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DRAWING LIST:

ARCHITECTURAL

A-01 GENERAL NOTES AND PLANS

MECHANICAL

M-001 COVER SHEET
M-100 MECHANICAL DEMO
M-200 MECHANICAL RENO

ELECTRICAL

E-01 COVER SHEET & EXISTING/DEMO ELECTRICAL PLAN
E-02 NEW ELECTRICAL PLAN

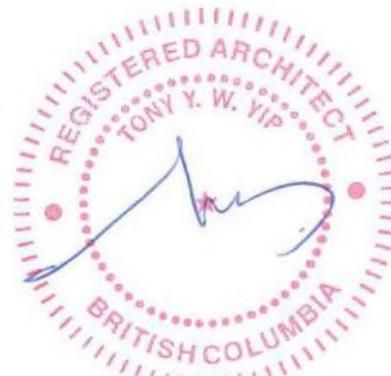
END OF SECTION 00 00 10

CONSULTANTS – SEAL & SIGNATURE

Discipline

Seal/Signature/Date

Architectural
Chernoff Thompson Architects



2020-09-30

Mechanical
AME Group



2020-09-30

Electrical
O'm Engineering Electrical and Electronic Consulting Engineer



2020-10-01

END OF SECTION 00 01 07

1.0 GENERAL

1.1 CODES

- .1 Perform work in accordance with National Building Code for Canada 2015, Workers' Compensation Board of BC, B.C. Building Code 2018 and any other code of provincial or local application provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.
- .2 Meet or exceed requirements of specified standards, codes and referenced documents.

1.2 DESCRIPTION OF WORK

- .1 Work under this Contract comprises, but is not limited to, the provision of all labour, materials, services and equipment necessary for the replacement of three (3) chemical storage trailers at Agassiz Research and Development Center at Agassiz, BC, as fully described in the Tender Documents.

1.3 CONTRACT DOCUMENTS

- .1 The Contract documents, drawings and specifications are intended to complement each other.
- .2 Drawings are, in general, diagrammatic and are intended to indicate the scope and general arrangement of the work.

1.4 TIME OF COMPLETION

- .1 Commence work immediately upon official notification of acceptance of offer and complete the project within eighteen (18) weeks after contract award.

1.5 HOURS OF WORK

- .1 All work which generates excessive noise and vibration, including cutting and coring, shall be executed outside of the normal operating hours, except Saturday and Sunday.
- .2 All other work, except for that noted in Clause 1.5.1 shall be executed during the normal operating hours: Monday through Friday – 08:00 to 16:00 hours.
- .3 All work conducted during or outside of normal operating hours will be subject to restrictions outlined in sections 01 14 00 Work Restriction.

1.6 WORK SCHEDULE

- .1 Carry out work as follows:
 - .1 Within 10 working days after Contract award, provide a "phasing bar chart" and a schedule showing anticipated progress stages and final completion of the work within the time period required by the Contract documents. Indicate the following:
 - .1 Submission of shop drawings, product data, MSDS sheets and samples.
 - .2 Commencement and completion of work of each section of the specifications or trades for each phase as outlined.
 - .3 Final completion date within the time period required by the Contract documents.
 - .2 Do not change approved Schedule without notifying Departmental Representative.
 - .3 Interim reviews of work progress based on work schedule will be conducted as decided by Departmental Representative and schedule updated by Contractor in conjunction with and to approval of Departmental Representative.

1.7 COST BREAKDOWN

- .1 Before submitting the first progress claim, submit a breakdown of the Contract price in detail as directed by the Departmental Representative and aggregating Contract price. After approval, the

cost breakdown will form the basis of progress payments.

- .2 General Contractor, Mechanical and Electrical Sub-Contractor should attend meetings with Departmental Representative as required to finalize the breakdown.

1.8 CODE, BYLAWS, STANDARDS

- .1 Perform work in accordance with the National Building Code of Canada (NBC) 2015, and other indicated Codes, Construction Standards and/or any other Code or Bylaw of local application.
- .2 Comply with applicable local bylaws, rules and regulations enforced at the location concerned.
- .3 Meet or exceed requirements of Contract documents, specified standards, codes and referenced documents.
- .4 In any case of conflict or discrepancy, the most stringent requirements shall apply.

1.9 DOCUMENTS REQUIRED

- .1 Maintain one copy each of the following at the job site:
 - .1 Contract drawings.
 - .2 Contract specifications.
 - .3 Addenda to Contract documents.
 - .4 Copy of work schedule.
 - .5 Reviewed shop drawings.
 - .6 Change orders.
 - .7 Other modifications to Contract.
 - .8 Field test reports.
 - .9 Reviewed samples.
 - .10 Manufacturer's installation and application instructions.
 - .11 One set of record drawings and specifications for "as-built" purposes.
 - .12 National Building Code of Canada 2015.
 - .13 Current construction standards of workmanship listed in technical Sections.
 - .14 Building Safety Plan.

1.10 REGULATORY REQUIREMENTS

- .1 Building Permit
 - .1 There is no building permit requirement for this project.
 - .2 Other trades permits, certificates or licenses required by City of Agassiz and/or Provincial Authority to complete work will be the responsibility of the contractor.
- .2 Provide inspection authorities with plans and information required for issue of acceptance certificates.
- .3 Furnish inspection certificates in evidence that the work installed conforms with the requirements of the specification.

1.11 CONTRACTOR'S USE OF SITE

- .1 Use of site:
 - .1 Exclusive and complete for execution of work.
 - .2 Assume responsibility for assigned premises for performance of this work.
 - .3 Be responsible for coordination of all work activities on site, including the work of other contractors engaged by the Departmental Representative.
 - .4 Coordinate with Departmental Representative for use of storage or work areas needed for

operations under this Contract.

- .2 Perform work in accordance with Contract documents. Ensure work is carried out in accordance with approved schedules.
- .3 Do not unreasonably encumber site with material or equipment.

1.12 EXAMINATION

- .1 Examine site and be familiar and conversant with existing conditions likely to affect work.

1.13 EXISTING SERVICES

- .1 Where Work involves breaking into or connecting to existing services, carry out work as directed in Section 01 14 00 – Work Restrictions.
- .2 Record locations of maintained, re-routed and abandoned service lines.
- .3 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.14 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 his approval for actual location.
- .4 Submit field drawings or shop drawings to indicate the relative position of various services and equipment when required by the Departmental Representative and/or as specified.

1.15 CUTTING AND PATCHING

- .1 Cut existing surfaces as required to accommodate new work.
- .2 Remove items so shown or specified.
- .3 Do not cut, bore, or sleeve load-bearing members.
- .4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.
- .5 Fit work airtight to pipes, sleeves, ducts and conduits.
- .6 Conceal pipes, ducts and wiring in raised floors, wall and ceiling construction of finished areas except where indicated otherwise.
- .7 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish and texture.
- .8 Making good is defined as matching construction and finishing materials and the adjacent surfaces such that there is no visible difference between existing and new surfaces when viewed from 1.5 metres in ambient light, and includes painting the whole surface to the next change in plane.

1.16 SETTING OUT OF WORK

- .1 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.
- .2 Provide devices needed to lay out and construct work.
- .3 Supply such devices as templates required to facilitate Departmental Representative's inspection of work.

1.17 ACCEPTANCE OF SUBTRADES

- .1 Each trade shall examine surfaces prepared by others and job conditions which may affect his work, and shall report defects to the Departmental Representative. Commencement of work shall imply acceptance of prepared work or substrate surfaces.

1.18 QUALITY OF WORK

- .1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.
- .2 The workmanship, erection methods and procedures to meet minimum standards set out in the National Building Code of Canada 2015 and Construction Standards as specified herein.
- .3 In cases of dispute, decisions as to standard or quality of work rest solely with the Departmental Representative, whose decision is final.

1.19 WORKS COORDINATION

- .1 Coordinate work of sub-trades:
 - .1 Designate one person to be responsible for review of contract documents and shop drawings and managing coordination of Work.
- .2 Convene meetings between subcontractors whose work interfaces and ensure awareness of areas and extent of interface required.
 - .1 Provide each subcontractor with complete plans and specifications for Contract, to assist them in planning and carrying out their respective work.
 - .2 Develop coordination drawings when required, illustrating potential interference between work of various trades and distribute to affected parties.
 - .1 Pay particularly close attention to overhead work above ceilings and within or near to building structural elements.
 - .2 Identify on coordination drawings, building elements, services lines, rough-in points and indicate location services entrance to site.
 - .3 Facilitate meeting and review coordination drawings. Ensure subcontractors agree and sign off on drawings.
 - .4 Publish minutes of each meeting.
 - .5 Plan and coordinate work in such a way to minimize quantity of service line offsets.
 - .6 Submit copy of coordination drawings and meeting minutes to Departmental Representative for information purposes.
- .3 Submit shop drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.
- .4 Work cooperation:
 - .1 Ensure cooperation between trades in order to facilitate general progress of Work and

- avoid situations of spatial interference.
- .2 Ensure that each trade provides all other trades reasonable opportunity for completion of Work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed work.
- .3 Ensure disputes between subcontractors are resolved.
- .5 Departmental Representative is not responsible for, or accountable for extra costs incurred as a result of Contractor's failure to coordinate Work.
- .6 Maintain efficient and continuous supervision.

1.20 APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- .1 In accordance with Section 01 33 00, submit the requested shop drawings, product data, MSDS sheets and samples indicated in each of the technical Sections.
- .2 Allow sufficient time for the following:
 - .1 Review of product data.
 - .2 Approval of shop drawings.
 - .3 Review of re-submission.
 - .4 Ordering of approved material and/or products. Refer to individual technical sections of specifications.

1.21 PROJECT MEETINGS

- .1 Contractor shall arrange project meetings and assume responsibility for setting times and distributing minutes.
- .2 The contractor shall provide the meeting facilities, record the meeting minutes and issue a meeting agenda 3 days prior to the meeting to Departmental Representative for review.

1.22 TESTING AND INSPECTION

- .1 Particular requirements for inspection and testing to be carried out by testing service or laboratory approved by the Departmental Representative are specified in Sections 01 45 00.
- .2 The Contractor will appoint and pay for the services of testing agency or testing laboratory as specified, and where required for the following:
 - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
 - .2 Inspection and testing performed exclusively for Contractor's convenience.
 - .3 Testing, adjustment and balancing of mechanical and electrical equipment and systems.
 - .1 Mill tests and certificates of compliance.
 - .2 Tests specified in the contract documents to be carried out by Contractor which may be under the Departmental Representative's supervision.
- .3 Within 15 working days after Contract award provide a list of proposed testing services or testing laboratories for Departmental Representative's approval.
- .4 The Departmental Representative may require, and pay for, additional inspection and testing services not included in paragraph 1.22.2.
- .5 Where tests or inspections by designated testing laboratory reveal work is not in accordance with the Contract requirements, Contractor shall pay costs for additional tests or inspections as the Departmental Representative may require to verify acceptability of corrected work.

- .6 Contractor shall furnish labour and facilities to:
 - .1 Notify Departmental Representative in advance of planned testing.
- .7 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .8 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by Departmental Representative.
- .9 Provide Departmental Representative with 2 copies of testing laboratory reports as soon as they are available.

1.23 AS-BUILT DOCUMENTS

- .1 Keep one set of current white prints of all contract drawings and all addenda, revisions, clarifications, change orders, and reviewed shop drawings in the site office; and have them available at all times for inspection by Departmental Representative.
- .2 As the Work progresses, maintain accurate records to show all deviations from the Contract documents. Note on as-built specifications, drawings and shop drawings as changes occur.
- .3 At completion of the Work, transfer all deviations, including those called up by addenda, revisions, clarifications, shop drawings and change order, to a set of Issued for Construction drawings. Submit the 'red-marked' as-built set to the Departmental Representative, in hard copy and in PDF.
- .4 Refer to Section 01 78 00 – Close-out Submittals.

1.24 CLEANING

- .1 Refer to Section 01 74 11 - Cleaning.

1.25 DUST CONTROL

- .1 Provide temporary dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of work and public.
- .2 Protect furnishings and equipment within work area with 0.102 mm thick polyethylene film during construction. Remove film during non- construction hours and leave premises in clean, unencumbered and safe manner for normal daytime function.
- .3 Maintain and relocate protection until such work is complete.

1.26 ENVIRONMENTAL PROTECTION

- .1 Prevent extraneous materials from contaminating air beyond construction area, by providing temporary enclosures during work.
- .2 Do not dispose of waste or volatile materials into water courses, storm or sanitary sewers.
- .3 Ensure proper disposal procedures in accordance with all applicable territorial regulations.

1.27 MAINTENANCE MATERIALS, SPECIAL TOOLS AND SPARE PARTS

- .1 Specific requirements for maintenance materials, tools and spare parts are specified in individual technical sections of specifications.

1.28 ADDITIONAL DRAWINGS

- .1 The Departmental Representative may furnish additional drawings for clarification. These additional drawings have the same meaning and intent as if they were included with drawings referred to in the Contract Documents.
- .2 Upon request, Departmental Representative may furnish up to a maximum of ten (10) sets of Contract Documents for use by the Contractor at no additional cost. Should more than ten (10) sets of documents be required, the Departmental Representative will provide them at additional cost.

1.29 BUILDING SMOKING ENVIRONMENT

- .1 Smoking within the property is prohibited.

1.30 SYSTEM OF MEASUREMENT

- .1 The metric system of measurement (SI) will be employed on this Contract.

1.31 SECURITY REQUIREMENTS

- .1 Refer to Section 01 14 00.

END OF SECTION 01 11 55

1.0 GENERAL

1.1 FACILITY OPERATIONS AND SECURITY PROCEDURES

- .1 All construction staff shall become thoroughly familiar with and abide by all provisions and requirements of Agassiz Research and Development Centre: Operations, Safety and Security Procedures and Restrictions.
- .2 There is no sign-in protocol for entry into the property and remain at the job site. Contractor has to sign-in online if required to access the interior of any other building on site.

1.2 ACCESS AND EGRESS

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, as required to perform the work in accordance with relevant municipal, provincial and other regulations.

1.3 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
- .2 Maintain existing services to the project area and provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security as per Departmental Representatives direction and as specified in 1.7 Security.
- .4 Closures: protect work temporarily until permanent enclosures are completed.
- .5 Other buildings within the property will be occupied by the public and government staff during entire construction period.
- .6 Coordinate with Departmental Representative in scheduling operations to minimize conflict and to facilitate use of space.

1.4 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

- .1 Execute work with least possible interference or disturbance to the operations, occupants, and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

1.5 EXISTING SERVICES

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 10 working days of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends. The maximum number of shut downs is limited to 4 for the duration of the project.
 - .1 Optimize and plan shut-downs so that services are restored in time for normal facility operation hours. Coordinate all shut-downs with utility providers, on-site facility maintenance personnel.
 - .2 Contractor shall be held responsible for damages to facility equipment as the result of service shut-downs.
 - .3 Contractor shall be held responsible for any and all unscheduled shut-downs of building utilities and services.
 - .4 Contractor will not be allowed to connect to Departmental Representative's existing data and

communication services.

- .5 Obtain permission from Departmental Representative for access to restricted areas outside the construction zones 24 hours in advance.

- .3 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.6 COVID 19 Protocol

- .1 Contractor to observe Guidance for Contractors working on AAFC. Refer to Appendix 3 of this specification.

1.7 NOISE CONTROL

- .1 Carry out noise and vibration generating Work outside the normal operating hours of the facility. Means and procedures of controlling and isolating construction noise affecting occupied areas shall be responsibility of the Contractor and approved by the Departmental Representative.
- .2 Means and procedures of controlling and isolating construction noise affecting occupied areas shall be responsibility of the contractor and approval of Departmental Representative.
- .3 Level of work noise must be maintained at a level no greater than 87 dBA, over an eight-hour period.
- .4 If work noise level exceeds 87 dBA, reduce noise either by using engineering devices to reduce or by shortening the duration of exposure.
 - .1 Refer to Table of maximum duration of exposure to sound levels higher than 87dBA permitted by Canada Occupational Health and Safety Regulations:

Sound Level in dBA	Maximum Duration of Exposure in Hours per Employee per 24-Hour Period	Sound Level in dBA	Maximum Duration of Exposure in Hours per Employee per 24-Hour Period
87	8.0	104	0.16
88	6.4	105	0.13
89	5.0	106	0.10
90	4.0	107	0.080
91	3.2	108	0.064
92	2.5	109	0.050
93	2.0	110	0.040
94	1.6	111	0.032
95	1.3	112	0.025
96	1.0	113	0.020
97	0.80	114	0.016
98	0.64	115	0.013
99	0.50	116	0.010
100	0.40	117	0.008
101	0.32	118	0.006
102	0.25	119	0.005
103	0.20	120	0.004

1.0 GENERAL

1.1 ADMINISTRATIVE

- .1 Schedule and administer site meetings throughout the progress of the work on a regular basis or at the call of Departmental Representative.
- .2 Prepare and distribute agenda at least three (3) days prior to the meetings.
- .3 Distribute written notice of each meeting seven (7) days in advance of meeting date to Departmental Representative.
- .4 Provide physical space and make arrangements for meetings.
- .5 Preside at meetings.
- .6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7 Reproduce and distribute copies of minutes within five (5) days after meetings and transmit to meeting participants and affected parties not in attendance, Departmental Representative
- .8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRE-CONSTRUCTION MEETING

- .1 Within 15 days after award of Contract: Departmental Representative will request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Attendance will include, but is not limited to, the Departmental Representative and the client representative.
- .3 Departmental Representative to establish time and location of pre-construction meeting, Contractor to notify parties concerned a minimum of 4 working days before meeting.
- .4 Departmental Representative will chair the meeting, record minutes and issue minutes.
- .5 Agenda to include:
 - .1 Introduction of official representative of participants in the Work.
 - .2 Start date on site.
 - .3 Communication Protocol for submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 51 00 - Temporary Utilities.
 - .5 Site safety in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
 - .6 Communication Protocol for proposed changes, change orders, procedures, approvals required.
 - .7 Owner's Work.
 - .8 Record drawings in accordance with Section 01 78 00 - Closeout Submittals.
 - .9 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
 - .10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
 - .11 Monthly progress claims, administrative procedures, photographs, hold backs.

- .12 Appointment of inspection and testing agencies or firms.

1.3 PROGRESS MEETINGS

- .1 During course of Work and two weeks prior to Project Completion, Contractor to schedule progress meetings bi-weekly.
- .2 Attendance to include but is not limited to Departmental Representative, client representatives, Contractor, and major subcontractors.
- .3 Contractor is responsible to record minutes of meetings and circulate to attending parties and affected parties not in attendance within five (5) days after meeting.
- .4 Record next meeting dates in the meeting minutes or notify parties minimum of seven (7) days in advance for other ad-hoc meetings.
- .5 Agenda to include, at a minimum, the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Health and Safety including any incidents, near misses, and WorkSafe BC visits.
 - .3 Review of Work progress since previous meeting.
 - .4 Coordination discussions with Departmental Representatives.
 - .5 Construction schedule review.
 - .6 Review of off-site fabrication delivery schedules.
 - .7 Corrective measures and procedures to regain projected schedule.
 - .8 Request for Information (RFI) log review.
 - .9 Engineering Disciplines Reviews.
 - .10 Change order log review.
 - .11 Review submittal schedule.
 - .12 Review updated as built.
 - .13 Review and resolve site issues.
 - .14 New business.

1.0 GENERAL

1.1 DEFINITIONS

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

1.2 REQUIREMENTS

- .1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.
- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.
- .5 Clearly show sequence and interdependence of construction activities and indicate:
 - .1 Start and completion of all items of Work, their major components and interim milestones completion dates.
 - .2 Activities for procurement, delivery, installation and completion of each major piece of equipment, materials and other supplies, including:
 - .1 Time for submittals, re-submittal and review.
 - .2 Time for fabrication and delivery of manufactured products for Work.
 - .3 Interdependence of procurement and construction activities.

- .3 Include sufficient detail for project activities to assure adequate planning and execution of work. Activities should generally range in duration from 3 to 15 days each.
- .4 Provide level of detail for project activities such that sequence and interdependency of Contract tasks are demonstrated to allow coordination and control of project activities. Show continuous flow from left to right.
- .5 Ensure activities with no float are calculated and clearly indicated on logical CPM construction network system as being whenever possible, continuous series of activities throughout length of project to form critical path.

1.3 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative within ten (10) working days after Award of Contract Project schedule in form of Bar (GANTT) Chart for planning, monitoring and reporting of project progress.

1.4 REVIEW OF THE SCHEDULE

- .1 Allow 10 working days for Departmental Representative to review proposed schedule. Make necessary changes to proposed schedule within 5 days.
- .2 Submit letter ensuring the schedule has been prepared in coordination with major subcontractors and suppliers.
- .3 Promptly provide additional information to validate practicability of schedule as required by Departmental Representative.
- .4 Submittal of Schedule indicates that it meets Contract Requirements and will be executed generally in sequence.

1.5 COMPLIANCE WITH SCHEDULE

- .1 Comply with reviewed schedule.
- .2 Proceed with significant changes and deviations from schedule sequence of activities which cause delay only after review by Departmental Representative.
- .3 Identify activities that are behind schedule and causing delay. Provide measures to regain slippage.
 - .1 Corrective measures may include:
 - .1 An increase of personnel on the site for effective activities or work packages.
 - .2 An increase in materials and equipment.
 - .3 Additional work shifts, longer hours.

1.6 PROJECT SCHEDULE

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule that shows milestone and activity types and expand from the following items:
 - .1 Award.
 - .2 Shop Drawings, Samples and Approvals.
 - .3 Permits.
 - .4 Mobilization.
 - .5 Mock-ups and Approvals.
 - .6 Procurement.

.7 Site Works.

1.7 PROJECT SCHEDULE REPORTING

- .1 On an ongoing basis, schedule on job site must show “progress to date”. Arrange participation on and off site of subcontractor and suppliers, as and when necessary, for purpose of network planning, scheduling, updating and progress monitoring. Inspect Work with Departmental Representative at least once monthly to establish progress on each current activity shown on applicable networks.
- .2 Maintain a daily log of progress of the work:
 - .1 Submit daily force report to Departmental Representative daily prior to noon the following day indicating:
 - .1 Total number of personnel on site.
 - .2 Major subcontractors on site listed by trade.
 - .3 Major equipment on site, i.e. excavators, cranes, drills.
 - .4 Visitors to site.
 - .5 Weather
 - .6 Documents required from Departmental Representative to Contractor to maintain.
 - .3 Perform schedule update monthly dated on last working day of the month. Update to reflect activities completed to date, activities in progress, logic and duration changes.
 - .4 Do not automatically update actual start and finish dates by using default mechanisms found in project management software.
 - .5 Requirements for monthly progress monitoring and reporting are basis for progress payment request.
 - .6 Submit monthly schedule updates with the progress payment request.
 - .7 Submit monthly written reports based on schedule, showing Work to Date performed, comparing work progress planned and presenting current forecasts. Report must summarize progress, defining problem areas and anticipated delays with respect to Work Schedule, and critical paths. Explain alternatives for possible schedule recovery to mitigate any potential delay. Include in report:
 - .1 Description of progress made.
 - .2 Pending items and status of: Permits, shop drawings, samples, mockups, deliveries, change orders, possible time extension.
 - .3 Status of Contract Completion Date and Milestones.
 - .4 Current and Anticipated problem areas, potential delays and corrective measures.
 - .8 Submit 3 weeks look ahead schedule to Departmental Representative on each Friday of the Week indicating the planned tasks of the next three weeks period.

1.8 PROJECT MEETINGS

- .1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

1.0 GENERAL

1.1 ADMINISTRATIVE

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

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 When specified in the Contract document, submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia of Canada.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 10 days for Departmental Representative's review of each submission, unless noted otherwise.

