



Public Works and Government Services Canada

Requisition No. EZ899-162813

MERX I.D. No. _____

SPECIFICATIONS for:

**The Gulf of Georgia Cannery
Building Envelope Remediation Phase 3
12138 Fourth Avenue, Richmond, BC V7E 3J1**

Project No. R.060702.001

APPROVED BY:

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Regional Manager, AES

2016-04-20
Date

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Regional Construction Safety Coordinator

2016-04-12
Date

TENDER:

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Project Manager

14/04/21
Date

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1 GENERAL

1.01 WORK DESCRIBED BY CONTRACT DOCUMENTS

- .1 The work of this contract comprises of the partial building envelope repair of the Gulf of Georgia Cannery, located at 12138 Fourth Avenue, Richmond BC.
- .2 Work to be performed under this Contract includes the following items covered further in the Contract documents:
 - .1 Temporary hoarding: the Contractor shall determine the need for and provide temporary hoarding to ensure safety of the general public and comply with safety authority requirements. The Owner does not require the installation of temporary hoarding.
 - .2 Review of testing reports provided with Contract documents. Based on findings of testing reports provided with Contract documents: Contractor to determine if lead abatement procedure is required.
 - .3 Prepare & paint the artifacts listed below. Contractor to manage odor and mitigate impact of smell from surface preparation and repainting on surrounding Gulf of Georgia Cannery museum site & surrounding businesses. The use of power tools is not permitted for paint removal. Existing coatings are to be removed to expose bare metal. Refer to BE1.0 – Site and Roof Plan, Aerial View and Painting Schedule for approximate locations of artifacts:
 - .1 Stinkeroo - structural steel replacement, new concrete footing and repainting (Item 9 on Drawing BE1.0):
 - .1 Localized replacement of severely corroded columns. Refer to Structural drawings & structural technical specifications.
 - .2 Installation of new concrete footing as indicated in structural drawings and structural technical specifications.
 - .3 Repair corroded Stinkeroo components: lowest ring of Stinkeroo body and brackets at top of columns. Refer to Structural drawings and structural technical specifications.
 - .4 Prepare surface & repaint Stinkeroo, adjoining structural steel components, and accessory pieces of the Stinkeroo (including but not limited to: ladders, latches and platforms). Refer to 09 91 00 – Painting. New paint to match existing.
 - .5 Remove existing concrete topping.
 - .6 Temporarily remove existing chain link fence and store for future reinstallation.
 - .7 Locally excavate as required to install new concrete footing.
 - .8 Make good all adjacent hard surfaces including pavers and asphalt as indicated.
 - .9 Reinstall existing chain link fence. Install new portion of chain link fence at the south side of the Stinkeroo.
 - .2 Fish Oil Tanks, Pipes & Valves – structural upgrades and repainting (Item 4 on Drawing BE1.0):
 - .1 Install new heavy timber cross bracing and metal fabrications as indicated in structural drawings & structural technical specifications.
 - .2 Review colour scheme of pipes and valves with Departmental Representative.
 - .3 Document existing markings on sides of Fish Oil Tanks to be repainted. Location, text size, and line weights of existing marks are to match the existing condition.

- .4 Prepare surface & repaint Fish Oil Tanks, pipes and valves, including markings on the sides of Fish Oil Tanks.
- .3 Barometric Condenser – Repainting & Guy Wire Review (Item 1 on Drawing BE1.0):
 - .1 Prepare surfaces & repaint Barometric Condenser assembly, and adjoining components including (but not limited to): supporting structural steel frame and adjoining pipes.
 - .2 Review guy wires with Structural Engineer per item 1.01.3.6 – Guy Wires. Report corrosion or adverse existing conditions to the Consultant.
- .4 Ice Machine – Repainting and Relocation (Item 2 on Drawing BE1.0):
 - .1 Prepare surfaces & repaint Ice Machine & associated components. Work includes (but is not limited to) the following components of the Ice Machine: “Ice Machine Flywheel Piston Armatures, Ice Machine Flywheels, Drive Motor and Sheave. Refer to 09 91 00 – Painting.
 - .2 Install new concrete pad at northeast corner of Gulf of Georgia Cannery parking lot, as indicated on drawing 2 – Aerial View of sheet BE1.0 Site and Roof Plan, Aerial View and Painting Schedule. Refer to structural drawings and technical specifications for concrete pad design.
 - .3 Relocate Ice Machine to northeast corner of Gulf of Georgia Cannery parking lot as indicated in BE1.0 – Site and Roof Plan, Aerial View and Painting Schedule.
 - .4 Balance of Ice Machine components to be moved into Dryer Shed as directed by the Owners.
 - .5 Install new rope fence as indicated on BE2.0 – Photos and Ice Machine Display Base.
 - .6 Remove existing Open Air Storage Shed and discard. Remove existing slab on grade at current location of Open Air Storage Shed. Coordinate repair of hard surfaces at current location of Open Air Storage Shed with hard new “Stinkeroo” footing.
- .5 Three Separator Vent Stacks (Item 5 on Drawing BE1.0), Dryer Shed Exhaust Vent (Item 6 on Drawing BE1.0), Dryer Addition Exhaust Vent (Item 3 on Drawing BE1.0), Two Tall Boiler Stacks (Item 7 on Drawing BE1.0) and Short Boiler Vent Stack (Item 8 on Drawing BE1.0):
 - .1 Review guy wires per item 1.01.3.6 – Guy Wires. Report corrosion or adverse existing conditions to the Consultant.
 - .2 Prepare surfaces & repaint Smoke Stacks, Stinkeroo Stack and Dryer Shed Stack. Refer to 09 91 00 – Painting. Refer to site plan for approximate locations.
- .6 Guy Wires:
 - .1 Contractor and Structural Engineer to review guy wires at Smoke Stacks and Barometric Condenser at time of construction. Report corrosion or adverse existing conditions to the Consultant.
- .7 Localized Repairs at Cedar Shingle Roofs:
 - .1 Targeted repairs of cedar shingle roofs and adjoining wall areas (where applicable): Refer to BE1.0 – Site and Roof Plan, Aerial View and Painting Schedule. Locally repair areas near leaks with cedar shingles and prefinished metal flashings.

- .3 Contractor shall take possession of the project area and be contractually responsible for all construction activities. Cooperate with Parks Canada in scheduling operations to minimize conflict and to facilitate usage.

1.02 TIME OF COMPLETION

- .1 Commence work upon notification of acceptance and complete work within eighteen (18) weeks.

1.03 MINIMUM STANDARDS

- .1 Work to conform to the minimum applicable standards of the Canadian General Standards Board, the Canadian Standards Association, the National Building Code of Canada 2010 (NBC) and applicable Provincial and Municipal codes. In the case of conflict or discrepancy, the most stringent requirement applies.
- .2 Work must be carried out in conformance to WorkSafe BC safety standards and requirements.
- .3 Meet or exceed requirements of Contract documents, specified standards, codes and referenced documents.

1.04 CONTRACT DOCUMENTS

- .1 The Contract documents, drawings and specifications are intended to complement each other, and to provide for and include everything necessary for the completion of the work. Drawings are, in general, diagrammatic and are intended to indicate the scope and general arrangement of the work. Drawings have been prepared in colour for clarity purposes and are intended to be printed in colour. Contractor is responsible for any misinterpretations caused as a result of printing in black and white.

1.05 DIVISION OF SPECIFICATIONS

- .1 The specifications are subdivided in accordance with the current 6-digit National Master Specifications System.
- .2 A division may consist of the work of more than one subcontractor. Responsibility for determining which subcontractor provides the labour, material, equipment and services required to complete the work rests solely with the Contractor.
- .3 In the event of discrepancies or conflicts when interpreting the drawings and specifications, the specifications govern.

1.06 TAXES

- .1 Pay all taxes properly levied by law (including Federal, Provincial and Municipal).

1.07 REGULATORY REQUIREMENTS

- .1 Building Permit is not required. Obtain and pay for - Certificates, Licenses and other permits required by regulatory municipal, provincial or federal authorities to complete the work.
- .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 authority having jurisdiction.

1.08 PROJECT MEETINGS

- .1 Contractor will schedule a project start-up meeting following notice of acceptance.
- .2 Agenda to include lines of communication, contact information, scheduling and coordination.
- .3 Subsequent meetings will be called as required.

1.09 CONTRACTOR'S USE OF SITE

- .1 Use of site:
 - .1 The Gulf of Georgia Cannery will remain an active National Historic Site. Parks Canada Western Region has control over the site. All activities and security controls must remain operational at all times unless otherwise indicated. Coordinate with the Departmental Representative for all activities that impact on-going operations.
 - .2 Be responsible that removed paint does not fall into the water below the Cannery.
 - .3 Work restrictions and security provisions will be enforced.
 - .4 Assume responsibility for assigned premises for laydown and storage areas as indicated and for performance of this work.
 - .5 Be responsible for coordination of all work activities on site, including the work of other contractors engaged by the Departmental Representative.
- .2 Perform work in accordance with Contract documents. Ensure work is carried out in accordance with indicated phasing.
- .3 Do not unreasonably encumber site with material or equipment.
- .4 Maintain scaffolding and hoarding throughout duration of work. Do not exceed areas indicated unless written approval by Departmental Representative is provided.
- .5 Execute work with least possible interference or disturbance to normal use. Make arrangements with Departmental Representative to facilitate work as stated.
- .6 Maintain existing services and provide for personnel, visitor and vehicle access.
- .7 Where security is reduced by work, provide temporary means to maintain security. Review measures with Departmental Representative before proceeding.

1.10 HOURS OF WORK

- .1 The Gulf of Georgia Cannery National Historic Site is operational for staff daily from 08:30 to 17:30 and to the public daily from 10:00 – 17:00.
 - .1 Access to the vicinity of the site is not restricted.
 - .2 Carry out work Monday to Friday 08:30 to 17:30 hours and Saturday, Sunday and statutory holidays 10:00 to 17:00 hours. Interior work must be carried out Monday to Friday 09:30 to 17:30 hours only or at times directed by the authorities having jurisdiction.
- .2 Hours of work :

- .1 Contractor may submit work schedule in cooperation with Departmental Representative.
- .2 Gulf of Georgia Cannery Summer Schedule: Work is to minimize disturbance on Friday summer events at the "Courtyard" space near "Fish Oil Tanks" (Item 4 on Drawing BE1.0) and "Barometric Condenser Stack and Steel Support Tower" (Item 1 on Drawing BE1.0) artifacts. Work at the above noted locations is not to commence until the day of July 18, 2016.
- .3 Notify Departmental Representative and seek approval of all after hours work, including weekends and holidays.

1.11 SECURITY

- .1 For Contractor access to building interior and for contractor access to exterior work after 17:30 hours, coordinate with and pay for the services of a commissionaire from the BC Commissionaires from the time of beginning work on site until substantial completion of the work. The contractor shall provide the Departmental Representative with an estimate of the total cost for that requirement after contract award at which time the Departmental Representative will then contract directly with Commissionaires BC for that work and pay for those costs directly accordingly since they will not work directly for the contractor. Upon completion of the contract work, a change order credit will be issued for the full cost of the Commissionaires so the contractor shall allow for that cost in their contract pricing. Contractor can refer to the following web site as a reference:
<http://www.commissionaires.bc.ca>
- .2 Provide required service for any security to contractor's forces for further works to be done between substantial and final completion.

1.12 NON SMOKING ENVIRONMENT

- .1 Smoking is not permitted on site.

1.13 WORK SCHEDULE

- .1 Provide detailed project schedule (Gantt Bar Chart) within 5 working days of Award of Contract date showing activity sequencing, interdependencies and duration estimates. Include listed activities as follows:
 - .1 Shop drawings.
 - .2 Samples.
 - .3 Approvals.
 - .4 Procurement.
 - .5 Construction.
 - .6 Installation.
 - .7 Site works.
 - .8 Testing.
 - .9 Acceptance.
- .2 Do not change approved schedule without notifying and receiving approval from 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.

- .4 Schedule Work in consultation with Departmental Representative to minimize impact on public use of facility during operating hours.

1.14 SUBMITTALS

- .1 Product Data: Manufacturers catalogue sheets, brochures, literature, performance charts and diagrams.
 - .1 Submit electronic copies of documentation.
 - .2 Delete information not applicable to project.
 - .3 Cross-reference product data information to applicable portion of Contract Documents.
- .2 Samples: examples of materials, equipment, quality, finishes and workmanship.
 - .1 Provide two samples of each material as indicated in technical sections.
 - .2 Where colour, pattern or texture is criterion, submit full range of samples.
 - .3 Reviewed and accepted samples will become standard of workmanship and material against which installed work will be verified.
- .3 Shop Drawings:
 - .1 Submit electronic copies of all shop drawings to include:
 - .1 Date.
 - .2 Project Title and number.
 - .3 Name and address of Subcontractor, Supplier and Manufacturer.
 - .4 Fabrication.
 - .5 Key plan and layout, showing dimensions, including identified field dimensions and clearances.
 - .6 Setting or erection details.
 - .7 Relationship to adjacent work.
 - .8 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .9 Revised shop drawing submissions to be bubbled identifying revisions.
 - .2 Submit drawings stamped and signed by professional engineer registered and licensed in the Province of British Columbia as indicated.

1.15 COST BREAKDOWN

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

1.16 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy each document as follows:
 - .1 Contract Drawings.
 - .2 Contract Specifications.
 - .3 Addenda to Contract Documents.
 - .4 Copy of approved work schedule.
 - .5 Environmental Protection Plan.
 - .6 Reviewed and approved Shop Drawings.
 - .7 List of Outstanding Shop Drawings.
 - .8 Change Orders.
 - .9 Other Modifications to Contract.
 - .10 Field Test Reports.
 - .11 Reviewed and approved samples.

- .12 Copy of Approved Work Schedule.
- .13 Manufacturer's installation and application instructions.
- .14 National Building Code, 2010.
- .15 Health and Safety Plan and Other Safety Related Documents.
- .16 Other documents as specified.

1.17 HEALTH, SAFETY AND HAZARDOUS MATERIALS

- .1 Comply with Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
- .2 Comply with British Columbia Workers Compensation Act.
- .3 Perform duties in accordance with the British Columbia Occupational Health and Safety Regulation.
- .4 Submit copies of WCB Clearance Letter and WCB Contractor Rating. Submit copy of Final WCB Clearance Letter at completion of project.
- .5 Submit letter stating that Contractor assumes the role of Prime Contractor for the purposes of site safety responsibility and the Workers Compensation Act.
- .6 Submit copies of work site health and safety meeting minutes, inspection reports, reports or directions issued by Federal, Provincial or Municipal health and safety inspectors, incident and accident reports, and follow-up reports.
- .7 Work at site may involve contact with PCB and lead-containing paint. Take appropriate precautions.
- .8 Notify the Departmental Representative 48 hours for access to interior work and advise if work involves hazardous substances (Canada Labour Code, Part II, Section 10) or caulking.
- .9 Ensure fire code requirements are continued to be met during the course of construction. Ensure emergency exits from the building, exterior emergency egress paths, or access areas for emergency vehicles are not restricted.

1.18 EXAMINATION

- .1 Examine site and be familiar and conversant with existing conditions likely to affect work.
- .2 Provide photographs of surrounding objects and structures liable to be damaged or be the subject of subsequent claims (photographs not to include staff on duty).

1.19 EXISTING SERVICES

- .1 Where work involves breaking into or connecting to existing services, carry out work at times directed by the authorities having jurisdiction.

1.20 LOCATION OF EQUIPMENT AND FIXTURES

- .1 Location of equipment indicated or specified are to be considered as approximate.
- .2 Locate equipment 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.

1.21 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.

1.22 ACCEPTANCE OF SUBSTRATES

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

1.23 QUALITY OF WORK

- .1 Remedial Work:
 - .1 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of work.
 - .2 Perform remedial work required to repair or replace part or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.
- .2 Ensure that quality workmanship is performed through use of skilled and experienced tradesmen, under supervision of qualified journeyman.
- .3 The workmanship, erection methods and procedures to meet minimum standards set out in the National Building Code Construction Standards.
- .4 In cases of dispute, decisions as to standard or quality of work rest solely with the Departmental Representative whose decision is final.

1.24 WORKS COORDINATION

- .1 Coordinate work of subtrades:
 - .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 or near to building structural elements, including existing roof.
 - .2 Identify on coordination drawings, building elements and interface requirements.

- .3 Facilitate meeting and review coordination drawings. Ensure subcontractors agree and sign off on drawings.
- .4 Publish minutes of each meeting.
- .5 Submit copy of coordination drawings and meeting minutes to Departmental Representative for information purposes.

- .3 Submit shop drawings and of 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 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, 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. Full-time site superintendent required throughout project.

1.25 APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- .1 In accordance with Section 01 33 00 - Submittals Procedures, 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 technical sections.

1.26 TESTING AND INSPECTIONS

- .1 Particular requirements for inspection and testing to be carried out by testing service or laboratory approved by the Departmental Representative.

- .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.
 - .1 Mill tests and certificates of compliance.
 - .2 MPI Painting Inspections.
 - .3 Tests specified to be carried out by Contractor under the Departmental Representative's supervision.

- .3 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.

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

1.27 AS-BUILT DOCUMENTS

- .1 The Departmental Representative will provide 2 sets of drawings, 2 sets of specifications, for "as-built" purposes.
- .2 As 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.

1.28 CLEANING

- .1 Daily conduct cleaning and disposal operations. Comply with local ordinances and anti-pollution laws.
- .2 Ensure cleanup of the work areas each day after completion of work.
- .3 In preparation for interim and final inspections:
 - .1 Examine all sight-exposed exterior surfaced and concealed spaces.
 - .2 Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed exterior finished surfaces, including glass.
- .4 Use cleaning materials and methods in accordance with instructions of the manufacturer of the surface to be cleaned.

1.29 CONTROL

- .1 Existing Structure:
 - .1 The existing structures are part of this National Historic Site. The Contractor and sub trade personnel shall pay utmost attention to the preservation of all existing items on this site at all times during remediation work. Prior to the commencement of this project, the Contractor shall submit to the Departmental Representative a list of all proposed protection measures for approval. This list must identify procedures for the protection of adjacent building materials and elements to prevent accidental damage to this national historic site for the duration of the project.
- .2 Provide temporary dust tight screens and/or partitions to localize dust generating activities, and for protection of workers, finished areas of work and public. Precautionary measure shall be taken for potential source of Lead and Arsenic dust within the complex. Refer to Appendix 1, Appendix 2 and Appendix 3.

- .3 Protect work area with scaffolding structure for work with weather-tight polyethylene film during construction.
- .4 Maintain and relocate protection until work is complete.

1.30 PUBLIC WAY CONSTRUCTION

- .1 Design, erect and maintain hoarding and covered pedestrian walkways to support all loads including windloads and provide protection, complete with signs and electrical lighting as required by authority having jurisdiction and Departmental Representative.

1.31 RELICS AND ANTIQUITIES

- .1 Relics and antiquities and items of historical or scientific interest shall remain property of Department. Protect such articles and request directives from Departmental Representative.
- .2 Give immediate notice to Departmental Representative if evidence of historical or archeological finds are encountered during remediation work and await Departmental Representative's written instructions before proceeding with work in this area.

1.32 ENVIRONMENTAL PROTECTION

- .1 Contractor is responsible for environmental protection during all construction activities at all locations work is performed.
- .2 Ensure removed paint, debris and paint overspray does not fall into the Fraser River under the Cannery Pier in accordance with applicable legislation.
- .3 Prevent extraneous materials from contaminating air beyond construction area, by providing temporary extensions to Mechanical intake louvres during work.
- .4 Environmental degradation arising from construction activities shall be prevented, abated, controlled and minimized by complying with all applicable federal, provincial and local laws and regulations concerning environmental pollution control and abatement.
- .5 Do not dispose of waste or volatile materials into water courses, storm or sanitary sewers. Construction methods shall be employed to ensure no fuels, oils, wood preservatives or other contaminants enter the Fraser River. As general Mitigation Measures for this project, it must be enforced and closely supervised and monitored as follows:
 - .1 All contractors and work crews must be briefed upon the importance of adhering to prescribed best practices or mitigation measures. Project meeting prior to commencement of the work shall indicate the above requirements have been fully explained to the contractor and staff.
 - .2 A copy of the mitigation measures shall be posted in a conspicuous location on site or readily accessible for reference.
 - .3 Conduct work in a manner which clearly separates visitors from the active construction area on site to minimize potential accidents for public safety.
 - .4 Contractor and sub trade personnel must develop and maintain spill response and reporting procedures including containment methods. In the event of a spill, contact the Provincial Emergency Program at 1-800-663-3456.

- .5 The Contractor is to have personnel on site that are trained and ready to use spill containment kits. Ensure proper disposal procedures in accordance with all applicable provincial and municipal regulations. Fires and burning of rubbish on site is not permitted.
- .6 The Contractor must have all spill containment kits ready for immediate deployment, containing sufficient quantities of absorbent materials on site in close proximity to working machinery and equipment such as fuel portable generator, air compressors, hoist and tools.
- .7 Ensure all equipment used on site is clean and free from contaminants.
- .6 Ensure proper disposal procedures in accordance with all applicable provincial regulations.

1.33 MAINTENANCE MATERIALS, SPECIAL TOOLS AND SPARE PARTS

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

1.34 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 plans referred to in the Contract documents.
- .2 Upon request, Departmental Representative may furnish up to a maximum of 5 sets of Contract documents for use by the Contractor at no additional cost. Should more than 5 sets of documents be required the Departmental Representative will provide them at additional cost.

1.35 SYSTEM OF MEASUREMENT

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

1.36 SUBMISSION OF TENDER

- .1 Submission of a tender is deemed to be confirmation of the fact that the Tenderer has analyzed the Contract documents and inspected the site, and is fully conversant with all conditions.

2 PRODUCTS

2.01 NOT USED

- .1 Not used.

3 EXECUTION

3.01 NOT USED

- .1 Not used.

END OF SECTION

1 GENERAL

1.01 ACCESS AND EGRESS

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

1.02 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 building and provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security as approved by Departmental Representative.
- .4 Washroom facilities are available at the free-standing public washroom building located by the main entry.
- .5 Elevators are not permitted for Contractor use.
- .6 Closures: protect work temporarily until permanent enclosures are completed.

1.03 HOURS OF WORK

- .1 The Cannery is operational daily from 08:30 to 17:30 for staff and from 10:00 to 17:00 for the public. Contractor may set his own schedule of work onsite, within restrictions specified. Submit proposed hours-of-work to Departmental Representative for review and approval with Work in accordance with Section 01 11 55 – General Instructions.
- .2 Disruptive construction noise and operations to be executed before 11:00 daily.
- .3 Contractor must give Departmental Representative 48 hours notice of construction activity requiring access to the interior of the buildings.
 - .1 Workers must notify reception desk at time of entry and at time of departure of interior work.

1.04 ALTERATIONS AND REPAIRS TO EXISTING BUILDING

- .1 Execute work with least possible interference or disturbance to building operations occupants, public and normal use of premises.
- .2 Maintain existing services and abide by regulations for personnel and vehicle access.
- .3 Closures: protect work temporarily, including where window sashes temporarily until project is complete.

- .4 Any work which impacts the operations onsite must have one (1) week notice and must be approved by Departmental Representative. Five (5) visitor parking passes, valid for duration of the work will be allocated to the Contractor for the visitor's parking lot. Work truck will be allowed to be located in the Contractor's laydown area where indicated. Additional parking will be permitted where directed by Departmental Representative. Do not occupy any other parking areas without the approval of the Departmental Representative.
- .5 Construction crews are not permitted to use washrooms in the main building. Refer to Section 01 51 00 – Temporary Utilities.

1.05 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 one (1) week notice for permission. The maximum number of shut-down periods, is limited to four (4) for duration of the project.
- .3 Provide for personnel and pedestrian traffic.
- .4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- .5 Contractor will be held responsible for damages to facility equipment as the result of service shut-downs.
- .6 Contractor will be held responsible for unscheduled shut-downs of building utilities and services.
- .7 Contractor will not be allowed to connect to Owner's existing data and communication services for his own use.

1.06 SPECIAL REQUIREMENTS

- .1 Security Cameras:
 - .1 Security cameras to remain operational. Cameras requiring temporary relocation to be serviced as directed by Departmental Representative.
- .2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .3 Keep within limits of work and avenues of ingress and egress. Respect properties adjacent to work site, providing continued access for public vehicular and pedestrian traffic.
- .4 Noise Generation:
 - .1 Means and procedures of controlling and isolating other excessive or disturbing noise and vibration affecting occupied areas shall be the responsibility of the Contractor and approved by the Departmental Representative.

1.07 SECURITY

- .1 Be accountable for tools/equipment at all times. Do not leave tools unattended and/or within reach of the travelling public.

.2 Act professionally at all times. No foul language or rude behavior.

.3 Do not interact with the public, unless authorized to do so where required.

1.08 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not permitted on the site.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 ADMINISTRATIVE

- .1 Contractor will arrange pre-construction project meeting.
- .2 Contractor to assume responsibility for setting meeting times and recording and distributing meeting minutes. Contractor to attend project meetings throughout the progress of the work and at the call of Departmental Representative.
- .3 Contractor to provide physical space and make arrangements for progress meetings.
- .4 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.02 PRECONSTRUCTION MEETING

- .1 Contractor will:
 - .1 Within ten (10) days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
 - .2 Departmental Representative, Contractor, major Subcontractors, field reviewers and supervisors will be in attendance.
 - .3 Establish time and location of meeting and notify parties concerned minimum five (5) days before meeting.
 - .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5 Provide Agenda, to include:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Schedule of Work: in accordance with Section 01 11 55 – General Instructions – Bar (Gantt) Chart.
 - .3 Schedule of submission of shop drawings and samples. 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 52 00 - Construction Facilities.
 - .5 Delivery schedule of specified equipment.
 - .6 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
 - .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
 - .8 Record drawings in accordance with Section 01 78 00 - Closeout Submittals.
 - .9 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
 - .10 Monthly progress claims, administrative procedures, photographs, hold backs.
 - .11 Appointment of inspection firms.
 - .12 Insurances, transcript of policies.

1.03 PROGRESS MEETINGS

- .1 Contractor will:
 - .1 During course of Work and up to project completion, schedule progress meetings every two weeks. Additional meetings will be scheduled to resolve extraordinary issues as required.

- .2 Contractor, major Subcontractors involved in Work and Departmental Representative are to be in attendance.
- .3 Notify parties minimum three (3) days prior to meetings.
- .4 Contractor will record minutes of progress meetings and circulate to attending parties and affected parties not in attendance.
- .5 Provide Agenda. Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule.
 - .5 Review of off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revision to construction schedule.
 - .8 Progress schedule, during succeeding work period.
 - .9 Review submittal schedules: expedite as required.
 - .10 Maintenance of quality standards.
 - .11 Review proposed changes for affect on construction schedule and on completion date.
 - .12 Other business.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 07 92 00 – Joint Sealants.
- .2 Section 09 91 00 – Painting.

1.02 APPROVALS

- .1 Approval of shop drawings: refer to Section 01 11 55 – General Instructions.

1.03 ADMINISTRATIVE

- .1 This Section specifies the general requirements and procedures for the Contractor's submissions of shop drawings, product data, samples and other requested submittals to Departmental Representative for review. Additional specific requirements for submissions are specified in individual technical sections.
- .2 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .3 Where items or information is not produced in SI Metric units converted values are acceptable.
- .4 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .5 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .6 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review unless Departmental Representative gives written acceptance of specific deviations.
- .7 Make any changes in submissions which Departmental Representative may require consistent with Contract documents and resubmit as directed by Departmental Representative.
- .8 Notify Departmental Representative in writing, when resubmitting, of any revisions other than those requested by Departmental Representative.
- .9 Do not proceed with work or order construction materials or products until relevant submissions are reviewed and approved by the Departmental Representative.
- .10 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 coordinated 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.**
- .11 Verify field measurements and affected adjacent Work are coordinated.
- .12 Keep one reviewed copy of each submission on site.

1.04 SUBMISSION REQUIREMENTS

- .1 Coordinate each submission with the requirements of the work and the Contract documents. Individual submissions will not be reviewed until all related information is available.
- .2 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.
- .3 Submissions shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative, certifying approval of submissions, verification of field measurements and compliance with Contract documents. **Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.**
 - .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 Relationship to adjacent work.
- .4 After Departmental Representative's review, distribute copies. Keep one reviewed copy of each submission on site.

1.05 SHOP DRAWINGS

- .1 Shop drawings: original drawings or modified standard drawings, diagrams, illustrations, schedules, performance charts, brochures or other data provided by Contractor to illustrate details of portions of work which are specific to project requirements.
 - .1 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. Provide cross references to drawings and specifications.
- .2 Submit electronic drawings for each requirement requested in technical specification sections and as requested by Departmental Representative. Cross- reference shop drawing information to applicable portions of the Contract documents.

- .3 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.
- .4 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.
- .5 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, project number and address.
- .6 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.
- .7 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .8 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .9 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .10 Delete information not applicable to project.
- .11 Supplement standard information to provide details applicable to project.

1.06 SHOP DRAWING REVIEW

- .1 Review of shop drawings by the Departmental Representative is for the sole purpose of ascertaining conformance with the general concept.
- .2 Allow seven (7) business days for Departmental Representative's review of each submission.
- .3 This review shall not mean that the Departmental Representative approves the detail design inherent in the shop drawings, responsibility for which shall remain with Contractor submitting same.
- .4 This review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the construction and Contract documents.

- .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 ordering materials or Work.
- .6 Make changes in shop drawings by Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested. All revisions to be clearly clouded.
- .7 Without restricting the generality of the foregoing, the Contractor is responsible for:
 - .1 Dimensions to be confirmed and correlated at the job site.
 - .2 Information that pertains solely to fabrication processes or to techniques of construction and installation.
 - .3 Coordination of the work and all sub-trades.
- .8 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, electronic copy will be returned and ordering, fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings with bubbled changes, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .9 Shop drawings to incorporate applicable key plan, plan, elevations and details for all work submitted. No materials to be ordered and no work to be fabricated shall be undertaken until shop drawings and other related submittals are reviewed.

1.07 PRODUCT DATA

- .1 Product data: manufacturers' catalogue sheets, MSDS sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products or any other specified information.
- .2 Delete information not applicable to project.
- .3 Supplement standard information to provide details applicable to project.
- .4 Cross-reference product data information to applicable portions of Contract documents.
- .5 Submit electronic copies of product data.

1.08 SAMPLES

- .1 Submit for review samples in duplicate as requested in individual technical specification Sections. Label samples with origin and intended use. One sample will be returned with Shop Drawing Review.
- .2 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .3 Where colour, pattern or texture is criterion, submit full range of samples.
- .4 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 ordering materials or proceeding with Work.
- .5 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

1.09 MOCK-UPS

- .1 Erect mock-ups where directed by Departmental Representative and in accordance with Section 01 45 00 - Quality Control. Upon acceptance by Departmental Representative, mock-up may remain.

1.10 PROGRESS SCHEDULE

- .1 Submit work schedule and cost breakdown in accordance with Section 01 11 55 – General Instructions.

1.11 INSPECTION REPORTS

- .1 Submit in electronic test results and inspection reports where indicated.

1.12 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, building name and elevation with date of exposure indicated.
- .3 Number of viewpoints: 4 locations.
 - .1 Viewpoints and their location as determined by Departmental Representative.
- .4 Frequency of photographic documentation: as directed by Departmental Representative.
 - .1 Before concealment of Work and as directed by Departmental Representative.

1.13 CERTIFICATES AND TRANSCRIPTS

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

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

1 GENERAL

1.01 REFERENCES

- .1 Government of Canada
 - .1 Canada Labour Code, Part 2 Canada Occupational Safety and Health Regulations.
 - .2 Canada Occupational Health and Safety Regulations.
- .2 National Building Code of Canada (NBC) 2010
 - .1 Part 8 – Safety Measures at Construction and Demolition Sites.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .4 Province of British Columbia
 - .1 Workers Compensation Act Part 3 – Occupational Health and Safety, RSBC 1996 – Current Edition.
- .5 Canadian Standards Association (CSA) as amended:
 - .1 CSA Z797-2009 Code of Practice for Access Scaffold.
 - .2 CSA S269.1-1975 (R2003) Falsework for Construction Purposes.
 - .3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures.
- .6 American National Standards Institute (ANSI):
 - .1 ANSI A10.3 Operations – Safety Requirements for Powder-Actuated Fastening Systems.

1.02 RELATED SECTIONS

- .1 Section 02 41 99 – Demolition for Minor Works.
- .2 Section 02 83 10 – Lead Base Paint Abatement – Minimum Precautions.
- .3 Section 07 92 00 – Joint Sealants.
- .4 Section 09 91 00 – Painting.

1.03 WORKER'S 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.

1.04 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.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit to Departmental Representative, submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Work affected by submittal shall not proceed until review is complete.
- .3 Submit the following:
 - .1 Health and Safety Plan.
 - .2 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.
 - .3 Copies of incident and accident reports.
 - .4 Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
 - .5 Emergency Procedures.
- .4 The Departmental Representative will review Contractor's site-specific Health and Safety Plan and emergency procedures and provide comments to Contractor within seven (7) business days after receipt of plan. Revise 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 and resubmission of the Health and Safety Plan 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.

1.06 RESPONSIBILITY

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

1.07 HEALTH AND SAFETY CO-ORDINATOR

- .1 The Health and Safety Coordinator/Registered Occupational Hygienist/Certified Industrial Specified Hygienist must:

- .1 Be responsible for completing all health and safety training sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
- .2 Be responsible for implementing, enforcing daily and monitoring site-specific Health and Safety Plan.
- .3 Be on site during execution of Work.

1.08 GENERAL CONDITIONS

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

1.09 PROJECT/SITE CONDITIONS

- .1 Work at site will involve:
 - .1 Parks Canada.
 - .2 Departmental Representative.
 - .3 Work on a National Historic Building.
 - .4 Working over water with tides (with scaffolding over open water adjacent to fire access lane).
 - .5 Working at heights reaching approximately 10 metres.
 - .6 Lead containing paint abatement as indicated in Appendix 1, 2 and 3.

1.10 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.

1.11 WORK PERMITS

- .1 Obtain and pay for specialty permits related to project before start of work.

1.12 FILING OF NOTICE

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

1.13 HEALTH AND SAFETY PLAN

- .1 Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.

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

1.14 EMERGENCY PROCEDURES

- .1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e. names/telephone numbers) of:
 - .1 Designated personnel from own company.
 - .2 Regulatory agencies applicable to work and as per legislated regulations.
 - .3 Local emergency resources.
 - .4 Departmental Representative site staff.
- .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 which may be affected if the risk extends beyond the workplace.

- .6 Notify Departmental Representative site staff.
- .3 Provide written rescue/evacuation procedures as required for, but not limited to:
 - .1 Work at high angles.
 - .2 Work with hazardous substances.
- .4 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.

1.15 HAZARDOUS PRODUCTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.
- .2 Where use of hazardous and toxic products cannot be avoided:
 - .1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as per Section 01 33 00 - Submittal Procedures.
 - .2 In conjunction with Departmental Representative, schedule to carry out work during "off hours" when tenants have left the building.
 - .3 Provide adequate means of ventilation in accordance with Section 01 51 00 - Temporary Utilities.

1.16 ELECTRICAL SAFETY REQUIREMENTS

- .1 Comply with authorities.
 - .1 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.

1.17 OVERLOADING

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

1.18 FALSEWORK

- .1 Design and construct falsework in accordance with CSA S269.1.

1.19 SCAFFOLDING

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

1.20 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.

1.21 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, Departmental Representative resulting from false alarms.

1.22 UNFORESEEN HAZARDS

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

1.23 POSTED DOCUMENTS

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

1.24 MEETINGS

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

1.25 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.

- .3 The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time. The General Contractor/subcontractors will be responsible for any costs arising from such a "stop work order".

2 PRODUCTS

2.01 NOT USED

- .1 Not used.

3 EXECUTION

3.01 NOT USED

- .1 Not used.

END OF SECTION

1 GENERAL

1.01 RELATED SECTIONS

- .1 Section 02 41 99 – Demolition for Minor Works.
- .2 Section 02 83 10 - Lead Base Paint Abatement – Minimum Precautions.
- .3 Section 09 91 00 – Painting.

1.02 REFERENCES

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

1.03 ADMINISTRATIVE REQUIREMENTS

- .1 Convene start-up meeting prior to beginning work with contractor's representative and Departmental Representative to:
 - 1. Verify Environmental Protection Plan and conformance requirements to municipal, provincial and federal regulations.

1.04 ACTION AND INFORMATIONAL SUBMITTALS

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

- .5 Drawings showing locations of proposed temporary scaffolding over water crossings, material storage areas, structures, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
- .6 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Ensure plan includes measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.
- .7 Pollution Control Plan:
 - .1 Including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
 - .2 Identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
 - .3 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
 - .4 Air pollution control plan detailing provisions to assure that dust, paint overspray, debris, materials, and trash, are contained on project site.
 - .5 Name of individual who will be responsible for implementing and supervising the spill containment and cleanup.
 - .6 Training requirements for Contractor's personnel and methods of accomplishing the training.
- .8 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

1.05 FIRES

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

1.06 DRAINAGE

- .1 Do not allow water containing suspended materials to into waterways, sewer or drainage systems.
- .2 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.07 WORK ADJACENT TO WATERWAYS

- .1 Construction equipment to be operated on land only.
- .2 Do not use waterway beds.
- .3 Waterways to be free of excavated fill, waste material and debris.
- .4 Design and construct temporary crossings to minimize erosion to waterways.
- .5 Do not skid construction materials across waterways.

1.08 POLLUTION CONTROL

- .1 Contractor and sub trade personnel must develop and maintain spill response and reporting procedures including containment methods.

- .2 In the event of a spill, Contractor shall immediately contain and assess the spill, provide appropriate notifications and take the necessary steps to prevent further discharge. Notifications shall include contacting the Provincial Emergency Program at 1-800-663-3456 and the Departmental Representative.
- .3 The Contractor must have spill containment kits ready for immediate deployment, containing sufficient quantities of absorbent materials on site in close proximity to work area including working machinery and equipment such as fuel portable generator, air compressors, hoist and tools.
- .4 The Contractor is to have personnel on site that are trained and ready to use spill containment kits. Ensure proper disposal procedures in accordance with all applicable provincial and municipal regulations. Fires and burning of rubbish on site is not permitted.
- .5 Contractor is responsible for immediate clean up of the spill and restoration of the area to the satisfaction of the Departmental Representative and other regulatory agencies, where involved.
- .6 Ensure all equipment used on site is clean and free from contaminants. Materials and equipment shall be regularly inspected, maintained, operated and stored in a manner that prevents deleterious substances (eg. Petroleum products, silt, etc.) from entering watercourse.
- .7 Ensure proper procedures in accordance with all applicable provincial regulations.
- .8 Ensure removed paint, debris and paint overspray does not fall into the Fraser River under the Cannery Pier in accordance with applicable legislation.
- .9 Control emissions from equipment to local authorities' emission requirements.
- .10 Prevent extraneous materials from contaminating air and waterways beyond application area. Provide temporary enclosures.

1.09 NOTIFICATION

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

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials and recycle or deposit at authority approved facilities.
- .3 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

END OF SECTION

1 GENERAL

1.01 REFERENCES AND CODES

- .1 Perform Work in accordance with National Building Code of Canada (NBC), 2010 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 Perform Work in accordance with WorkSafe BC current requirements and standards.
- .3 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.

1.02 HAZARDOUS MATERIAL DISCOVERY

- .1 Lead-containing Paint present. Take appropriate precautions in accordance with Section 02 83 10 – Lead Base Paint Abatement – Minimum Precautions.
- .2 PCB: Polychlorinated Biphenyl: may be present. Take appropriate precautions.
- .3 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Departmental Representative.

1.03 BUILDING SMOKING ENVIRONMENT

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

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 06 10 00 – Rough Carpentry.
- .2 Section 07 92 00 – Joint Sealants.
- .3 Section 09 91 10 – Painting.

1.02 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.

1.03 INDEPENDENT INSPECTION AGENCIES

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

1.04 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.

1.05 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.

1.06 REJECTED WORK

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

1.07 REPORTS

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

1.08 TESTS AND MIX DESIGNS

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

1.09 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in technical specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations acceptable and as approved by Departmental Representative.
- .3 Prepare mock-ups for Departmental Representative review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups 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.

.5 Mock-ups, when approved may remain as part of Work.

1.10 MILL TESTS

.1 Submit mill test certificates as required of specification Sections.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 REFERENCES

- .1 Canadian Standards Association (CSA) as amended:
 - .1 CAN/CSA Z321-96(R2001), Signs and Symbols for the Occupational Environment.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

1.03 ACCESS AND DELIVERY

- .1 Only designated entrance may be used for access to building. Confirm with Departmental Representative.
 - .1 Maintain for duration of Contract.
 - .2 Make good damage resulting from Contractor's use.
- .2 Use of facilities will be granted to the Contractor by reservation through the Departmental Representative.
 - .1 Limited parking is permitted as directed by Departmental Representative. Security has been instructed to have unauthorized vehicles towed at the Contractor's expense. Refer to Section 01 14 00 – Work Restrictions.

1.04 STORAGE FACILITIES

- .1 Storage space will be provided as directed by Departmental Representative.

1.05 WATER

- .1 Water supply is available at existing building and may be used for construction purposes at no cost.
 - .1 Hose bib locations for each building as directed by Departmental Representative.

1.06 POWER

- .1 Electrical power and lighting at existing buildings may be used for construction purposes at no extra cost, provided that warranties are not affected thereby and electrical components used for temporary power are replaced when damaged. Do not use emergency power or UPS panels for this purpose.
 - .1 Power located as directed by Departmental Representative.

1.07 HEATING AND VENTILATION

- .1 Do not begin work until arrangements have been made with the Departmental Representative for protection of heating, ventilating and air-conditioning (temporary removal of existing exterior vents or louvres).
 - .1 If there is any dirt or dust in the heating and ventilating system, it will be the Contractor's responsibility to return to its original state in accordance with the Departmental Representative's specifications.
- .2 Prevent dust and odour migration to occupied areas.
 - .1 Do not deactivate HVAC system.

1.08 TEMPORARY COMMUNICATION FACILITIES

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

1.09 SANITARY FACILITIES

- .1 Washroom facilities are available at the free-standing public washroom building located by the main entry.

1.10 SCAFFOLDING

- .1 Construct and maintain scaffolding in rigid, secure and safe manner in accordance with Section 01 52 00 – Construction Facilities and WorkSafe BC requirements.
- .2 Scaffolding to be erected independent of walls where possible. Remove promptly when no longer required. Remove fastenings from structure, if used and patch, sand and paint to match.

1.11 REMOVAL OF TEMPORARY FACILITIES

- .1 Remove temporary facilities from site when directed by the Departmental Representative.

1.12 SIGNS AND NOTICES

- .1 Signs and notices for safety and instruction are permitted and shall be in both official languages or graphic symbols conforming to CAN/CSA-Z321.
- .2 Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project or when directed by Departmental Representative.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED.

- .1 Not Used.

END OF SECTION

1 GENERAL

1.01 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-Z271-10, Safety Code for Suspended Platforms.
 - .2 CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

1.03 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 Indicate use of supplemental or other staging area.
- .3 Provide construction facilities in order to execute work expeditiously.
- .4 Remove from site all such work after use.

1.04 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA- Z271.
- .2 Provide and maintain scaffolding, ladders, platforms and temporary stairs.

1.05 BARRIERS AND ENCLOSURES

- .1 In accordance with Section 01 56 00 – Temporary Barriers and Enclosures and WorkSafe BC requirements.

1.06 ELEVATORS

- .1 Existing elevators not to be used by construction personnel and transporting of materials.

1.07 SITE STORAGE/LOADING

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.08 CONSTRUCTION PARKING

- .1 Limited parking will be permitted on site as directed by Departmental Representative. Provide for additional parking off site. Refer to 01 14 00 – Work Restrictions.
- .2 Provide and maintain adequate access to project site.

1.09 SECURITY

- .1 Provide and pay for responsible security personnel to guard contractor storage and laydown area after working hours and during holidays.

1.10 OFFICES

- .1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available location.

1.11 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

1.12 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.

1.13 PROTECTION AND MAINTENANCE OF TRAFFIC

- .1 Refer to Section 01 14 00 – Work Restrictions.
- .2 Provide access as necessary to maintain traffic.
- .3 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
- .4 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
- .5 Protect travelling public from damage to person and property.
- .6 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .7 Verify adequacy of existing roads and allowable load limit on these roads. Contractor responsible for repair of damage to roads caused by construction operations.
- .8 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .9 Dust control: adequate to ensure safe operation at all times.
- .10 Provide snow removal during period of Work when required.

1.14 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, where directed by Departmental Representative.
- .4 Stack stored new or salvaged material not in construction facilities.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED.

- .1 Not Used.

END OF SECTION



1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 02 41 99 – Demolition for Minor Works.
- .2 Section 02 83 10 – Lead Base Paint Abatement – Minimum Precautions.

1.02 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA-O121-08(R2013), Douglas Fir Plywood.

1.03 INSTALLATION AND REMOVAL

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

1.04 HOARDING

- .1 Erect temporary building envelope enclosures to protect wall assemblies from elements during Work.
- .2 Erect and maintain pedestrian walkways and exits including roof and side covers, complete with signs and electrical lighting as required by law.
- .3 Protect site from damage by equipment and construction procedures.

1.05 GUARD RAILS AND BARRICADES

- .1 Provide as required by governing authorities.

1.06 WEATHER ENCLOSURES

- .1 Provide weather tight closures to unfinished remediated wall assemblies and other openings in exterior walls including window sashes, vents, louvres and lighting.
- .2 Design enclosures to withstand wind pressure and snow loading.

1.07 DUST TIGHT SCREENS

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

1.08 ACCESS TO SITE

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

1.09 PUBLIC TRAFFIC FLOW

- .1 Provide and maintain barricades as required to perform Work and protect public.

1.10 FIRE ROUTES

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles, including the area between west elevation of Cannery Building and adjacent building.

1.11 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

1.12 PROTECTION OF BUILDING FINISHES

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

1.13 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 06 10 00 – Rough Carpentry.
- .2 Section 07 31 29 – Cedar Shingles.
- .3 Section 07 92 00 – Joint Sealants.
- .4 Section 09 91 10 – Painting.

1.02 REFERENCES

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

1.03 PRODUCTS, MATERIALS AND EQUIPMENT

- .1 Products, materials, equipment and articles incorporated in Work shall be NEW, not damaged or defective, and of best quality for purpose intended and compatible with the specifications. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Use products of one (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.

1.04 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for 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 Work.

- .3 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.05 STORAGE, HANDLING AND PROTECTION

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store sheet materials on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .5 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

1.06 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.

1.07 MANUFACTURER'S INSTRUCTIONS

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

1.08 QUALITY OF WORK

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

1.09 CO-ORDINATION

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

1.10 REMEDIAL WORK

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

1.11 FASTENINGS

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 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 unless stainless steel or other material is specifically requested in technical specification sections.
 - .3 Use heavy hexagon heads, semi-finished unless otherwise specified.
 - .4 Bolts may not project more than 1 diameter beyond bolts.
- .3 Types of washers as follows:
 - .1 Soft neoprene washers: use for exposed fastening of exterior metal panels.
- .4 Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact.
- .5 Prevent damage, adulteration and soiling of products during delivery, handling and storage. Immediately remove rejected products from site.
- .6 Store products in accordance with suppliers' instructions.
- .7 Touch up damaged factory finished surfaces according to manufacturer's recommendations and to Departmental Representative's satisfaction.
 - .1 Use primer or enamel to match original.
 - .2 Do not paint over nameplates.
- .8 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .9 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .10 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.12 PROTECTION OF EXISTING BUILDING AND WORK IN PROGRESS

- .1 Protect existing building components and finishes (including glazing, roof finishes, ramps, guardrails, stairways and areas not included in scope of work) from damage. Repair damaged components and finishes according to Departmental Representative's specifications, to better condition.
- .2 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

1.13 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 Acceptable Product. Alternative products may be considered provided full technical data is received in writing by Departmental Representative in accordance with Section 01 11 55 – General Instructions.
- .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 at no cost to Departmental Representative.
- .6 Provide cost saving breakout in bid form for alternate material or system if incorporated.
- .7 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.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 02 41 99 – Demolition for Minor Works.
- .2 Section 02 83 10 – Lead Base Paint Abatement – Minimum Precautions.
- .3 Section 06 10 00 – Rough Carpentry.
- .4 Section 07 31 29 – Cedar Shingles.
- .5 Section 07 92 00 – Joint Sealants.
- .6 Section 09 91 10 – Painting.

