



Public Works and Government Services Canada

Requisition No. EZ899-183126


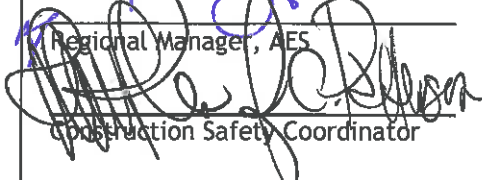
DRAWINGS & SPECIFICATIONS

for:

Institute of Ocean Sciences
Data Centre Temporary Cooling
Sidney, B.C.

Project No.: R.089467.001

APPROVED BY:

 _____ Regional Manager, AES	<u>2018-02-27</u> _____ Date
 _____ Construction Safety Coordinator	<u>2018-02-27</u> _____ Date

TENDER:

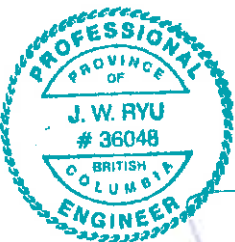
 _____ Project Manager	<u>2018-02-28</u> _____ Date
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CONSULTANTS – SEAL & SIGNATURE

Discipline

Seal / Signature / Date

Mechanical
(Prime)



J. W. RYU
08 FEB 2018

Electrical



FEB 08 2018

08 FEB 2018

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LIST OF DRAWING SHEETS

Mechanical Drawings:

M000	Mechanical Legend, Notes and Site Plan
M001	Temporary Cooling Data Centre Level Partial Plan

Electrical Drawings:

E100	Power Supply to Temporary Cooling System
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END OF SECTION

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Part 1 General

1.1 SUMMARY OF WORK

- .1 Work covered by Contract Documents:
 - .1 This Contract covers the following work at the Institute of Ocean Sciences, Sidney, BC.
 - .2 Work to be performed under this Contract includes, but not limited to, the following items covered further in the Contract documents:
 - .1 Provision and installation of a complete temporary air conditioning system to serve the existing server room
 - .2 Provide a detailed work plan including a project schedule and phasing. This detailed work plan shall be submitted to the Departmental Representative for review to verify that there will be no unacceptable interruption of service.
 - .3 Do not start work until all essential equipment is delivered to the site and the work can proceed without delays.
 - .4 Provide as-built drawings and closeout submittals.
- .3 Contractor's Use of Premises:
 - .1 Contractor has limited use of site for work of this contract until Substantial Completion:
 - .1 Contractor use of premises for storage and access, as approved by the Departmental Representative.
 - .2 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

1.2 WORK RESTRICTIONS

- .1 Notify Departmental Representative of intended interruption of power, communication, water and drainage services and provide schedule of interruption times.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of services throughout course of work. Keep duration of interruptions to a minimum. Coordinate interruptions with local authority having jurisdiction and local residences and businesses affected by the disruption. The available time for power shut down of the server room as required to complete the electrical works starts March 24, 2018 at 9am and ends March 25th, 2018 at 10pm. The contractor shall schedule all required power shut down associated works within this time.
- .3 Construct barriers in accordance with Section 01 52 00 – Construction Facilities
- .4 Hours of work:
 - .1 Perform work during normal working hours of the Institute, 0730 to 1600, Monday through Friday except holidays.

- .2 When it is necessary, arrange in advance with Departmental Representative to work outside of normal working hours. This includes work required afterhours in order to perform electrical shut down works.
- .5 The contractor shall allow of and provide approved commissionaires services to provide security escort for all contractors working on site, at all times.

1.3 CONSTRUCTION WORK SCHEDULE

- .1 Commence work immediately upon official notification of acceptance of offer. Temporary Cooling will be operation 2 weeks after contract award and operation for period of 8months
- .2 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Substantial Certificate and Final Certificate as defined times of completion are of essence of this contract.
- .3 Submittal:
 - .1 Submit to Departmental Representative within 10 working days of Award of Contract, a Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of construction progress.
 - .2 Identify each trade or operation.
 - .3 Show dates for delivery of items requiring long lead time.
 - .4 Departmental Representative will review schedule and return one copy.
 - .5 Re-submit two (2) copies of finalized schedule to Departmental Representative within five (5) working days after return of reviewed preliminary copy.
- .4 Project Scheduling Reporting:
 - .1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.
 - .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.
- .5 Project Meetings:
 - .1 Discuss Project Schedule at bi-weekly site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
 - .2 Weather related delays with their remedial measures will be discussed and negotiated.
 - .3 Before submitting first progress claim submit breakdown of Contract price in detail as directed by Departmental Representative and aggregating contract price. After approval by Departmental Representative cost breakdown will be used as basis for progress payments. Only PWGSC paper work is acceptable.

1.4 SUBMITTAL PROCEDURES

- .1 Administrative:
 - .1 Submit to Departmental Representative submittal listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work.

- Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Work affected by submittal shall not proceed until review is complete.
 - .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
 - .4 Where items or information is not produced in SI Metric units converted values are acceptable.
 - .5 Review submittal 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. Submittal not stamped, signed, dated and identified as to specific project will be returned without being examined and shall be 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 coordinated.
 - .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative review of submittal.
 - .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.
- .2 Shop Drawings:
- .1 Drawings to be originals prepared by Contractor, Subcontractor, Supplier or Distributor, which illustrate appropriate portion of work; showing fabrication, layout, setting or erection details as specified in appropriate sections.
- .3 Product Data:
- .1 Certain specification Sections specify that manufacturer's standard schematic drawings, catalogue sheets, diagrams, schedules, performance charts, illustrations and other standard descriptive data will be accepted in lieu of shop drawings, provided that the product concerned is clearly identified. Submit in sets, not as individual submissions.
- .4 Submission Requirements:
- .1 Schedule submissions at least ten days before dates reviewed submissions will be needed.
 - .2 Submit number of copies of product data, shop drawings which Contractor requires for distribution plus four (4) copies which will be retained by Departmental Representative.
 - .3 Accompany submissions with transmittal letter in duplicate.
 - .4 Submit bond copies (hard copy) as directed by Departmental Representative.
- .5 Coordination of Submissions:
- .1 Review shop drawings, product data and samples prior to submission.
 - .2 Coordinate with field construction criteria.

- .3 Verify catalogue numbers and similar data.
- .4 Coordinate each submittal with requirements of the work of all trades and contract documents.
- .5 Responsibility for errors and omissions in submittal is not relieved by Departmental Representative's review of submittal.
- .6 Responsibility for deviations in submittal from requirements of Contract documents is not relieved by Departmental Representative's review of submittal, unless Departmental Representative gives written acceptance of specified deviations.
- .7 Notify Departmental Representative, in writing at time of submission, of deviations in submittal from requirements of Contract documents.
- .8 Make any changes in submissions which Departmental Representative may require consistent with Contract Documents and re-submit as directed by Departmental Representative.
- .9 After Departmental Representative's review, distribute copies.
- .10 **Shop Drawings Review:**
 - .1 Review of shop drawings by Public Works and Government Services Canada (PWGSC) is for the sole purpose of ascertaining conformance with the general concept.
 - .2 The Departmental Representative's review does not mean that PWGSC approves the detail design inherent in the shop drawings, responsibility remains with the contractor submitting same, and such review will not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the construction and contract documents.
 - .3 Without restricting the generality of the foregoing, the Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation, and for co-ordination of the work of all subtrades.

1.5 HEALTH AND SAFETY

- .1 Specified in Section 01 35 33.

1.6 ENVIRONMENTAL PROCEDURES

- .1 Fires and burning of rubbish on site not permitted.
- .2 Do not bury rubbish and waste materials on site.
- .3 Do not dispose of waste or volatile materials such as oil, paint thinner or mineral spirits into waterways, storm or sanitary systems.
- .4 Control disposal of run-off of water containing suspended materials or other harmful substances in accordance with local authority requirements. Construct settlement ponds and silt fences as required by the Provincial Environmental authority.
- .5 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.
- .6 Under no circumstances dispose of rubbish or waste materials on adjoining property.

1.7 REGULATORY REQUIREMENTS

- .1 References and Codes:
 - .1 Perform Work in accordance with current version of the National Building Code of Canada and where applicable the current version of the British Columbia Building Code including all amendments up to bid closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.

1.8 QUALITY CONTROL

- .1 Inspection:
 - .1 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.
 - .2 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.
 - .3 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.
- .2 Procedures:
 - .1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
 - .2 Submit 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.
- .3 Rejected Work:
 - .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
 - .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .4 Reports:
 - .1 Submit (4) four copies of inspection and test reports to Departmental Representative.

- .5 Tests and Mix Designs:
 - .1 Furnish test results and mix designs as may be requested.
- .6 Equipment and Systems:
 - .1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.
 - .2 Refer to specific Section for definitive requirements.

1.9 TEMPORARY UTILITIES

- .1 Installation and Removal:
 - .1 Provide temporary utilities controls in order to execute work expeditiously.
 - .2 Remove from site all such work after use.
- .2 Temporary Communication Facilities:
 - .1 Provide and pay for temporary telephone and fax hook up, line(s) necessary for own use.
- .3 Fire Protection:
 - .1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.

1.10 CONSTRUCTION FACILITIES

- .1 Installation and Removal:
 - .1 Provide construction facilities in order to execute work expeditiously.
 - .2 Remove from site all such work after use.
- .2 Scaffolding:
 - .1 Design, construct and maintain scaffolding in rigid, secure and safe manner, in accordance with WorkSafeBC regulations and Section 01 35 33.
 - .2 Erect scaffolding independent of walls. Remove promptly when no longer required.
- .3 Hoisting:
 - .1 Provide, operate and maintain hoists required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.
 - .2 Hoists to be operated by qualified operator.
- .4 Site Storage/Loading:
 - .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
 - .2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.
- .5 Contractor's Site Office and Enclosure:
 - .1 Provide office of size to accommodate site meetings and Contractor's operations.

- .2 Provide a clearly marked and fully stocked first-aid case in a readily available location.
- .3 Provide temporary fenced area to enclose site and operations.
- .6 Equipment, Tools and Material 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.
- .7 Sanitary Facilities:
 - .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

1.11 TEMPORARY BARRIERS AND ENCLOSURES

- .1 Hoarding:
 - .1 Provide temporary, dust tight enclosures around all areas where dust generating activities will occur.
- .2 Protection of Building Finishes:
 - .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
 - .2 Provide necessary screens, covers, and hoardings.
 - .3 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.
 - .4 Be responsible for damage incurred due to lack of or improper protection.

1.12 COMMON PRODUCT REQUIREMENTS

- .1 Reference Standards:
 - .1 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.
 - .2 Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.
 - .3 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.
- .2 Quality:
 - .1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
 - .2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace

- defective products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
 - .4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
 - .5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.
- .3 Storage, Handling and Protection:
- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
 - .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
 - .3 Store products subject to damage from weather in weatherproof enclosures.
 - .4 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
 - .5 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .4 Transportation:
- .1 Pay costs of transportation of products required in performance of Work.
- .5 Manufacturer's Instructions:
- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
 - .2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative may establish course of action.
 - .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.
- .6 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.
- .7 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.
- .8 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.
- .9 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 neither to damage nor to put at risk any portion of Work.
- .10 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.
 - .3 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.
- .11 Fastenings:
 - .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
 - .2 Prevent electrolytic action between dissimilar metals and materials.
 - .3 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
 - .4 Keep exposed fastenings to a minimum, space evenly and install neatly.
 - .5 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.
- .12 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.
- .13 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.
- .14 Existing Utilities:
 - .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 pedestrian and vehicular traffic.
 - .2 Before commencing work, establish location and extent of service lines in areas 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. Adhere to approved schedule and provide notice to affected parties.
 - .4 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
 - .5 Record locations of maintained, capped and re-routed services lines.
- .15 Contractors Options for Selection of Products:
 - .1 Products specified by "**Prescriptive**" specifications: select any product meeting or exceeding specifications.
 - .2 Products specified under "**Acceptable Products**" (used for complex Mechanical or Electrical Systems): select any one of the indicated manufacturers, or any other manufacturer meeting or exceeding the Prescriptive specifications and indicated Products.
 - .3 Products specified by performance and referenced standard: select any product meeting or exceeding the referenced standard.
 - .4 Products specified to meet particular design requirements or to match existing materials: use only material specified Approved Product. Alternative products may be considered provided full technical data is received in writing by Departmental Representative in accordance with "Instructions to Bidders".
 - .5 When products are specified by a referenced standard or by Performance specifications, upon request of Departmental Representative, obtain from manufacturer an independent laboratory report showing that the product meets or exceeds the specified requirements.
- .16 Substitution after award of Contract:
 - .1 No substitutions are permitted without prior written approval of the Departmental Representative.
 - .2 Proposals for substitution may only be submitted after Contract award. Such request must include statements of respective costs of items originally specified and the proposed substitution.
 - .3 Proposals will be considered by the Departmental Representative if:
 - .1 Products selected by tenderer from those specified are not available;

- .2 Delivery date of products selected from those specified would unduly delay completion of Contract, or
- .3 Alternative product to that specified, which is brought to the attention of and considered by Departmental Representative as equivalent to the product specified, and will result in a credit to the Contract amount.
- .4 Should the proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on the project. Pay for design or drawing changes required as result of substitution.
- .5 Amounts of all credits arising from approval of the substitutions will be determined by the Departmental Representative, and the Contract price will be reduced accordingly.

