91 31 Commissioning Plan.
 - .4 Section 01 91 33 Commissioning Forms.
 - .5 Preliminary Commissioning Plan.

1.2 DESCRIPTION OF WORK

- .1 Provide sufficient time, material, labour and supervision for training associated with systems outlined in Section 01 91 31 Commissioning Plan and in accordance with the outline for instruction and training provided in the Commissioning Plan, as applicable.

1.3 RAINEES

- .1 Trainees: Personnel selected for operating and maintaining the facility, may include Property or Facility Manager, building operators, maintenance staff, security staff, and technical specialists as required.
- .2 Trainees will be available for training during later stages of construction for purposes of familiarization with systems.
- .3 Trainees may participate in functional performance testing as part of training activities.

1.4 INSTRUCTORS

- .1 Mechanical and Electrical Design Consultants to provide instruction on the following:
 - .1 Descriptions of systems.
 - .2 Design philosophy, design criteria, and design intent.
 - .3 Interaction among systems during integrated operation.
- .2 Contractor and certified factory-trained manufacturers' personnel to provide instruction on the following:
 - .1 Start-Up, operation, shut-down of equipment, components and systems once Functional Performance tests have been successfully completed.
 - .2 Control features, reasons for, results of, implications on associated systems of, adjustment of set points of control and safety devices.
 - .3 Instructions on servicing, maintenance and adjustment of systems, equipment and components.
- .3 Contractor and equipment manufacturer to provide instruction on:
 - .1 Start-up, operation, maintenance and shut-down of equipment they have certified as installed, started up and once Functional Performance tests have been successfully completed.

1.5 TRAINING OBJECTIVES

- .1 Training to be detailed and of 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.

1.6 TRAINING MATERIALS

- .1 Instructors to be responsible for content and quality.
- .2 Training materials to include:
 - .1 "As-Built" Contract Documents.
 - .2 Operating Manual.
 - .3 Maintenance Manual.
 - .4 Management Manual.
 - .5 TAB and Functional Performance Test Reports.
- .3 Departmental Representative and Commissioning Agent reserve the right to review the training material. Departmental Representative will approve the training manuals.
- .4 Training materials to be in a format that permits future training procedures to the same degree of detail.
- .5 Provide sufficient handouts for all Trainees.
- .6 Supplement training materials:
 - .1 Transparencies for overhead projectors.
 - .2 Multimedia presentations.
 - .3 Manufacturer's training videos.
 - .4 Equipment models.

1.7 SCHEDULING

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

1.8 RESPONSIBILITIES

- .1 Be responsible for:
 - .1 Implementation of training activities,
 - .2 Coordination among instructors,
 - .3 Quality of training, training materials,
- .2 Departmental Representative reserve the right to evaluate training and materials.

1.9 TRAINING SESSIONS

- .1 No training will take place without the Contractor submitting the following information to the Departmental Representative two (2) weeks in advance for review:
 - .1 Qualifications of Instructors
 - .2 Written agenda for the training session(s)
 - .3 Training manuals, tools, O & M Manuals and training handouts
- .2 Training to include demonstrations by Instructors using the installed equipment and systems.

- .3 Use of room with overhead or table mount projector and screen in concert with laptop computer containing control software, graphics sequences, etc. specific to the facility is considered a pre-requisite for effective demonstration and presentation of the materials herein.
- .4 Upon completion of training, provide written report, signed by Instructors, witnessed by Departmental Representative and/or Commissioning Agent outlining:
 - .1 Time, Date and Location
 - .2 Name of Instructor(s)
 - .3 Topics of training
 - .4 List of Trainees
- .5 Provide specialized training as specified in relevant Technical Sections of the construction specifications.

1.10 TRAINING CONTENT

- .1 Training to include:
 - .1 Review of facility, occupancy profile and functional requirements.
 - .2 System philosophy, limitations and interaction of systems.
 - .3 Review of system layout, equipment, components and controls.
 - .4 Equipment and system start-up, operation, monitoring, servicing, maintenance, emergency and shut-down procedures.
 - .5 In depth review of EMCS or BAS sequences of operation.
 - .6 Trouble-shooting diagnosis.
 - .7 Interaction among systems during integrated operation.
 - .8 Review of O & M documentation emphasizing safe and proper operating requirements, preventative maintenance, special tools needed, spare parts inventory suggestions.
 - .9 Discussion on relative health and safety issues and solutions.
 - .10 Information concerning the warranties and their use and the location of all guarantees.
 - .11 Description of spare parts in stock and their service.
 - .12 Service contracts and protocols.

1.11 VIDEO-BASED TRAINING

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

Part 2 Products
2.1 NOT USED

Part 3 Execution
3.1 NOT USED

END