1.02 ACTION AND INFORMATIONAL 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 Departmental Representative 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 Departmental Representative or separate contractor.
 - .7 Written permission of affected separate contractor.
 - .8 Date and time work will be executed.

1.03 MATERIALS

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

1.04 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 and review existing conditions with Departmental Representative.
- .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.

1.05 EXECUTION

- .1 Execute cutting, fitting, and patching to complete Work.
- .2 Fit several parts together, to integrate with other Work.
- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .6 Restore work with new products in accordance with requirements of Contract Documents.
- .7 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

1.06 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

1 GENERAL

1.01 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 at municipal approved facilities. Do not burn waste materials on site.
- .3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .4 Provide on-site containers for collection of waste materials and debris.
- .5 Provide and use marked separate bins for recycling.
- .6 Dispose of waste materials and debris off site.
- .7 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .8 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .10 Schedule cleaning operations so that resulting dust, debris and other contaminants will not contaminate building systems.

1.02 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 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 Vacuum clean behind grilles, louvres and screens.
- .6 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .7 Broom clean and wash exterior walks, steps and surfaces; where used for project Work.
- .8 Remove dirt and other disfiguration from exterior surfaces of Work.
- .9 Clean equipment and fixtures to sanitary condition; clean glazing and frames where adjacent to work.

1.03 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Refer to technical sections for waste management and disposal.

1.02 WASTE MANAGEMENT GOALS

- .1 Prior to start of Work, conduct meeting with Departmental Representative to review and discuss PWGSC's Waste Management Plan and Goals.

1.03 DEFINITIONS

- .1 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .2 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .3 Reuse: repeated use of product in same form but not necessarily for same purpose.
Reuse includes:
 - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
 - .2 Returning reusable items including pallets or unused products to vendors.
- .4 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

1.04 STORAGE, HANDLING AND PROTECTION

- .1 Handle waste materials not re-used, salvaged or recycled in accordance with appropriate regulations and codes.
- .2 Materials in separated condition: collect, handle, store on site where directed and transport off-site to an approved and authorized recycling facility.
- .3 Materials must immediately be separated into required categories for re-use or recycling.
- .4 Unless specified otherwise, materials for removal become Contractor's property.
- .5 Separate non-salvageable materials for recycling where applicable recycling facility exists. Transport and deliver non-salvageable items to licensed recycling and disposal facilities.
- .6 Protect structural components not removed for demolition from movement or damage.
- .7 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.
- .8 Separate and store materials produced during dismantling of structures in designated areas.
- .9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.

- .1 On-site source separation is recommended.
- .2 Remove co-mingled materials to off-site processing facility for separation.

1.05 DISPOSAL OF WASTES

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste, volatile materials, mineral spirits, oil, paint thinner into waterways, storm, or sanitary sewers.
- .3 Remove materials from deconstruction as deconstruction/disassembly Work progresses.

1.06 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises.
- .2 Maintain security measures as approved by Departmental Representative.

1.07 SCHEDULING

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

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 APPLICATION

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

3.02 CLEANING

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

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 07 31 29 – Cedar Shingles.
- .2 Section 07 92 00 – Joint Sealants.
- .3 Section 09 91 10 – Painting.

1.02 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Departmental Representative review.
 - .2 Departmental Representative's review:
 - .1 Departmental Representative and Contractor to review Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:
 - .1 Work: completed and reviewed for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Work: complete and ready for final review.
 - .4 Final Review:
 - .1 When completion tasks are done, request final review of Work by Departmental Representative.
 - .2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-review.

1.03 FINAL CLEANING

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

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 ADMINISTRATIVE REQUIREMENTS

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

1.02 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Three (3) weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, two (2) final hard copies and one electronic copy of operating and maintenance manuals. Substantial completion will not be considered until this submission is completed.
- .3 Ensure spare parts, maintenance materials and special tools are new, neither damaged nor defective, and of same quality and manufacture as products provided in Work.
- .4 Provide evidence, if requested, for type, source and quality of products supplied.
- .5 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

1.03 FORMAT

- .1 Organize data as 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.
 - .1 Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by Section numbers and sequence of the Table of Contents according to the contract documents 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 with drawing number and description visible.
- .9 Provide 1:1 scaled CAD files in dwg format on CD.

1.04 CONTENTS - PROJECT RECORD DOCUMENTS

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

1.05 AS -BUILT DOCUMENTS

- .1 Contract drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measured locations of internal utilities and appurtenances, reference to visible and accessible features of construction.
 - .2 Field changes of dimension and detail.
 - .3 Changes made by change orders.
 - .4 Change Orders and other modifications to Contract.
 - .5 Details not on original Contract drawings.
 - .6 References to related shop drawings and modifications.
- .2 Contract Specifications: legibly mark each item to record actual 'workmanship of construction', including:
 - .1 Manufacturer, trade name, and catalogue number of each 'Product/Material' actually installed, particularly optional items and substitute items.
 - .2 Changes made by addenda and change orders.
- .3 As-built information:
 - .1 Record changes in red ink as work progresses.
 - .2 Mark on 1 set of drawings, specifications and shop drawings at completion of project and, before final review, neatly transfer notations to second set.
 - .3 Provide 1 set of CDs in PDF file format with all as-built information included.

- .4 Submit all sets to Departmental Representative.

1.06 EQUIPMENT AND SYSTEMS

- .1 Include manufacturer's printed operation and maintenance instructions.
- .2 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .3 Additional requirements: as specified in individual specification sections.

1.07 MATERIALS AND FINISHES

- .1 Building products, applied materials, and finishes: include product data, with colour and texture designations.
 - .1 Provide information for re-ordering 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.

1.08 WARRANTIES

- .1 Separate each Document 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 inspection reports executed in by subcontractors, suppliers, manufacturers and inspection agencies within 10 days after completion of applicable item of work.
- .4 Except for items put into use with the Departmental Representative's permission leave date of beginning of time of warranty until the date of substantial performance is determined.
- .5 Verify that documents are in proper form, contain full information and are notarized.
- .6 Co-execute submittals when required.
- .7 Retain warranties and bonds until time specified for submittal with Operating and Maintenance manual.
- .8 Conduct joint 9 month warranty inspection, measured from time of acceptance, by Departmental Representative.

1.09 COMPLETION

- .1 Submit a written certificate that the following have been performed:
 - .1 Work has been completed and reviewed for compliance with the Contract documents.
 - .2 Defects have been corrected and deficiencies have been completed.

.3 Work is complete and ready for final review.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 RELATED SECTIONS

- .1 Section 02 83 10 – Lead Base Paint Abatement – Minimum Precautions.

1.02 REFERENCES

- .1 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures and 01 74 19 - Construction/Demolition Waste Management and Disposal.

1.04 SITE CONDITIONS

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

2 PRODUCTS

2.01 NOT USED

- .1 Not used.

3 EXECUTION

3.01 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 in operating condition.

3.02 PREPARATION

- .1 Protection of In-Place Conditions:
 - .1 Prevent movement, settlement, or damage to adjacent structures, utilities, and landscaping features and parts of building and finishes to remain.
 - .2 Protect existing roofing.
 - .3 Keep noise, dust, and inconvenience to occupants to minimum.
 - .4 Protect building systems, services and equipment.
 - .5 Provide temporary dust screens, covers, railings, supports and other protection as required.

- .6 Do Work in accordance with Section 01 35 33 - Health and Safety Requirements.
- .2 Demolition/Removal:
 - .1 Remove items as indicated.
 - .2 Remove parts of existing buildings as indicated to permit remedial construction. Items for reinstallation to be stored in a dry, protected area as directed by Departmental Representative.

3.03 REINSTALLATION

- .1 Reinstall elements that have been removed for remediation work once remediated work has been completed and reviewed by Departmental Representative.
- .2 Install to original position and make good any damaged elements to satisfaction of Departmental Representative.
- .3 Upon completion of installation, notify Departmental Representative for review of completed work.

3.04 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 Refer to demolition drawings and specifications for items to be salvaged for reuse.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Construction/Demolition and Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at authorized facility.

END OF SECTION

1 GENERAL

1.01 SUMMARY

- .1 Comply with requirements of this Section when performing following Work:
 - .1 Removal of lead-containing coatings and hazardous materials as required.

1.02 RELATED REQUIREMENTS

- .1 Section 02 41 99 – Demolition for Minor Works.
- .2 Section 09 91 00 – Painting.

1.03 REFERENCES

- .1 Department of Justice Canada
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .2 Health Canada
 - .1 Workplace Hazardous Materials Information System (WHMIS), Material Safety Data Sheets (MSDS).
- .3 Human Resources and Social Development Canada (HRSDC)
 - .1 Canada Labour Code Part II, - SOR 86-304 - Occupational Health and Safety Regulations.
- .4 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .5 U.S. Environmental Protection Agency (EPA)
 - .1 EPA 747-R-95-007-1995, Sampling House Dust for Lead.
- .6 U.S. Department of Labour - Occupational Safety and Health Administration (OSHA) - Toxic and Hazardous Substances
 - .1 Lead in Construction Regulation - 29 CFR 1926.62-[1993].
- .7 Underwriters' Laboratories of Canada (ULC)

1.04 DEFINITIONS

- .1 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with a filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .2 Authorized Visitors: Departmental Representative or designated representatives.
- .3 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects over cuts and tears, and elsewhere as required to provide protection and isolation. For protection of underlying surfaces from damage and to prevent lead dust entering in clean area.
- .4 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must be appropriate capacity for scope of work.
- .5 Action level: employee exposure, without regard to use of respirators, to airborne concentration of lead of 50 micrograms per cubic meter of air (50 ug/m²) calculated as 8-

hour time-weighted average (TWA). Minimum precautions for lead abatement are based on airborne lead concentrations less than 0.05 milligrams per cubic meter of air for removal of lead based paint by methods noted in paragraph 1.1.

- .6 Competent person: individuals capable of identifying existing lead hazards in workplace taking corrective measures to eliminate them.
- .7 Lead dust: wipe sampling on vertical surfaces and/or horizontal surfaces, dust and debris is considered to be lead contaminated if it contains more than 40 micrograms of lead in dust per square foot.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide proof satisfactory to Departmental Representative that suitable arrangements have been made to dispose of lead based paint waste in accordance with requirements of authority having jurisdiction.
- .3 Provide proof of Contractor's General Insurance.
- .4 Quality Control:
 - .1 Provide Departmental Representative necessary permits for transportation and disposal of lead based paint waste and proof that lead based paint waste has been received and properly disposed.
 - .2 Provide proof satisfactory to Departmental Representative that employees have had instruction on hazards of lead exposure, respirator use, dress, and aspects of work procedures and protective measures.

1.06 QUALITY ASSURANCE

- .1 Regulatory Requirements: comply with Federal, Provincial/Territorial and local requirements pertaining to lead paint, provided that in case of conflict among those requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at time work is performed.
- .2 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements and WorkSafe regulations and standards.
 - .2 Safety Requirements: worker and visitor protection.
 - .1 Protective equipment and clothing to be worn by workers and visitors in work Area include:
 - .1 Half mask respirator: half-mask particulate respirator with N - series filter, and 95 % efficiency could be provided.
 - .2 Eating, drinking, chewing, and smoking are not permitted in work area.
 - .3 Ensure workers wash hands and face when leaving work area. Facilities for washing are located where approved by Departmental Representative.
 - .4 Visitor Protection:
 - .1 Instruct Authorized Visitors procedures to be followed in entering and exiting work area.

1.07 WASTE MANAGEMENT AND DISPOSAL

- .1 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional

and Municipal regulations.

- .2 Disposal of lead waste generated by removal activities must comply with Federal, Provincial, Territorial and Municipal regulations. Dispose of lead waste in sealed double thickness 6 ml bags or leak proof drums. Label containers with appropriate warning labels.
- .3 Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

1.08 EXISTING CONDITIONS

- .1 Reports and information pertaining to lead based paint to be handled, removed, or otherwise disturbed and disposed of during this Project are bound into this specification.
- .2 Notify Departmental Representative of lead based paint discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Departmental Representative.

1.09 SCHEDULING

- .1 Not later than two days before beginning Work on this Project notify following in writing:
 - .1 Appropriate Regional or Zone Director of Medical Services Branch, Health Canada.
 - .2 Provincial Ministry of Labour.
 - .3 Disposal Authority.
- .2 Inform sub trades of presence of lead-containing materials identified in Existing Conditions.
- .3 Provide Departmental Representative copy of notifications prior to start of Work.

1.10 PERSONNEL TRAINING

- .1 Provide Departmental Representative satisfactory proof that every worker has had instruction and training in hazards of lead exposure, in personal hygiene, in aspects of work procedures, and in use, cleaning, and disposal of respirators.
- .2 Instruction and training related to respirators includes, at minimum:
 - .1 Proper fitting of equipment.
 - .2 Inspection and maintenance of equipment.
 - .3 Disinfecting of equipment.
 - .4 Limitations of equipment.
- .3 Instruction and training must be provided by competent, qualified person.
- .4 Supervisory personnel to complete required training.

2 PRODUCTS

2.01 MATERIALS

- .1 Polyethylene 0.15 mm thick unless otherwise specified; in sheet size to minimize joints.
- .2 Tape: fibreglass - reinforced duct tape suitable for sealing polyethylene under dry conditions and wet conditions using amended water.

- .3 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual lead paint residue.
- .4 Lead waste containers: type acceptable to dump operator with tightly fitting covers and 0.15 mm thickness sealable polyethylene liners.
 - .1 Label containers with pre-printed bilingual cautionary Warning Lead clearly visible when ready for removal to disposal site.

3 EXECUTION

3.01 SUPERVISION

- .1 One Supervisor for every ten workers is required.
- .2 Supervisor must remain within work area during disturbance, removal, or handling of lead based paints.

3.02 PREPARATION

- .1 Remove and store items to be salvaged or reused.
 - .1 Protect and wrap items and transport and store in area specified by Departmental Representative.
- .2 Work Area:
 - .1 Shut off and isolate HVAC system to prevent dust dispersal into other building areas. Conduct smoke tests to ensure duct work is airtight.
 - .2 Seal off openings with polyethylene sheeting and seal with tape.
 - .3 Maintain emergency fire exits or establish alternatives satisfactory to Authority having jurisdiction.
 - .4 Where water application is required for wetting lead containing materials, provide temporary water supply appropriately sized for application of water as required.
 - .5 Provide electrical power and shut off for operation of powered tools and equipment. Provide 24 volt safety lighting and ground fault interrupter circuits on power source for electrical tools, in accordance with applicable CSA Standard. Ensure safe installation of electrical cables and equipment.
- .3 Do not start work until:
 - .1 Arrangements have been made for disposal of waste.
 - .2 Tools, equipment, and materials waste containers are on site.
 - .3 Arrangements have been made for building security.
 - .4 Notifications have been completed and preparatory steps have been taken.

3.03 LEAD ABATEMENT

- .1 Removal of lead-containing coatings with a chemical gel or paste and fibrous laminated cloth wrap; or removal with non-powered hand tools. Contractor to determine method in accordance with regulatory bodies and WorkSafe BC.
- .2 Remove lead based paint in small sections and pack as it is being removed in sealable 0.15 mm plastic bags and place in labelled containers for transport.
- .3 Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to staging area. Clean external surfaces thoroughly again by wet sponging. Wash containers thoroughly pending removal to outside. Ensure containers

are removed by workers who have entered from uncontaminated areas dressed in clean coveralls.

- .4 After completion of stripping work, clean surface from which lead based paint has been removed to remove visible material. During this work keep surfaces wet.
- .5 After cleaning to remove visible lead based paint, and after encapsulating lead containing material impossible to remove, wet clean entire work area, and equipment used in process. After inspection by Departmental Representative apply continuous coat of slow drying sealer to surfaces of work area.

3.04 INSPECTION

- .1 Perform inspection to confirm compliance with specification and governing authority requirements. Deviations from these requirements not approved in writing by Departmental Representative will result in work stoppage, at no cost to Owner.
- .2 Departmental Representative will inspect work for:
 - .1 Adherence to specific procedures and materials.
 - .2 Final cleanliness and completion.
 - .3 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

3.05 FINAL CLEANUP

- .1 Following cleaning and when lead wipe surfaces sampling are below acceptable concentrations, proceed with final cleanup.
- .2 Remove polyethylene sheet by rolling it away from walls to centre of work area. Vacuum visible lead containing particles observed during cleanup, immediately, using HEPA vacuum.
- .3 Place polyethylene sheets, tape, cleaning material, clothing, and contaminated waste in plastic bags and sealed labelled waste containers for transport.
- .4 Conduct final check to ensure no dust or debris remains on surfaces as result of dismantling operations.

3.06 RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS

- .1 Repair or replace objects damaged in course of work to their original state or better, as directed by Departmental Representative.

END OF SECTION

1.0 GENERAL

1.1 RELATED WORK

- | | | |
|----|------------------------|------------------|
| .1 | Concrete Reinforcing | Section 03 20 00 |
| .2 | Cast-in-Place Concrete | Section 03 30 00 |

1.2 REFERENCES

- .1 CAN/CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction.
- .2 CAN/CSA-O86-09, Engineering Design in Wood (Limit States Design).
- .3 CSA O121-08, Douglas Fir Plywood.
- .4 CSA O151-09, Canadian Softwood Plywood.
- .5 CSA S269.1-16 Falsework for Construction Purposes.
- .6 CAN/CSA-S269.3-M92 (R2013), Concrete Formwork, National Standard of Canada

1.3 SHOP DRAWINGS

- .1 Prepare shop drawings for formwork and falsework.
- .2 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1, for falsework drawings and comply with CAN/CSA-S269.3 for formwork drawings.
- .3 Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms.
- .4 Indicate sequence of erection and removal of formwork/falsework as directed by Departmental Representative.
- .5 The contractor is responsible for the design of all formwork and shoring and for complying with all Workers' Compensation Board regulations pertaining to formwork construction, design and inspection. Formwork and shoring shall be designed by a qualified professional engineer registered or licensed in British Columbia.

2.0 PRODUCTS

2.1 MATERIALS

- .1 Formwork materials:
 - .1 For concrete without special architectural features, use plywood and wood formwork materials to CSA-O121 and CAN/CSA-O86,
 - .2 For concrete with special architectural features, use formwork materials to CAN/CSA-A23.1.
- .2 Pan forms: removable as indicated.
- .3 Form ties:
 - .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
 - .2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.
- .4 Form liner:
 - .1 Plywood: Douglas Fir to CSA O121 or Canadian Softwood Plywood to CSA O151 square edge.
- .5 Form release agent: chemically active release agents containing compounds that react with free lime in concrete resulting in water insoluble soaps.
- .6 Falsework materials: to CSA S269.1.

3.0 EXECUTION

3.1 FABRICATION AND ERECTION

- .1 Verify lines, levels and centres before proceeding with formwork / falsework and ensure dimensions agree with drawings.
- .2 Obtain Departmental Representative's approval for use of earth forms framing openings not indicated on drawings.
- .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .4 Fabricate and erect falsework in accordance with CSA S269.1.
- .5 Do not place shores on frozen ground.
- .6 Provide site drainage to prevent washout of soil supporting shores.

- .7 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.
- .8 Align form joints and make watertight. Keep form joints to minimum.
- .9 Use 25mm chamfer strips on external corners and/or 25mm fillets at interior corners of concrete members, joints, unless specified otherwise.
- .10 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated. Refer to architectural drawings for reveals, recesses, chamfers, finishes and other architectural requirements not indicated on the structural drawings.
- .11 Refer to architectural, mechanical and electrical drawings for locations and sizes of curbs and equipment pads.
- .12 Construct forms for architectural concrete, and place ties as indicated and/or as directed. Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.
- .13 Build in anchors, sleeves, and other inserts required to accommodate Work specific in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .14 Clean formwork in accordance with CAN/CSA-A23.1, before placing concrete.

3.2 REMOVAL AND RESHORING

- .1 Formwork removal and reshoring: Do not remove forms and shoring before the concrete has attained sufficient strength to ensure the safety of the structure and not before the following minimum and long term performance periods of time after placing concrete:

24 hours	Columns, and footing sides
----------	----------------------------
- .2 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.
- .3 Re-use formwork and falsework subject to requirements of CAN/CSA-A23.1.

END OF SECTION

1.0 GENERAL

1.1 RELATED WORK

- | | | |
|----|--------------------------------|------------------|
| 1. | Concrete Forms and Accessories | Section 03 10 00 |
| .2 | Cast-in-Place Concrete | Section 03 30 00 |

1.2 REFERENCES

- .1 American Concrete Institute (ACI)
 - .1 SP-66-04, ACI Detailing Manual 2004.
 - .1 ACI 315-99, Details and Detailing of Concrete Reinforcement.
 - .2 ACI 315R-04, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.
- .2 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A143/A143M-03, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
 - .2 ASTM A185/A185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - .3 ASTM A497/A497M-07, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA-A23.3-04, Design of Concrete Structures.
 - .3 CAN/CSA-G30.18-09 (R2014), Billet-Steel Bars for Concrete Reinforcement, A National Standard of Canada.
 - .4 CSA-G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .5 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles, A National Standard of Canada.

- .6 CSA W186-M1990 (R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .4 Reinforcing Steel Institute of Canada (RSIC)
 - .1 RSIC-2004, Reinforcing Steel Manual of Standard

1.3 SOURCE QUALITY CONTROL

- .1 Provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 1 week prior to commencing reinforcing work.
- .2 Inform Departmental Representative of proposed source of material to be supplied.

1.4 SHOP DRAWINGS

- .1 Produce shop drawings including placing of reinforcement.
- .2 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacing, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacing and locations of chairs, spacers and hangers. Prepare reinforcement drawings in accordance with ANSI/ACI 315 and ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.
- .3 Detail lap lengths and bar development lengths to CAN3-A23.3, unless otherwise indicated.

1.5 SUBSTITUTES

- .1 Substitute different size bars only if permitted in writing by Departmental Representative.

2.0 PRODUCTS

2.1 MATERIALS

- .1 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.
- .2 Reinforcing steel: weldable low alloy steel deformed bars to CAN/CSA G30.18.
- .3 Cold-drawn annealed steel wire ties: to CAN/CSA G30.18.

- .4 Welded steel wire fabric: to CSA W186. Provide in flat sheets only.
- .5 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.
- .6 Mechanical splices: subject to approval of Departmental Representative.
- .7 Plain round bars: to CAN/CSA-G40.21.

2.2 FABRICATION

- .1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1, ANSI/ACI 315, and ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures unless indicated otherwise. For epoxy coated bars, fabricate in accordance with ASTM D3963.
- .2 Obtain Departmental Representative's approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.
- .4 Ship bundles of bar reinforcement clearly identified in accordance with bar bending details and lists.

3.0 EXECUTION

3.1 FIELD BENDING

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.
- .2 When field bending is authorized, bend without heat, applying a slow and steady pressure.
- .3 Replace bars which develop cracks or splits.

3.2 PLACING REINFORCEMENT

- .1 Place reinforcing steel as indicated on placing drawings and in accordance with CAN/CSA-A23.1.
- .2 Use plain round bars as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint. When paint is dry, apply a thick even film of mineral lubricating grease.
- .3 Prior to placing concrete obtain Departmental Representative's approval of reinforcing material and placement.

- .4 Ensure cover to reinforcement is maintained during concrete pour.

END OF SECTION

1.0 GENERAL

1.1 RELATED SECTIONS

- | | | |
|----|--------------------------------|------------------|
| .1 | Concrete Forms and Accessories | Section 03 10 00 |
| .2 | Concrete Reinforcing | Section 03 20 00 |

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C109-12, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50-mm Cube Specimens). ASTM D260-86 (2001), Standard Specification for Boiled Linseed Oil.
 - .2 ASTM C309-11, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .3 ASTM C332-09, Specification for Lightweight Aggregates for Insulating Concrete.
 - .4 ASTM C827-10, Test Method for Early Volume Change of Cementitious Mixtures.
 - .5 ASTM D1751-04(R2008), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types).
 - .6 ASTM D1752-04a(2008), Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
 - .7 ASTM C 260 – 10a, Specifications for Air-Entraining Admixtures for Concrete.
 - .8 ASTM C 494M – 13, Specifications for Chemical Admixtures for Concrete.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-19.24-M90, Multicomponent, Chemical-Curing Sealing Compound.

- .3 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1-09 Concrete Materials and Methods of Concrete Construction.
 - .2 CSA-A23.2-09, Methods of Test for Concrete.
 - .3 CAN/CSA-A3000-13, Cementitious Materials Compendium
 - .4 CSA-A3001-13, Cementitious Materials for Use in Concrete.
 - .5 CAN/CSA-G30.18-M92(R2014), Billet-Steel Bars for Concrete Reinforcement.

1.3 CERTIFICATES

- .1 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.
- .2 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1.

1.4 QUALITY ASSURANCE

- .1 Minimum 2 weeks prior to starting concrete work, submit proposed quality control procedures for Departmental Representative's approval for following items:
 - .1 Falsework erection.
 - .2 Hot weather concrete.
 - .3 Cold weather concrete.
 - .4 Curing.
 - .5 Finishes.
 - .6 Formwork removal.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
- .2 Ensure emptied containers are sealed and stored safely.
- .3 Use excess concrete for:
- .4 Divert unused concrete materials from landfill to local facility as reviewed by Departmental Representative.
- .5 Provide appropriate area on job site where concrete trucks and be safely washed.
- .6 Divert admixtures and additive materials from landfill to approved official hazardous material collections site as reviewed by Departmental Representative.
- .7 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

2.0 PRODUCTS

2.1 MATERIALS

- .1 Portland cement: to CAN/CSA-A5.
- .2 Supplementary cementing materials: to CAN/CSA-A23.5.
- .3 Water: to CAN/CSA-A23.1.
- .4 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density.
- .5 Air entraining admixture: to ASTM C260.
- .6 Chemical admixtures: to ASTM C494M. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .7 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents.
 - .1 Compressive strength: 50 MPa at 28 days.
 - .2 Consistency:
 - .1 Fluid: to ASTM C827. Time of efflux through flow cone (ASTM C939), under 30 s.

- .2 Flowable: to ASTM C827. Flow table, 5 drops in 3 s, (ASTM C109, applicable portion) 125 to 145%.
- .3 Plastic: to ASTM C827. Flow table, 5 drops in 3 s, (ASTM C109, applicable portions) 100 to 125%.
- .4 Dry pack to manufacturer's requirements.

- .8 Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for the mixture to retain its shape when made into a ball by hand and capable of developing compressive strength of 50 MPa at 28 days.

- .9 Curing compound: to CAN/CSA-A23.1 and to ASTM C309, Type 1-chlorinated rubber.

- .10 Weep hole tubes: plastic.

2.2 MIXES

- .1 Proportion normal density concrete in accordance with CAN/CSA-A23.1, Alternative 1 to give the following properties:

	.1	Cement: Type GU Portland cement (Normal Condition).			
	.2	Minimum compressive strength at 28 days, class of exposure and nominal size of coarse aggregate:			
Member		minimum 28-days strength (MPa)	maximum aggregate size (mm)	exposure class	air content Category
Exterior Footings/Pads		25	20	F-2	1
Exterior Slab on Grade		32	20	C-2	1
Ground Seal		10	20	F-2	1
	.3	Slump at time and point of discharge: To CSA-A23.1 Clause 4.3.2.3. When superplasticizers are used, the slump may be increased by shall kept below the point where segregation will occur. The cost of superplasticizers shall be included in the cost of the concrete. Smaller aggregate size may be used where necessary to increase slump.			
	.4	Air content: To CSA-A23.1 Table 2 & 4 to suit appropriate exposure class.			
	.5	Chemical admixtures: following admixtures in accordance with to ASTM C494M. Admixtures shall contain no salts or acids.			
	.6	Concrete mix designs shall be submitted to a material consultant for approval and to Departmental representative for review prior to any concrete work.			

3.0 EXECUTION

3.1 PREPARATION

- .1 Obtain Departmental Representative's approval before placing concrete. Provide 24 hours notice prior to placing of concrete.
- .2 Pumping of concrete is permitted only after approval of equipment and mix.
- .3 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .4 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing.
- .5 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .6 In locations where new concrete is dowelled to existing work, drill holes in existing concrete. Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.
- .7 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 CONSTRUCTION

- .1 Do cast-in-place concrete work in accordance with CAN/CSA-A23.1 and CAN/CSA-A23.2. Adhere strictly to CSA-A23.1 for proper preparation and protection for cold weather and hot weather concrete work.
- .2 Sleeves and inserts.
 - .1 No sleeves, ducts, pipes or other openings shall pass through joists, beams, column capitals or columns, except where indicated or approved by Departmental Representative.
 - .2 Where approved by Departmental Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 100 x 100 mm not indicated, must be approved by Departmental Representative.
 - .3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Departmental Representative before placing of concrete.
 - .4 Check locations and sizes of sleeves and openings shown on drawings.
 - .5 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.

- .3 Anchor bolts.
 - .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.
 - .2 With approval of Departmental Representative, grout anchor bolts in holes drilled after concrete has set. Drilled holes to be to manufacturer's recommendations.
 - .3 Protect anchor bolt holes from water accumulations, snow and ice build-up.
 - .4 Set bolts and fill holes with epoxy grout.
 - .5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.

- .4 Drainage holes and weep holes:
 - .1 Form weep holes and drainage holes in accordance with Section 03 10 00 - Concrete Forms and Accessories. If wood forms are used, remove them after concrete has set.
 - .2 Install weep hole tubes and drains as indicated.

- .5 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.

- .6 Finishing:
 - .1 Finish concrete in accordance with CAN/CSA-A23.1.
 - .2 Use procedures acceptable to Departmental Representative or those noted in CAN/CSA-A23.1 to remove excess bleed water. Ensure surface is not damaged.
 - .3 Use curing compounds compatible with applied finish on concrete surfaces. Applied finish on concrete: Provide written declaration that compounds used are compatible.

- .7 Inserts and openings as indicated in the structural drawings and specifications or in documents by other consultants.

- .8 All dowels, anchor bolts, embedded plates and other inserts shall be placed before the concrete is poured.

3.3 SITE TOLERANCE

- .1 All horizontal surfaces shall meet the Class A Slab and Floor Finish classification (+/- 8mm) in accordance with Table 19 of CAN/CSA-A23.1 straight edge method.
- .2 Tolerance closer than those specified in CSA-A23.1 may be required at certain locations for structural, architectural and construction requirements.

3.4 FIELD QUALITY CONTROL

- .1 Inspection and testing of concrete and concrete materials will be carried out by a CSA certified Testing Laboratory designated by Departmental Representative in accordance with CAN/CSA-A23.1. Submit all concrete testing results to the departmental representative.
- .2 The Contractor will pay for costs of tests as specified in Section 01 11 55 – General Instructions.
- .3 The Contractor will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .4 Non-destructive Methods for Testing Concrete shall be in accordance with CAN/CSA-A23.2.
- .5 Inspections or testing by the Contractor will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

END OF SECTION

1.0 **GENERAL**

1.1 **RELATED SECTIONS**

- .1 Waste Management And Disposal Section 01 74 19
- .2 Cast-in-Place Concrete Section 03 30 00
- .3 Painting Section 09 91 00

1.2 **REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A53/A53M-12, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Steamless.
 - .2 ASTM A307-14, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel.
 - .2 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CAN/CSA S16-14, Limit States Design of Steel Structures.
 - .4 CSA W59-13 Welded Steel Construction.
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .4 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
- .5 Green Seal Environmental Standard GS 03 (anti-corrosive primer).

1.3 **QUALITY ASSURANCE**

- .1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

- .3 Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Section.

1.4 DELIVERY, STORAGE & 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 off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with 01 74 21 Construction, Demolition Waste Management & Disposal Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated and cardboard packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.
- .3 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

2.0 PRODUCTS

2.1 MATERIALS

- .1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 300W, 350W.
- .2 Steel pipe: to ASTM A53/A53M standard weight and extra strong, double extra strong, black, galvanized finish.
- .3 Welding materials: to CSA W59.
- .4 Welding electrodes: to CSA W48 Series.

- .5 Bolts and anchor bolts: to ASTM A307; corrosion resistant types to ASTM A325M, Type 3.
- .6 Provide all required anchoring devices including anchor clips, bar and strap anchors, expansion bolts and shields, and other devices designed to support and secure work.
- .7 Grout: non-shrink, non-metallic, flowable, 15 MPa pull out strength 7.9 MPa at 24 hours.
- .8 Security fasteners: screws and bolts with spanner type heads to prevent removal except with special tools; non-corrosive type.
- .9 Shop coat primer: to The Master Painters Institute (MPI), Architectural Painting Specification Manual - current edition.
- .10 Galvanize touch-up primer: zinc rich, read mix to Green Seal Environmental Standard GS 03 (anti-corrosive primer).
- .11 Imperial size bolts and plate products are acceptable on an equal size – equal strength basis.

2.2 FABRICATION

- .1 Build work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Fabricate items from steel unless indicated otherwise; use galvanized steel for exterior items, unless indicated otherwise.
- .3 Use self-tapping shake-proof countersunk flat headed screws on items requiring assembly by screws or as indicated. Use screws for interior work. Use welded connections for exterior work, unless approved otherwise by Departmental Representative.
- .4 Where possible, fit and shop assemble work, match mark, ready for erection.
- .5 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush with sharp edges and corners rounded to 3 mm radius. Where continuous welds may cause distortion of fabrication use stitch welds and plastic filler, grind and sand smooth.
- .6 Seal exterior steel fabrications to provide corrosion protection in accordance with CAN/CSA-S16.1.

2.3 **FINISHES**

- .1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m² to CAN/CSA-G164.
- .2 Shop coat primer: to to The Master Painters Institute (MPI), Architectural Painting Specification Manual - current edition.
- .3 Zinc primer: zinc rich, ready mix to Green Seal Environmental Standard GS 03 (anti-corrosive primer).

2.4 **SHOP PAINTING**

- .1 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.
- .2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.
- .3 Clean surfaces to be field welded; do not paint.

3.0 **EXECUTION**

3.1 **ERECTION**

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .5 Provide components for building by other sections in accordance with shop drawings and schedule.
- .6 Make field connections with bolts to CAN/CSA-S16.1, or weld.
- .7 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

- .8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.
- .9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.2 **MISCELLANEOUS STEEL BRACKETS, CAPS, SHOES, BEAM SUPPORTS AND ANGLES**

- .1 Supply for installation by respective trades. Drill for countersunk screws and anchor bolts.anchor bolts.

3.3 **CLEANING**

- .1 Perform cleaning after installation to remove construction and accumulate environmental dirt.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .1 Section 01 74 21- Construction/Demolition Waste Management And Disposal.

1.2 REFERENCES

- .1 American Wood-Preservers' Association (AWPA)
 - .1 AWPA M2-15, Standard Inspection of Treated Wood Products.
 - .2 AWPA M4-15, Standard for the Care of Preservative-Treated Wood Products.
- .2 Canadian Standards Association (CSA)
 - .1 CSA O80 Series-15, Wood Preservation.
 - .2 CSA O80.201-M89, Standard for Hydrocarbon Solvents for Preservatives. This Standard covers hydrocarbon solvents for preparing solutions of preservatives.- This is not stand alone specification
 - .3 CSA O322-1976(R1999), Procedure for Certification of Pressure-Treated Wood Materials for Use in Preserved Wood Foundations.

1.3 QUALITY ASSURANCE

- .1 Plant inspection of products treated with preservative by pressure impregnation will be carried out by designated testing laboratory to AWPA M2, and revisions specified in CSA O80 Series, Supplementary Requirements to AWPA M2.
- .2 Each piece of lumber and plywood for preserved wood foundations to be identified by CSA O322 certified stamp.
- .3 Inspection and testing of insert materials will be carried out by a Testing Laboratory designated by Departmental Representative.
- .4 Contractor will pay for costs of tests as specified in Section 01 11 55 - Payment Procedures: Testing Laboratory Services.

1.4 CERTIFICATES

- .1 Submit certificates in accordance with Section 01 11 55 – General Instructions.
- .2 For products treated with preservative by pressure impregnation submit following information certified by authorized signing officer of treatment plant:

- .1 Information listed in AWWA M2 and revisions specified in CSA O80 Series, Supplementary Requirement to AWWA M2 applicable to specified treatment.
- .2 Moisture content after drying following treatment with water-borne preservative.
- .3 Acceptable types of paint, stain, and clear finishes that may be used over treated materials to be finished after treatment.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 Waste Management and Disposal.
- .2 Do not dispose of preservative treated wood through incineration.
- .3 Do not dispose of preservative treated wood with other materials destined for recycling or reuse.
- .4 Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill approved by Departmental Representative.
- .5 Dispose of unused wood preservative material at official hazardous material collections site approved by Departmental Representative.
- .6 Do not dispose of unused preservative material into sewer system, into streams, lakes, onto ground or in other location where they will pose health or environmental hazard.

Part 2 Products

2.1 MATERIALS

Above Water installed timber:

- .1 Preservative: to CSA-O80 Series, odourless, water-borne, for stained finish.
- .2 Solvent: to CSA-O80.201

Timber piles for coastal water:

- .1 Preservative: to CSA-O80.20, creosote, BMP stamped.
- .2 Solvent: to CSA-O80.201

Part 3 Execution

3.1 APPLICATION: PRESERVATIVE

Above Water installed timber:

- .1 Treat Douglas Fir Larch lumber to CSA O80 Series No 2 or better using Only Alkaline Copper Quat (ACQ-C, ACQ-D, ACQ-D Carbonate) to obtain minimum net retention of 6.4 kg/m³ of wood.
- .2 Following water-borne preservative treatment, dry material to maximum moisture content of 15%.

Timber piles and bracings for coastal water:

- .3 Treat Douglas Fir Larch lumber to CSA O80 Series No 1 or better using Creosote
- .4 Following BMP preservative treatment, dry material to maximum moisture content of 19%.

3.2 APPLICATION: FIELD TREATMENT

- .1 Comply with AWWA M4 and revisions specified in CSA O80 Series, Supplementary Requirements to AWWA M2.
- .2 Remove chemical deposits on treated wood to receive applied finish.

END OF SECTION

1.0 GENERAL

1.1 RELATED SECTIONS

- .1 Beam shoes and brackets: Section 05 50 00

1.2 REFERENCES

- .1 CSA B111-1974 (R2003) Wire Nails, spikes and Staples.
- .2 CAN/CSA-G164-M92 (R2003) Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CAN3-O86-14 Engineering Design in Wood (Limit States Design).
- .4 CAN/CSA-O141-05(R2014) Softwood Lumber.
- .5 CAN/CSA-O325-07 (R2012) Construction Sheathing.
- .6 National Lumber Grades Authority (NLGA) Standard Grading Rules for Canadian Lumber 2014.
- .7 ASTM A307-14, Specification for Carbon Steel Bolts and Studs, 60,000psi Tensile.

1.3 QUALITY ASSURANCE

- .1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Plywood identification: by grade mark in accordance with applicable CSA standards.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Waste Management And Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused wood materials from landfill to recycling, reuse and composting facility approved by Departmental Representative.
- .5 Do not dispose of preservative treated wood through incineration.
- .6 Do not dispose of preservative treated wood with materials destined for recycling or reuse.
- .7 Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill approved by Departmental Representative.
- .8 Dispose of unused wood preservative material at official hazardous material collections site approved by Departmental Representative.
- .9 Do not dispose of unused preservative material into sewer system, into streams, lakes, onto ground or in other locations where they will pose health or environmental hazard.

2.0 PRODUCTS

2.1 LUMBER MATERIAL

- .1 Lumber: unless specified otherwise, softwood, natural grade, moisture content 19% or less, except as specified otherwise, in accordance with following standards:
 - .1 CAN/CSA-O141.
 - .2 NLGA Standard Grading Rules for Canadian Lumber.
 - .3 CAN/CSA-O86.1
- .2 Framing and natural sizes lumber: in accordance with NBC, except as follows:
 - .1 Built-up beams, solid joists, deck framing and all other blocking and framing forming a part of deck framing:
 - .1 Douglas Fir Larch species, NLGA No. 1 or better grade.

- .2 Posts and beams:
 - .1 Douglas Fir Larch species, NLGA No. 1 or better grade.
- .3 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:
 - .1 Natural sizes: "Standard" light framing or better grade.
 - .2 Post and timbers sizes: No. 1 or better grade.

2.2 ACCESSORIES

- .1 Nails, spikes and staples: to CSA B111. All nailing shall be common nails. If P-nails (Power driven nails) are intended as substitution, submit P-nails information for Departmental representative's review prior to use. Adjustment of nails spacing or requirements may be required.
- .2 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and cut steel washers. All bolts and anchor bolts shall conform to ASTM A307. Bolt holes shall be 1mm larger than the bolt diameter. Bolts in wood shall not be less than 7 diameter from the end and 4 diameters from the edge unless otherwise detailed.
- .3 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.
- .4 Steel plates: All steel plates used in connection details shall be grade 300W.
- .5 Lag screws: Lag screws shall be predrilled with a bit size of 65% of the shank diameter for the threaded portion. Lead holes shall be the same length as the unthreaded portion and the same diameter as the shank. Screw all lags into place. Cut washers shall be provided under heads which bear on wood.
- .6 No checks or splits allowed at areas to be bolted or lagged.
- .7 All bolts, steel plates/connections and nails for use with red cedar wood to be hot dipped galvanized to ASTM A653 class G90 as produced by Simpson Strong Tie or approved equal by the Departmental representative.
- .8 Galvanizing: to CSA G164 unless noted otherwise. Use galvanized fasteners for exterior work, interior highly humid areas.
- .9 Joist/beam hangers, post bases: unless noted otherwise shall be hot dipped galvanized as per manufacture and approved by the Departmental representative.

3.0 EXECUTION

3.1 CONSTRUCTION

- .1 Comply with requirements of NBCC 2010, Part 9 and General Notes on Structural Drawings. Where conflict exists, the more stringent requirements will apply.

3.2 ERECTION OF FRAMING MEMBERS

- .1 Install members true to line, levels and elevations.
- .2 Construct continuous members from pieces of longest practical length.
- .3 Install spanning members with “crown-edge” up.

3.3 DEFACEMENT MARKS

- .1 Install lumber and deck materials so that grade-marks and other defacing marks are not visible or are removed by sanding at location(s) where exposed in final assembly.

3.6 FURRING, STRAPPING AND BLOCKING

- .1 Install furring, strapping and solid backing in structures as required. Use solid blocking or 19 mm plywood securely nailed to framing members.
- .2 Align and plumb faces of furring and blocking to tolerance of 1:600.

3.7 FASTENERS

- .1 Frames, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
- .2 Countersink bolts where necessary to provide clearance for other work.

END OF SECTION

1.0 GENERAL

1.1 RELATED SECTIONS

- .1 Metal Fabrications Section 05 50 00

1.2 WORK INCLUDED

- .1 Fabrication of piles, columns/post, beams, ceiling ties, handrails, and fence as shown on drawings structural drawings.

1.3 QUALITY ASSURANCE

- .1 Grading:
 - .1 2010 NBC Part 4 - Design, as applicable to Timber Construction
 - .2 Timber components and construction to CSA Standard O86.1S1-98 and according to N.L.G.A. Standard rules 2014 as applicable.
 - .3 Standards: CSA Standards S16.1 and O86.1S1-98 for Steel Connections.

1.4 REFERENCES:

- .1 Canadian Standards Association (CSA International)
 - .1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
 - .2 CAN/CSA O86-14, Engineering Design in Wood.
 - .3 CAN/CSA-S16-14, Limit States Design of Steel Structures.
 - .4 CAN/CSA O80-15 series, Wood Preservation
- .2 National Lumber Grades Authority (NLGA)
 - Standard Grading Rules for Canadian Lumber 2014.
- .3 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A 307-14, Specification for Carbon Steel Bolts and Studs, 60,000psi Tensile.
 - .2 ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc-coated (Galvanized), or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

- .3 ASTM D1413-07e1, Standard Test Method for Wood Preservatives by Laboratory Soil-block Cultures

1.5 SUBMITTALS

- .1 Shop Drawings: submit drawings for all fabricated timber elements and connections of accordance with Section 01 33 00 – Submittal Procedures.

Indicate grades of timber, shop applied finishes and restraining requirements, shop and erection details including cuts, holes, fastenings and connection hardware.

- .2 Review of shop drawings to be for size and arrangement of original and auxiliary members only. Such review will not relieve Contractor of responsibility for general and detail dimensions and fit or any errors or omissions.
- .3 Drawings showing erection procedures and erection bracing to be prepared by fabricator. Erection procedures and details and size of temporary bracing is the responsibility of the Fabricator.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- .1 Storage of pre-fabricated components in Contractor's storage yard piled off the ground and stacked to provide maximum air circulation and ventilation until required at Construction Site.
- .2 Protect with tarps from water staining, soiling, dust and other construction activity until pick-up.

1.6 CONDITIONS

- .1 Examine all conditions on which the successful work of this section depends.
- .2 Refer to Drawings and Details for specific framing and connecting requirements.

2.0 PRODUCTS

2.1 MATERIALS

- .1 General: all materials shall be new and of the quality and grade specified. No seconds, off grades or materials not meeting tolerance specifications will be accepted in the finished construction.
- .2 All above water installed heavy timber elements shall be properly air dried to a maximum of 19% moisture content prior to installation.
- .3 All round timber components shall be timber logs with sizes indicated on drawings.
- .4 Pile branding: brand treated piles to indicate producer, in accordance with AWWA M6
- .5 Round wood piles: to CAN3-056.
- .6 Order length of piles to be site measured.
- .7 Type of peeling: Douglas Fir Larch grade No 1 or better.
- .8 Pile species: Douglas Fir Larch grade No 1 or better.
- .9 Pile caps and brace timbers: pressure treated in accordance with Section 06 05 73 - Wood Treatment
- .10 Piles one piece, splices not permitted.
- .11 Splices permitted with approval of Departmental Representative.
- .12 Submit detail for review.
- .13 Departmental Representative will be sole judge of quality and dimension of piles.
- .14 All sizes are rough.
- .15 Connections:
 - .1 All bolts and pins shall conform to ASTM A307
 - .2 All bolts and nuts must be fitted with cut steel washers
 - .3 All steel plate used in connection details shall be grade 300W
 - .4 All nails and spikes shall conformed to CSA-B111
 - .5 Bolt holes shall be 1mm larger than the bolt diameter
 - .6 Bolts in wood shall not be less than 7 diameter from the end and 4 diameter from the edge unless otherwise detailed.
 - .7 No checks or splits allowed at areas to be bolted, pinned or lagged.
- .16 Galvanizing: to ASTM A653/A653M Class G185 for all connection fasteners and related hardware.

2.2 TREATMENT OF WOOD MATERIALS AND HANDLING

- .1 All above water installed timber members shall be treated with water-borne salts:
 - .1 Conform to CSA O80 Series and its current amendments.

- .2 Only Alkaline Copper Quat (ACQ-C, ACQ-D, ACQ-D Carbonate) and Copper Azole (CBA-A & CA-B) will be accepted.
 - .3 Retention: 6.4 kg/m³ (0.4 lb/ft³) for ACQ; 6.58 kg/m³ (0.41 lb/ft³) for CBA-A and 3.37 kg/m³ (0.21 lb/ft³) for CA-B.
 - .4 Minimum depth of penetration: 10mm.
 - .5 Contractor shall submit preservative type and % retention to the Departmental Representative for approval prior to use on the project.
-
- .2 Treated material will be rejected if damaged in any manner during handling, including damage from strapping and slings.
 - .3 Do not make field cuts in treated material unless permitted by the Departmental Representative. When permitted, field treat cuts as soon as possible with preservative specified for the original timber treatment.
 - .4 Treated posts, logs, rails and field drilled holes: when field treating is permitted, field treat to CSA O80, and using 2 coats of approved wood preservative.
 - .5 Treat wood piles and bracing in Marine coastal water with wood preservative treatment treated with creosote in accordance with Section 06 05 73 - Wood Treatment.
 - .6 Preservative Treatment of pile in Marine coastal water: to CSA-O80 Series, CSA-O80.18, AWWA-C1 and AWWA-C3
 - .7 Only BMP stamped Pressure treated piles in Marine coastal water shall be used and that the related post- Treatment procedures (i.e., employment of vacuum recovery, expansion bath and steaming) are strictly followed. The installer and/or the supplier should guarantee provision of these measures, and be prepared to produce documentation to verify compliance.