1.13 EXAMINATION AND PREPARATION

- .1 Existing Services:
 - .1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.
- .2 Location of Equipment and Fixtures:
 - .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
 - .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
 - .3 Inform Departmental Representative of impending installation and obtain approval for actual location.
 - .4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.14 EXECUTION REQUIREMENTS

- .1 Preparation:
 - .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
 - .2 After uncovering, inspect conditions affecting performance of Work.
 - .3 Beginning of cutting or patching means acceptance of existing conditions.
 - .4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
 - .5 Provide protection from elements for areas which may be exposed by uncovering work; maintain excavations free of water.
- .2 Execution:
 - .1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.
 - .2 Fit several parts together, to integrate with other Work.
 - .3 Uncover Work to install ill-timed Work.
 - .4 Remove and replace defective and non-conforming Work.

- .5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .7 Cut rigid materials using purpose made saw or core drill. Pneumatic or impact tools not allowed on brittle materials without prior approval.
- .8 Restore work with new products in accordance with requirements of Contract Documents.
- .9 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .10 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material, full thickness of the construction element.
- .11 Refinish surfaces to match adjacent finishes: For continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.
- .12 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

1.15 CLEANING

- .1 Project Cleanliness:
 - .1 Maintain Work in tidy condition, free from accumulation of waste products and debris.
 - .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, unless approved by Departmental Representative.
 - .3 Provide on-site containers for collection of waste materials and debris.
 - .4 Provide and use clearly marked separate bins for recycling. Refer to Construction/Demolition Waste Management and Disposal.
 - .5 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.
 - .6 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
 - .7 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
 - .8 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
 - .9 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.
- .2 Final Cleaning:
 - .1 When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
 - .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

- .3 Prior to final review, remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and 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.
- .5 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.
- .6 Clean lighting reflectors, lenses, and other lighting surfaces.
- .7 Vacuum clean and dust building interiors
- .8 Wax, seal, vacuum clean, shampoo or prepare floor finishes, as recommended by manufacturer.
- .9 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .10 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .11 Remove dirt and other disfiguration from exterior surfaces.
- .12 Sweep and wash clean paved areas.
- .13 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.

1.16 CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL

- .1 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and/or recyclable materials and waste.
 - .1 Separate non-salvageable materials from salvaged items.
 - .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.
 - .3 Transport and deliver non-salvageable items to licensed disposal facility.
- .2 Provide containers to deposit reusable and/or recyclable materials. Locate containers in locations, to facilitate deposit of materials without hindering daily operations. Provide containers to deposit reusable and/or recyclable materials.
- .3 Collect, handle, store on-site and transport off-site, salvaged materials in separate condition. Transport to approved and authorized recycling facility and/or users of material for recycling.
- .4 Locate waste and salvage bins on site as directed by Departmental Representative.

1.17 CLOSEOUT PROCEDURES

- .1 Inspection and Declaration:
 - .1 Contractor's Inspection: Conduct an inspection of Work with all subcontractors, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .2 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
 - .3 Request Departmental Representative's Inspection.

- .2 Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.
- .3 Substantial 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 Operation of systems have been demonstrated to Departments Representatives.
 - .5 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. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

1.18 CLOSEOUT SUBMITTAL

- .1 Record Drawings:
 - .1 As work progresses, maintain accurate records to show all deviations from the Contract Drawings. Note on as-built drawings as changes occur. At completion supply:
 - .1 Four (4) sets of CD's in AutoCAD file format (version: 2014) with all as-built information on the diskettes.
 - .2 Four (4) sets of as-built plotted reproducible drawings.
 - .3 Four (4) sets of printed as-built drawings.
 - .4 Submit one copy of check plots to Departmental Representative prior to final printing of as-built drawings.
 - .5 Departmental Representative will supply copies of the original AutoCAD files.
 - .6 Retain original logo and title block on the as-built drawings. Contractor may place on the upper right-hand title block area a small company logo, the text "AS-BUILT" and the date.
 - .2 Costs for transferring as-built information from marked up working set of drawings to electronic format using ACAD and plotting service is included in the Contract.
- .2 Maintenance manual:
 - .1 On completion of project submit to Departmental Representative four (4) CD R/ disk copies and four (4) paper copies (in loose leaf type binder) of Operations and Maintenance Manual, made up as follows:
 - .1 Provide maintenance manual on CDs using pdf, or other approved format for descriptive writing, page size images and page size drawings. Organize manuals into industry standard maintenance manual tabs with links in index to each descriptive section describing the component or maintenance procedure etc.

- .2 Organize files into CSI MasterFormat numbering system or other approved descriptive titles.
 - .3 Label disk "Operation and Maintenance Data", project name, date, names of Contractor, subcontractors, consultants and subconsultants.
 - .4 Include scanned guarantees, diagrams and drawings.
 - .5 Organize contents into applicable sections of work to parallel project specification break-down. Mark each section by labeled tabs (navigational buttons).
 - .6 Drawings, diagrams and manufacturer's literature must be legible.
 - .7 Refer to Mechanical and Electrical Divisions for specific details for Mechanical and Electrical data.
- .3 Maintenance Materials, Special Tools and Spare Parts:
- .1 Specific requirements for maintenance materials, tools and spare parts are specified in individual sections.
 - .2 Deliver maintenance materials, special tools and spare parts to Departmental Representative and store in designated area as directed by Departmental Representative.
 - .3 Prepare lists of maintenance materials, special tools and spare parts for inclusion in Manual specified in Clause 18.2.
 - .4 Maintenance materials:
 - .1 Deliver wrapped, identify on carton or package, colour, room number, system or area as applicable where item is used.
 - .5 Special tools:
 - .1 Assemble as specified;
 - .2 Include identifications and instructions on intended use of tools.
 - .6 Spare parts:
 - .1 Assemble parts as specified;
 - .2 Include part number, identification of equipment or system for which parts are applicable;
 - .3 Installation instructions;
 - .4 Name and address of nearest supplier.
- .4 Warranties and Bonds:
- .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing in maintenance manual.
 - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.
 - .4 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until the Date of Interim Completion is determined.

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

1.19 DEMONSTRATION AND TRAINING

- .1 Demonstration and Training:
 - .1 Demonstrate operation and maintenance of equipment and systems to maintenance personnel following interim Completion and prior to date of final certificate of completion
 - .2 Departmental Representative will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

1.20 GENERAL COMMISSIONING

- .1 Commission installed systems prior to Demonstration and Training.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises general construction requiring the addition of temporary, water cooled air conditioning units the existing data center located within the Institute of Ocean Sciences, Sidney, BC.

1.2 TIME OF COMPLETION OF THE WORK

- .1 The Contractor shall achieve the date of completion of the Work within the indicated timeline:
 - .1 Temporary Cooling Solution shall be operational 2 weeks after contract award and remain in operation for 8months after contract award.
- .2 The Contractor shall commence Work immediately upon official notification of acceptance of offer.

1.3 SPECIAL COORDINATION AND SCHEDULING

- .1 The Contractor's attention is specifically drawn to the following areas of the Work with respect to coordination and scheduling:
 - .1 Work will proceed as described on the drawings. The drawings are a guide to the requirements for this project. The Contractor is required to provide detailed coordination scheduling of the Work. Provide detailed schedules where the renovation will affect the operations of the existing facility.
 - .2 Procurement of all items required for the renovation and construction, installation and testing. The existing facility is in operation and therefore any disruptions caused by construction/renovation must be kept to a minimum. The Contractor is advised that prior to commencement of Work in the areas to be renovated all products, materials and supplies must be procured, and available for installation and testing. This must be scheduled, logged and verified to the Departmental Representative. All Work must be scheduled in detail; reviewed with the Departmental Representative and agreed to.
 - .3 Coordination of Division 01, 23 and 26
 - .4 Commissioning of systems, commissioning with other trades, access and egress.
 - .5 Construction, review and acceptance by Departmental Representative.
 - .6 The contractor shall allow of and provide approved commissionaires services to provide security escort for all contractors working on site, at all times.

1.4 WORK AFFECTING THE EXISTING BUILDING

- .1 Work Sequence Requirements
 - .1 The Contractor's attention is specifically drawn to the following areas of the Work with respect to coordination and scheduling:
 - .1 The Work is to be completed as described on the drawings.
 - .2 The Contractor must include all costs for the Work affecting the existing building. The Contractor must factor in the overall project schedule the

requirements for completing the Work affecting the existing building. This includes sequencing the Work to accommodate all operational requirements of the occupants of the existing building. Departmental Representative must be consulted.

- .2 Alteration Project Procedures
 - .1 No services may be disrupted at any time which affects the operation of the existing building or the occupants.
 - .2 If existing services are affected to accomplish installation of new Work consult with Departmental Representative regarding procedures. This must be shown in the project schedule. All costs must be included, no exceptions or additional costs will be considered. The acceptable window for server room power shutdowns is March 24th, 2018 starting at 9am to March 25th, 2018 at 10pm.

1.5 HEALTH AND SAFETY OF BUILDING OCCUPANTS

- .1 Refer to Section 01 35 33 - Health and Safety.
- .2 The Contractor is to provide in the Health and Safety Plan, contingencies should the air in the Work area affect the building occupants.
- .3 The Contractor is to provide detailed scheduling and planning for construction noise generating activities. In general, noise generating activities that affect operations will not be tolerated.

1.6 CONTRACTOR USE OF PREMISES

- .1 Hours of Work:
 - .1 Standard working hours, 730am to 4pm, Monday to Friday
 - .2 Weekends or extended hours during the week:
 - .1 A notice to the Departmental Representative must be given.
 - .2 Approval must be obtained from the Departmental Representative.
- .2 Contractor shall limit use of premises for Work, for storage, and for access, to allow:
 - .1 Work by other Contractors.
- .3 Coordinate use of premises under direction of Departmental Representative.
- .4 Obtain and pay for use of additional storage or Work areas needed for operations under this Contract.

1.7 RESPONSIBILITIES

- .1. Departmental Representative Responsibilities:
 - .1 No additional responsibilities except as described in the specifications.
- .2 Contractor Responsibilities:
 - .1 Designate submittals and delivery date for each product in progress schedule.
 - .2 Review shop drawings, product data, samples, and other submittals. Submit to Departmental Representative notification of any observed discrepancies or problems anticipated due to non-conformance with Contract Documents.

- .3 Receive and unload products at site.
- .4 Inspect deliveries jointly with Departmental Representative; record shortages, and damaged or defective items.
- .5 Handle products at site, including uncrating and storage.
- .6 Protect products from damage, and from exposure to elements.
- .7 Assemble, install, connect, adjust, and finish products.
- .8 Provide installation inspections required by public authorities.
- .9 Repair or replace items damaged by Contractor or Subcontractor on site under his control.
- .10 Pay for and coordinate commissionaires services for security escorting

1.8 MINIMUM STANDARDS

- .1 Unless specified otherwise, perform Work in accordance with the minimum standards set forth in the current version of the National Building Code and the requirements of Fire Commissioner of Canada. Where conflicts arise, the most stringent requirements shall be followed.

1.9 DRAWINGS AND SPECIFICATIONS

- .1 The Departmental Representative will provide the Contractor, 2 copies of drawings and specifications. The number of copies will be determined by the Departmental Representative.

1.10 GENERAL

- .1 The Contractor shall provide and apply its skill, judgement, expertise and experience as reasonably required to complete the Work and ensure that the Work is performed in a good, proper and workmanlike manner and not less than the accepted construction industry practice of a competent Contractor experienced in work similar to the Work to be performed.
- .2 The Contractor and each Subcontractor affirmatively represents that they are skilled and experienced in the performance of the Work as required by this Project and in the use and interpretation of drawings and specifications such as those included in the Contract Documents; that they have carefully reviewed the drawings and specifications of this Project and that their Contract is based solely on these Documents, not relying in any way on any explanations or interpretations - oral or written - from any other source. The Contractor agrees that it has exercised its aforementioned skill and experience and found the drawings and specifications sufficient and free from ambiguities, errors, or omissions for the purpose of determining its Contract for the performance of the Work in conformity with the drawings, specifications, and all other Contract Documents.
- .3 The Contractor shall report any error, inconsistency or omission in the Contract Documents it might discover, such review to be to the best of the Contractor's knowledge, information and belief.
- .4 The Contractor shall provide sufficient and adequate labour, materials and construction equipment necessary to properly correlate all phases of the Work to the end that the approved Construction Schedule can be maintained, and the date of Substantial Performance of the Work be met. Each Contractor is responsible for all necessary

development of the Work to fulfill the intent of the Contract Documents for a complete and/or functioning system whether totally defined by the drawings and specifications or not.

- .5 Each Contractor is responsible for all necessary development of the Work to fulfill the intent of the Contract Documents for a complete and/or functioning system whether totally defined by the drawings and specifications or not. In no case shall the Contractor or any of its Subcontractors proceed with Work in uncertainty.

1.11 PROJECT INFORMATION AND COMMUNICATION

- .1 Information and communication required to carry out the Work of the project issued by the Departmental Representative or the Contractors shall be in electronic form. This Information and communication may be but is not limited to the following:
 - .1 Project Drawings and Specifications
 - .2 Contractor submittals
 - .3 Requests for Information.
 - .4 Other forms of project communication.
- .2 The Departmental Representative requires that the Contractor set up an internet site organized to accommodate the required project information and communication.
- .3 The Contractor shall manage the site and ensure that the information is up to date. The Contractor shall notify the appropriate parties of information that is uploaded and updated onto the site.
- .4 The Departmental Representative, Contractor, other Contractors and Subcontractors must have rights to access the site.