- .5 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.
- .6 Make changes in shop drawings as Departmental Representative may require consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, 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.
- .8 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .9 After Departmental Representative's review, distribute copies.
- .10 Submit electronic copy of shop drawings for each requirement requested in specification sections and as Departmental Representative may reasonably request.
- .11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.

- .13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- .14 Submit electronic copies of manufacturer's instructions for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .15 Submit copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .17 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .18 Delete information not applicable to project.
- .19 Supplement standard information to provide details applicable to project.
- .20 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .21 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of Construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.
- .22 Shop drawings must be submitted in electronic format. Electronic submissions will only be reviewed and returned electronically. No hardcopies will be returned to contractor.
- .23 All electronic submissions to be uploaded to Document Control System FTP site hosted by Departmental Representative.

1.3 SAMPLES

- .1 Submit for review samples in duplicate as required in respective specification Sections. Label samples with origin and intended use.

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

1.4 MOCK-UPS

- .1 Erect mock-ups in accordance with 01 45 00 - Quality Control.

1.5 PHOTOGRAPHIC DOCUMENTATION

- .1 Submit electronic copy of colour digital photography in jpg format, standard resolution monthly with progress statement and as directed by Departmental Representative.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Viewpoints and their locations as reasonably determined by Departmental Representative.
- .4 Provide photographic documentation of adjacent existing conditions prior to commencement of construction for determining and accidental damage as a result of contractor's work.
- .5 Frequency of photographic documentation: monthly as directed by Departmental Representative.
 - .1 Upon completion of: demolition, framing and services before concealment of Work, and as directed by Departmental Representative.

1.6 CERTIFICATES AND TRANSCRIPTS

- .1 Submit electronic copies of test results and inspection reports required as noted in each section of specifications.

END OF SECTION 01 33 00

1.0 GENERAL

PWGSC Update on Asbestos Use

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

COVID 19

All contractors shall follow Canadian Construction Association COVID-19 - Standardized Protocols for All Canadian Construction Sites.

1.1 REFERENCES

- .1 Government of Canada.
 - .1 Canada Labour Code - Part II (as amended)
 - .2 Canada Occupational Health and Safety Regulations (as amended).
- .2 National Building Code of Canada (NBC): (as amended)
 - .1 Part 8, Safety Measures at Construction and Demolition Sites.
- .3 The Canadian Electrical Code (as amended)
- .4 Canadian Standards Association (CSA) as amended:
 - .1 CSA Z797-2018 Code of Practice for Access Scaffold.
 - .2 CSA S269.1-2016 Falsework for Construction Purposes.
 - .3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures.
 - .4 CSA Z1006-10 Management of Work in Confined Spaces.
 - .5 CSA Z462-18 Workplace Electrical Safety Standard
- .5 National Fire Code of Canada 2015 (as amended)
 - .1 Part 5 – Hazardous Processes and Operations and Division B as applicable and required.
- .6 American National Standards Institute (ANSI): (as amended)
 - .1 ANSI/ASSP A10.3-2013, Operations – Safety Requirements for Powder-Actuated Fastening Systems.
- .7 Province of British Columbia:
 - .1 Workers Compensation Act Part 3-Occupational Health and Safety (as amended).
 - .2 Occupational Health and Safety Regulation (as amended)
- .8 Refer Appendix A of the specification for hazmat reports of all the buildings.

1.2 RELATED SECTIONS

- .1 Refer to the following current NMS sections as required:
 - .1 Section 01 01 50 General Instructions
 - .2 Section 01 32 16.0 Construction Progress Schedule-Bar (GANTT) Chart
 - .3 Section 01 33 00 Submittal Procedures
 - .4 Section 01 51 00 Temporary Utilities
 - .5 Section 01 52 00 Construction Facilities
 - .6 Section 01 56 00 Temporary Barriers and Enclosures
 - .7 Section 02 41 99 Demolition for Minor Works

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 PWGSC may terminate the Contract without liability to PWGSC 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 01 50.
- .2 Work affected by submittal shall not proceed until review is complete.
- .3 Submit the following:
 - .1 Organizations Health and Safety Plan.
 - .2 Site Specific Safety Plan or Health and Safety Plan (SSSP or HASP)
 - .3 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.
 - .4 Copies of incident and accident reports.
 - .5 Complete set of Material Safety Data Sheets (SDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
 - .6 Emergency Response Procedures.
- .4 The Departmental Representative will review the Contractor's Site Specific Safety Plan or Health and Safety Plan (SSSP/HASP) and emergency response 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 Medical surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of work, and submit additional certifications for any new site personnel to Departmental Representative.
- .6 Submission of the Site Specific Safety Plan or 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 and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.7 HEALTH AND SAFETY COORDINATOR

- .1 Assign a competent and qualified Health and Safety Coordinator who shall:
 - .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, daily enforcing, and monitoring the Site Specific Safety Plan (SSSP) or Health and Safety Plan (HASP)
 - .3 Be on site during execution of work.
 - .4 Have minimum two (2) years' site-related working experience
 - .5 Have working knowledge of the applicable occupational safety and health regulations.

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 or provide security guard 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.
 - .3 Energized electrical services.
 - .4 Working from heights.
 - .5 Persons incarcerated in the federal institutional system.
 - .6 Hazards - PSPC Preliminary Hazard Assessment included as an Appendix to Specifications

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 specialty permit(s) related to project before start of work.

1.13 FILING OF NOTICE

- .1 The General Contractor is to file Notice of Project with Provincial authorities prior to commencement of work. (All construction projects require a Notice of Work)
- .2 Provide copies of all notices to the Departmental Representative.

1.14 SITE SPECIFIC 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 the Site-Specific Safety Plan (SSSP) or Health and Safety Plan (HASP) based on the required 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/Representative procedures.
 - .9 Occupational Health and Safety meetings.
 - .10 Occupational Health and Safety communications and record keeping procedures.
 - .11 COVID 19 Protocols and 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. SDS required for all products.
 - .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 Site Specific Safety Plan (SSSP) and/or Health and Safety Plan (HASP) as required, and re-submit to the Departmental Representative.
- .5 Departmental Representative's review: the review of Site Specific Safety Plan and/or Health and Safety Plan by Public Works and Government Services Canada (PWGSC) shall not relieve the Contractor of responsibility for errors or omissions in final Site Specific Safety Plan and/or Health and Safety Plan of responsibility for meeting all requirements of construction and Contract documents and legislated requirements.

1.15 EMERGENCY PROCEDURES

- .1 List standard operating procedures and measures to be taken in emergency situations. Include an emergency response and emergency 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.
 - .5 A route map with written directions to the nearest hospital or medical clinic.
- .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.
- .3 Provide written rescue/evacuation procedures as required for, but not limited to:
 - .1 Work at high angles.
 - .2 Work in confined spaces or where there is a risk of entrapment.
 - .3 Work with hazardous substances.
 - .4 Underground work.
 - .5 Work on, over, under and adjacent to water.
 - .6 Workplaces where there are persons who require physical assistance to be moved.
- .4 Design and mark emergency exit routes to provide quick and unimpeded exit.
- .5 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.
- .6 Contractors must not rely solely upon 911 for emergency rescue in a confined space, working at heights, etc.

1.16 HAZARDOUS PRODUCTS

- .1 Comply with requirements of Workplace Hazardous Materials Information

System (WHMIS 2015) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling and provision of Safety Data Sheets (SDS) 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 SDS and WHMIS 2015 documents as per Section 01 01 50.
 - .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 in accordance with Section 01 51 00.
 - .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 bought 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 current applicable Federal and Provincial Regulations.
- .2 Removal and handling of asbestos will be in accordance with current applicable Provincial / Federal Regulations.

1.18 PCB REMOVALS

- .1 Mercury-containing fluorescent tubes and ballasts which contain polychlorinated biphenyls (PCBs) are classified as hazardous waste.
- .2 Remove, handle, transport and dispose of as indicated in Division 2 specifications.

1.19 REMOVAL OF LEAD-CONTAINING PAINT

- .1 All paint containing TCLP lead concentrations above 5 ppm are classified as hazardous.
- .2 Carry out demolition and/or remediation activities involving lead-containing paints in accordance with current applicable Provincial / Territorial Regulations.
- .3 Work with lead-containing paint shall be completed as per Provincial and Federal regulations.
- .4 Dry Scraping/Sanding of any materials containing lead is strictly prohibited.
- .5 The use of Methylene Chloride based paint removal products is strictly prohibited.

1.20 ELECTRICAL SAFETY REQUIREMENTS

(Reference: Worksafe BC OHS Regulation Part 19 – Electrical Safety)

- .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 arc flash protection, 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 FALSEWORK

- .1 Design and construct falsework in accordance with CSA S269.1-1975 (R2003) (as amended).

1.24 SCAFFOLDING

- .1 Design, construct and maintain scaffolding in a rigid, secure and safe manner, in accordance with CSA Z797-2009 (as amended) and B.C. Occupational Health and Safety Regulations (as amended).

1.25 CONFINED SPACES

- .1 Carry out work in compliance with current Provincial / Territorial regulations.

1.26 POWDER-ACTUATED DEVICES

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

1.27 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.
- .3 Hot Work permits are a mandatory requirement for any hot work activities.

1.28 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 (as amended).

- .3 Portable gas and diesel fuel tanks are not permitted on most federal work sites. Approval from the Departmental Representative is required prior to any gas or diesel tank being brought onto the work site.

1.29 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, the building owner and the tenants, resulting from false alarms.

1.30 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 immediately advise the Departmental Representative verbally and in writing.

1.31 POSTED DOCUMENTS

- .1 Post legible versions of the following documents on site:
 - .1 Site Specific Safety Plan (SSSP) or Health and Safety Plan (HASP)
 - .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. Must be posted in a non-inmate access area and locked up when not being used.
 - .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 2015) documents.
 - .9 Material Safety Data Sheets (SDS).
 - .10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.
 - .11 All Hazardous Material and Substance Reports including Lab Analysis
- .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.

1.32 MEETINGS

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

1.33 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 noncompliance 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".

2.0 PRODUCTS

- .1 Not used.

3.0 EXECUTION

- .1 Not used.

END OF SECTION 01 35 33

1.0 GENERAL

1.1 RELATED SECTIONS

- .1 General Instructions Section 01 11 55

1.2 REFERENCES AND CODES

- .1 Perform Work in accordance with National Building Code of Canada (NBC) 2015 and B.C. Building Code 2018 including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Meet or exceed requirements of:
- .1 Contract Documents.
 - .2 Specified standards, codes and referenced documents.

1.3 BUILDING SMOKING ENVIRONMENT

- .1 No smoking is allowed within the property.

END OF SECTION 01 41 00

1.0 GENERAL

1.1 INSPECTION

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

1.2 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Contractor for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Contractor.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection.

1.3 ACCESS TO WORK

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

1.4 PROCEDURES

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

1.5 REJECTED WORK

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

1.6 REPORTS

- .1 Submit electronic copy of inspection and test reports to Departmental Representative. Testing and Inspection companies engaged by the Contractor will furnish paper copies of reports on site to allow for work to proceed in a timely manner.
- .2 Provide copies to subcontractor of work being inspected or tested, or manufacturer or fabricator of material being inspected or tested.

1.7 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations acceptable to Departmental Representative as specified in specific Section. Each required sample mock up as noted in specification is to be constructed and placed against the existing for comparison.
- .3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in orderly sequence, to not cause delays in Work. Contractor to provide mock up in a prompt manner and schedule a mock up review by Departmental Representative who may invite other stakeholders.
- .4 Failure to prepare mock-ups in timely manner is not considered a reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 Individual specification section identifies whether mock-up may remain as part of Work or if it is to be removed.

END OF SECTION 01 45 00

1.0 GENERAL

1.1 REFERENCES

- .1 U.S. Environmental Protection Agency (EPA) / Office of Water
- .1 EPA 832R92005, Storm Water Management for Construction Activities:
Developing Pollution Prevention Plans and Best Management Practices.

1.2 ACTION AND INFORMATION SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

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

1.4 WATER SUPPLY

- .1 There is no water supply available on site for construction use. Contractor is to arrange their own temporary water supply. Disconnect all temporary water supply after project completion.

1.5 TEMPORARY POWER

- .1 There is no permanent power available on site for construction use. Contractor is to arrange their own temporary power. Disconnect all temporary power after project completion.

1.6 FIRE PROTECTION

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

1.7 TEMPORARY CLEANING STATION

- .1 Provide and maintain temporary cleaning station for hand and tool cleaning for hygiene control.

END OF SECTION 01 51 00

1.0 GENERAL

1.1 RELATED REQUIREMENTS

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 1. 189-00, Exterior Alkyd Primer for Wood.
 - .2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

- .2 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA-0121-M1978 (R2003), Douglas Fir Plywood.
 - .3 CAN/CSA-S269.2 – M1987 (R2001), Access Scaffolding for Construction Purpose.
 - .4 CAN/CSA-Z321-96 (R2001), Signs and Symbols for the Occupational Environment.

- .3 U.S. Environmental Protection Agency (EPA) / Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 INSTALLATION AND REMOVAL

- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

- .2 Identify areas which have to be gravelled to prevent tracking of mud.

- .3 Indicate use of supplemental or other staging area.

- .4 Provide construction facilities in order to execute work expeditiously.

- .5 Remove from site all such work after use.

1.5 SITE STORAGE/LOADING

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

- .3 The area around the existing chemical storage area, along with area across the road can be used as contractor's laydown area. Contractor to coordinate with Agassiz Research and Development Centre on-site personnel for exact extent of laydown area.

1.6 CONSTRUCTION PARKING

- .1 Parking is possible in the area across the road in front of the production range greenhouse.

- .2 Provide and maintain adequate access to project site.

1.7 SECURITY

- .1 Contractor to provide and pay for their own security personnel as needed to guard their site contents during the full duration of the contract. PSPC is not responsible for any security on site.

1.8 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

1.9 SANITARY FACILITIES

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

1.10 CONSTRUCTION SIGNAGE

- .1 No other signs or advertisements, other than warning signs, are permitted on site.
- .2 Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project or earlier if directed by Departmental Representative.

1.11 PROTECTION AND MAINTENANCE OF TRAFFIC

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

- .11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.
- .12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
- .13 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.12 CLEAN-UP

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

END OF SECTION 01 52 00

1.0 GENERAL

1.1 REFERENCES

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

1.2 INSTALLATION AND REMOVAL

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

1.3 HOARDING

- .1 Erect temporary site enclosure using new minimum 1.83 m high module lock fence for any work to be carried out outside the existing chemical storage fence line.
- .2 Protect from damage by equipment and constriction procedures.

1.4 GUARD RAILS AND BARRICADES

- .1 Provide secure, rigid guard rails and barricades around deep excavations.
- .2 Provide as required by governing authorities.

1.5 WEATHER ENCLOSURES

- .1 Provide weather tight closures to unfinished work.

1.6 ACCESS TO SITE

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

1.7 PUBLIC TRAFFIC FLOW

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

1.8 FIRE ROUTES

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.
- .2 Maintain clearance for all egress routes.

1.9 PROTECTION OFF-SITE AND PUBLIC PROPERTY

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

1.10 PROTECTION OF EXISTING PROPERTY

- .1 Provide protection for finished and partially finished property and equipment during performance of

Work.

- .2 Provide necessary screens, covers, and hoardings.
- .3 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

1.12 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION 01 56 00

1.0 GENERAL

1.1 PRODUCTS/MATERIAL AND EQUIPMENT

- .1 Use NEW products/material and equipment unless otherwise specified. The term "products" is referred to throughout the specifications.
- .2 Use products of 1 manufacturer for material and equipment of the same type or classification unless otherwise specified.
- .3 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.
- .4 Notify Departmental Representative in writing of any conflict between these specifications and manufacturer's instructions. Departmental Representative will designate which document is to be followed.
- .5 Provide metal fastenings and accessories in the same texture, colour and finish as base metal in which they occur.
 - .1 Prevent electrolytic action between dissimilar metals.
 - .2 Use non-corrosive fasteners, anchors and spacers for securing exterior work.
 - .3 Fastenings which cause spalling or cracking are not acceptable.
 - .4 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
 - .5 Use heavy hexagon heads, semi-finished unless otherwise specified.
 - .6 Bolts may not project more than 1 diameter beyond nuts.
 - .7 Types of washers as follows:
 - .1 Plain type washers: use on equipment and sheet metal.
 - .2 Soft gasket lock type washers: use where vibrations occur.
 - .3 Resilient washers: use with stainless steel.
 - .8 Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact.
 - .9 Prevent damage, adulteration and soiling of products during delivery, handling and storage. Immediately remove rejected products from site.
 - .10 Store products in accordance with suppliers' instructions.
 - .11 Touch up damaged factory finished surfaces to Departmental Representative's satisfaction.
 - .1 Use primer or enamel to match original.
 - .2 Do not paint over nameplates.

1.2 QUALITY OF PRODUCTS

- .1 Products, materials and equipment (referred to as products) incorporated into work shall be new, not damaged or defective, and of the best quality (compatible with the specifications) for the purpose intended. If requested, furnish evidence as to type, source and quality of the products provided.
- .2 Defective products will be rejected regardless of previous inspections.
 - .1 Inspection does not relieve responsibility, but is precaution against oversight or error.
 - .2 Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
 - .3 Retain purchase orders, invoices and other documents to prove that all products utilized in this Contract meet the requirements of the specifications. Produce documents when requested by the Departmental Representative.

- .3 Should any dispute arise as to quality or fitness of products, the decision rests strictly with the Departmental Representative based upon the requirements of the Contract documents.
- .4 Unless otherwise indicated in the specifications, maintain uniformity of manufacture for any particular or like item throughout the building.

1.3 AVAILABILITY OF PRODUCTS

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

1.4 MANUFACTURER'S INSTRUCTIONS

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

1.5 CONTRACTOR'S OPTIONS FOR SELECTION OF PRODUCTS FOR TENDERING

- .1 Products are specified by "Prescriptive" specifications: select any product meeting or exceeding specifications.
- .2 Products specified under "Acceptable Products": 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 "Special Instructions to Tenderers".
- .5 When products are specified by a referenced standard or by or Performance specifications, upon request of Departmental Representative obtain from manufacturer an independent laboratory report showing that the product meets or exceeds the specified requirements.

1.6 SUBSTITUTION AFTER CONTRACT AWARD

- .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.

END OF SECTION 01 61 00

1.0 GENERAL

1.1 SUBMITTALS

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

1.2 MATERIALS

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

1.3 PREPARATION

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

1.4 EXECUTION

- .1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.
- .2 Uncover Work to install ill-timed Work.
- .3 Remove and replace defective and non-conforming Work.
- .4 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .5 Restore work with new products in accordance with requirements of Contract Documents.

- .6 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION 01 73 00

1.0 GENERAL

1.1 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .4 Provide on-site containers for collection of waste materials and debris.
- .5 Provide and use marked separate bins for recycling. Refer to Section 01 74 19 - Waste Management and Disposal.
- .6 Dispose of waste materials and debris off site.
- .7 Clean areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .9 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .10 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not remain on newly finished surfaces.
- .12 Use only approved and/or safe cleaning agents only.

1.2 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris including that caused by Owner or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.

- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Remove stains, spots, marks and dirt on new or existing surfaces resulting from construction work.
- .8 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .9 Remove dirt and other disfiguration from exterior surfaces.
- .10 Sweep and wash clean paved areas resulting from construction work.
- .11 Remove debris and surplus materials from site.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION 01 74 11

1.0 GENERAL

1.1 SUMMARY

- .1 This Section includes requirements for management of construction waste and disposal, which forms the Contractor's commitment to reduce and divert waste materials from landfill and includes the following:
 - .1 Preparation of a Draft Construction Waste Management Plan that will be used to track the success of the Construction Waste Management Plan against actual waste diversion from landfill.
 - .2 Preparation of a Construction Waste Management Plan that provides guidance on a logical progression of tasks and procedures to be followed in a pollution prevention program to reduce or eliminate the generation of waste, the loss of natural resources, and process emissions through source reduction, reuse, recycling, and reclamation.
 - .3 Preparation of monthly progress reports indicating cumulative totals representing progress towards achieving diversion and reduction goals of waste materials away from landfill and identifying any special programs, landfill options or alternatives to landfill used during construction.
 - .4 Preparation of a Construction Waste Management Report containing detailed information indicating total waste produced by the project, types of waste material and quantity of each material, and total waste diverted and diversion rates indicated as a percentage of the total waste produced.
- .2 Departmental Representative has established that this project shall generate the least amount of waste possible and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors be employed by the Contractor.

1.2 RELATED REQUIREMENTS

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

1.3 REFERENCE STANDARDS

- .1 American Society for Testing and Materials (ASTM):
 - .1 ASTM E1609 01, Standard Guide for Development and Implementation of a Pollution Prevention Program
- .2 Canada Green Building Council (CaGBC)
 - .1 LEED® Reference Guide for Building Design and Construction, Version 4
- .3 Recycling Certification Institute (RCI):
 - .1 RCI Certification Construction and Demolition Materials Recycling

1.4 DEFINITIONS

- .1 Clean Waste: Untreated and unpainted; not contaminated with oils, solvents, sealants or similar materials.
- .2 Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, repair and demolition.

- .3 Hazardous: Exhibiting the characteristics of hazardous substances including properties such as ignitability, corrosiveness, toxicity or reactivity.
- .4 Non hazardous: Exhibiting none of the characteristics of hazardous substances, including properties such as ignitability, corrosiveness, toxicity, or reactivity.
- .5 Non toxic: Not poisonous to humans either immediately or after a long period of exposure.
- .6 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- .7 Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- .8 Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form; recycling does not include burning, incinerating, or thermally destroying waste.
- .9 Return: To give back reusable items or unused products to vendors for credit.
- .10 Reuse: To reuse a construction waste material in some manner on the project site.
- .11 Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- .12 Sediment: Soil and other debris that has been eroded and transported by storm or well production run off water.
- .13 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- .14 Toxic: Poisonous to humans either immediately or after a long period of exposure.
- .15 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- .16 Volatile Organic Compounds (VOC's): Chemical compounds common in and emitted by many building products over time through outgassing:
 - .1 Solvents in paints and other coatings;
 - .2 Wood preservatives; strippers and household cleaners;
 - .3 Adhesives in particleboard, fiberboard, and some plywood; and foam insulation.
 - .4 When released, VOC's can contribute to the formation of smog and can cause respiratory tract problems, headaches, eye irritations, nausea, damage to the liver, kidneys, and central nervous system, and possibly cancer.
- .17 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

- .18 Construction Waste Management Plan: A project related plan for the collection, transportation, and disposal of the waste generated at the construction site; the purpose of the plan is to ultimately reduce the amount of material being landfilled.

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate waste management requirements with all Divisions of the Work for the project, and ensure that requirements of the Construction Waste Management Plan are followed.
- .2 Preconstruction Meeting: Arrange a pre-construction meeting in accordance with Section 01 31 19 – Project Meetings before starting any Work of the Contract attended by the Departmental Representative, Contractor and Consultants to discuss the Contractor's Construction Waste Management Plan and to develop mutual understanding of the requirements for a consistent policy towards waste reduction and recycling.

1.6 SUBMITTALS

- .1 Provide required information in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Action Submittals: Provide the following submittals before starting any work of this Section:
- .1 Draft Construction Waste Management Plan (Draft CWM Plan): Submit to Departmental Representative a preliminary analysis of anticipated site generated waste by listing a minimum of five (5) construction or demolition waste streams that have potential to generate the most volume of material indicating methods that will be used to divert construction waste from landfill and source reduction strategies; Departmental Representative will provide commentary before development of Contractor's Construction Waste Management Plan.
- .2 Construction Waste Management Plan (CWM Plan): Submit a CWM Plan for this project prior to any waste removal from site and that includes the following information:
- .1 Material Streams: Analysis of the proposed jobsite waste being generated, including material types and quantities forming a part of identified material streams in the Draft CWM Plan; materials removed from site destined for alternative daily cover at landfill sites and land clearing debris cannot be considered as contributing to waste diversion and will be included as a component of the total waste generated for the site.
- .2 Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials, and incorporate into CWM Plan.
- .3 Alternative Waste Disposal: Prepare a listing of each material proposed to be salvaged, reused, recycled or composted during the course of the project, and the proposed local market for each material.
- .4 Landfill Options: The name of the landfill where trash will be disposed of; landfill materials will form a part of the total waste generated by the project.
- .5 Materials Handling Procedures: A description of the means by which any

recycled waste materials will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.