2.3 QUALITY CONTROL:

- .1 Preserved wood treating plants shall be certified by the Canadian Wood Preservation Certification Authority (CWPCA). Certification shall be supplied to the Departmental Representative upon request.
- .2 Independent Inspection/Testing Agency will be engaged and paid by the contractor for the purpose of inspecting and/or testing the treated material retention at fabrication shop or site in accordance with ASTM D1413 and Section 01 11 55 – General Instructions.
- .3 Minimum 20% of preserved treating logs are required for retention testing and minimum one test per batch treatment is required. The test reports need to be presented for each progress payment claim.
- .4 The materials installed that are subsequently found to have failed the testing will be required to be removed and replaced at the Contractor's cost.

3.0 EXECUTION

- .1 Comply with the requirements of NBC 2010 Part 9 and CSA Standards O86.1.
- .2 Install members true to line, levels and elevation, brace and anchor until permanently secured by structure.
- .3 Install lumber materials so that grade marks or other defacing marks in exposed areas are not visible or are removed by sanding.
- .4 Splice and joint only at locations indicated on reviewed shop drawings.
- .5 Treated Wood Mitigation Measures:
 - .1 Accurately measure and order wooden materials in sizes that minimize the number of saw cuts required in the field for onsite handling.
 - .2 Treated wood materials must be cut over a plastic tub, impervious tarp or other similar means to capture all waste wood and cuttings.
 - .3 All cuttings and other treated wood waste not appropriate for reuse must be collected and dispose of at an approved landfill site in accordance with Provincial Waste Management and Environmental Canada regulations in accordance with Section 01 74 19 – Waste Management and Disposal. Burning of treated wood waste products is prohibited.
 - .4 Treated products must be visually inspected to ensure that excessive residual Preservative is not present on the wood surface. Material with excessive residual product will not be used prior its removal.
 - .5 Conduct any on-site treatment activities in a contained upland location where possible. Apply preservative specified for the original timber treatment to all sides and ends of members and in bolt holes at connections as required.
 - .6 Exercise good housekeeping practices to minimize the amount and distribution of treated timber sawdust. Provide barrier with dust control in locations that treated timber may expose workers, site staff and visitors to sawdust..
- .6 Fit all members closely and accurately to all other members and other assemblies.
- .7 Maintain protection of all Heavy timber members until installation is complete.
- .8 Install all Hot dipped Galvanised metal fasteners in strict accordance with manufacturer's instructions.

END OF SECTION

1 GENERAL

1.1 DESCRIPTION

- .1 Work includes labour, materials, equipment and services necessary to provide and install cedar roofing and localized cedar wall cladding.

1.2 REFERENCES

- .1 CSA 0118.1 Western Red Cedar Shingles and Shakes.
- .2 CSA A123.3 M 1979, Roofing felt.
- .3 CSA B111 Wire Nails, Spikes and Staples.
- .4 RCABC Roofing Practice Manual
- .5 CSA 080 Series-97 Wood Preservation

1.3 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit full size shingles of finish and profile specified.

1.4 WARRANTY

- .1 Provide a manufacturer's standard material guarantee for thirty (30) years.

2 PRODUCTS

2.1 MATERIALS

- .1 Western red cedar shingles: to CSA 0118.1-97, 24" length; shingle width and pattern to match existing.
- .2 Cedar shingles must be No. 1 Blue Label (100% heartwood, 100% clear and 100% edge grain) except for starter course that may be No. 2 grade. Shingles to be sawn both sides.
- .3 Cedar shingles must be fire retardant treated by means of chemical impregnation. Fire retardant treatment to comply with CAN/ULC-S107. Class B flame spread rating to be achieved. Dried after treatment to less than 19% moisture content.
- .4 Roofing Felt Underlayment: asphalt saturated felt, to CSA A123.3 M 1979, perforated, 15 lb. weight.
 - .1 Acceptable product: No. 15 Shake felt by Hal Industries or preapproved equal.
- .5 Eave Protection:
 - .1 Acceptable products:
 - .1 Asphalt saturated felt, 2 layers of No. 15, to CSA A123.3M 1979, perforated.
 - .2 2 layers of No.15 Shake Felt by Hal Industries or preapproved equal.

- .6 Metal Flashings: 26 gauge, dark brown, prepainted and galvanized flashings. Minimum galvanizing is to be G90 or AZ150.
 - .1 Acceptable products
 - .1 Dofasco Series 8000+ pre-finished steel
 - .2 Stelco Series 8000+ pre-finished steel
 - .3 VicWest Colorite HMP
 - .4 Cascadia Metals 12000 Series PVDF coated
 - .2 Colour to match existing flashings where flashing is below cedar roof.
- .7 Nails: Fabricate to CSA B111. All fasteners to be stainless steel ring shank type. Nails must have sufficient length to penetrate the underlying strapping a minimum of 20 mm, or in the case of plywood, completely through the sheathing. Staples and T-nails will not be accepted.
- .8 Spaced wood sheathing (for replacement of deteriorated strapping):
 - .1 All wood sheathing to be pressure treated wood as per Specification 06 05 73 and 06 10 00.
 - .2 Spaced sheathing (across down the slope) is to be 1x6 strapping spacing to match the weather exposure of the cedar roofing.

3 EXECUTION

3.1 GENERAL REQUIREMENTS

- .1 Install cedar shingles in accordance with RCABC Roofing Practices manual RGC system sheet specification STR-CS.
- .2 Whenever the requirements explicitly stated in this specification are more stringent than noted in the above RGC specifications the more stringent requirement will apply.

3.2 REMOVAL OF EXISTING ROOFING

- .1 Remove existing cedar shakes and underlayment.
- .2 Retain existing flashings where indicated remove other flashings.
- .3 Consultant to inspect roof sheathing as required. Cut out and remove portion of sheathing affected by rot or fungal attack as directed on site by Consultant.
- .4 Replace cut out portions of sheathing with new sheathing of equal sectional dimensions, and specified grade. Seat each end of board on rafter, with 1" bearing, and secure to rafter.

3.3 ROOFING FELT UNDERLAYMENT

- .1 Install a 30" wide strip of **No. 15 felt** over roofing felt at valleys, hips and ridges prior cedar roofing and flashing installation. All laps in the **felt** must be formed to shed water (ie. shingle laps).
- .2 Install 24" (minimum) wide crimped metal flashings in valleys. Flashing to have a central fold and hemmed edges on sides.

3.4 SHINGLE APPLICATION

- .1 Do cedar roof work in accordance with CSA O118 and as described in the RGC specifications.
- .2 Install shingles over dry substrate.
- .3 Install shingles as required as recommended for roof slope and shingle/shake length. Refer to RGC specification.
- .4 Shingles are to be applied in straight single courses.
- .5 Lay shingles with grain perpendicular to eaves.
- .6 Saw shingles parallel to valley centre line. Do not break joints into valley.
- .7 Butts of first course must project minimum of 1-1/2" (40mm) beyond roof edge.
- .8 Minimum projection of cedar roofing for gable ends is 1" (25mm)
- .9 Maximum recommended exposure must not be exceeded.
- .10 Space shingles from 1/4" to 3/8" (6 to 10 mm).
- .11 Stagger joints minimum of 1-1/2" (40 mm) in succeeding courses. Ensure that in any 3 courses no two joints are in alignment.
- .12 Over hips and ridges use shingles of uniform width approximately 6" (150 mm) wide. Apply shingles at same weather exposure as field of roof.
- .13 Use two nails per shingle. Space nails 3/4" (20 mm) from edge and 1-1/2" (40 mm) above butt line of following course.
- .14 Drive nails flush but do not crush shingles.
- .15 Install step flashings at vertical surfaces meeting sloped roofing. Extend flashing a minimum of 5" up vertical surfaces, 4" between courses of roofing and 3" headlap. Interlace step flashing with each successive course of shingles/shakes.
- .16 Install apron, backpan, and counter flashings as required following the RGC specification.
- .17 Penetrations through the cedar roofing is to follow RGC recommendations.
- .18 All ridges and hips to receive an underlayment of 15lb roofing felt prior to capping. All hips and ridges to be of alternate underlay and use concealed fasteners.
- .19 Provide zinc strips at all ridges, hips and shoulders. Exposure 4.

3.5 SIDEWALL APPLICATIONS

- .1 Sidewall applications to follow the recommendations in the RGC Roofing practices manual Section 7.2.2.2 and 7.2.3.1 as applicable.
- .2 Install all shingles in single coursing pattern.

END OF SECTION

1 GENERAL

1.01 SUMMARY

- .1 Work includes provision of sealants and related accessories including:
 - .1 Preparing joint surfaces.
 - .2 Primers and joint backing.
 - .3 Installation of sealants in interior and exterior joints, around items penetrating structure, and other applications to allow expansion, contraction, and other movement while protecting against intrusion of water, air, and foreign matter.
 - .4 Tooling silicone sealant joints and cleaning adjacent surfaces.

1.02 REFERENCES

- .1 ASTM International (ASTM):
 - .1 ASTM C510-05a - Standard Test Method for Staining and Color Change of Single and Multi-component Joint Sealants.
 - .2 ASTM C639-01(2011) - Standard Test Method for Rheological (Flow) Properties of Elastomeric Sealants.
 - .3 ASTM C661-06(2011) - Standard Test Method for Indentation Hardness of Elastomeric Type Sealants by Means of a Durometer.
 - .4 ASTM C679-03(2009)e1 - Standard Test Method for Tack-Free Time of Elastomeric Sealants.
 - .5 ASTM C719-93(2010) - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
 - .6 ASTM C794-10 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.
 - .7 ASTM C920-11 – Standard Specification for Elastomeric Joint Sealants.
 - .8 ASTM D412-06a(2013) - Standard Test Method for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension.
 - .9 ASTM D624-00(2012) - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
 - .10 ASTM D2202-00(2010) - Standard Test Method for Slump of Sealants.
 - .11 ASTM D2240-05(2010) – Standard Test Method for Rubber Property - Durometer Hardness.
- .12 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .13 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .14 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).

1.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Manufacturer's product to describe.
 - .1 Caulking compound.

- .2 Primers.
- .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
- .3 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Submit duplicate samples of each type of material and colour.
- .5 Cured samples of exposed sealants for each color where required to match adjacent material.
- .6 Submit manufacturer's instructions in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Instructions to include installation instructions for each product used.
- .7 Submit warranties for review by Departmental Representative.

1.04 QUALITY ASSURANCE / MOCK-UPS

- .1 Installer qualifications: 3 years successful experience installing joint sealants and acceptable to sealant manufacturer for installing their products.
- .2 During construction period, each type of sealant and related primer and backing shall be products provided by a single manufacturer.
- .3 Pre-Installation Adhesion Test:
 - 1. Prior to application of sealants, test each application condition to ensure sealant satisfactorily adheres to substrate.
 - 2. Apply sealant to sample substrate and perform hand-pull tab test in accordance with ASTM C1193, Method A.
 - 3. Determine if primer is required. If so, re-test using primer.
 - 4. Submit report to Consultant with description of test, results, and recommended installation procedures to obtain proper adhesion.
- .4 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
- .5 Construct mock-up to show location, size, shape and depth of joints complete with back-up material, primer, caulking and sealant.
- .6 Mock-up will be used:
 - .1 To judge workmanship, substrate preparation, operation of equipment and material application.
- .7 Locate where directed by Departmental Representative.
- .8 Allow 48 hours for review of mock-up by Departmental Representative before proceeding with sealant work.
- .9 When accepted, mock-up will demonstrate minimum standard of quality required for this Work. Approved mock-up may remain as part of finished Work.

1.05 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, handle, store and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.
- .3 Do not use sealants and primers after manufacturer's stated shelf life.

1.06 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .5 Unused sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
- .6 Divert unused joint sealing material from landfill to official hazardous material collections site.
- .7 Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic materials destined for recycling.
- .8 Fold up metal banding, flatten, and place in designated area for recycling.

1.07 SITE CONDITIONS

- .1 Environmental Limitations. Do not proceed with installation of joint sealants under following conditions:
 - .1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 3.0 degrees C of dew point or above 50 degrees C.
 - .2 Optimal sealant application temperature: 10 and 35 degrees C.
 - .3 When joint substrates are wet.
- .2 Joint-Width Conditions:
 - .1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- .3 Joint-Substrate Conditions:
 - .1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.08 ENVIRONMENTAL REQUIREMENTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Labour Canada.
- .2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .3 Ventilate area of work as directed by Departmental Representative by use of approved portable supply and exhaust fans.

1.09 WARRANTY

- .1 Project Warranty: Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Provide installer's standard 5 year warranty under provisions of Section 01 78 00 - Closeout Submittals. Warranty to be executed by authorized company official.
- .3 Provide manufacturer's standard 5 year warranty under provisions of Section 01 78 00 - Closeout Submittals. Warranty to be executed by authorized company official.
- .4 Manufacturer's warranty is in addition to, and not a limitation of, other rights Departmental Representative may have under Contract Documents.

2 PRODUCTS

2.01 SEALANT MATERIAL DESIGNATIONS

- .1 Wood components and electrical wire penetrations through siding, at flashing terminations:
 - .1 Single Component Urethane, to ASTM C920, Type S, Grade NS, Class 100/50, Use T, NT, M, G, A and O, colour to match.
 - .1 Acceptable Products: Tremco Dynamic FC Polyurethane Sealant or Sonneborn NP-1.
 - .2 Or pre-approved alternative.
 - .3 Joint size limitations:
 1. Width: 6mm to 25mm. Greater than 25mm only upon approval of Departmental Representative.
 2. Depth: 6mm to 12mm.
 3. Colour: to match existing.
- .2 Wood Windows – Glazing Putty:
 - .1 Acceptable Products: Bostik Linseed Putty or DAP '33' glazing putty.
 - .2 Or pre-approved alternative.
- .3 Wood Repair Putty (for window frames).
 - .1 Acceptable Product: Bostik Linseed Putty.
 - .2 Or pre-approved alternative.

- .4 Accessories:
 - .1 Cleaning solvents: As recommended by sealant manufacturer to be compatible with sealant and not adversely affect substrate.
 - .2 Wood Preservative for repair of decayed window frames: After decayed portions of wood are removed from the window frames, treat with Boracol 10-2BD to kill wood decay fungi.
 - .3 Cleaning cloths: Clean, soft, absorbent, lint-free cloths.
 - .4 Substrate primer: As recommended for project conditions and provided by sealant manufacturer
 - .5 Sealant backing: Provide backing complying with ASTM C1330 open-cell polyurethane.
 - .1 Size: Greater than joint opening by 25 percent minimum.
 - .6 Bond breaker tape: Provide tape to prevent adhesion to joint fillers or joint surfaces at back of joint and allow sealant movement.
 - .1 Type: Polyethylene or other plastic tape recommended by sealant manufacturer.

2.02 JOINT CLEANER

- .1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.
- .2 Primer: as recommended by manufacturer.

3 EXECUTION

3.01 PROTECTION

- .1 Protect installed Work of other trades from staining or contamination.

3.02 SURFACE PREPARATION

- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work. Clean nonporous substrates with two-cloth solvent wipe in accordance with ASTM C1193.

 - .1 Pour cleaning solvent onto clean cloth. Wipe vigorously to remove contaminants.
 - .2 Immediately wipe cleaned area with separate cloth before solvent has evaporated.
- .2 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.
- .3 Ensure joint surfaces are dry and frost free.
- .4 Prepare surfaces in accordance with manufacturer's directions. Do not apply in totally confined spaces without ventilation for curing.

3.03 PRIMING

- .1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
- .2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.
- .3 Apply primer to substrates determined by adhesion test.
 - .1 Pour primer into small, clean container. Use within 10 minutes to avoid contamination.
 - .2 Dip cloth into primer and wipe a thin film onto substrate. Use brush for inaccessible areas. Do not over-apply.
 - .3 Allow primer to dry. Apply sealant the same day surfaces are primed.
 - .4 Do not apply primer to sealant joint backing.
- .4 Masking: Apply masking tape as required to protect adjacent surfaces and to ensure straight bead line and facilitate cleaning.

3.04 BACKUP MATERIAL

- .1 Avoid three sided sealant adhesion by use of backer rod or bond breaker tape. Apply bond breaker tape where required to manufacturer's instructions.
- .2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.05 MIXING

- .1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.06 APPLICATION

- .1 Sealant.
 - .1 Apply sealant in accordance with manufacturer's written instructions.
 - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
 - .3 Sealant backing: install without gaps, twisting, stretching, or puncturing backing material. Use gage to ensure depth to achieve correct profile, coverage and performant.
 - .4 Apply sealant in continuous beads.
 1. Use sealant-dispensing equipment to push sealant bead into opening. Fill joint opening to full and proper configuration. Apply in continuous operation. Ensure sealant fills entire joint and firmly contacts all surfaces.
 - .5 Use sufficient pressure to fill voids and joints solid.
 - .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
 - .7 Tooling: Before skinning or curing begins, tool sealant with metal stapula. Provide concave, smooth, uniform, sealant finish. Eliminate air pockets and ensure complete contact on both sides of joint opening. Tool joints with one continuous stroke.
 - .8 Remove excess compound promptly as work progresses and upon completion.

- .9 Complete horizontal joints prior to vertical joints. Lap vertical sealant over horizontal joints.
- .2 Curing.
 - .1 Cure sealants in accordance with sealant manufacturer's instructions.
 - .2 Uncured sealant: within 10 minutes of application, remove uncured sealant with solvent-dampened cloth, wearing solvent resistant gloves.
 - .3 Completely cured sealant: carefully cut or scrape away.
 - .4 Do not cover up sealants until proper curing has taken place.
 - .5 Ensure installed sealant is not painted as part of other construction operations unless specifically formulated to be painted.
- .3 Cleanup:
 - .1 Clean adjacent surfaces immediately and leave Work neat and clean.
 - .2 Remove excess and droppings, using recommended cleaners as work progresses.
 - .3 Remove masking tape after initial set of sealant.
- .4 Field Quality Control:
 - .1 Perform adhesion tests in accordance with manufacturer's instructions and ASTM C1193 Method A, Field-Applied Sealant Joint Hand-Pull Tab.
 - 1. Perform 1 test per floor per building elevation minimum.
 - 2. For sealant applied between dissimilar materials, test both sides of joint.
 - .2 Sealants failing adhesion test shall be removed, substrates cleaned, sealants re-installed, and re-testing performed.

END OF SECTION

1 General

1.1 Work Included:

- .1 Section Includes: All labor, materials, tools, scaffold and other equipment, services and supervision required to complete all exterior repainting work of all previously painted surfaces as indicated on Finish Schedules and to the full extent of the drawings and specifications.
- .2 Work under this Contract shall also include, but not necessarily be limited to:
 - .a Surface preparation of substrates as required for acceptance of paint, including cleaning, small crack repair, patching, caulking, and making good surfaces and areas to the limits defined under *MPI* Repainting Manual Preparation requirements.
 - .b Specific pre-treatments noted herein or specified in the *MPI* Repainting Manual.
 - .c Sealing / priming surfaces for repainting in accordance with *MPI* Repainting Manual requirements.
- .3 Include all incidental items not specifically noted above but considered part of the finished surface.
- .4 Refer to Finish Schedule for type, location and extent of exterior repainting required scheduled or specified.
- .5 This Section along with the Finish Schedule forms part of the Contract documents and is to be read, interpreted and coordinated with all other parts.
- .6 Division 0, and Division 1, General Requirements form an integral part of this Section of Work. The Painting Contractor shall refer to these and all other related parts.

1.2 Related Sections – Work Excluded:

- .1 Unless otherwise noted, the following work is not included under this Section of work
 - .a Condition of substrates, correction of DSD-4 defects and deficiencies in substrates which may adversely affect repainting work, except for minimal work performed by this trade and preparation of surfaces to receive paint and finishes under this section of work.
 - .b Correction of leaking windows, flashings, decks, membranes, scuppers, stucco or other jurisdictional items.

1.3 Quality Assurance:

- .1 The Contractor shall have a minimum of five (5) years proven satisfactory experience and shall show proof before commencement of work that he will maintain a qualified crew of painters throughout the duration of the work. When requested, the Painting Contractor shall provide a list of the last three comparable exterior repainting jobs including, name, location, Specifying Authority / Project Manager/ Property Management, start / completion dates and value of the work.

- .2 Only trades qualified journeypersons, as defined by local jurisdiction, shall be engaged in exterior repainting work. Registered apprentices may be employed provided they work under the direct supervision of a qualified journeyperson in accordance with trade regulations.
- .3 All materials, preparation and workmanship shall conform to the standards contained in the latest edition of the Master Painters Institute (**MPI**) Maintenance and Repainting Manual (herein referred to as the **MPI** Repainting Manual) as issued by the local **MPI** Accredited Quality Assurance Association having jurisdiction.
- .4 All exterior repainting work shall be inspected by the MPDA Inspection Agency acceptable to the local **MPI** Accredited Quality Assurance Association. The Painting Contractor shall notify the MPDA Inspection Agency a minimum of one week prior to commencement of work and provide all documents defined in Section 1300 Submittals.
- .5 **All surfaces requiring repainting shall be inspected** by the Painting Contractor who shall notify the MPDA Inspection Agency, Owner or Authorized Representative in writing of any defects or problems, prior to commencing repainting or after preparation work.

1.4 Inspection

- .1 The MPDA Technical Representative will not be responsible for and will not have control, or supervise the Painting Contractor or Subcontractors in performance of the Work.
- .2 The MPDA Technical Representative will be responsible to observe and report and shall not be responsible for the Painting Contractor or Subcontractors failure to carry out the Work in accordance with the Contract Documents.

1.5 Regulatory Requirements:

- .1 Conform to work place safety regulations for storage, mixing, application and disposal of all paint related materials to requirements of those authorities having jurisdiction.
- .2 Conform to safety precautions in accordance with the latest requirements to Industrial Health and Safety Regulations, latest edition, of authorities having jurisdiction.
- .3 Comply with WorkSafeBC Lead Abatement requirements, to include Exposure Control Plans and Risk Assessment and removal, copies to be submitted to Owners.
- .4 Notify the MPDA Inspection Agency on award of contract and make application for assignment of an MPDA Technical Representative using appropriate forms supplied by the Agency as well as, finish schedule and list of MPI Approved Products Intended for Use on the Project for verification purposes prior to commencement of work.
 - .a Fully cooperate at all times with the requirements of the MPDA Paint Inspection Agency in the performance of their duties, including providing access and assistance as required to complete inspection work.
- .5 To reduce the amount of contaminants entering waterways, sanitary / storm drain systems or into the ground the following procedures shall be strictly adhered to but not limited to:
 - .a Retain cleaning water for water-based materials to allow sediments to be filtered out.
 - .b Retain cleaners, thinners, solvents and excess paint and place in designated

- containers and ensure proper disposal.
- .c Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
- .c Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
- .d Empty paint cans are to be dry prior to disposal or recycling (where available).
- .e Close and seal tightly partly used cans of materials including sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.
- .f Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.

1.6 Mock-Ups:

- .1 When requested by the Owner, Authorized Representative or MPDA Technical Representative, prepare and repaint a designated exterior surface area or item to requirements specified herein, with specified paint or coating showing selected colors, gloss / sheen, texture and workmanship to *MPI* Repainting Manual standards for review and approval. When approved, the exterior surface area and/or item shall become the acceptable standard of finish quality and workmanship for similar on-site repainting work.

1.7 Submittals:

- .1 All submittals shall be in accordance with the requirements of Section 01300 - Submittals.
- .2 Submit written proof of ability to supply a 100% two (2) year Maintenance Bond, if Paint Association warranty option is not used with Bid Submission.
- .3 Submit list of all MPI Approved Products Intended for Use on the Project to the MPDA Inspection Agency for review prior to ordering materials, including sundries.
- .4 Submit two sets of Material Safety Data Sheets (MSDS) prior to commencement of work for review and for posting at job site as required.
- .5 Submit certification reports for ecologo paint products used.
- .6 If requested submit an invoice list of all paint materials ordered for the Work to the Paint Inspection Agency indicating manufacturer, types and quantities for verification and compliance with specification.
- .7 Submit work schedule for various stages of the Work to the Owner or Authorized Representative for approval if requested.
- .8 At project completion provide an itemized list complete with manufacturer, paint type and color coding for all colors used for Owner's later use in maintenance.

1.8 Product Delivery, Storage and Handling:

- .1 Deliver all painting materials in sealed, original labeled containers bearing manufacturer's name, brand name, type of paint or coating and color designation, standard compliance, materials content as well as mixing and/or reducing and application requirements.
- .2 Store all paint materials in original labeled containers in a secure (lockable), dry, heated and well ventilated single designated area meeting the minimum requirements of both paint manufacturer and authorities having jurisdiction and at a minimum ambient temperature of 45 F (7 C). Only materials used on this project are to be stored on site.
- .3 Where toxic and/or volatile / explosive / flammable materials are being used, provide adequate fireproof storage lockers and take all necessary precautions and post adequate warnings (e.g. no smoking) as required.
- .4 Take all necessary precautionary and safety measures to prevent fire hazards and spontaneous combustion and to protect the environment from hazard spills. Materials that constitute a fire hazard (paints, solvents, drop clothes, etc.) shall be stored in suitable closed and rated containers and removed from the site on a daily basis.
- .5 Comply with requirements of authorities having jurisdiction, in regard to the use, handling, storage and disposal of hazardous materials.

1.9 Temporary Facilities

- .1 The temporary use of existing electrical power and water services shall be subject to the conditional approval of the Owner. Disconnect all such temporary services as required and remove at job completion; the Painting Contractor shall supply their own hoses, cords, etc.
- .2 Unless otherwise approved or supplied by the Owner, provide temporary dry, heated, ventilated and secure portable self-contained field office/material, equipment and tool storage shed(s) as required for the execution of the work to the requirements of the authorities having jurisdiction.
- .3 Unless otherwise approved or supplied by the Owner, provide and maintain clean, enclosed and screened sanitary facilities for use of trades in accordance with the authorities having jurisdiction.
- .4 At completion ensure all areas are cleaned and made good to the Owner's satisfaction.

1.10 Project /Environmental Requirements:

- .1 It is the Painting Contractors responsibility to conduct all required tests such as moisture content, pH tests, air and surface temperature and all other testing prior to the application of any coatings.
- .2 UNLESS specifically pre-approved by the Owner, Authorized Representative, MPDA Inspection Agency and the applied product manufacturer, perform no exterior repainting work when the ambient air and substrate temperatures are below 50 F (10 C).
- .3 Perform no exterior repainting work unless environmental conditions are within the MPI and paint manufacturer's requirements.

- .4 Perform no exterior repainting work when the relative humidity is above 85% or when the dew point is less than 5 F (3 C) variance between the air and surface temperature.

1.11 Protection

- .1 The Painting Contractor shall guard or otherwise protect the Work including all material, plant and real property related to the Work against loss or damage from any cause.
- .2 All ladders, scaffolds, lift equipment and general plant shall be securely locked when not in use to prevent access to the balconies, roofs or through windows by other parties than the Contractor.
- .3 Protect all exterior surfaces and areas, including landscaping, walks, drives, all adjacent building surfaces (including glass, aluminum surfaces, etc.) and equipment and any labels and signage from repainting operations and damage by drop cloths, shields, masking, templates, or other suitable protective means and make good any damage caused by failure to provide such protection.

1.12 Scheduling:

- .1 Schedule repainting operations to prevent disruption of Owner's operations or building occupants. Obtain written authorization from Owner or Authorized Representative for changes in work schedule.

1.13 Guarantee:

- .1 Furnish a two (2) year Maintenance Bond both in accordance with MPI Repainting Manual requirements (one (1) year on Wood Fences). The Maintenance Bond shall be obtained from an approved bonding company and shall warrant that all repainting work has been performed in accordance with MPI Repainting Manual requirements.
- .2 All exterior repainting work shall be in accordance with MPI Repainting Manual requirements and shall be inspected by the Painting Association whether using the Painting Association Guarantee or the Maintenance Bond option.
- .3 The cost for such Painting Association inspections, at 5% of the contract value, as well as either the Painting Association Guarantee or Maintenance Bond shall be included in the Base Bid Price and any Separate Pricing or Cost Plus items awarded to the Painting Contractor.
- .4 Painting Subcontractors choosing the Maintenance Bond option shall provide written proof of their ability to supply same at time of bidding.

1.14 Maintenance Materials:

- .1 At project completion provide a minimum of 4 liters (1 gallon) of each type and color of paint from same production run (batch mix) used in unopened cans, properly labeled and identified for Owner's later use in maintenance.

2 PRODUCTS

2.1 Materials:

- .1 All materials (primers, paints, coatings, varnishes, stains, etc.) shall be products listed in the latest edition of the **MPI** Approved Product List and shall be from a single manufacturer for each system used.
- .2 Other paint sundries such as linseed oil, shellac, solvents, shall be the highest quality product and shall be compatible with other coating materials as recommended by the MPI Approved product manufacturer.
- .3 All materials and paints shall be lead and mercury free.
- .4 Where required, paint products shall meet **MPI** Environmentally Friendly" [E1] [E2] [E3] ratings based on VOC (EPA Method 24) content levels.
- .5 Caulking and filling compounds shall be as recommended by the Painting Contractors chosen paint manufacturer.
- .6 All paint materials shall have good flowing and brushing properties and shall dry or cure free of blemishes, sags, air entrapment, etc. Refer to 3.5, Field Quality Control / Standard of Acceptance requirements.
- .7 Slip Resistant Additives (SRA): rubber aggregate or clean / washed silica sand for use with or as a component part of paint (usually floor / porch / stair enamel) on exterior horizontal surfaces as required to provide slip resistance. Where site applied, material to either mixed into paint and mixed constantly to keep material in suspension.

2.2 Equipment:

- .1 Painting Equipment: to best trade standards for type of product and application.
- .2 Spray-Painting Equipment: of ample capacity, suited to the type and consistency of paint or coating being applied and kept clean and in good working order at all times.

2.3 Mixing and Tinting:

- .1 Unless otherwise specified or pre-approved, all paints shall be ready-mixed and pre-tinted. Re-mix all paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and color and gloss uniformity.
- .2 Catalyzed paint mixes shall be mixed in strict accordance with manufacturer's written instructions.
- .3 Where thinner is used, addition shall not exceed paint manufacturer's recommendations.

- .4 If required, thin paint for spraying in strict accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to the MPDA Inspection Agency.

2.4 Finish and Colors:

- .1 Unless otherwise specified herein, all exterior repainting work shall be done in accordance with **MPI** Premium Grade requirements.
- .2 Colors shall be as selected by the Owner or Authorized Representative from a manufacturer's full range of colors. Refer to the Finish Schedule for identification and location.
- .3 Color selection will be based on four (4) base colors and two (2) accent colors. No more than (six (6)) colors will be selected for exterior painting work on this project unless specified otherwise.
- .4 Provide a slip resistant additive to exterior painted stair treads, landings etc.

2.5 Gloss / Sheen:

- .1 Paint gloss shall be defined as the sheen rating of applied paint, in accordance with the following **MPI** gloss / sheen standard values:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	Matte or Flat finish	0 to 5	10 maximum
G2	Velvet finish	10 maximum	10 to 35
G3	Eggshell finish	10 to 25	10 to 35
G4	Satin finish	20 to 35	35 minimum
G5	Semi-Gloss finish	35 to 70	
G6	Gloss finish	70 to 85	
G7	High-Gloss finish	> 85	

- .2 Gloss level ratings of all painted surfaces shall be as specified herein and as noted on Finish Schedule

2.6 Performance Characteristics:

- .1 Products for primer, 1st coat and 2nd coat outlined 3.7: Exterior Finish Schedule are to meet the following performance criteria:

.1 Zinc Rich Primer:

Test Name	Test Method	Results
Abrasion Resistance	ASTM D4060, CS17 wheel, 1000 cycles, 1kg load	45 mg loss
Corrosion Weathering	ASTM D5984, 15 cycles, 5000 hours	Rating 10 per ASTM D610 Rusting (field): Rating 10 per ASTM D714 Blistering
Salt Fog Resistance	ASTM B117, 5000 hours	Rating 10 per ASTM D610 for Rusting; Rating 10 per ASTM D714 for Blistering.

.2 Clear Single Component Moisture Curing Urethane Primer:

Test Name	Test Method	Results
Abrasion Resistance	ASTM D4060, CS17 wheel, 1000 cycles, 1kg load	88 mg loss
Flexibility	ASTM D522, 180° bend, 1/8" mandrel	Passes

.3 High Build Epoxy:

Test Name	Test Method	Results
Abrasion Resistance	ASTM D4060, CS17 wheel, 1000 cycles, 1kg load	84 mg loss
Corrosion Weathering	ASTM D5984, 36 cycles, 12,000 hours	Rating 10 per ASTM D714 for blistering; Rating 9 per ASTM D610 per rusting
Immersion	1 year fresh and salt water	Passes, no rusting, blistering, or loss of adhesion
Salt Fog Resistance	ASTM B117, 6,500 hours	Rating 10 per ASTM D610 for rusting; Rating 9 per ASTM D1654 for corrosion.

.4 Single Component Low VOC Moisture Curing Urethane:

Test Name	Test Method	Results
Abrasion Resistance	ASTM D4060, CS17 wheel, 1000 cycles, 1kg load	80 mg loss
Corrosion Weathering	ASTM D5984, 12 cycles, 4,032 hours	Rating 10 per ASTM D610 for rusting; Rating 10 per ASTM D714 for blistering.
Salt Fog Resistance	ASTM B117, 6,500 hours	Rating 10 per ASTM D610 for rusting; Rating 9 per ASTM D714 for blistering.

.5 Single Component Moisture Curing Urethane (Aluminum and Micaceous Iron Oxide Filled Urethane Type):

Test Name	Test Method	Results
Adhesion	ASTM D4541	1000 psi
Corrosion Weathering	ASTM D5894, 1700 hours, 5 cycles	Rating 9 per ASTM D610 for rusting; Rating 9 per ASTM D714 for blistering.
Moisture Condensation Resistance	ASTM D4585, 100°F (38°C), 300 hours	Passes
Salt Fog Resistance	ASTM B117, 2300 hours	Rating 10 per ASTM D610 for rusting; Rating 10 per ASTM D714 for blistering.

3 EXECUTION

3.1 Condition of Surfaces:

- .1 Prior to commencement of repainting work, thoroughly examine (and test as required) all exterior conditions and surfaces scheduled to be repainted and report in writing to the Owner, Authorized Representative and MPDA Inspection Agency where applicable; any

conditions or surfaces that will adversely affect work of this section.

- .2 The degree of surface deterioration (DSD) shall be assessed using the assessment criteria indicated in the *MPI* Maintenance Repainting Manual. In general the *MPI* DSD ratings and descriptions are as follows:

Condition	Description
DSD-0	Sound Surface (may include visual (aesthetic) defects that do not affect films protective properties).
DSD-1	Slightly Deteriorated Surface (may show fading; gloss reduction, slight surface contamination, minor pin holes scratches, etc.) / Minor cosmetic defects (runs, sags, etc.).
DSD-2	Moderately Deteriorated Surface (small areas of peeling, flaking, slight cracking, staining, etc.).
DSD-3	Severely Deteriorated Surface (heavy peeling, flaking, cracking, checking, scratches, scuffs, abrasion, small holes and gouges).
DSD-4	Substrate Damage (repair or replacement of surface required by others).

- .3 No repainting work shall commence until all such DSD-4 adverse conditions and defects have been corrected and surfaces and conditions are acceptable to the Painting Contractor. The Painting Contractor shall not be responsible for the condition of the substrate or for correcting defects and deficiencies in the substrate, which may adversely affect the painting work except for minimal work normally performed by the Painting Contractor and as, indicated herein. It shall always, however, be the responsibility of the Painting Contractor to see that surfaces are properly prepared before any paint or coating is applied.
- .4 It shall also be the Painting Contractor's responsibility to paint the surface as specified providing that the owner accepts responsibility for uncorrected DSD-4 substrate conditions.

3.2 Preparation of Surfaces:

- .1 Prepare and test all exterior surfaces scheduled for repainting in accordance with MPI Repainting Manual requirements and applicable SSPC Standards. Refer to the MPI Repainting Manual in reference to specific requirements for the following:
- .a environmental conditions.
 - .d rust stain removal.
 - .e mildew removal.
 - .i structural steel and miscellaneous metals.
 - .k galvanized and zinc coated metal.
- .2 Refer to the following SSPC Standards:
- SSPC-PA 1 Shop, Field and Maintenance Painting
 - SSPC-PA Measurement of Dry Paint Thickness With Magnetic Gages
 - SSPC-PA A Guide to Safety In Paint Application
 - SSPC-SP1 Solvent Cleaning
 - SSPC-SP10 Near White Blast

- .3 Structural steel surfaces are to be abrasive blast cleaned to the requirements of SSPC-SP10 Near White Blast Cleaning, refer to manufacturers Technical Data for recommended blast profile and type.
- .4 On completion of all abrasive blast cleaning operations, all surfaces shall be blown off with compressed air and cleaned by vacuum so that all products of abrasive blast cleaning are removed from surfaces, pockets and corners.
- .5 All irregular angles, edges, bolts, pitted sections shall be given a stripe coat of the primer and finish in addition to the spray application.
- .6 Any defects in the coating application stages shall be corrected prior to proceeding with subsequent coats.
- .7 Areas exceeding the maximum coating thickness will require sanding back to a sound surface and recoated to meet the manufacturers requirements.
- .8 All preparation and application procedures shall conform to the requirements of the manufacturers latest "Technical Data" for the product specified.

3.3 Application:

- .1 Do not commence repainting unless substrates and all environmental conditions are acceptable for the application of products.
- .2 Apply primer, paint or stain in accordance with **MPI** Painting Manual Premium Grade finish requirements unless otherwise specified.
- .3 If the Painting Contractor elects to utilize spray application methods then all coating applications will require back-rolling/brushing unless approved otherwise by the Owner, Authorized Representative or MPDA Inspection Agency.
- .4 Apply primer, paint or stain in a workmanlike manner using skilled and trade qualified applicators as noted under Quality Assurance.
- .5 Apply primer, paint or stain within an appropriate time frame after cleaning and preparation to prevent weathering or water staining of substrate or before environmental conditions encourage flash-rusting, rusting, contamination or when the manufacturer's paint specifications require earlier applications.
- .6 Primer, paint or stain coats specified are intended to cover surfaces satisfactorily when applied at proper consistency and in accordance with manufacturer's recommendations.
- .7 Tint each coat of paint progressively darker to enable confirmation of number of coats unless approved by the MPDA Inspection Agency.
- .8 Where deep or bright colors are used allow for the application of additional finish coats to achieve satisfactory results.
- .9 Sand and dust between each coat to provide an anchor for next coat and to remove surface defects such as runs, sags, etc. on existing and new coatings were applicable for the surface texture.

- .10 Do not apply finishes on exterior surfaces that are not sufficiently dry. Unless manufacturer's directions state otherwise, each coat shall be sufficiently dry and hard before a following coat is applied.
- .11 To avoid air entrapment in applied coats, apply materials in strict accordance with manufacturer's spread rates and application requirements.
- .12 Where touch-up painting is undertaken and found to be noticeable, the entire surface will require repainting from break to break or corner to corner.

3.4 Field Quality Control / Standard of Acceptance:

- .1 All surfaces, preparation and paint applications shall be inspected by the MPDA Inspection Agency.
- .2 Repainted exterior surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent to the MPDA Technical Representative and not limited to:
 - .a brush/roller/tracking, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coatings.
 - .b spray application defects such as dry spray, gun spits, heavy orange peel etc.
 - .c damage due to touching before paint is sufficiently dry or any other contributory cause.
 - .d damage due to application on moist surfaces.
 - .e damage and/or contamination of paint due to wind blown contaminants (dust, sand blast materials, salt spray, etc.).
- .3 Repainted exterior surfaces shall be considered unacceptable if any of the following are evident under natural lighting conditions:
 - .a visible defects are evident on vertical surfaces when viewed at 90 degrees to the surface from a distance not less than 1000 mm (39").
 - .b visible defects are evident on horizontal surfaces when viewed at 45 degrees to the surface from a distance not less than 1000 mm (39").
 - .c visible defects are evident on soffit and other overhead surfaces when viewed at 45 degrees to the surface
 - .d when the final coat on any surface exhibits a lack of uniformity of sheen across full surface area.
- .4 Repainted surfaces rejected by the Owner or Authorized Representative or MPDA Technical Representative shall be made good at the expense of the Painting Contractor.

3.6 Clean-up:

- .1 Remove all paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that will not cause damage to the finished surfaces.
- .2 Keep work area free from any unnecessary accumulation of tools, equipment, surplus materials and debris.
- .3 Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.

- .4 Clean equipment and dispose of wash water / solvents as well as all other cleaning and protective materials (e.g. rags, drop cloths, masking papers, etc.), paints, thinners, paint removers/strippers in accordance with the safety requirements of authorities having jurisdiction.
- .5 All brushes, rollers and spray equipment solvent residue shall not be disposed into site drains, utility sinks or any other water drainage system

3.7 Exterior Finish Schedule:

- .1 Repaint exterior surfaces in accordance with the following **MPI** Repainting Manual premium grade requirements. Colours of new paints are to match existing colours.

REX 5.1 Structural Steel & Metal

REX 5.1 Custom (A)	DSD 3	Stinkeroo Tank 2 Fish Oil Tanks 1 Barometric Condenser Ladders/Framing/Platforms	BE2.0 Ref: 9A/9B/9C BE2.0 Ref: 4A/4B/4C/4D BE2.0 Ref: 1A/1B
Full-Prime		Zinc Rich Primer	
1 st Coat		Single Component Moisture Curing Urethane (Aluminum and Micaceous Iron Oxide Filled Urethane Type)	N/A
2 nd Coat		Single Component Moisture Curing Urethane (Aluminum and Micaceous Iron Oxide Filled Urethane Type)	N/A
REX 5.1 Custom (B)	DSD 3	Ice Machine Components Pipes, Valves and Fittings Stair Handrails	BE2.0 Ref: 2A/2B/2C/2D
Full-Prime		Zinc Rich Primer	
1 st Coat		High Build Epoxy	N/A
2 nd Coat		Single Component Low VOC Moisture Curing Urethane Aliphatic Finish Coat	G6 Gloss

REX 5.3 Galvanized Surfaces

REX 5.3 Custom (A)	DSD 3	Existing Dryer Shed Exhaust Vent Addition Dryer Shed Exhaust Vent	BE2.0 Ref: 6 BE2.0 Ref: 3
Full Prime		Clear Single Component Moisture Curing Urethane Primer	
1 st Coat		Single Component Moisture Curing Urethane (Aluminum and Micaceous Iron Oxide Filled Urethane Type)	N/A
2 nd Coat		Single Component Moisture Curing Urethane (Aluminum and Micaceous Iron Oxide Filled Urethane Type)	N/A
REX 5.3 Custom (B)	DSD 3	Boiler Stacks	BE2.0 Ref: 5/7 & 8
Full Prime		Clear Single Component Moisture Curing Urethane Primer	
1 st Coat		Single Component Moisture Curing Urethane (Aluminum and Micaceous Iron Oxide Filled Urethane Type)	N/A
2 nd Coat		Single Component Low VOC Moisture Curing Urethane Aliphatic Finish Coat	N/A

APPENDIX 1

LEAD-CONTAINING PAINT AND LIMITED ASBESTOS SAMPLING

Gulf of Georgia Cannery
Moncton Street, Richmond, BC

FINAL REPORT



Prepared for:

Public Works and Government Services Canada
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Project No.:

1237-10616

Date:

March 26, 2013



Stantec



Stantec

EXECUTIVE SUMMARY

Stantec Consulting Ltd. (Stantec) was retained by Public Works Government Services Canada (PWGSC) to conduct lead-containing paint and limited asbestos sampling at the Gulf of Georgia Cannery located on Moncton Street in Richmond BC (subject building).

The purpose of the assessment was to determine the presence (or absence), location and estimated quantities of lead-containing paints (LCPs) and/or asbestos-containing materials (ACMs) within areas that may be impacted by proposed renovation activities, to meet the requirements of the Canada Labour Code, Part II Occupational Health and Safety Regulations (Canada Labour Code) and *British Columbia's Occupational Health & Safety Regulation* (BC Reg. 296/97).

Based on Stantec's visual assessment and on the laboratory analyses performed on samples collected, LCPs and ACMs were identified within the subject building, in areas to be impacted by proposed renovations.

A summary of our findings is presented below. It should be noted that this summary is subject to the same limitations restrictions and limitations as presented in Section 4 (Assessment Limitations) and Section 7 (Closure). The information provided is to be read in conjunction with the remainder of this report.

Recommendations pertaining to the handling, removal, transportation and/or disposal of identified LCPs and ACMs are provided in Section 6 of this report.

Summary of Findings

Lead-Containing Paints

The following paints were identified as LCPs

- Green paint on east cannery building interior walls and window frames.
- Yellow paint on east cannery building interior walls and window frames.
- White paint on Vitamin oil building interior walls and ceiling.
- White paint on vitamin oil building exterior walls.
- Burgundy paint on cannery building exterior trim.
- Cream paint on cannery building interior ceiling and west wall.
- Purple paint on north storage sheds exterior trim.
- Burgundy paint on north cannery building exterior trim.
- Yellow paint on north end of cannery building exterior mechanical pipe.
- Silver paint on ice house upper interior walls.
- White paint on ice house lower interior walls.

It should also be noted that lead is expected to be present in the solder used on copper domestic pipes, is likely present in the caulking on bell fittings for cast iron drainage pipes and is expected to be present in electrical equipment (i.e., batteries for emergency lighting/signage).

Lead Leachate

Analytical results indicated that the representative sample collected (paint and substrate, sampled in a form presumed to be representative of waste generated during corrective action and/or removal of multiple types of lead-containing paints) would not create waste that would be leachable for lead in excess of acceptable landfill criteria.

Lead-Containing Paint and Limited Asbestos Sampling

Gulf of Georgia Cannery
Moncton Street, Richmond, BC
Final Report
Executive Summary

Summary of Findings

Asbestos-Containing Materials (ACMs)

Through limited assessment and sampling, asbestos-containing cement panels were identified in the following locations:

- At the front entrance of the east wing (exterior - approximately 2,400 ft²)
 - On the east wall of the cannery building (exterior - approximately 200 ft²)
 - On the south wall of the dryer shed (exterior - approximately 2,000 ft²)
 - On the west wall of the dryer shed at the roof (exterior - approximately 600 ft²).
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1 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by Public Works Government Services Canada (PWGSC) to conduct lead-containing paint and limited asbestos sampling at the Gulf of Georgia Cannery located on Moncton Street in Richmond BC(subject building).

The purpose of the assessment was to determine the presence (or absence), location and estimated quantities of lead-containing paints (LCPs) and/or asbestos-containing materials (ACMs) within areas that may be impacted by proposed renovation activities, to meet the requirements of the Canada Labour Code, Part II Occupational Health and Safety Regulations (Canada Labour Code) and *British Columbia's Occupational Health & Safety Regulation* (BC Reg. 296/97).

Site work was completed within the subject building on March 11, 2013.

2 BACKGROUND

The subject building was reportedly constructed in stages between 1894 and 1964. These construction eras are consistent with dates when LCPs and ACMs were commonly used in construction.

Stantec understands that renovation activities are proposed to occur within the subject building, whereby many exterior and some interior painted surfaces will be affected, as follows.

- Corrective action and/or removal for exterior paints
- Corrective action and/or removal for interior paints in the vitamin oil building and ice house
- Renovations within the boiler house

Based on the above and in accordance with the requirements of the Canada Labour Code and BC Reg. 296/97 pertaining to identification and removal of hazardous building materials prior to renovation activities, PWGSC commissioned this assessment.

3 SCOPE AND METHODOLOGY

Keith Irwin and Zack Kranjec of Stantec conducted visual assessments within the subject building on March 11, 2013. Site work was conducted in general compliance with the requirements of BC Reg. 296/97.

Materials expected to be impacted by the proposed renovation activities, as outlined by the scope of work provided herein, within the subject building were visually examined to determine the suspected presence of LCPs and/or ACMs. Where building materials were suspected but not confirmed to contain lead (in paint), or asbestos, samples were collected for analysis to confirm or deny the presence of these hazardous materials. Based on analytical results, visually similar materials were referenced to specific analyzed samples to reduce the number of samples collected.

Additional background information and the methodology used for the determination of presence or absence of each specific hazardous material considered in this assessment are outlined in the following sections.

