Public Works and Government Services Canada

Requisition No. EZ899-170597

MERX I.D. No. _____

SPECIFICATIONS
For Osoyoos, BC
CBSA Border Crossing
Roof Restoration
R.075896.001

Issued for Building Permit -

APPROVED BY:

Regional Manager, AES — Date 2016-06-14

Construction Safety Coordinator — Date 2016-06-14

TENDER:

Project Manager — Date 2016-06-14

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
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JUNE 10/16

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END OF SECTION

Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Replacement of the existing conventional roof assemblies on roof areas A, B, C, D, E, F and H with a new conventionally insulated 2-ply SBS MB roof assembly, including a slope package, new drains, flashings, etc.

.2 Installation of ladder supports, a fixed ladder, new anchors and horizontal life lines as part of the roof access and fall protection, as outlined on the drawings.

.3 Building Sealant Renewal (Unit Price Item).

.4 Apply PMMA liquid-applied membrane in existing gutter along Roof Area G.

.5 Provide access to existing anchors along Roof Area G and coordinate testing.

.6 Provide access to existing skylight along Roof Area G at GL 23, disassemble skylight for review by Departmental Representative and then reassemble.

.7 Clean all areas affected by the work to satisfaction of the Departmental Representative.

.8 All other work specified herein or noted on drawings

1.2 CONTRACT METHOD

.1 Construct Work under stipulated price contract.

1.3 WORK SEQUENCE

.1 Co-ordinate Progress Schedule and co-ordinate with Departmental Representative during construction.

.2 Maintain fire access/control.

1.4 OCCUPANCY

.1 Departmental Representative will occupy premises during entire construction period for execution of normal operations.

.2 Co-operate with CBSA staff and schedule operations to minimize conflict and to facilitate Departmental Representative usage.

.3 Maintain unobstructed access to facilities and follow Traffic Management Plan acceptable to Departmental Representatives.

1.5 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

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

1.6 EXISTING SERVICES

.1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours' notice for necessary interruption of mechanical or electrical

service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to vehicular traffic and occupant operation.

.3 Provide alternative routes for personnel and vehicular traffic.

.4 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.

.5 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

.6 Provide temporary services when directed by Departmental Representative to maintain critical building and tenant systems.

.7 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.

.8 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

.9 Record locations of maintained, re-routed and abandoned service lines.

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

1.7 DOCUMENTS REQUIRED

.1 Refer to Section 01 11 55 – General Instruction, paragraph 10.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 DESCRIPTION OF WORK

.1 See Section 01 11 00 for Summary of Work.

1.2 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.

.2 Drawings are, in general, diagrammatic and are intended to indicate the scope and general arrangement of the work.

1.3 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 1 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.

1.4 TIME OF COMPLETION

.1 Complete the Roof Replacement Project within 10 weeks after Contract Award.

1.5 HOURS OF WORK

.1 Restrictive as follows:

.1 Schedule deconstruction, removal and construction work during normal working hours of the building. Monday to Friday between 07:30 and 17:00 hours unless it has been approved by the Departmental Representative.

.2 Work will be permitted after hours, weekends and holidays providing that it has been approved by the Departmental Representative and requirements for security have been met.

.3 Obtain and pay for a security guard from the Commissionaire Centre for any work performed either inside from the building or outside of the normal working hours.

1.6 WORK SCHEDULE

.1 Carry out work as follows:

.1 Within 10 working days after Contract award, provide a "phasing bar chart" and a schedule showing anticipated progress stages and final completion of the work within the time period required by the Contract documents. Indicate the following:

.1 Submission of shop drawings, product data, MSDS sheets and samples.
.2 Commencement and completion of work of each section of the specifications or trade for each phase as outlined.
.3 Final completion date within the time period required by the Contract documents.

.2 Do not change approved Schedule without notifying Departmental Representative. Departmental Representative may or may not accept changes in schedule in their sole discretion.

.3 Interim reviews of work progress based on work schedule will be conducted as decided by Departmental Representative and schedule updated by Contractor in conjunction with and to approval of Departmental Representative.

1.7 COST BREAKDOWN

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

1.8 CODES, BYLAWS, STANDARDS

.1 Perform work in accordance with the National Building Code of Canada (NBC) current edition, and other indicated Codes, Construction Standards and/or any other Code or Bylaw of local application.

.2 Comply with applicable local bylaws, rules and regulations enforced at the location concerned.

.3 Meet or exceed requirements of Contract documents, specified standards, codes and referenced documents.

.4 In any case of conflict or discrepancy, the most stringent requirements shall apply.