1.12 COORDINATION

- .1 Coordinate construction activities included in various sections of the specifications to assure efficient and orderly installation of each component. Coordinate construction operations included under different sections that depend on each other for proper installation, connection and operation.
- .2 Where the installation of one component depends installation of other components before or after its own installation, schedule activities in the sequence required to obtain the best results.
- .3 Coordinate installation of different components to assure maximum accessibility for maintenance, service and repair.
- .4 Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate Work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- .5 Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building.
- .6 In finished areas except as otherwise indicated, conceal pipes, ducts and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

- .7 Coordinate completion and clean up of Work of separate sections in preparation for portions of the Work designated for the Departmental Representative's partial occupancy.
- .8 After Departmental Representative occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with the Contract Documents, to minimize disruption of Departmental Representative activities.

1.13 COORDINATION OF MECHANICAL AND ELECTRICAL SERVICES WITHIN AND ABOVE CEILINGS

- .1 Before commencing installation of any mechanical and electrical services and components within and above ceilings, prepare drawings showing proposed layouts for Departmental Representative's review and approval.
- .2 Mechanical and electrical services include, but are not limited to plumbing, heating and fire protection piping, ventilation ductwork, boxes and dampers, conduit runs and junction boxes, grilles, louvres, light fixtures, speakers, detectors, and access doors and panels.
- .3 Include plan layouts and sections on drawings.
- .4 Do not commence with installation until layouts are reviewed and approved by Departmental Representative.
- .5 Remove services installed before Departmental Representative's review and approval, and reinstalled in an acceptable manner, at no cost.
- .6 Comply with layouts approved by Departmental Representative. If changes to layouts are necessary, obtain Departmental Representative's approval of changes before proceeding with them.

1.14 DOCUMENT CROSS-CHECK

- .1 The Contractor and its Subcontractors shall review all current drawings and relevant specifications. Should specifications conflict with drawings, request clarification from the Departmental Representative before proceeding.
- .2 Mechanical and electrical Subcontractors shall review and become familiar with the drawings.
- .3 All costs resulting from Work, including labour, materials, equipment, miscellaneous requirements related to Work of other Subcontractors and/or required by coordination of other Subcontractors, is to be included. No additional costs will be considered.

1.15 REQUEST FOR INFORMATION

- .1 Maintain a Request for Information system for questions regarding clarifications. A Request for Information (RFI) will be a written document submitted in electronic form which includes, as a minimum, the following details: Hand written RFI's will not be accepted.
 - .1 Date.
 - .2 References to drawings and/or specifications.
 - .3 Location of the Work item in question.
 - .4 Complete description of the question.

- .5 Affect this item will have on other work.
- .6 Suggestions to resolve these questions.
- .7 Date that response information is required.
- .2 An RFI form is to be prepared with headings and spaces for this information to be filled in.
- .3 Allow 10 working days for response to a RFI.
- .4 The Departmental Representative's response does not authorize changes in the Contract Price or Contract Time.
- .5 RFI's are intended for clarification of drawings and specifications. RFI's shall not be used by the Contractor to identify errors or omissions in the Contract Documents, communicate directly with the Departmental Representative for clarification in this case.

1.16 DOCUMENTS

- .1 The Contractor is responsible for requesting any additional instructions or clarifications that may be required from the Departmental Representative which are needed for the performance of the Work and shall request such instructions or clarifications in time to avoid any delay in the Work.
- .2 Notwithstanding the foregoing, inconsistencies and omissions shall not include lack of reference on the drawings or in the specifications to labour or Products that are required or normally recognized within respective trade practices as being necessary for the complete execution of the Work.
- .3 Where "Notes" are included on the drawings, such Work shall be included in the Contract Price. It is the Contractor's and Subcontractor's responsibility to review all "Notes" and include all related costs in the Work to perform the Work identified in the "Notes." If the bidders require clarification of the scope of a "Note" such clarification shall be made prior to the tender closing, no additional costs will be considered by the Departmental Representative for bidder's failure to include all Work associated with the "Notes".
- .4 Where typical is noted on the drawings, the requirements of the Work apply to all conditions whether or not shown for each specific condition. The typical conditions apply to all subtrades work. It is the Contractor's and Subcontractor's responsibility to review the requirements and include all costs, no additional costs will be considered by the Departmental Representative for bidder's failure to include all work considered to be typical.
- .5 The Project consists of Products and assemblies that may require the work of more than one trade to complete. The Contractor, its suppliers, manufacturers, architectural trades, mechanical trades, electrical trades and specialty trades are advised that all materials, products, cutting, fitting, patching, scheduling, coordination, and site conditions must be taken into account for the completion of the Work and included in the Contract Price, no claims for additional costs will be considered by the Departmental Representative for failure to do so.

1.17 SPECIFICATION

- .1 The specifications and drawings are arranged in a manner to indicate the content of the Work. These sections do not however obligate the Departmental Representative to establish limits or limit the responsibility of any Subcontractor or Supplier. The onus for defining the extent of the Subcontractor's work remains with the Contractor to interpret all documents as a whole, and who will ensure that when awarding subcontracts, the area or scope of responsibility of any particular Subcontractor or Supplier is set out in full detail.
- .2 Division 01 of the specification specifies Work that is the direct responsibility of the General Contractor, administrative procedures and general requirements applying to all Subcontractors. Division 01 shall not be interpreted as defining limits of responsibility between the Contractor and its Subcontractors.
- .3 Ensure that Subcontractors understand that the General Conditions of the Contract and portions of the Division 01 which apply to sections of their Work.
- .4 Wherever in the Contract Documents the words "approval", "approved", "direction", "directed", "selection", "selected", "request", "requested", "report", "reviewed" and similar words are used, such approvals, directions, selections, requests and reports shall be given by the Departmental Representative unless specifically stated otherwise.
- .5 Wherever in the Contract Documents the word "provide" is used in any form, it shall mean that the Work concerned shall include both supply and installation of the products required for the completion of that part of the Work.
- .6 Wherever in the Contract Documents the word "supply" is used in any form, it shall mean that the Work specified to be supplied includes delivery to site and unloading at location directed.
- .7 Wherever in the Contract Documents the word "installed" issued in any form, it shall mean Work specified for installation includes receiving, uncrating, unpacking; moving from stored location to place of installation; and installing to meet specified requirements.
- .8 Wherever in the Contract Documents it is specified that Work is to proceed or to meet approval, direction, selection or request of jurisdictional authorities or others, such approval, direction, selection or request shall be in writing.
- .9 Wherever in the Contract Documents or as directed by the Departmental Representative it is specified that Work is to be repaired, made good or replaced, perform the Work without any additional cost to the Contract.
- .10 Wherever in the specifications the term "Related Sections" is used, it shall be taken to mean Work that is directly related to the section but not specified therein. The purpose of this clause is to redirect the reader to other sections of the specification for Work related to this section. This clause shall not be construed as a definition of trade responsibility, nor is it exhaustive in its description of related sections and is included for convenience only.
- .11 Except where a reference standard is specifically dated in the specifications, references to standards will be taken to mean the latest edition in effect at the date of award of this Contract. In the case of standards (dated or not) which appear in the specifications and

which are referenced in the National Building Code, the specific edition of the standard referenced in the code shall govern.

- .12 Where a standard is revised, supplemented or amended after award of the Contract, carry out the Work in accordance with latest edition of such standards. If the revision to the standard is such that a revision to the Contract Price is necessary, submit claims to the Departmental Representative in accordance provisions of the Contract Documents.

1.18 DRAWINGS

- .1 Refer to Section 01 78 00 - Closeout Submittals, for requirement to maintain a system of current drawings at all times.
- .2 Drawings are in part diagrammatic and are intended to convey the content of the Work required and, as such, indicate general and approximate location, arrangement and sizes of materials, elements, fixtures, equipment and outlets. Obtain more accurate information about locations, arrangement and sizes by studying, familiarizing with and correlating the Contract Documents, including coordination with the shop drawings, and becoming totally familiar with conditions and spaces affecting these matters before proceeding with the Work. Where job conditions require reasonable adjustments in the indicated locations and arrangements, make the necessary modifications at no additional cost to the Contract. Similarly, where existing conditions interfere with new installation and required location, include such relocation in the Work of this Contract. Install and arrange fixtures and equipment in such a way as to conserve as much headroom clearance and space as possible.
- .3 The Contractor is responsible for coordination of metric dimensions as shown on the drawings and as specified.

1.19 DOCUMENTS ON SITE

- .1 Maintain at the job site one copy of each of the following:
 - .1 Contract drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed shop drawings, product data and samples.
 - .5 Change orders.
 - .6 Other modifications to Contract.
 - .7 Field test reports.
 - .8 National Building Code.
 - .9 Copy of all permits from authorities having jurisdiction.
 - .10 Building permit drawings.
 - .11 Industrial Health and Safety Regulations of WorkSafeBC.
 - .12 Contractor's Safety Program.
 - .13 Construction Schedule.
 - .14 Record drawings.
 - .15 Fire Safety Program.
 - .16 Site reports.

- .17 Field instructions.
- .18 WHMIS brochures.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 35 33 - Health and Safety Requirements
- .2 Section 01 78 00 - Closeout Submittals.
- .3 Section 01 91 41 - Demonstration and Training.

1.2 ADMINISTRATIVE

- .1 Submit to Departmental Representative submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Work affected by submittal shall not proceed until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI 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 shall be 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 coordinated.
- .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 Maintain a submittal log.

1.3 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .3 Allow 14 working days for Departmental Representative's review of each submission.
- .4 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .5 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of any revisions other than those requested.
- .6 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .7 Submissions shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.

- .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .8 After Departmental Representative's review, distribute copies.
 - .9 Submit one electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
 - .10 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. Notwithstanding the foregoing, submit full shop drawings including but not limited to the following items: toilet partitions, washroom accessories (provide layout drawing), detention and commercial doors and frames, detention windows, and chain link fencing.
 - .11 Delete information not applicable to project.
 - .12 Supplement standard information to provide details applicable to project.
 - .13 Shop drawings will be reviewed by the Departmental Representative for general conformance with the design concept of the project and general compliance with information given in the Contract Documents. The Departmental Representative will signify the status of the review by stamping and dating the electronic copy accordingly, in one of the following manners:
 - .1 Reviewed
 - .2 Reviewed as Noted
 - .3 Revise and Resubmit
 - .4 Not Reviewed
 - .14 The Departmental Representative will return the electronic copy to the Contractor for their use and for copying for record keeping purposes and for distribution to Subcontractors and to suppliers.
 - .15 The Contractor shall distribute copies of the returned shop drawings by the Departmental Representative as "Reviewed," "Reviewed as Noted" to the Site Office and to the offices of Subcontractors, and suppliers.
 - .16 Shop drawings stamped "Revise and Resubmit" or "Not Reviewed" will be returned and shall be corrected and resubmitted to the Departmental Representative following the requirements stated above.
 - .17 Only shop drawings stamped "Reviewed" and "Reviewed as Noted" shall be used on the site and used for fabrication and installation of work. All other shop drawings shall be

- considered as being not reviewed and shall not be used on site or for fabrication and installation of work.
- .18 Conform to review comments and stamped instructions of each shop drawing reviewed.
 - .19 Only drawings noted for revision and re-submission need be resubmitted. Include revisions required by previous reviews before re-submission of shop drawings.
 - .20 No new details or information shall be added to shop drawings after they have been fully reviewed.
 - .21 No work dependent on shop drawing information shall proceed until review is given and verification received from the Departmental Representative. Be responsible for work performed prior to receipt of reviewed shop drawings. No review comments shall be construed as authorization for Changes in the Work.
 - .22 Each Subcontractor or supplier shall fabricate work exactly as shown on shop drawings and if shop practice dictates revision, shall revise shop drawings and resubmit.
 - .23 File one copy of each finally revised and corrected shop drawing on site.
 - .24 Consider this article the minimum requirement. Further instruction contained in any particular specification section governs for that section of the Work.
 - .25 Shop drawings must be in Metric measurement.
 - .26 The review of shop drawings by the Departmental Representative is for sole purpose of ascertaining conformance with general concept. This review shall not mean that PWGSC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting all requirements of construction and Contract Documents. Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of all sub-trades.
 - .27 The Contractor will have a system in place to allow the Departmental Representative, Contractor and its Subcontractors to have electronic access to the project submittals, shop drawings, project communication and latest drawings on file through a internet site. The Contractor and its Subcontractors are required to access the system to obtain the latest drawings on which their shop drawings will be based. If shop drawings are submitted based on out dated drawings shop drawings will be returned without further action. The users of the electronic system, once entered into the system, will be informed electronically of updated drawings available to them on the system. Photo copies of the Departmental Representatives design drawings will not be accepted.
 - .28 The Departmental Representative's CADD files shall not be used by the Contractor, its Subcontractors or Suppliers for use in preparing shop drawings.

- .29 A copy of final reviewed shop drawings in electronic format shall be included in operating and maintenance manuals specified under Section 01 78 00 - Closeout Submittals.

1.4 CERTIFICATIONS

- .1 When specified in individual specification sections, submit certification by manufacturer to the Departmental Representative to indicate material or Product conforms to or exceeds specified requirements.
- .2 Certificates may be recent or previous test results on material or Product, but must be acceptable to the Departmental Representative.

1.5 CERTIFICATES AND TRANSCRIPTS

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 23 80 99 – Temporary Water-Cooled Air Conditioners

1.2 REFERENCES

- .1 National Building Code, Safety Measures at Construction and Demolition Site.
- .2 Workers' Compensation Board (WCB) of British Columbia Regulations.
- .3 CSA S350-M1980 - "Code of Practice for Safety in Demolition of Structure."

1.3 QUALITY ASSURANCE

- .1 Assign work to trades experienced, efficient and skilled in the work designated to remain or to be removed so as to cause the least damage to each type of work encountered.