3.1 Lead-Containing Paints (LCPs)

The lead content of interior paint was limited to 0.5% by weight (5,000 parts per million, or “ppm”) in 1976 under the Federal *Hazardous Products Act*. Recently, the *Hazardous Products Act* had reduced the criteria for surface coatings (including paint) to 600 mg/kg (600 ppm) to define them as “lead-containing” (this has since been reduced to 90 ppm). In addition, WorkSafe BC has compiled a manual titled “*Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry*”, (Lead Guideline) which defines a “lead-containing surface coating material” and sets out requirements for coatings with a lead content that exceeds 600 mg/kg (or 600 ppm). As such, Stantec will reference this value (600 ppm) in defining paints as “lead-containing”.

Samples of suspected LCPs were collected from major paint applications, and were collected to substrate, where possible, in sufficient quantity to conduct analyses for total lead content. Samples collected were placed into separate, sealed, and labelled polyethylene bags, and submitted to EMSL for analyses of total lead content using Flame Atomic Absorption Spectrometry AAS (SW 846 3050B and 7420).

EMSL analytical laboratory is also accredited by the American Industrial Hygiene Association (AIHA) Environmental Lead Laboratory Approval Program.

3.1.1 Lead Leachate

As indicated in the British Columbia Hazardous Waste Regulation (BC Reg. 63/88), lead waste may be considered a toxic leachate (and require special disposal) if lead is in a dispersible form and its leachate contains greater than 5.0 milligrams per litre (mg/L) lead.

Based on the above, a representative sample of waste expected to be generated through alteration of painted surfaces identified for corrective action and/or removal throughout the subject building was collected, containing over 50 grams in weight. The sample was placed in a labelled plastic bag that was sealed and submitted to EMSL Canada Inc. of Mississauga, ON. Analysis of the sample was conducted by EMSL using Method 1311 Toxicity Characteristic Leaching Procedure (TCLP), described in US EPA Reg. 40CFR261 (Method EPA 200.8), Appendix II as recommended in BC Reg. 63/88.

3.2 Asbestos-Containing Materials (ACMs)

The common use of friable (materials which, when dry, can be easily crumbled or powdered by hand pressure) ACMs in construction generally ceased voluntarily in the mid-1970s but was only banned through legislation by the late 1980s. Friable asbestos was used in many building products, primarily high temperature insulations, spray-applied structural fireproofing, and a material called vermiculite that was commonly used as block wall insulation and may be contaminated with asbestos fibres. Asbestos was also used in many non-friable manufactured products such as floor tiles, ceiling tiles, Transite™ cement products, and various other construction materials. Some cement products currently used in the construction of buildings may still contain asbestos.

The presence of asbestos in federal workplaces, and pertaining to federally regulated workers is governed by the Canada Labour Code. The presence of asbestos in the workplace in British Columbia pertaining to provincially regulated workers is governed by BC Reg. 296/97. As both federally regulated workers and provincially regulated workers (e.g., contractors) are expected to carry out work activities within the subject buildings, and as the provincial regulations are generally more prescriptive pertaining to asbestos (and generally include the requirements noted in the Canada Labour Code), this assessment was conducted to meet the requirements of the BC Reg. 296/97

According to the current version of BC Reg. 296/97, asbestos-containing material (ACM) means any material containing at least 0.5% asbestos, or vermiculite insulation with any asbestos.

Based on this criterion, samples of suspected ACMs were collected and submitted to EMSL Canada Inc. (EMSL) in Mississauga, Ontario for analysis of asbestos content using Polarized Light Microscopy (PLM) with dispersion staining, in accordance with the United States Environmental Protection Agency (EPA) 600/R-93/116 method.

A positive stop option was used during the laboratory analysis of the building materials suspected to contain asbestos. Multiple samples of visually similar material were collected and submitted for laboratory analysis. If the first sample of the set analyzed was identified to contain asbestos, further analysis of the subsequent samples was deemed to be unnecessary and not conducted.

EMSL's analytical laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

3.2.1 Asbestos Sampling Quality Assurance/Quality Control

Sampling activities pertaining to asbestos were conducted in accordance with Stantec's Safe Work Practices (SWPs), which take into account current provincial regulations pertaining to such work (i.e., sampling procedures, required number of samples, and laboratory analytical procedures).

Representative bulk samples were collected of accessible suspect ACMs in sufficient quantities for laboratory analyses. Suspect ACM samples were sealed in polyethylene zip-lock bags labelled with the sample number, suspect material description, and sample location. As part of sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples.

Sample bags were compiled in order and placed into a single container accompanied with a Chain of Custody form outlining the project information, date, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

4 ASSESSMENT LIMITATIONS

This report reflects the observations made within accessed areas only and the results of analyses performed on specific materials sampled during the assessment. Analytical results reflect the sampled materials at the specific sample locations.

The limitations of this assessment pertaining to each of the considered hazardous building materials are outlined in the following sub-sections.

4.1 Lead-Containing Paints (LCPs)

Assessment for the presence of lead-containing paints was visual in nature, and was conducted pertaining to readily visible surfaces within accessible spaces of the subject building only. The presence of lead-containing paints in inaccessible areas not assessed includes, but is not limited to: ceiling spaces, wall cavities, crawlspaces, and buried materials.

Samples of suspected LCPs were collected within the subject building only from surfaces of major paint applications where visually different paint colours and/or types were identified and where paint applications were identified for corrective action and/or removal. Although the surfaces where samples were collected may be covered with more than one coat of paint, the paint samples are described by the surface (visible) colour only.

Attempts were made to represent all layers of paint in the samples collected. As analytical results are referenced to the surface paint colour only, the lead content of all painted surfaces similar to that represented by the surface paint colour will be presumed to be the same, regardless of differing sub-surface paints, if any.

Sampling and analysis for lead leachate was conducted where paint applications were identified for corrective action and/or removal. The lead leachate sample submitted was intended to represent a mixture of painted surfaces that would be removed and disposed of during the proposed renovation activities.

4.2 Asbestos-Containing Materials (ACMs)

As requested, assessment sampling associated with suspected ACMs was only conducted pertaining to building materials expected to be impacted during proposed renovation activities, as outlined herein. This assessment does not constitute a comprehensive ACM assessment for the subject building.

If encountered during renovation, demolition or other activities, any suspected ACMs not identified within this report should be presumed to contain asbestos and handled as such until otherwise proven, through analytical testing.

5 RESULTS

Floor plans showing bulk sample locations and locations of identified hazardous materials (where practical) are provided in **Appendix A**.

The results of the assessment for each of the considered hazardous materials are provided in the following sub-sections.

5.1 Lead-Containing Paints (LCPs)

Eighteen (18) paint chip samples of suspected LCPs were collected within the subject building and submitted to EMSL for analysis of lead content. A summary of the sample types, locations and analytical results is presented in Table 5.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected LCP samples submitted is included in **Appendix B**.

**Table 5.1.1: Summary of Suspected LCP Bulk Samples
 Gulf of Georgia Cannery – Moncton Street, Richmond, BC**


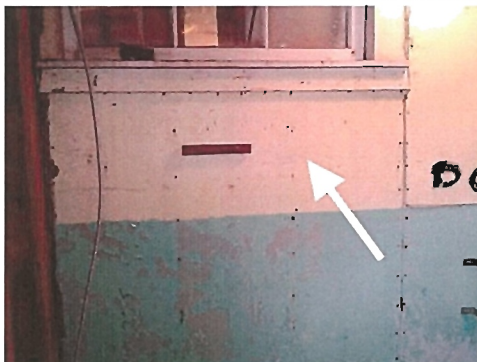

Sample Number	Paint Description	Location	Result (ppm)
PS-01	Purple	East equipment shelter exterior trim	< 90
PS-02	White	East equipment shelter exterior walls	< 90
PS-03	Green	East cannery building interior walls and window frames	7,200
PS-04	Yellow	East cannery building interior walls and window frames	5,800
PS-05	White	Vitamin oil building interior walls and ceiling	3,700
PS-06	White	Vitamin oil building exterior walls	9,500
PS-07	Burgundy	Cannery building exterior trim	6,400
PS-08	Red	Vitamin oil building front exterior trim and fence	< 90
PS-09	Cream	Cannery building interior ceiling and west wall	5,500
PS-10	White	South cannery building exterior walls	200
PS-11	Burgundy	South cannery building exterior trim	580
PS-12	Purple	Sheds 2 and 3 exterior trim	870
PS-13	Burgundy	North cannery building exterior trim (4 layers)	13,000
PS-14	White	Sheds 2 and 3 exterior walls	140
PS-15	Red	North cannery building exterior trim and fence	< 90
PS-16	Yellow	North end of cannery building exterior mechanical pipe	31,000
PS-17	Silver	Ice house upper interior walls	3,400
PS-18	White	Ice house lower interior walls	2,100




NOTE:

Yellow highlight and bolding indicates an Identified LCP.



Based on our observations and interpretations of suspected LCP sample analytical results, the materials presented in Table 5.1.2, below were identified as LCPs.

Table 5.1.2: Summary of Identified LCPs
Gulf of Georgia Cannery – Moncton Street, Richmond, BC

Lead-Containing Paint Description	Photo
<p>Green paint on east cannery building Interior walls and window frames.</p> <p>This paint was observed to be in poor condition (flaking and peeling).</p>	
<p>Yellow paint on east cannery building Interior walls and window frames.</p> <p>This paint was observed to be in good condition (minimal flaking, bubbling, and peeling).</p>	
<p>White paint on Vitamin oil building interior walls and ceiling.</p> <p>This paint was observed to be in good condition (minimal flaking, bubbling, and peeling).</p>	

Lead-Containing Paint Description	Photo
<p>White paint on vitamin oil building exterior walls. This paint was observed to be in poor condition (flaking and peeling).</p>	 A photograph showing the exterior of a building with white horizontal siding. A white arrow points to a section of the siding that is peeling and flaking. In the background, there is a walkway with a metal railing and some trees.
<p>Burgundy paint on cannery building exterior trim. This paint was observed to be in poor condition (flaking and peeling).</p>	 A close-up photograph of a building's exterior trim. The trim is painted a dark burgundy color and shows significant peeling and flaking. A white arrow points to the damaged area. A metal mesh fence is visible in the foreground.
<p>Cream paint on cannery building interior ceiling and west wall. This paint was observed to be in poor condition (flaking and peeling).</p>	 An interior photograph of a building showing the ceiling and a portion of a wall. The paint is a light cream color and is in poor condition, with large areas of flaking and peeling. A white arrow points to the damaged ceiling. Large windows are visible in the background.

Lead-Containing Paint Description	Photo
<p>Purple paint on north storage sheds exterior trim. This paint was observed to be in poor condition (flaking and peeling).</p>	
<p>Burgundy paint on north cannery building exterior trim (4 layers). This paint was observed to be in poor condition (flaking and peeling).</p>	
<p>Yellow paint on north end of cannery building exterior mechanical pipe. This paint was observed to be in poor condition (flaking and peeling).</p>	

Lead-Containing Paint Description	Photo
<p>Silver paint on ice house upper interior walls. This paint was observed to be in poor condition (flaking and peeling).</p>	
<p>White paint on ice house lower interior walls. This paint was observed to be in good condition (minimal flaking, bubbling, and peeling).</p>	

5.1.1 Lead Leachate

One (1) sample presumed to be representative of waste generated during corrective action and/or removal of multiple types of lead-containing paints was collected and submitted to EMSL for analysis of leachable lead content.

Analytical results indicated that the representative sample collected would not create waste that would be leachable for lead in excess of acceptable landfill criteria (2.8 mg/L). A copy of the certificate of analysis provided by EMSL for the sample submitted is included in **Appendix B**.

5.2 Asbestos-Containing Materials (ACMs)

Stantec understands that previously identified asbestos-containing cement roof panels are present on the Dryer Shed. As this material is not expected to be impacted during the planned renovation activities, additional sampling and/or assessment of this material was not part of the scope of this assessment.

Stantec identified and sampled various suspected ACMs that are anticipated to be impacted by planned renovations, including the following:

- Cement panels
- Corrugated roofing/siding
- Gutter downspout mastic
- Pipe wrap
- Interior stucco

Twenty-one (21) samples of the above-noted suspected ACMs were collected within the subject building and submitted to EMSL for analysis of asbestos content and nature. A summary of the sample types, locations and analytical results is presented in Table 5.2.1, below. Copies of the certificates of analysis provided by EMSL for the suspected ACM samples submitted are included in **Appendix C**.

**Table 5.2.1: Summary of Suspected ACM Bulk Samples
 Gulf of Georgia Cannery – Moncton Street, Richmond, BC**

Sample Number	Material Description	Sample Location	Result
ST-01A	Boiler house stucco (patch) - White	Boiler house	None Detected
ST-01B	Boiler house stucco (patch) - White	Boiler house	None Detected
ST-01C	Boiler house stucco (patch) - White	Boiler house	None Detected
ST-02A	Boiler house stucco - Grey	Boiler house	None Detected
ST-02B	Boiler house stucco - Grey	Boiler house	None Detected
ST-02C	Boiler house stucco - Grey	Boiler house	None Detected
ST-02D	Boiler house stucco - Grey	Boiler house	None Detected
ST-02E	Boiler house stucco - Grey	Boiler house	None Detected
ST-02F	Boiler house stucco - Grey	Boiler house	None Detected
CP-01A	Cement panel	Front entrance exterior	20% Chrysotile
CP-01B	Cement panel	Front entrance exterior	Stop Positive
CP-01C	Cement panel	Front entrance exterior	Stop Positive
GM-01A	Gutter mastic – Black and soft	North storage sheds	None Detected
GM-01B	Gutter mastic – Black and soft	North storage sheds	None Detected
GM-01C	Gutter mastic – Black and soft	North storage sheds	None Detected
PW-01A	Pipe wrap - Black	Exterior northwest corner of cannery building	None Detected
PW-01B	Pipe wrap - Black	Exterior northwest corner of cannery building	None Detected
PW-01C	Pipe wrap - Black	Exterior northwest corner of cannery building	None Detected
CR-01A	Corrugated roofing/siding – Green	Exterior drying and bagging room	None Detected
CR-01B	Corrugated roofing/siding – Green	Exterior drying and bagging room	None Detected
CR-01C	Corrugated roofing/siding – Green	Exterior drying and bagging room	None Detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of the results of suspected ACM samples collected, the materials presented in Table 5.2.2, below were identified as ACMs within subject building.

Table 5.2.2: Summary of Identified ACMs
Gulf of Georgia Cannery – Moncton Street, Richmond, BC

Identified ACM Description		Photo
Exterior cement panel at the front entrance of the east wing (approximately 2,400 ft ²), on the east wall of the cannery building (approximately 200 ft ²), on the south wall of the dryer shed (approximately 2,000 ft ²), and on the west wall of the dryer shed at the roof (approximately 600 ft ²).		
% Type	20% Chrysotile	
Friability	Non-friable	
Condition	Good	

Identified ACM Description	Photo
	

6 RECOMMENDATIONS

The recommendations pertaining to the pre-renovation requirements for each of the hazardous materials identified within the subject areas are presented in the sub-sections below.

6.1 Lead-Containing Paints (LCPs)

If LCPs are to be disturbed and/or removed, ensure compliance with the following:

- The occupational exposure control requirements of BC Reg. 296/97, including the provisions of the Lead Guideline
- The disposal requirements of the *British Columbia Hazardous Waste Regulation* (BC Reg. 63/88)
- The transportation requirements of the *Federal Transportation of Dangerous Goods Regulation*

Corrective action or remedial work on paint applications containing any concentration of lead should be undertaken in a manner so as to avoid generating fine particulate matter or dust (i.e., avoid sanding). Airborne lead dust or fumes should not exceed the BC Reg. 296/97 8-hour Occupational Exposure Limit (OEL) of 0.05 milligram per cubic metre (mg/m^3) during the removal of paints and products containing any concentration of lead. The use of personal protective equipment is recommended to reduce the potential for over-exposure to lead dust.

6.1.1 Lead Leachate

Sampling and analysis indicate that representative waste material coated with the paint applications identified for corrective action and/or removal throughout the subject building do not contain lead in dispersible form such that the leachate contains greater than 5.0 mg/L lead. As such, waste associated with the proposed renovation activities is not considered hazardous, with respect to lead leachate.

6.2 Asbestos-Containing Materials (ACMs)

Identified ACMs that will be impacted by renovation activities should be handled in accordance with the procedures outlined in the current version of the WorkSafe BC document entitled "Safe Work Practices for Handling Asbestos", by a qualified asbestos abatement contractor.

If materials that are visually similar to identified ACMs are discovered within the subject building in locations not outlined in this report, these materials should be considered as asbestos-containing and handled as such, unless proven otherwise, through analytical testing.

If encountered during renovation activities, any suspected ACMs not accessible and/or identified during this assessment should be considered as asbestos-containing and handled as such, unless proven otherwise, through analytical testing.

Ensure asbestos containing waste is handled, stored, and disposed of in accordance with the requirements of the *Federal Transportation of Dangerous Goods Regulation* and the *British Columbia Hazardous Waste Regulation* (BC Reg. 63/88).

7 CLOSURE

This report has been prepared by Stantec for the sole benefit of PWGSC. This report may not be relied upon by any other person or entity without the express written consent of Stantec and PWGSC.

Any use that a third party makes of this report, or any reliance on decisions to be made based on it, is the responsibility of such third parties. Stantec accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

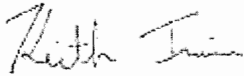
The conclusions presented represent the best judgment of the assessor based on current environmental standards and the site conditions observed on the date cited within this report. This report is based on, and limited by, circumstances and conditions stated herein, and on information available at the time of preparation of the report. Due to the limited nature of the investigation and the limited data available, Stantec cannot warrant against undiscovered environmental liabilities. It is possible that additional, concealed hazardous materials may become evident during renovation and/or demolition activities within the subject areas.

If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

We trust that the report meets your current requirements. Should you have any questions or concerns regarding the above, please do not hesitate to contact the undersigned.

Respectfully submitted,

Stantec Consulting Ltd.



Keith Irwin, Dipl. Tech.
Environmental Technologist

Reviewed by:



Sean Brigden, B.Sc., P.B.Dipl.
Senior Reviewer

KI/SB/nlb

Lead-Containing Paint and Limited Asbestos Sampling
Gulf of Georgia Cannery
Moncton Street, Richmond, BC
Final Report

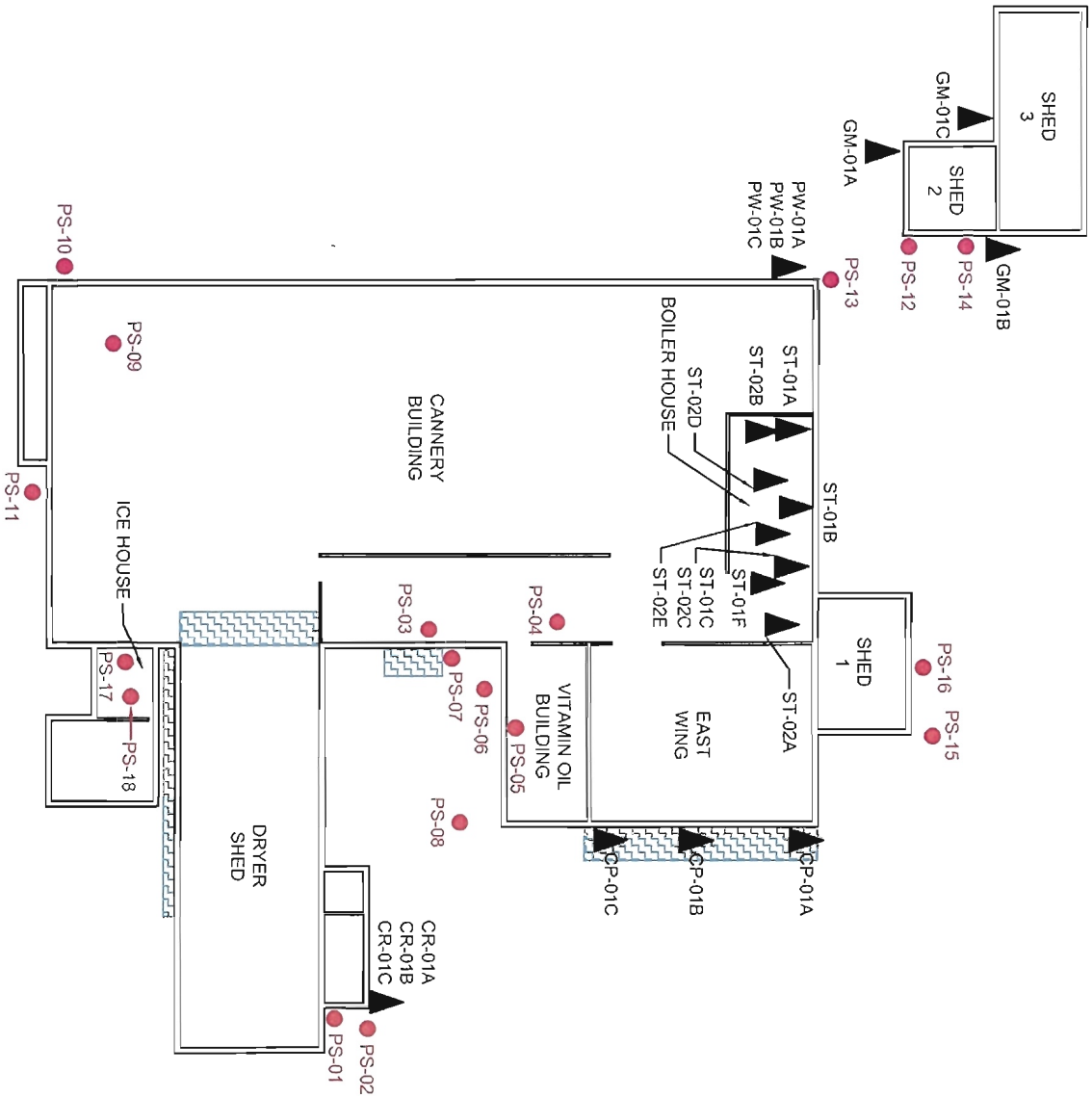


APPENDIX A

Floor Plans










NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN SHOWING HAZARDOUS MATERIALS AND BULK SAMPLE LOCATIONS

GULF OF GEORGIA CANNERY, MONCTON STREET, RICHMOND, BC

Client: PUBLIC WORKS GOVERNMENT SERVICES CANADA

LEGEND

-  BULK SAMPLE
-  PAINT CHIP SAMPLE
-  EXTERIOR CEMENT PANEL

Project No.:	123710616
Scale:	N.T.S.
Date:	13/03/15
Dwn. By.:	CD CS SL2013030175
App'd By.:	SB

Dwg. No.:

1



Lead-Containing Paint and Limited Asbestos Sampling
Gulf of Georgia Cannery
Moncton Street, Richmond, BC
Final Report



APPENDIX B

Analytical Certificates – Paint Samples for Lead (Total and Leachate)

**EMSL Canada Inc.**

10 Falconer Drive, Unit #3, Mississauga, ON L5N 3L8
 Phone/Fax: 289-997-4602 / (289) 997-4607
<http://www.emsl.com> torontolab@emsl.com

EMSL Canada Or 551301463
 CustomerID: 55JACQ30L
 CustomerPO: 123710616.200
 ProjectID:

Attn: **Keith Irwin**
Stantec Consulting, Ltd.
1100- 111 Dunsmuir Street
Vancouver, BC V6B 6A3

Phone: (604) 696-8272
 Fax:
 Received: 03/13/13 10:13 AM
 Collected:

Project: 123710616 TASK 200

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B*/7000B)

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
PS-01 Site: EAST EQUIPMENT SHELTER EXTERIOR TRIM Desc: PURPLE	0001	3/13/2013		<90 ppm
PS-02 Site: EAST EQUIPMENT SHELTER EXTERIOR WALLS Desc: WHITE	0002	3/13/2013		<90 ppm
PS-03 Site: EAST CANNERY BUILDING INTERIOR WALLS & WINDOW SILL Desc: GREEN	0003	3/13/2013		7200 ppm
PS-04 Site: EAST CANNERY BUILDING INTERIOR WALLS Desc: YELLOW	0004	3/13/2013		5800 ppm
PS-05 Site: VITAMIN OIL BUILDING INTERIOR WALLS Desc: WHITE	0005	3/13/2013		3700 ppm
PS-06 Site: VITAMIN OIL BUILDING EXTERIOR WALLS Desc: WHITE	0006	3/13/2013		9500 ppm
PS-07 Site: EXTERIOR TRIM CANNERY BUILDING Desc: BURGUNDY	0007	3/13/2013		6400 ppm
PS-08 Site: VITAMIN OIL BUILDING FRONT EXTERIOR TRIM & FENCE Desc: RED	0008	3/13/2013		<90 ppm
PS-09 Site: INTERIOR CEILING & WEST WALL OF Desc: CREAM	0009	3/13/2013		5500 ppm
PS-10 Site: SOUTH CANNERY BUILDING EXTERIOR WALLS Desc: WHITE	0010	3/13/2013		200 ppm

Kevin Pang
 or other approved signatory

Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. The QC data associated with these results included in this report meet the method QC requirements, unless specifically indicated otherwise. Unless noted, results in this report are not blank corrected. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. * slight modifications to methods applied. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request.
 Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 03/13/2013 17:58:24



EMSL Canada Inc.

10 Falconer Drive, Unit #3, Mississauga, ON L5N 3L8
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CustomerID: 55JACQ30L
CustomerPO: 123710616.200
ProjectID:

Attn: **Keith Irwin**
Stantec Consulting, Ltd.
1100- 111 Dunsmuir Street
Vancouver, BC V6B 6A3

Phone: (604) 696-8272
Fax:
Received: 03/13/13 10:13 AM
Collected:

Project: 123710616 TASK 200

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B*/7000B)

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
PS-11 Site: SOUTH CANNERY BUILDING EXTERIOR TRIM Desc: BURGUNDY	0011	3/13/2013		580 ppm
PS-12 Site: NORTH STORAGE SHEDS EXTERIOR TRIM Desc: PURPLE	0012	3/13/2013		870 ppm
PS-13 Site: NORTH CANNERY BUILDING EXTERIOR TRIM (4 LAYERS) Desc: BURGUNDY	0013	3/13/2013		13000 ppm
PS-14 Site: NORTH STORAGE SHEDS EXTERIOR WALLS Desc: WHITE	0014	3/13/2013		140 ppm
PS-15 Site: NORTH CANNERY BUILDING EXTERIOR TRIM & FENCH Desc: RED	0015	3/13/2013		<90 ppm
PS-16 Site: EXTERIOR MECHANICAL PIPE AT NORTH END OF Desc: YELLOW	0016	3/13/2013		31000 ppm
PS-17 Site: ICE HOUSE UPPER INTERIOR WALLS Desc: SILVER	0017	3/13/2013		3400 ppm
PS-18 Site: ICE HOUSE LOWER INTERIOR WALLS Desc: WHITE	0018	3/13/2013		2100 ppm

Kevin Pang
or other approved signatory

Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. The QC data associated with these results included in this report meet the method QC requirements, unless specifically indicated otherwise. Unless noted, results in this report are not blank corrected. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. * slight modifications to methods applied. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request.
Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 03/13/2013 17:58:24



EMSL Analytical, Inc.

200 Route 130 North, Cinnaminson, NJ 08077

Phone: (856) 303-2500 Fax: (856) 858-4571 Email: jsmith@emsl.com

Attn:

Kevin Pang
EMSL Toronto QC
10 Falconer Drive Unit #3
Mississauga, ON L5N 3L8

3/20/2013

Phone: (289) 997-4602

Fax: (289) 997-4607

The following analytical report covers the analysis performed on samples submitted to EMSL Analytical, Inc. on 3/18/2013. The results are tabulated on the attached data pages for the following client designated project:

Stantec/123710616 Task 200

The reference number for these samples is EMSL Order #011301059. Please use this reference when calling about these samples. If you have any questions, please do not hesitate to contact me at (856) 303-2500.

Reviewed and Approved By:

Julie Smith - Laboratory Director



The test results contained within this report meet the requirements of NELAC and/or the specific certification program that is applicable, unless otherwise noted.

NELAP Certifications: NJ 03036, NY 10872, PA 68-00367

The sample amount provided to the laboratory for TCLP analysis was less than the recommended minimum amount of 100 grams (EPA SW-846 Method 1311).

The samples associated with this report were received in good condition unless otherwise noted. This report relates only to those items tested as received by the laboratory. The QC data associated with the sample results meet the recovery and precision requirements established by the NELAP, unless specifically indicated. All results for soil samples are reported on a dry weight basis, unless otherwise noted. This report may not be reproduced except in full and without written approval by EMSL Analytical, Inc.

**EMSL Analytical, Inc.**

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Mississauga, ON L5N 3L8

Phone: (289) 997-4602
 Fax: (289) 997-4607
 Received: 03/18/13 9:10 AM
 Collected: 1/11/2013

Project: Stantec/123710616 Task 200

Analytical Results

Client Sample Description P-01 *Collected:* 1/11/2013 *Lab ID:* 0001
 Paint waste chips - mix

<i>Method</i>	<i>Parameter</i>	<i>Result</i>	<i>RL</i>	<i>Units</i>	<i>Prep Date</i>	<i>Analyst</i>	<i>Analysis Date</i>	<i>Analyst</i>
TCLP 1311/6010C	Lead	2.8	0.10	mg/L	3/19/2013	BE	3/19/2013	JR

Definitions:

ND - indicates that the analyte was not detected at the reporting limit
 RL - Reporting Limit

Lead-Containing Paint and Limited Asbestos Sampling
Gulf of Georgia Cannery
Moncton Street, Richmond, BC
Final Report



APPENDIX C

Analytical Certificates - Suspected ACM Samples



EMSL Canada Inc.

10 Falconer Drive, Unit #3 Mississauga, ON L5N 3L8
Phone/Fax: 289-997-4602 / (289) 997-4607
<http://www.emsl.com> / torontolab@emsl.com

EMSL Canada Order 551301465
Customer ID: 55JACQ30L
Customer PO: 123710616.200
Project ID:

Attn: Keith Irwin
Stantec Consulting, Ltd.
1100- 111 Dunsmuir Street
Vancouver, BC V6B 6A3
Phone: (604) 696-8272
Fax:
Collected:
Received: 3/13/2013
Analyzed: 3/13/2013
Proj: 123710616 TASK 200

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: ST-01A *Lab Sample ID:* 551301465-0001

Sample Description: BOILER HOUSE/BOILER HOUSE STUCCO (PATCH) - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Gray	0%	100%	None Detected	

Client Sample ID: ST-01B *Lab Sample ID:* 551301465-0002

Sample Description: BOILER HOUSE/BOILER HOUSE STUCCO (PATCH) - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Gray	0%	100%	None Detected	

Client Sample ID: ST-01C *Lab Sample ID:* 551301465-0003

Sample Description: BOILER HOUSE/BOILER HOUSE STUCCO (PATCH) - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Gray/White/Variou	0%	100%	None Detected	

Client Sample ID: ST-02A *Lab Sample ID:* 551301465-0004

Sample Description: BOILER HOUSE/BOILER HOUSE STUCCO - GREY

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Gray	0%	100%	None Detected	

Client Sample ID: ST-02B *Lab Sample ID:* 551301465-0005

Sample Description: BOILER HOUSE/BOILER HOUSE STUCCO - GREY

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Gray	0%	100%	None Detected	

Client Sample ID: ST-02C *Lab Sample ID:* 551301465-0006

Sample Description: BOILER HOUSE/BOILER HOUSE STUCCO - GREY

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Gray	0%	100%	None Detected	

Client Sample ID: ST-02D *Lab Sample ID:* 551301465-0007

Sample Description: BOILER HOUSE/BOILER HOUSE STUCCO - GREY

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Gray	0%	100%	None Detected	



EMSL Canada Inc.

10 Falconer Drive, Unit #3 Mississauga, ON L5N 3L8
Phone/Fax: 289-997-4602 / (289) 997-4607
<http://www.emsl.com> / torontolab@emsl.com

EMSL Canada Order 551301465
Customer ID: 55JACQ30L
Customer PO: 123710616.200
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: ST-01E **Lab Sample ID:** 551301465-0008

Sample Description: BOILER HOUSE/BOILER HOUSE STUCCO - GREY

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Gray/White	0%	100%	None Detected	

Client Sample ID: ST-01F **Lab Sample ID:** 551301465-0009

Sample Description: BOILER HOUSE/BOILER HOUSE STUCCO - GREY

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Gray/White	0%	100%	None Detected	

Client Sample ID: CP-01A **Lab Sample ID:** 551301465-0010

Sample Description: FRONT ENTRANCE EXTERIOR/CEMENT PANEL

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Gray/White	0%	80%	20% Chrysotile	

Client Sample ID: CP-01B **Lab Sample ID:** 551301465-0011

Sample Description: FRONT ENTRANCE EXTERIOR/CEMENT PANEL

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013				Stop Positive (Not Analyzed)	

Client Sample ID: CP-01C **Lab Sample ID:** 551301465-0012

Sample Description: FRONT ENTRANCE EXTERIOR/CEMENT PANEL

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013				Stop Positive (Not Analyzed)	

Client Sample ID: GM-01A **Lab Sample ID:** 551301465-0013

Sample Description: NORTH STORAGE SHEDS/GUTTER MASTIC - BLACK AND SOFT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Black	0%	100%	None Detected	

Client Sample ID: GM-01B **Lab Sample ID:** 551301465-0014

Sample Description: NORTH STORAGE SHEDS/GUTTER MASTIC - BLACK AND SOFT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Black	0%	100%	None Detected	

Client Sample ID: GM-01C **Lab Sample ID:** 551301465-0015

Sample Description: NORTH STORAGE SHEDS/GUTTER MASTIC - BLACK AND SOFT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Black	0%	100%	None Detected	



EMSL Canada Inc.

10 Falconer Drive, Unit #3 Mississauga, ON L5N 3L8
Phone/Fax: 289-997-4602 / (289) 997-4607
<http://www.emsl.com> / torontolab@emsl.com

EMSL Canada Order 551301465
Customer ID: 55JACQ30L
Customer PO: 123710616.200
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: PW-01A

Lab Sample ID: 551301465-0016

Sample Description: EXTERIOR NORTHWEST CORNER OF CANNERY BUILDING/PIPE WRAP - BLACK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Black	10%	90%	None Detected	

Client Sample ID: PW-01B

Lab Sample ID: 551301465-0017

Sample Description: EXTERIOR NORTHWEST CORNER OF CANNERY BUILDING/PIPE WRAP - BLACK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Black	10%	90%	None Detected	

Client Sample ID: PW-01C

Lab Sample ID: 551301465-0018

Sample Description: EXTERIOR NORTHWEST CORNER OF CANNERY BUILDING/PIPE WRAP - BLACK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Various/Black	30%	70%	None Detected	

Client Sample ID: CR-01A

Lab Sample ID: 551301465-0019

Sample Description: EXTERIOR DRYING AND BAGGING ROOM/CORRUGATED ROOFING/SIDING - GREEN

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Gray/Clear	65%	35%	None Detected	

Client Sample ID: CR-01B

Lab Sample ID: 551301465-0020

Sample Description: EXTERIOR DRYING AND BAGGING ROOM/CORRUGATED ROOFING/SIDING - GREEN

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Gray/Clear	65%	35%	None Detected	

Client Sample ID: CR-01C

Lab Sample ID: 551301465-0021

Sample Description: EXTERIOR DRYING AND BAGGING ROOM/CORRUGATED ROOFING/SIDING - GREEN

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/13/2013	Various	70%	30%	None Detected	

Analyst(s)

Alice Feng	PLM	(13)
Kevin Pang	PLM	(6)

Kevin Pang
or other Approved Signatory

Any questions please contact Kevin Pang.

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 03/13/2013 19:53:14

APPENDIX 2



Stantec Consulting Ltd.
1100 - 111 Dunsmuir Street
Vancouver BC V6B 6A3
Tel: (604) 696-8000
Fax: (604) 696-8100

Stantec

VIA EMAIL

July 5, 2013

Project No: 1237-10616.300

Public Works and Government Services Canada
Environmental Services, Pacific Region
219 – 800 Burrard Street
Vancouver, BC V6Z 09B

Attention: Tom Dunphy

Dear Mr. Dunphy:

**Reference: Assessment of PCB and Lead Content in Paint
Gulf of Georgia Cannery
Moncton Street, Richmond, BC**

1 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by Public Works and Government Services Canada (PWGSC) to conduct an assessment of PCB and lead content in various paints at the Gulf of Georgia Cannery located on Moncton Street in Richmond, British Columbia (subject facility).

The purpose of the project was to assess the PCB and lead content of various paints within areas that may be impacted by proposed renovation activities, such that work can be planned to proceed in accordance with applicable occupational health and safety regulations and applicable environmental protection regulations, to meet the requirements of the *Canada Labour Code, Part II Occupational Health and Safety Regulations* (Canada Labour Code), *British Columbia's Occupational Health & Safety Regulation* (BC Reg. 296/97) and *PCB Regulations* (SOR/2008-273).

The hazardous materials considered during this assessment included lead including lead-containing paints (LCPs) and polychlorinated biphenyls (PCBs) in paints.

2 BACKGROUND

Stantec previously conducted lead-containing paint and limited asbestos sampling at the subject facility and identified asbestos-containing materials (ACMs) and LCPs in the following report:

- Stantec Report 123710616 "*Lead-Containing Paint and Limited Asbestos Sampling, Gulf of Georgia Cannery, Moncton Street, Richmond, BC*" dated March 26, 2013 (Initial Assessment)

Reference: **Assessment of PCB and Lead Content in Paint**
Gulf of Georgia Cannery
Moncton Street, Richmond, BC

Subsequent to the completion of the Initial Assessment, questions were raised as to the potential for PCB-containing paints to have been used on the subject building, given its proximity to the mouth of the Fraser River/Strait of Georgia, and the understanding that paints used in marine applications have been known to contain PCBs.

As such, and as a measure of diligence in gathering sufficient information to plan the renovation project in accordance with applicable occupational health and safety regulations (i.e. Canada Labour Code, Part II Occupational Health and Safety Regulations [Canada Labour Code], *British Columbia's Occupational Health & Safety Regulation* [BC Reg. 296/97]) and applicable environmental protection regulations (i.e. British Columbia's Hazardous Waste Regulation [BC Reg. 63/88] and the Federal *PCB Regulations* [SOR/2008-273]), this additional sampling was requested.

3 SCOPE OF WORK

Zack Kranjec of Stantec conducted a visual assessment within the subject facility on June 19, 2013. Site work was conducted in general compliance with the requirements of BC Reg. 296/97.

Materials expected to be impacted by the proposed renovation activities, as outlined by the scope of work provided herein, were visually examined to determine the suspected presence of lead-containing paints (LCPs) if additional information was required to supplement the Initial Assessment, as well as PCBs in paint. Where building materials were suspected but not confirmed to contain lead and/or PCBs (in paint), samples were collected for analysis to confirm or deny the presence of these hazardous materials. Based on analytical results, visually similar materials were referenced to specific analyzed samples to reduce the number of samples collected.

Additional background information and the methodology used for the determination of presence or absence of each specific hazardous material considered in this assessment are outlined in the following sections.

3.1 Lead

The lead content of interior paint was limited to 0.5% by weight (5,000 parts per million, or "ppm") in 1976 under the federal *Hazardous Products Act*. Recently, the *Hazardous Products Act* had reduced the criteria for surface coatings (including paint) to 600 mg/kg (600 ppm) to define them as "lead-containing" (this has since been reduced to 90 ppm). In addition, WorkSafeBC has compiled a manual titled "*Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry*", (Lead Guideline) which defines a "lead-containing surface coating material" and indicates that "...the improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit"... As such, Stantec will reference this value (600 ppm) in defining paints as "lead-containing".

Samples of suspected LCPs were collected from major paint applications, and were collected to substrate, where possible, in sufficient quantity to conduct analyses for total lead content. Samples

Reference: Assessment of PCB and Lead Content in Paint
Gulf of Georgia Cannery
Moncton Street, Richmond, BC

collected were placed into separate, sealed, and labeled polyethylene bags, and submitted to EMSL for analyses of total lead content using Flame Atomic Absorption Spectrometry AAS (SW 846 3050B and 7420).

EMSL analytical laboratory is also accredited by the AIHA Environmental Lead Laboratory Approval Program.

3.2 Polychlorinated Biphenyls

Part 2, sections 5 and 6 of the *PCB Regulations* (SOR/2008-273) states that, no person shall release PCBs into the environment in a concentration of:

- 2 mg/kg or more for a liquid containing PCBs
- 50 mg/kg or more for a solid containing PCBs
 - The 50 mg/kg criteria for a solid will be used to compare to the paint chip samples collected for total content of PCBs.

Based on the above, samples of paints suspected to contain PCBs were collected from major paint applications, and were collected to substrate, where possible, in sufficient quantity to conduct analyses for total content of PCBs. Samples collected were placed into separate, sealed, and labeled polyethylene bags, and submitted to EMSL for analyses of total content of PCBs in Paint Chips via EPA SW 846 3540C/8082A.

4 LIMITATIONS

This report reflects the observations made within accessed areas of the subject area and the results of analyses performed on specific materials sampled during the assessment. Analytical results reflect the sampled materials at the specific sample locations.

The limitations of this assessment pertaining to each of the considered hazardous materials are outlined in the following sub-sections.

4.1 Lead

Samples of suspected LCPs were collected within the subject area only from surfaces of major paint applications where visually different paint colours and/or types were identified, for applications that required information supplemental to that provided in the Initial Assessment. Although the surfaces where samples were collected may be covered with more than one coat of paint, the paint samples are described by the surface (visible) colour only.

Attempts were made to represent all layers of paint in the samples collected. As analytical results are referenced to the surface paint colour only, the lead content of all painted surfaces similar to that represented by the surface paint colour will be presumed to be the same, regardless of differing sub-surface paints, if any.

Reference: Assessment of PCB and Lead Content in Paint
Gulf of Georgia Cannery
Moncton Street, Richmond, BC

4.2 Polychlorinated Biphenyls

Samples of paints suspected to contain PCBs were collected at the subject facility only from surfaces of major paint applications where visually different paint colours and/or types were identified. Although the surfaces where samples were collected may be covered with more than one coat of paint, the paint samples are described by the surface (visible) colour only.

Attempts were made to represent all layers of paint in the samples collected. As analytical results are referenced to the surface paint colour only, the lead content of all painted surfaces similar to that represented by the surface paint colour will be presumed to be the same, regardless of differing sub-surface paints, if any.

5 RESULTS

The results of the assessment for each of the considered hazardous materials are provided in the following sub-sections.

5.1 Lead

Two paint chip samples were obtained from the exterior of the main structure (including shed 1), where suspected lead-containing white paint was observed, as results from the Initial Assessment pertaining to exterior white paint on the main structure yielded inconsistent results (< 90 ppm on the east equipment shelter, 9,500 ppm on the vitamin oil building).

A summary of the sample types, locations and analytical results of the additional samples collected is presented in Table 5.3, below. A copy of the certificate of analysis provided by EMSL for the suspected LCP samples submitted is included in **Appendix A**.

Table 5.1: Suspected LCP Sample Collection and Analysis Summary
Gulf of Georgia Cannery, Moncton Street, Richmond, BC
June 19, 2013

Sample No.	Material Description	Sample Location	Result (Lead – ppm)
PB-01	White colour paint	North exterior wall of cannery building	12,000
PB-02	White colour paint	North exterior wall of shed 1	14,000

NOTE:

Yellow highlight and bolding indicates an identified LCP.

Analysis of the paint chip samples submitted indicated that the white paint is considered to be lead-containing in the areas sampled as part of this assessment. As three of four samples of the white paint on the exterior of the main structure have indicated that this paint is lead-containing, and as visual distinction between lead-containing and non-lead-containing paint on the exterior of the main

Reference: Assessment of PCB and Lead Content in Paint
Gulf of Georgia Cannery
Moncton Street, Richmond, BC

structure is not practical, white paint on the exterior of the main structure (including shed 1) should be considered lead-containing.

5.2 Polychlorinated Biphenyls

Six paint chip samples were obtained from the subject facility, representative of the major paint applications, and were submitted for analysis of PCB content. A summary of the sample types, locations and analytical results is presented in Table 5.1, below. A copy of the certificate of analysis provided by EMSL for the suspected PCBs paint samples submitted is included in **Appendix B**.

Table 5.1: Suspected PCBs in Paint Sample Collection and Analysis Summary
Gulf of Georgia Cannery, Moncton Street, Richmond, BC
June 19, 2013

Sample No.	Material Description	Sample Location	Result (PCBs – mg/kg)
PCB-01	White colour paint	North side of cannery building, exterior wall	2.2 (Aroclor-1248)
PCB-02	Burgundy colour paint	North side of cannery building, door to boiler house	4.9 (Aroclor-1248)
PCB-03	Purple colour paint	East side of shed 2, exterior trim	Not detected
PCB-04	Yellow colour paint	North side of shed 1, exterior mechanical pipe	Not detected
PCB-06	Burgundy colour paint	West side of cannery building, exterior trim	Not detected
PCB-07	Burgundy colour paint	West side of cannery building, exterior trim	Not detected

Analysis of the paint chip samples submitted indicated that none contain PCBs in excess of 50 mg/kg (applicable criteria for a solid waste material), and that PCBs were present in concentrations less than the analytical detection limits in the majority of the samples collected.

6 RECOMMENDATIONS

6.1 Lead

If lead-containing paints are to be disturbed and/or removed during renovation activities, ensure compliance with the following:

- The occupational exposure control requirements of the Canada Labour Code and BC Reg. 296/97, including the Lead Guideline

Reference: Assessment of PCB and Lead Content in Paint
Gulf of Georgia Cannery
Moncton Street, Richmond, BC

- The disposal requirements of the *British Columbia Hazardous Waste Regulation* (BC Reg. 63/88)
- The transportation requirements of the *Federal Transportation of Dangerous Goods Regulation*

6.2 Polychlorinated Biphenyls

As the paints sampled at the subject facility were identified to contain concentrations of PCBs less than the prescribed criteria for PCBs in a solid, and/or less than the analytical detection limits, no recommendations have been developed.

7 CLOSURE

This report has been prepared by Stantec Consulting Ltd. for the sole benefit of Public Works and Government Services Canada. This report may not be relied upon by any other person or entity without the express written consent of Public Works and Government Services Canada.

Any use that a third party makes of this report, or any reliance on decisions to be made based on it, is the responsibility of such third parties. Stantec Consulting Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The conclusions presented represent the best judgment of the assessor based on current environmental standards and the site conditions observed on the date cited within this report. Due to the nature of the investigation and the limited data available, Stantec Consulting Ltd. cannot warrant against undiscovered environmental liabilities. It is possible that additional, concealed hazardous materials may become evident during renovation and/or demolition activities within the subject facility.

If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

Stantec

Attention: Tom Dunphy
Project No: 1237-10616.300

July 5, 2013
Page 7 of 7
Final Report

Reference: Assessment of PCB and Lead Content in Paint
Gulf of Georgia Cannery
Moncton Street, Richmond, BC

We trust that the report meets your current requirements. Should you have any questions or concerns regarding the above, please do not hesitate to contact the undersigned.

Respectfully submitted,
Stantec Consulting Ltd.

Reviewed by:



Zack Kranjec, Dipl. T.
Project Technologist, Indoor Environments



Sean Brigden, B.Sc., P.B.Dipl.
Project Manager, Indoor Environments

Appendix A: Certificates of Analysis – Suspected LCP Bulk Samples
Appendix B: Certificates of Analysis – Suspected PCBs in Paint Bulk Samples

ZK/SB/bd

File Name and Path: [\\cd1209-402\workgroup\1237\active\123710600 -
10699\123710616\report\pcb_paint_sampling\rpt_123710616_gog_cannery_pcb_s_2013_0705_final.docx



APPENDIX A

**Certificates of Analysis –
Suspected LCP Bulk Samples**



EMSL Canada Inc.

10 Falconer Drive, Unit #3, Mississauga, ON L5N 3L8
Phone/Fax: 289-997-4602 / (289) 997-4607
<http://www.emsl.com> torontolab@emsl.com

EMSL Canada Or 551303910
CustomerID: 55JACQ30L
CustomerPO: 123710616.300
ProjectID:

Attn: **Zack Kranjec**
Stantec Consulting, Ltd.
1100- 111 Dunsmuir Street
Vancouver, BC V6B 6A3

Phone: (604) 696-8272
Fax:
Received: 06/21/13 11:58 AM
Collected: 6/19/2013

Project: 123710616.300

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B*/7000B)

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
PB-01 Site: NORTH EXTERIOR WALL OF CANNERY Desc: WHITE COLOUR PAINT	0001	6/19/2013	6/24/2013	12000 ppm
PB-02 Site: NORTH EXTERIOR WALL OF SHED 1 Desc: WHITE COLOUR PAINT	0002	6/19/2013	6/24/2013	14000 ppm

Kevin Pang
or other approved signatory

Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. The QC data associated with these results included in this report meet the method QC requirements, unless specifically indicated otherwise. Unless noted, results in this report are not blank corrected. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. * slight modifications to methods applied. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request.
Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 06/27/2013 18:21:28



APPENDIX B

Certificates of Analysis – Suspected PCBs in Paint Bulk Samples



EMSL Analytical, Inc.