1.9 DOCUMENTS REQUIRED

.1 Maintain 1 copy each of the following at the job site:

.1 Contract drawings.
.2 Contract specifications.
.3 Addenda to Contract documents.
.4 Up-to-date copy of approved work schedule.
.5 Reviewed/approved shop drawings.
.6 Change orders.
.7 Other modifications to Contract.
.8 Field test reports.
.9 Reviewed/approved samples.
.10 One set of record drawings and specifications for "as-built" purposes.
.11 Site Specific Health and Safety Plan and all other mandatory legislated federal and provincial safety documentation.
.12 Traffic Management Plan
.13 Emergency Procedures

1.10 REGULARTORY REQUIREMENT

.1 Obtain and pay for Certificates, Licenses and other permits required by regulatory municipal, provincial or federal authorities to complete the work.

1.11 CONTRACTOR'S USE OF SITE

.1 Use of site:

.1 The CBSA Border Crossing will remain in full operation during the course of work. The contractor shall coordinate and schedule the work so as not to impair normal functions of the site.

.2 Assume responsibility for assigned premises for performance of this work.

.3 Be responsible for coordination of all work activities on site within area of work, including the work of other contractors engaged by the Departmental Representative such as moving contractors and furniture installers.

.4 Assume that the building will have no equipment or materials stored in the "Area of Work" that will hinder the work that is to be performed. The Departmental Representative will be responsible for removing any items that the contractor has indicated are interfering with the Work.

.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 Accept liability for damage, safety of equipment and overloading of structure.

1.12 EXAMINATION

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

1.13 EXISTING SERVICES

.1 Refer to Section 01 14 00 – Work Restrictions.

1.14 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space, and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Departmental Representative of impending installation and obtain his approval for actual location.

.4 Submit field drawings or shop drawings to indicate the relative position of various services and equipment when required by the Departmental Representative and/or as specified.

1.15 CUTTING AND PATCHING

.1 Cut existing surfaces as required to accommodate new work.

.2 Remove items so shown or specified.

.3 Do not cut, bore, or sleeve load-bearing members.

.4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.

.5 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish and texture.

.6 Making good is defined as matching construction and finishing materials and the adjacent surfaces such that there is no visible difference between existing and new surfaces when viewed from 1.5 metres in ambient light, and includes painting the whole surface to the next change in plane.

1.16 SETTING OUT OF WORK

.1 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.

.2 Provide devices needed to lay out and construct work.

.3 Supply such devices as templates required to facilitate Departmental Representative's review of work.

1.17 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 Departmental Representative. Commencement of work shall imply acceptance of prepared work or substrate surfaces.

1.18 QUALITY OF WORK

.1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.

.2 The workmanship, erection methods and procedures to meet minimum standards set out in the National Building Code of Canada, current edition.

.3 In cases of dispute, decisions as to standard or quality of work rest solely with the Departmental Representative, whose decision is final.

1.19 WORKS COORDINATION

.1 Coordinate work of 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 above ceilings and within or near to building structural elements.

.2 Identify on coordination drawings, building elements, services lines, rough-in points and indicate location services entrance to site.

.3 Facilitate meeting and review coordination drawings.

.4 Plan and coordinate work in such a way to minimize quantity of service line offsets.

.3 Submit shop drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.

.4 Work cooperation:

.1 Ensure cooperation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.

.2 Ensure that each trade provides all other trades reasonable opportunity for completion of Work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed work.

.5 Ensure disputes between subcontractors are resolved.

.6 Departmental Representative is not responsible for, or accountable for extra costs incurred as a result of Contractor's failure to coordinate Work.

.7 Maintain efficient and continuous supervision.

1.20 APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 In accordance with Section 01 33 00, submit the requested shop drawings, product data, and samples indicated in each of the technical Sections.

1.21 PRE-CONSTRUCTION MEETING

.1 Prior to start of work, Departmental Representative and Contractor will perform walk-through review of site, including any areas affected by the work, to review and document existing conditions.

.2 Contractor is to perform a thorough review of the site prior to start of work and provide written notice to Departmental Representative detailing any damaged

property. Departmental Representative will verify damage. If written notice is not given within five days of commencement of work, it will be assumed that the Contractor has reviewed the site and accepted the condition of the property as being free of damage.

.3 Any damages not listed as part of written notice mentioned above, found after the completion of the work will be the sole responsibility of the Contractor to rectify. Rectifications shall be completed in a timely and satisfactory manner.

1.22 PROJECT MEETINGS

.1 Refer to Section 01 31 19 – Project Meetings.

1.23 TESTING AND REVIEW

.1 Particular requirements for review and testing to be carried out by testing service or laboratory approved by the Departmental Representative are specified in under various sections.

.2 Refer to Section 01 45 00 – Quality Control.