- .6 Transportation: A description of the means of transportation of the recyclable materials, whether materials will be site separated and self hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site, and destination of materials.

1.7 PROJECT CLOSEOUT SUBMISSIONS

- .1 Record Documentation: Submit as constructed information in accordance with Section 01 78 00– Closeout Submittals as follows:
 - .1 Construction Waste Management Report (CWM Report): Submit a CWM Report for this project according to the samples provided.
 - .1 Accounting: Submit information indicating total waste produced by the project.
 - .2 Composition: Submit information indicating types of waste material and quantity of each material.
 - .3 Diversion Rate: Submit information indicating total waste diverted from landfill as a percentage of the total waste produced by the project.
 - .4 Diversion Documentation: Submit copies of transportation documents or shipping manifests indicating weights of materials, and other evidence of disposal indicating final location of waste diverted from landfill and waste sent to landfill.
 - .5 Alternative Daily Cover (ADC): Submit quantities of material that were used as ADC at landfill sites, and that form a part of the total waste generated by the project.
 - .6 Multiple Waste Hauling: Compile all information into a single CWM Report where multiple waste hauling and diversion strategies were used for the project.
 - .7 Photographs: Submit photographs of waste diversion facilities documenting location and signage describing usage of waste separation containers.

1.8 QUALITY ASSURANCE

- .1 Resources for Development of Construction Waste Management Report (CWM Report): The following sources may be useful in developing the Draft Construction Waste Management Plan:
 - .1 Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials, and incorporate into CWM Plan.
 - .2 Waste-to-Energy Systems: Investigate local waste-to-energy incentives where systems for diverting materials from landfill for reuse or recycling are not available.

1.9 DELIVERY, STORAGE AND HANDLING

- .1 Storage Requirements: Implement a recycling/reuse program that includes separate collection of waste materials as appropriate to the project waste and the available

recycling and reuse programs in the project area.

- .2 Handling Requirements: Clean materials that are contaminated before placing in collection containers and ensure that waste destined for landfill does not get mixed in with recycled materials:
 - .1 Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.
 - .2 Arrange for collection by or delivery to the appropriate recycling or reuse facility.
- .3 Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations.

2.0 PRODUCTS

2.1 NOT USED

- .1 Not used.

3.0 EXECUTION

3.1 (CWM PLAN) IMPLEMENTATION

- .1 Manager: Contractor is responsible for designating an on-site party or parties responsible for instructing workers and overseeing and documenting results of the CWM Plan for the project.
- .2 Distribution: Distribute copies of the CWM Plan to the job site foreman, each Subcontractor, the Departmental Representative and other site personnel as required to maintain CWM Plan.
- .3 Instruction: Provide on site instruction of appropriate separation, handling, and recycling, salvage, reuse, composting and return methods being used for the project to Subcontractor's at appropriate stages of the project.
- .4 Separation Facilities: Lay out and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, composting and return:
 - .1 Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.
 - .2 Hazardous wastes shall be separated, stored, and disposed of in accordance with local regulations.
- .5 Progressive Documentation: Submit a monthly summary of waste generated by the project to ensure that waste diversion goals are on track with project requirements:
 - .1 Submission of waste summary can coincide with application for progress payment, or similar milestone event as agreed upon between the Contractor and Departmental Representative.
 - .2 Monthly waste summary shall contain the following information:
 - .1 The amount in tonnes or m³ and location of material landfilled,
 - .2 The amount in tonnes or m³ and location of materials diverted from landfill, and

- .3 Indication of progress based on total waste generated by the project with materials diverted from landfill as a percentage.

3.2 SUBCONTRACTOR'S RESPONSIBILITY

- .1 Subcontractor's shall cooperate fully with the Contractor to implement the CWM Plan.
- .2 Failure to cooperate may result in the Departmental Representative not achieving their environmental goals, and may result in penalties being assessed by the Contractor to the responsible Subcontractor's.

3.3 SAMPLE CONSTRUCTION WASTE MANAGEMENT FORMS

- .1 Sample waste tracking form below can be used by the Contractor to establish their own forms for recording management of construction waste:

.2 SAMPLE WASTE MANAGEMENT FORM

Material Stream	Diverted Waste by Report Date	Total	Units				
Sept	Oct	Nov	Dec				
Material Streams Contributing to Credit	Plastic	1.25	2.5	10	5	18.75	m ³
Paper/Cardboard	5	2.5	2.5	5	15	m ³	
Clean Wood	0	25	0	1.25	26.25	m ³	
Metal	1.25	2.5	5.5	7	16.25	m ³	
Concrete	10.5	2.5	5.5	8.75	27.25	m ³	
Total Diverted Waste	135	m ³					
Material Streams not Contributing to Credit	Landfill	10.75	7.5	15	10	43.25	m ³
Screen Fines (ADC)	5	1.25	0	2.5	8.75	m ³	
150 mm Minus (ADC)	1.25	1.25	5	5.5	13	m ³	
Total Landfill/ADC Waste	65			m ³			
Total Waste	200	m ³					
Percent Diverted	67.5	%					

1.0 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.

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.
 - .3 Departmental Representative's Review: Departmental Representative and Contractor will perform review of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.
 - .4 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 Work is complete and ready for Final Inspection.

END OF SECTION 01 77 00

1.0 GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 45 00 - Quality Control.
- .2 Section 01 77 00 – Closeout Procedures.

1.2 SUBMISSION

- .1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .2 Copy will be returned after final inspection, with Departmental Representative's comments.
- .3 Revise content of documents as required prior to final submittal.
- .4 Two weeks prior to Interim Completion of the Work, submit to the Departmental Representative, four final copies of operating and maintenance manuals in English.
- .5 An electronic copy of Interactive Operating and Maintenance Manual System is required as specified under clause 1.3.
- .6 Hard copies of the Operating and Maintenance Manual System is required as specified under clause 1.4. Provide 4 sets of the Hard Copy Interactive Operating and Maintenance Manual System to the Departmental Representative.
- .7 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.
- .8 If requested, furnish evidence as to type, source and quality of products provided.
- .9 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .10 Pay costs of transportation.

1.3 INTERACTIVE OPERATING AND MAINTENANCE MANUAL SYSTEM

- .1 In addition to the printed copies, submit provide an Interactive Operating and Maintenance Manual System as specified herein.
- .2 System Description and Requirements
 - .1 All as constructed drawings and operation and maintenance (O&M) manuals listed under the Scope of Work shall be converted, where necessary, into Portable Data File (PDF) format for viewing using the Adobe Acrobat Reader.
 - .2 Documentation storage and retrieval system shall be structured based on a database framework with direct links to the appropriate PDF files. Documents retrieval and viewing shall be executed through a menu driven approach.
- .3 Program shall be capable of storing separately and independently data of multiple buildings and shall be expandable for addition of new buildings and systems.
- .4 Data of each building shall be accessible by the input of either the building name or building number as defined by the Departmental Representative.

- .5 O&M data and as constructed drawings shall be classified by their corresponding disciplines, including:
- .1 Architectural
 - .2 Civil
 - .3 Under each discipline, data shall be grouped into the following four major categories:
 - .1 Basic Documents
 - .1 'Basic Documents' shall, according to the type of services or disciplines, include the full contents of each hard copy of the O&M manuals with the addition of Miscellaneous Maintenance Reports and Records, or as defined by the user. In general, the following shall be included unless specifically excluded by the Departmental Representative:
 - .1 Introduction
 - .2 Consultant/Contractor/Suppliers List
 - .3 System Description
 - .4 Maintenance and Lubrication Schedules
 - .5 Testing and Commissioning (T&C) Reports
 - .6 Misc. Reports
 - .7 Specifications
 - .8 Equipment and/or point schedules as identified in the hard copy documents
 - .9 Others as stipulated by the Departmental Representative
 - .2 All Basic Documents PDF files shall be enhanced with appropriate bookmarks to facilitate searching of information within the document or linking to other relevant documents for references.
 - .2 'As-Constructed' Drawings
 - .1 'As-Constructed' drawings shall be converted from the original electronic files, such as CAD, into PDF format. If only the hard copies of the 'as constructed' drawings are available, they shall be scanned and saved in PDF format. PDF files of the 'As-Constructed' drawings shall be enhanced with the following bookmarks to zoom into legible views on the computer screen as a minimum:
 - .1 Drawing Number and Title
 - .2 Drawing Notes
 - .3 Major Equipment Locations
 - .4 Cross-links to other related drawings
 - .5 Revisions
 - .3 Equipment Data
 - .1 Equipment data shall be classified into the following categories:
 - .1 Equipment submittals
 - .2 T&C Report
 - .3 Maintenance Data
 - .4 Maintenance Records
 - .5 Photo
 - .2 Provide a summary screen to list all equipment classified under a specific system. On the summary screen, provide direct links to the corresponding equipment data under each category with addition links to the relevant 'As Constructed' drawings.
 - .4 The Contractor shall provide a demonstration of the building system to the Departmental Representative to provide verification that the requirements if the specification are fulfilled.

1.4 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 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.
- .4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: Manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- .9 Provide 1:1 scaled CAD files in .dwg format on CD.

1.5 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 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

1.6 '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.

1.7 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.

1.8 MATERIALS AND FINISHES

- .1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.

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

1.9 SPARE PARTS

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

1.10 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.

1.11 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.

1.12 WARRANTIES AND BONDS

- .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
- .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

- .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers within ten days after completion of the applicable item of work.
- .4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.
- .5 Verify that documents are in proper form, contain full information, and are notarized.
- .6 Co-execute submittals when required.
- .7 Retain warranties and bonds until time specified for submittal.

END OF SECTION 01 78 00

1.0 GENERAL

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of substantial performance.
- .2 Owner: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.
- .3 Preparation:
 - .1 Verify conditions for demonstration and instructions comply with requirements.
 - .2 Verify designated personnel are present.
 - .3 Ensure equipment has been inspected and put into operation in accordance with Division.
 - .4 Ensure testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 General Commissioning (Cx) Requirements.
- .4 Demonstration and Instructions:
 - .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the equipment location.
 - .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
 - .3 Review contents of manual in detail to explain aspects of operation and maintenance.
 - .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.
- .5 Time Allocated for Instructions: ensure adequate amount of time required for instruction of each item of equipment or system.

1.2 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval.
- .3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .4 Give time and date of each demonstration, with list of persons present.
- .5 Provide electronic & hard copies (Refer to Section 01 78 00 Closeout Submittals) of completed operation and maintenance manuals for use in demonstrations and instructions.

1.3 QUALITY ASSURANCE

- .1 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:
 - .1 Instruct Owner's personnel.
 - .2 Provide written report that demonstration and instructions have been completed.

1.0 GENERAL

1.1 SUMMARY

- .1 Section Includes:
General requirements relating to commissioning of project's components and systems of the chemical storage containers, specifying general requirements to Performance Verification of components, equipment, sub-systems, systems, and integrated systems.

- .2 Related Sections:

Section 01 33 00 - Submittal Procedures

Section 01 45 00 - Quality Control.

Section 01 78 00 – Closeout Procedures

Section 13 34 24 - Prefabricated Buildings

Section 21 05 01 - Common Work Results for Mechanical

Section 23 08 00 – Commissioning of Mechanical Systems

Section 26 05 00 - Common Work Results for Electrical

- .3 Acronyms:
 - .1 AFD - Alternate Forms of Delivery, service provider.
 - .2 BMM - Building Management Manual.
 - .3 Cx - Commissioning.
 - .4 O&M - Operation and Maintenance.
 - .5 PV - Performance Verification.
 - .6 TAB - Testing, Adjusting and Balancing.
 - .7 PSPC – Public Services and Procurement Canada.
 - .8 ECA – Electrical Commissioning Agent.
 - .9 MCA – Mechanical Commissioning Agent.
 - .10 O&M – Operations and Maintenance.

1.2 REFERENCE

- .1 CSA Z 320-11

1.3 GENERAL

- .1 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Cx to be performed as per CSA Z320-11.
Objectives:
 - .1 Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.
 - .2 Ensure appropriate documentation is compiled into the BMM.
 - .3 Effectively train O&M staff.

- .2 Cx is to be performed by Contractor's appointed professional Cx Agent(s) after work is completed and prior to energizing any equipment. The Commissioning Agent must have performed similar work for a minimum of 5 years. Qualifications of Cx Agent submitted by General Contractor shall be submitted for review by Departmental Representative.

- .3 General Contractor to retain the services of the Cx Agent on-site to carry out the tests and calibration. All work must be performed by qualified technicians/electricians with applicable accreditation for the appropriate permitting required.
- .4 Furnish Cx agency professional engineer's letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions. The letter is to be submitted stamped by a Professional Engineer, registered in BC, and provided to Departmental Representative.
- .5 Commissioning Agent on-site to operate equipment and systems, troubleshooting and making adjustments as required.
 - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems must interact with each other as intended in accordance with Contract Documents and design criteria.
 - .2 During these checks, adjustments will be made to enhance performance to meet environmental or user requirements.
- .6 All factory assemblies, equipment and components for the chemical storage container, whether they are installed integral to the container or shipped separately, should all be commissioned in the shop to meet contract requirement prior to delivery to site.
- .7 Design Criteria: as per individual technical specification.

1.4 COMMISSIONING OVERVIEW

- .1 Cx to be a line item of General Contractor's cost breakdown.
- .2 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .3 Cx is to ensure the built product is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.
- .4 Complete all start-up and verification of systems prior to review by Commissioning Agent.
 - .1 To bring mechanical, electrical and building architectural systems and components from a state of static completion to a state of dynamic operation.
 - .2 To verify conformance to contract requirements.
 - .3 To confirm installations meet requirements of Contract Documents.
 - .4 To provide all testing documents and records.
 - .5 To ensure completed facility meets contract requirements.
 - .6 To provide a documented operator training program.
 - .7 To verify accuracy of project record drawings and operating and maintenance manuals.
- .5 Building can only be defined as completed and can be operated for its intended purpose when:
 - .1 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.
 - .2 Equipment, components and systems have been commissioned.
 - .3 O&M training has been completed.

1.5 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

- .1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the

unfunctional system, including related systems as deemed required by Departmental Representative, Departmental Representative to ensure effective performance.

- .2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by General Contractor. Above costs to be in form of progress payment reductions or hold-back assessments.

1.6 PRE-CX REVIEW

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

1.7 CONFLICTS

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

1.8 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit no later than 4 weeks after award of Contract:
 - .1 Name of Contractor's Cx agent.
 - .2 Draft Cx documentation.
 - .3 Preliminary Cx schedule.

1.9 COMMISSIONING DOCUMENTATION

- .1 General Contractor to review and approve Cx documentation submitted by Cx Agent prior to submission to Departmental Representative for review.

1.10 COMMISSIONING SCHEDULE

- .1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 01 32 17 Construction Progress Schedule.

- .2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
 - .1 Approval of Cx reports.
 - .2 Verification of reported results.
 - .3 Repairs, retesting, re-commissioning, re-verification.
 - .4 Training.

1.11 STARTING AND TESTING

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

1.12 WITNESSING OF STARTING AND TESTING

- .1 Provide 7 days' notice prior to commencement.
- .2 Departmental Representative to witness of start-up and testing.
- .3 General Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.
 - .1 Minimum of 5 years experience in design, installation and operation of equipment and systems.
 - .2 Ability to interpret test results accurately.
 - .3 To report results in clear, concise, logical manner.

1.13 PROCEDURES

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

1.14 START-UP DOCUMENTATION

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

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

1.15 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

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

1.16 TEST RESULTS

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

1.17 COMMISSIONING PERFORMANCE VERIFICATION

- .1 Carry out Cx:
 - .1 Under accepted simulated operating conditions, over entire operating range, in all modes.
 - .2 On independent systems and interacting systems.
- .2 Cx procedures to be repeatable and reported results are to be verifiable.
- .3 Follow equipment manufacturer's operating instructions.

1.18 WITNESSING COMMISSIONING

- .1 Departmental Representative to witness activities.
- .2 Notify Departmental Representative 1 week prior to tests, and confirm 48 hours before test.

1.19 EXTRAPOLATION OF RESULTS

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

1.20 SUNDRY CHECKS AND ADJUSTMENTS

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

1.21 DEFICIENCIES, FAULTS, DEFECTS

- .1 Correct deficiencies found during start-up and Cx to satisfaction of Departmental Representative.

- .2 Report problems, faults or defects affecting Cx to Departmental Representative in writing. Stop Cx until problems are rectified. Proceed with written approval from Departmental Representative.

1.22 COMPLETION OF COMMISSIONING

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

1.23 ACTIVITIES UPON COMPLETION OF COMMISSIONING

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

1.24 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

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

1.25 OCCUPANCY

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

1.26 INSTALLED INSTRUMENTATION

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

1.27 PERFORMANCE VERIFICATION TOLERANCES

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

1.28 PERFORMANCE TESTING

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

1.0 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Concrete Finishing Section 03 35 00
- .2 Prefabricated Buildings Section 13 34 23

1.2 REFERENCES

- .1 CSA International
 - .1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

1.3 ACTION & INFORMATIONS SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures and 01 74 19 - Waste Management Disposal.
- .2 Sustainable Design Submittals:
 - .1 Construction Waste Management:
 - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
 - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.

1.4 SITE CONDITIONS

- .1 If material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous is encountered, stop work, take preventative measures, and notify Departmental Representative immediately.
 - .1 Proceed only after receipt of written instructions have been received from Consultant.
- .2 Notify Departmental Representative before disrupting building access or services.

1.5 HEALTH AND SAFETY

- .1 Do Construction Occupational Health and Safety in accordance with Section 01 35 33- Health and Safety Requirements and the Workers' Compensation Board of BC latest regulations.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste management materials and recycling in accordance with Section 01 74 19 – Waste Management and Disposal.

1.7 CHEMICAL STORAGE

- .1 Refer to Appendix 1 for list of chemicals that were stored in the 3 existing units.

2.0 PRODUCTS

- .1 Not used.

3.0 EXECUTION

3.1 EXAMINATION

- .1 Inspect building with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
- .2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .3 Notify and obtain approval of utility companies before starting demolition.

3.2 PREPARATION

- .1 Protection of In-Place Conditions:
 - .1 Prevent movement, settlement, or damage to adjacent structures, and utilities.
 - .2 Keep noise, dust, and inconvenience to occupants to minimum.
 - .3 Protect building systems, services and equipment.
 - .4 Provide temporary dust screens, covers, railings, supports and other protection as required.
 - .5 Do Work in accordance with Section 01 35 33 - Health and Safety Requirements.

3.3 CONTAINER UNIT REMOVAL

- .1 Disconnect, cap, plug or divert, as required, existing utilities that service the building, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.
 - .1 Remove all 3 existing container units including but not limited to existing anchors, dowel bars, and all associated supports of the existing units to provide a bare concrete slab to receive new units.
 - .2 Immediately notify Departmental Representative and the Owner concerned in case of damage to any utility or service designated to remain in place.
 - .3 Immediately notify the Departmental Representative should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION 02 41 99

1.0 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Demolition for Minor Works Section 02 41 99
- .2 Prefabricated Buildings Section 13 34 23

1.2 REFERENCES

- .1 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC 2009, LEED (Leadership in Energy and Environmental Design): LEED Canada Reference Guide for Green Building Design and Construction 2009.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-25.20-95 Surface Sealer for Floors.
- .3 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1168-A2005, Adhesive & Sealants Applications.

1.3 QUALITY ASSURANCE

- .1 Installer Qualifications:
 - .1 Work shall be carried out by personnel who are thoroughly trained and experienced in the floor treatment. The installer to provide a list of a minimum of 3 projects performed within 3 years of equivalent complexity and scope as this contract.

1.4 SUBMITTALS

- .1 Submittals to be in accordance with 01 33 00 Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature and data sheets for concrete sealer and include product characteristics, performance criteria, physical size, finish and limitations.
 - .1 Provide two copies of WHMIS MSDS in accordance with Section 01 35 33- Health & Safety Requirements. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for concrete floor treatment materials. Indicate VOC content in g/L.
 - .2 Include application instructions for concrete sealer.
- .3 Submit maintenance instructions for insertion in operations and maintenance manuals. Instructions shall give specific warning of maintenance or cleaning practices or materials, which may damage installed work.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and acceptance and storage requirements:
 - .1 Deliver materials to site in manufacturer's original factory packaging, labelled with manufacturer's name and address.
 - .2 Store materials in a clean dry area in accordance with manufacturer's instructions.
 - .3 Keep product from freezing.
 - .4 Avoid direct contact with this product as it may cause mild to moderate irritation of the eyes and/or skin.
 - .5 Protect materials during handling and application to prevent damage or contamination.
- .3 Dispense special concrete finish material from sealed containers.
- .4 Packaging Waste Management: Comply with requirements of Section 01 74 19 Waste Management and Disposal.

- .5 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 Labour Canada.

1.6 ENVIRONMENTAL REQUIREMENTS / PROJECT CONDITIONS

- 1. Do not apply product when air, surface, or material temperature is below 35°F (2°C) or above 135°F (57°C).
- .2 Do not apply to frozen concrete.
- .3 Control the use of water. Remove standing water from completed floor surfaces.

1.7 EXTENDED WARRANTY

- 1. Provide two (2) year manufacturer's warranty on products and installation against fading and delamination of finished surfaces.

2.0 PRODUCTS

2.1 MATERIALS

- .1 Concrete Sealing Compound: Surface Sealer: to CAN/CGSB-25.20-95 Surface Sealer for Floors, low VOC, non-toxic, solvent based UV resistant exterior polyurethane concrete clear sealer top coat (2 coats) with epoxy base primer to achieve desired bonding to existing concrete.

3.0 EXECUTION

3.1 CONCRETE SLAB PREPARATION

- .1 Clear all existing vegetation.
- .2 Patch, repair any concrete cracks and make good existing slab with concrete topping/levelling as required after removal of existing units to receive new container units.
- .3 Apply steel Trowel Finish to new concrete topping / leveller to match existing slab

3.2 CONCRETE SEALER APPLICATION

- .1 Use a low-volume, high-pressure airless sprayer or apply with a micro-fiber mop, using a push-and-pull motion to get thin, even coverage.
 - .1 Remove all oil, grease, stains, dirt, and dust from the concrete.
 - .2 Strip any existing sealer from the surface.
 - .3 Open up the concrete with an etching solution.
 - .4 Apply primer evenly on the concrete surface to cover all surface cracks.
 - .5 Apply a thin coat of sealer using a roller or sprayer.
 - .6 Wait for the first layer of sealer to dry.
 - .7 Apply a second coat in the opposite direction.

3.3 FINISHING-GENERAL

- .1 Do concrete finishing work in accordance with CAN/CSA-A23.1-M01, unless otherwise indicated.
- .2 Tops of Walls and Columns to be level and true. Allowable tolerance 6 mm in 3,000 mm.

3.4 DEFECTIVE WORK

- .1 Where in the opinion of Departmental Representative, material or workmanship fails to meet the requirements of the specification, such work may be rejected. Work rejected shall be replaced or repaired to the approval of the consultant at no additional cost to the owner.

3.5 PROTECTION

- .1 Take every precaution to protect finished surfaces from stains and abrasions.

- .2 Protect work of other sections from damage resulting from work of this Section.
- .3 Erect barricades to prevent traffic on newly finished surfaces.
- .4 Suggested protection in high traffic areas after the sealer has been applied is as follows:
 - .1 Place cheap colourfast carpet that is breathable (not rubber backed), fuzzy side down or Protect CP board.
 - .2 Masonite or plywood may then be applied over the carpet/cardboard for further protection.