200 Route 130 North, Cinnaminson, NJ 08077

Phone: (856) 303-2500 Fax: (856) 858-4571 Email: j.smith@emsl.com

Attn: **Zack Kranjec**
Stantec Consulting, LTD
1100- 111 Dunsmuir Street
Vancouver, BC V6B 6A3

6/28/2013

Phone: (604) 696-8272
Fax:

The following analytical report covers the analysis performed on samples submitted to EMSL Analytical, Inc. on 6/21/2013. The results are tabulated on the attached data pages for the following client designated project:

123710616.300

The reference number for these samples is EMSL Order #011302769. Please use this reference when calling about these samples. If you have any questions, please do not hesitate to contact me at (856) 303-2500.

Reviewed and Approved By:

Julie Smith - Laboratory Director



The test results contained within this report meet the requirements of NELAC and/or the specific certification program that is applicable, unless otherwise noted.
NELAP Certifications: NJ 03036, NY 10872, PA 68-00367

The samples associated with this report were received in good condition unless otherwise noted. This report relates only to those items tested as received by the laboratory. The QC data associated with the sample results meet the recovery and precision requirements established by the NELAP, unless specifically indicated. All results for soil samples are reported on a dry weight basis, unless otherwise noted. This report may not be reproduced except in full and without written approval by EMSL Analytical, Inc.

**EMSL Analytical, Inc.**

200 Route 130 North, Cinnaminson, NJ 08077
 Phone/Fax: (856) 303-2500 / (856) 858-4571
<http://www.emsl.com> j.smith@emsl.com

EMSL Order: 011302769
 CustomerID: JACQ30L
 CustomerPO: 123710616.300
 ProjectID:

Alln: **Zack Kranjec**
Stantec Consulting, LTD
1100- 111 Dunsmuir Street
Vancouver, BC V6B 6A3

Phone: (604) 696-8272
 Fax:
 Received: 06/21/13 9:20 AM
 Collected: 6/19/2013

Project: 123710616.300

Analytical Results

Client Sample Description PCB-01 *Collected:* 6/19/2013 *Lab ID:* 0001

Method	Parameter	Result	RL	Units	Prep Date	Analyst	Analysis Date	Analyst
3540C/8082A	Aroclor-1016	ND	0.71	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1221	ND	0.71	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1232	ND	0.71	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1242	ND	0.71	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1248	2.2	0.71	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1254	ND	0.71	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1260	ND	0.71	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1262	ND	0.71	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1268	ND	0.71	mg/Kg	6/25/2013	AB	6/28/2013	EH

Client Sample Description PCB-02 *Collected:* 6/19/2013 *Lab ID:* 0002

Method	Parameter	Result	RL	Units	Prep Date	Analyst	Analysis Date	Analyst
3540C/8082A	Aroclor-1016	ND	0.65	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1221	ND	0.65	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1232	ND	0.65	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1242	ND	0.65	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1248	4.9	0.65	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1254	ND	0.65	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1260	ND	0.65	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1262	ND	0.65	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1268	ND	0.65	mg/Kg	6/25/2013	AB	6/28/2013	EH

Client Sample Description PCB-03 *Collected:* 6/19/2013 *Lab ID:* 0003

Method	Parameter	Result	RL	Units	Prep Date	Analyst	Analysis Date	Analyst
3540C/8082A	Aroclor-1016	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1221	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1232	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1242	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1248	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1254	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1260	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1262	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1268	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH

**EMSL Analytical, Inc.**

200 Route 130 North, Cinnaminson, NJ 08077
 Phone/Fax: (856) 303-2500 / (856) 858-4571
<http://www.emsl.com> jsmith@emsl.com

EMSL Order: 011302769
 CustomerID: JACQ30L
 CustomerPO: 123710616.300
 ProjectID:

Attn: **Zack Kranjec**
Stantec Consulting, LTD
1100- 111 Dunsmuir Street
Vancouver, BC V6B 6A3

Phone: (604) 696-8272
 Fax:
 Received: 06/21/13 9:20 AM
 Collected: 6/19/2013

Project: 123710616.300

Analytical Results

Client Sample Description PCB-04 *Collected:* 6/19/2013 *Lab ID:* 0004

Method	Parameter	Result	RL	Units	Prep Date	Analyst	Analysis Date	Analyst
3540C/8082A	Aroclor-1016	ND	0.69	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1221	ND	0.69	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1232	ND	0.69	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1242	ND	0.69	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1248	ND	0.69	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1254	ND	0.69	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1260	ND	0.69	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1262	ND	0.69	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1268	ND	0.69	mg/Kg	6/25/2013	AB	6/28/2013	EH

Client Sample Description PCB-06 *Collected:* 6/19/2013 *Lab ID:* 0005

Method	Parameter	Result	RL	Units	Prep Date	Analyst	Analysis Date	Analyst
3540C/8082A	Aroclor-1016	ND	0.51	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1221	ND	0.51	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1232	ND	0.51	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1242	ND	0.51	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1248	ND	0.51	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1254	ND	0.51	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1260	ND	0.51	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1262	ND	0.51	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1268	ND	0.51	mg/Kg	6/25/2013	AB	6/28/2013	EH

Client Sample Description PCB-07 *Collected:* 6/19/2013 *Lab ID:* 0006

Method	Parameter	Result	RL	Units	Prep Date	Analyst	Analysis Date	Analyst
3540C/8082A	Aroclor-1016	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1221	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1232	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1242	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1248	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1254	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1260	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1262	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH
3540C/8082A	Aroclor-1268	ND	0.50	mg/Kg	6/25/2013	AB	6/28/2013	EH



EMSL Analytical, Inc.

200 Route 130 North, Cinnaminson, NJ 08077

Phone/Fax: (856) 303-2500 / (856) 858-4571

<http://www.emsl.com> jsmith@emsl.com

EMSL Order:	011302769
CustomerID:	JACQ30L
CustomerPO:	123710616.300
ProjectID:	

Definitions:

ND - indicates that the analyte was not detected at the reporting limit

RL - Reporting Limit

APPENDIX 3



LEAD ANALYSIS REPORT

12138 FORTH AVENUE, STEVESTON, BC

Client: PWGSC Environmental Services	Date: September 18, 2013
Attention: Ms. Amy Moizumi	Date Submitted: September 18, 2013
Project Name: Lead-Based Coating Samples	
DST Project Number: BE-VC-O/H	

LEAD-BASED COATING SAMPLE ANALYSIS RESULTS

Sample Number	Location / Description	Color	Result (mg/cm ²)	Lead-Based Coating
Sample A	Window Putty Paint – Sample B	White	0.09	Yes
Sample B	Window Putty Paint – Sample B	White	0.16	Yes

ANALYTICAL METHODOLOGY:

A Niton X-Ray Fluorescence (XRF) spectroscopy detector was used to make measurements on suspect building painted surfaces. The Niton XRF is designed to detect and quantify the amount of lead present primarily in painted surfaces. Measurements were made following Niton XRF standard operating procedures for lead in surface coating measurements.

Suspect surface coating samples analyzed were identified to have hazardous levels of lead (600 ppm or ≥ 0.05 mg/cm²) with a detection limit of ≥ 0.02 mg/cm².



Asbestos Analytical Services Ltd.

7 - 2883 East Kent Avenue N., Vancouver, BC, V5S 3T9

ASBESTOS ANALYSIS REPORT

Project Location: Gulf of Georgia Cannery,
12138 Forth Avenue, Steveston, BC

Reference #: BE-VC-017423

Number of Samples: 2

AASL Report #: **B00398**

Analyst: Gabrielle Sutton

Report Date: 18SEP2013

Method: NIOSH Method 9002

# B00398	Sample	Sub-Sample	Sample Description / Location	Results	ASB
1 *	Sample A	Single Phase - white	Window Putty, Sample A, Exterior Wall, Window	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	--
2. 1	Sample B	Layer 1 - thin pale grey (paint)	Window Putty, Sample B, Exterior Wall, Window	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---
2. 2 *	Sample B	Layer 2 - white	Window Putty, Sample B, Exterior Wall, Window	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---

Comments

Samples analyzed in accordance with NIOSH Laboratory Method 9002

American Industrial Hygiene Association (AIHA) BAPAT Program Laboratory Number 204301

Estimated Limit of Detection is <0.5 %

ASB = Asbestos present/absent in material

T = Asbestos Present

AASL *Asbestos Analytical Services Ltd.* will not accept any responsibility as to the manner of interpretation or application of these results.

* Sample preparation included grinding process.

Analyst: Original Signed By

Gabrielle Sutton, B.A.

Date: September 18, 2013

Original Signed By

Reviewed By: Gabrielle Sutton, B.A.



AASL - Bulk Sample Chain of Custody

Sample Submission:
Attention: Gabrielle Sutton
AASL Asbestos Analytical Services Ltd.
18 - 8980 Fraserwood Court
Burnaby, BC, V5L 5H7

B00398

Project #:

Project #:

Project #:

BE-VC-017423

Project Name / Location: Gulf of Georgia Cannery, 12138 Forth Avenue, Steveston, BC

AASL Lab Sample # (Lab use only)	Field Sample #	Material Description (ie: Type of Material, Colour, Pattern)	Material Location (ie: Floor, Wall, Ceiling, Mechanical System)	General Location (ie: Room #, Floor #, Level, Building)
<i>B00398</i> <i>1</i>	Sample A	Window Putty - Sample A	Exterior Wall	Window
<i>B00398</i> <i>2</i>	Sample B	Window Putty - Sample B	Exterior Wall	Window

Comments:

Regulatory Jurisdiction:
 BC ON QC
 AB MB Other _____

Send analytical results to: Attention: C. Injates
 Attention: _____
 Samples relinquished by: _____
 Samples received at AASL by: _____

Date: *Sep 18/2013 11:45am*

APPENDIX 4

Date of Report: March 6, 2015

Paint chip samples were collected from various surfaces on the exterior of the building, and submitted to EMSL Canada Inc. (EMSL) for analysis of total lead content using Flame Atomic Absorption Spectrometry AAS. EMSL's analytical laboratory is also accredited by the American Industrial Hygiene Association (AIHA) Environmental Lead Laboratory Approval Program.

A summary of the materials sampled and analytical results is provided below (and a drawing with sample locations is attached, for your reference):

- White paint on plywood exterior walls of the Cannery (Paint-01 – 14,000 ppm)
- Silver paint on piping at the back of the Cannery (Paint-02 – 1,000 ppm)
- White paint on plywood walls on the exterior of the Cannery (Paint-03 – 9,700 ppm)
- White paint on wood siding on the south exterior siding walls (Paint-04 - 510 ppm)
- White paint on wood siding on the south exterior wall (Paint-05 – 680 ppm)
- Brown paint on wood trim on the south exterior of the building (Paint-06 – 2,200 ppm)
- White paint on wood siding on the south exterior of the building (Paint-07 – 7,200 ppm)

Sampled paints **Paint-01, Paint-02, Paint-03, Paint-05, Paint-06 and Paint-07** listed above **are considered to be LCPs** (i.e. paints with a lead content that exceeds 600 ppm) according to the WorkSafe BC manual titled "Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry" (LCP Guide, 2011). Analytical certificates for the paint chip samples submitted are attached, for your records.

With respect to lead in paint, when materials coated with the identified LCPs above are removed or disturbed during renovation activities (or the LCP itself is removed), work should be undertaken in accordance with the requirements of the LCP Guide, 2011. It should further be noted that work on surfaces with paint containing any concentration of lead should be conducted in a manner so as to avoid generating fine particulate matter or dust (i.e., avoid sanding or grinding), such that airborne lead dust or fumes do not exceed the BC Reg. 296/97 8-hour Occupational Exposure Limit (OEL) of 0.05 mg/m³. The use of personal protective equipment (PPE) is recommended to reduce the potential for over-exposure to lead dust.

With respect to the identified LCPs, if the pipes are to be torch cut as part of the renovation, the paint coating must be removed from areas where torch cutting will take place in advance of this work. Lead should be removed to below 0.43 mg/m² or 40 µg/ft² from the surface before torch cutting takes place. Torch cutting of surfaces from which lead paint has been removed should be conducted in accordance with low–moderate risk work procedures as outlined in the LCP Guide.

We trust that this information is sufficient for your current needs. Please don't hesitate to contact us with any questions or concerns.

Regards,

Tiffany Waite, B.Sc.

Team Lead, Physical Sciences
Stantec



EMSL Canada Inc.

2756 Slough Street, Mississauga, ON L4T 1G3
Phone/Fax: 289-997-4602 / (289) 997-4607
http://www.EMSL.com torontolab@emsl.com

EMSL Canada Or 551502226
CustomerID: 55JACQ30L
CustomerPO: 123220125
ProjectID:

Attn: **Tiffany Waite**
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6

Phone: (604) 412-3004
Fax:
Received: 03/06/15 10:03 PM
Collected:

Project: 123220125

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

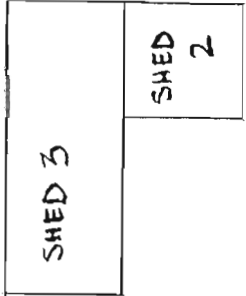
<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
PAINT-01 Site: WHITE PAINT ON PLYWOOD EXTERIOR Desc: EXT OF CANNERY BLDG	551502226-0001		3/9/2015	14000 ppm
PAINT-02 Site: SILVER PAINT ON PIPING Desc: BACK OF CANNERY BLDG	551502226-0002		3/9/2015	1000 ppm
PAINT-03 Site: WHITE PAINT OF PLYWOOD Desc: EXT OF CANNERY BLDG	551502226-0003		3/9/2015	9700 ppm
PAINT-04 Site: WHITE PAINT ON WOOD SIDING Desc: SOUTH EXT SIDING WALLS	551502226-0004		3/9/2015	510 ppm
PAINT-05 Site: WHITE PAINT ON WOOD SIDING Desc: SOUTH EXT WALL	551502226-0005		3/9/2015	680 ppm
PAINT-06 Site: BROWN PAINT ON WOOD TRIM Desc: SOUTH EXT	551502226-0006		3/9/2015	2200 ppm
PAINT-07 Site: WHITE PAINT ON WOOD SIDING Desc: SOUTH EXT	551502226-0007		3/9/2015	7200 ppm

Lisa Podzyhun
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

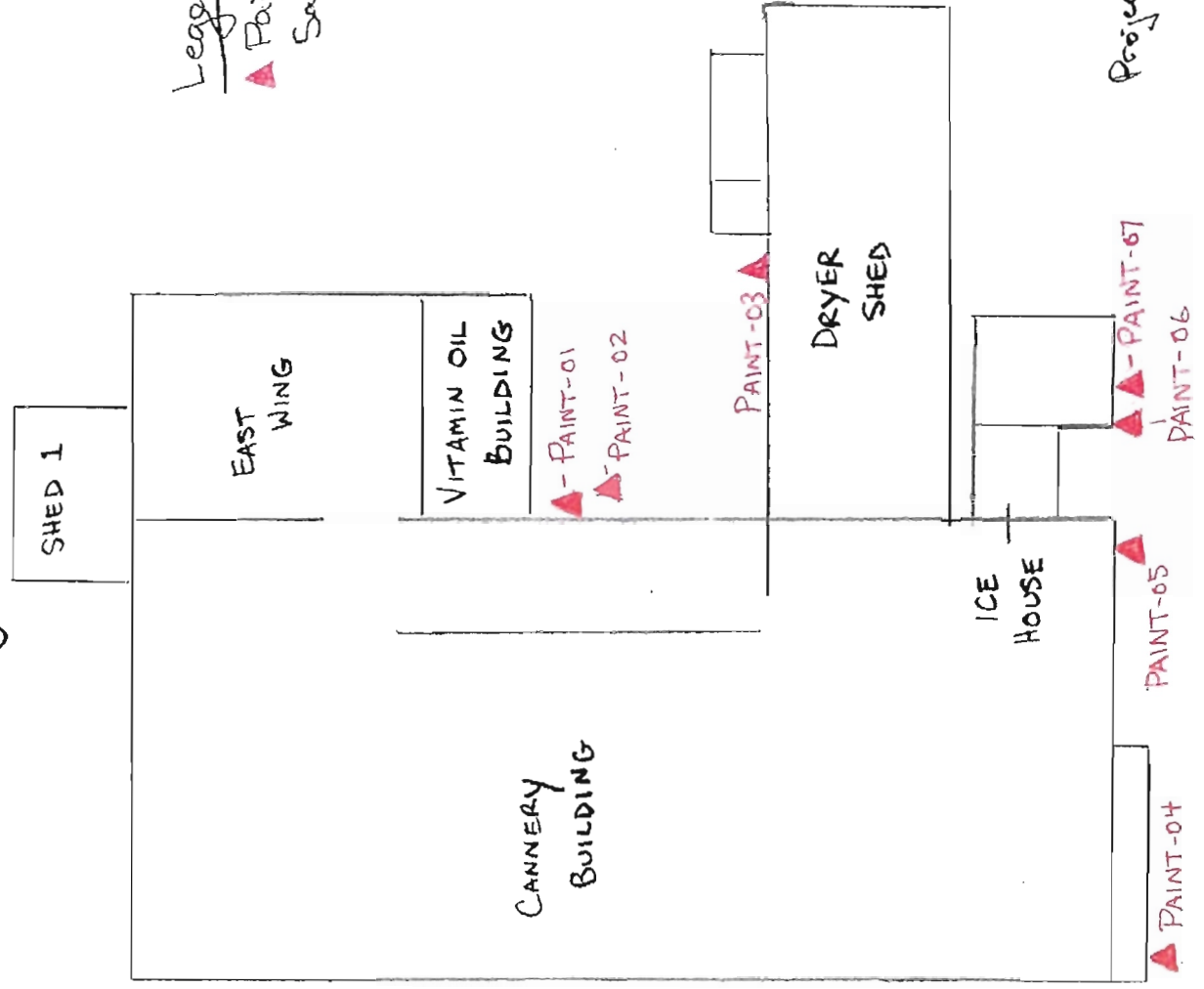
Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 03/09/2015 13:25:08



Floor Plan Showing Paint Chip Sample Locations

Gulf of Georgia Cannery, Richmond BC



Legend
 ▲ Paint Chip Sample

Project No. 123220125

APPENDIX 5

ARCADIS Canada Inc.
121 Granton Drive
Suite 12
Richmond Hill
Ontario L4B 3N4
Tel 905 882 5984
Fax 905 882 8962
www.arcadis.com

VIA EMAIL: jennifer.kolodziej@pwgsc.gc.ca

Ms. Jennifer Kolodziej
a/ Environmental Specialist (OA)
Public Works and Government Services Canada
219 – 800 Burrard Street
Vancouver BC
V6Z 0B9

ENVIRONMENT

Subject:
Collection of Paint Samples for Lead Analysis
Gulf Cannery, 12138 Fourth Avenue, Richmond, BC
Phase 2 – CCN #07

Date:
November 25, 2015

Contact:
Paul Smith

Dear Ms. Kolodziej:

Phone:
905 882 5984

We are pleased to submit our report for the collection and analysis of paint samples from various areas at the above-referenced location, in accordance with our proposal to PWGSC dated October 20, 2015.

Email:
paul.smith@arcadis.com

It is our understanding that the following work at the Gulf Cannery is being contemplated:

Our ref:
702358-002

- Stinkeroo Stack on Drier Shed – removal of existing coatings and surface corrosion; priming and painting;
- Stack on Drier Shed – removal of existing coatings and surface corrosion; priming and painting; and
- Ice Machine – removal of existing coatings and surface corrosion; priming and painting.

In addition, the following work is also being contemplated:

- Barometric Condenser, Fish Oil Tanks, Remaining Smoke Stacks and Associated Equipment – removal of existing coatings and surface corrosion; priming and painting;

Mr. Kenny Luong attended the site on November 6, 2015 to collect the samples.

1. Background Information on Hazardous Materials

Canada Labour Code

Requirements related to disclosing the presence of hazardous substances (including designated substances) in federal government buildings are specified in Part II of the *Canada Labour Code*, sections 124(1)y and 125(1)Z.14, which state that employers shall:

- *“ensure that the activities of every person granted access to the work place do not endanger the health and safety of employees [Section y]; and*
- *take all reasonable care to ensure that all of the persons granted access to the workplace, other than the employer’s employees, are informed of every known or foreseeable health or safety hazard to which they are likely to be exposed in the workplace. [Section Z.14]”.*

When construction or redevelopment work is undertaken by a company whose primary activity is construction or redevelopment work at the site of a federally-regulated employer, the provincial health and safety laws apply. The British Columbia Workers Compensation Act and Occupational Health and Safety Regulations (B.C. Reg. 296/97) would therefore apply to any construction work undertaken at the subject site.

1.1 Lead

Lead is a heavy metal that can be found in construction materials such as paints, coatings, mortar, concrete, pipes, solder, packings, sheet metal, caulking, glazed ceramic products and cable splices. Lead has been used historically in exterior and interior paints.

The *Surface Coating Materials Regulations* made under the *Hazardous Products Act* (SOR/2005-109) sets a maximum concentration of total lead of 90 mg/kg (0.009 percent or 90 parts per million) for surface coating materials, including paints, effective 21 October 2010. This criterion level applies to the sale and importation of new surface coating materials.

The National Plumbing Code allowed lead as an acceptable material for pipes until 1975 and in solder until 1986.

B.C. Reg. 296/97 prescribes specific requirements for control of workplace exposure to lead. Employers are responsible for developing and implementing an exposure control

plan if workers are or may be exposed to lead. The WorkSafe BC publication “Lead-Containing Paints and Coatings, Preventing Exposure in the Construction Industry” provides guidance in the measures and procedures that should be followed when handling lead-containing paints and coatings during construction projects and states the following:

- “Information from the U.S. Occupational Safety and Health Administration (OSHA) suggests that the improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit. This would trigger the requirement for an Exposure Control Plan (ECP) and safe work procedures.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children. Any risk assessment should include for the presence of high risk individuals within the workplace.”

2. Results

Twenty-eight samples of paints were collected by ARCADIS. The samples were submitted to Maxxam Analytics for analysis of lead content. The results of the analyses are presented below in Table 1, and the laboratory report is provided at the rear of the report in Attachment A. Photographs of the sample locations are provided in Attachment B.

Lead was detected at a level above the WorkSafe BC guideline value of 600 mg/kg in all but two of the samples, and above the *Surface Coating Materials Regulations* maximum concentration of 90 mg/kg in all of the samples. Some of the paint samples were found to contain lead at very high levels. Where one colour of paint is indicated in the sample descriptions in Table 1, only one layer of paint observed. Where multiple colours are indicated in the sample descriptions, multiple layers of paint were observed.

All paint applications were noted to be generally in fair to poor (flaking) condition at the time of the survey by ARCADIS. If paint will be disturbed during the course of construction/renovation work, the measures and procedures outlined in the WorkSafe BC publication *Lead-Containing Paints and Coatings, Preventing Exposure in the Construction Industry*, should be followed.

It should be noted that several of the samples of paint were collected from parts that were not identified by any name, but simply by part number. These parts were either

located outside, adjacent to the storage shed (Parts 11, 12, 15, 17, 23, 26 and 68), or in a bin inside the dryer shed (Parts 43, 51, 62 and 67).

Table 1
Summary of Results of Analyses of Paint Samples for Lead Content
Gulf Cannery
November 6, 2015

SAMPLE N°	LOCATION	DESCRIPTION	CONDITION	LEAD CONTENT (mg/kg)
L1	exhaust stack at southwest corner of dryer shed	grey paint	Poor	339
L2	exhaust stack at southeast corner of dryer shed	grey paint	Poor	5,260
L3	stinkeroo	grey paint	Poor	4,020
L4	condenser structure	grey paint	Fair	56,100
L5	fish oil tanks	grey paint	Fair	21,500
L6	stinkeroo ladder and framing	red paint	Fair	1,180
L7	blue crank cylinder inside exterior storage shed	blue paint	Poor	17,600
L8	Part 12	blue/yellow/silver paint	Poor	16,500
L9	Part 17	silver paint	Poor	2,790
L10	Part 23	silver/blue paint	Poor	3,300
L11	Part 26	black paint	Poor	1,350
L12	Part 11	blue/red/yellow paint	Poor	35,200
L13	Part 15	grey paint	Poor	119,000
L14	Part 68	green paint	Poor	20,700
L15	stair railing at west fish oil tank	dark green paint	Poor	99.1
L16	pipe leading to/from fish oil tanks	grey paint	Poor	11,300
L17	pipe leading to/from fish oil tanks	grey paint	Poor	64,700
L18	motor wheel spokes at east side of fish oil tanks	white paint	Poor	117,000

SAMPLE N ^o	LOCATION	DESCRIPTION	CONDITION	LEAD CONTENT (mg/kg)
L19	motor at east side of fish oil tanks	grey paint	Poor	29,000
L20	tall exhaust stack at north end of cannery	green paint	Poor	4,450
L21	short exhaust stack at north end of cannery	black paint	Fair	1,370
L22	Part 51	orange paint	Poor	30,200
L23	Part 67	black paint	Poor	14,500
L24	Part 43	yellow/blue	Poor	24,700
L25	Part 62	yellow paint	Poor	7,540
L26	large pipe by stairs to dryer shed roof	green paint	Poor	20,600
L27	Red base of Part 26	red paint	Poor	12,800
L28	Part 34	blue/yellow/red paint	Poor	8,320

NOTES:

Results shown in bold type exceed the criterion level of 600 mg/kg for classification of lead paint (where high risk individuals, such as pregnant women and children, are not present).
All levels exceeded the *Surface Coating Materials Regulations* concentration of 90 mg/kg.
mg/kg - milligrams lead per kilogram paint.
1 mg/kg - 1 part per million (ppm).

3. Closure

Please call if you have any questions.

Sincerely,

Arcadis Canada Inc.



Paul Smith, B.Sc., IHT
Project Manager

Attachment A

Laboratory Report

Your Project #: 702358-002
Site Location: GULF CANNERY-STEVESTON
Your C.O.C. #: 08413484, 08413485, 08413486

Attention:Paul Smith
ARCADIS Canada
121 GRANTON DR
UNIT 11
RICHMOND HILL, ON
CANADA L4B 3N4

Report Date: 2015/11/18
Report #: R2081598
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5A0570
Received: 2015/11/10, 11:15
Sample Matrix: PAINT
Samples Received: 28

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
Elements by ICP-AES (acid extr. solid)	11	2015/11/17	2015/11/17	BBY7SOP-00018	EPA 6010c R3 m
Elements by ICP-AES (acid extr. solid)	17	2015/11/17	2015/11/18	BBY7SOP-00018	EPA 6010c R3 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Amandeep Nagra, Account Specialist
Email: ANagra@maxxam.ca
Phone# (604)639-2602

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: BSA0570
Report Date: 2015/11/18

ARCADIS Canada
Client Project #: 702358-002
Site Location: GULF CANNERY-STEVESTON
Sampler Initials: KL

LEAD IN PAINT CHIPS (PAINT)

Maxxam ID		NP7009	NP7010	NP7011	NP7012	NP7013	NP7014	NP7015		
Sampling Date		2015/11/06	2015/11/06	2015/11/06	2015/11/06	2015/11/06	2015/11/06	2015/11/06		
COC Number		08413484	08413484	08413484	08413484	08413484	08413484	08413484		
	UNITS	L1	L2	L3	L4	L5	L6	L7	RDL	QC Batch

Total Metals by ICP										
Total Lead (Pb)	mg/kg	339	5260	4020	56100	21500	1180	17600	3.0	8115762
RDL = Reportable Detection Limit										

Maxxam ID		NP7016	NP7017	NP7018	NP7030		NP7031	NP7032		
Sampling Date		2015/11/06	2015/11/06	2015/11/06	2015/11/06		2015/11/06	2015/11/06		
COC Number		08413484	08413484	08413484	08413485		08413485	08413485		
	UNITS	L8	L9	L10	L11	QC Batch	L12	L13	RDL	QC Batch

Total Metals by ICP										
Total Lead (Pb)	mg/kg	16500	2790	3300	1350	8115762	35200	119000	3.0	8115834
RDL = Reportable Detection Limit										

Maxxam ID		NP7033	NP7034	NP7035	NP7036	NP7037	NP7038	NP7039		
Sampling Date		2015/11/06	2015/11/06	2015/11/06	2015/11/06	2015/11/06	2015/11/06	2015/11/06		
COC Number		08413485	08413485	08413485	08413485	08413485	08413485	08413485		
	UNITS	L14	L15	L16	L17	L18	L19	L20	RDL	QC Batch

Total Metals by ICP										
Total Lead (Pb)	mg/kg	20700	99.1	11300	64700	117000	29000	4450	3.0	8115834
RDL = Reportable Detection Limit										

Maxxam ID		NP7058	NP7059	NP7060	NP7061	NP7062	NP7063	NP7064		
Sampling Date		2015/11/06	2015/11/06	2015/11/06	2015/11/06	2015/11/06	2015/11/06	2015/11/06		
COC Number		08413486	08413486	08413486	08413486	08413486	08413486	08413486		
	UNITS	L21	L22	L23	L24	L25	L26	L27	RDL	QC Batch

Total Metals by ICP										
Total Lead (Pb)	mg/kg	1370	30200	14500	24700	7540	20600	12800	3.0	8115834
RDL = Reportable Detection Limit										

Maxxam ID		NP7065		
Sampling Date		2015/11/06		
COC Number		08413486		
	UNITS	L28	RDL	QC Batch

Total Metals by ICP				
Total Lead (Pb)	mg/kg	8320	3.0	8115834
RDL = Reportable Detection Limit				

Maxxam Job #: B5A0570
Report Date: 2015/11/18

ARCADIS Canada
Client Project #: 702358-002
Site Location: GULF CANNERY-STEVESTON
Sampler Initials: KL

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B5A0570
Report Date: 2015/11/18

QUALITY ASSURANCE REPORT

ARCADIS Canada
Client Project #: 702358-002
Site Location: GULF CANNERY-STEVESTON
Sampler Initials: KL

QC Batch	Parameter	Date	Method Blank		RPD		QC Standard	
			Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8115762	Total Lead (Pb)	2015/11/17	<3.0	mg/kg	6.3	35	100	80 - 120
8115834	Total Lead (Pb)	2015/11/18	<3.0	mg/kg	6.1	35	99	80 - 120

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

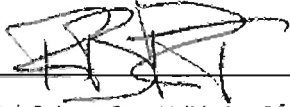
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Maxxam Job #: B5A0570
Report Date: 2015/11/18

ARCADIS Canada
Client Project #: 702358-002
Site Location: GULF CANNERY-STEVESTON
Sampler Initials: KL

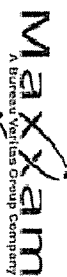
VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Rob Reinert, Data Validation Coordinator

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



MAXXAM
A Bureau Veritas Group Company

CHAIN OF CUSTODY RECORD

BBY FCD-00077/05

Page 1 of 5



Invoice Information

Report Information (if differs from invoice)

Project Information

08413484

round Time (Total) Required

Company Name: Arcadis Canada Inc.
Contact Name: Paul Smith
Address: 222 Queen Ave, 4th Floor, Toronto, ON M5H 1W4
Phone: 505 882 2934
Email: paul.smith@arcanadainc.com

Company Name: SAME
Contact Name:
Address:
Phone:
Email:

Project #: 702336-007
Project No.: GULF CARTERS - SUSTENTION
Site Location:
Site #:
Sampled by: Mervyn Murray

Please provide advance notice for rush projects
Rush confirmation #:
Date required:
Rush Confirmation #:
Date required:

Regulatory Criteria

Special Instructions

Analysts Requested

IIC/SW Soil
 IIC/SW Water
 C/VE (Specify) Other (Specify)
 Drinking Water Hot Water Quality

Return Cooler
 Ship Samples Out (Specify)

WQC/PH
 MTE
 TCH
 LCH/EN
 STXV F1
 F1-F4
 Dissolved Metals
 Filtered
 Preserved
 Dissolved Mercury
 Filtered
 Preserved
 Total Metals
 Field Preserved
 Total Mercury
 Field Preserved
 Chloride
 Fluoride
 Sulfate
 TSS
 TOC
 BOD
 COD
 pH
 Conductivity
 Ammonia
 Nitrate
 Ammonia

LABORATORY USE ONLY
CUSTODY SEAL: Y/N
COOLERS: Y/N
TEMPERATURES: Y/N
COOLING MEDIA PRESENT: Y/N
COMMENTS:

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Sample Identification	Lab Identification	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	STXV/F1	MTE	WQC/PH	TCH	LCH/EN	STXV F1	F1-F4	Dissolved Metals	Filtered	Preserved	Dissolved Mercury	Filtere	Preserved	Total Metals	Field Preserved	Total Mercury	Field Preserved	Chloride	Fluoride	Sulfate	TSS	TOC	BOD	COD	pH	Conductivity	Ammonia	Nitrate	Ammonia	# OF CONTAINERS SUBMITTED	HOLD - DO NOT ANALYZE	
1	NP2009	11/6/2015																																		
2	NP2010	11/6/2015																																		
3	NP2011	11/6/2015																																		
4	NP2012	11/6/2015																																		
5	NP2013	11/6/2015																																		
6	NP2014	11/6/2015																																		
7	NP2015	11/6/2015																																		
8	NP2016	11/6/2015																																		
9	NP2017	11/6/2015																																		
10	NP2018	11/6/2015																																		
RELEASING BY (Signature/Print)		DATE (YYYY/MM/DD)		TIME (HH:MM)		RECEIVED BY (Signature/Print)		DATE (YYYY/MM/DD)		TIME (HH:MM)		MAXXAM JOB #																								
Mervyn Murray		11/07/15		11:00		Mervyn Murray		11/07/15		11:15		B5A0570																								

B5A0570_COC



CHAIN OF CUSTODY RECORD

08413485

BY FCD-00077/05

Report Information (if different from invoice)

Company Name: **Arcebis Gambla Inc**
 Contact Name: **Paul Krutch**
 Address: **121 Graham Drive, Waco, TX 76798**
 Phone: **817 882 5884**
 Email: **Paul.Krutch@arcebis.com**

Company Name: **Same**
 Contact Name: **Same**
 Address: **PC**
 Phone: **PC**
 Email: **PC**

Project Information
 Order # / Ref: **702358902**
 Invoice #:
 S/L # (optional): **Gulf Community Association**
 S/N #:
 Analyzed By: **Kenny Lutzke**

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
 Regular FAT 5 days (Weekend excluded)
 Rush FAT 3 days (Weekend excluded)
 Rush YAT (Surcharge will be applied)
 Same Day
 2 Days
 3 Days
 Date Required:
 Rush Confirmation #:
 Laboratory Use Only:
 CUSTOMER COOLER TEMPERATURES
 COMMENTS: **18**

Regulatory Criteria
 TPC CSF SSI
 BOD/CB Water
 Coliform (Specific)
 Other (Specify):
 Other (Specify):
 Other (Specify):
 Other (Specify):
 Other (Specify):
 Other (Specify):
 Other (Specify):

Special Instructions
 Return Cooler
 Ship Sample Boxes (Please Specify):

Analysis Requested
 BTEX/VOL
 PCBs
 EPA
 PAH
 GC/MS/PI
 FE-F4
 Dissolved Metals
 Field Preserved?
 Dissolved Mercury
 Field Preserved?
 Total Metals
 Field Preserved?
 Total Mercury
 Field Preserved?
 Chloride
 Fluoride
 Sulfate
 CO2
 SO2
 SO4
 pH
 Conductivity
 Ammonia
 Boron
 Nitrate
 Nitrite
 Phosphate
 Silica
 Total Solids
 Total Suspended Solids
 Total Dissolved Solids
 Total Hardness
 Total Alkalinity
 Total Acidity
 Total Chlorine Demand
 Total Free Chlorine
 Total Available Chlorine
 Total Residual Chlorine
 Total Chlorine
 Total Bromine
 Total Iodine
 Total Fluoride
 Total Selenium
 Total Tellurium
 Total Vanadium
 Total Manganese
 Total Zinc
 Total Cadmium
 Total Lead
 Total Copper
 Total Nickel
 Total Chromium
 Total Molybdenum
 Total Antimony
 Total Arsenic
 Total Barium
 Total Bismuth
 Total Cadmium
 Total Cobalt
 Total Chromium
 Total Copper
 Total Gallium
 Total Germanium
 Total Indium
 Total Iron
 Total Lead
 Total Lithium
 Total Magnesium
 Total Manganese
 Total Mercury
 Total Molybdenum
 Total Nickel
 Total Niobium
 Total Potassium
 Total Rhenium
 Total Rubidium
 Total Selenium
 Total Silver
 Total Strontium
 Total Tellurium
 Total Thallium
 Total Tin
 Total Vanadium
 Total Zirconium
 Total Zirconium
 Total Zirconium
 Total Zirconium

SAMPLE MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Sample Identification	Lab Identification	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Mark	RECEIVED BY (Signature/Print)	DATE (YYYY/MM/DD)	TIME (HH:MM)
1	L11	NP7030	11/6/2015				
2	L12	NP7031	11/6/2015				
3	L13	NP7032	11/6/2015				
4	L14	NP7033	11/6/2015				
5	L15	NP7034	11/6/2015				
6	L16	NP7035	11/6/2015				
7	L17	NP7036	11/6/2015				
8	L18	NP7037	11/6/2015				
9	L19	NP7038	11/6/2015				
10	L20	NP7039	11/6/2015				

RECEIVED BY (Signature/Print): **Kenny Lutzke**
 DATE (YYYY/MM/DD): **11/6/2015**
 TIME (HH:MM): **11:00**
 RECEIVED BY (Signature/Print): **Kenny Lutzke**
 DATE (YYYY/MM/DD): **11/6/2015**
 TIME (HH:MM): **11:10**
 MAXXAM JOB #: **B5A0570**

BSA0570_COC



CHAIN OF CUSTODY RECORD

BBV FCD-0007705

Page 3 of 3

08413486

Invoice Information Company Name: <u>Acculis Canada Inc.</u> Contact Name: <u>Paul Smith</u> Address: <u>121 Queen Ave. W. 8th Floor Toronto, ON M5H 1A3</u> Phone: <u>295 982 5984</u> Email: <u>Paul.Smith@acculis.com</u>		Report Information (if differs from Invoice) Company Name: _____ Contact Name: _____ Address: _____ Phone: _____ Email: _____	
Project Information Project Name: _____ Project #: <u>202358-ND2</u> Site Location: <u>gulf Carriway - Stevenson</u> Site #: _____ Sampled By: <u>Kerry Lunn</u>		Quotation #: _____ P.O. # / A/E/M: _____ Date Requested: _____ Round Time (TAT) Required: _____ Regular TAT is <u>2 Days</u> (does not include weekends) Rush TAT (charges will be applied): <input type="checkbox"/> Same Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3 Days <input type="checkbox"/> 1 Day <input type="checkbox"/> 3 Days	

Regulatory Criteria <input type="checkbox"/> H.C. (S&P) <input type="checkbox"/> C.C.M.E. (S&P) <input type="checkbox"/> Drinking Water <input type="checkbox"/> B.C. Water Quality	Special Instructions <input type="checkbox"/> require cooler <input type="checkbox"/> ship samples in ice <input type="checkbox"/> Pesticide Specific (V)	Analysis Requested <input type="checkbox"/> BTEX/VOC <input type="checkbox"/> PAH <input type="checkbox"/> CCME-PHC <input type="checkbox"/> Dissolved Metals <input type="checkbox"/> Dissolved Mercury <input type="checkbox"/> Total Mercury <input type="checkbox"/> Chloride <input type="checkbox"/> TSS <input type="checkbox"/> pH <input type="checkbox"/> Nitrite <input type="checkbox"/> Nitrate <input type="checkbox"/> Fluoride <input type="checkbox"/> Sulfate <input type="checkbox"/> TOC <input type="checkbox"/> COD <input type="checkbox"/> CO2 <input type="checkbox"/> Conductivity <input type="checkbox"/> Alkalinity <input type="checkbox"/> Ammonia <input type="checkbox"/> Arsenic	
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SAMPLES MUST BE KEPT COOL | < 10°C | FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Sample Identification	Lab Identification	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	BTX/VOC	PAH	CCME-PHC	Dissolved Metals	Dissolved Mercury	Total Mercury	Chloride	TSS	pH	Nitrite	Nitrate	Fluoride	Sulfate	TOC	COD	CO2	Conductivity	Alkalinity	Ammonia	Arsenic
1	L21	NP2053	11/6/2015																					
2	L22	NP2054	11/6/2015																					
3	L23	NP2060	11/6/2015																					
4	L24	NP2061	11/6/2015																					
5	L25	NP2062	11/6/2015																					
6	L26	NP2063	11/6/2015																					
7	L27	NP2064	11/6/2015																					
8	L28	NP2065	11/6/2015																					
9																								
10																								

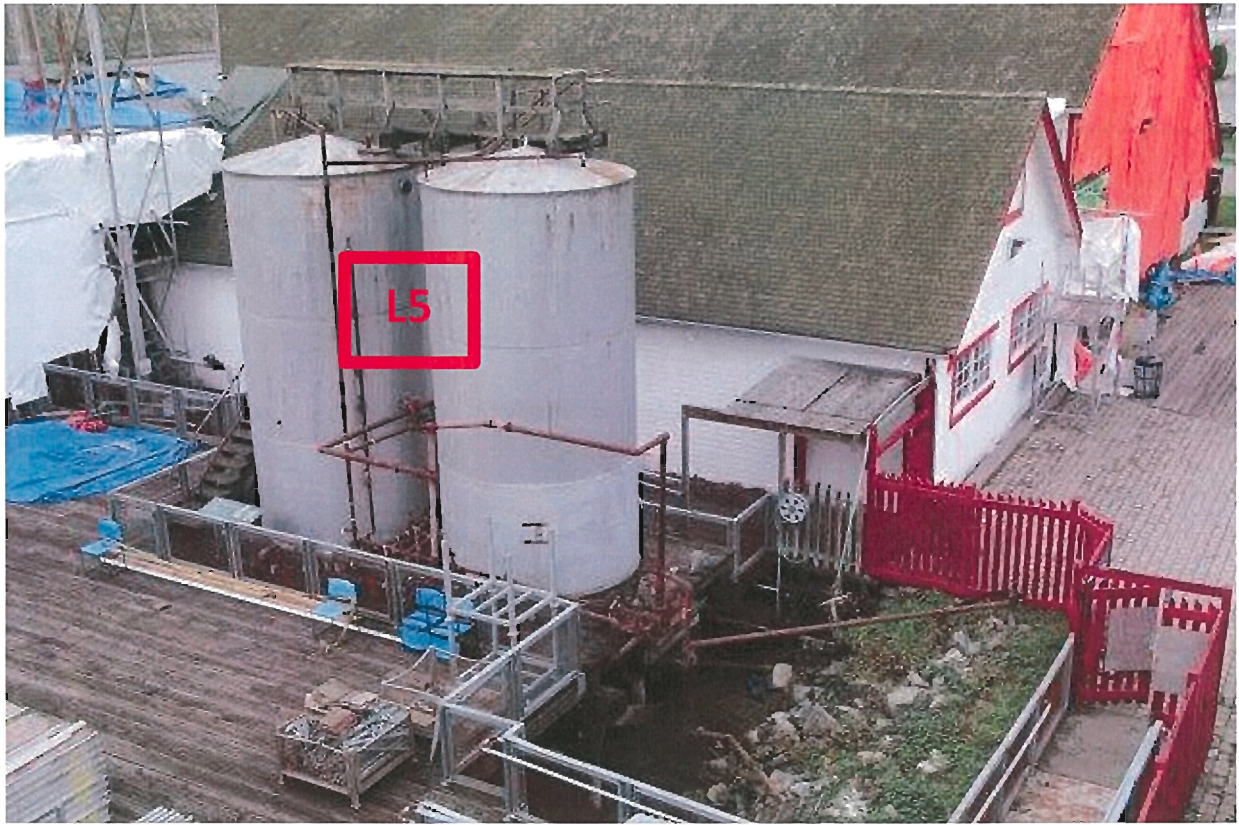
RELEASED BY: (Signature/Print) Kerry Lunn	DATE: (YYYY/MM/DD) 11/09/2015	TIME: (HH:MM) 11:00	RECEIVED BY: (Signature/Print) [Signature]	DATE: (YYYY/MM/DD) 11/09/15	TIME: (HH:MM) 11:15	MAXXAM JOB # BSA0570
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PWGSC
November 25, 2015
702358-002