1.4 SITE CONDITIONS

- .1 The drawings and schedules indicate the general extent of existing surfaces, cabinets, fittings and equipment requiring patching, making good and re-finishing. The drawings and specifications do not necessarily indicate or describe the entire and complete extent of the work. The Contractor is responsible for reviewing and assessing the existing construction to determine the extent of work necessary to repair, patch and make good the existing surfaces.
- .2 Where existing pre-finished materials are required to be replaced to re-finish surfaces including but not limited to: ceramic tiles, and wood veneer and identical replacement finishes no longer available, submit samples of proposed replacement materials to the Departmental Representative for review prior to commencement of the affected work.
- .3 During the Work, wall inserts and plugs may be encountered. Remove inserts and plugs, patch holes.
- .4 If while carrying out alteration Work, the Contractor or its Subcontractors expose conditions which are in contravention with applicable regulatory codes and requirements of authorities having jurisdiction, unsafe or in any way less than the acceptable industry standard for the particular item, immediately notify the Departmental Representative before proceeding with further Work. The Departmental Representative will review the condition and issue the appropriate instruction.
- .5 All Work performed and materials used, to be not less than the standard of quality for the existing finished building, except where such existing materials are no longer available, are inappropriate for the intended reconstruction or detailed otherwise on the drawings.
- .6 Break into existing utilities, services and other areas of the Work as required to make proper connections to existing work. Patch and make good existing work that may be

damaged through the Work and reasonably match new to existing in all respects. Use extreme care when breaking into existing work as some services may not be shown or identified.

1.5 SECURITY

- .1 Obtain Departmental Representative permission prior to commencing any work in the alteration work areas and ensure worker observe all of the existing security regulations wherever such regulations apply.
- .2 Make provisions to maintain security in a manner acceptable to the Departmental Representative.

1.6 ACCESS

- .1 Maintain free access to areas not under construction at all times.
- .2 Maintain existing entrances and fire exits free from obstruction throughout alteration work.
- .3 The Departmental Representative has complete jurisdiction over the entry of Contractor's staff and workers to the existing buildings and control of construction vehicle routes within site, including and existing or necessary regulations which may be imposed for duration of the Contract.
- .4 Arrange and schedule access to the Work and agreed to by the Departmental Representative.

1.7 EXISTING SERVICES

- .1 The drawings may diagrammatically show some known utilities including abandoned and relocated utilities in their approximate locations. These locations are not guaranteed nor is their existence confirmed.
- .2 Become familiar with all available information and documents regarding existing building services and ensure that they are maintained continuously throughout the entire period of construction and alterations.
- .3 There are existing services including but not limited to: electrical, plumbing, BSCS systems hidden in concrete floors and concrete block walls. Where access is required, locate existing services using ground penetrating radar or similar methods as specified under this section.
- .4 Protect and maintain existing active services designated to remain or as required to facilitate the work.

1.8 PROTECTION

- .1 Take all necessary precautions to fully protect those portions of the existing building, to remain, against damage during demolition and/or installation of new Work.

- .2 Take special provisions to protect existing building areas, when exposed, by removal of existing walls, roofs or other exterior surfaces. Take necessary precautions and measures to ensure the interior of the existing building is weather tight and fully secure at all times.
- .3 Make good damage of any nature to existing building or its contents, except where required by the Work, to the satisfaction of the Departmental Representative and at no additional cost. Making good means restoration to at least original condition in terms of strength, safety, workmanship, and appearance.
- .4 Upon completion of the work in a given area, thoroughly clean all floors, walls, fixtures, cable trays, pipes, ducts and all other surfaces above and below the existing ceilings to the satisfaction of the Departmental Representative.

1.9 INSPECTION

- .1 Inspect the work and notify the Departmental Representative of any conditions affecting the performance of the work. Review the drawings and determine the total content of work to follow.
- .2 Ensure all services, whether buried, built-in or exposed, are properly located and staked as to position, type of service, size, direction of flow.
- .3 Inspect materials, equipment, components to be reused or turned over to the Departmental Representative. Note their condition and advise the Departmental Representative in writing of any defects or conditions which would affect removal and reuse.

1.10 PREPARATION

- .1 Provide protection to ensure materials, finishes and surfaces to remain will not be damaged, scratched, or marred by Work of this section.
- .2 Ensure that affected services and utilities designated for removal have been disconnected prior to the commencement of Work.

1.11 ALTERATIONS, CUTTING AND PROTECTION

- .1 Perform cutting and removal work so as not to cut or remove more than is necessary and so as not to damage adjacent work.
- .2 Assign patching of finish materials to mechanics skilled in the work of the finish trade involved.
- .3 Protect remaining finishes, equipment and adjacent work from damage caused by cutting, moving, removal and patching operations. Protect surfaces which will remain a part of the finished work.
- .4 Remove debris promptly from the area of work. Load removed material directly on trucks for removal from site.

- .5 Suppress dust. Prevent the occurrence of unsanitary conditions, dirt or debris on the site.

1.12 CUTTING AND CORING

- .1 Determine the location of reinforcing steel, concealed mechanical and electrical services prior to cutting or coring.
- .2 The approved method is ground penetrating radar. The contractor must allow for these services in the contract price. No additional costs will be considered.
- .3 Refer to the drawings and examine site conditions to determine cutting and coring required. Cut and core existing work as required to facilitate the installation of plumbing, mechanical, electrical and other services as shown or reasonably implied by the Contract Documents and as required by trades to facilitate installation of their work. Review existing conditions by site investigation and other methods as required to obtain information for such evaluation. Use dry cutting and coring methods where possible or take adequate measures to collect water during cutting and coring operations.
- .4 Take care not to remove more existing material than required. Excessive removal of material may damage the structure. No beams or columns are to be cut or in any way damaged. Before cutting or coring any holes, check that no beam or column will be encountered.
- .5 Keep the size of any new mechanical, electrical or plumbing opening in the existing structure to a minimum. Where groups of services occur, put through one or two larger cored holes. A line of holes may damage the capacity of the existing slabs.

1.13 PATCHING, EXTENDING AND MATCHING

- .1 Patch and extend existing work using skilled mechanics who are capable of matching the existing quality of workmanship. The quality of patched or extended work not to be less than that specified for new work as specified in the sections of the specifications which follow.
- .2 In areas where a portion of an existing finished surface is damaged, lifted, stained, or otherwise made or found to be imperfect, patch or replace the imperfect portion of the surface with matching material.
- .3 Unless otherwise shown on the drawings, do not incorporate salvaged or used material in new construction, except where small quantities of finish material which are difficult to match or duplicate is approved for patching or extending purposes by the Departmental Representative.
- .4 Provide adequate support or substrate for patching of finishes.
- .5 If the imperfect surface was painted or coated, repaint or recoat the patched portion in such a way that uniform colour and texture over the entire surface results.
- .6 If the surrounding surface cannot be matched, repaint or recoat the entire surface.

- .7 In the sections of the specifications which follow these general requirements, no concerted attempt has been made to describe each of the various existing products that must be used to patch, match, extend or replace existing work. Obtain all such products in time to complete the work on schedule. Provide such products in quality which is in no way inferior to the existing products.
- .8 The quality of the products that exist in the building, as apparent during pre-bid site visits, will serve as the specification requirement for strength, appearance and other characteristics.
- .9 Where new work abuts or finishes flush with existing work, make the transition as smooth and workmanlike as possible. Patched work to match existing adjacent work in texture and appearance so as to make the patch or transition invisible to the eye at a distance of 1m.
- .10 Where drywall, wood, metal or other finished surface is cut in such a way that a smooth transition with new work is not possible, terminate the existing surface in a neat fashion along a straight line at a natural line of division and provide trim appropriate to the finished surface.
- .11 Restore existing work that is damaged during construction to a condition equal to its condition at the time of the start of work.
- .12 Where a product or type of construction occurs in the existing building, and it is not specified as a part of the new work, provide such products or types of construction as needed to patch, extend or match the existing work.
- .13 These specifications will generally not describe existing products or standards of execution, nor will they enumerate products which are not a part of the new construction. The existing product is its own specification.
- .14 The presence of any product or type of construction in the old work shall cause its patching, extending or matching to be performed, as necessary to make the work complete and consistent, to identical standards of quality and visual appearance.
- .15 Patch damaged existing fireproofing and firestopping. Where existing fireproofing and firestopping is damaged during the installation of new construction, repair damaged materials to original condition.

1.14 REPAIR

- .1 Replace work damaged in the course of alterations, except at areas approved by the Departmental Representative for repair.
- .2 Where full removal of extensive amounts of almost suitable work would be needed to replace damaged portions, then filling, spackling, straightening and similar repair techniques, followed by full painting or other finishing, will be permitted.
- .3 If the repaired work is not brought up to standard for new work, the Departmental Representative will direct that it be cut out and replaced with new work.

1.15 CLEANING

- .1 As soon as work in each area of the alterations is complete, clean up all surfaces, remove equipment, salvage and debris, and return in condition suitable for use by the Departmental Representative as quickly as possible.
- .2 Clean up at the end of each day and keep dust and contamination of the work to a minimum.
- .3 Continuously during the work of this section remove all dirt, debris discarded material and deposit in waste containers. Keep routes to and from waste containers clear.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Public Services and Procurement Canada (PSPC) Update on Asbestos Use

Effective April 1, 2016, all Public Works and Government Services Canada (PWGSC) contracts for new construction and major rehabilitation will prohibit the use of asbestos-containing materials.

Further information can be found at <http://www.tpsgc-pwgsc.gc.ca/comm/vedette-features/2016-04-19-00-eng.html>

Part 1 General

1.1 References

- .1 Government of Canada.
 - .1 Canada Labour Code - Part II
 - .2 Canada Occupational Health and Safety Regulations.
- .2 National Building Code of Canada (NBC):
 - .1 Part 8, Safety Measures at Construction and Demolition Sites.
- .3 The Canadian Electric Code (as amended)
- .4 Canadian Standards Association (CSA) as amended:
 - .1 CSA Z462- Workplace Electrical Safety Standard
- .5 Current National Fire Code of Canada (as amended)
 - .1 Part 5 – Hazardous Processes and Operations and Division B as applicable and required.
- .6 Province of British Columbia:
 - .1 Workers Compensation Act Part 3-Occupational Health and Safety.
 - .2 Occupational Health and Safety Regulations

1.2 Related Sections

- .1 Refer to the following current NMS sections as required:
 - .1 Section 01 33 00 - Submittals Procedures

1.3 Workers' Compensation Board Coverage

- .1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the work.
- .2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.4 Compliance with Regulations

- .1 PSPC may terminate the Contract without liability to PSPC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.

- .2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

1.5 Submittals

- .1 Submit to Departmental Representative submittals listed for review, in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Work effected by submittal shall not proceed until review is complete.
- .3 Submit the following:
 - .1 Site Specific Health and Safety Plan.
 - .2 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.
 - .3 Copies of incident and accident reports.
 - .4 Complete set of current Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
 - .5 Emergency Procedures.
- .4 The Departmental Representative will review the Contractor's Site-Specific Health and Safety Plan and emergency procedures, and provide comments to the Contractor within 5 days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative.
- .5 Submission of the Site-Specific Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:
 - .1 Be construed to imply approval by the Departmental Representative.
 - .2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.
 - .3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

1.6 Responsibility

- .1 Assume responsibility as the Prime Contractor for work under this contract.
- .2 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable Federal, Provincial, Territorial and local statutes, regulations, and ordinances, and with Site Specific Health and Safety Plan.

1.7 Health and Safety Coordinator

- .1 The Health and Safety Coordinator:
 - .1 Be responsible for completing all health and safety training and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform work.

- .2 Be responsible for implementing, revising, daily enforcing, and monitoring the Site-Specific Health and Safety Plan.
- .3 Be on site during execution of work.

1.8 General Conditions

- .1 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.
- .2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.
 - .1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.
 - .2 Secure site at night time as deemed necessary to protect site against entry.

1.9 Project/Site Conditions

- .1 Work at site will involve contact with:
 - .1 Multi-employer work site.
 - .2 Federal employees and general public.

1.10 Utility Clearances

- .1 The Contractor is solely responsible for all utility detection and clearances prior to starting the work.
- .2 The Contractor will not rely solely upon the Reference Drawings or other information provided for utility locations.

1.11 Regulatory Requirements

- .1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at site.
- .2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

1.12 Work Permits

- .1 Obtain speciality permits related to project before start of work.
 - .1 This includes but is not limited to electrical trade permit and refrigeration trade permit.

1.13 Filing of Notice

- .1 The General Contractor is to complete and submit a Notice of Project as required by Provincial authorities.
- .2 Provide copies of all notices to the Departmental Representative.

1.14 Health and Safety Plan

- .1 Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.
- .2 Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:
 - .1 Primary requirements:
 - .1 Contractor's safety policy.
 - .2 Identification of applicable compliance obligations.
 - .3 Definition of responsibilities for project safety/organization chart for project.
 - .4 General safety rules for project.
 - .5 Job-specific safe work procedures.
 - .6 Inspection policy and procedures.
 - .7 Incident reporting and investigation policy and procedures.
 - .8 Occupational Health and Safety Committee procedures.
 - .9 Occupational Health and Safety meetings.
 - .10 Occupational Health and Safety communications and record keeping procedures.
 - .2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.
 - .3 List hazardous materials to be brought on site as required by work.
 - .4 Indicate Engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.
 - .5 Identify personal protective equipment (PPE) to be used by workers.
 - .6 Identify personnel and alternates responsible for site safety and health.
 - .7 Identify personnel training requirements and training plan, including site orientation for new workers.
- .3 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.
- .4 Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.
- .5 Departmental Representative's review: the review of Site Specific Health and Safety Plan by Public Service and Procurement Canada (PSPC) shall not relieve the Contractor of responsibility for errors or omissions in final Site-Specific Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.