3.6 ADJUSTING & CLEANING

- .1 Progress Cleaning: Clean during progress of the Work in accordance with Section 01 74 11- Cleaning.
- .2 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

END OF SECTION 03 35 00

1.0 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 02 41 99 – Demolition for Minor Works.
- .2 Section 03 31 00 – Concrete Finishing.

1.2 REFERENCES

- .1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE)
 - .1 ASHRAE 90.1-2019 (SI Edition), Energy Standard for Buildings Except Low-Rise Residential Buildings.
- .2 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0-2009, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum).
- .3 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI 30M-17, Standard for Steel Building Systems.
- .4 National Research Council (NRC)/Institute for Research in Construction (IRC)
 - .1 Construction Technology Update No. 9-1997, Evolution of Wall Design for Controlling Rains Penetration.
 - .2 Construction Technology Update No. 17-1998, Pressure Equalization in Rainscreen Wall systems.
 - .3 Construction Technology Update No. 34-1999, Designing Exterior Walls According to the Rainscreen Principle.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-installation Meetings:
 - .1 Convene pre-installation meeting 1 week prior to beginning work of this Section and on-site installation, with contractor's representative and Departmental Representative and Consultants in accordance with Section 01 31 19 - Project Meetings 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.
 - .2 Arrange for site visit with Departmental Representative and Consultant prior to start of Work to examine existing site conditions adjacent to demolition work.
 - .3 Hold project meetings every 2 weeks.
 - .4 Ensure key personnel, contractor's site supervisor, project manager, subcontractor representatives attend.
 - .5 Departmental Representative will submit written and verbal notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.

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 [sealants, insulation, and building materials] and include product characteristics, performance criteria, physical size, finish and limitations.

- .2 Submit [1] copy of WHMIS MSDS in accordance with Section 01 35 33 - Health and Safety Requirements according to the requirement of individual specification section.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of BRITISH COLUMBIA, Canada.
 - .1 Submit drawings for fabricator designed assemblies, components and Connections, and anchorage to the existing concrete slab.
- .4 Delegated Design Submittals:
 - .1 Indicate plans and grid lines, structural members and connection details, bearing and anchorage details: roof cladding, wall cladding, framed openings, accessories, schedule of materials and finishes, camber and loadings, fasteners and welds.
 - .2 Indicate detailed description of mechanical, electrical and other systems in Work.
 - .3 Describe requirements of other systems of components related to this Work but provided by others.
 - .1 Obtain necessary information required to detail this Work including methods of integration and securing.
 - .4 Submit erection drawings to Departmental Representative and Consultant for approval, before construction.
 - .5 Indicate erection dimensions and methods.
- .5 Manufacturer's Instructions: submit application instructions for any required caulking, taping and sealant and installing on any equipment shipped loose and to be installed on site.
- .6 Manufacturer's Field Reports: submit to Departmental Representative and Consultant manufacturer's written report, within 3 days of review, verifying compliance of Work.
- .7 Sustainable Design Submittals:
 - .1 Submittals: in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Construction Waste Management:
 - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
 - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.
 - .3 Recycled Content:
 - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer and post-industrial content, and total cost of materials for project.
 - .4 Regional Materials: submit evidence that project incorporates required percentage 10% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.
 - .5 Low-Emitting Materials:
 - .1 Submit listing of adhesives and sealants used in building, showing compliance with VOC and chemical component limits or restriction requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging,

labelled with manufacturer's name and address.

- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect components and equipment from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 74 19 Waste Management and Disposal.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal.

1.6 WARRANTY

- .1 Contractor warrants Work of this section is in accordance with General Conditions including an Manufacturer's extended warranty of 10years.
- .2 Submit Manufacturer's warranty for container units.

2.0 PRODUCTS

2.1 MATERIALS

- .1 Construction of Container Units: (Quantity - 3 container units MINIMUM SIZE approx. Size 2,540mm +/- High x 6705mm +/-Long x 2440mm +/-Wide, all metal construction, double wall explosion panels, each Container unit to have 3 chambers having access door to each, access door minimum 1220mm wide x 2032mm high completed with weather stripping/seals, sump capacity minimum 2400 +/- liters, with explosion relief panels.
 - .1 Exterior walls to be 12 gauge Galvannealed steel (double wall with RSI 1.92 (R11) insulation), interior walls to be 20 gauge cold rolled metal double wall, air/void 75mm +/-.
 - .2 Door hardware to be ULC classified heavy duty institutional grade keyed storeroom function lock set. Confirm keying requirements with Departmental Representative prior to keying to match facility standards.
 - .3 12 gauge steel sump with a minimum capacity of 2,400 liter.
 - .4 Heavy gauge forklift channels with open end, for lifting units
 - .5 Bolt down plates (4) with a minimum of 22mm dia. Holes, for tie down to Existing concrete slab
 - .6 Multiple static grounding connections
 - .7 Inlet vents for natural ventilation
 - .8 Explosion relief panels, each container unit for each chamber
 - .9 Finish of metal, two-part chemical resistant aliphatic polyurethane paint, colour to be confirmed with Departmental Representative.
 - .10 Container units comply with NFPA 30 Flammable and Combustible Liquids Code.
 - .11 Exterior Electrical Panel with NEMA 3R Electrical Enclosure, 12 spaces 100A breaker, 120/208V ac, 3 phase, at each container unit for connection to existing power supply.
 - .12 Explosion proof ceiling 26W LED light fixture with switch for each chamber.
 - .13 Weather proof wall LED light fixture with switch for each container.
 - .14 Exterior 60Hz Photocell light fixture one per container with manual override exterior switch, non-explosion proof.
 - .15 Explosion proof fan forced heater capable of a heat output of minimum of 10,239 BTU controlled by a thermostat for each chamber.

- .16 6 Contactors per unit / Electrical Hookup to Energize and De-Energize Equipment.
- .17 RSI 1.92 (R11) insulation in exterior walls, ceiling, door, floor (below the sump) and explosion relief panels. Provide metal flashing on top of door for rainwater diversion.
- .18 ABC Dry Chemical Fire Suppression System, 7.7kg tank per chamber container unit, with alarm bell, alarm tie in and remote pull station (middle compartment); designed & installed according to NFPA17. Install fire suppression tank and control on the outside of each container. Provide weather proof cabinet to encase control head. Location of tank and control as shown on drawing. Fire suppression system is to be plumbed before delivery to the site.
- .19 Explosion proof Exhaust system with indicator light, with explosion proof emergency shut off switch for exhaust system pre-installed as part of container.
3 exhaust units per container unit; one for each compartment, exhaust runs continuously 24hours, 7 days a week. Each fan supplies minimum of 335 CFM with indicator light
- .20 Provide one sump liner per chamber; sump liner to be HDPE. Each sump to be separated by dividing wall.
- .21 Adjustable shelves to be 355mm wide each with 50mm upturn lips (all 4 sides of shelf), grade 316 stainless steel wall brackets and shelf construction with 3 – 1220mm tiers in each chamber of each unit.
- .22 Grounding kit to include 2440mm rod and 3050mm cable.
- .23 Fibreglass floor grating installed in all units/chambers.
- .24 Two metal separation walls per unit creating 3 chambers, interior separation metal faced both side with minimum of 75mm +/- air gap in between.
- .25 Provide 300x300mm grade 316 stainless steel sign plate with acid etched color lettering, one for each container, denoting container A, B and C
- .26 Provide 200x200mm grade 316 stainless steel sign plate with acid etched color graphics of NFPA rating of chemicals stored in the compartment, one sign for each chamber, rating classification information to be provided by Department Representative.
- .27 Provide one (1) wall mount portable eyewash bottle in each chamber.
- .28 Provide one (1) 10lb dry chemical wall mount portable fire extinguisher in each chamber.
- .29 Exterior house keeping weather proof power outlet, one for each container.
- .30 Provide all other factory components as noted in Electrical and Mechanical Drawings and Specifications required to be connected and commissioned on site.
- .31 Approximate roof snow load 3.35 kpa (70psf).
- .32 Approximate weight of each container 5,550kg +/-

2.2 SYSTEM DESCRIPTION

- .1 Provide building structure and enclosure to physical dimensions as indicated on Architectural Drawing.
- .2 Building occupancy use as defined by National Building Code of Canada to be Group F, Division 2. Medium Hazard Industrial.
- .3 Generally, building is intended to enclose: chemicals – refer to Appendix 1 of this specification for the list of chemicals to be stored.

2.3 DESIGN CRITERIA

- .1 Design building to allow for thermal movement of component materials caused by ambient temperature without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.
- .2 Building watertight construction.
- .3 Provide for positive drainage of condensation occurring within wall construction and water entering

- at joints, to exterior face of wall.
- .4 Vapour seal building enclosure to withstand, without failure, design RH at design ambient temperature condition, maintained against interior atmospheric pressure of 250 Pa.
 - .5 Design members to withstand, within acceptable deflection limitations:
 - .1 Specific to Region Area per NBC 2015 and BCBC 2018 requirements, whichever is more stringent.
 - .6 Design building enclosure elements to accommodate, by means of expansion joints, movement in wall and structural movements without permanent distortion, damage to infills, racking of joints, breakage of seals, water penetration or glass breakage.
 - .7 Design Container Supports to spread/bear load over an existing cast in place concrete slab. The slab thickness is about 127mm (5").
 - .8 Design, assemble and secure building elements to building frame to ensure stresses in sealants and seals are within sealant manufacturer's recommended maximum.
 - .9 Design building assembly to permit easy replacement and disassembly of components.
 - .10 Allow for ceiling, piping, conduit and other interior dead loads imposed on this structure.

2.4 PERFORMANCE CRITERIA

- .1 Design loads for Snow and wind load to conform to region where units are installed refer to NBC 2015 and BCBC 2018. Design loads for snow, wind and earthquake to be based on "High" Importance Category, or "Normal Importance Category" if the container is equipped with secondary containment of toxic, explosive or other hazardous substances, including, but not limited to, double-wall tanks, chamber of sufficient size to contain a spill, and a blast, to prevent the release of harmful quantities of contaminants to the air, soil, groundwater, surface water or atmosphere.

2.5 FABRICATION

- .1 Maintain air and vapour and thermal barrier throughout building enclosure elements.
- .2 Locate vapour barrier on warm side of thermal insulation.
- .3 Locate air barrier as detailed.
- .4 Complete enclosure assembly with exterior skin, access units [doors], inner air/vapour seal membrane (continuous welded metal interior wall liner is accepted as vapour barrier), thermal insulation and interior finish.
- .5 Accurately fit and rigidly frame together joints, corners and mitres.
 - .1 Match components carefully to produce continuity of line and design.
 - .2 Make joints and connections toward exterior weather-tight.
 - .3 Provide hairline joints for materials in contact.
 - .4 Co-ordinate location of visible joints.

2.6 FINISHES

- .1 Exterior and Interior, paint metal two-part chemical resistant aliphatic polyurethane paint.
- .2 Paint Colour: selection from manufacturer's standard selection.

3.0 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for prefabricated building erection installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative and Consultant.
 - .2 Inform Departmental Representative and Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative and Consultant.

3.2 ERECTION

- .1 Do prefabricated metal building Work to CSSBI 30M.
- .2 Erect building structure and enclosure elements.
- .3 Install and anchor Container Units in location as indicated on Drawing.

3.3 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer's verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in Paragraph 1.4 - ACTION AND INFORMATIONAL 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 Ensure manufacturer's representative is present before and during critical periods of Installation, construction of field joints and testing.
 - .4 Schedule site visits:
 - .1 After delivery and storage of products, and when preparatory Work is complete but before installation begins.
 - .2 Three times during progress of Work at 25% and 60% and 100% completion.
 - .3 Upon completion of Work, after cleaning is carried out.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove excess sealant by moderate use of low VOC mineral spirits or other solvent as directed by sealant manufacturer.
 - .2 Clean surfaces.
- .3 Waste Management: separate waste materials for [reuse] [and] [recycling] in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

- .1 Protect finished surfaces with strippable coatings, strippable wrappers, plywood or sheet materials as required before acceptance of Work.

- .2 Protect installed products and components from damage during construction.
- .3 Repair damage to adjacent materials caused by sealants, insulation, and building materials installation.

END OF SECTION 13 34 23

1. GENERAL

1.1 Section Scope

- .1 This Section specifies general conditions for Divisions 21, 23 and is to be read, interpreted, and coordinated with all other sections.

1.2 Related Requirements

- .1 This section of the Specification forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.
- .2 Drawings and General Provisions of the Contract, including General and Supplementary Conditions, Division 00 and Division 01 Specification Sections apply to work specified in this section.

1.3 References

- .1 The latest revisions of the following standards shall apply unless noted otherwise. Apply the greater requirement called for between the National and British Columbia codes.
- .2 National Codes:
 - .1 National Building Code of Canada 2015 (NBC).
 - .2 National Energy Code of Canada for Buildings 2015.
 - .3 National Fire Code of Canada 2015.
 - .4 National Plumbing Code of Canada 2015.
- .3 British Columbia Codes:
 - .1 British Columbia Building Code 2018 (BCBC).
 - .2 British Columbia Fire Code 2018.
 - .3 British Columbia Plumbing Code 2018.
 - .4 Technical Safety BC regulations and regulatory notices.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
 - .1 Material Safety Data Sheets (MSDS).
- .5 Electrical Equipment Manufacturers' Association Council (EEMAC):

1.4 Definitions

- .1 "concealed" – means hidden from normal sight in furred spaces, shafts, ceiling spaces, walls and partitions.
- .2 "exposed" – means work normally visible, including work in equipment rooms, service tunnels, and similar spaces.
- .3 "finished" - means when in description of any area or part of an area or a product which receives a finish such as paint, or in case of a product may be factory finished.
- .4 "provision" or "provide" (and tenses of "provide") – means supply and install complete.
- .5 "install" (and tenses of "install") – means secure in position, connect complete, test, adjust, verify and certify.

- .6 "supply" – means to procure, arrange for delivery to site, inspect, accept delivery and administer supply of products; distribute to areas; and include manufacturer's supply of any special materials, standard on site testing, initial start-up, programming, basic commissioning, warranties and manufacturers' assistance to Contractor.
- .7 "delete" or "remove" (and tenses of "delete" or "remove") – means to disconnect, make safe, and remove obsolete materials; patch and repair/finish surfaces to match adjoining similar construction; include for associated re-programming of systems and/or change of documentation identifications to suit deletions, and properly dispose of deleted products off site unless otherwise instructed by Departmental Representative.
- .8 "BAS" – means building automation system; "BMS" – means building management system; "FMS" – means facility management system; and "DDC" means direct digital controls; references to "BAS", "BMS", "FMS", and "DDC" generally mean same.
- .9 "governing authority" and/or "authority having jurisdiction" and/or "regulatory authority" and/or "Municipal authority" – means government departments, agencies, standards, rules and regulations that apply to and govern work and to which work must adhere.
- .10 "OSHA" and "OHS" – stands for Occupational Safety and Health Administration and Occupational Health and Safety Act, and wherever either one is used, they are to be read to mean local governing occupational health and safety regulations that apply to and govern work and to which work must adhere, regardless if Project falls within either authority's jurisdiction.
- .11 "Mechanical Divisions" – refers to Divisions 21 and 23, and other Divisions as specifically noted, and which work as defined in Specifications and/or on drawings is responsibility of Mechanical Contractor, unless otherwise noted.
- .12 "Electrical Divisions" – refers to Divisions 26 and other Divisions as specifically noted, and which work as defined in Specifications and/or on drawings is responsibility of Electrical Contractor, unless otherwise noted.
- .13 Wherever words "indicated", "shown", "noted", "listed", or similar words or phrases are used in Contract Documents they are understood, unless otherwise defined, to mean product referred to is "indicated", "shown", "listed", or "noted" on Contract Documents.
- .14 Wherever words "reviewed", "satisfactory", "as directed", "submit", or similar words or phrases are used in Contract Documents they are understood, unless otherwise defined, to mean that work or product referred to is "reviewed by", "to the satisfaction of", "submitted to", etc., Departmental Representative.

1.5 General Scope

- .1 Provide complete, fully tested, and operational systems to meet the requirements described herein and in complete accord with applicable codes and ordinances.
- .2 Refer to 01 14 00 1.7 Security for specific job site access requirements.
- .3 Contract documents and drawings of this Division are diagrammatic and approximately, to scale unless detailed otherwise. They establish scope, material, and installation quality but are not detailed installation instructions.
- .4 Follow manufacturers' recommended installation instructions, details, and procedures for equipment, supplemented by requirements of the Contract Documents.
- .5 Install equipment generally in locations and routes indicated. Maximize headroom and maintain minimum interference with other services and free space. Remove and replace improperly installed equipment to satisfaction of the Departmental Representative at no extra cost.

- .6 Install external fire suppression system controls and tanks at location as shown in Architectural drawing.
- .7 For work within existing facilities, confirm locations and elevations of existing piping and equipment prior to commencement of new work.
- .8 Install equipment to provide service access, maintain service clearances and for ease of maintenance.
- .9 Connect to equipment specified in other Sections and to equipment supplied and installed by other Contractors or by the Departmental Representative. Uncrate equipment, move in place and install complete; start up and test.
- .10 Chemical storage containers are to be delivered to the site c/w the following pre-wired mechanical systems and components:
 - .1 Explosion proof fan forced heaters (quantity:9),
 - .2 Exhaust fans (quantity:9),
 - .3 Explosion proof exhaust system (quantity:9)
 - .4 Fire suppression system (ABC dry fire suppression system complete with the pressurized tank and Nitrogen cartridge uninstalled and complete with localized fire alarms)
 - .5 Controls
- .11 Explosion proof fan forced heaters (quantity:9) is to be supplied by the chemical storage container manufacturer complete with dedicated thermostats. Thermostat to have user adjustable temperature settings from 50°F to 90°F. Contractor to set the temperature to 70°F.
- .12 Exhaust fans (quantity:9) are to be pre-installed and set to run 24/7 by the chemical storage container manufacturer.
- .13 Explosion proof exhaust system (quantity:9) is to be supplied by the chemical storage container manufacturer complete with emergency shut off switch. The removable exhausts are to be shipped loose and to be installed by the contractor on site.
- .14 Fire suppression system is to be plumbed by the chemical storage container manufacturer before delivery to the site.
- .15 Contractor to hire the local fire suppression system representative (the fire suppression dealer specific to the fire suppression system installed in the containers) to arm the system. The tank and bracket will be provided by the container manufacturer detached from the container. The fire suppression system representative is to reattach the tank, attach the Nitrogen cartridge, install detectors and pull station, arm the system and certify the system.
- .16 Contractor to replace the temporary washers on the explosion relief panels as per manufacturer's installation instructions.
- .17 Commissioning agent to verify and confirm the operation of the pre-wired mechanical systems provided by the chemical storage container manufacturer:
 - .1 Exhaust fans (quantity:9),
 - .2 Explosion proof fan forced heaters (quantity:9),
 - .3 Fire suppression system (ABC dry fire suppression system complete with the pressurized tank and Nitrogen cartridge uninstalled and complete with fire alarms)
 - .4 Controls

1.6 Coordination of Work

- .1 Cooperate and coordinate with other trades on the project.
- .2 Make reference to electrical, mechanical, structural, and architectural drawings when setting out work. Consult with respective Divisions in setting out locations for equipment, so that conflicts are avoided and symmetrical even spacing is maintained. Jointly work out all conflicts on site before fabricating or installing any materials or equipment.
- .3 Where dimensional details are required, work with the applicable architectural and structural drawings.
- .4 Full size and detailed drawings shall take precedence over scale measurements from drawings. Specifications shall take precedence over drawings.
- .5 Any areas indicated as space for future materials or equipment shall be left clear.

1.7 Permits and Fees

- .1 All work shall comply with provincial, municipal, bylaws and authorities having jurisdiction.
- .2 Obtain all permits and pay all fees applicable to the scope of work.
- .3 Contractor shall arrange for inspections of the work by the authorities having jurisdiction and shall provide certificates indicating Final Approval.

1.8 Tender Price Breakdown

- .1 Submit a tender price breakdown before first progress claim, in a format agreed to with the Departmental Representative.
- .2 As a minimum, include the following in the tender price breakdown:
 - .1 Mechanical: Equipment, materials, labour
 - .2 Controls: Equipment, materials, labour
 - .3 Fire suppression: Equipment, materials, labour

1.9 Submittals

- .1 Submittals shall be in accordance with Section 01 33 00 - Submittal Procedures, and 01 77 00 – Closeout Procedures, and the following:
- .2 No work may begin on any segment of this project until submittals have been successfully reviewed for conformity with the design intent.
- .3 Contractor shall provide and submit to the Departmental Representative Assurance of Professional Design and Commitment for Field Review by Supporting Registered Professional Schedule S-B and Assurance of Professional Field Review and Compliance by Supporting Registered Professional Schedule S-C for seismic engineering.
- .4 Requirements for Contractor Retained Engineers
 - .1 Professional engineers retained to perform consulting services with regard to Project work, i.e. seismic engineer or structural engineer, are to be members in good standing with local Association of Professional Engineers, and are to carry and pay for errors and omissions professional liability insurance in compliance with requirements of governing authorities in Place of the Work.

- .2 Retained engineer's professional liability insurance is to protect Contractor's consultants and their respective servants, agents, and employees against any loss or damage resulting from professional services rendered by aforementioned consultants and their respective servants, agents, and employees in regards to the Work of this Contract.
- .3 Retained consultants are to ascertain that sub-consultants employed by them carry insurance in the form and limits specified above.
- .4 Evidence of the required liability insurance in such form as may be required is to be issued to Departmental Representative and Municipal Authorities as required prior to commencement of aforementioned consultant's services.
- .5 Submit shop drawings for all products identified in the relevant specification sections of Divisions 21, and 23. Provide drawings as electronic files (file format: .dwg, .dxf, pdf, or comparable). When manufacturer's cut sheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Each submitted piece of literature and drawings shall clearly reference the specification and/or drawing that the submittal is to cover. General catalogs shall not be accepted as cut sheets to fulfill submittal requirements. Submittals shall include a complete bill of materials of equipment to be used indicating quantity, manufacturer, model number, and other relevant technical data
- .6 Submit the following shop drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia.
 - .1 Fastening details for Seismic restraints.
 - .2 Mounting details for spring isolation of equipment.
- .7 Shop drawings and product data shall be accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify current model production.
 - .5 Certification for compliance to applicable codes.
- .8 Shop drawings to indicate:
 - .1 Material Specification including CSA or ULC reference numbers.
 - .2 Installation details to suit the applications on this project.
 - .3 Operating and maintenance requirements.
- .9 Material Safety Data Sheets (MSDS):
 - .1 Submit Material Safety Data Sheets (MSDS) in accordance with Division 01 - Submittal Procedures for the following products. Indicate VOC emissions, prior to installation or use:
 - .1 Adhesives.
 - .2 Caulking compounds.
 - .3 Sealants.
 - .4 Insulating materials.