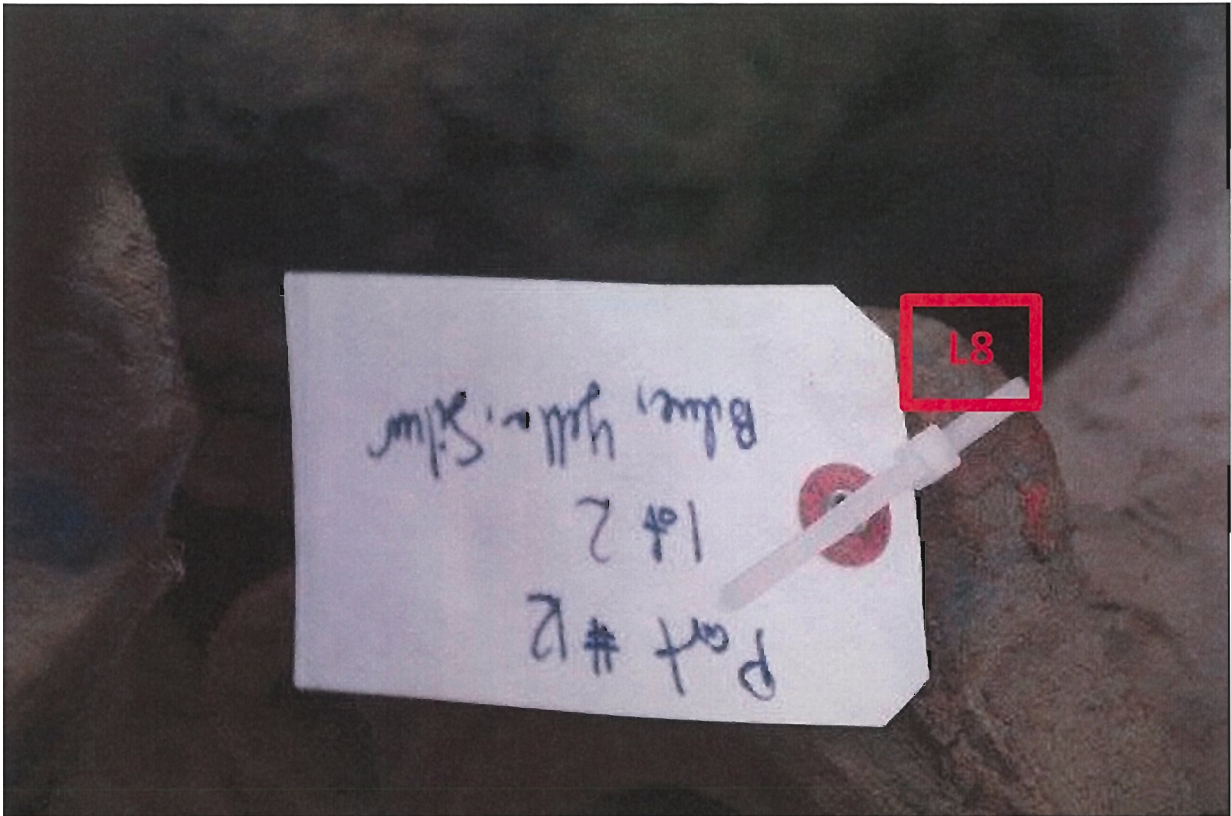
Attachment B

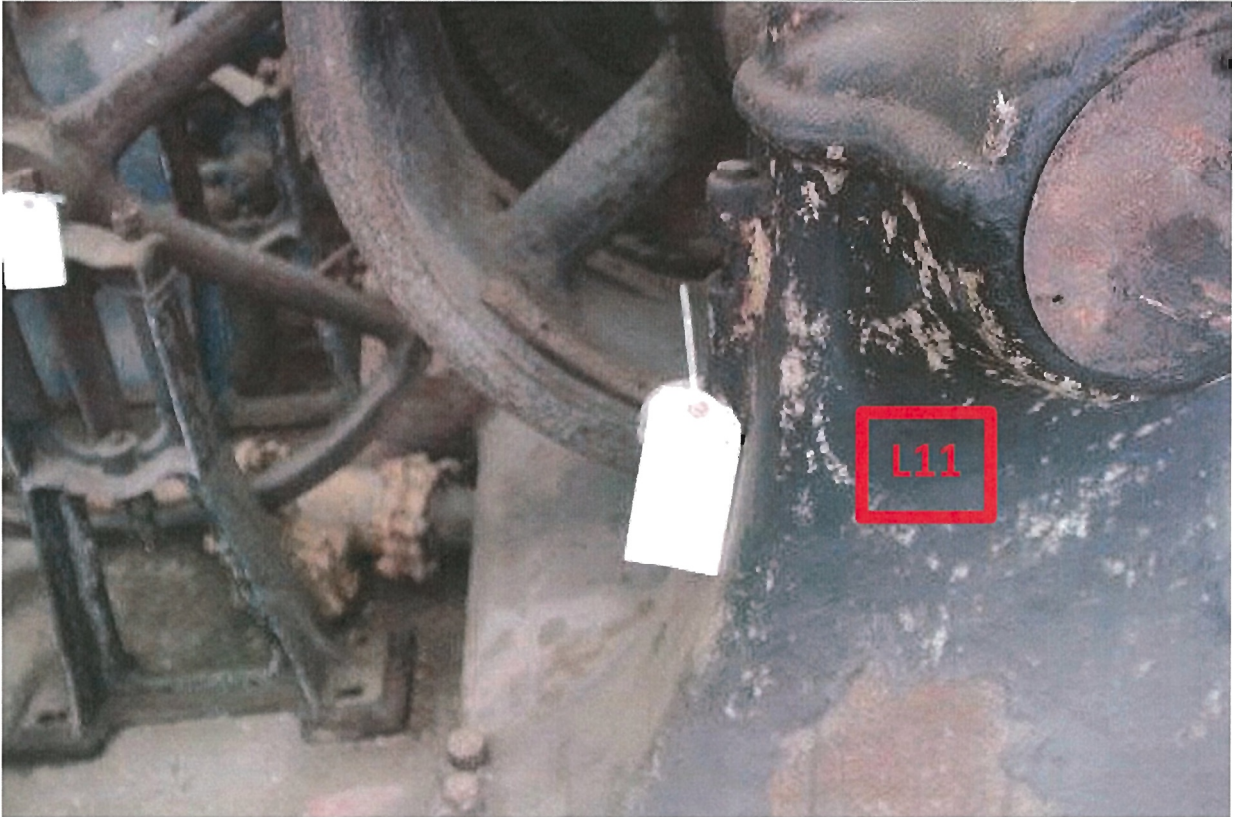
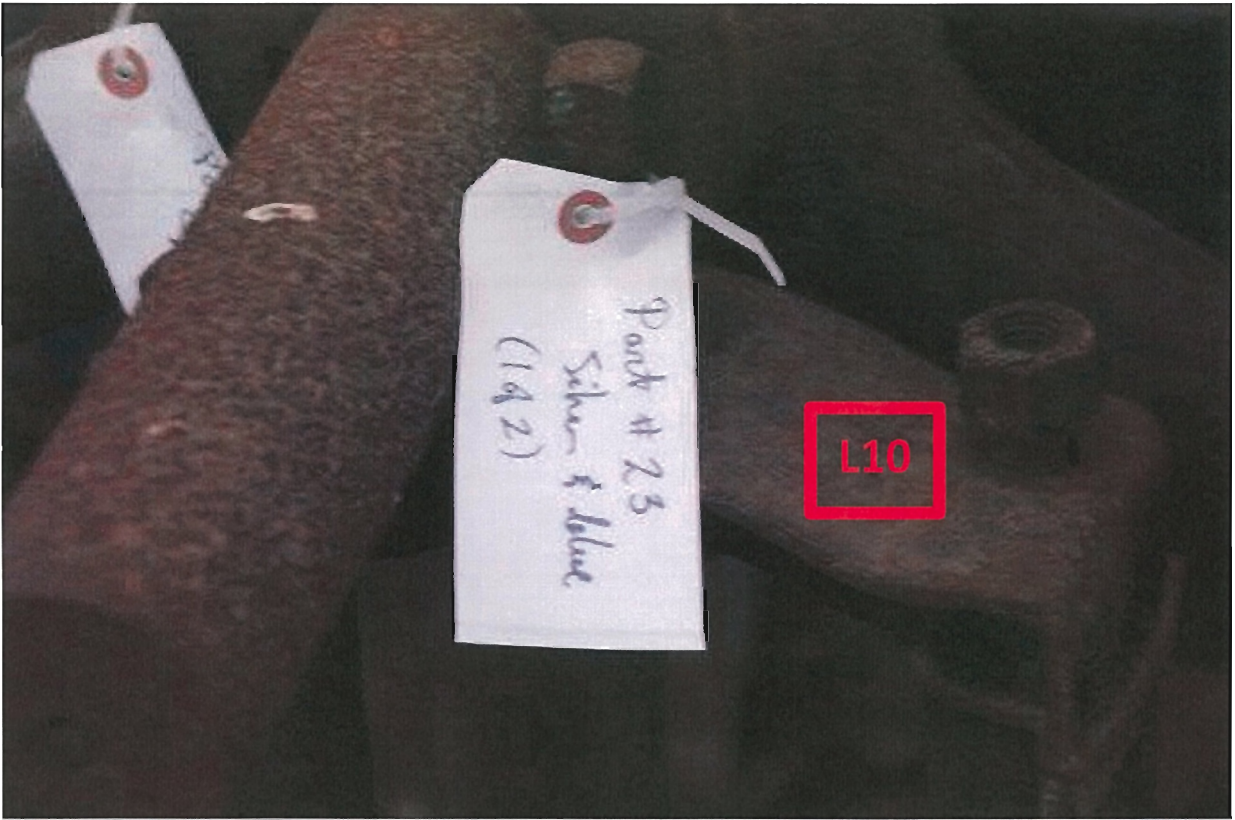
Photographs

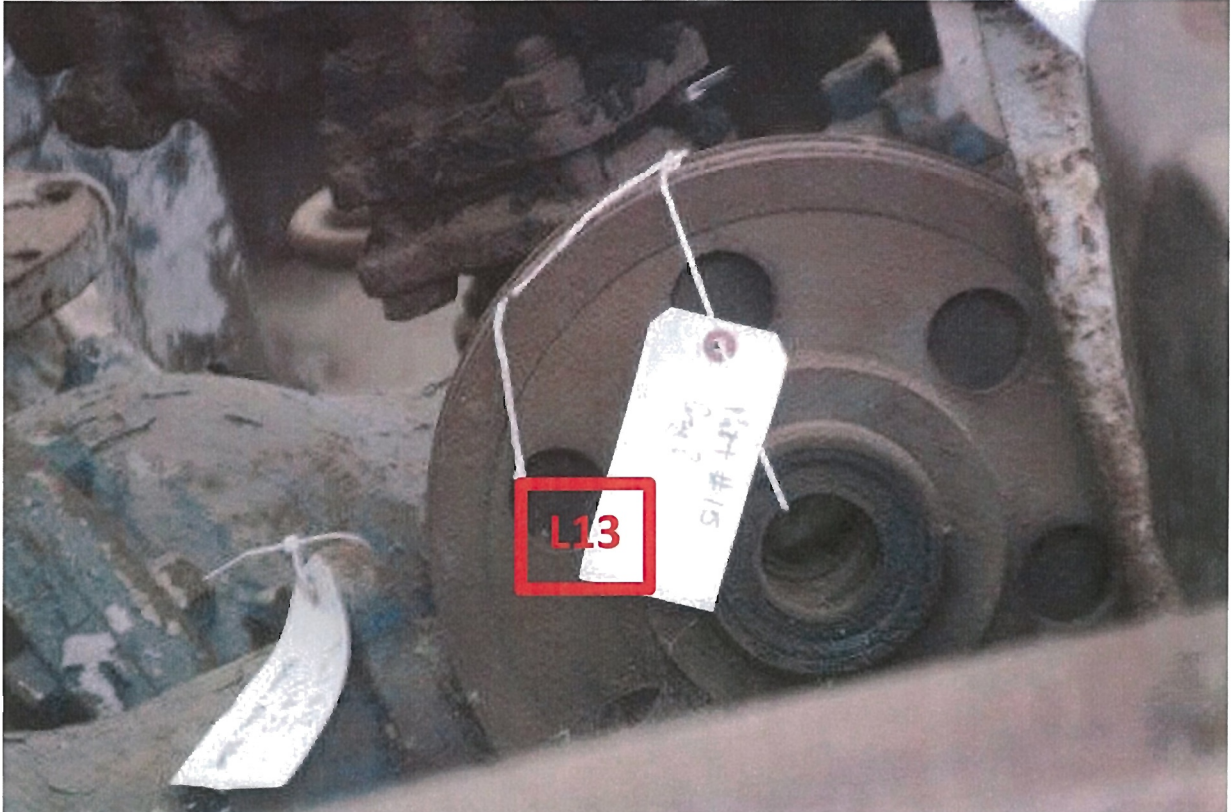
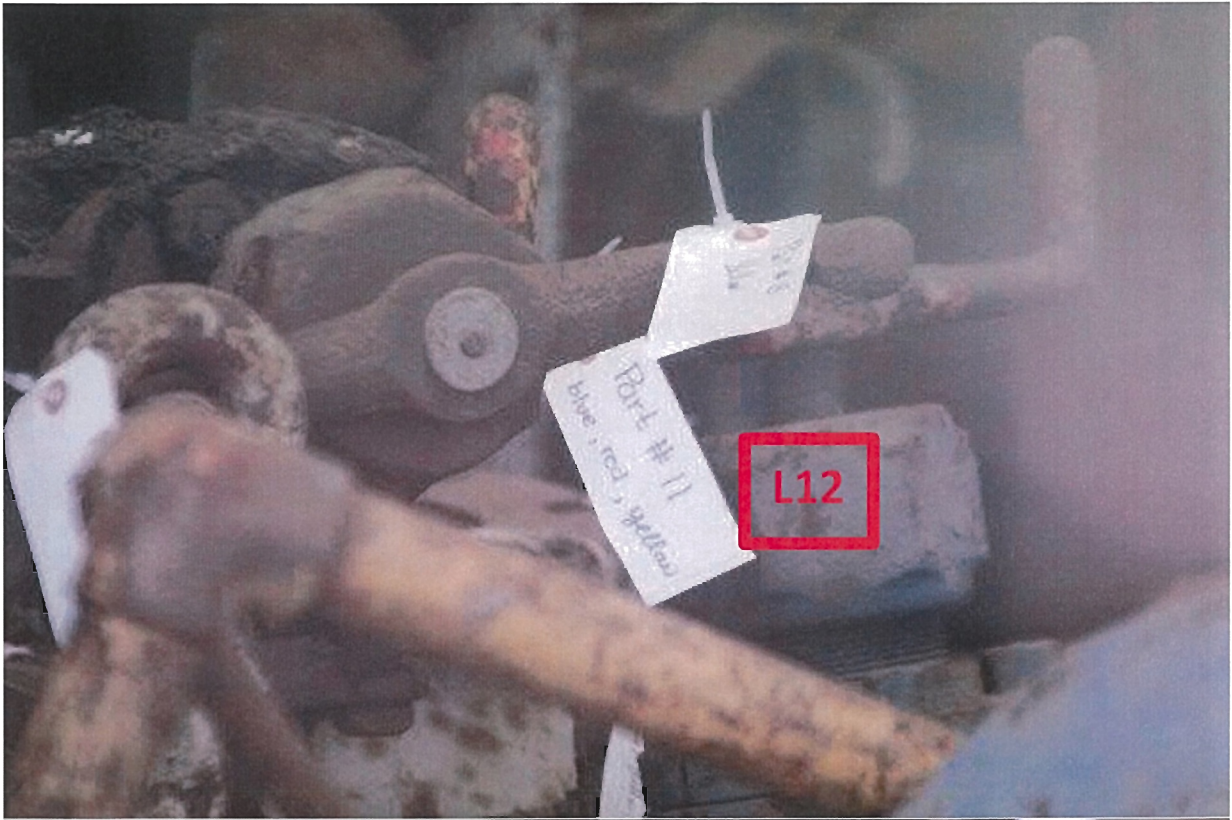


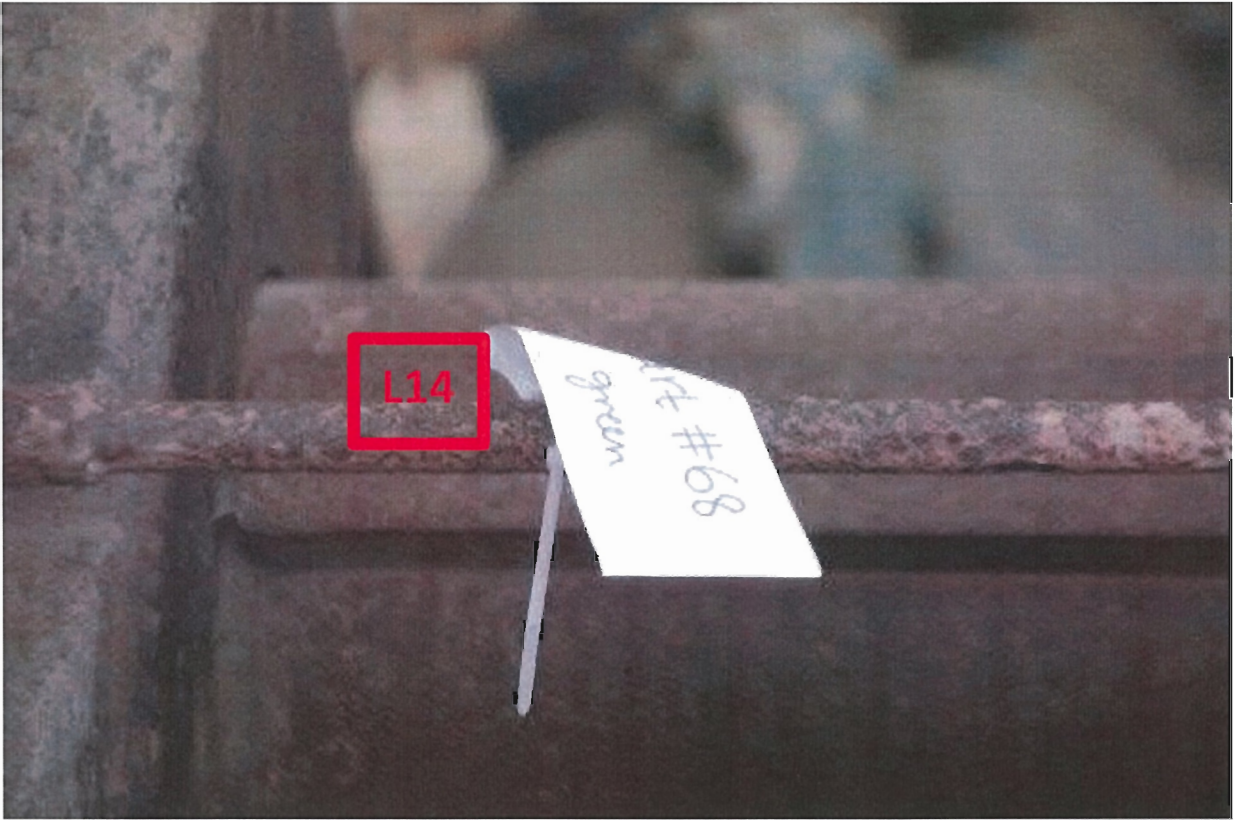


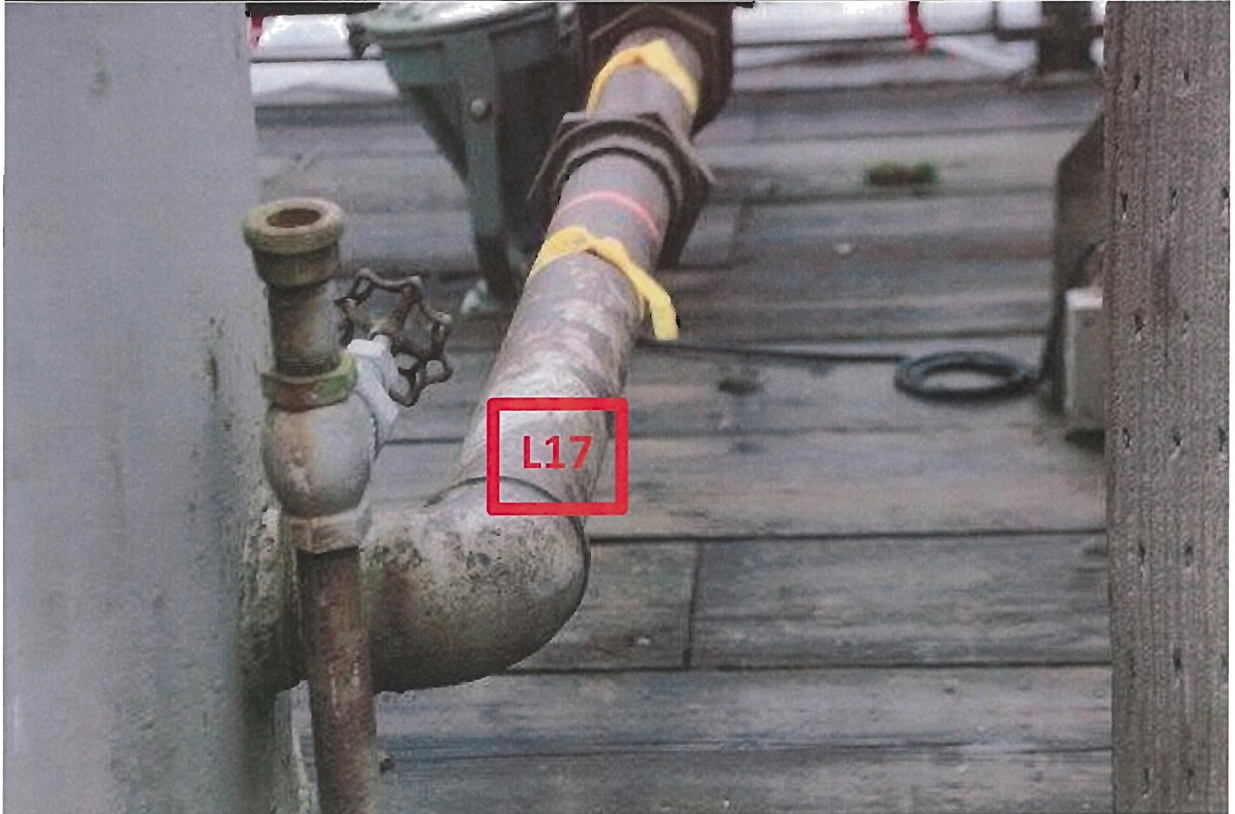
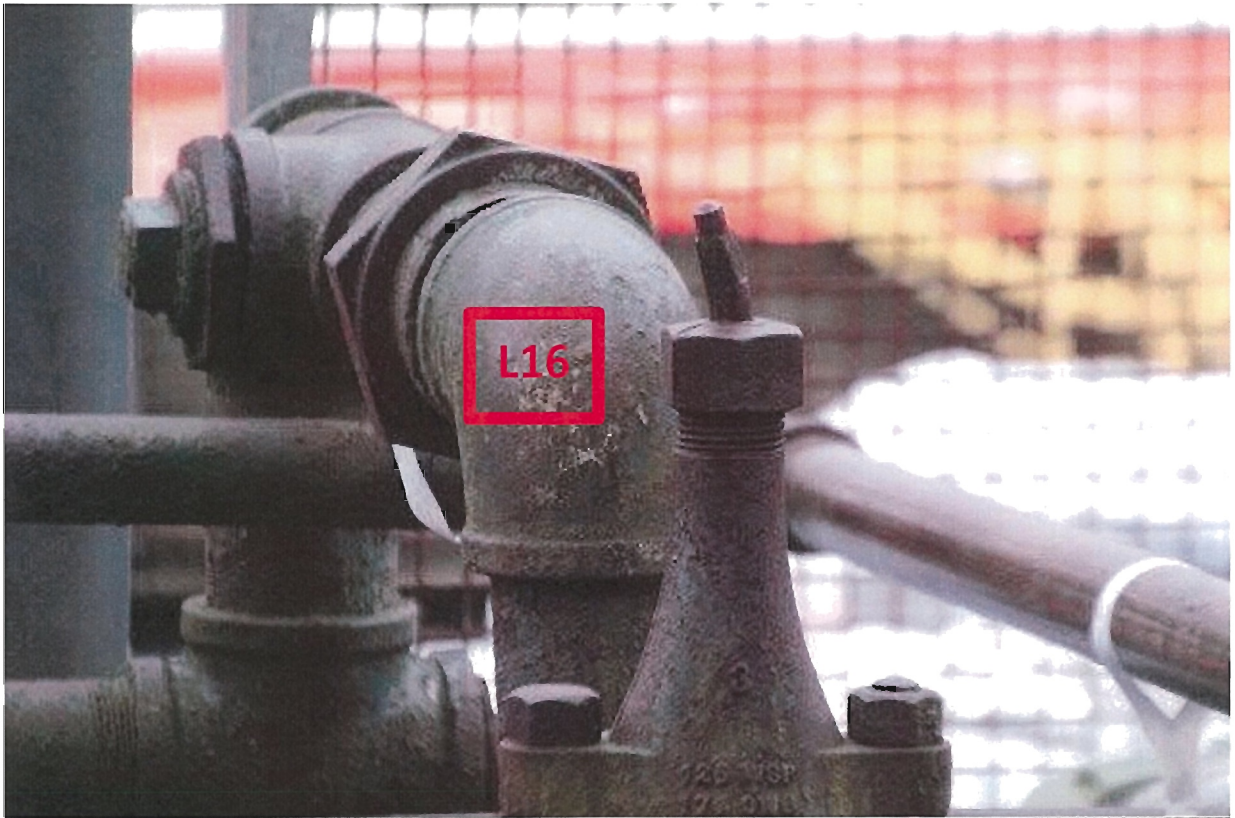


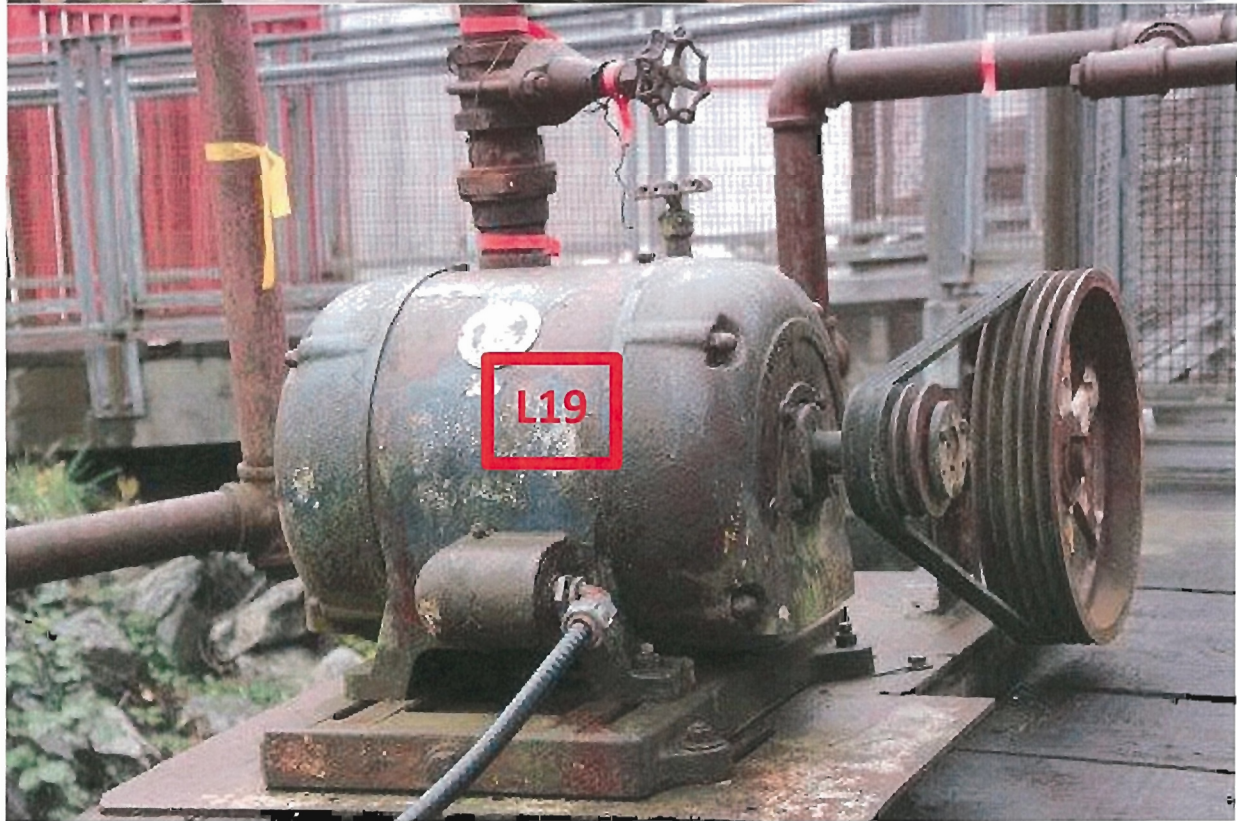
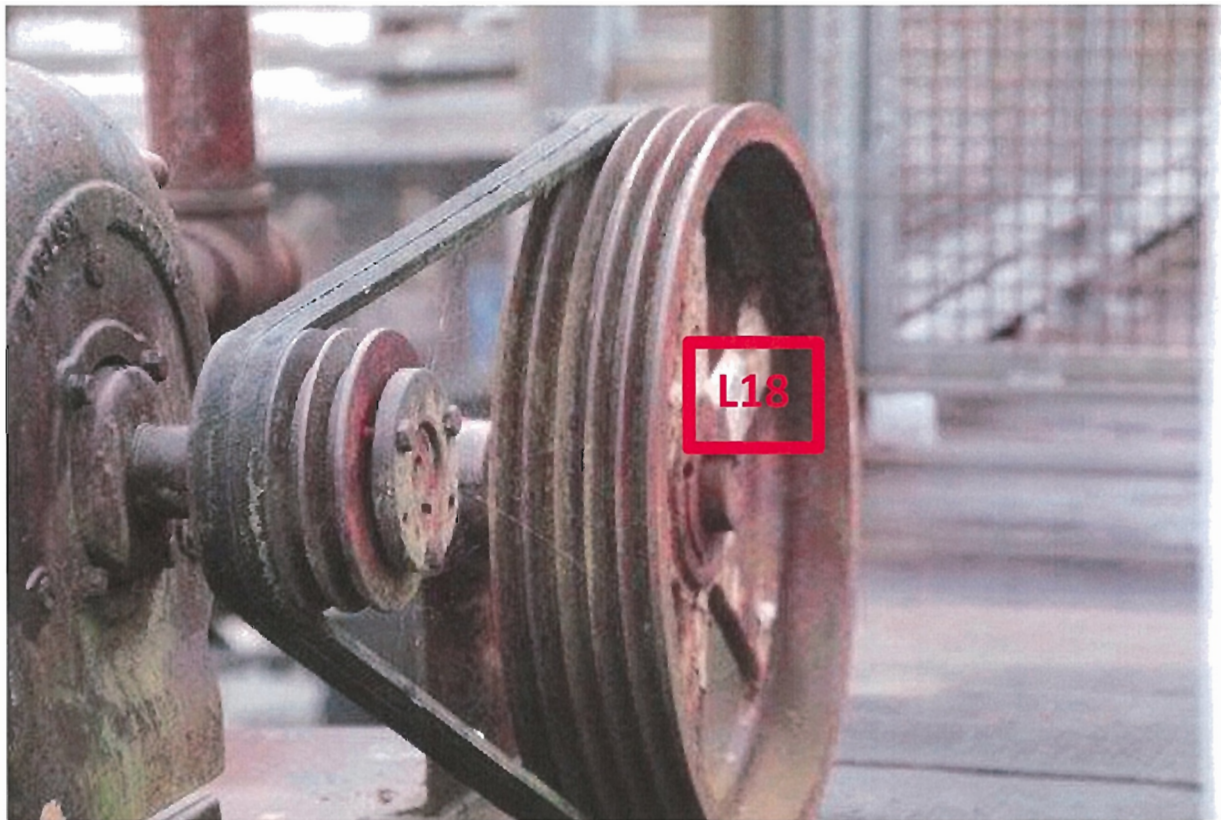


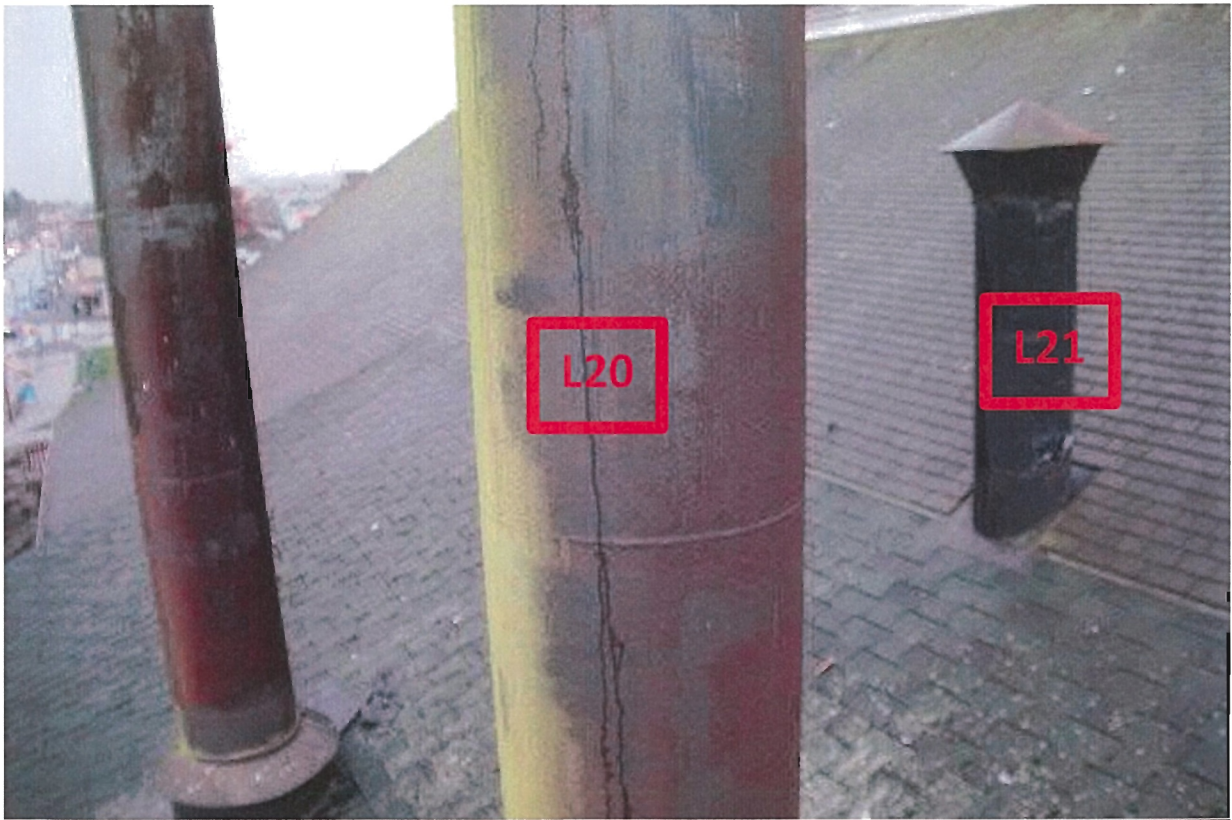






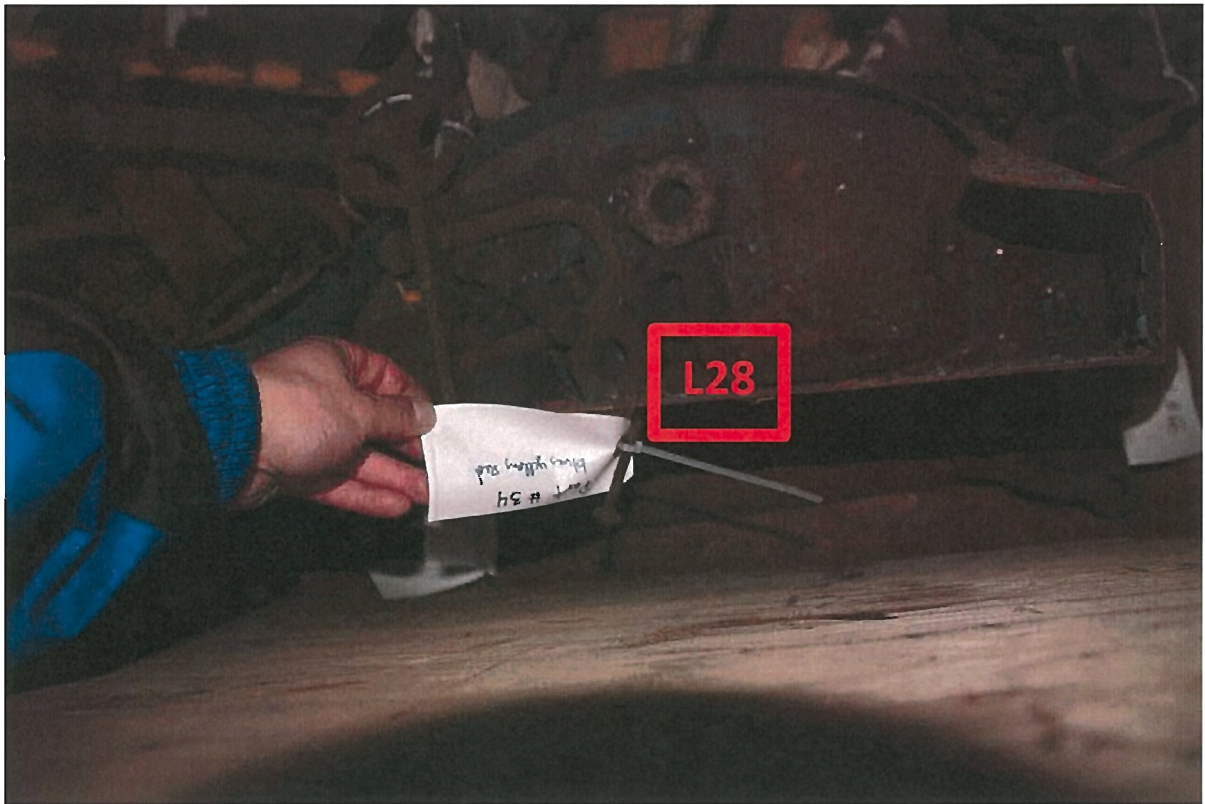
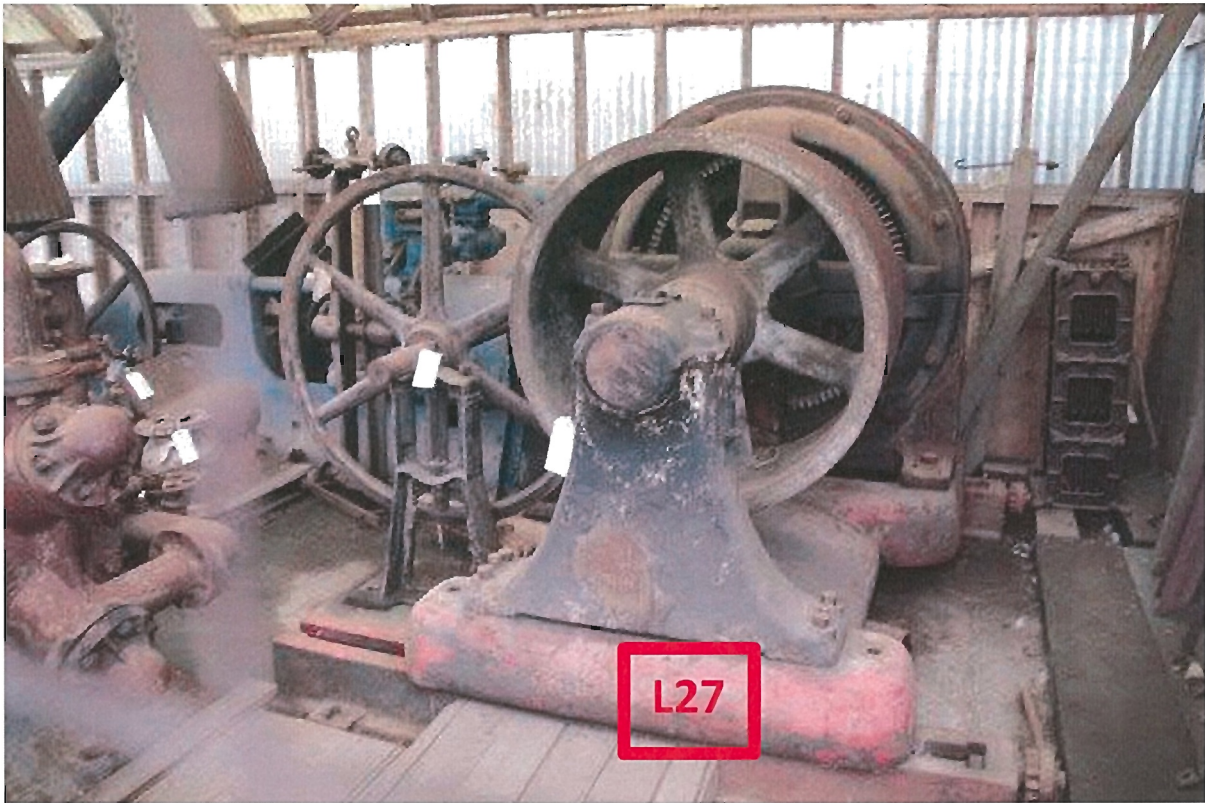




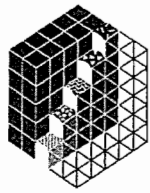








APPENDIX 6



JECTH
Consultants Inc.

Geotechnical & Environmental Engineers

**GEOTECHNICAL ENGINEERING REVIEW AND ASSESSMENT
GULF OF GEORGIA EXTERIOR ARTIFACT DISPLAYS**

**AT
12138 FOURTH AVENUE,
RICHMOND, BC**

FOR

**GULF OF GEORGIA CANNERY
C/O CWMM CONSULTING ENGINEERS LTD.**

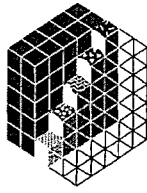
PREPARED BY

**JECTH CONSULTANTS INC.
SUITE 122 - 3823 HENNING DRIVE
BURNABY, B.C.
V5C 6P3**

OUR FILE NO.: 215P554

DATE: OCTOBER 6, 2015

*122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com*



**GEOTECHNICAL ENGINEERING REVIEW AND ASSESSMENT
GULF OF GEORGIA EXTERIOR ARTIFACT DISPLAYS
12138 FOURTH AVENUE, RICHMOND, BC**

1.0 INTRODUCTION

1.1 AUTHORIZATION ARTIFACT

As authorized by Louis Lam of CWMM Consulting Engineers Ltd. on behalf of Public Works and Government Services Canada / Government of Canada on August 8, 2015 with regards to the review foundation condition for exterior displays at the subject site, JECTH Consultants Inc. (JCI) has carried out a Geotechnical Engineering Review and Assessment for foundation for the existing Stinkeroo Tank and Fish Oil Tanks, and proposed new Ice Machine Display at the subject site.

1.2 METHODOLOGY

The Geotechnical Engineering Assessment and Review includes:

- Reviewed of available site plan.
- Obtained the Surficial Geological Map from The Geological Survey of Canada.
- Review Liquefaction Hazard Map of Richmond from BC Geological Survey of Canada.
- Conducted site Reconnaissance on September 2, 2015.
- Conducted Site Review for a test pitting by others on September 9, 2015
- Reviewed available Historical Record for the Site in regard in past construction activities
- Utilized our previous experience to access subsurface ground conditions from nearby projects.
- Communicated with Architect and Designers, if required.

1.3 OBJECTIVE

This Geotechnical Engineering Report summarizes our findings and provides Geotechnical Engineering Comments and Recommendations for the foundation design of the existing Stinkeroo Tank and proposed Ice

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

Machine Artifact display as required by BC Building Code (2012) - Schedule "B" (Geotechnical).

The report also provides geotechnical comments and recommendation for the existing off-shore piling piers / platform which support 2 nos. Fish Oil Tank Artifact.

1.4 AS-BUILT DRAWING

This report is prepared based on the information provided by CWMM Consulting Engineers Ltd. for the existing off-shore piling plan as-built record.

2.0 SITE AND SITE CONDITION

The Site is located at the river bank at the south end of 4th Avenue, Richmond, BC as shown in Figure 1 – Site Location Plan and Figure 2 – Site Air Photo Plan.

The Gulf of Georgia Cannery building compound is situated beside the north river bank of Fraser River and is found on off-shore piling platform. It is bounded by Moncton Street to the north and a footpath to the east. The off-shore piling platform is situated beside a dyke.

At the present, there are 2 dykes observed to the east and to the west of the existing Cannery Museum building compound. The 2 dykes are joint by an old dyke along the east perimeter (footpath), north perimeter and part of the west perimeter of the Museum building compound.

The old dyke has a slope of about 2.5H:1V at the water side and is protected by rip-rap. The land side of the old dyke has a slope at about 4H:1V and is covered with turf. Top of dyke is about 10 ft. ± higher than the nearby street grade and is at approximate the same level with the main floor level of the Museum building compound.

The Cannery Museum composed of a 1-storey, L-shaped timber warehouse main building at the center, a separate 1-storey timber west-wing building to the west and a smaller, 2-storey timber east wing building to the east of the main building. In between the east wing building and the L-shape main building is a timber platform, which is believed hoisting groups of fish oil tanks in the past. All the buildings, as well as the timber platform, are founded on off-shore timber piles.

There are 3 areas under the consideration of this report in regard to the following Artifact Display outside the Building compounds:

- Stinkeroo tank Artifact / display situated in vicinity north of the east wing building. The location of the Stinkeroo tank is situated on top of an old dyke.
- 2 nos. of fish oil Tank Display on existing off-shore timber platform which is situated between the east wing building and the L-shape main building.
- Ice Machine Display at north west of the Cannery Musuem near Moncton Street. The location is believed within land side slope of the old dyke.

Locations of the area under consideration are shown in Figure 2 – Site Air Photo Plan and also in Figure 5 – As Built Piling Plan.

3.0 HISTORICAL REVIEW FOR PAST CONSTRUCTION ACTIVITIES

Based on available information from Gulf of Georgia Cannery Society, past activities in relate to construction of the Cannery Museum building can be summarized as below.

- The Cannery open in 1894 as a Salmon Cannery with Main Building constructed in 1894 and East Wing Building in 1897.
- East Wing Building was shorten by 50 ft. due to dyke construction in 1906.
- The Cannery became a salmon shipment point in early 1930 after decline of Salmon Cannery production.
- The Cannery revitalized as herring reduction process plant in mid 1940 to 1960's. Various structural upgrade were taken for building to accommodate new machine installation from herring production.
- East Wing building raised to accommodate evaporation process of herring production
- Cannery close in 1979, site was used as a net lot.
- The Building compound became a Museum in 1994.

Historical photograph of the Site is shown in Photo No. 1 and No. 2 which shows the old dyke (built in 1906) surrounding the Cannery Buildings. The present photo of the Site is shown in Photo No. 3 which shows new (existing) dyke in front of the old dyke. The new dyke probably constructed for further land reclamation extend into the Fraser River.

4.0 FIELD WORK AND FINDINGS

Field work involve a site reconnaissance on September 2, 2015 and a test pitting investigation on September 9, 2015.

Our site reconnaissance identify the Artifact Stinkeroo Tank Artifact is situated on top of a dyke as shown in Photo No. 4, the future Ice Machine Display will be within land side slope of dyke as shown in Photo No. 9 and the Fish Tanks Artifact are located on a off-shore timber platform supported by piles as shown in Photo No. 5 and No. 6.

There is no obvious ground settlement for the dyke for area at the existing Stinkeroo Tank and the future Ice Machine Artifact display locations. There is also no obvious distress of the off-shore timber platform by visual observation.

A test pit was carried out on September 9, 2015 by Contractor to investigate the thickness of existing footing of the Stinkeroo Tank. Test pit was excavated to the depth foundation subgrade and exposed the Dyke FILL.

Based on observation, the dyke FILL composes of a brown, compact to dense, dry fine to medium SAND with some gravel and trace of SILT. It can be also described as Pit-run Sand and Gravel in road construction term. JECTH probed the subgrade with a soil probe and found immediate refusal for probing. The Test Pit is shown in Photo No. 7 and No. 8 attached with this report.

Soil probing was also carried out near the proposed of the Ice-Machine Artifact location as shown in Photo No. 9. Probing indicates 4 in. \pm to refusal as such the same pit-run Sand and Gravel will likely to be found at land side slope of dyke. The dyke FILL at proposed ice machine location is probably covered by 4 in. \pm of top soil.

5.0 SUBSURFACE SOIL CONDITION

5.1 GEOLOGICAL MAP AND LIQUEFACTION HAZARD MAP

Based on Geological Map as shown in Figure 3 – Geological Map, the Site should be underlain by 6 ft. \pm of silty clay loam overlain fine to medium SAND of the Fraser River sediments deposit. The area is identified as SF³ area with moderate to high liquefaction potential as shown in Figure 4 – Liquefaction Hazard Map of Richmond.

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The Liquefaction Hazard Map identify a “shallow topset sands” of 7 m. (23 ft. ±) thick for SF and SF³ area, which may implies possible occurrence of liquefiable fine SAND at shallow depth.

It is assumed that the Site is underlain by a few ft. of overbank SILT deposit at the surface and further underlain by loosed, fine to medium River SAND to 30 ft. ± below existing timber platform level. The fine to medium SAND is further underlain by compact medium SAND below 30 ft. ± depth.

Water level will be fluctuated daily in high and low tide level, storm surge in windy weather and within seasons.

The old dyke which surrounding the Cannery Museum is believed to be found on top of a few feet of SILT along the river bank. Dyke configuration is unknown and material forming the dyke is probably pit-run Sand and gravel with some SILT as shown in Test Pit Location.

5.2 IN HOUSE RECORD

In-house Drilling Record at location near an old dyke at No. 2 Road indicate 4 ft. ± of SILT at surface, underlain with liquefiable SAND up to 27 ft. ± depth below field grade and further underlain by a compact to dense SAND.

The in-house drilling record conform with the prediction by both Geological Map and Richmond Liquefaction Hazard Map in general.

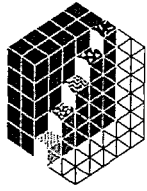
6.0 FOUNDATION RECOMMENDATION

6.1 FOUNDATION FOR ARTIFACTS ON OLD DYKE

Both the Stinkeroo Tank and Ice Machine Artifacts are found on dyke FILL composed of compact Pit-run SAND and Gravel.

The existing Stinkeroo Tank is found on a mat foundation composed of a 15 ft. by 15 ft. by 1 ft. ± thick reinforced concrete slab. The mat foundation was probably built in 1940's when the Cannery operation changed to a herring reduction processing plant. It is believed that both the Stinkeroo Tank and East Wing Building had been used for evaporation process for herring production.

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The existing mat foundation had supported a full operational Stinkeroo Tank filled with fish product in the past. The mat footing appears intact at the time of investigation. At the present, the Stinkeroo Tank is empty and remains as an Artifact for display. Loading for the existing Tank is considered having less weight than the past full operational tank. The new loading consideration will likely be wind load that may topple the empty Tank. In the case that the Tank is tied by anchor bolt onto the existing mat foundation, the foundation subgrade will experience the loading by weight of an empty Tank, base shear and moment induce at Tank bottom by wind load. De-couple the moment may resolve with compression at one side of the foundation and tension at the other side.

JECTH recommends an Allowable Bearing Capacity of 2,000 psf. for SLS Design and 3,000 psf. for ULS Design for the Stinkeroo Tank foundation Structural Design on Dyke FILL.

The same bearing capacity recommendation will be applied to the proposed foundation for the Ice-Machine Artifact Display. The foundation will be conventional shallow footing with either stripped and pad footings, or similar mat footing as the Stinkeroo Tank slab foundation. Base Friction coefficient can be take as 0.38 to resist base shear caused by wind loading.