1.15 Emergency Procedures

- .1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e. names/telephone numbers) of:
 - .1 Designated personnel from own company.

- .2 Regulatory agencies applicable to work and as per legislated regulations.
- .3 Local emergency resources.
- .4 Departmental Representative
- .2 Include the following provisions in the emergency procedures:
 - .1 Notify workers and the first-aid attendant, of the nature and location of the emergency.
 - .2 Evacuate all workers safely.
 - .3 Check and confirm the safe evacuation of all workers.
 - .4 Notify the fire department or other emergency responders.
 - .5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
 - .6 Notify Departmental Representative and site staff
- .3 Provide written rescue/evacuation procedures as required for, but not limited to:
 - .1 Work with hazardous substances.
 - .2 Work on, over, under and adjacent to water.
- .4 Design and mark emergency exit routes to provide quick and unimpeded exit.

1.16 Hazardous Products

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.
- .2 Where use of hazardous and toxic products cannot be avoided:
 - .1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as per Section 01 33 00 – Submittal Procedures.
 - .2 In conjunction with Departmental Representative, schedule to carry out work during "off hours" when tenants have left the building.
 - .3 Provide adequate means of ventilation
 - .4 The contractor shall ensure that the product is applied as per manufacturers recommendations.
 - .5 The contractor shall ensure that only pre-approved products are brought onto the work site in an adequate quantity to complete the work.

1.17 Asbestos Hazard

- .1 Carry out any activities involving asbestos in accordance with applicable Provincial / Territorial Regulations.

1.18 PCB Removals

- .1 Mercury-containing fluorescent tubes and ballasts which contain polychlorinated biphenyls (PCBs) are classified as hazardous waste.

1.19 Removal of Lead-Containing Paints

- .1 All paints containing TCLP lead concentrations above 5 pm are classified as hazardous.
- .2 Carry out demolition and/or remediation activities involving lead-containing paints in accordance with applicable Provincial / Territorial Regulations.

1.20 Electrical Safety Requirements

- .1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.
 - .1 Before undertaking any work, coordinate required energizing and de-energizing of new and existing circuits with Departmental Representative.
 - .2 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.

1.21 Electrical Lockout

- .1 Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.
- .2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request/authorization form. Have procedures available for review upon request by the Departmental Representative.
- .3 Keep the documents and lockout tags at the site and list in a log book for the full duration of the Contract. Upon request, make such data available for viewing by Departmental Representative or by any authorized safety representative.

1.22 Overloading

- .1 Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.

1.23 Confined Spaces

- .1 Carry out work in confined spaces in compliance with Provincial / Territorial Regulations

1.24 Powder-Actuated Devices

- .1 Use powder-actuated devices in accordance with ANSI A10.3 only after receipt of written permission from the Departmental Representative.

1.25 Fire Safety and Hot Work

- .1 Obtain Departmental Representative's authorization before any welding, cutting or any other hot work operations can be carried out on site.
- .2 Hot work includes cutting/melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which produces sparks.

1.26 Fire Safety Requirements

- .1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
- .2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.
- .3 Portable gas and diesel fuel tanks are not permitted on most federal work sites. Approval from the DR is required prior to any gas or diesel tank being brought onto the work site.

1.27 Fire Protection and Alarm System

- .1 Fire protection and alarm systems shall not be:
 - .1 Obstructed.
 - .2 Shut off.
 - .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 Be responsible/liable for costs incurred from the fire department and the building occupants, resulting from false alarms.

1.28 Unforeseen Hazards

- .1 Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the work, immediately stop work and advise the Departmental Representative verbally and in writing.

1.29 Posted Documents

- .1 Post legible versions of the following documents on site:
 - .1 Site Specific Health and Safety Plan.
 - .2 Sequence of work.
 - .3 Emergency procedures.
 - .4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
 - .5 Notice of Project.
 - .6 Floor plans or site plans.
 - .7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.
 - .8 Workplace Hazardous Materials Information System (WHMIS) documents.
 - .9 Material Safety Data Sheets (MSDS).
 - .10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.
- .2 Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.

- .3 Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.

1.30 Meetings

- .1 Attend health and safety pre-construction meeting and all subsequent meetings called by the Departmental Representative.

1.31 Correction of Non-Compliance

- .1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.
- .3 The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time. The General Contractor/subcontractors will be responsible for any costs arising from such a "stop work order".

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION



INSTITUTE of OCEAN SCIENCES PRELIMINARY HAZARD ASSESSMENT FORM

Project Number:	R.089467.001
Location:	Institute of Ocean Sciences, Sidney, BC
Date:	February 6, 2018
Name of Departmental Representative:	KAI MARK
Name of Client:	Shared Services Canada
Name of Client Project Co-ordinator	Aaron Peeke-Vout PH: (250)-208-0104

Site Specific Orientation Provided at Project Location Yes

Notice of Project Required Yes

NOTE:

PWGSC REQUIRES A Notice of Project FOR ALL CONSTRUCTION WORK RELATED ACTIVITIES

NOTE:

OHS law is made up of many municipal, provincial, and federal acts, regulations, bylaws and codes. There are also many other pieces of legislation in British Columbia that impose OHS obligations.

Important Notice: This hazard assessment has been prepared by PSPC for its own project planning process, and to inform the service provider of actual and potential hazards that may be encountered in performance of the work. PSPC does not warrant the completeness or adequacy of this hazard assessment for the project and the paramount responsibility for project hazard assessment rests with the service provider.

TYPES OF HAZARDS TO CONSIDER	Potential Risk for:				COMMENTS
	PWGSC, OGD's, or tenants		General Public or other contractors		
Examples: Chemical, Biological, Natural, Physical, and Ergonomic					Note: When thinking about this pre-construction hazard assessment, remember a hazard is anything that may cause harm, such as chemicals, electricity, working from heights, etc; the risk is the chance, high or low, that somebody could be harmed by these and other hazards, together with an indication of how serious the harm could be.
Listed below are common construction related hazards. Your project may include pre-existing hazards that are not listed. Contact the Regional Construction Safety Coordinator for assistance should this issue arise.	Yes	No	Yes	No	

Typical Construction Hazards					
Concealed/Buried Services (electrical, gas, water, sewer etc)	Yes			No	Potential for hazards in walls where new penetrations will be made
Slip Hazards or Unsound Footing		No		No	
Working at Heights		No		No	
Working Over or Around Water	Yes			No	Water and drainage tie-ins in the janitor rooms
Heavy overhead lifting operations, mobile		No		No	



cranes etc.					
Marine and/or Vehicular Traffic (site vehicles, public vehicles, etc.)	Yes		Yes		General Site Traffic
Fire and Explosion Hazards		No		No	
High Noise Levels		No		No	
Excavations		No		No	
Blasting		No		No	
Construction Equipment	Yes		Yes		
Pedestrian Traffic (site personnel, tenants, visitors, public)	Yes		Yes		
Multiple Employer Worksite	Yes				Example: Contractor working in an occupied Federal Employee space.

Electrical Hazards					Comments
Contact With Overhead Wires		No			
Live Electrical Systems or Equipment	Yes				New electrical tie ins
Other:					
Physical Hazards					
Equipment Slippage Due To Slopes/Ground Conditions		No			
Earthquake	Yes				
Tsunami	Yes				
Avalanche		No			
Forest Fires		No			
Fire and Explosion Hazards	Yes				
Working in Isolation		No			
Working Alone	Yes				
Violence in the Workplace	Yes				
High Noise Levels		No			
Incllement weather	Yes				
High Pressure Systems		No			
Other:					
Hazardous Work Environments					
Confined Spaces / Restricted Spaces PSPC employees do not enter confined space.		No			
Suspended / Mobile Work Platforms		No			
Other:					
Biological Hazards					
Mould Proliferations		No			
Accumulation of Bird or Bat Guano		No			
Bacteria / Legionella in Cooling Towers / Process Water		No			
Rodent / Insect Infestation	Yes				
Poisonous Plants		No			
Sharp or Potentially Infectious Objects in Wastes		No			
Wildlife	Yes				



Chemical Hazards				
Asbestos Materials on Site	Yes			If "yes" a pre-project asbestos survey report is required. Provide Contractor with ELF Form 16 "Contractor Notification and Acknowledgement"
Designated Substance Present		No		If "yes" a pre-project designated substance survey report is required.
Chemicals Used in work		No		
Lead in paint		No		If "yes" a pre-project lead survey report is required.
Mercury in Thermostats or Switches		No		If "yes" a pre-project mercury survey report is required.
Application of Chemicals or Pesticides		No		
PCB Liquids in Electrical Equipment		No		
Radioactive Materials in Equipment		No		
Contaminated Sites Hazards				
Hazardous Waste		No		
Hydrocarbons		No		
Metals		No		
Other:				

Security Hazards				Comments
Risk of Assault		No		
Other:				
Other Hazards				

Other Compliance and Permit Requirements¹	YES	NO	Notes / Comments²
Is a Building Permit required?		No	Client to confirm
Is an Electrical permit required?	Yes		
Is a Plumbing Permit required?		No	
Is a Sewage Permit required?		No	
Is a Dumping Permit required?		No	
Is a Hot Work Permit required?	Yes		Soldering of water connections
Is a Permit to Work required?			Mandatory for ALL AFD managed work sites.
Is a Confined Space Entry Permit required?		No	Not applicable
Is a Confined Space Entry Log required		NO	Not applicable
Discharge Approval for treated water required			

Notes:

- (1) Does not relieve Service Provider from complying with all applicable federal, provincial, and municipal laws and regulations.
- (2) TBD means To Be Determined by Service Provider.



Service Provider Acknowledgement: We confirm receipt and review of this Pre-Project Hazard Assessment and acknowledge our responsibility for conducting our own assessment of project hazards, and taking all necessary protective measures (which may exceed those cited herein) for performance of the work.

Service Provider Name	
------------------------------	--

Signatory for Service Provider		Date Signed	
---------------------------------------	--	--------------------	--

RETURN EXECUTED DOCUMENT TO PSPC DEPARTMENTAL REPRESENTATIVE PRIOR TO ANY WORK COMMENCING

Part 1 General

1.1 REFERENCES AND CODES

- .1 Perform Work in accordance with the current version of the National Building Code of Canada (NBC) including all amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

- .2 Meet or exceed requirements of:
 - .1 Contract documents;
 - .2 Specified standards, codes, and referenced documents.

1.2 BUILDING SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 WORK IN EXISTING BUILDING

- .1 Where Noise and Dust Making Activities are carried out, provide temporary hoarding as required and approved by the Departmental Representative.

1.2 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, as required.
- .2 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Administrative procedures preceding preliminary and final inspections of Work.

1.2 RELATED SECTIONS

- .1 Section 01 78 00 - Closeout Submittals.
- .2 Section 01 91 13 - Commissioning.

1.3 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 shall correct Work accordingly.
- .3 Completion: submit written certificate that following have been performed:
 - .1 Work has been completed and inspected for compliance with Contract Documents.
 - .2 Defects have been corrected and deficiencies have been completed.
 - .3 Equipment and systems have been tested, adjusted, and balanced and are fully operational.
 - .4 Certificates required by authorities having jurisdiction.
 - .5 Commissioning of all systems: Final commissioning reports have been submitted to the Departmental Representative.
 - .6 Operation of systems has been demonstrated to Departmental Representative's personnel.
 - .7 Work is complete and ready for Final Inspection.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 77 00 - Closeout Procedures.
- .2 Section 01 91 13 - Commissioning.
- .3 Section 01 91 41 - Demonstration and Training.

1.2 SUBMISSION

- .1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .2 Two weeks prior to Interim Completion of the Work, submit to the Departmental Representative two final copies of operating and maintenance manuals in English.
- .3 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.
- .4 If requested, furnish evidence as to type, source and quality of products provided.
- .5 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .6 Pay costs of transportation.

1.3 FORMAT HARD COPY MANUALS

- .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 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .4 Arrange content by Section numbers and sequence of Table of Contents.
- .5 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .6 Text: Manufacturer's printed data, or typewritten data.
- .7 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

- .8 Provide 1:1 scaled CAD files in dwg format on CD.

1.4 CONTENTS - EACH VOLUME

- .1 Table of Contents: provide title of project;
 - .1 Date of submission;
 - .2 Names, addresses, and telephone and fax numbers of Contractor, Subcontractors, Suppliers with name of responsible parties;
 - .3 Schedule of products and systems, indexed to content of volume.
 - .4 Copy of hardware schedule and paint schedules, complete with the actual manufacturer, supplier and identification names and numbers.
 - .5 All extended guarantees, warranties, maintenance bonds, certificates, letters of guarantees, registration cards, as called for in the various sections of the specification.
 - .6 Complete set of all final reviewed shop drawings.
 - .7 Certificates of inspection by authorities having jurisdiction.
 - .8 Test reports and certificates as applicable.
 - .9 Complete set of as constructed drawings.
- .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 Training: Refer to Section 01 91 41 - Demonstration and Training.

1.5 'AS CONSTRUCTED' DRAWINGS AND SAMPLES

- .1 In addition to requirements in General Conditions, maintain at the site one record copy of:
 - .1 Contract Drawings;
 - .2 Specifications;
 - .3 Addenda;
 - .4 Change Orders and other modifications to the Contract;
 - .5 Reviewed shop drawings, product data, and samples;
 - .6 Field test records;
 - .7 Inspection certificates;
 - .8 Manufacturer's certificates.
- .2 Store record documents 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 Provide an electronic copy of as constructed drawings.