.10 Closeout Submittals:

- .1 Provide mechanical operation and maintenance data in compliance with Division 01 - Closeout Submittals and the following:
 - .1 The Contractor shall furnish and pay for one (1) complete set of operating and maintenance manual for the complete mechanical installation plus one (1) copy of the digital version of the manual on USB type flash drive.
 - .2 Supply indexed copies of equipment manufacturers' operating and maintenance (O&M) instruction data manuals. Consolidate each copy of data in an identified hard cover three "D" ring binder. Each binder to include:
 - .1 Front cover: project name; wording – "Mechanical Systems Operating and Maintenance Manual"; and date;
 - .2 Introduction sheet listing, Contractor, and Subcontractor names, street addresses, telephone and fax numbers, and e-mail addresses;
 - .3 Equipment manufacturer's authorized contact person name, telephone number and company website;
 - .4 Table of Contents sheet, and corresponding index tab sheets;
 - .5 Copy of each "REVIEWED" or clean, updated "REVIEWED AS NOTED" shop drawing or product data sheet, with manufacturer's/supplier's name, telephone and fax numbers, email address, company website address, and email address for local source of parts and service; when shop drawings are returned marked "Reviewed As Noted" with revisions marked on shop drawing copies, they are to be revised by equipment supplier to incorporate comments marked on "Reviewed" shop drawings and a clean updated copy is to be included in operating and maintenance manual;
 - .3 Operation and maintenance manual approved by, and final copies deposited with the Departmental Representative a minimum of 7-days before final inspection.
 - .4 Operation data to include but not limited to:
 - .1 Pressure test reports, and certificates issued by governing authorities
 - .2 Control schematics for systems including environmental controls.
 - .3 Wiring and connection diagrams.
 - .4 A description of the systems and associated controls.
 - .5 Description of operation of systems at various loads together with reset schedules and seasonal variances.
 - .6 Operational instructions for systems and associated components.
 - .7 A description of actions to be taken in the event of equipment failure.
 - .8 Valves schedule and flow diagrams.
 - .9 Colour coding chart.
 - .5 Maintenance data to include:
 - .1 Servicing, maintenance, operation, and trouble-shooting instructions for each item of equipment.

- .2 Data to include schedules of tasks, frequency, tools required and task time.
- .3 Recommended maintenance practices and precautions.
- .4 Complete parts lists with numbers.
- .6 Performance data to include:
 - .1 Equipment manufacturer's performance datasheets indicating point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results and final commissioning report.
 - .3 Special performance data as specified.
 - .4 Testing, adjusting, and balancing.
- .7 Digital Version of Manuals
 - .1 The digital version of the manuals and the hard copy version shall be prepared by the same company.
 - .2 Utilize latest version of Adobe Acrobat, Portable Document Format (pdf).
 - .3 The digital manual shall be enhanced with the following features: Bookmarks, Internet Links, and Internal Documents Links and Optical Character Recognition (OCR).
 - .4 All shop drawings shall be scanned to a minimum 216mm x 279mm size. If the original page is 279mm x 432mm, the digital copy shall also be 279mm x 432mm.
 - .5 Provide a minimum 300 DPI for all scanned pages.
 - .6 All scanned material may be searched for text with minimum 60% Optical Character Recognition (OCR).
 - .7 Rotation of scanned page images/texts shall be displayed within +/- 20 degrees.
 - .8 Digital manual shall be organized in the same manner as the hard copy manual. Bookmark all major tabs and sub-sections and each set of shop drawings. Link the Table of Contents to the referenced section. Insert Internet Links to the Mechanical Equipment Manufacturers/Suppliers/Contractors official websites
- .8 Approvals:
 - .1 Submit 1 copy of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.
 - .2 Make changes as required and re-submit as directed by Departmental Representative.
- .9 Warranties
 - .1 Include copy of all equipment warranty and extended warranty certificates into the Operation and Maintenance Manual.
- .10 Additional data:

- .1 Prepare and insert into operation and maintenance manual additional data when need as it becomes apparent during demonstrations and instructions.
 - .2 Results of Departmental Representative's Orientation (demonstrations).
 - .3 List of spare parts turned over to Departmental Representative's forces.
- .2 Site records:
- .1 Contractor shall maintain 1 set of white prints at contractors cost to mark changes as work progresses and as changes occur.
 - .2 Use different colour waterproof ink for each service. Do not use pencil or black ink.
 - .3 Transfer information weekly to show work as actually installed.
 - .4 Make available for reference purposes and inspection.
 - .5 Before applying for a Certificate of Substantial Performance of the Work, update a clean copy of Contract Drawing set in accordance with marked up set of "as-built" white prints including deviations from original Contract Drawings, thus forming an "as-built" drawing set. Submit "as-built" site drawing prints to Departmental Representative for review. Make necessary revisions to drawings as per Departmental Representative's comments, to satisfaction of Departmental Representative.
- .3 Record drawings:
- .1 Prior to start of Testing, Adjusting and Balancing for Mechanical, finalize production of record drawings.
 - .2 Use final reviewed "as-built" drawing set to provide CAD files of drawings thus forming true "as-built" set of Contract Drawings. Identify set as "Project Record Copy". Load digital copies of final reviewed by Departmental Representative as-built drawings onto USB type flash drive. Provide 2 complete sets of "as-built" drawings on separate USBs. Submit "as-built" sets of white prints and USBs to Departmental Representative
 - .3 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (date).
 - .4 Submit to Departmental Representative for approval and make corrections as directed.
 - .5 Perform testing, adjusting and balancing for HVAC using record drawings.
 - .6 Submit completed reproducible record drawings with Operating and Maintenance Manuals.
 - .7 Cost to transfer record information onto reproducible media & Auto-CAD are this contractor's responsibility. Departmental Representative will release drawings to contractor after signing a copyright form.
 - .8 Should the Contractor choose to utilise this Departmental Representative for transferring as built information, allow \$400 / sheet for all drawings in the construction set. This will cover costs for drafting time & printing costs.
 - .9 Submit copies of record drawings for inclusion in final testing and balancing report

- .10 Submitted drawings are to be of same quality as original Contract Drawings. CAD drawing files are to be compatible with AutoCAD software release version confirmed with Departmental Representative.

1.10 Spare Parts Submittals

- .1 Furnish spare parts in accordance with Division 01 - Closeout Submittals and as follows:
 - .1 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.
 - .2 Additional spare parts shall also be included as outlined in their appropriate sections.
 - .3 Provide one set of special tools if required to service equipment as recommended by manufacturers.

1.11 Quality of Work

- .1 All work shall be by qualified tradesmen with valid Provincial Trade Qualification Certificates. Spot checks will be made by the Departmental Representative.
- .2 Work, which does not conform to standards accepted by the Departmental Representative and the trade, may be rejected by the Departmental Representative. The Contractor shall redo rejected work to the accepted standard at no cost to the Departmental Representative.

1.12 Metric Conversion

- .1 All units in this division are expressed in SI units.
- .2 Submit all shop drawings and maintenance manuals in SI units.
- .3 On all submittals (shop drawings etc.), use the same SI units as stated in the specification.
- .4 Equivalent Nominal Diameters of Pipes - Metric and Imperial:
 - .1 Where pipes are specified with metric dimensions and Imperial sized pipes are available, provide equivalent nominal Imperial sized pipe as indicated in the table, and provide at no extra cost adapters to ensure compatible connections to all metric sized fittings, equipment, and piping.
 - .2 When CSA approved SI Metric pipes are provided, the Contractor shall provide at no extra cost adapters to ensure compatible connections between the SI Metric pipes and all new and existing pipes, fittings, and equipment.

Equivalent Nominal Diameter Of Pipes					
mm	inches (NPS)	mm	inches (NPS)	mm	inches (NPS)
3	1/8	40	1-1/2	200	8
6	1/4	50	2	250	10
10	3/8	65	2-1/2	300	12
15	1/2	75	3	375	15
20	3/4	100	4	450	18
25	1	125	5	500	20
30	1-1/4	150	6	600	24

- .5 Metric Duct Sizes:
 - .1 The Metric duct sizes are expressed as 25 mm = 1 inch.

1.13 Drawings and Specifications

- .1 Drawings and specifications are complementary to each other, and what is called for by one shall be binding as if called for by both.
- .2 Should any discrepancy appear between drawings and specifications, which leaves the Contractor in doubt as to the true intent and meaning of the plans, and specifications, obtain written clarification from the Departmental Representative during the tender period. Without a written clarification, the better quality and/or greater quantity of work or materials shall be estimated, performed and furnished within the tendered price.
- .3 Examine all contract documents, including all drawings and specifications, and work of other trades to ensure that work is satisfactorily carried out without changes to building.

1.14 Installation of Equipment

- .1 Maintain permanent access to equipment for maintenance.

1.15 Connections to Existing Services

- .1 Maintain liaison with the Departmental Representative and provide a mutually acceptable schedule to interrupt, reroute or connect to existing building services with the minimum of interruption of those services.
- .2 Major services shall not be interrupted before all preparatory work is completed and all required materials are on site. Provide a minimum of 48 hours' notice for all service shutdowns. Allow for major service interruptions outside of normal operating hours of the facility.
- .3 Interruptions and shutdowns of existing services shall be by the building/plant maintenance staff. Advise building/plant maintenance staff of the duration of service interruption or shut down.

1.16 Selective Demolition

- .1 Reference Standards
 - .1 Unless otherwise specified, carry out demolition work in accordance to CSA S350-M1980 Code of Practice for Safety in Demolition of Structures.
- .2 Remove from site all equipment, ducting or piping which is no longer required because of work under this Contract.
- .3 Existing Conditions
 - .1 Visit and examine the site and note all characteristics and irregularities affecting the work of this Section.
- .4 Protection
 - .1 Prevent movement or settlement of adjacent work. Provide and place bracing or shoring and be responsible for safety of such work. Be liable for any such movement or settlement and any damage or injury caused.
 - .2 Cease operations and notify the Departmental Representative immediately for special protective and disposal instructions when any asbestos materials are uncovered during the work in this Section.
 - .3 Prevent debris from blocking surface drainage inlets and all types of drainage piping systems which remain in operation

- .5 Salvageable Materials

1.17 Equipment and Materials

- .1 Materials and equipment installed shall be new, CSA approved and of quality specified.
- .2 Each major component of equipment shall bear manufacturer's name, address, catalog and serial number in a conspicuous place.
- .3 Where two or more products of the same type are required, products shall be of the same manufacturer.
- .4 Notify the Departmental Representative in writing ten (10) days prior to the tender close, any materials or equipment specified which is not currently available or will not be available for use as called for herein. Failing this, the contract will assume that the most expensive alternate has been included in the tender price.
- .5 All equipment supplied to the project will meet efficiencies as defined in ASHRAE Standard 90.1 and NECB (current versions)

1.18 Cleaning

- .1 During construction, keep site reasonably clear of rubbish and waste material resulting from work on a daily basis to the satisfaction of Departmental Representative. Before applying for a Certificate of Substantial Performance of the Work, remove rubbish and debris, and be responsible for repair of any damage caused as a result of work.
- .2 Clean equipment and devices installed as part of this project

1.19 Delivery, Storage and Handling

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 Common Product Requirements, the manufacturer's written instructions and the following:
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials and equipment in accordance with the manufacturer's recommendations in a clean, dry, well-ventilated area.
 - .2 Store and protect equipment from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Protect equipment and materials in storage on site during and after installation until final acceptance. Leave factory covers in place. Take special precautions to prevent entry of foreign material into working parts of piping, equipment and duct systems.
- .5 Protect equipment and open-end duct with polyethylene covers and maintain equipment on crates until installation.
- .6 Protect bearings and shafts during installation. Grease shafts and sheaves to prevent corrosion. Supply and install necessary extended nipples for lubrication purposes.
- .7 Ensure that existing equipment is carefully dismantled and not damaged or lost. Do not reuse existing materials and equipment unless specifically indicated.
- .8 Develop a Construction Waste Management Plan or Waste Reduction Work plan as related to Work of this Section in accordance with Section 01 74 19 Waste Management and Disposal.
- .9 Packaging Waste Management

- .1 Remove for reuse and return pallets, crates, padding, packaging materials etc. as specified in the Construction Waste Management Plan or Waste Reduction Work plan in accordance with 01 74 19 Waste Management and Disposal.

1.20 Miscellaneous Metals

- .1 Provide all necessary miscellaneous to hang or support materials, equipment and provide access for work under this contract.
- .2 All miscellaneous metals shall be prime painted.
- .3 Miscellaneous metals shall include but not limited to:
 - .1 Hangers for equipment, piping and ductwork.
 - .2 Support for equipment.

1.21 Water Proofing Materials

- .1 Modular, mechanical seal assemblies consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and pipe sleeve or wall opening, assembled with stainless steel bolts and pressure plates and designed so when bolts are tightened the links expand to seal the opening watertight. Select seal assemblies to suit pipe size and sleeve size or wall opening size.

1.22 Escutcheons and Plates

- .1 Provide escutcheons and plates on all piping and ductwork passing through finished walls, floors and ceilings.
- .2 Escutcheons shall be one piece, stainless or chrome plated steel.

1.23 Progress Claim Breakdown

- .1 Prior to submittal of first progress payment draw, submit a detailed breakdown of work cost to assist Departmental Representative in reviewing and approving progress payment claims.
- .2 Payment breakdown is subject to Departmental Representative's approval and review. Progress payments will not be processed until an approved breakdown is in place. Breakdown is to include one-time claim items such as mobilization and demobilization, insurance, bonds (if applicable), shop drawings and product data sheets, commissioning including testing, adjusting and balancing, system testing and verification, and project closeout submittals.
- .3 Indicate equipment, material and labour costs for site services (if applicable) and indicate work of each trade in same manner as indicated on progress draw.

1.24 Notice for Required Field Reviews

- .1 Whenever there is a requirement for Departmental Representative to perform a field review prior to concealment of any work, to inspect/re-inspect work for deficiencies prior to Substantial Performance of the Work, for commissioning demonstrations, and any other such field review, give minimum 5 working days' notice in writing to Departmental Representative.
- .2 If Departmental Representative is unable to attend a field review when requested, arrange an alternative date and time.
- .3 Do not conceal work until Departmental Representative advises that it may be concealed.

- .4 When Departmental Representative is requested to perform a field review and work is not ready to be reviewed, reimburse Departmental Representative for time and travel expenses

1.25 Changes in the Work

- .1 Whenever Departmental Representative proposes in writing to make a change or revision to design, arrangement, quantity or type of work from that required by Contract Documents, prepare and submit to Departmental Representative for review, a quotation being proposed cost for executing change or revision.
- .2 Quotation is to be a detailed and itemized estimate of product, labour, and equipment costs associated with change or revision, plus overhead and profit percentages and applicable taxes and duties.
- .3 Make requests for changes or revisions to work to Departmental Representative in writing and, if Departmental Representative agrees, will issue Notice of Change.
- .4 Do not execute any change or revision until written authorization for the change or revision has been obtained from Departmental Representative.

1.26 Temporary or Trial Usage

- .1 Temporary or trial usage by the Departmental Representative of mechanical equipment supplied under contract shall not represent acceptance.
- .2 Repair or replace permanent equipment used temporarily.
- .3 Repair or otherwise rectify damage caused by defective materials or workmanship during temporary or trial usage.

1.27 Instruction to Departmental Representative

- .1 Refer to equipment and system operational and maintenance training requirements specified Section 01 79 00 Demonstration and Training.
- .2 Train Departmental Representative's designated personnel in aspects of operation and maintenance of equipment and systems as specified. Demonstrations and training are to be performed by qualified technicians employed by equipment/system manufacturer/supplier. Supply hard copies of training materials to each attendee.
- .3 Unless where specified otherwise in trade Sections, minimum requirements are for manufacturer/suppliers of each system and major equipment, to provide minimum two separate sessions each consisting of minimum 4 hours on site or in factory training (at Departmental Representative's choice), of Departmental Representative's designated personnel, on operation and maintenance procedures of system.
- .4 For each item of equipment and for each system for which training is specified, prepare training modules as specified below. Use Operating and Maintenance Manuals during training sessions. Training modules include but are not limited to:
 - .1 Operational Requirements and Criteria – equipment function, stopping and starting, safeties, operating standards, operating characteristics, performance curves, and limitations;
 - .2 Troubleshooting – diagnostic instructions, test and inspection procedures;
 - .3 Documentation – equipment/system warranties, and manufacturer's/supplier's parts and service facilities, telephone numbers, email addresses, and the like;
 - .4 Maintenance – inspection instructions, types of cleaning agents to be used as well as cleaning methods, preventive maintenance procedures, and use of any special tools;

- .5 Repairs – diagnostic instructions, disassembly, component removal and repair instructions, instructions for identifying parts and components, and review of any spare parts inventory.
- .5 Before instructing Departmental Representative's designated personnel, submit to Departmental Representative for review preliminary copy of training manual and proposed schedule of demonstration and training dates and times. Incorporate Departmental Representative's comments in final copy.
- .6 Obtain in writing from Departmental Representative a list of Departmental Representative's representatives to receive instructions. Submit to Departmental Representative prior to application for Certificate of Substantial Performance of the Work, complete list of systems for which instructions were given, stating for each system:
 - .1 Date instructions were given to Departmental Representative's staff;
 - .2 Duration of instruction;
 - .3 Names of persons instructed;
 - .4 Other parties present (manufacturer's representative, etc.).
- .7 Obtain signatures of Departmental Representative's staff to verify they properly understood system installation, operation and maintenance requirements, and have received operating and maintenance instruction manuals and "as-built" record drawings

1.28 Guarantee / Warranty

- .1 Furnish a written guarantee stating that all work executed in this contract will be free from defective workmanship and materials for a period of one (1) year from the date of Substantial Performance. The Contractor shall, at his own expense, repair and replace any work, which fails or becomes defective during the term of the guarantee/warranty, providing such work is not due to improper usage. The period of guarantee specified shall not in any way supplant any other guarantees of a longer period but shall be binding on work not otherwise covered.
- .2 Use of permanent systems for temporary heat shall not modify terms of the manufacturers' warranty or the guarantee.
- .3 If the equipment is used during construction, the warranty or guarantee period shall not be shortened or altered.

1.29 Substantial and Total Performance

- .1 Prior to requesting an inspection for Substantial Performance, provide a complete list of items, which are deficient.
- .2 A certificate of Substantial Performance will not be granted unless the following items are completed and available to the Departmental Representative:
 - .1 Final Plumbing Inspection Certificate from the Authority having Jurisdiction.
 - .2 Schedule S-C for seismic engineering.
 - .3 Schedule S-C for Fire Suppression.
 - .4 Commissioning checklists are completed and submitted as per Division 01.
 - .5 Vibration isolation supplier's inspection report
 - .6 Major equipment – suppliers start-up test sheets and letters certifying start up. (packaged equipment)
 - .7 Draft Operating/Maintenance Manuals have been submitted for review.

- .8 All mechanical systems have been commissioned and are capable of operation with alarm controls functional and automatic controls in operation.
- .9 Air system has been balanced with draft report submitted to the Departmental Representative.
- .10 Mechanical identification is complete.
- .11 Warranty forms have been mailed to the manufacturer. Provide copy of the original warranty for equipment, which has a warranty period longer than one year.
- .12 Operating and Maintenance demonstrations have been provided to the Departmental Representative.
- .13 Written inspection report by manufacturer's representative has been submitted for noise and vibration control devices and flexible connections.
- .14 Record drawings have been submitted.
- .15 Fan plenums have been cleaned, and temporary filters have been replaced with permanent filters.
- .16 All previously identified deficiencies have been corrected and accepted.
- .3 Prior to a Total Performance Inspection, provide declaration in writing that deficiencies noted at time of substantial performance inspection have been corrected and the following items completed prior to the total performance inspection:
 - .1 Submit final air balance report.
 - .2 Submit final operating and maintenance manuals.
 - .3 Complete final calibration.
- .4 The Departmental Representative shall provide one (1) visitation for the purpose of total performance inspection. Subsequent visitations if required shall be at the expense of the Contractor.
- .5 The Contractor shall provide qualified personnel in appropriate numbers to operate the facility until substantial performance is declared.

1.30 Alternate Materials and Equipment

- .1 The price submitted for this contract shall be based on the use of materials and equipment as specified.
- .2 Requests for alternate equivalent materials or equipment must be submitted to the Departmental Representative no later than seven (7) working days prior to the Mechanical trades' closing tender date. Submit all applicable technical data, including performance curves and physical details for review. Approval of requests shall only be given by addendum.
- .3 Approved equivalents and/or alternatives to specified products shall be equal to the specified product in every respect, operate as intended, and meet the space, capacity, and noise requirements outlined.
- .4 The Contractor shall be fully responsible for any additional labour and materials required by any trades or other Contractors to accommodate the use of other than specified materials or equipment. The Contractor shall bear any and all costs for design/system modifications to accommodate the "alternate" equipment. Extras will not be approved to cover such work.

2. PRODUCTS

2.1 Existing Services

- .1 Disconnect and cap all mechanical services in accordance with requirements of the authority having jurisdiction.
- .2 Building Mechanical Services: Maintain activity of all building services during demolition/removal of existing services required of this contract.

2.2 Demolition

- .1 Completely demolish the items scheduled and remove all materials from the premises unless otherwise requested by the Departmental Representative.
- .2 Carry out demolition in a manner to cause as little inconvenience to the occupied building area as building area as possible. Co-ordinate this activity with the Departmental Representative.
- .3 Carry out demolition in an orderly and careful manner.
- .4 All coring, patching and removal of existing equipment, pipes, and ductwork, which may affect the operation of occupied areas of the building, shall be carried out outside of regular office hours or as scheduled with the Departmental Representative.

2.3 Asbestos

- .1 The intent is for a Haz-Mat Contractor to remove all asbestos containing material prior to the proposed project work taking place. Notify the Departmental Representative if asbestos containing material is suspected to remain on site.
- .2 When new work is required to be connected to existing plumbing, piping, ductwork or equipment, which contains asbestos insulation or products the following, shall apply:
 - .1 Keep disruption to existing piping and equipment to a minimum
 - .2 Protect the site and all Contractors from the work
 - .3 Remove the asbestos at piping and equipment for new connections and carry out work in accordance with Work Safe BC requirements for asbestos removal.

3. EXECUTION

3.1 System Cleaning

- .1 Clean interior and exterior of all systems including strainers. Commercially vacuum interior of ductwork and air handling units.

3.2 Field Quality Control

- .1 Manufacturer's Field Services:
 - .1 Obtain written reports from manufacturers' verifying compliance of the work, in handling, installing, applying, protecting, cleaning and start-up of a product.
 - .2 Submit Manufacturer's Field Reports as described in Section 01 33 00 – Submittal Procedures.
 - .3 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.

3.3 Demonstration

- .1 Departmental Representative may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 Supply tools, equipment and personnel to demonstrate and instruct the operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .3 Where specified elsewhere in Division 21, 22, 23 or 25 manufacturers to provide demonstrations and instructions.
- .4 Use operation and maintenance manual, record drawings, and audio visual aids as part of instruction materials.
- .5 Instruction duration requirements shall be as specified in the appropriate sections.
- .6 Contractor will record these demonstrations on digital video for future reference.

3.4 Protection

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

1. GENERAL

1.1 Section Scope

- .1 This Section includes commissioning process requirements for chemical storage containers and equipment.

1.2 Related Requirements

- .1 This section of the Specification forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.3 References

- .1 The latest revisions of the following standards shall apply unless noted otherwise. Apply the greater requirement called for between the National and British Columbia codes.
- .2 Commissioning Agency (CxA)
- .3 CSA Z320-11 – Building Commissioning Standard

1.4 Submittals

- .1 Comply with Section 01 33 00 – Submittal Procedures and 01 78 00 Closeout Submittals and in addition the following:
 - .1 Pre-construction start up report for the current generator installation and start up.
 - .2 Commissioning Schedule
 - .3 Certificates of readiness (static verification)
 - .4 Certificates of completion of installation, prestart, and start-up activities (functional performance verification)
 - .5 Commissioning Report at Post Substantial Completion
 - .6 Retro-Commissioning report during the warranty period (at 10 months after occupancy)

1.5 Contractor's Responsibilities

- .1 Perform commissioning tests as per CSA Z320-11.
- .2 Attend construction phase controls coordination meeting.
- .3 Controls End-End point verification report.
- .4 Controls commissioning report.
- .5 Participate in orientations and inspections associated with Plumbing systems, assemblies, and equipment.
- .6 Correct all deficiencies identified during commissioning.
- .7 Provide information requested by the CxA for the final commissioning documentation.
- .8 Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

- .9 Provide start up documentation for all equipment to CxA complete with a full record of all settings measured, confirmed, or altered/adjusted. Factory start-ups to be completed prior to CxA verifications.