Minimum footing size will be at least 24 in. for stripped footing and 36 in. for pad footing. Footing depth is recommended at least 18 in. below grade for frost protection.

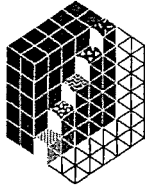
In regard to the existing Stinkeroo Tank foundation, the frost protection recommendation depth can be relieved since the foundation seems perform well since 1940's. However, the integrity of the existing footing is outside geotechnical aspect. It is the decision of the Structural Engineer to adapt retain the existing footing or to replace with a new footing if the existing footing performance is in question.

6.2 OFF-SHORE PILING PLATFORM

6.2.1 INTRODUCTION

The 2 nos. of fish oil tanks Artifact display are seated on existing timber platform which supported by off-shore timber piles. As-

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built record for piling plan is shown in Figure 5 – As-Built Piling Record and Figure 6 – As-Built Piling Plan at Fish Oil Tank.

Based on the pier plan obtained from CWMM Engineering, piles are about 6 ft. \pm c/c in a row to form piers. There are 9 rows of piers with off-set distance from 6 ft. \pm to 4 ft. \pm between each row timber decks are constructed on top of piers to form existing timber platform. The timber piles, piers and timber deck are connected with steel ties and bolts.

Based on Historical photo, the platform had hoisted many tanks for herring reduction process. At the present, the platform hoists 2 nos. of Fish Oil Tank empty tanks as outdoor Artifact display.

Similarly to the Stinkeroo Tank, empty fish oil Tank will be subjected to wind load. The loading will be transfer to base shear, compression and tension to piles. As such the axial capacity, tension capacity, buoyancy effect of the pile and lateral capacity of the pile should be under consideration.

Another important consideration is the integrity of the piles and deck which had been constructed in early 1900's. The piles integrity must be investigated whether they have damaged by Marine Wood Borers or other process weakening the timber.

6.2.2 AXIAL PILE LOAD CAPACITY

Since there is no detail available pile record for the depth of the piles in regard of length, driven pile setting, etc., an assumed pile model is chosen for the piles supporting the existing platform as follows:

Pile Length – 30 ft. \pm for common used timber pile.

Pile Diameter – 12 in, to 16 in. as observed on site.

Timber Type – Douglas Fir

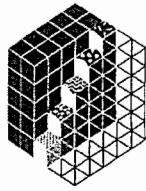
Pile Head Free Length – 10 ft. \pm above dredge line (River bed)

Pile Embedded Length – 20 ft. \pm in loose to compact River SAND

Pile Setting – 1 blow per 2 in. with 4,800 lb hammer drop at 5 ft.

By adapting classical piling formula by Meyerhof with a assumed friction angle of 24° for loose to compact SAND, the allowable

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Geotechnical & Environmental Engineers

Client: Gulf of Georgia Cannery

Date: October 6, 2015

File No.: 215P554

axial load capacity of a single pile is estimated at 6 kips/pile with a Factor of Safety of 3.

In accordance to Dynamic Pile Load Formula by Canadian National Building Code Method, a pile setting of 1 blow per 2 in. with 4,800 lb hammer, drop at 5 ft. will have an allowable axial load capacity of 13.5 kip with a Factor of Safety of 3. The calculation is plotted on a chart by excel spreadsheet and presented in Appendix "B" – Dynamic Pile Load Chart (CNBC) for reference.

It is recommended that allowable axial pile load capacity for existing timber pile to be 10 kip per single pile.

The same pile axial load capacity can be assumed for pile tension capacity against pulling out of the pile by toppling of fish oil tank under wind load and against buoyancy of pile submerge in water.

6.2.3 BUOYANCY OF PILE

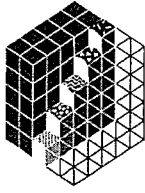
The specific gravity of a coast Douglas Fir is about 0.45. By assume the entire pile (30 ft. \pm) submerge in a high storm surge, the total buoyancy force for a 30 ft. long, 1 ft. \pm in diameter pile will be 1520 lb. or 1.5 kip per pile. The calculation is based on specific gravity of water of 1.0 with water density at 62.4 lb/ft³, with assumption the enter pile (above and below dredge line) subjected under buoyancy force.

6.2.4 LATERAL LOAD PILE CAPACITY

The characteristic of off-shore piling platform is the relatively long pile head free length (above dredge level) in compare to land based pile. Also marine off-shore structure will experience lateral load from impact of parking boat and base shear from object / structure carried by off-shore piling platform under wind load.

Traditional pile lateral load capacity evaluation for piles are developed since 1920's. One of the proven record of design is the p-y curve design method utilized by the theory of Beam of Elastic Foundation. Different stiffness of soil spring are assumed along embedded length of pile. The pile soil interaction are calculated

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based on deflection of pile and yielding of soil spring by finite difference method under the Beam of Elastic Foundation Theory.

There are several p-y curves published by different authorities based on the theory and verified with field lateral pile load test. The one adopted by this report is the COM624 pile analysis program (1993) issued by US Department of Transportation. It claims the program having support and data updated with hundreds of lateral pile load tests for various piles in various ground condition in USA. The COM 264 also are used for many successful piling jobs for bridges in US Highway. The p-y curve built into the COM 264 computer program has proven record for successful design and analysis in years.

By assume the same pile model with free head of 10 ft. ± and embedded depth of 20 ft. ± in loosed to compact river SAND, a trial and error calculation is proceeded for different lateral load at top of a 30 ft. ± long pile to evaluate a deflection of pile at dredge level (River Bend) for 0.5 in. to 1.0 in.

Since the pile in marine structure has a relatively long free length, the lateral force at top of pile is replaced by the same magnitude of lateral force plus a moment (created by the force times free length) at the dredge level. As such the program input is a 20 ft. ± pile in SAND with lateral load plus moment. This is for more accurate prediction of Soil/ Structure interaction with the p-y curve built in the COM 624 system.

The following results are obtained for a 12 in. diameter pile with Elastic Modules of Douglas Fir at 1,560 kips/in.².

Lateral Deflection at 1 in. at dredge level.

Lateral Force = 3,000 lb (3 kip) at Pile Head

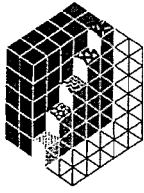
Moment = 360,000 lb-in (360 kip-in.) at dredge level

Maximum Bending Moment = 435 kip-in.

Maximum Soil Stress = 2,650 lb / in.²

A sample output data and graphs are presented in Appendix "C" – Lateral Pile Calculation Result.

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In regard of the p-y curves at different depth of pile, four different depth locations along the Pile depth are chosen (20 in., 60 in., 100 in. and 150 in.) for review the p-y curve behaviour. All p-y curves indicate Lateral Pile Capacity reaches maximum at 0.5 in. pile deflection. As such a 1 in. \pm pile deflection with 3 kip lateral load should reach the ultimate lateral load capacity by some give and take with the assumption.

Recalculation for a 0.5 in. lateral deflection by trial and error calculation of the program indicates a maximum lateral load capacity for a single pile at about 1,750 lb. (1.75 kip) at pile head.

Based on the above analysis, it is recommended that a lateral capacity of 2 kip per pile can be adopted for design.

6.2.5 PILE INTEGRITY

Timber piles are known lasting for long time span of over 100 years without any degradation of pile integrity. Piles installed in marine environment are estimated at about 70 years in many literatures but many historical off-shore structure has long lasted the recommended age.

Marine timber pile are usually treated with chemical against attack from Marine Borer that usually live between high and low tide water level. In the case that the existing piles are well protected and with pile integrity not affected, the existing piles can be used to support the Fish Oil Tank Artifact without installing new piles.

JECTH recommends to retain a specialized marine pile inspection company to investigate integrity of the existing piles. Inspection team should be sent below the timber deck with a little boat at low tide to carry out visual inspection. Pile inspection is usually done by hammering the pile with a hand held hammer. An experienced person / inspector can identify weak pile based on sound from hammering. Pile in question by hand hammering will be hand-drilled with electrical tool to investigate the extent of wood decay. Pile with decay extend into heart wood of pile, either by Marine Borer and natural decay, will be rendered useless.

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After identification of weak pile, Structural Engineer may implement structural beams over useful piles to avoid loading to weakened piles if load transfer by structural beam is applicable. In the case that too many piles affected, new pile will be installed.

Due to restriction of access by heavy piling equipment, mini-pile will be the choice for new pile installation. New piles, if installed, should reach a depth embedded at least 10 ft. \pm by approximation in non-liquefiable SAND. The actual recommended depth will be based on site specific Cone Penetration Test Data (CPT). Recommendation of new pile configuration and depth cannot be specified in this report, since there is no site specific CPT investigation available to review at the present time.

7.0 SEISMIC RECOMMENDATION

7.1 FOUNDATION ON DYKE FILL

7.1.1 SITE CLASS

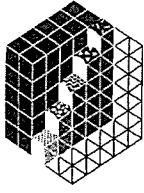
The existing old dyke is probably found on a few feet of SILT and further underlain with liquefiable fine SAND. The Site Classification within liquefiable region should be Class F that require site specific evaluation. However, due to presence of assumed 4 ft. \pm non-liquefiable SILT at bottom of dyke and close to 10 ft. \pm of dyke FILL composed of granular Pit-run Sand and Gravel, the foundation on Dyke FILL can be re-classified as Class E for soft soil.

The following table is a Site Class C spectral acceleration for firm ground as recommended by 2010 National Building Code and adopted by 2012 BC Building Code for the Site with co-ordinate at Latitude N 49.125° and Longitude W 123.187°. The information is obtained from website of Natural Resource Canada.

Sa (0.2)	Sa (0.5)	Sa(1.0)	Sa(2.0)	PGA
1.042 g	0.698 g	0.348 g	0.177 g	0.516 g

A print table is attached in Appendix "A" – Seismic Design Criteria for ease of reference.

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The above value can be interpreted by interpolation by Table 4.1.8.4B and 4.1.8.4C of 2012 BC Building Code to obtain spectral acceleration value for a Class E site for Structural Design.

7.1.2 DYKE INTEGRITY

The old dyke supporting the foundation of Stinkeroo Tank and Ice Machine Artifact was constructed in early 1900's.

It is considered that the old dyke cannot meet seismic design requirement for present day. In fact, new dykes design for seismic event are only applied to dyke section with pump house and piping. Other dyke section are not designed against failure in major seismic event due to economic concern as indicated by publish document by Ministry of Water, Land and Air Protection of BC.

The integrity of the old dyke is in question and may fail under a major M7 earthquake. However, it is beyond the scope of this report and the present budget to investigate seismic dyke stability and implement upgrade the existing old dyke.

7.2 OFF-SHORE TIMBER PLATFORM

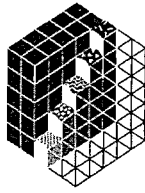
7.2.1 LIQUEFACTION

The off-shore timber platform is found on piers supporting by marine timber pile. It is estimated the SAND below shallow depth has a potential to liquefy in a major seismic event.

The timber pile is estimated at 30 ft. \pm depth below timber deck with a large portion of the pile within liquefiable SAND. The timber pile probably will lost strength in the duration when fine SAND liquefied.

Literature indicates liquefiable SAND can regain residual strength in a short time in post-liquefaction stage. The residual strength of the SAND can obtain 10% of effective overburden stress or with a soil friction angle at about 4 degree at a short time after liquefaction. Based on the assumption of a 4 degree, post liquefaction residual strength of SAND, the axial load pile capacity is estimated at 2.5 kip per pile with Factor of Safety of 1.0.

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The liquefiable SAND will move and displace horizontally in any direction from a few inches or up to a few feet. There will be no lateral load capacity available when piles deforms and moves laterally. However, the pile head are tied by piers and deck as such the deck will move in same direction and displacement.

7.2.2 SITE CLASS

The presence of liquefiable SAND at shallow surface will fall in Site Class F and it will required a site specific investigation by CPT to identify spectral acceleration and Site Class. It is beyond the scope of this report to carry out a site specific investigation with CPT.

Our past experience with site specific analysis in other Richmond area obtained spectral acceleration values less than Site Class E spectral acceleration. It is our opinion that for preliminary design purpose, the Structural Engineer can use Site Class E for design on the safe side but bear in mind a site specific investigation with CPT will be required.

7.2.3 SEISMIC UPGRADE

Seismic upgrade of the off-shore timber platform can be achieved by installation of piles with reasonable pile penetrating depth into non-liquefiable SAND. However, it is our opinion that to carry out a site specific investigation and install piles for saving 2 nos. of Fish Oil Tank Artifact is not worth to carry out at the present project scope. In the case many piles fail under liquefaction, the entire Museum Building compound will be in concern. A seismic upgrade will be worth to consider for the entire Museum building compound instead of just saving a single Artifact.

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8.0 CONCLUSION

This report is based on assumption with literature Geological Map and non-site specify in housed drilling record. The information may not represent the site specific condition.

The recommendations of this report is valid only for static condition, or even in mild seismic event that is not strong enough to cause liquefaction. A major seismic event may induce damage to the Museum as well as the 3 nos. of Artifact location under consideration. Recommendation for design against a major seismic event will require further site specific investigation and analysis, and is beyond the Scope of this report.

9.0 CLOSURE

We trust this report meets your immediate requirements. If you have any questions regarding this report, please do not hesitate to contact the undersigned @ 604-299-6617.

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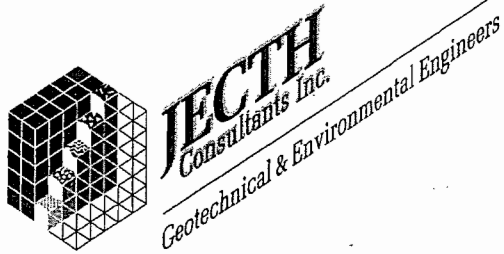
Ivan Chu, P.Eng.

Attachments: Figure 1 – Site Location Plan
Figure 2 – Site Air Photo Plan
Figure 3 – Geological Map
Figure 4 – Richmond Liquefaction Hazard Map
Figure 5 – As-Built Piling Plan
Figure 6 – As-Built Piling Plan at Fish Tanks Location

Site Photographs No. 1 to No. 9

Appendix "A" – Seismic Design Criteria
Appendix "B" – Dynamic Pile Load Chart (CNBC)
Appendix "C" – Lateral Pile Calculation Result

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Client: Gulf of Georgia Cannery
Date: October 6, 2015
File No.: 215P554

FIGURES

**GULF OF GEORGIA EXTERIOR ARTIFACT DISPLAYS
12138 FOURTH AVENUE
RICHMOND, BC**

LIST OF FIGURES

FIGURE 1 – SITE LOCATION PLAN

FIGURE 2 – SITE AIR PHOTO PLAN

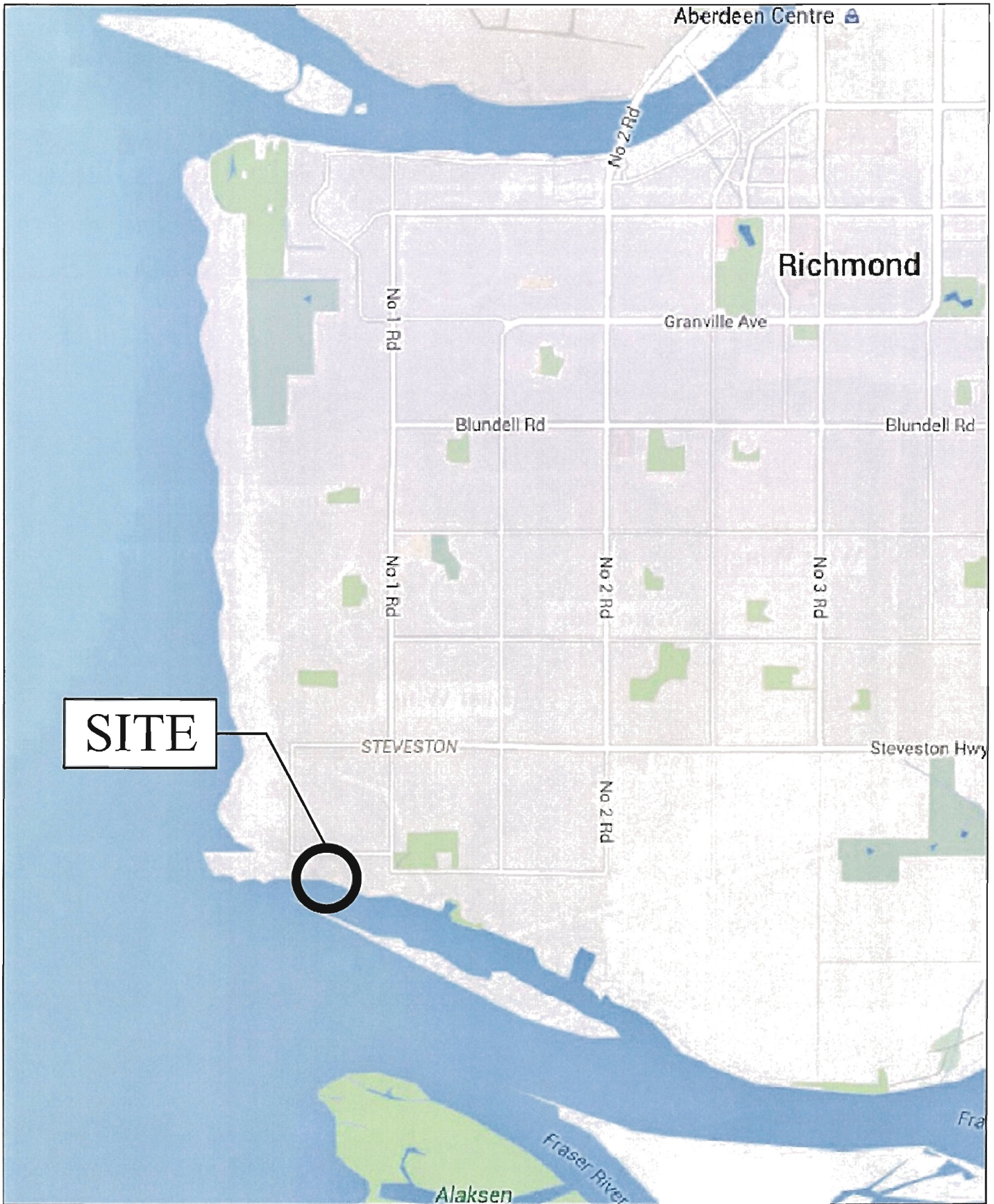
FIGURE 3 – GEOLOGICAL MAP

FIGURE 4 – RICHMOND LIQUEFACTION HAZARD MAP

FIGURE 5 – AS-BUILT PILING PLAN

FIGURE 6 – AS-BUILT PILING PLAN AT FISH TANKS LOCATION

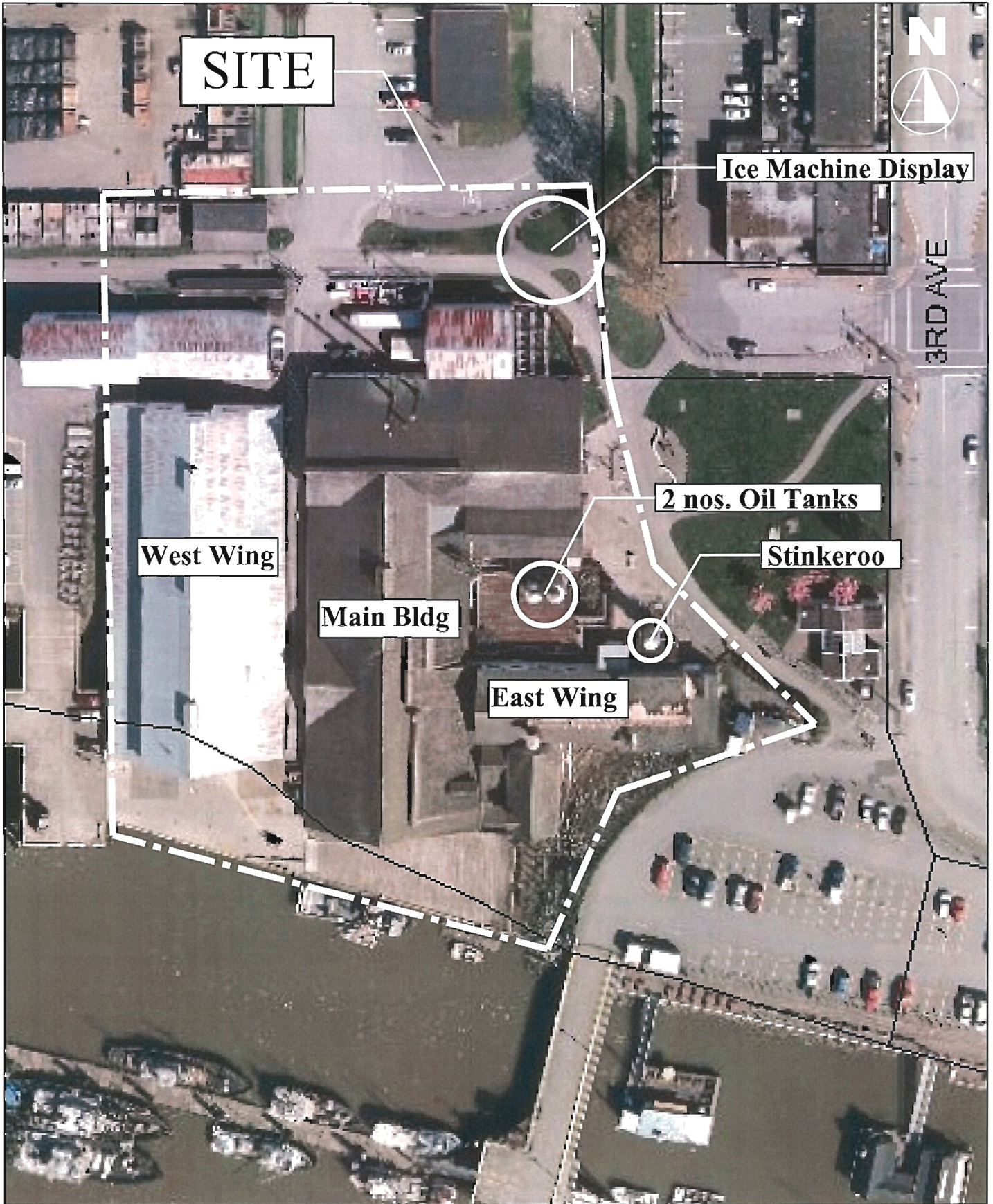
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Site Location Plan
Exterior Display Foundation Assessment
12138 Fourth Ave, Richmond, BC
Client: Gulf of Georgia Cannery

Drawn By: PF	Scale: NTS
Check by: IC	Date September 2015
Dwg no: 215P554 - Figure 1	



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Site Air Photo Plan

Exterior Display Foundation Assessment
 12138 Fourth Ave, Richmond, BC
 Client: Gulf of Georgia Cannery

Drawn By:
 PF

Scale:
 NTS

Check by:
 IC

Date
 September 2015

Dwg no: 215P554 - Figure 2



FRASER RIVER SEDIMENTS

Fa-e

Deltaic and distributary channel fill sediments overlying and cutting estuarine sediments and overlain in much of the area by overbank sediments: Fa, channel deposits, fine to medium sand and minor silt occurring along present day river channels; Fb, overbank sandy to silt loam normally less than 2 m thick overlying 15 m or more of Fd; Fc, overbank silty to silt clay loam normally less than 2 m thick overlying 15 m or more of Fd; Fd, deltaic and distributary channel fill (includes tidal flat deposits), 10 to 25 m interbedded fine to medium sand and minor silt beds; may contain organic and fossiliferous material; Fe*, estuarine, fossiliferous, interbedded fine sand to clayey silt (sand content increases from bottom to top of sequence), 10 to 185 m thick*

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Geological Map

Exterior Display Foundation Assessment
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Client: Gulf of Georgia Cannery

Drawn By:

PF

Check by:

IC

Scale:

NTS

Date

September 2015

Dwg no: 215P554 - Figure 3



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Richmond Liquefaction Hazard Map

Exterior Display Foundation Assessment
 12138 Fourth Ave, Richmond, BC
 Client: Gulf of Georgia Cannery

Drawn By: PF	Scale: NTS
Check by: IC	Date September 2015
Dwg no: 215P554 - Figure 4	

REAL PROPERTY SERVICES
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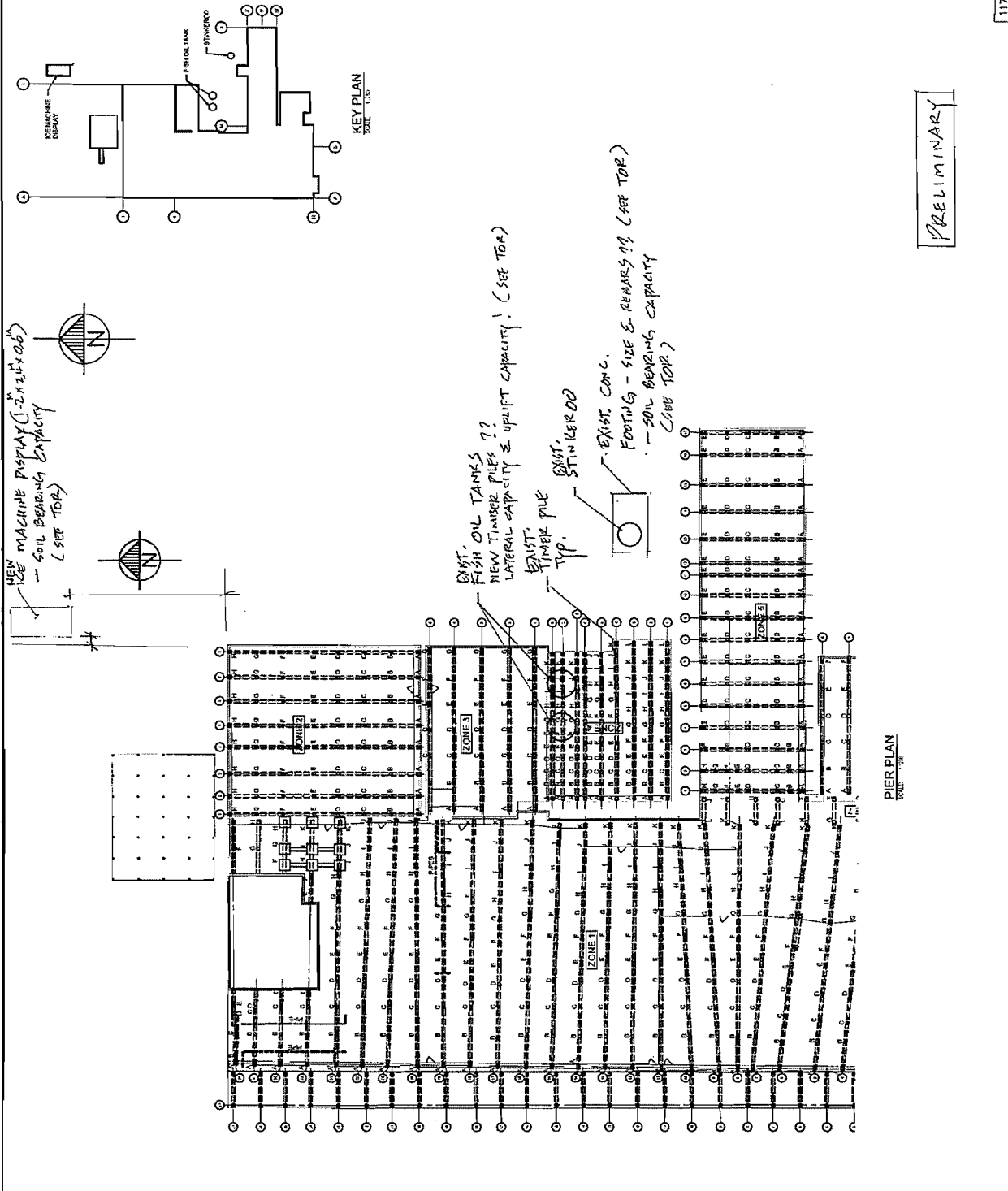
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PARKS CANADA
 WESTERN REGION

Gulf of Georgia Cannery
 National Historic Site
 Steveston, British Columbia

PIER PLAN
 SHEET 2

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 S202

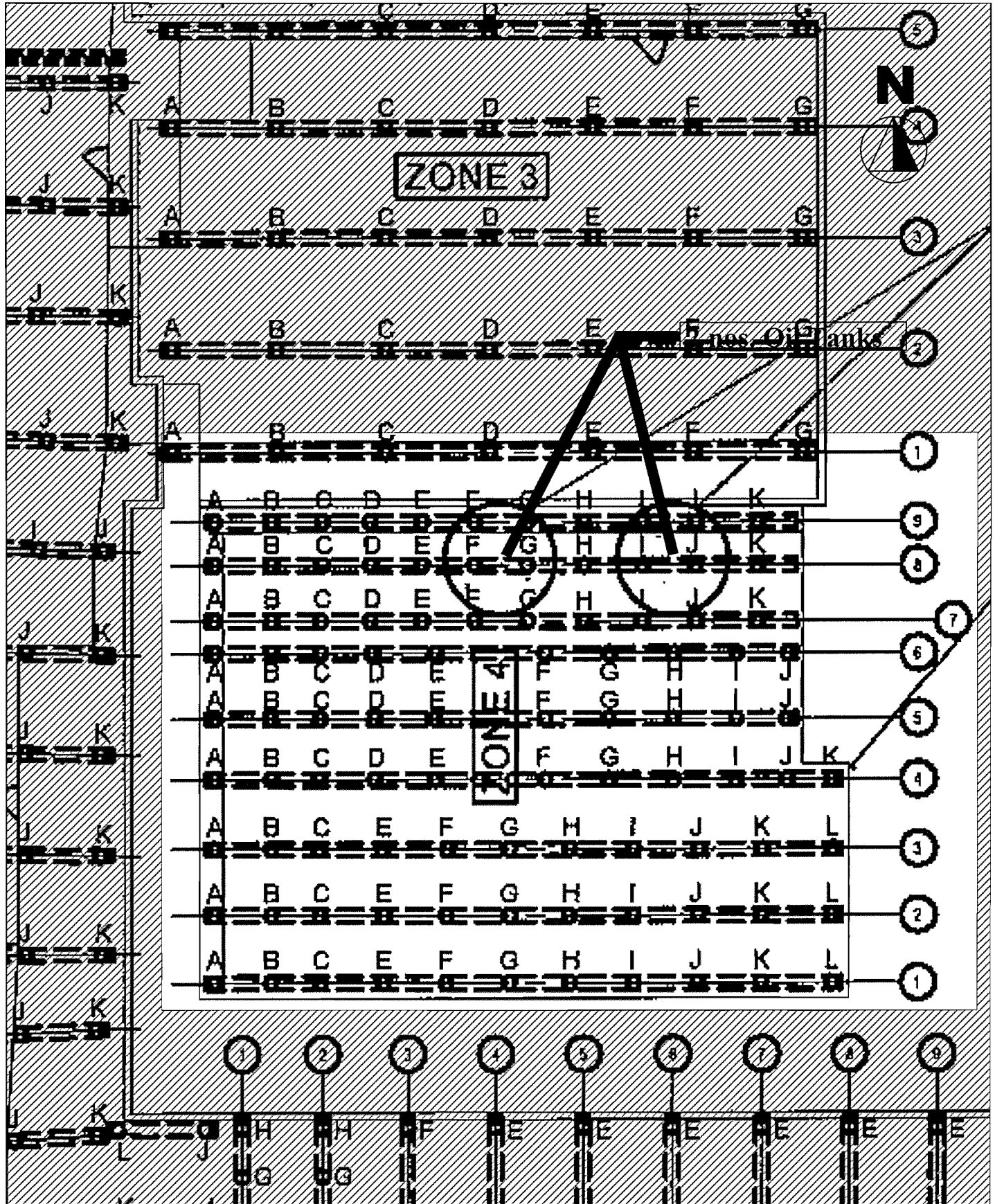


PRELIMINARY

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As-Built Piling Plan
 Exterior Display Foundation Assessment
 12138 Fourth Ave, Richmond, BC
 Client: Gulf of Georgia Cannery

Drawn By: PF	Scale: NTS
Check by: IC	Date September 2015
Dwg no: 215P554 - Figure 5	



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Phone: (604) 299-6617
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As Built Piling Plan at Fish Oil Tank

Exterior Display Foundation Assessment

12138 Fourth Ave, Richmond, BC

Client: Gulf of Georgia Cannery

Drawn By:

PF

Check by:

IC

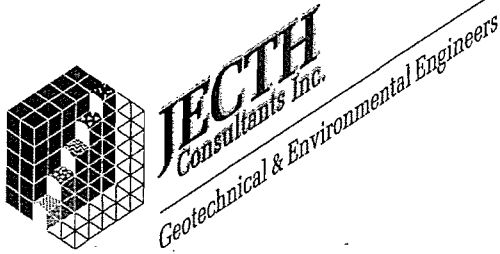
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NTS

Date

September 2015

Dwg no: 215P554 - Figure 6



Client: Gulf of Georgia Cannery
Date: October 6, 2015
Our File No.: 215P554

SITE PHOTOGRAPHS

**GULF OF GEORGIA EXTERIOR ARTIFACT DISPLAYS
12138 FOURTH AVENUE
RICHMOND, BC**

LIST OF PHOTOGRAPHS:

- PHOTO # 1: AIR PHOTO FOR THE CANNERY SITE IN 1950'S**
- PHOTO # 2: AIR PHOTO FOR THE CANNERY SITE SHOWING THE OLD DYKE**
- PHOTO # 3 : PRESENT CANNERY SITE, SHOWING A NEW DYKE IN ADJACENT TO SITE**
- PHOTO # 4: STINKEROO TANK ARTIFACT ON CROWN OF OLD DYKE**
- PHOTO # 5: FISH OIL TANKS (2NOS.) ARTIFACT ON PILE DECK**
- PHOTO # 6: TIMBER DECK AND TIMBER PILES SUPPORTING THE FISH OIL TANK ARTIFACT**
- PHOTO # 7: TEST PIT BESIDE THE STINKEROO TANK ARTIFACT**
- PHOTO # 8: SUBGRADE SOIL (DYKE FILL) EXPOSED IN TEST PIT**
- PHOTO # 9: ESTIMATED LOCATION OF ICE MACHINE CLOSE TO BOTTOM OF DYKE**

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Photo # 1: Air Photo for the Cannery Site in 1950's



Photo # 2: Air Photo for the Cannery Site showing the old dyke



Photo # 3: Present Cannery Site, showing a new dyke in adjacent to Site



Photo # 4: Stinkeroo Tank Artifact on crown of old dyke



Photo # 5: Fish Oil Tanks (2 nos.) Artifact on pile deck



Photo # 6: Timber Deck and Timber Piles supporting the Fish Oil Tank Artifact



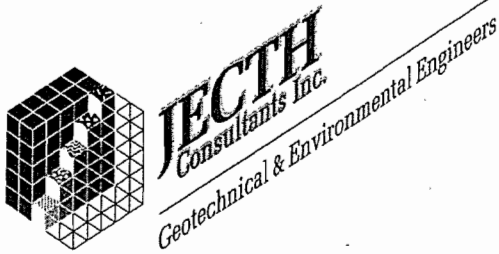
Photo # 7: Test pit beside the Stinkeroo Tank Artifact



Photo # 8: Subgrade Soil (Dyke FILL) exposed in test pit



Photo # 9: Estimated location of ice machine close to bottom of dyke



Client: Gulf of Georgia Cannery
Date: October 6, 2015
File No.: 215P554

APPENDIX "A"

GULF OF GEORGIA EXTERIOR ARTIFACT DISPLAYS
12138 FOURTH AVENUE
RICHMOND, BC

SEISMIC DESIGN CRITERIA

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Please note that the information you provide using the seismic hazard calculator may be routed through an American or other internationally-based server. However, in the event that this occurs, the information will be deleted from the American or internationally-based server after one week.

There are no legal or administrative consequences for refusing to provide the personal information requested. Under the Privacy Act, you have rights of access to, correction of, and protection of personal information.

The information you provide using this form is described in the following standard Personal Information Bank (PIB): Public Communications - PSU 914. For more information about this PIB and your privacy rights, please consult Info Source: Sources of Federal Government and Employee Information, which is published on the Internet by the Treasury Board of Canada Secretariat at: <http://infosource.gc.ca/index-eng.asp>.

Calculate

Page will reload with results inserted at the end of the page under the heading "Search Results"

Search Results

2010 National Building Code of Canada interpolated seismic hazard values

Determined for a 2% in 50 year (0.000404 per annum) probability of exceedence. Values are for "firm ground" (NBCC 2010 soil class C - average shear wave velocity 360-750 m/s). Median (50th percentile) values are given in units of g for spectral acceleration (Sa(T), where T is the period in seconds) and peak ground acceleration (PGA). Only 2 significant figures are to be used.

These values have been interpolated Using Shepards method from a 10 km spaced grid of points.

Depending on the gradient of the nearby points, values at this location calculated directly from the hazard program may vary. More than 95 percent of interpolated values are within 2 percent of the calculated values.

Site Coordinates: **49.1247 °N 123.1869°W**

User File Reference: **12138 Fourth Avenue, Richmond, BC**

Requested by: **pf, JECTH**

National Building Code interpolated seismic hazard values

2%/50 years (0.000404 per annum) probability

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA
1.042 g	0.698 g	0.348 g	0.177 g	0.516 g

Interpolated seismic hazard values at other probabilities

40%/50 years (0.01 per annum)

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA
0.251 g	0.166 g	0.084 g	0.041 g	0.129 g

10%/50 years (0.0021 per annum)

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA
0.550 g	0.363 g	0.181 g	0.090 g	0.278 g

5%/50 years (0.001 per annum)

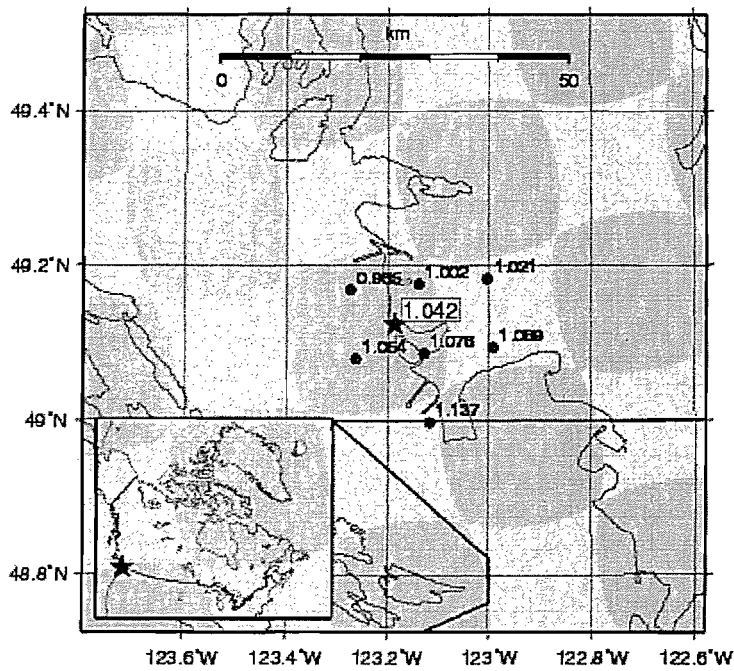
Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA
0.749 g	0.496 g	0.247 g	0.124 g	0.374 g

Warning: You are in a region which considers the hazard from a deterministic Cascadia subduction event for the National Building Code. Values determined for high probabilities (0.01 per annum) in this region do not consider the hazard from this type of earthquake.

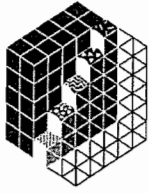
Generate a pdf version of the interpolated NBCC 2010 values

Nearby points values for National Building Code probabilities

Distance		Latitude	Longitude	Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA
15.111	km	48.997	-123.116	1.137	0.760	0.356	0.180	0.567
14.929	km	49.183	-123.002	1.021	0.680	0.336	0.174	0.506
14.663	km	49.094	-122.991	1.089	0.727	0.344	0.176	0.542
8.083	km	49.169	-123.275	0.985	0.678	0.347	0.177	0.484
7.498	km	49.080	-123.264	1.054	0.704	0.354	0.179	0.523
6.684	km	49.176	-123.139	1.002	0.669	0.342	0.176	0.496
5.997	km	49.087	-123.128	1.078	0.719	0.349	0.178	0.535
Interpolated		49.1247	-123.1869	1.042	0.698	0.348	0.177	0.516



Date modified: 2013-07-23



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Consultants Inc.
Geotechnical & Environmental Engineers

Client: Gulf of Georgia Cannery
Date: October 6, 2015
File No.: 215P554

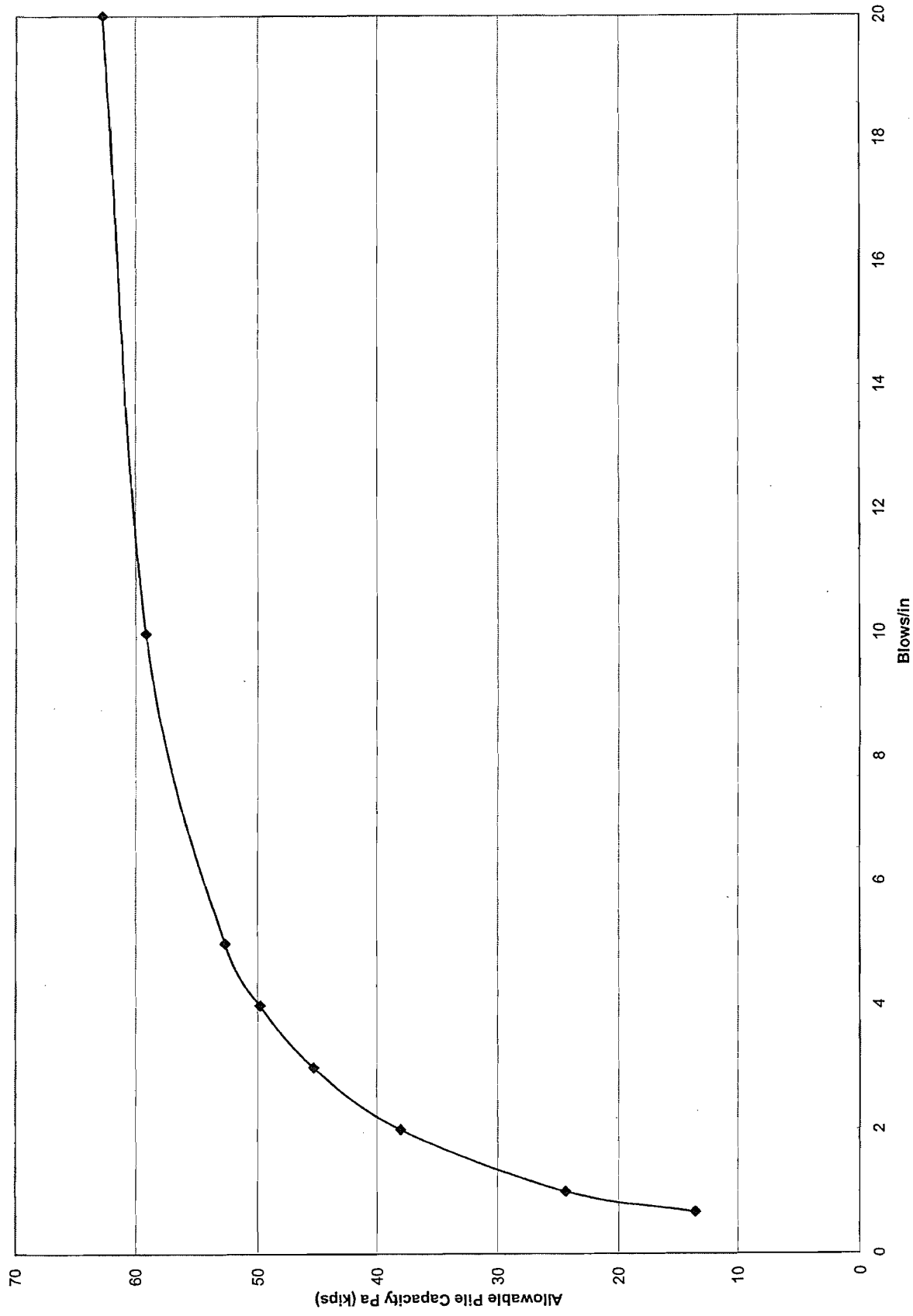
APPENDIX "B"

**GULF OF GEORGIA EXTERIOR ARTIFACT DISPLAYS
12138 FOURTH AVENUE
RICHMOND, BC**

DYNAMIC PILE LOAD CHART (CNBC)

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Comparison of the allowable pile capacity - CNBC





JECTH
Consultants Inc.

Geotechnical & Environmental Engineers

Client: Gulf of Georgia Cannery

Date: October 6, 2015

File No.: 215P554

APPENDIX "C"

GULF OF GEORGIA EXTERIOR ARTIFACT DISPLAYS
12138 FOURTH AVENUE
RICHMOND, BC

LATERAL PILE CALCULATION RESULT

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Web: www.jecth.com*

PILE1A

Single Pile in River SAND - without axial load

UNITS--ENGL

PILE DEFLECTION, BENDING MOMENT, SHEAR & SOIL RESISTANCE

INPUT INFORMATION

THE LOADING IS STATIC

PILE GEOMETRY AND PROPERTIES

PILE LENGTH = 240.00 IN
MODULUS OF ELASTICITY OF PILE = .156E+04 KIP/IN**2
1 SECTION(S)

X	DIAMETER	MOMENT OF INERTIA	AREA
IN	IN	IN**4	IN**2
.00	12.000	.102E+04	.113E+03
240.00			

SOILS INFORMATION

X-COORDINATE AT THE GROUND SURFACE = .00 IN
SLOPE ANGLE AT THE GROUND SURFACE = .00 DEG.