1.6 RECORDING ACTUAL SITE CONDITIONS

- .1 Record information on set of black line opaque drawings 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 Addenda and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.7 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 manufacture's start-up reports
 - .15 Additional requirements: As specified in individual specification sections.

1.8 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 location as directed; place and store.
- .4 Receive and catalogue all items. Submit inventory listing to Departmental Representative. Include approved listings in the Operating and Maintenance Manuals.

- .5 Obtain receipt for delivered products and submit prior to final payment.

1.9 SPECIAL TOOLS

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

1.10 STORAGE, HANDLING AND PROTECTION

- .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.

1.11 WARRANTIES AND BONDS

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures

1.2 QUALITY ASSURANCE

- .1 Provide third party commissioning agent(s) for mechanical and electrical systems acceptable to the Departmental Representative. Provide costs of commissioning in tender price.
- .2 Commissioning Agent(s) for testing to be a current member in good standing of AABC certified to perform specified services. Comply with applicable procedures and standards of the certification sponsoring association.
- .3 The Commissioning Agent(s) to be responsible for scheduling inspections and including reports in their final submission prior to turnover.

1.3 SUBMITTALS

- .1 Submit the names of a minimum three (3) commissioning agents proposed to perform commissioning and testing services, complete with references and CV of each member of the agency who will be doing the work for this project. Submit documentation to confirm agencies compliance with quality assurance provision.
- .2 Prior to commencing commissioning services, submit 3 preliminary specimen copies of each of report forms proposed for use.
- .3 Upon completion of commissioning services, prepare and submit preliminary report. Prepare final report with corrections and completed work requested, at time of turnover. Submit 3 copies and one electronic PDF file of final reports on approved forms.
- .4 The project will not be turned over without a final report showing no deficiencies or outstanding work. Once the building is occupied there will be no opportunities to return to the range to complete work unless escorted.

1.4 PROCEDURES - GENERAL

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

1.5 FINAL REPORTS

- .1 Commissioning agent to prepare final reports. Submit Operation and Maintenance manuals, testing results and reports to Commissioning Agent for final submission to Departmental Representative.
- .2 Ensure each form bears signature of recorder, and that of supervisor of reporting organization.
- .3 Identify each instrument used, and latest date of calibration of each.

1.6 COMMISSIONING AGENT'S RESPONSIBILITIES

- .1 Conduct testing and commissioning of the HVAC Equipment in accordance with the requirements in Division 23.
 - .1 The equipment supplied and installed under the General Contract will be commissioned as specified in Division 23.
- .2 Conduct mechanical system testing and balancing in accordance with mechanical requirements in Division 23

1.7 PREPARATION

- .1 Provide instruments required for testing, adjusting, and balancing operations.
- .2 Make instruments available to Departmental Representative to facilitate spot checks during testing.
- .3 Retain possession of instruments and remove at completion of services.
- .4 Verify systems installation is complete and in continuous operation.

1.8 EXECUTION

- .1 Test equipment, balance distribution systems, and adjust devices for HVAC systems.
- .2 For schedule of Mechanical systems requiring testing, adjusting, and balancing services, refer to Division 23.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3	Execution
3.1	NOT USED
.1	Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 78 00 - Closeout Submittals
- .3 Section 01 91 13 - Commissioning

1.2 DESCRIPTION

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to Departmental Representative's personnel two weeks prior to date of interim completion.
- .2 Departmental Representative will provide list of personnel to Contractor and coordinate dates and times.

1.3 QUALITY CONTROL

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

1.4 SUBMITTALS

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

1.5 CONDITIONS FOR DEMONSTRATIONS

- .1 Equipment has been inspected and put into operation.
- .2 Testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 – Commissioning, and equipment and systems are fully operational.
- .3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.6 PREPARATION

- .1 Verify that conditions for demonstration and instructions comply with requirements.

- .2 Verify that designated personnel are present.

1.7 DEMONSTRATION AND INSTRUCTIONS

- .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times, at the equipment location.
- .2 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.
- .3 Review contents of manual in detail to explain all aspects of operation and maintenance.
- .4 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 11 00 - Summary of Work

1.2 REFERENCE STANDARDS

- .1 American Society of Mechanical Engineers International (ASME)
 - .1 ANSI/ASME B16.18-12, Cast Copper Alloy Solder Joint Pressure Fittings.
- .2 National Sanitation foundation (NSF)
 - .1 NSF/ANSI 61-13, Drinking Water System Components-Health Effects.
- .3 National Research Council (NRC)
 - .1 National Plumbing Code of Canada (NPC)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data
 - .1 Provide manufacturer's printed product literature and datasheets for insulation and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Closeout Submittals:
 - .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

Part 2 Products

2.1 PIPING

- .1 Domestic cold within building.
 - .1 Above ground:
 - .1 Type 'K' hard drawn seamless copper tubing to ASTM B88 or copper pipe to ASTM B42. All copper water tubing shall be certified by the Canadian Standards Association or Warnock Hersey Professional Services Ltd. to ASTM B88.

2.2 FITTINGS

- .1 NPS 2 and larger:
 - .1 ANSI/ASME B16.18 or ANSI/ASME B16.22 roll grooved to CSA B242.
- .2 NPS 1 ½ and smaller:

- .1 Wrought copper to ANSI/ASME B16.22 or cast copper to ANSI/ASME B16.18; Suitable for operating pressure to 1380kPa.

2.3 JOINTS

- .1 Solder: tin copper alloy 95/5.
- .2 Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner.

2.4 BALL VALVES

- .1 NPS 2 and under, screwed:
 - .1 Class 150.
 - .2 Bronzebody, stainless steelball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle
- .2 NPS 2 and under, soldered:
 - .1 To ANSI/ASME B16.18, Class 150.
 - .2 Bronzebody, stainless steelball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle

Part 3 Execution

3.1 PREPARATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

- .1 Install in accordance with National Plumbing Code.
- .2 Assemble piping using fittings manufactured to ANSI and Standard Council of Canada (SCC) standards.
- .3 Provide continuous supervision during start-up.
- .4 Start-up procedures:
 - .1 Establish circulation and ensure that air is eliminated.
 - .2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.
 - .3 Check control, limit, safety devices for normal and safe operation.
- .5 Rectify start-up deficiencies.

3.3 PERFORMANCE VERIFICATION

- .1 Scheduling:

- .1 Verify system performance after pressure and leakage tests and disinfection are completed, and Certificate of Completion has been issued by authority having jurisdiction.
- .2 Reports:
 - .1 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 11 00 - Summary of Work

1.2 REFERENCE STANDARDS

- .1 ASTM International Inc.
 - .1 ASTM B306-02, Standard Specification for Copper Drainage Tube (DWV).
- .2 Canadian Standards Association (CSA International).
 - .1 CAN/CSA-B125.3-05, Plumbing Fittings.
- .3 National Research Council Canada (NRC)
 - .1 National Plumbing Code of Canada (NPC). Where conflicts arise between documents, the most stringent requirements shall apply.

Part 2 Products

2.1 COPPER TUBE AND FITTINGS

- .1 Above ground sanitary DWV to: ASTM B306.
 - .1 Fittings.
 - .1 Cast brass: to CAN/CSA-B125.3.
 - .2 Wrought copper: to CAN/CSA-B125.3.
 - .2 Solder: lead free, 95:5

Part 3 Execution

3.1 APPLICATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

- .1 Install in accordance with National Plumbing Code.

3.3 TESTING

- .1 Hydraulically test to verify grades and freedom from obstructions.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 11 00 - Summary of Work
- .2 Section 01 33 00 - Submittal Procedures

1.2 REFERENCE STANDARDS

- .1 CSA International
 - .1 CSA-B64 Series-11, Backflow Preventers and Vacuum Breakers.
- .2 National Research Council Canada (NRC)
 - .1 National Plumbing Code of Canada (NPC).

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-installation Meetings:
 - .1 Convene pre-installation meeting a minimum of 1 week prior to beginning on-site installation with Departmental Representative to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building construction subtrades.
 - .4 Review manufacturer's written installation instructions and warranty requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for plumbing products and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Indicate on drawings to indicate dimensions, materials, construction and assembly details.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Instructions: submit manufacturer's installation instructions.
- .6 Manufacturers' Field Reports: manufacturers' field reports specified.

Part 2 Products

2.1 BACK FLOW PREVENTERS

- .1 Reduced pressure principle backflow prevention device (RPPD), with inlet and outlet shut-off valves, double check valve assembly, differential relief outlet and repair/maintenance kit to CAN/CSA-B64.10 and CAN/CSA-B64.10.1.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 INSTALLATION

- .1 Install in accordance with National Plumbing Code of Canada (NPC)
- .2 Install in accordance with manufacturer's instructions and as specified.

3.3 BACK FLOW PREVENTERS

- .1 Install in accordance with CSA-B64 Series, where indicated and elsewhere as required by code.
- .2 Backflow prevention stations shall be in complete accordance with CAN/CSA-B64.10 and CAN/CSA-B64.10.1 Manual for the Selection and Installation of Backflow Prevention Devices/Manual for the Maintenance and Field Testing of Backflow Prevention Devices.
- .3 Complete testing of all reduced pressure principle backflow prevention devices shall be carried out by a certified tester under this section of the work prior to final acceptance of plumbing systems. Submit a certificate for each device duly signed and witnessed that testing was successfully completed.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Materials and installation requirements for the temporary water-cooled air-conditioning units.

1.2 REFERENCES

- .1 AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)
 - .1 AHRI 410 (2001; Addendum 1 2002; Addendum 2 2005; Addendum 3 2011) Forced-Circulation Air-Cooling and Air-Heating Coils
 - .2 AHRI 320 (1998) Water-Source Heat Pumps
- .2 AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)
 - .1 ANSI/ASHRAE 15 & 34 (2016) ANSI/ASHRAE Standard 15-Safety Standard for Refrigeration Systems and ANSI/ASHRAE Standard 34-Designation and Safety Classification of Refrigerants
 - .2 ASHRAE 52.2 (2012) Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size

1.3 SHOP DRAWINGS

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate following:
 - .1 Major components.
 - .2 Accessories.
 - .3 Type of refrigerant used.
 - .4 Electrical wiring diagram and requirements.
 - .5 Dimensions and weights.
 - .6 Installation and mounting requirements.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 WARRANTY

- .1 For refrigeration compressors, extend the standard warranty period prescribed to 5 years.

Part 2 Products

2.1 UNITARY (TEMPORARY) AIR CONDITIONING UNITS

.1 General:

- .1 Unit shall be a water-cooled factory assembled, weatherproof or indoor packaged unit as indicated.
- .2 Unit shall be the air-conditioning type conforming to applicable Underwriters Laboratories (UL) standards including UL 1995.
- .3 Unit shall be rated in accordance AHRI 340/360 I-P or AHRI 320.
- .4 Unit shall be provided with equipment as specified in paragraph "Unitary Equipment Components".
- .5 Evaporator or supply fans shall be double-width, double inlet, forward curved, backward inclined, or airfoil blade, centrifugal scroll type. Motors shall have Drip-proof or totally enclosed enclosures.
- .6 Interior water source metallic piping shall be adequately insulated (minimum 2" mineral fiber with/ vapor barrier. Hoses shall be or of a low conductance material to eliminate condensation forming on its surface.
- .7 Water-cooled unit shall be fitted with a strainer protected solenoid shut-off valve. The valve shall be a fully automatic, self-contained temperature regulating valve with integral thermometer.

.2 Air-to-Refrigerant Coils

- .1 Air-to-refrigerant coils shall have copper or aluminum tubes of 10 mm 3/8 inch minimum diameter with copper or aluminum fins that are mechanically bonded or soldered to the tubes.
- .2 Casing shall be galvanized steel or aluminum. Contact of dissimilar metals shall be avoided.
- .3 Coils shall be tested in accordance with ASHRAE 15 & 34 at the factory and be suitable for the working pressure of the installed system.
- .4 Each unit shall be provided with a factory operating charge of refrigerant and oil or a holding charge. Unit shipped with a holding charge shall be field charged.
- .5 Separate expansion devices shall be provided for each compressor circuit

.3 Water-to-Refrigerant Coils

- .1 Coils shall be of the tube-in-tube, shell-and-coil, shell-and-tube, or concentric tube type and be provided as an integral part of the packaged unit.
- .2 Water-wetted metals shall be copper or copper-nickel.
- .3 Coils shall be rated for not less than 2758 kPa 400 psi refrigerant side and 862 kPa 125 psi water side pressure service at operating temperatures.
- .4 Water supply, return connections and piping internal to unit shall be copper with brazed or threaded copper or bronze fittings.
- .5 Performance shall be based on an allowable water velocity not less than 0.9 m/s 3 fps.