Where specified start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for authority to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility. AHJ demonstrations should not replace Cx duties.
- .10 Include the cost of participating in the commissioning process as outlined in the specifications in the total contract price.
- .11 In each purchase order or subcontract written, include requirements for submittal data, commissioning documentation, O&M data and training.
- .12 Provide three sets of all keys, operators, special tools (software keys, security dongles, discs and unlock codes), etc required for the operation and maintenance of all equipment and systems. These shall be turned over to the Departmental Representative with a signed receipt.
- .13 Allow for additional visits to the site for seasonal verification of systems operation within warranty period.

1.6 CxA's Responsibilities

- .1 Provide Project-specific construction checklists and commissioning process test procedures for the equipment, and components to be furnished and installed as part of the construction contract.
- .2 Prepare a Commissioning plan.
- .3 Organize and lead Cx meetings and activities during construction.
- .4 Prepare and provide coordinated Operating and Maintenance Manuals. Include description of systems, normal operating parameter. The CxA shall pull together documentation from the mechanical and controls contractors. Refer to 21 05 01 for additional O&M Manual requirements.
- .5 Facilitate Departmental Representative training. Ensure the Departmental Representative is trained in all operating and routine maintenance aspects of the major building systems and specialty systems. Provide a minimum of 3 days, for at least 6 participants from the Departmental Representative group. Provide all training documentation required including as-built drawings and complete O&M manuals. Departmental Representative training cannot begin until all systems have been fully commissioned and all deficiencies resolved.
- .6 Create a Maintenance program for the Major building systems that satisfies the manufacturer's warranty requirements and outlines recommended procedures to achieve the full service life of the equipment.
- .7 Provide Project-specific construction checklists and commissioning process test procedures for actual Plumbing systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.
- .8 Carry out, verify and participate in commissioning testing. Note that AHJ demonstrations shall not replace CxA duties.
- .9 Verify testing, adjusting, and balancing of work are complete.
- .10 Provide copies of documentation to the Consultants.

1.7 Commissioning Documentation

- .1 Commissioning Schedule
- .2 Certificates of readiness (static verification)
- .3 Certificates of completion of installation, prestart, and start-up activities (functional performance verification)
- .4 Commissioning Report at Post Substantial Completion
- .5 Retro-Commissioning report during the warranty period (at 10 months after occupancy)
- .6 Provide the following information to the CxA for the inclusion in the commissioning plan:
 - .1 Plan for delivery and review of submittals, systems manuals, and other documents and reports.
 - .2 Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
 - .3 Process and schedule for completing construction checklists for PLUMBING/PROCESS systems, assemblies, equipment, and components to be verified and tested.
 - .4 Certificate of completion certifying that installation, start-up checks, and start-up procedures have been completed.
 - .5 Test and inspection reports, and certificates.
 - .6 Documented verification of testing, adjusting, and balancing reports.
 - .7 All final set points and schedules to be listed in Cx report.

2. PRODUCTS (NOT USED)

3. EXECUTION

3.1 Testing Preparation

- .1 Certify that chemical storage containers and equipment, have been installed, calibrated, and started and are operating according to the Contract Documents.
- .2 Construction documents review:
 - .1 Provide full set of Div 21, 23 drawings and specifications for preliminary design review.
- .3 Certify that HVAC and fire suppression systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.
- .4 Certify that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.
- .5 Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
- .6 Inspect and verify the position of each device and interlock identified on checklists.

- .7 Check safety cut-outs, alarms, and interlocks with life-safety systems during each mode of operation.
- .8 Testing instrumentation: Install measuring instruments and logging devices to record test data.

3.2 Testing and Balancing Verification

- .1 Prior to performance of testing and balancing (TAB) work, provide copies of TAB procedures, reports, sample forms, checklists, and certificates to the CxA.
- .2 Notify the CxA at least 10 working days in advance of testing and balancing work, and provide access for the CxA to witness testing and balancing work.
- .3 Provide technicians, instrumentation, and tools to verify testing and balancing.
 - .1 The CxA will notify testing and balancing Contractor 10 working days in advance of the date of field certification. Notice will not include data points to be verified.
 - .2 The testing and balancing Contractor shall use the same instruments (by model and serial number) that were used when original data were collected.
 - .3 Failure of an item includes, other than for sound measurements, a deviation of more than 10 percent. Failure of more than 10 percent of selected items shall result in rejection of final testing, adjusting, and balancing report. For sound pressure readings, a deviation of 3dB shall result in rejection of final testing.
 - .4 Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.3 General Testing Requirements

- .1 Scope of chemical storage container HVAC and fire suppression systems testing includes entire installation including the pre-installed systems provided by the container manufacturer.
- .2 Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.
- .3 The CxA along with the Contractors, testing and balancing Contractor, and the Instrumentation and Control Contractor shall prepare detailed testing plans, procedures, and checklists for systems, and equipment.
- .4 Tests will be performed using design conditions whenever possible.
- .5 Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Calibrate testing instruments before simulating conditions. Provide equipment to simulate loads. Set simulated conditions and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.
- .6 Alter sensor values with a signal generator when design or simulating conditions and altering set points are not practical.
- .7 Alter sensor values with a signal generator when design or simulating conditions and altering set points are not practical.
- .8 If tests cannot be completed because of a deficiency outside the scope of the chemical storage system, document the deficiency and report it to the departmental representative. After deficiencies are resolved, reschedule tests.

- .9 If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 This Section describes the Common Work Results applicable to electrical disciplines.

1.2 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.

1.3 GENERAL

- .1 The general conditions and general requirements together with all amendments and supplements contained in the General Specifications shall form an integral part of the electrical specification and will be made part of this contract.
- .2 Reference to "Electrical Divisions" shall mean all Divisions 26, 27, 28, 33 and 48 in the Master Format or the Canadian Master Specifications.
- .3 The words "Provide" or "Furnish" shall mean "Supply and Install" the products and services specified. "As Indicated" means that the item(s) specified are shown on the drawings.
- .4 Confirm with the architectural plans and specifications the extent and nature of the work and how it will affect the electrical work. Include in the Tender sum for any complications or additional work described therein.
- .5 Review mechanical plans and specifications for the extent of electrical work required to make mechanical systems complete and include this work in the Tender sum.
- .6 Review structural plans for limitations of penetrations or inclusions of electrical equipment. In the Tender sum, allow for avoiding critical areas with electrical equipment.
- .7 Review existing record plans and site conditions for limitations of penetrations or inclusions of electrical equipment. In Tender sum, allow for avoiding critical areas with electrical equipment.
- .8 Comply with the requirements of the General Contract and coordinate the installation with all other trades on site.
- .9 Confirm on-site the exact location of equipment, outlets, and fixtures and the location of outlets for equipment supplied by other trades.

1.4 ELECTRICAL SCOPE OF WORK

- .1 The electrical scope of work shall include the supply and installation of all the necessary materials and apparatus for complete operating systems as indicated on the plans or mentioned in this specification, with the exception of materials or apparatus specifically mentioned to be omitted or to be supplied by Departmental Representative.
- .2 Items obviously necessary or reasonably implied to complete the work shall be included as if shown on drawings and noted in the specifications.
- .3 All materials, tools, appliances, scaffolding, apparatus and labour necessary for the execution, erection and completion of the systems described herein shall be furnished. This includes providing temporary lighting and power for own work.
- .4 This contract shall include, but is not confined to, the following scope of work:
 - .1 Disconnect existing power service to existing storage containers for demolition.

COMMON WORK RESULTS FOR ELECTRICAL

- .2 Install three new ground rods that come with new storage containers and connect to grounding system in the new containers. Test for continuity of grounding system.
- .3 Test and verify electrical wiring and connections of electrical equipment which comes pre-installed in the new storage containers prior to energizing.
- .4 Connect main power service connection to new storage containers and energize. Ensure all electrical equipment is operating correctly.
- .5 Complete all electrical connections to equipment and accessories pertaining to this contract and leave all in operating condition to the Departmental Representative's satisfaction.
- .6 Remove all existing electrical equipment and material made redundant by this contract or in conflict with work to be carried out. Reroute, reinstall or replace existing electrical material that becomes necessary due to work carried out by this contract so a complete working electrical system will be retained in all areas affected by this installation.

1.5 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 lighting, outlets, panelboards, etc.
- .3 Shop drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in 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 co-ordinated 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 on 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.
- .4 Certificates:
 - .1 Provide CSA certified equipment.
 - .2 Where CSA certified equipment is not available, submit such equipment 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 certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

1.6 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00- Closeout Submittals.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.

COMMON WORK RESULTS FOR ELECTRICAL

- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235.
- .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 labels for control items in English and French.
- .4 Use one label for each language.

2.2 MATERIALS AND EQUIPMENT

- .1 Provide material and equipment in accordance with Section 01 61 00- Common Product Requirements.
- .2 Equipment and material to be CSA certified. Where CSA certified equipment and materials are not available, obtain special approval from inspection authorities before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .3 Factory assemble control panels and component assemblies.

2.3 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of authority having jurisdiction and Departmental Representative.
- .2 Decal signs, minimum size 175 x 250 mm.

2.4 WIRING TERMINATIONS

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

2.5 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with labels as follows:
 - .2 Labels: embossed plastic labels with [6] mm high letters unless specified otherwise.
 - .3 Wording on to be approved by Departmental Representative prior to manufacture.
 - .4 Allow for minimum of twenty-five (25) letters per label.

- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .7 Terminal cabinets and pull boxes: indicate system and voltage.
- .8 Transformers: indicate capacity, primary and secondary voltages.

2.6 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, 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.

2.7 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 [15] m intervals.
- .3 Colours: [25] mm wide prime colour and [20] mm wide auxiliary colour.

Type	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

2.8 FINISHES

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

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

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

3.3 NAMEPLATES AND LABELS

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

3.4 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 Provide upon completion of work, load balance report as directed in PART 1 - ACTION AND INFORMATIONAL 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 45 00- Quality Control.
 - .1 Power distribution system including phasing, 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 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
- .3 Notify Departmental representative 2 weeks prior to testing and carry out tests in presence of Departmental Representative if required.
- .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 - ACTION AND INFORMATIONAL 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.

3.5 SYSTEM STARTUP

- .1 Instruct Departmental Representative 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.

3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning .
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning .
- .3 Waste Management: separate waste materials for recycling/reuse in accordance with Section 01 74 19- Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Project No.: R. 110899.001

**RESEARCH AND DEVELOPMENT CENTRE AGASSIZ, BC
CHEMICAL STORAGE BUILDINGS REPLACEMENT**

APPENDIX 1

**List of Chemicals Stored in Existing Container Units
(for reference use only)**

CHEMICAL STORAGE BUILDINGS REPLACEMENT AT AGASSIZ RESEARCH AND DEVELOPMENT CENTRE AGASSIZ, BC
LIST OF CHEMICALS IN CHAMBER

CONTAINER COMPARTMENT 'A1' (OXY)						
COMPARTMENT	MATERIAL NAME	BARCODE ID	NET QUANTITY	UNIT NAME	CAS NO	CATALOG NO
ChemStores-A1	Ammonium nitrate	99159492	2	kg	6484-52-2	A-7455-2,5KG

CONTAINER COMPARTMENT 'A2'

Overflow, miscellaneous, empties being stored in this compartment

-acids, phosphoric, sulphuric & nitric acid (70-98% concentrations)

CONTAINER COMPARTMENT 'A3' (COR)						
COMPARTMENT	MATERIAL NAME	BARCODE ID	NET QUANTITY	UNIT NAME	CAS NO	CATALOG NO
A3	Sodium hydroxide solution, 1N	99205476	4	L	1310-73-2	SS268B-4
A3	Sodium Hydroxide	99205477	10	kg	1310-73-2	B10252
A3	Ammonium hydroxide solution	99205480	2	L	1336-21-6	9721-3
A3	Ammonium hydroxide solution	99205555	2	L	1336-21-6	9721-3
A3	Potassium silicate	99205562	620	lbs	1312-76-1	
A3	Sodium hydroxide, solution 50% w/w	99205571	20	L	1310-73-2	SS410-20
A3	Sodium hydroxide, solution 50% w/w	99205572	20	L	1310-73-2	SS410-20
A3	Sodium hydroxide, solution 50% w/w	99205573	20	L	1310-73-2	SS410-20
A3	Sodium hydroxide, solution 50% w/w	99162931	1	L	1310-73-2	SS254-1
A3	Sodium hydroxide, solution 50% w/w	99205578	20	L	1310-73-2	SS410-20
A3	Sodium hydroxide, solution 50% w/w	99205579	20	L	1310-73-2	SS410-20

CONTAINER COMPARTMENT 'B1' - LEFT (ACID OXY)

COMPARTMENT	MATERIAL NAME	BARCODE ID	NET QUANTITY	UNIT NAME	CAS NO	CATALOG NO
B1, Left Compartment	Sodium cacodylate trihydrate	99202121	100	g	6131-99-3	C0250
B1, Left Compartment	Devaria's alloy	99202122	500	g	04/118049	28009
B1, Left Compartment	Bromophenol Blue Sodium Salt	99202123	25	g	34725-61-6	150524
B1, Left Compartment	(Ethylenedinitrio)tetraacetic acid	99202124	500	g	60-00-4	AC-4228
B1, Left Compartment	DL-Asparagine monohydrate	99202190	100	g	3130-87-8	15357-5
B1, Left Compartment	Ammonium Sulfate	99202195	50	g	7783-20-2	1209
B1, Left Compartment	Curcumin	99202200	10	g	458-37-7	1179
B1, Left Compartment	D-(+)-Glucose	99202221	1	lbs	50-99-7	D-16
B1, Left Compartment	Eriochrome black 1 indicator	99202223	25	g	1787-61-7	E-512
B1, Left Compartment	Ammonium Sulfate	99202224	500	g	7783-20-2	A-702
B1, Left Compartment	(Ethylenedinitrio)tetraacetic acid	99202225	500	g	60-00-4	AC-4228
B1, Left Compartment	Ammonium oxalate	99202240	500	g	1113-38-8	ACS 081
B1, Left Compartment	Ammonium oxalate	99202242	500	g	1113-38-8	ACS 081

**CHEMICAL STORAGE BUILDINGS REPLACEMENT AT AGASSIZ RESEARCH AND DEVELOPMENT CENTRE AGASSIZ, BC
LIST OF CHEMICALS IN CHAMBER**

B1, Left Compartment	Acacia	99202244	500	g	05/01/9000	G85-500
B1, Left Compartment	Ammonium oxalate	99202262	500	g	1113-38-8	ACS 081
B1, Left Compartment	Aluminum Sulfate Octadecahydrate	99202280	500	g		1-0564
B1, Left Compartment	Alizarol Cyanone RC	99202281	25	g		532
B1, Left Compartment	Bolling granules	99202283	500	g	1344-28-1	136-C
B1, Left Compartment	Ammonium oxalate	99202300	500	g	1113-38-8	ACS 081
B1, Left Compartment	Ammonium ferrous sulfate hexahydrate	99202301	500	g	7783-85-9	ACS060
B1, Left Compartment	EDTA disodium salt dihydrate	99202302	500	g	6381-92-6	S311-500
B1, Left Compartment	Calcium Chloride Dihydrate	99202303	10	kg	10035-04-8	2520-1
B1, Left Compartment	Amberlite; XAD-4	99202313	500	g	9003-69-4	3412
B1, Left Compartment	Amberlite; XAD-4	99202315	500	g	9003-69-4	3412
B1, Left Compartment	Amberlite; XAD-4	99202316	500	g	9003-69-4	3412
B1, Left Compartment	Amberlite; XAD-4	99202318	500	g	9003-69-4	3412
B1, Left Compartment	Amberlite; XAD-4	99202319	500	g	9003-69-4	3412
B1, Left Compartment	Amberlite; XAD-4	99202320	500	g	9003-69-4	3412
B1, Left Compartment	Amberlite; XAD-4	99202321	500	g	9003-69-4	3412
B1, Left Compartment	Amberlite; XAD-4	99202322	500	g	9003-69-4	3412
B1, Left Compartment	Amberlite; XAD-4	99202324	500	g	9003-69-4	3412
B1, Left Compartment	Amberlite; XAD-4	99202325	500	g	9003-69-4	3412
B1, Left Compartment	Amberlite; XAD-4	99202326	500	g	9003-69-4	3412
B1, Left Compartment	D-(+)-Glucose	99202344	1	lbs	50-99-7	180.162
B1, Left Compartment	L (-) Cysteine	99202346	100	g		C-563
B1, Left Compartment	Chloral hydrate	99202349	500	g	302-17-0	C-286
B1, Left Compartment	Calcium Chloride Dihydrate	99202351	500	g	10035-04-8	C5080-500G
B1, Left Compartment	Calcium carbonate	99202356	1	lbs	471-34-1	C-64
B1, Left Compartment	Calcium acetate	99202359	500	g	62-54-4	C46-500
B1, Left Compartment	Carboxymethylcellulose sodium salt	99202360	500	g	9004-32-4	27929
B1, Left Compartment	Barium chloride	99202380	500	g	10361-37-2	ACS 120
B1, Left Compartment	Brij 35; solution	99202382	1	pt	9002-92-0	S0-B-146
B1, Left Compartment	2,6-Di-tert-butyl-4-methylphenol	99202400	500	g	128-37-0	B1378
B1, Left Compartment	Bismark Brown Y	99202421	10	g		331
B1, Left Compartment	Buffer Solution pH 5.0	99202440	1	L	77-92-9	SB102B-1
B1, Left Compartment	Calcium Chloride Dihydrate	99202441	500	g	10035-04-8	C79-500
B1, Left Compartment	Buffer Solution Concentrate pH 4.0	99202442	1	L		SB95B-1

**CHEMICAL STORAGE BUILDINGS REPLACEMENT AT AGASSIZ RESEARCH AND DEVELOPMENT CENTRE AGASSIZ, BC
LIST OF CHEMICALS IN CHAMBER**

COMPARTMENT	MATERIAL NAME	BARCODE ID	NET QUANTITY	UNIT NAME	CAS NO	CATALOG NO
B1, Left Compartment	Buffer Solution, pH 7.00	99202443	1	L	7776-77-0	SB1095-1
B1, Left Compartment	Buffer Solution pH 8.00	99202444	1	L		SB112B-1
B1, Left Compartment	Buffer Solution pH 9.00	99202445	1	L		SB114B-1
B1, Left Compartment	Buffer Solution pH 9.00	99202446	1	L		SB114B-1
B1, Left Compartment	Buffer Solution pH 8.00	99202448	1	L		SB112B-1
B1, Left Compartment	1x8-50 ion-exchange resin	99202460	500	g		21740-9
B1, Left Compartment	Congo Red	99202461	10	g	573-55-0	378
B1, Left Compartment	Crystal violet	99202463	10	g	548-62-9	681
B1, Left Compartment	Calcium carbonate	99202464	25	lbs	471-34-1	C-62
B1, Left Compartment	Calcium chloride	99202467	2	kg	10043-52-4	5-1311
B1, Left Compartment	Sulfuric Acid	99202504	2	L	7664-93-9	45006
B1, Left Compartment	Sulfuric Acid	99202511	9	lbs	7664-93-9	Mar-73
B1, Left Compartment	Nitric acid	99202542	1	L	7697-37-2	
B1, Left Compartment	Sulfuric Acid	99202560	2	L	7664-93-9	45006
B1, Left Compartment	Potassium Nitrate	99202600	10	kg	7757-79-1	P-261
B1, Left Compartment	Calcium hypochlorite	99202601	2	kg	7776-54-3	
B1, Left Compartment	Sulfurous acid	99202602	1	L	7782-99-2	A307-1
B1, Left Compartment	Sulfurous acid	99202603	1	L	7782-99-2	A307-1
B1, Left Compartment	Sulfuric Acid	99202604	500	mL	7664-93-9	4802-1
B1, Left Compartment	Sulfuric Acid	99202605	500	mL	7664-93-9	4802-1
B1, Left Compartment	Ferric nitrate	99202606	1	lbs	10421-48-4	5032
B1, Left Compartment	Silver nitrate	99202607	0	lbs	7761-85-8	
B1, Left Compartment	Zirconyl Nitrate	99202608	1	lbs		Z-62
B1, Left Compartment	Methanesulfonic Acid, 99%	99202609	100	mL		M860-6
B1, Left Compartment	Potassium Dichromate	99202610	1	lbs	7776-50-9	PX1445
B1, Left Compartment	Cresol red	99202611	25	g	1733-12-6	150725
B1, Left Compartment	Potassium persulfate	99202612	500	g	7727-21-1	P282-500
B1, Left Compartment	Magnesium nitrate hexahydrate	99202613	500	g	13446-18-9	10309
B1, Left Compartment	Alumina activated	99202614	5	lbs	1344-28-1	A-545
B1, Left Compartment	Battery Fluid Acid	99202617	25	kg		
B1, Left Compartment	Hamp-ene 3% Calcium Chelate Solution	99202623	5	GAL		
B1, Left Compartment	Sulfuric Acid	99204120	2	L	7664-93-9	A300P-212

**CHEMICAL STORAGE BUILDINGS REPLACEMENT AT AGASSIZ RESEARCH AND DEVELOPMENT CENTRE AGASSIZ, BC
LIST OF CHEMICALS IN CHAMBER**

B1, Left Compartment,Left General Chemicals	D-(+)-Glucose	98202120	1	lbs	50-99-7	D-16
B1, Left Compartment,Left General Chemicals	Calcium hypochlorite	98202361	500	g	7778-54-3	C100-500
B1, Left Compartment,Left General Chemicals	Potassium Dichromate	98308360	454	g	7778-50-9	3093
B1, Left Compartment,Left General Chemicals	Sodium phosphate dibasic	98308362	1	LB	7558-79-4	S-374
B1, Left Compartment,Left General Chemicals	Sodium phosphate monobasic	98308363	1	lbs	10049-21-5	S-389
B1, Left Compartment,Left General Chemicals	Calcium Chloride Dihydrate	98308364	1	lbs	10035-04-8	C79
B1, Left Compartment,Left General Chemicals	Potassium iodide	98308365	500	g	7681-11-0	B10212
B1, Left Compartment,Left General Chemicals	Potassium iodide	98308366	100	g	7681-11-0	B10212
B1, Left Compartment,Left General Chemicals	Calcium Chloride Certified Anhydrous	98308369	500	g		C614-500
B1, Left Compartment,Left General Chemicals	Light mineral oil	98308484	500	mL		
B1, Left Compartment,Left General Chemicals	Brookfield viscosity reference standard	98308485	500	mL		
B1, Left Compartment,Left General Chemicals	Brookfield viscosity reference standard	98308486	500	mL		5
B1, Left Compartment,Left General Chemicals	Brookfield viscosity reference standard	98308487	500	mL		
B1, Left Compartment,Left General Chemicals	Organic Waste	98312884	4	L		
B1, Left Compartment,Left General Chemicals	Sulfuric Acid	98313815	35	kg	7664-93-9	
B1, Left Compartment,Left General Chemicals	Nitric acid	98313901	2	L	7697-37-2	9601-04
B1, Left Compartment,Left General Chemicals	Sodium chloride	98316822	2	kg	7647-14-5	81708-380
COMPARTMENT	MATERIAL NAME	BARCODE ID	NET QUANTITY	UNIT NAME	CAS NO	CATALOG NO
B1, Left Compartment,Left General Chemicals	Sodium chloride	98316823	2	kg	7647-14-5	81708-380
B1, Left Compartment,Left General Chemicals	Sodium chloride	98316824	2	kg	7647-14-5	81708-380
B1, Left Compartment,Left General Chemicals	Sodium chloride	98316825	2	kg	7647-14-5	81708-380
B1, Left Compartment,Left General Chemicals	Sodium chloride	98316826	2	kg	7647-14-5	81708-380
B1, Left Compartment,Left General Chemicals	Methanol	98317071	4	L	67-56-1	MX0475-1