1 LAYER(S) OF SOIL

LAYER 1
THE LAYER IS A SAND
X AT THE TOP OF THE LAYER = .00 IN
X AT THE BOTTOM OF THE LAYER = 240.00 IN
VARIATION OF SOIL MODULUS, k = .400E+03 LBS/IN**3

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
2 POINTS

X, IN	WEIGHT, LBS/IN**3
.00	.69E-01
240.00	.69E-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
2 POINTS

X, IN	C, LBS/IN**2	PHI, DEGREES	E50

		PILE1A	
.00	.000E+00	24.000	-----
240.00	.000E+00	24.000	-----

FINITE DIFFERENCE PARAMETERS

NUMBER OF PILE INCREMENTS	=	100
TOLERANCE ON DETERMINATION OF DEFLECTIONS	=	.100E-04 IN
MAXIMUM NUMBER OF ITERATIONS ALLOWED FOR PILE ANALYSIS	=	100
MAXIMUM ALLOWABLE DEFLECTION	=	.15E+03 IN

INPUT CODES

OUTPT	=	1
KCYCL	=	1
KBC	=	1
KPYOP	=	1
INC	=	2

Single Pile in River SAND - without axial load

UNITS--ENGL

OUTPUT INFORMATION

GENERATED P-Y CURVES

THE NUMBER OF CURVE IS	=	4
THE NUMBER OF POINTS ON EACH CURVE	=	17

DEPTH BELOW GS IN	DIAM IN	PHI	GAMMA LBS/IN**3	A	B
20.00	12.00	24.0	.7E-01	1.67	1.20
	Y		P		
	IN		LBS/IN		
	.000		.000		
	.017		34.493		
	.033		42.886		
	.050		48.713		
	.067		53.321		
	.083		57.194		
	.100		60.566		
	.117		63.572		
	.133		66.296		
	.150		68.795		
	.167		71.111		
	.183		73.272		
	.200		75.303		
	.450		104.879		
	12.450		104.879		

PILE1A
 24.450 104.879
 36.450 104.879

DEPTH BELOW GS IN	DIAM IN	PHI	GAMMA LBS/IN**3	A	B
60.00	12.00	24.0	.7E-01	.88	.50

Y IN	P LBS/IN
.000	.000
.017	41.127
.033	62.684
.050	80.208
.067	95.539
.083	109.422
.100	122.249
.117	134.261
.133	145.616
.150	156.426
.167	166.774
.183	176.724
.200	186.325
.450	327.932
12.450	327.932
24.450	327.932
36.450	327.932

DEPTH BELOW GS IN	DIAM IN	PHI	GAMMA LBS/IN**3	A	B
100.00	12.00	24.0	.7E-01	.88	.50

Y IN	P LBS/IN
.000	.000
.017	102.366
.033	156.021
.050	199.639
.067	237.798
.083	272.351
.100	304.279
.117	334.176
.133	362.439
.150	389.346
.167	415.103
.183	439.868
.200	463.765
.450	816.226
12.450	816.226
24.450	816.226
36.450	816.226

DEPTH BELOW GS IN	DIAM IN	PHI	GAMMA LBS/IN**3	A	B
150.00	12.00	24.0	.7E-01	.88	.50

Y IN	P LBS/IN
.000	.000
.017	190.689
.033	290.638

PILE1A	
.050	371.892
.067	442.975
.083	507.342
.100	566.817
.117	622.510
.133	675.158
.150	725.281
.167	773.262
.183	819.395
.200	863.911
.450	1520.483
12.450	1520.483
24.450	1520.483
36.450	1520.483

PILE LOADING CONDITION

LATERAL LOAD AT PILE HEAD = .300E+01 KIP
 APPLIED MOMENT AT PILE HEAD = .360E+03 IN-KIP
 AXIAL LOAD AT PILE HEAD = .100E+02 KIP

X	DEFLECTION	MOMENT	TOTAL	SHEAR	SOIL	FLEXURAL
IN	IN	IN-KIP	STRESS	KIP	RESIST	RIGIDITY
*****	*****	*****	LBS/IN**2	*****	LBS/IN	KIP-IN**2
.00	.108E+01	.360E+03	.221E+04	.323E+01	.000E+00	.159E+07
4.80	.966E+00	.375E+03	.230E+04	.294E+01	.243E+02	.159E+07
9.60	.862E+00	.390E+03	.239E+04	.276E+01	.509E+02	.159E+07
14.40	.764E+00	.404E+03	.247E+04	.246E+01	.771E+02	.159E+07
19.20	.672E+00	.416E+03	.254E+04	.203E+01	.101E+03	.159E+07
24.00	.586E+00	.425E+03	.259E+04	.149E+01	.123E+03	.159E+07
28.80	.505E+00	.431E+03	.263E+04	.855E+00	.141E+03	.159E+07
33.60	.432E+00	.435E+03	.265E+04	.142E+00	.155E+03	.159E+07
38.40	.364E+00	.434E+03	.265E+04	-.607E+00	.159E+03	.159E+07
43.20	.303E+00	.430E+03	.262E+04	-.137E+01	.160E+03	.159E+07
48.00	.248E+00	.422E+03	.258E+04	-.213E+01	.153E+03	.159E+07
52.80	.199E+00	.411E+03	.251E+04	-.286E+01	.154E+03	.159E+07
57.60	.156E+00	.396E+03	.242E+04	-.360E+01	.151E+03	.159E+07
62.40	.119E+00	.377E+03	.231E+04	-.431E+01	.145E+03	.159E+07
67.20	.868E-01	.355E+03	.218E+04	-.499E+01	.137E+03	.159E+07
72.00	.602E-01	.330E+03	.203E+04	-.561E+01	.124E+03	.159E+07
76.80	.384E-01	.302E+03	.187E+04	-.616E+01	.106E+03	.159E+07
81.60	.209E-01	.271E+03	.169E+04	-.662E+01	.813E+02	.159E+07
86.40	.738E-02	.239E+03	.149E+04	-.693E+01	.478E+02	.159E+07
91.20	-.269E-02	.205E+03	.130E+04	-.701E+01	-.286E+02	.159E+07
96.00	-.978E-02	.172E+03	.110E+04	-.677E+01	-.687E+02	.159E+07
100.80	-.144E-01	.140E+03	.916E+03	-.637E+01	-.949E+02	.159E+07
105.60	-.169E-01	.111E+03	.743E+03	-.587E+01	-.114E+03	.159E+07
110.40	-.179E-01	.842E+02	.585E+03	-.528E+01	-.128E+03	.159E+07
115.20	-.176E-01	.604E+02	.444E+03	-.465E+01	-.137E+03	.159E+07
120.00	-.164E-01	.397E+02	.322E+03	-.397E+01	-.142E+03	.159E+07

PILE1A

124.80	-.147E-01	.222E+02	.219E+03	-.329E+01	-.143E+03	.159E+07
129.60	-.126E-01	.802E+01	.136E+03	-.261E+01	-.139E+03	.159E+07
134.40	-.104E-01	-.297E+01	.106E+03	-.197E+01	-.129E+03	.159E+07
139.20	-.831E-02	-.110E+02	.153E+03	-.138E+01	-.116E+03	.159E+07
144.00	-.632E-02	-.164E+02	.185E+03	-.860E+00	-.102E+03	.159E+07
148.80	-.457E-02	-.194E+02	.203E+03	-.409E+00	-.861E+02	.159E+07
153.60	-.310E-02	-.204E+02	.209E+03	-.337E-01	-.702E+02	.159E+07
158.40	-.192E-02	-.198E+02	.205E+03	.265E+00	-.541E+02	.159E+07
163.20	-.103E-02	-.180E+02	.194E+03	.486E+00	-.382E+02	.159E+07
168.00	-.400E-03	-.152E+02	.178E+03	.631E+00	-.221E+02	.159E+07
172.80	.931E-05	-.120E+02	.159E+03	.685E+00	.646E+00	.159E+07
177.60	.244E-03	-.880E+01	.140E+03	.639E+00	.173E+02	.159E+07
182.40	.352E-03	-.596E+01	.124E+03	.543E+00	.222E+02	.159E+07
187.20	.372E-03	-.361E+01	.110E+03	.432E+00	.236E+02	.159E+07
192.00	.339E-03	-.181E+01	.991E+02	.320E+00	.229E+02	.159E+07
196.80	.280E-03	-.529E+00	.915E+02	.215E+00	.208E+02	.159E+07
201.60	.212E-03	.271E+00	.900E+02	.123E+00	.171E+02	.159E+07
206.40	.148E-03	.678E+00	.924E+02	.524E-01	.122E+02	.159E+07
211.20	.936E-04	.803E+00	.932E+02	.437E-02	.791E+01	.159E+07
216.00	.507E-04	.744E+00	.928E+02	-.249E-01	.438E+01	.159E+07
220.80	.184E-04	.583E+00	.919E+02	-.391E-01	.163E+01	.159E+07
225.60	-.537E-05	.383E+00	.907E+02	-.416E-01	-.485E+00	.159E+07
230.40	-.236E-04	.194E+00	.896E+02	-.352E-01	-.218E+01	.159E+07
235.20	-.390E-04	.548E-01	.887E+02	-.211E-01	-.367E+01	.159E+07
240.00	-.535E-04	.000E+00	.884E+02	.000E+00	-.514E+01	.159E+07

COMPUTED LATERAL FORCE AT PILE HEAD = .30000E+01 KIP
 COMPUTED MOMENT AT PILE HEAD = .36000E+03 IN-KIP
 COMPUTED SLOPE AT PILE HEAD = -.23320E-01

 THE OVERALL MOMENT IMBALANCE = -.184E-08 IN-KIP
 THE OVERALL LATERAL FORCE IMBALANCE = .102E-06 LBS

OUTPUT SUMMARY

PILE HEAD DEFLECTION = .108E+01 IN
 MAXIMUM BENDING MOMENT = .435E+03 IN-KIP
 MAXIMUM TOTAL STRESS = .265E+04 LBS/IN**2

 NO. OF ITERATIONS = 17
 MAXIMUM DEFLECTION ERROR = .777E-05 IN

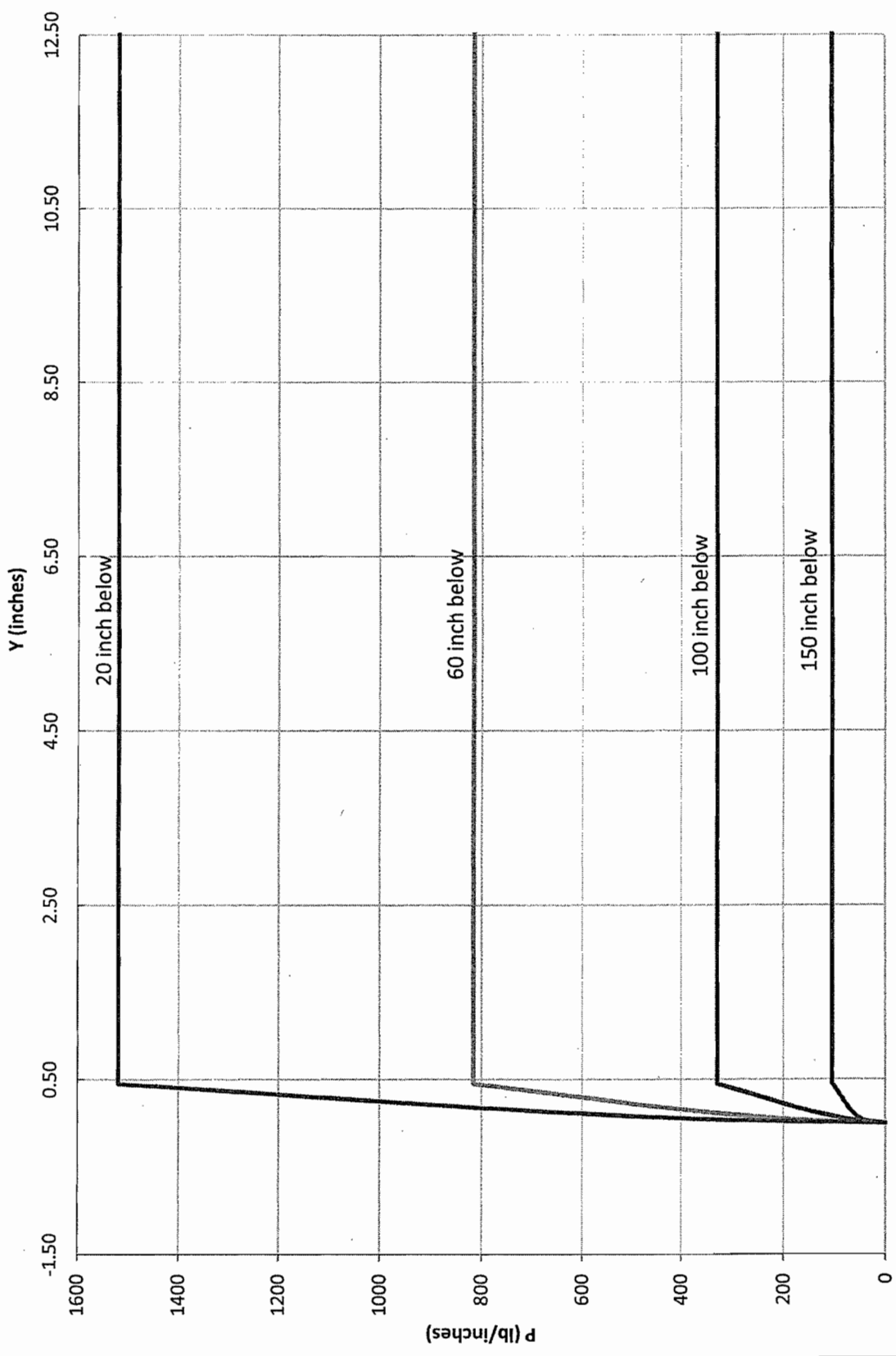
S U M M A R Y T A B L E

LATERAL LOAD (KIP)	BOUNDARY CONDITION BC2	AXIAL LOAD (KIP)	YT (IN)	ST (IN/IN)	MAX. MOMENT (IN-KIP)	MAX. STRESS (LBS/IN**2)
.300E+01	.360E+03	.100E+02	.108E+01	-.233E-01	.435E+03	.265E+04

Project No. : 215P554

P VS Y

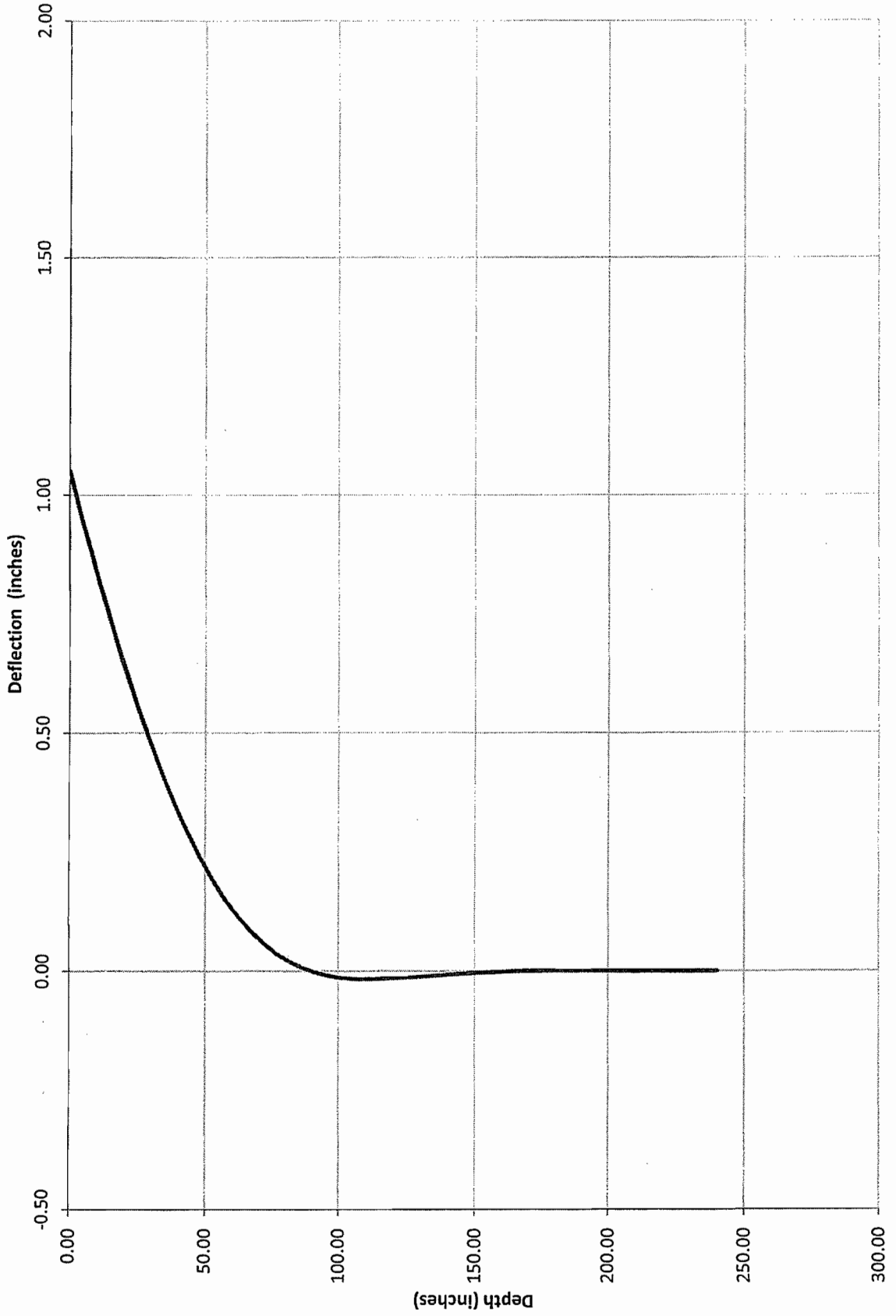
JECTH Consultants Inc.



Project No. : 215P554

JECTH Consultants Inc.

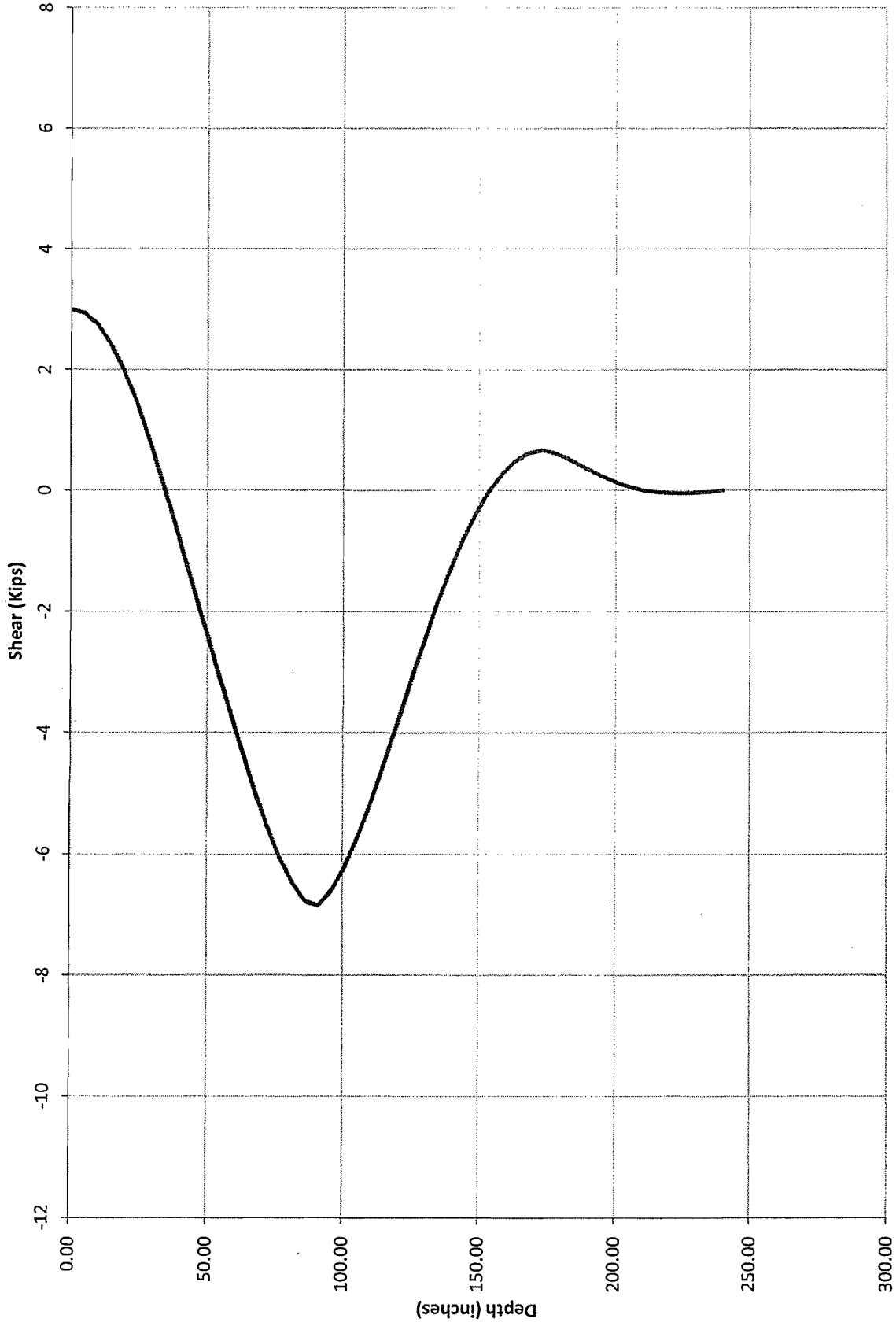
Depth vs Deflection



Project No. : 215P554

JECTH Consultants Inc.

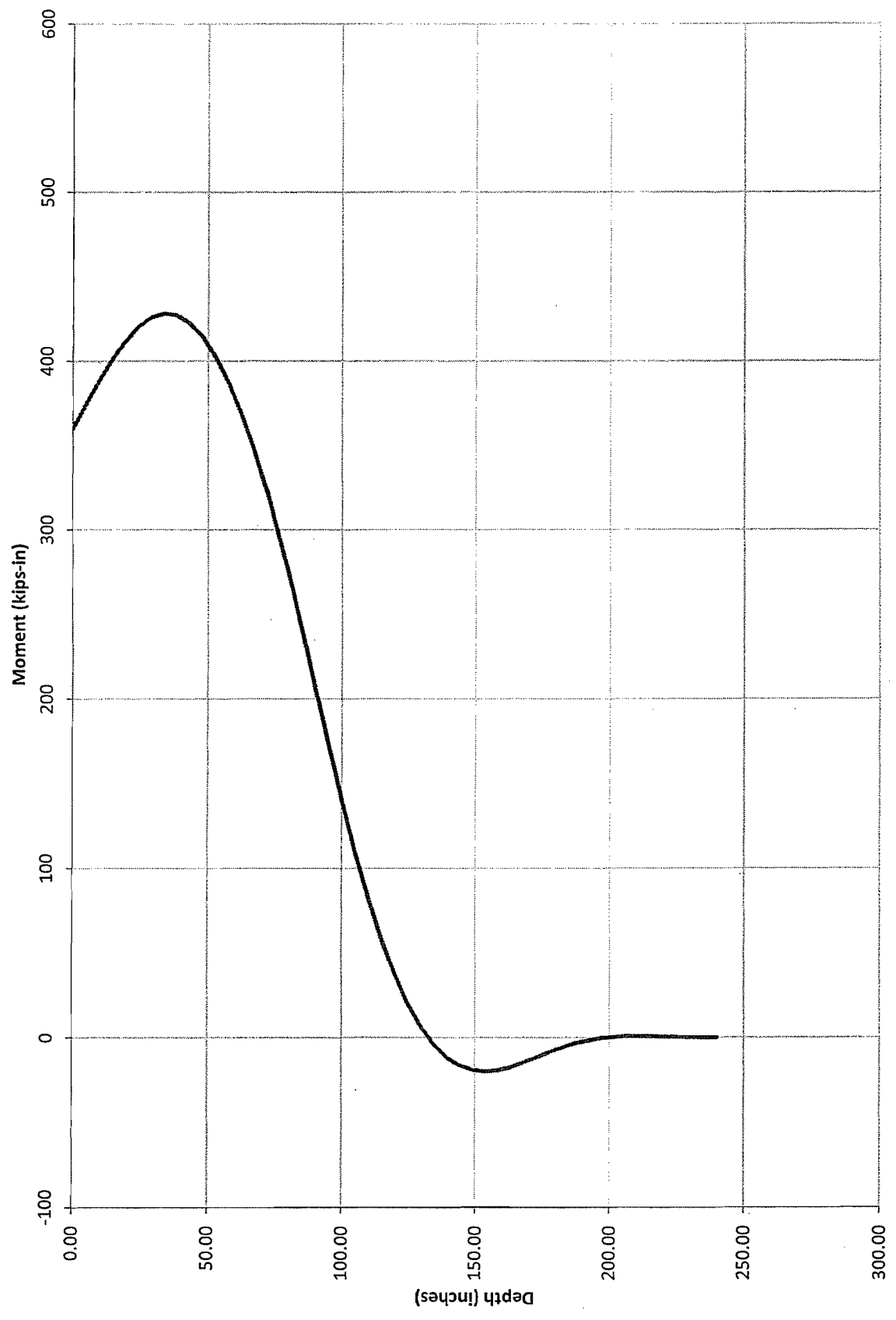
Depth vs Shear



Project No. : 215P554

JECTH Consultants Inc.

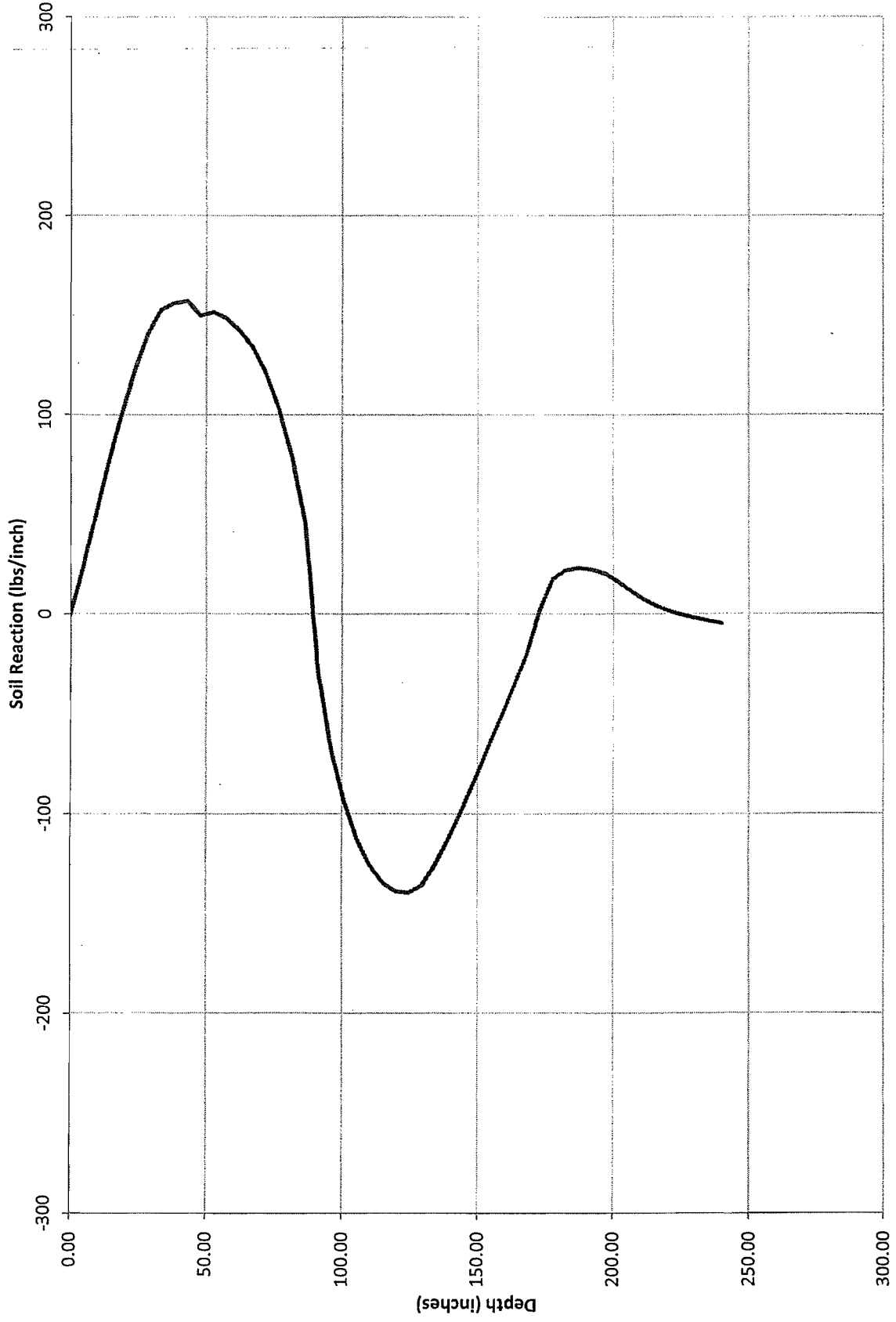
Depth vs Moment



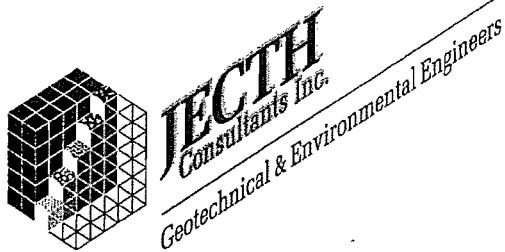
Project No. : 215P554

JECTH Consultants Inc.

Depth vs Soil Reaction



APPENDIX 7



OFFICE MEMO

Date: March 28, 2016	Our File No.: 215P554
Project: Proposed Gulf of Georgia Cannery Artifact Displays - 12138 Fourth Avenue, Richmond, BC	
Firm: CWMM Consulting Engineers Ltd.	Name: Mr. Louis Lam
Tel. No.: (604) 731-6584 ext. 150	Subject: Liquefaction Hazard
Email: llawm@cwmm.com	

1.0 INTRODUCTION

As discussed by telephone between JECTH (Ivan Chu) and CWMM Consulting (Louis Lam) on March 14, 2016 in regard to potential of sand liquefaction under moderate earthquake (M5) at the subject site, JECTH indicated that large scale of liquefaction will be unlikely under a moderate earthquake.

A subsequent email from CWMM on March 21, 2016 requires JECTH to issue a memo to confirm our statement and to append as supplement information for the Geotechnical Report dated October 6, 2015.

2.0 METHODOLOGY

Several methods have been adopted to evaluate sand liquefaction under different magnitude of earthquake and data have been used to produce Liquefaction Hazard Map for design consideration.

There is an available Liquefaction Hazard Map for Richmond, BC in Year 2013 to delineate regions of Richmond for potential liquefaction. The Hazard Map is based on assumption of a M7 earthquake which may occur at 2% probability of exceedance in 50 years seismic event. The Hazard Map using a Probability of Liquefaction Severity (PLS) to delineate area of different liquefaction potential by utilize available SPT data and CPT data in Richmond area.

The map basically adopt a simplified method of Cyclic Stress Ratio (CSR) which use a value of Peak Ground Acceleration (PGA) with subsurface soil data to determine liquefaction potential. The method will not be described in detail in this memo. Basically, it calculate a cyclic stress ratio (CSR) involve PGA and compare to cyclic resistance ratio (CRR) of different soil stratum evaluated by SPT or CPT for the evaluation of liquefaction potential for the site. Despite different subsurface soil data may be interpreted by SPT and CPT, the same Peak Ground Acceleration (PGA) which is a common factor for different soil stratum is used for the evaluation.

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The simplified method is further expand into the production of the Hazard Map by available geological data and work out different regions on PLS in City of Richmond. Liquefaction potential will be classified from low to high as shown in the following table in the Hazard Map.

PLS (in 50 years)	Hazard Rating
25-35%	Very High
15-25%	High
5-15%	Moderate
2-5%	Low

A copy of Hazard Map and magnification of parts of the map are enclosed in Appendix "A". A detail copy of the Hazard Map is available in website of Ministry of Energy, Mines and Petroleum Resources.

Despite complication of production of the Hazard Map, the liquefaction Potential of Sand at the subject site is directly relate to PGA under different magnitude of different seismic event, providing the subsurface soil condition remains unchanged as described in the Hazard Map.

3.0 PEAK GROUND ACCELERATION

In accordance to 2010 National Building Code Seismic Hazard Data, the PGA can be obtained in Resource Canada published website as:

Event	PGA (g)
2% exceedance in 50 years	0.517g
5% exceedance in 50 years	0.374g
10% exceedance in 50 years	0.278g

Moderate Earthquake (M5) are always associate in 10% exceedance in 50 years event, as such PGA of 0.278 g. will be chosen to re-work PLS given by Hazard Map under M7 earthquake.

PGA values obtain from Resource Canada is enclosed in Appendix "B" for ease of reference.

4.0 ASSUMPTION FOR BACK CALCULATION

By assume PGA has linear proportion in related to the evaluation of PLS, the PLS value can be back calculated from existing value of Hazard Map.

The Cannery site is within region SF³ and have the following PLS value in the Hazard Map:

Maximum	35.50%
Minumum	12.79%
Average	24.1%

The PLS of the site under a M7 earthquake is within 25% - 35% and is classified for very high Hazard Rating under PGA of 0.517 g for a 2% exceedance in 50 years seismic event.

By back calculating with a PGA of 0.278g for a 10% exceedance in 50 years seismic event which is usually associated with M5 earthquake, the following PLS values are obtained.

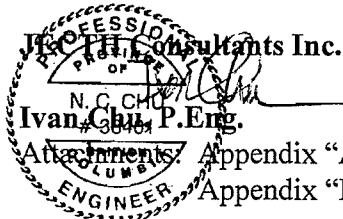
Maximum	19.1% ±
Minimum	6.82% ±
Average	13.0% ±

The back calculation obtain a 13.0% PLS value and is with the 5-15% range for moderate Hazard Rating in the Hazard Map recommendation.

5.0 CONCLUSION

With rough estimation by lowering the PGA from a 2% exceedance in 50 years event to a 10% exceedance in 50 years event, the sand liquefaction potential at the Cannery site will be moderate and unlikely to encounter a major liquefaction of SAND that may fail all the timber piles.

We trust that the above should satisfy your immediate enquires. If you have further questions, please do not hesitate to contact the undersigned.



Attachments: Appendix "A" – Liquefaction Hazard Map of Richmond
Appendix "B" – Seismic PGA Data

C.c. Gulf of Georgia Cannery – Mr. Tom Dunphy
NY Construction – Mr. Steve Wicks

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Client: Gulf Of Georgia Cannery
Date: March 28, 2016
File No.: 215P554

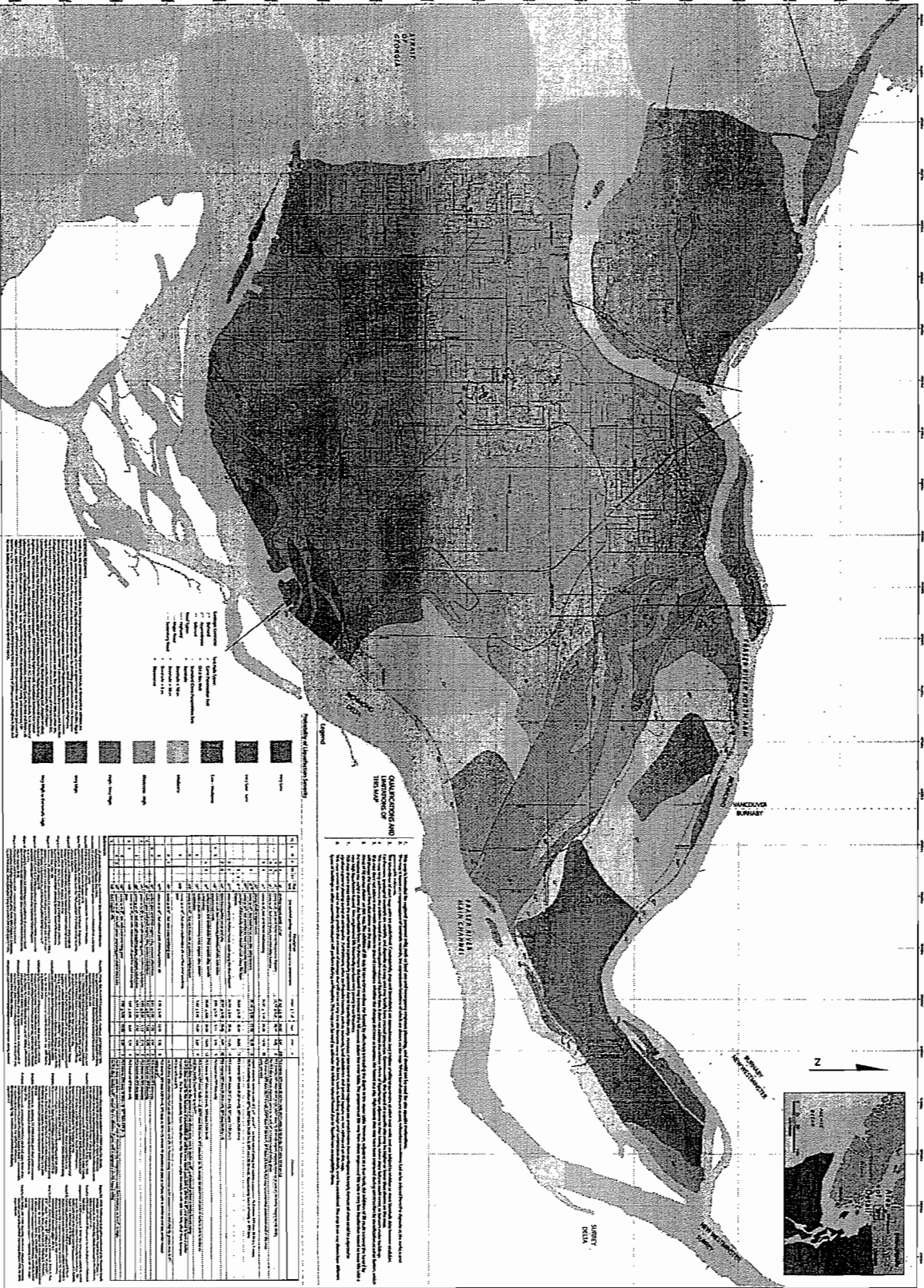
APPENDIX "A"

**GULF OF GEORGIA EXTERIOR ARTIFACT DISPLAYS
12138 FOURTH AVENUE
RICHMOND, BC**

LIQUEFACTION HAZARD MAP OF RICHMOND

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Overall Hazard Map



City of Richmond, British Columbia


LIQUEFACTION HAZARD MAP OF RICHMOND, BRITISH COLUMBIA

Prepared by: **Geotechnical Engineering Associates Ltd.**

Project No.: **2010-01**

Scale: **1:50,000**

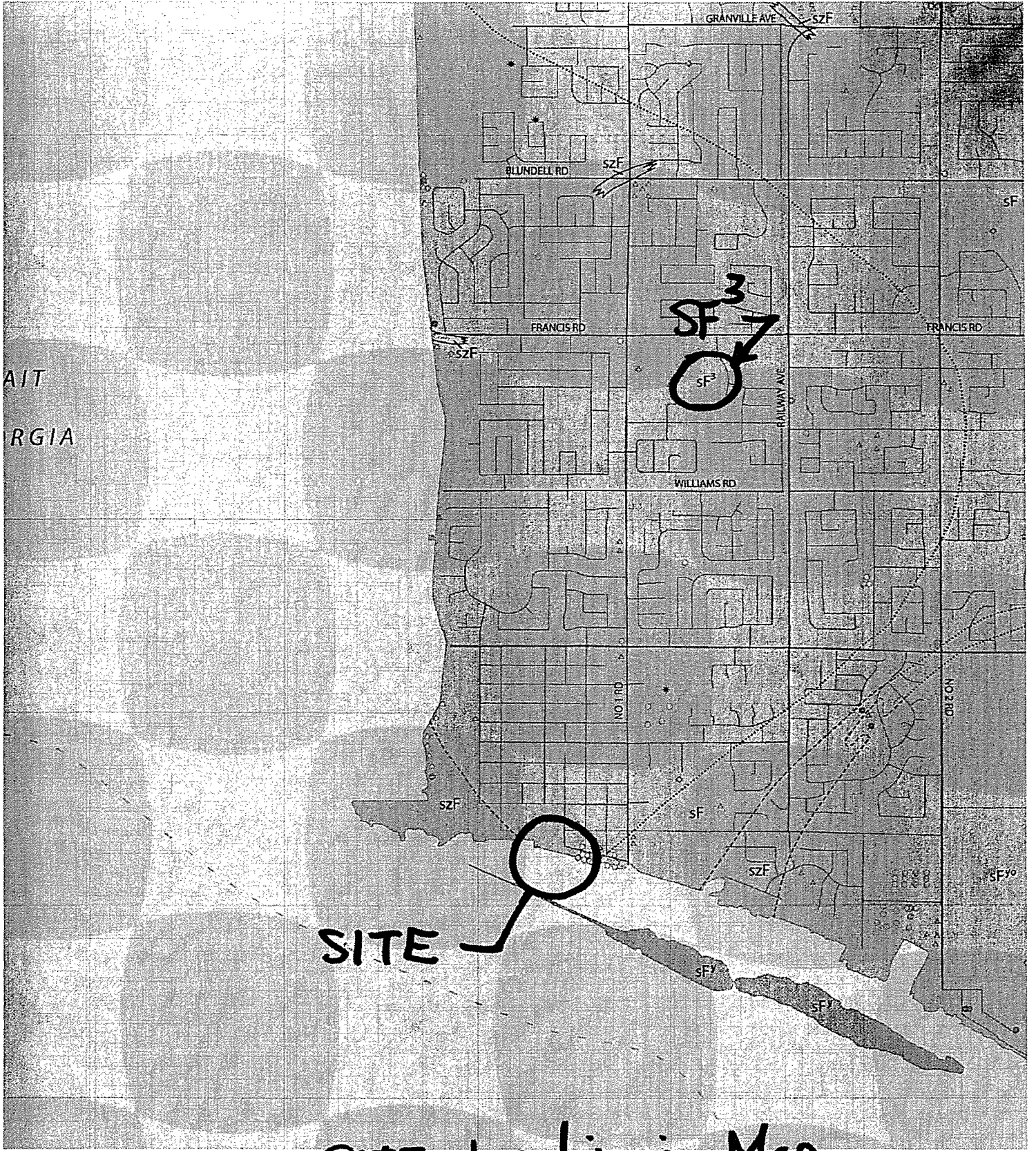
Map Date: **October 2010**



Richmond, British Columbia

October 2010

This map is intended for the purpose of providing a general overview of the liquefaction hazard potential in the City of Richmond, British Columbia. It is not intended to be used for engineering or design purposes. The map is based on data provided by the City of Richmond and other sources. The map is subject to change without notice. The City of Richmond is not responsible for any errors or omissions in this map. The map is provided as a service to the public and is not intended to be used for any other purpose. The map is subject to the terms and conditions of the City of Richmond's policies and procedures. The map is provided as a service to the public and is not intended to be used for any other purpose. The map is subject to the terms and conditions of the City of Richmond's policies and procedures.



SITE Location in Map.

SITE DATA

VL	L	H	VH	EH	Map Unit	Description (see surficial geology map for more complete descriptions)	mean ± 1 sd	max	min	n	
		X	X		SF	shallow topset sands (<7 m)	21.62 ± 5.40	34.67	8.87	125	P1
		X	X		SF ¹	same as SF, but sand facies over Pleistocene deposits	14.43 ± 6.24	23.15	7.38	5	P1
		X	X		SF ²	same as SF, but sand facies over thin delta foresets					Ni
		X	X		SF ³	same as SF, but sand facies shell-bearing	24.07 ± 5.48	35.50	12.79	20	P1
					SF ⁴	young, shallow topset sands					Ur
			X		SFY ²	same as SF ¹ , but sand facies over thin delta foresets	27.34 ± 5.05	32.16	17.77	13	tc
			X		SFY ¹	same as SF ¹ , but sand facies over Pleistocene deposits					3k
			X	X	SFY ³	younger of the young shallow topset sands along the Main Channel	36.52 ± 6.28	45.40	26.05	11	P1

Evaluation of PLS for Site
Under M7 Earthquake

The liquefaction susceptibility at the various sites has been quantified here by calculation of the Probability of Liquefaction Severity (PLS; Levson et al., 1996a, 1998; Monahan et al., 1998, 2000a). PLS is defined by:

$$PLS = \frac{\sum (WHPI)}{\sum (WH)}$$

where P_i is the probability of liquefaction at depth i (calculated from 0 to 20 metres), which is calculated from CRR and the probabilistic National Building Code of Canada seismic model (J. Cassidy, Geological Survey of Canada, 2002 personal communication); H is the layer thickness; and W_i is a depth weighting function that decreases linearly from 0.1 at the surface to 0 at 20 metres.

Calculation of PLS provides not only a relative index of liquefaction susceptibility within an area, but also permits comparison of the liquefaction hazard between areas of different seismicity because it takes into account both seismicity and in situ liquefaction susceptibility. Hazard ratings have been assigned to specific PLS ranges (Table 1).

Table 1. Liquefaction Hazard Ratings (modified from (Levson et al., 1996b, Monahan et al., 1998, 2000a)

PLS (in 50 years)	Hazard Rating
>35%	extremely high
25-35%	very high
15-25%	high
5-15%	moderate
2-5%	low
0-2%	very low

Hazard Values.

The objective of this map is to show the relative natural hazard without anthropogenic influences. However, a few metres of anthropogenic fill can have a significant effect on the PLS, which is strongly influenced by small changes in the depth to the water table. Consequently, the PLS was calculated for each site with the effects of fill removed. To do this, the data were normalized using the conditions at the site when the test was conducted, that is with the fill in place and using the observed water table, according to the procedures recommended by Youd et al. (2001). The PLS was then calculated from the normalized data using the depth from the inferred natural ground level. Furthermore, the PLS was calculated assuming a water table that is one metre below the natural surface, based on the assumption that the delta surface is at approximately the same elevation throughout Richmond. This method was used in order to remove the effects of seasonal variations and to be able to compare the relative hazard at each site.

Calculation of the PLS was simplified by assuming a Magnitude 7 earthquake rather than a range of earthquake magnitudes, based on the assumption that most of the earthquake hazard is derived from a Magnitude 7 earthquake. A conservative magnitude scaling factor of 1.19 was applied to the analyses (Youd et al., 2001). Although this simplification does remove the real effects of variability of earthquake magnitudes, it enabled the processing of a large volume of data. Because all data were analyzed in the same way, the relative differences in liquefaction hazard are valid.

A uniform amplification of acceleration resulting from the thickness of deltaic soils was used in the PLS calculation and was based on the ratio of the design acceleration on firm ground to the acceleration recommended by Byrne and Anderson (1991) for use in the Fraser River delta. This simplification is more questionable, because amplification varies with the thickness of the deltaic section (e.g. Uthayakumar and Naesgaard, 2004). However, the thickness of the deltaic section is not well constrained beyond the northern margin of the delta in northern Richmond, so that the effect of the variation in deltaic thickness could not be consistently applied.

USING M7 Earthquake



Client: Gulf Of Georgia Cannery
Date: March 28, 2016
File No.: 215P554

APPENDIX "B"

**GULF OF GEORGIA EXTERIOR ARTIFACT DISPLAYS
12138 FOURTH AVENUE
RICHMOND, BC**

SEISMIC PGA DATA

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2010 National Building Code Seismic Hazard Calculation

INFORMATION: Eastern Canada English (613) 995-5548 français (613) 995-0600 Facsimile (613) 992-8836
Western Canada English (250) 363-6500 Facsimile (250) 363-6565

Requested by: , JECTH Consultants Inc.

March 28, 2016

Site Coordinates: 49.1262 North 123.1757 West

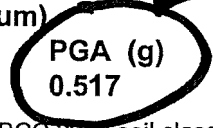
User File Reference: 12138 4th Ave. Richmond

National Building Code ground motions:

2% probability of exceedance in 50 years (0.000404 per annum)

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA (g)
1.043	0.698	0.347	0.177	0.517

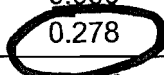
M7



Notes. Spectral and peak hazard values are determined for firm ground (NBCC 2010 soil class C - average shear wave velocity 360-750 m/s). Median (50th percentile) values are given in units of g. 5% damped spectral acceleration (Sa(T), where T is the period in seconds) and peak ground acceleration (PGA) values are tabulated. Only 2 significant figures are to be used. *These values have been interpolated from a 10 km spaced grid of points. Depending on the gradient of the nearby points, values at this location calculated directly from the hazard program may vary. More than 95 percent of interpolated values are within 2 percent of the calculated values.* Warning: You are in a region which considers the hazard from a deterministic Cascadia subduction event for the National Building Code. Values determined for high probabilities (0.01 per annum) in this region do not consider the hazard from this type of earthquake.

Ground motions for other probabilities:

Probability of exceedance per annum	0.010	0.0021	0.001
Probability of exceedance in 50 years	40%	10%	5%
Sa(0.2)	0.251	0.550	0.750
Sa(0.5)	0.166	0.363	0.496
Sa(1.0)	0.084	0.181	0.246
Sa(2.0)	0.041	0.090	0.124
PGA	0.129	0.278	0.374



M5

References

National Building Code of Canada 2010 NRCC no. 53301; sections 4.1.8, 9.20.1.2, 9.23.10.2, 9.31.6.2, and 6.2.1.3

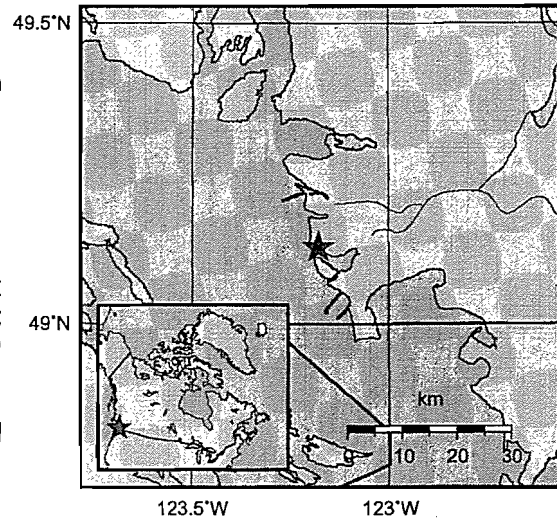
Appendix C: Climatic Information for Building Design in Canada - table in Appendix C starting on page C-11 of Division B, volume 2

User's Guide - NBC 2010, Structural Commentaries NRCC no. 53543 (in preparation)
Commentary J: Design for Seismic Effects

Geological Survey of Canada Open File xxxx
Fourth generation seismic hazard maps of Canada: Maps and grid values to be used with the 2010 National Building Code of Canada (in preparation)

See the websites www.EarthquakesCanada.ca and www.nationalcodes.ca for more information

Aussi disponible en français



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