.4 Fan Section

- .1 Fan shall be the centrifugal type in accordance with paragraph.
- .2 Do not locate fan and fan motor in the discharge airstream of the unit. Motors shall have splashproof or totally enclosed enclosure and be suitable for the indicated service.
- .3 The unit design shall prevent water from entering into the fan section.
- .5 Compressor
 - .1 Compressor shall be direct drive, semi-hermetic or hermetic reciprocating,
 - .2 or scroll type capable of operating at partial load conditions.
 - .3 Compressor shall be capable of continuous operation down to the lowest step of unloading as specified.
 - .4 Compressors of 35 kW 10 tons and larger shall be provided with capacity reduction devices to produce automatic capacity reduction of at least 50 percent. If standard with the manufacturer, two or more compressors may be used in lieu of a single compressor with unloading capabilities, in which case the compressors shall operate in sequence, and each compressor shall have an independent refrigeration circuit through the condenser and evaporator.
 - .5 Compressors shall start in the unloaded position. Each compressor shall be provided with vibration isolators, crankcase heater, thermal overloads, pressure safety cutoffs and protection against short cycling.
- .6 Refrigeration Circuit
 - .1 Refrigerant containing components shall comply with ASHRAE 15 & 34 and be factory tested, cleaned, dehydrated, charged, and sealed.
 - .2 Refrigerant charging valves and connections, and pumpdown valves shall be provided for each circuit.
 - .3 Refrigerant flow control devices shall be an adjustable superheat thermostatic expansion valve with external equalizer
- .7 Unit Controls:
 - .1 Unit shall be internally prewired with a control circuit powered by an internal transformer. Terminal blocks shall be provided for power wiring and external control wiring.
 - .2 Unit shall have cutoffs for high and low pressure, low oil pressure for compressors with positive displacement oil pumps, supply fan failure and safety interlocks on all service panels.
 - .3 Adjustable-cycle timers shall prevent short-cycling. Multiple compressors shall be staged by means of a time delay.
 - .4 Unit shall be internally protected by fuses or a circuit breaker in accordance with UL 1995.
 - .5 Externally Accessible Controls: The following controls shall be externally accessible:
 - .1 Start and stop total system functions.
 - .2 Audible alarm silence.
 - .3 Main power disconnect.

- .6 Status Indicators: The following status indicators shall be externally visible:
 - .1 Power On.
 - .2 System On.
 - .3 Malfunction.
 - .4 Provision for remote alarm status indication.
- .7 Alarmed Conditions: The following system status conditions shall be both audibly and visually alarmed:
 - .1 Loss of air flow.
 - .2 Dirty filters.
 - .3 Compressor overload or lock-out (compressor high head pressure and low suction pressure).
 - .4 High room temperature.

Part 3 Execution

3.1 GENERAL

- .1 Install units as indicated and to manufacturers' recommendations.
- .2 Provide and install all necessary pipes, hoses and all appurtenances for domestic cold water supply, domestic cold water return, and condensate drain lines as indicated.
- .3 Provide condensate drain pump and drain lines as indicated.
- .4 All supply and drain hoses used for distribution of pressurized water shall be tested to a minimum of 200psi for 12 hours, prior to installation. Provide pressure test reports to the departmental representative.

3.2 EQUIPMENT PREPARATION AND START-UP

- .1 Provide services of manufacturer's field engineer to set and adjust equipment for operation as specified. Refer to Section 01 91 13 - Commissioning.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 This section covers items common to sections of Division 26. This section supplements requirements of Division 1.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-C22.1-15, Canadian Electrical Code, Part 1 Safety Standard for Electrical Installations latest version.
 - .2 CAN/CSA-C22.2 No. 0-10 (R2015), General requirements-Canadian electrical code, part II latest version.
 - .3 CAN/CSA-C22.3 No. 1-01(Update March 2005), Overhead Systems.
 - .4 CAN3-C235-83(R2000), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
 - .1 EEMAC 2Y-1-[1958], Light Grey Colour for Indoor Switch Gear.
- .3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
 - .1 IEEE SP1122-[2000], The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.3 DEFINITIONS

- .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.4 SCOPE OF WORK

- .1 Electrical contractor to supply and install cables, breakers and terminations to connect temporary transformers. Electrical contractor is responsible for installation, testing and coordination with other trades.

1.5 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235-83.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
 - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification nameplates for control items in English.

1.6 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Detailed work schedules clearly indicating all the shutdown time.

- .3 Product Data: submit WHMIS MSDS in accordance with Section 01 35 33 – Health and Safety.
- .4 Shop drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada.
 - .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure coordinated installation.
 - .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
 - .5 If changes are required, notify Departmental Representative of these changes before they are made.
- .5 Quality Control: in accordance with Section 01 01 50 – Subsection 1.8 Quality Control.
 - .1 Provide CSA certified equipment and material.
 - .2 Where CSA certified equipment and material is not available, submit such equipment and material to inspection authorities for special approval before delivery to site.
 - .3 Submit test results of installed electrical systems and instrumentation.
 - .4 Permits and fees: in accordance with General Conditions of contract.
 - .5 Submit, upon completion of Work, load balance report as described in PART 3 – LOAD BALANCE.
- .6 Manufacturer's Field Reports: submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 – FIELD QUALITY CONTROL.

1.7 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 01 50 – Subsection 1.8 Quality Control.
- .2 Qualifications: Electrical work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with Authorities Having Jurisdiction as per the conditions of Provincial Act respecting manpower vocational training and qualification.
 - .1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
 - .2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.
- .3 Site Meetings:
 - .1 Site Meetings: as part of Manufacturer's Field Services described in Part 3 – FIELD QUALITY CONTROL, schedule site visits to review Work, at stages listed:
 - .1 After delivery and storage of products, and when preparatory Work is complete but before installation begins;

- .2 At bi-monthly intervals for the duration of the project;
- .3 Upon completion of Work after cleaning is carried out.
- .4 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 33 – Health and Safety.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Material Delivery Schedule: provide Departmental Representative with schedule within two (2) weeks after award of Contract.
- .2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling.

1.9 SYSTEM STARTUP

- .1 Instruct Departmental Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

1.10 OPERATING INSTRUCTIONS

- .1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
- .2 Operating instructions to include following:
 - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
 - .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
 - .3 Safety precautions.
 - .4 Procedures to be followed in event of equipment failure.
 - .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.
- .3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
- .4 Post instructions where directed.
- .5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
- .6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

Part 2 Products

2.1 SUSTAINABLE REQUIREMENTS

- .1 Materials and products in accordance with Division 1 – Sustainable Requirements: Construction.
- .2 Do verification requirements in accordance with Section 01 01 50 – Subsection 1.8 Quality Control..

2.2 MATERIALS AND EQUIPMENT

- .1 Provide material and equipment in accordance with Section 01 01 50 – Subsection 1.12 – Common Product Requirements.
- .2 Material and equipment to be CSA certified. Where CSA certified material and equipment is not available, obtain special approval from inspection authorities before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.
- .3 Factory assemble control panels and component assemblies.

2.3 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

- .1 Verify installation and coordination responsibilities related to motors, equipment and controls, as indicated.
- .2 Control wiring and conduit: in accordance with Section 26 05 21 – Wires and Cables (0-1000 V).

2.4 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of Departmental Representative.
- .2 Porcelain enamel decal signs, minimum size 175mm x 250mm.

2.5 WIRING TERMINATIONS

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.6 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates as follows:
 - .1 Nameplates: Lamacoid 3mm thick plastic engraving sheet. For normal power, black face, white lettering. Lettering accurately aligned and engraved into core mechanically attached with self-tapping screws. For emergency power, the same Lamacoid label, only red face and white lettering.
 - .2 Sizes as follows:

NAMEPLATE SIZES

Size 1	10 x 50mm	1 line	3mm high letters
Size 2	12 x 70mm	1 line	5mm high letters
Size 3	12 x 70mm	2 lines	3mm high letters
Size 4	20 x 90mm	1 line	8mm high letters
Size 5	20 x 90mm	2 lines	5mm high letters

NAMEPLATE SIZES

Size 6	25 x 100mm	1 line	12mm high letters
Size 7	25 x 100mm	2 lines	6mm high letters

- .2 Labels: embossed plastic labels with 6mm high letters unless specified otherwise.
- .3 Wording on nameplates to be approved by Departmental Representative prior to manufacture.
- .4 Allow for minimum of 25 letters per nameplate.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and voltage characteristics.
- .6 Identify equipment with size 3 labels engraved "ASSET INVENTORY NO." as directed by Departmental Representative.
- .7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .8 Terminal cabinets and pull boxes: indicate system and voltage.
- .9 Transformers: indicate capacity, primary and secondary voltages.

2.7 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

2.8 CONDUIT AND CABLE IDENTIFICATION

- .1 Colour code conduits, boxes, and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15m intervals.
- .3 Colours: 25mm wide prime colour and 20mm wide auxiliary colour.

	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency	Red	Blue
Other Security Systems	Red	Yellow

2.9 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

- .1 Paint indoor switchgear and distribution enclosures light grey to EEMAC 2Y-1-1958.

Part 3 Execution

3.1 INSTALLATION

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.
- .2 Do overhead and underground systems in accordance with CSA C22.3 No.1 except where specified otherwise.

3.2 NAMEPLATES AND LABELS

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.3 CONDUIT AND CABLE INSTALLATION

- .1 Install conduit and sleeves prior to pouring of concrete.
 - .1 Sleeves through concrete: rigid galvanized conduit, sized for free passage of conduit, and protruding 50mm.
- .2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- .3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.4 MOUNTING HEIGHTS (WHERE APPLICABLE)

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at following heights unless indicated otherwise.
 - .1 Local switches: 1400mm.
 - .2 Wall receptacles:
 - .1 General: 300mm.
 - .2 Above top of continuous baseboard heater: 200mm.
 - .3 Above top of counters or counter splash backs: 175mm.
 - .4 In mechanical rooms: 1400mm.
 - .3 Panelboards: as required by Code or as indicated.

3.5 COORDINATION OF PROTECTIVE DEVICES

- .1 Ensure circuit protective devices such as overcurrent trips, relays, circuit breakers, and fuses are installed to required values and settings, and protection devices are coordinated.

3.6 FIELD QUALITY CONTROL

- .1 Load Balance:
 - .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
 - .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
 - .3 Provide upon completion of work, load balance report as directed in PART 1 - SUBMITTALS: phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.
- .2 Conduct following tests in accordance with Section 01 01 50 – Subsection 1.8 Quality Control.
 - .1 Power distribution system including phasing (phase rotation), voltage, grounding and load balancing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Lighting and its control.
 - .4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
 - .5 Systems: fire alarm system and communications.
 - .6 Insulation resistance (IR) testing:
 - .1 Megger circuits, feeders and equipment up to 350V with a 500V instrument.
 - .2 Megger 350-600V circuits, feeders and equipment with a 1000V instrument.
 - .3 Check resistance to ground before energizing.
 - .4 Other testing as defined in other sections of the contract documents.
- .3 Carry out tests in presence of Departmental Representative.
- .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .5 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.7 CLEANING

- .1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

- .2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

END OF SECTION

Part 1 General

1.1 RELATED WORK

- .1 This Section of the Specification is to be read, coordinated and implemented in conjunction with all other parts of the Contract Documents.

1.2 REGULATORY REQUIREMENTS

- .1 Restraints shall meet the requirements of the latest edition of the British Columbia Building Code and amendments.
- .2 The Seismic Consulting Engineer should be able to provide a proof of professional insurance and the related practice credentials if requested by the Electrical Consultant. The Seismic Consulting Engineer should be familiar with SMACNA, ECABC & NFPA guidelines as well as BCBC and VBBL requirements.
- .3 The Contractors Seismic Consultant shall submit original signed BC Building Code "Letters of Assurance" "Schedules B1, B2, and C-B" to the Prime Consultant or Electrical Consultant.
- .4 Projects in the jurisdiction of the Town of Sidney to comply with the local bylaw as applicable.
- .5 Use the District of Saanich requirements in the absence of any local requirements.
- .6 The above requirements shall not restrict or supplant the requirements of any local bylaws, codes, or other certified agencies which may have jurisdiction over all or part of the installation.

1.3 SCOPE

- .1 It is the responsibility of equipment manufacturers to design their equipment so that the strength and anchorage of internal components of the equipment exceeds the force level used to restrain and anchor the unit itself to the supporting structure.
- .2 Manufacturer's shop drawings to be submitted with seismic information on equipment structure, bracing and internal components and as required by Division 01.
- .3 Provide restraint on all equipment and machinery, which is part of the building electrical services and systems, to prevent injury or hazard to persons and equipment in and around the structure. Restrain all such equipment in its normal position in the event of an earthquake.
- .4 The total electrical seismic restraint design and field review and inspection will be by a B.C. registered professional structural engineer who specializes in the restraint of building elements. Contractor to allow for coordination, provision of seismic restraints, as well as all costs for the services of the Seismic Restraint Engineer. This engineer, herein referred to as the Seismic Consultant, will provide normal engineering functions as they pertain to seismic restraint of electrical installations.
- .5 The Contractor shall be aware of, and comply with, all current seismic restraining requirements and make provision for those that may come into effect during construction of the project. Make proper allowance for such conditions in the tender.

- .6 The Seismic Consultant shall provide detailed seismic restraint installation shop drawings to the Contractor. Copies of the shop drawings to be included in the final project manual.
- .7 Provide seismic restraints on all equipment, and/or installations or assemblies, which are suspended, pendant, shelf mounted, freestanding and/or bolted to the building structure or support slabs.
- .8 The Seismic Consultant shall provide inspections during and after installation. The Contractor shall correct any deficiencies noted without additional cost to the contract.
- .9 Include all costs associated with the Seismic installation and certification in the base tender.

1.4 SHOP DRAWINGS & SUBMITTALS

- .1 Submit shop drawings of all seismic restraint systems including details of attachment to the structure, either tested in an independent testing laboratory or approved by the seismic consultant.
- .2 Submit all the proposed types and locations of inserts or connection points to the building structure or support slabs. Follow the directions and recommendations of the Seismic Consultant.