1.24 RECORD DOCUMENTS

.1 The Departmental Representative will provide 2 sets of full size drawings and 2 sets of specifications. One copy of drawings for "Record" purposes.

.2 As work progresses, maintain accurate records to show all deviations from the Contract documents. Note on record specifications, drawings and shop drawings as changes occur. Departmental Representative may review progress periodically. Provide 'working' as built drawings promptly upon request.

.3 Refer to Section 01 78 00.

1.25 DUST CONTROL

.1 When performing dust generating activities, provide temporary dust screens to protect finished areas of work and public.

1.26 ENVIRONMENTAL PROTECTION

.1 Removal and disposal of hazardous materials is to be in accordance with federal, provincial and municipal regulations. Refer to attached Appendix B and section 01 35 33 – Health and Safety Requirements.

.2 Prevent extraneous materials from contaminating air beyond construction area, by providing enclosures during work.

.3 Do not dispose of waste or volatile materials into water courses, storm or sanitary sewers.

1.27 MAINTENANCE MATERIALS, SPECIAL TOOLS AND SPARE PARTS

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

.2 Refer to Section 01 78 00 – Closeout Submittals.

1.28 ADDITIONAL DRAWINGS

.1 The Departmental Representative may furnish additional drawings for clarification. These additional drawings have the same meaning and intent as if they were included with plans referred to in the Contract documents.

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

1.29 BUILDING SMOKING ENVIRONMENT

.1 Smoking on site is not permitted.

1.30 SYSTEM OF MEASUREMENT

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

1.31 SUBMISSION OF TENDER

.1 Before submitting tender, become familiar with all conditions likely to affect the cost of the work.

1.32 WEATHER

.1 The work is to be performed at CBSA Border Crossing in Osoyoos, BC. Contractor shall explicitly consider weather in their schedule.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Excution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 ACCESS AND EGRESS

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

1.2 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. 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.

.4 Contractor to provide temporary sanitary facilities for crew. Keep facilities clean. Arrange location of facilities with Departmental Representative prior to mobilization.

.5 Closures: protect work temporarily until permanent enclosures are completed.

1.3 EXISTING SERVICES

.1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum.

.3 Provide for personnel, pedestrian and vehicular traffic.

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

1.4 SPECIAL REQUIREMENTS

.1 Carry out noise generating Work outside of normal business hours 8:00 to 19:00, Monday to Friday.

.2 Submit schedule for review by Department Representative.

.3 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.4 Keep within limits of work and avenues of ingress and egress.

.5 Ingress and egress of Contractor vehicles at site is to be organized with Department Representative prior to coming to site.

.6 Deliver materials outside of peak traffic hours 10:00 to 19:00 unless otherwise approved by Departmental Representative. Outline route of deliveries on submitted Traffic Management Plan.

1.5 SECURITY

.1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.

.2 Security clearances:

.1 Personnel employed on this project will be subject to security check.

.2 Provide and pay for escort by Commissionaire for each individual required to enter premises.

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

.3 Security escort:

.1 Personnel employed on this project must be escorted when executing work in non-public areas during normal working hours. Personnel must be escorted in all areas after normal working hours.

.2 Submit an escort request to Departmental Representative at least 3 days before service is needed. For requests submitted within time noted above, costs of security escort will be paid for by the Contractor.

.3 Any escort request may be cancelled free of charge if notification of cancellation is given at least 24 hours before scheduled time of escort. Cost incurred by late request will be Contractor's responsibility.

.4 Calculation of costs will be based on the rates of Commissionaire Centre: www.commissionaires.ca/en/national/home

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Refer to General Conditions.

1.2 REQUEST FOR APPROVAL OF ALTERNATIVES

.1 Contractors and suppliers of products or systems, which have not been specified, may apply for approval of their product/system as "alternative".

.2 Alternates will be considered after award of the contract to the successful bidder which provide cost reductions to the contract without any construction delays to the schedule.

.3 Request for approval shall include:

- .1 Project name and number.
- .2 Specification sections to which the product/system applied.
- .3 Description of proposed substitution including manufacturer's material specifications, manufacturer's preparation and application requirements and manufacturer's warranties.
- .4 Sample product indicating surface finish and material thickness to be applied under Contract.
- .5 Installation history of proposed alternative including:
  - .1 Projects and locations
  - .2 Approximate value of contract
  - .3 Approximate size of projects
  - .4 Number of years in use
  - .5 Type of usage
- .6 Where a specified product or system is not available at the time of price submission, the Contractor must inform the Departmental Representative in writing. In the event that the Contractor fails to do so, the Departmental Representative will choose a substitute product suitable for the application at the time of construction.