**CHEMICAL STORAGE BUILDINGS REPLACEMENT AT AGASSIZ RESEARCH AND DEVELOPMENT CENTRE AGASSIZ, BC
LIST OF CHEMICALS IN CHAMBER**

B1, Left Compartment,Left General Chemicals	Methanol	98317072	4	L	67-56-1	MX0475-1
B1, Left Compartment,Left General Chemicals	Methanol	98317073	4	L	67-56-1	MX0475-1
B1, Left Compartment,Left General Chemicals	Methanol	98317074	4	L	67-56-1	MX0475-1
B1, Left Compartment,Left General Chemicals	Organic Waste	98317076	20	L		
B1, Left Compartment,Left General Chemicals	Methanol	98332589	4	L	67-56-1	MX0475-1
B1, Left Compartment,Left General Chemicals	Methanol	98332590	4	L	67-56-1	MX0475-1
B1, Left Compartment,Left General Chemicals	Methanol	98332591	4	L	67-56-1	MX0475-1
B1, Left Compartment,Left General Chemicals	Methanol	98332592	4	L	67-56-1	MX0475-1
B1, Left Compartment,Left General Chemicals	Buffer Solution, pH 7.00	98346671	4	L	7778-77-0	SB107-4
B1, Left Compartment,Left General Chemicals	Buffer Solution, pH 7.00	98350445	475	mL	7778-77-0	910107
B1, Left Compartment,Oxidizers and Oxidizing Acids	Nitric acid	98254417	2	L	7697-37-2	9601-04
B1, Left Compartment,Oxidizers and Oxidizing Acids	Boiling granules	98271663	500	g	1344-28-1	136-C
B1, Left Compartment,Oxidizers and Oxidizing Acids	Boiling granules	98271664	500	g	1344-28-1	136-C
B1, Left Compartment,Oxidizers and Oxidizing Acids	Sulfuric Acid	98349380	2	L	7664-93-9	A300 212
B1, Left Compartment,Oxidizers and Oxidizing Acids	Sulfuric Acid	98349381	2	L	7664-93-9	A300 212
B1, Left Compartment,Oxidizers and Oxidizing Acids	Sulfuric Acid	98350268	2	L	7664-93-9	A300 212
B1, Left Compartment,Oxidizers and Oxidizing Acids	Sulfuric Acid	98350269	2	L	7664-93-9	A300 212
B1, Left Compartment,Oxidizers and Oxidizing Acids	Sulfuric Acid	98350270	2	L	7664-93-9	A300 212
B1, Left Compartment,Oxidizers and Oxidizing Acids	Nitric acid	98352080	2	L	7697-37-2	351285-212
B1, Left Compartment,Oxidizers and Oxidizing Acids	Nitric acid	98352081	2	L	7697-37-2	351285-212
B1, Left Compartment,Oxidizers and Oxidizing Acids	Nitric acid	98352082	2	L	7697-37-2	351285-212
B1, Left Compartment,Oxidizers and Oxidizing Acids	Nitric acid	98352083	2	L	7697-37-2	351285-212
CONTAINER COMPARTMENT 'B1' – CENTER (ACID OXY)						
COMPARTMENT	MATERIAL NAME	BARCODE ID	NET QUANTITY	UNIT NAME	CAS NO	CATALOG NO

**CHEMICAL STORAGE BUILDINGS REPLACEMENT AT AGASSIZ RESEARCH AND DEVELOPMENT CENTRE AGASSIZ, BC
LIST OF CHEMICALS IN CHAMBER**

B1	lecosorb sodium hydroxide, 20-30 mesh	99202920	500	g	1310-73-2	502-174
B1, Center Compartment	Potassium Phosphate Monobasic	99164662	100	g	7778-77-0	P-5379
B1, Center Compartment	Sodium phosphate dibasic	99164706	500	g	7558-79-4	
B1, Center Compartment	Methylene blue trihydrate	99164808	100	g	7220-79-3	
B1, Center Compartment	Magnesium perchlorate	99202800	454	g	10034-81-8	501-171
B1, Center Compartment	Magnesium perchlorate	99202801	454	g	10034-81-8	501-171
B1, Center Compartment	Magnesium perchlorate	99202802	454	g	10034-81-8	501-171
B1, Center Compartment	Magnesium perchlorate	99202803	454	g	10034-81-8	501-171
B1, Center Compartment	Magnesium perchlorate	99202804	454	g	10034-81-8	501-171
B1, Center Compartment	Magnesium perchlorate	99202805	454	g	10034-81-8	501-171
B1, Center Compartment	Magnesium perchlorate	99202806	454	g	10034-81-8	501-171
B1, Center Compartment	Magnesium perchlorate	99202807	454	g	10034-81-8	501-171
B1, Center Compartment	Magnesium perchlorate	99202808	454	g	10034-81-8	501-171
B1, Center Compartment	Magnesium perchlorate	99202809	454	g	10034-81-8	501-171
B1, Center Compartment	Magnesium perchlorate	99202810	454	g	10034-81-8	501-171
B1, Center Compartment	Magnesium perchlorate	99202811	454	g	10034-81-8	501-171
B1, Center Compartment	Magnesium perchlorate	99202812	454	g	10034-81-8	501-171
B1, Center Compartment	Magnesium perchlorate	99202820	454	g	10034-81-8	501-171
B1, Center Compartment	Magnesium perchlorate	99202821	454	g	10034-81-8	501-171
B1, Center Compartment	Magnesium perchlorate	99202822	454	g	10034-81-8	501-171
B1, Center Compartment	Magnesium perchlorate	99202832	454	g	10034-81-8	501-171
B1, Center Compartment	Magnesium perchlorate	99202833	454	g	10034-81-8	501-171
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	99202842	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	99202851	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	99202861	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	99202862	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	99202863	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	99202867	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	99202868	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	99202869	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	99202871	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	99202872	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	99202873	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	99202874	500	g	1310-73-2	502-174

**CHEMICAL STORAGE BUILDINGS REPLACEMENT AT AGASSIZ RESEARCH AND DEVELOPMENT CENTRE AGASSIZ, BC
LIST OF CHEMICALS IN CHAMBER**

COMPARTMENT	MATERIAL NAME	BARCODE ID	NET QUANTITY	UNIT NAME	CAS NO	CATALOG NO
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202875	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202876	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202877	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202878	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202904	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202905	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202906	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202908	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202910	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202911	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202912	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202913	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202914	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202915	500	g	1310-73-2	502-174
COMPARTMENT	MATERIAL NAME	BARCODE ID	NET QUANTITY	UNIT NAME	CAS NO	CATALOG NO
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202917	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202918	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202919	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202921	500	g	1310-73-2	502-174
B1, Center Compartment	lecosorb sodium hydroxide, 20-30 mesh	98202922	500	g	1310-73-2	502-174
B1, Center Compartment	EIW Quant Nitrite (NO2) Test Strips	98202947	100	strips		10 007
B1, Center Compartment	Magnesium chloride	98202950	500	g	7786-30-3	ACS 474
B1, Center Compartment	L-Rhamnose monohydrate	98203000	25	GM	10030-85-0	R3875-25G
B1, Center Compartment	4-Nitro-Phenol 98%	98203021	100	g		15705-1000
B1, Center Compartment	4-Nitrophenol	98203023	100	g	100-02-7	192
B1, Center Compartment	Magnesium Metal	98203026	100	g	7439-95-4	GD1
B1, Center Compartment	Oxalic acid dihydrate	98203031	500	g	6153-56-6	ACS 594
B1, Center Compartment	Oxalic acid	98203033	3	kg	144-62-7	A219-3
B1, Center Compartment	Magnesium Metal	98203040	100	g	7439-95-4	GD1
B1, Center Compartment	Orcein	98203043	10	g	1400-62-0	320
B1, Center Compartment	Oxalic acid	98203046	3	kg	144-62-7	A219-3
B1, Center Compartment	Oxalic acid dihydrate	98203049	500	g	6153-56-6	ACS 594
B1, Center Compartment	Oxalic acid dihydrate	98203051	500	g	6153-56-6	ACS 594
B1, Center Compartment	Oxalic acid dihydrate	98203052	500	g	6153-56-6	ACS 594

**CHEMICAL STORAGE BUILDINGS REPLACEMENT AT AGASSIZ RESEARCH AND DEVELOPMENT CENTRE AGASSIZ, BC
LIST OF CHEMICALS IN CHAMBER**

B1, Center Compartment	Malic acid	99203060	500	g	110-16-7	M0375-500G
B1, Center Compartment	Magnesium nitrate hexahydrate	99203063	50	g	13446-18-9	Art 5855
B1, Center Compartment	Hydroxylamine hydrochloride	99203082	100	g	011115470	H-330
B1, Center Compartment	Carbosorb	99203091	250	g		
B1, Center Compartment	Magnesium perchlorate	99203092	1	lbs	10034-81-8	IM-171
B1, Center Compartment	Magnesium Sulfate Heptahydrate	99203093	500	g	10034-99-8	M63-500
B1, Center Compartment	Magnesium Sulfate Heptahydrate	99203094	500	g	10034-99-8	B29117
B1, Center Compartment	Hexadecyltrimethylammonium bromide	99203095	500	g	57-09-0	03042-500
B1, Center Compartment	Fast sulphon black F	99203096	25	g		20049
B1, Center Compartment	D-(-)-Fructose	99203097	113	g	57-48-7	L-95
B1, Center Compartment	Lithium hydroxide	99203098	500	g	1310-66-3	29073
B1, Center Compartment	Manganese(II) sulfate monohydrate	99203099	1	lbs	10034-96-5	M-113
B1, Center Compartment	Magnesium Metal	99203100	100	g	7439-95-4	B29089
B1, Center Compartment	Lanthanum oxide	99203101	250	g	1312-81-8	6-P351
B1, Center Compartment	Gelatin	99203102	500	g	9000-70-8	G-7
B1, Center Compartment	D-(+)-Glucurono-6,3-lactone	99203103	5	g	32449-92-6	G-8875
B1, Center Compartment	2-Hydroxybiphenyl	99203104	500	g		
B1, Center Compartment	DL-Malic acid	99203105	500	g	6915-15-7	M-0875
B1, Center Compartment	DL-Lactic acid sodium salt	99203106	500	mL	72-17-3	L-1375
B1, Center Compartment	Lithium chloride	99203107	100	g	7447-41-8	L121-100
B1, Center Compartment	Malonic acid	99203108	500	g	141-82-2	M1750-500G
B1, Center Compartment	Lactophenol	99203110	100	mL	01107/8002	R03465
B1, Center Compartment	D-Mannitol	99203111	3	kg	69-65-8	MX0214-1
B1, Center Compartment	D-Mannitol	99203114	3	kg	69-65-8	MX0214-1
B1, Center Compartment	Potassium carbonate	99203121	10	kg	584-08-7	AC-7590
B1, Center Compartment	Potassium carbonate	99203122	10	kg	584-08-7	AC-7590
B1, Center Compartment	Magnesium oxide	99203151	3	kg	1305-48-4	M68-3
B1, Center Compartment	Magnesium oxide	99203152	3	kg	1305-48-4	M68-3
B1, Center Compartment	Magnesium oxide	99203153	3	kg	1305-48-4	M68-3
COMPARTMENT	MATERIAL NAME	BARCODE ID	NET QUANTITY	UNIT NAME	CAS NO	CATALOG NO
B1, Center Compartment	Rubidium chloride	99203760	100	g	091117791	16072
B1, Center Compartment	Se Catalyst	99203765	500	g		
B1, Center Compartment	Potassium chromate	99203782	1	lbs	7785-00-6	Jan-58
B1, Center Compartment	potassium hydroxide	99203786	5	lbs		3142

**CHEMICAL STORAGE BUILDINGS REPLACEMENT AT AGASSIZ RESEARCH AND DEVELOPMENT CENTRE AGASSIZ, BC
LIST OF CHEMICALS IN CHAMBER**

B1, Center Compartment	potassium hydroxide	99203788	5	lbs			
B1, Center Compartment	Potassium Cyanate	99203800	500	g		21507-4	
B1, Center Compartment	Potassium Phosphate Monobasic	99203801	1	lbs	7775-77-0	7100	
B1, Center Compartment	Potassium Phosphate Monobasic	99203802	500	g	7775-77-0	B10203	
B1, Center Compartment	1,10-Phenanthroline ferrous sulfate	99203820	100	mL	14634-91-4	P-69	
B1, Center Compartment	Potassium carbonate	99203822	2	kg	584-08-7	PX1390-3	
B1, Center Compartment	sodium dihydrogen orthophosphate monobasic	99203823	500	g	7558-79-4	ACS 795	
B1, Center Compartment	Selenium	99203824	50	g	7782-49-2	20965-1	
B1, Center Compartment	Sodium citrate	99203850	113	g	68-04-2	364	
B1, Center Compartment	Zinc chloride	99203855	1	lbs	7646-85-7	4324	
B1, Center Compartment	Sodium periodate	99203860	25	g	7790-28-5	S1878-25G	
B1, Center Compartment	Silver oxide	99203885	100	g	11113-88-5	S184-100	
B1, Center Compartment	Sodium Sulfite	99203890	500	g	7757-83-7	S-0505	
B1, Center Compartment	Sodium phosphate dibasic	99203902	113	g	7558-79-4	S-374	
B1, Center Compartment	Tetrasodium pyrophosphate	99203911	500	g	7722-88-5	ACS846	
B1, Center Compartment	Sodium sulfate	99203919	500	g	7757-82-6	3891-01	
B1, Center Compartment	Sodium phosphate	99203923	500	g	7601-54-9	834	
B1, Center Compartment	Sodium sulfate, anhydrous	99203925	500	g	7757-82-6	B10264	
B1, Center Compartment	Sodium salicylate	99203929	500	g	54-21-7	B30210	
B1, Center Compartment	Sodium salicylate	99203933	500	g	54-21-7	B30210	
B1, Center Compartment	Sodium iodide	99203935	500	g	7681-82-5	B10351	
B1, Center Compartment	Polyoxyethylene sorbitan monooleate	99203938	1	pint	9005-65-6	T-164	
B1, Center Compartment	Thiourea	99203940	500	g	62-56-6	4123-01	
B1, Center Compartment	15% Active Sodium Chlorite	99203943	25	L			
B1, Center Compartment	Sodium phosphate dibasic	99203944	5	lbs	7558-79-4	May-22	
B1, Center Compartment	silica gel 6-16 mesh	99203946	1	lbs	112926-00-8	S-160	
B1, Center Compartment	Urea	99203960	1	kg	57-13-6	208884-1KG	
B1, Center Compartment	Urea	99203962	1	kg	57-13-6	U270-9	
B1, Center Compartment	Thiosemicarbazide	99203963	100	g	79-19-6	30420	
B1, Center Compartment	Thymol blue	99203964	25	g	76-61-9	152141	
B1, Center Compartment	Salicylic Acid	99204003	500	g	69-72-7	0303-01	
B1, Center Compartment	Reducing Agent	99204005	475	mL		700005	
B1, Center Compartment	Sodium chloride	99204024	11	kg	7647-14-5	S641-212	
B1, Center Compartment	Potassium Dichromate	99308356	500	g	7775-50-9	PX1445	

**CHEMICAL STORAGE BUILDINGS REPLACEMENT AT AGASSIZ RESEARCH AND DEVELOPMENT CENTRE AGASSIZ, BC
LIST OF CHEMICALS IN CHAMBER**

B1, Center Compartment	TBS Buffer with TWEEN 20	99313784	10	packets			T9039-10PAK
B1, Center Compartment	Potassium Chloride	99368460	10	kg	7447-40-7		P217-10
B1, Center Compartment	Potassium Chloride	99368461	10	kg	7447-40-7		P217-10
B1, Center Compartment	Potassium Chloride	99368462	10	kg	7447-40-7		P217-10
B1, Center Compartment	Potassium Chloride	99368463	10	kg	7447-40-7		P217-10
CONTAINER COMPARTMENT 'B1' – RIGHT (ACID OXY)							
COMPARTMENT	MATERIAL NAME	BARCODE ID	NET QUANTITY	UNIT NAME	CAS NO	CATALOG NO	
B1 Right Compartment	Industrial Vinegar - Stripper Neutralizer	99204124	4	L			
B1 Right Compartment	Industrial Vinegar - Stripper Neutralizer	99204125	4	L			
B1 Right Compartment	o-Phosphoric acid; 85%	99204126	2	L	7664-38-2		A242-212
B1 Right Compartment	o-Phosphoric acid; 85%	99204127	2	L	7664-38-2		A242-212
B1 Right Compartment	o-Phosphoric acid; 85%	99204128	2	L	7664-38-2		A242-212
B1 Right Compartment	o-Phosphoric acid; 85%	99204129	2	L	7664-38-2		A242-212
B1 Right Compartment	Propionic acid	99204130	8	pint	79-09-4		7179
B1 Right Compartment	Propionic acid	99204131	8	pint	79-09-4		7179
B1 Right Compartment	Propionic acid	99204132	1	kg	79-09-4		8-U330
B1 Right Compartment	Formic acid	99204133	500	mL	64-18-6		0128-1
B1 Right Compartment	Propionic acid	99204134	500	mL	79-09-4		29688
B1 Right Compartment	1 part Acetic Acid 3 Parts Ethyl Alcohol	99204135	250	mL			
B1 Right Compartment	Hydrochloric acid	99204137	36	g	7647-01-0		4657
B1 Right Compartment	Hydrochloric acid solution	99204138	1	L	7647-01-0		VW 3419-1
B1 Right Compartment	Muriatic Acid	99204139	1	L			
B1 Right Compartment	Hypophosphorous acid	99204140	500	mL	6303-21-5		286454G
B1 Right Compartment	Hydroiodic acid	99204141	500	mL	10034-85-2		A135-500
B1 Right Compartment	Hydroiodic acid	99204142	500	mL	10034-85-2		A135-500
B1 Right Compartment	Hydroiodic acid	99204143	500	mL	10034-85-2		A135-500
B1 Right Compartment	Hydroiodic acid	99204144	500	mL	10034-85-2		A135-500
B1 Right Compartment	Hydrochloric acid	99204451	2	L	7647-01-0		AC-4955
B1 Right Compartment	Hydrochloric acid	99204459	2	L	7647-01-0		AC-4955
B1 Right Compartment	Hydrochloric acid	99204469	2	L	7647-01-0		AC-4955
B1 Right Compartment	Hydrochloric acid	99204473	2	L	7647-01-0		AC-4955
B1 Right Compartment	Hydrochloric acid	99204475	2	L	7647-01-0		AC-4955
B1 Right Compartment	Hydrochloric acid	99204479	2	L	7647-01-0		AC-4955
B1 Right Compartment	Hydrochloric acid	99204485	2	L	7647-01-0		AC-4955

**CHEMICAL STORAGE BUILDINGS REPLACEMENT AT AGASSIZ RESEARCH AND DEVELOPMENT CENTRE AGASSIZ, BC
LIST OF CHEMICALS IN CHAMBER**

B1 Right Compartment	Hydrochloric acid	99204487	2	L	7647-01-0	AC-4955
B1 Right Compartment	Hydrochloric acid	99204489	2	L	7647-01-0	AC-4955
B1 Right Compartment	Hydrochloric acid	99204490	2	L	7647-01-0	AC-4955
B1 Right Compartment	Hydrochloric acid	99204493	2	L	7647-01-0	AC-4955
B1 Right Compartment	Phosphoric Acid	99204513	20	L	7664-39-2	B-2658
B1 Right Compartment	Organic Activator	99204516	25	L		
B1 Right Compartment	Formic acid	99204525	25	kg	64-18-6	
B1 Right Compartment	Formic acid	99204526	25	kg	64-18-6	
B1 Right Compartment	Hydrofluoric acid	99204534	2	L	7664-39-3	6525-1
B1 Right Compartment	Fibersol-T	99204541	5	GAL		63083-292
B1 Right Compartment	Fibersol-T	99204542	5	GAL		63083-292
B1 Right Compartment	Fibersol-T	99204543	5	GAL		63083-292
B1 Right Compartment	Phosphoric Acid	99318466	2	L	7664-39-2	PX0995F-1
B1 Right Compartment	Phosphoric Acid	99318467	2	L	7664-39-2	PX0995F-1
B1 Right Compartment	Phosphoric Acid	99318468	2	L	7664-39-2	PX0995F-1
B1 Right Compartment	Phosphoric Acid	99318469	2	L	7664-39-2	PX0995F-1
B1 Right Compartment	Phosphoric Acid	99318470	2	L	7664-39-2	PX0995F-1
B1 Right Compartment	Phosphoric Acid	99318471	2	L	7664-39-2	PX0995F-1
CONTAINER COMPARTMENT 'C1'						
COMPARTMENT	MATERIAL NAME	BARCODE ID	NET QUANTITY	UNIT NAME	CAS NO	CATALOG NO
C1	Ethanol	99204697	1	L	64-17-5	EX0278-6
C1	Permount	99204704	1	pint	105-88-33;68240-09-5	S0-P-15
C1	Permount	99204705	1	pint	105-88-33;68240-09-5	S0-P-15
C1	Glutaraldehyde	99204738	250	mL	111-30-8	4239
C1	Formaldehyde	99204752	1	L	50-00-0	ACS 357
C1	Ethylene glycol monoethyl ether	99204766	500	mL	110-80-5	L210-07
C1	Ethylene glycol monoethyl ether	99204773	500	mL	110-80-5	L210-07
C1	Ethylene glycol monoethyl ether	99204779	500	mL	110-80-5	L210-07
C1	Ethylene glycol monoethyl ether	99204781	500	mL	110-80-5	L210-07
C1	Glutaraldehyde	99204786	1	kg	111-30-8	GX0154-1
C1	Formaldehyde	99204795	1	L	50-00-0	RSOF00104A
C1	Xylene	99204807	4	L	1330-20-7	X516-09
C1	Methanol	99204813	4	L	67-56-1	B10158
C1	Glycerol	99204820	4	L	56-81-5	G31-4

CHEMICAL STORAGE BUILDINGS REPLACEMENT AT AGASSIZ RESEARCH AND DEVELOPMENT CENTRE AGASSIZ, BC
LIST OF CHEMICALS IN CHAMBER

COMPARTMENT	MATERIAL NAME	BARCODE ID	NET QUANTITY	UNIT NAME	CAS NO	CATALOG NO
C1	Glycerol	99204821	4	L	56-81-5	G31-4
C1	Glycerol	99204887	4	L	56-81-5	G31-4
C1	Glycerol	99204896	500	mL	56-81-5	K91212
C1	Glycerol	99204903	500	mL	56-81-5	K91212
C1	Glycerol	99204913	500	mL	56-81-5	K91212
C1	Glycerol	99204916	500	mL	56-81-5	K91212
C1	Glycerol	99204919	500	mL	56-81-5	K91212
C1	Glycerol	99204930	1	pint	56-81-5	G-33
C1	Glycerol	99204953	500	mL	56-81-5	K91212
C1	Glycerol	99204992	500	mL	56-81-5	K91212
C1	4-Chloro-3-methylphenol	99204996	100	g	59-50-7	1182
C1	tert-Butanol	99205000	1	L	75-65-0	A401-1
C1	tert-Butanol	99205001	1	L	75-65-0	A401-1
C1	tert-Butanol	99205020	1	L	75-65-0	A401-1
C1	tert-Butanol	99205021	1	L	75-65-0	A401-1
C1	tert-Butanol	99205040	1	L	75-65-0	A401-1
C1	tert-Butanol	99205046	1	L	75-65-0	A401-1
C1	tert-Butanol	99205064	1	L	75-65-0	A401-1
C1	tert-Butanol	99205065	1	L	75-65-0	A401-1
C1	tert-Butanol	99205080	1	L	75-65-0	A401-1
C1	tert-Butanol	99205081	1	L	75-65-0	A401-1
C1	Acetone	99205090	3	L	67-64-1	15459-8
C1	Acetone	99205091	4	L	67-64-1	K90009
C1	Ethanol; 100%	99205092	4	L	64-17-5	9401-3
C1	Acetone	99205093	4	L	67-64-1	AX0125-4
C1	Methanol, Absolute	99205094	8	pint		Mar-69
C1	Methanol	99205095	4	L	67-56-1	A403
C1	Light mineral oil	99205096	4	L		O121-4
C1	Formaldehyde	99205097	10	L	50-00-0	B28421
C1	Molecular Sieves	99205098	5	lbs	68912-79-4	MS-1155
C1	Petroleum Spirit	99205269	4	L		ACS 603
C1	Petroleum Spirit	99205277	4	L		ACS 603
C1	Petroleum Spirit	99205278	4	L		ACS 603