Part 2 Products

2.1 SLACK CABLE SYSTEMS

- .1 Slack cable restraint systems shall be as designed and supplied by Vibra-Sonic Control or equal.
- .2 Slack cable restraints shall be provided on suspended and shelf mounted transformers along with associated equipment and assemblies connected to them at the points of vertical support (4 points). The restraint wires shall be oriented at approximately 90o to each other (in plan), and tied back to the ceiling slab or its structure at approximately 45o to the slab or basic structure. The restraints shall be selected for a 1 g earthquake loading, i.e. each wire shall have a working load capacity equal to the weight of the transformer. The anchors in the structure shall be selected for a load equal to the weight of the transformers at a 45o pull.
- .3 Slack cable systems to allow normal maintenance of equipment and shall not create additional hazard by their location or configurations. Contractor shall rectify any such installations at no additional cost, all to the satisfaction of the engineer and inspection authority having jurisdiction.
- .4 Coordinate requirements of slack cables with suppliers prior to installation.

Part 3 Execution

3.1 GENERAL

- .1 All seismic restraints systems shall conform to local authority having jurisdiction and all applicable code requirements.

3.2 CONDUITS

- .1 Provide restraint installation information and details on conduit and equipment as indicated below:
- .2 Vertical Conduit:
 - .1 Attachment - Secure vertical conduit at sufficiently close intervals to keep the conduit in alignment and carry the weight of the conduits and wiring. Stacks shall be supported at their bases and, if over 2 stories in height, at each floor by approved metal floor clamps.
 - .2 At vertical conduit risers, wherever possible, support the weight of the riser, at a point or points above the center of gravity of the riser. Provide lateral guides at the top and bottom of the riser, and at intermediate points not to exceed 9.2 m [30 ft] o.c.
- .3 Riser joints shall be braced or stabilized between floors.
- .4 Horizontal Conduits:
 - .1 Supports - Horizontal conduit shall be supported at sufficiently close intervals to keep it in alignment and prevent sagging.
 - .2 EMT tubing - tubing shall be supported at approximately 1.2 m [4 ft] intervals for tubing.
- .5 Provide transverse bracing at 12.2 m [40 ft] o.c. maximum unless otherwise noted. Provide bracing at all 90o bend assemblies, and pull box locations.
- .6 Provide longitudinal bracing at 24.4 m [80 ft] o.c. maximum unless otherwise noted.
- .7 Do not brace conduit runs against each other. Use separate support and restraint system.
- .8 Support all conduits in accordance with the capability of the pipe to resist seismic load requirements indicated.
- .9 Trapeze hangers may be used. Provide flexible conduit connections where conduits pass through building seismic or expansion joints, or where rigidly supported conduits connect to equipment with vibration or seismic isolators.
- .10 A conduit system shall not be braced to dissimilar parts of a building or two dissimilar building systems that may respond in a different mode during an earthquake. Examples: wall and a roof; solid concrete wall and a metal deck with lightweight concrete fill.
- .11 Provide large enough conduit sleeves through walls or floors to allow for anticipated differential movements with firestopping where required.
- .12 It is the responsibility of the contractor to ascertain that an appropriate size restraint device be selected for each individual piece of equipment. Submit details on shop drawings. Review with seismic consultant and submit shop drawings to consultants for their reference.

3.3 FLOOR MOUNTED EQUIPMENT

- .1 Bolt all equipment, e.g. transformers, switchgear, generators, motor control centres, free standing panelboards, control panels, capacitor banks, etc. to the structure. Design anchors and bolts for seismic force applied horizontally through the center of gravity to a seismic force of 0.5g. For equipment which may be subject to resonances, use a nominal 1.0 g seismic force.

- .2 Provide flexible conduit connections between floor mounted equipment to be restrained and its adjacent associated electrical equipment.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 CSA C22.2 No.0.3-96, Test Method for Electrical Wires and Cables.
- .2 CAN/CSA C22.2 No.131-M89 (R1994), Type TECK 90 Cable.

1.2 PRODUCT DATA

- .1 Provide product data in accordance with Section 01 33 00 – Submittal Procedures.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials in accordance with Section 01 01 50 – Subsection 1.16 Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 BUILDING WIRES

- .1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG, copper.
- .2 Copper conductors: size as indicated, with 600V insulation of cross-linked thermosetting polyethylene material rated RW90 or RWU90 Jacketed.
- .3 Neutral supported cable: 3-phase insulated conductors of copper and one (1) neutral conductor of copper or steel reinforced, size as indicated.

2.2 TECK 90 CABLE

- .1 Cable: in accordance with Section 26 05 00 – Common Work Results for Electrical.
- .2 Conductors:
 - .1 Grounding conductor: copper as indicated.
 - .2 Circuit conductors: copper as indicated, size as indicated.
- .3 Insulation: Chemically cross-linked thermosetting polyethylene rated type RW90XLPE, 600V.
- .4 Inner jacket: polyvinyl chloride material.
- .5 Armour: flat galvanized steel
- .6 Overall covering: thermoplastic polyvinyl chloride, compliant to applicable building code classification for this project.
- .7 Fastenings:
 - .1 One-hole steel straps to secure surface cables 50mm and smaller. Two-hole steel straps for cables larger than 50mm.
 - .2 Channel type supports for two (2) or more cables.
 - .3 Threaded rods: 6mm diameter to support suspended channels.

- .8 Connectors:
 - .1 Watertight, explosion-proof approved for TECK cable (this is a site specific direction to suit the exposed marine environment).

2.3 ARMOURED CABLES (WHERE APPLICABLE)

- .1 Conductors: insulated, copper, size as indicated.
- .2 Type: AC90, 600V XLPE RW90.
- .3 Armour: interlocking type fabricated from galvanized steel strip.
- .4 Connectors: anti-short connectors.
- .5 Only to be used in areas where reviewed by the Departmental Representative.

Part 3 Execution

3.1 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 – Common Work Results for Electrical.
- .2 Perform tests using method appropriate to site conditions and to approval of Departmental Representative and local Authority Having Jurisdiction over the installation.
- .3 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

- .1 Terminate cables in accordance with Section 26 05 20 – Wire and Box Connectors - (0-1000 V).
- .2 Cable Colour Coding: to Section 26 05 00 – Common Work Results for Electrical.
- .3 Conductor length for parallel feeders to be identical.
- .4 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.
- .5 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.
- .6 Branch circuit wiring for surge suppression receptacles to be 2-wire circuits only, i.e. common neutrals not permitted.
- .7 Provide numbered wire collars for telecom wiring. Numbers to correspond to record drawings. Obtain wiring diagram for telecom wiring.

3.3 INSTALLATION OF BUILDING WIRES

- .1 Install wiring as follows:
 - .1 Perform insulation resistance testing on all cable and wiring, submit results to the department representative.

- .2 Perform continuity test on all new cable and wiring; submit results to the department representative.
 - .3 Check each conductor tested for unintentional grounds.
 - .4 Check if wire and cable are properly tightened to manufacturer's recommendations.
- .2 Install straps, clamps and box connectors to cables as required.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 01 50 –Subsection 1.16 Construction/ Demolition Waste Management and Disposal.
- .2 Section 26 05 00 – Common Work Results for Electrical.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)
 - .1 ANSI/IEEE 837-1989 (R1996), Qualifying Permanent Connections Used in Substation Grounding.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 01 50 –Subsection 1.16 Construction/ Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 EQUIPMENT

- .1 Clamps for grounding of conductor: size as indicated as required to electrically conductive system ground at the existing substations.
- .2 Copper conductor: minimum 6m long for each concrete encased electrode, bare, stranded, tinned, soft annealed, size as indicated.
- .3 Rod electrodes: copper clad steel 19mm dia by 3m long (preferred).
- .4 Plate electrodes: copper, surface area 0.2m², 1.6mm thick (acceptable, to suit soil/ ground conditions).
- .5 Grounding conductors: bare stranded copper, tinned, soft annealed, size as indicated.
- .6 Insulated grounding conductors: green.
- .7 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.

- .8 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
 - .1 Grounding and bonding bushings.
 - .2 Protective type clamps.
 - .3 Bolted type conductor connectors.
 - .4 Thermit welded type conductor connectors or Hypress connectors, both installed with rubberized heat-shrink insulator boot over the connection.
 - .5 Bonding jumpers, straps.
 - .6 Pressure wire connectors.

Part 3 Execution

3.1 INSTALLATION GENERAL

- .1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories. Where EMT is used, run ground wire in conduit.
- .2 Install connectors in accordance with manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.
- .4 Make buried connections, and connections to conductive water main, electrodes, using copper welding by thermit process, permanent mechanical connectors or inspectable wrought copper compression connectors to ANSI/IEEE 837.
- .5 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .6 Soldered joints not permitted.
- .7 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.
- .8 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.
- .9 Install separate ground conductor to outdoor lighting standards.
- .10 Connect building structural steel and metal siding to ground by welding copper to steel.
- .11 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.
- .12 Bond single conductor, metallic armoured cables to cabinet at supply end, and provide non-metallic entry plate at load end.
- .13 Ground secondary service pedestals, run ground conductor to the source panel and existing substation ground.

3.2 MANHOLES

- .1 Install conveniently located grounding stud, electrode, size #6 stranded copper conductor in each manhole.

- .2 Install ground rod in each manhole so that top projects through bottom of manhole. Provide with lug to which grounding connection can be made.

3.3 ELECTRODES

- .1 Make ground connections to continuously conductive underground metal water pipe when a substation ground is not available.
- .2 Install water meter shunt, where required.
- .3 Install concrete encased electrodes in building foundation footings & concrete duct banks, with terminals connected to grounding system, as required.
- .4 Install rod electrodes or grounding plates and make permanent grounding connections.
- .5 Bond separate, multiple electrodes continuously.
- .6 Use size #4/0 AWG copper conductors for connections to electrodes or plates.
- .7 Make special provision for installing electrodes or plates that will give a resistance less than 5Ω to ground value where rock or sand terrain prevails. Ground as required by code.

3.4 EQUIPMENT GROUNDING

- .1 Install additional grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centres, starters, central distribution panels, building steel work, panelboards, outdoor lighting & masts and power pedestals.

3.5 GROUNDING BUS

- .1 Install additional grounding bus bar assembly, mounted on insulated supports in substation(s) enclosure, where required.

3.6 COMMUNICATION SYSTEMS

- .1 Install grounding connections for telephone, sound, fire alarm, intercommunication systems as follows:
 - .1 Telephones: make telephone grounding system in accordance with facility requirements.
 - .2 Fire alarm, intercommunication systems, where required.

3.7 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 – Common Work Results for Electrical.
- .2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Departmental Representative and the local Authority Having Jurisdiction over the work site.
- .3 Perform tests before energizing electrical system.
- .4 Disconnect ground fault indicator during testing.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 01 50 –Subsection 1.16 Construction/ Demolition Waste Management and Disposal.

1.2 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 01 50 –Subsection 1.16 Construction/ Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by Consultant.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 SUPPORT CHANNELS

- .1 U-shape, size 41mm x 41mm, 2.5mm thick, suspended set in poured concrete walls and ceilings.

Part 3 Execution

3.1 INSTALLATION

- .1 Secure equipment to solid masonry, tile and plaster surfaces with lead anchors.
- .2 Secure equipment to poured concrete with expandable inserts.
- .3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.
- .4 Secure surface mounted equipment with twist clip fasteners to inverted T-bar ceilings. Ensure that T-bars are adequately supported to carry weight of equipment specified before installation. (Where Applicable.)
- .5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .6 Fasten exposed conduit or cables to building construction or support system using straps.
 - .1 One-hole steel straps to secure surface conduits and cables 50mm and smaller.
 - .2 Two-hole steel straps for conduits and cables larger than 50mm.
 - .3 Beam clamps to secure conduit to exposed steel work.
- .7 Suspended support systems.

- .1 Support individual cable or conduit runs with 6mm dia threaded rods and spring clips.
- .2 Support two (2) or more cables or conduits on channels supported by 6mm dia threaded rod hangers where direct fastening to building construction is impractical.
- .8 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .9 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .10 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .11 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental Representative.
- .12 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES:

- .1 Materials for moulded-case circuit breakers, circuit breakers, ground-fault circuit-interrupters, fused circuit breakers, and accessory high-fault protectors.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 01 50 –Subsection 1.16 Construction/Demolition Waste Management and Disposal.

1.3 REFERENCES

- .1 Canadian Standards Association (CSA International).
 - .1 CSA-C22.2 No. 5-[02], Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, tenth edition, and the second edition of NMX-J-266-ANCE).

1.4 SUBMITTALS

- .1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Include time-current characteristic curves for breakers with interrupting capacity of 22,000A symmetrical (RMS) and over at system voltage.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 01 50 – Subsection 1.16 Construction/ Demolition Waste Management and Disposal.
- .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, and packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .3 Separate for reuse and recycling and place in designated containers Steel, Metal, Plastic waste in accordance with Waste Management Plan.

Part 2 Products

2.1 BREAKERS GENERAL

- .1 Moulded-case circuit breakers, Circuit breakers, and Ground-fault circuit-interrupters, fused circuit breakers, and Accessory high-fault protectors: to CSA C22.2 No. 5.
- .2 Bolt-on moulded case circuit breaker: quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40 °C ambient.
- .3 Common-trip breakers: with single handle for multi-pole applications.

- .4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
 - .1 Trip settings on breakers with adjustable trips to range from 3-8 times current rating.
- .5 Circuit breakers with interchangeable trips as indicated.
- .6 Thermal-magnetic circuit breakers to have minimum bus rating of 22 kA symmetrical RMS interrupting capacity.

Part 3 Execution

3.1 INSTALLATION

- .1 Install circuit breakers as indicated.
- .2 Supply and install circuit breakers to correspond with the CDP and panelboards.
- .3 Check circuit breaker operation in accordance with the manufacturer's requirements.
- .4 Check breaker installed corresponds to short-circuit ratings and trip setting in accordance with coordination study; provide coordination study for review prior to field installation.
- .5 Provide lamacoid identification for all new breakers.

END OF SECTION