**CHEMICAL STORAGE BUILDINGS REPLACEMENT AT AGASSIZ RESEARCH AND DEVELOPMENT CENTRE AGASSIZ, BC
LIST OF CHEMICALS IN CHAMBER**

C1	Petroleum Spirit	99205279	4	L		ACS 603
C1	Petroleum Spirit	99205282	4	L		ACS 603
C1	Petroleum Spirit	99205286	4	L		ACS 603
C1	Petroleum Spirit	99205289	4	L		ACS 603
C1	Paradichlorobenzene	99205295	1	lbs		1192
C1	Unknown	99205299	20	L		
C1	Unknown	99205300	20	L		
C1	Acetone	99205301	20	L	67-64-1	AC-0151
C1	Phenol red solution	99205304	1	pint	143-74-8	SO4-24
C1	Xylene	99205315	4	L	1330-20-7	X516-09
C1	Xylene	99205316	4	L	1330-20-7	X516-09
C1	Xylene	99205318	4	L	1330-20-7	X516-09
C1	Acetone	99205320	20	L	67-64-1	ACS 009-86
C1	Acetone	99205323	4	L	67-64-1	1101-4LG
C1	Acetone	99205325	4	L	67-64-1	1101-4LG
C1	Methanol	99205341	4	L	67-56-1	MX0475-1
CONTAINER COMPARTMENT 'C2'						
COMPARTMENT	MATERIAL NAME	BARCODE ID	NET QUANTITY	UNIT NAME	CAS NO	CATALOG NO
C2	Chloroform Waste	99205099	20.00	L		
C2	Chlorinated Waste	99205100	20.00	L		
C2	Hexane Waste	99205102	20.00	L		
C2	Organic and Halogenated Waste	99205103	20.00	L		
C2	Organic Waste	99205226	20.00	L		
C2	Organic Waste	99205227	20.00	L		
C2	Ethylene Glycol	99205230	4.00	L	107-21-1	B28296
C2	Ethylene Glycol	99205231	4.00	L	107-21-1	B28296
C2	Methanol	99205244	4.00	L	67-56-1	MX0486
C2	Acetone	99205247	20.00	L	67-64-1	A18-20
C2	n,n-Dimethyl formamide	99308367	250.00	mL	68-12-2	D4651-250ML
C2	COLLODION FLEXIBLE U.S.P.	99308368	500.00	mL	9004-70-0	9204-01

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**RESEARCH AND DEVELOPMENT CENTRE AGASSIZ, BC
CHEMICAL STORAGE BUILDINGS REPLACEMENT**

APPENDIX 2

Site Photos





















SITE PHOTOS









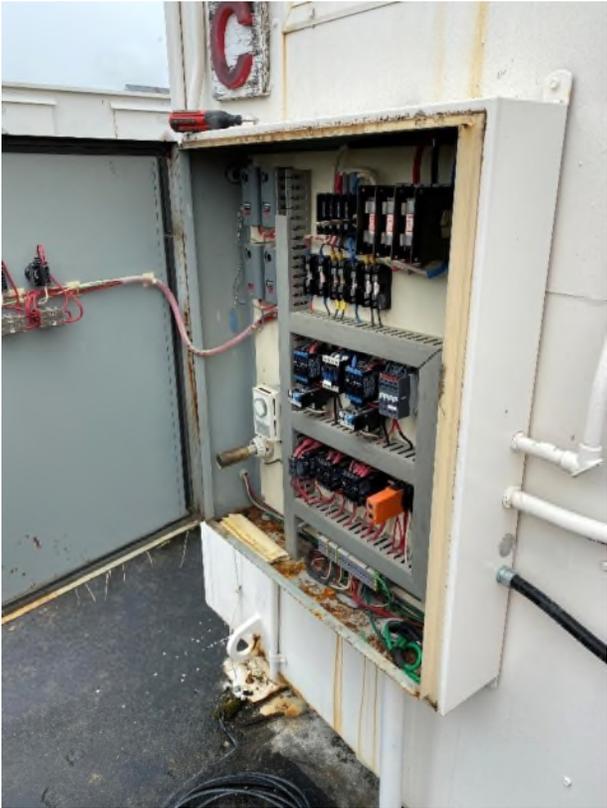




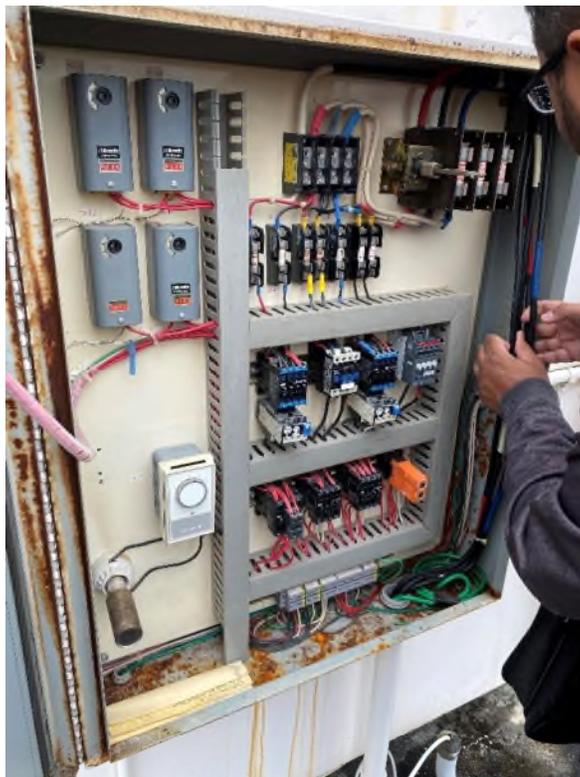
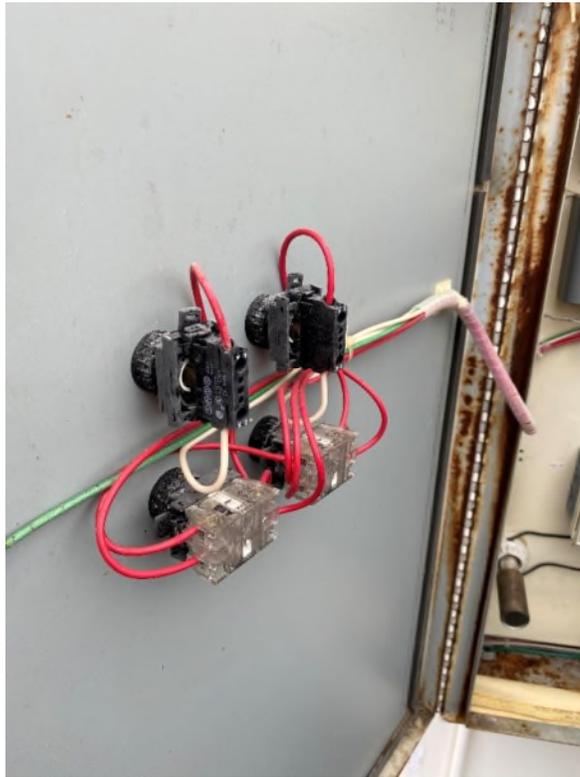
SITE PHOTOS

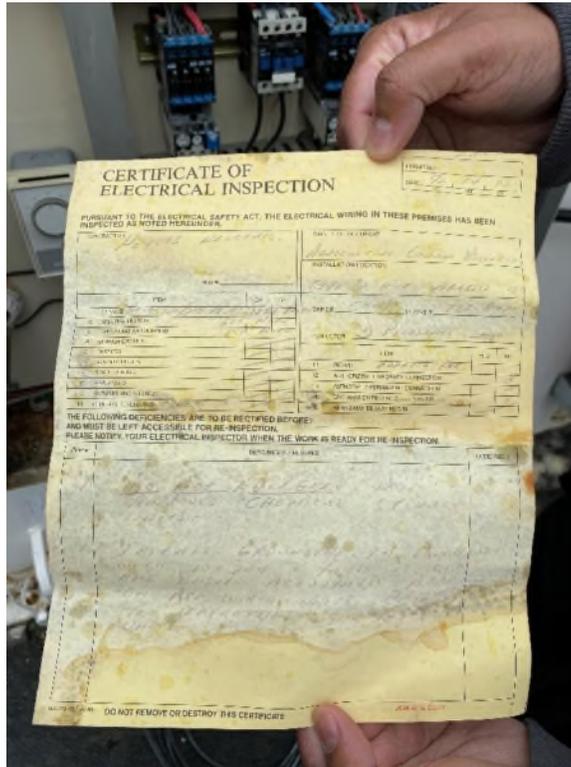












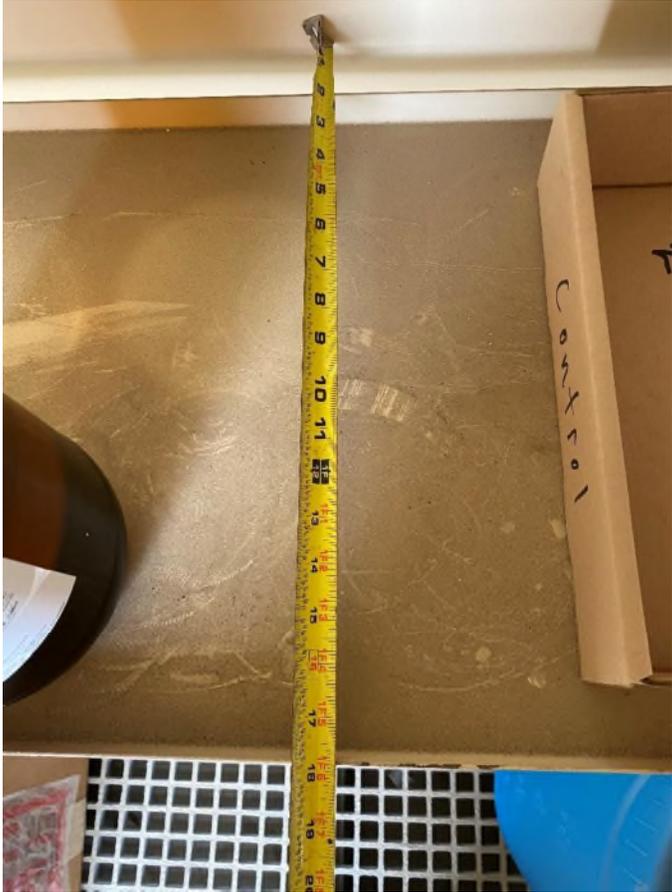








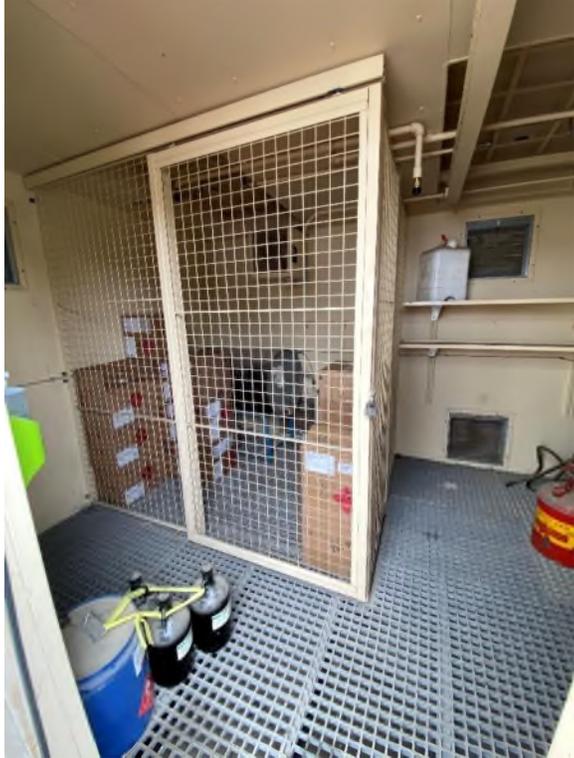
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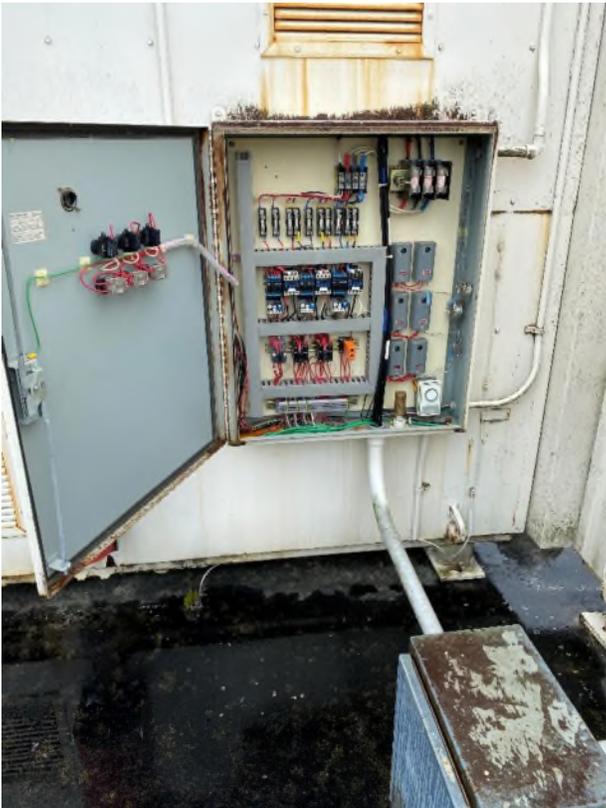
SITE PHOTOS

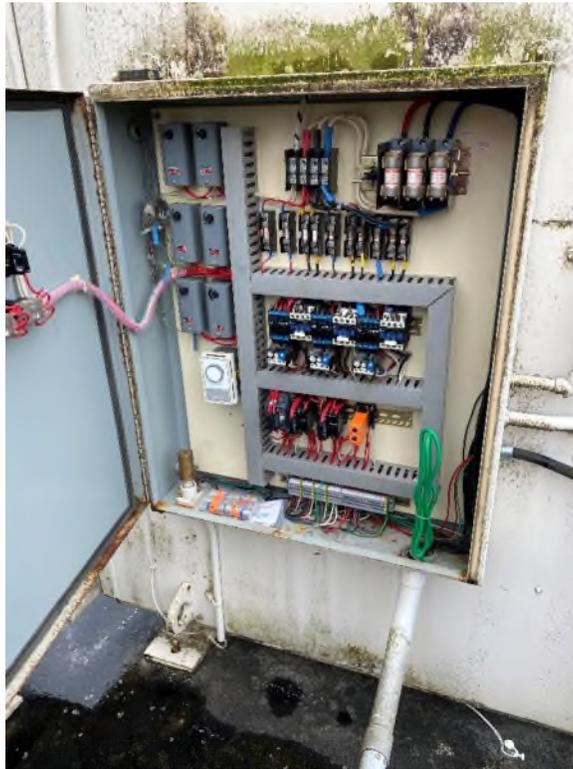


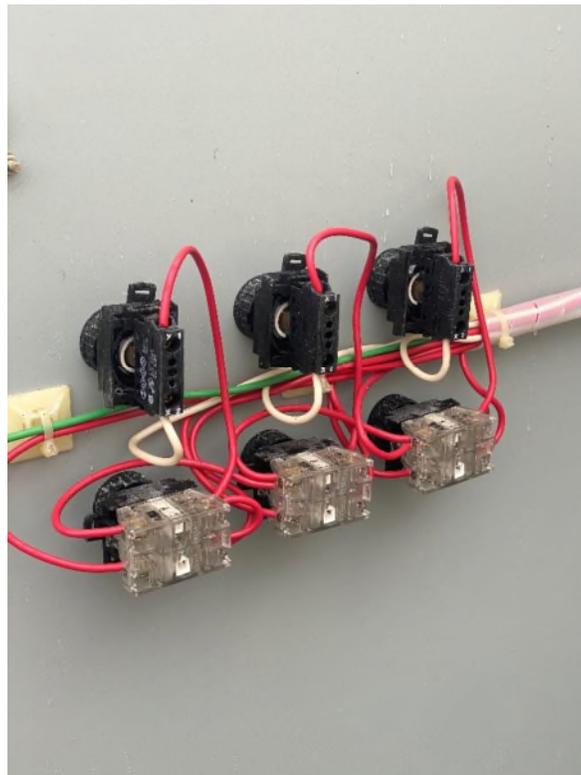
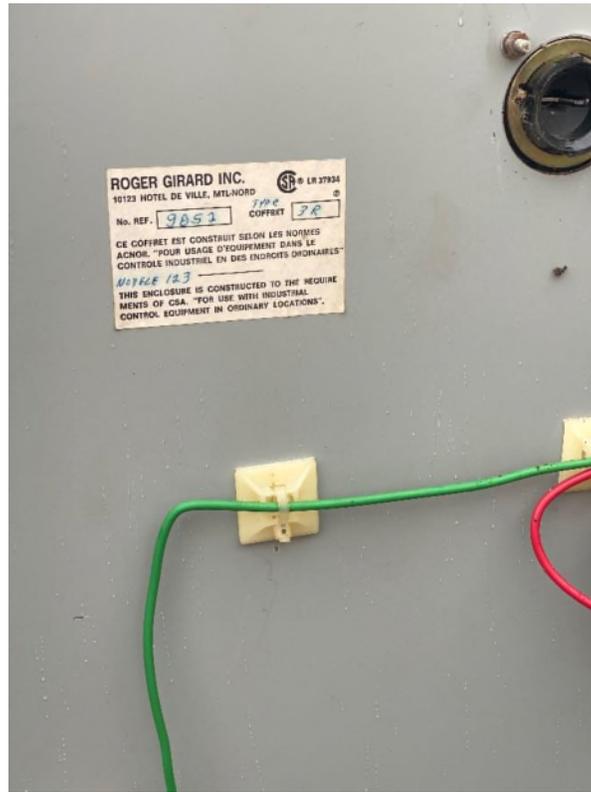


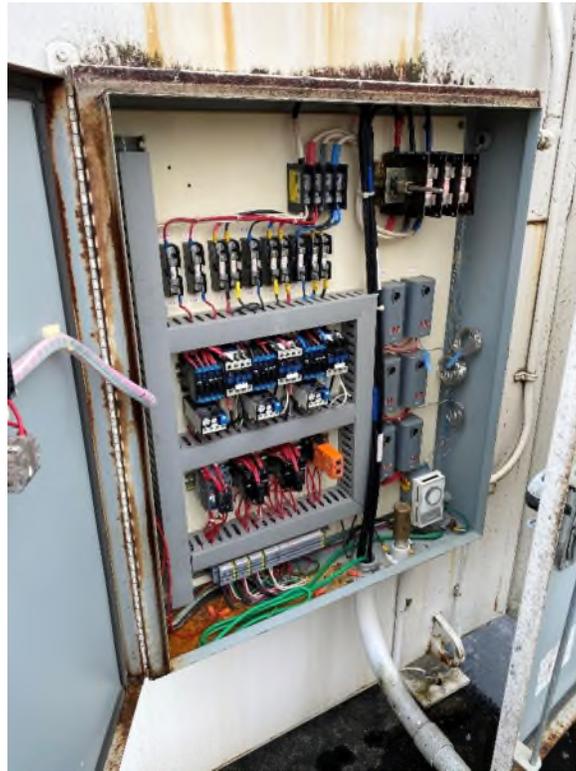












SITE PHOTOS





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**RESEARCH AND DEVELOPMENT CENTRE AGASSIZ, BC
CHEMICAL STORAGE BUILDINGS REPLACEMENT**

APPENDIX 3

Guidance for Contractors Working in AAFC Buildings

Updated Guidance for Contractors Working in AAFC Buildings

- For the purposes of this document, the term Contractor will mean contractor, sub-contractor, consultants and sub-consultants. Contractors are responsible to ensure that all their hired sub-contractors also adhere to the requirements of this document.
- Prior to accessing AAFC building interiors, Contractors will hold a orientation meeting (tele or video conference) with AAFC Facility Manager and Project Manager, and the following will be agreed to in writing with the intent of maintain physical distancing:
 - Access/egress and material delivery door(s) for worksite.
 - Daily shift or specific occupancy times, including estimated number of personnel.
 - Construction or work zone limits.
 - Use of site: washrooms, drinking water, parking location, garbage and recycling disposal.
 - Protocol that whenever physical distancing cannot be achieved at the worksite, facial covering will be worn by all personnel involved (AAFC and Contractor).
- Contractors are to submit signed confirmation that they understand and will follow requirements set out in attached **COVID-19 Check List for Contractors Working in AAFC Buildings**.

COVID-19 Check List for Contractors Working in AAFC Buildings

Prior to beginning contracted work in an AAFC building, Contractors are to submit signed confirmation that they and their hired subcontractors agree to the following:

- Contractor will follow **Canadian Construction Association's COVID-19 – Standardized Protocols for All Canadian Construction Sites**. (<https://www.cca-acc.com/covid-19-resources/>)
- All contractor personnel will complete Government of Canada's online **COVID-19 Symptom Self Assessment Tool** each day prior to work shift and will not come to AAFC site if Tool advises or recommends to self-isolate, stay at home or seek medical attention. (<https://www.canada.ca/en/public-health/services/diseases/coronavirus-disease-covid-19.html>)
- Advise AAFC Representative as soon as possible if any of Contractor's personnel who have worked in an AAFC building begin to exhibit flu-like symptoms.
- All contractor and hired sub-contract personnel will follow local, provincial and federal public health guidance and requirements including that of **Public Health Agency of Canada (PHAC) for Coronavirus disease (COVID-19): Prevention and risk**. (<https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/prevention-risks.html?topic=tilelink>)
- While on AAFC property, all Contractor and sub-contractors will comply to all posted signage in AAFC buildings, or advise AAFC Representative immediately if unable to comply.

These above mentioned requirements will be complied while conducting work in AAFC buildings for the duration of the contract.

Signature of Contractor Representative

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**RESEARCH AND DEVELOPMENT CENTRE AGASSIZ, BC
CHEMICAL STORAGE BUILDINGS REPLACEMENT**

**APPENDIX 4
NFPA Rating Explanation Guide**



NFPA Rating Explanation Guide



HEALTH HAZARD

- 4 = Can be lethal
- 3 = Can cause serious or permanent injury
- 2 = Can cause temporary incapacitation or residual injury
- 1 = Can cause significant irritation
- 0 = No hazard

FLAMMABILITY HAZARD

- 4 = Will vaporize and readily burn at normal temperatures
- 3 = Can be ignited under almost all ambient temperatures
- 2 = Must be heated or high ambient temperature to burn
- 1 = Must be preheated before ignition can occur
- 0 = Will not burn

- ALK = Alkaline
- ACID = Acidic
- COR = Corrosive
- OX = Oxidizing
- = Radioactive
- = Reacts violently or explosively with water
- = Reacts violently or explosively with water and oxidizing

- 4 = May explode at normal temperatures and pressures
- 3 = May explode at high temperature or shock
- 2 = Violent chemical change at high temperatures or pressures
- 1 = Normally stable. High temperatures make unstable
- 0 = Stable

SPECIAL HAZARD

INSTABILITY HAZARD

This chart for reference only - For complete specifications consult the NFPA 704 Standard