.4 When submitting alternatives to materials or equipment specified, Contractor shall include in their Price any changes in the work required to accommodate such alternatives. A later claim for addition to the Contract Price because of changes in the work necessitated by the use of alternatives will not be considered.

1.3 APPROVAL OF ALTERNATIVES

.1 Products/systems that have been approved as alternatives may be substituted for specified products/systems.

.2 Should any proposed alternative be accepted either in part or in whole, the Contractor shall assume full responsibility and bear the costs when substitution affects other work of the Project and pay for any drawing changes required as a result of the substitution.

.3 All cost savings arising from approved substitutions will be credited to the Contract in such amounts as may be determined by the Departmental Representative and Contract Price will be adjusted accordingly. No substitutions will be permitted without the prior written approval of the Departmental Representative.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 PRECONSTRUCTION MEETING

.1 Within 10 working days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Departmental Representatives and Contractor will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

.4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.5 Agenda to include:

- .1 Appointment of official representative of participants in the Work.
- .2 Detailed schedule of Work
- .3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 51 00.
- .5 Delivery schedule of specified equipment and materials.
- .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 33 00 - Submittal Procedures.
- .9 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
- .10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .11 Monthly progress claims, administrative procedures, photographs, hold backs.
- .12 Appointment of review and testing agencies or firms.
- .13 Insurances, transcript of policies.
- .14 Occupational Health and Safety

1.2 PROGRESS MEETINGS

.1 During course of Work schedule bi-weekly progress meeting.

.2 Contractor, major Subcontractors involved in Work, Departmental Representative, and Consultant are to be in attendance.

.3 Notify parties minimum four days prior to meetings.

.4 Consultant shall record minutes of meetings and circulate to attending parties and affected parties not in attendance within three days after meeting.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 GENERAL

.1 Use new material and equipment unless otherwise specified, equipment and systems.

.2 Within seven (7) days of written request by Departmental Representative, submit following information for any and all materials and products proposed for supply

- .1 Name and address of manufacturer
- .2 Trade name, model, and catalogue number
- .3 Performance, descriptive, and test data
- .4 Manufacturer's installation or application instructions

1.2 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.

.2 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.

1.3 DELIVERY AND STORAGE

.1 Refer to Section 01 61 00 – Common Product Requirements.

1.4 SUBSTITUTION AFTER CONTRACT AWARD

.1 No substitutions are permitted without prior written approval of the Departmental Representative.

.2 Proposals for substitution may only be submitted after Contract award. Such request must include statements of respective costs of items originally specified and the proposed substitution.

.3 Proposals will be considered by the Departmental Representative if

- .1 Products selected by Tenderer from those specified are not available
- .2 Delivery date of products selected from those specified would unduly delay completion of Contract, or
- .3 Alternative product to that specified, which is brought to the attention of and considered by Departmental Representative as equivalent to the product specified, will result in a credit to the Contract amount.

.4 Should the proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on the project. Pay for design or drawing changes required as result of substitution.

.5 Amounts of all credits arising from approval of the substitutions will be determined by the Departmental Representative, and the Contract Price will be reduced accordingly.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 35 33 – Health and Safety Requirements

.2 Section 05 55 00 – Metal Fabrications

.3 Section 07 52 00 – Modified Bitumen Membrane Roofing and Waterproofing

.4 Section 07 62 00 – Sheet Metal Flashings and Trim

.5 Section 07 92 00 – Sealants

1.2 ADMINISTRATIVE

.1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are co-ordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

.10 Keep one reviewed copy of each submission on site.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Refer to General Conditions.

.2 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.3 Submit drawings stamped and signed by professional engineer registered or licensed in British Columbia.

.4 Shop drawing illustrations and diagrams and adjacent building components are to be drawn to scale with appropriate scale noted on each page.

.5 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.6 Allow five business days for Departmental Representative's review of each submission.

.7 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.8 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

.9 Accompany submissions with transmittal letter, containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.10 Submissions include:

- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Single line and schematic diagrams.
  - .9 Relationship to adjacent work.

.11 After Departmental Representative's review, distribute copies.

.12 Submit electronic copy of shop drawings for each requirement requested in specification sections and as Departmental Representative may reasonably request.

.13 Submit electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.14 Submit electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within 3 years of date of contract award for project.

.15 Submit electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.16 Submit electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.17 Submit electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

.18 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.19 Submit electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.20 Delete information not applicable to project.

.21 Supplement standard information to provide details applicable to project.

.22 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.23 The review of shop drawings by Departmental Representatives is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of

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

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

.24 Refer to Section 01 35 22 – Health and Safety Requirements for additional submittals.

1.4 SAMPLES

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

.2 Deliver samples to Departmental Representative.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in samples which Departmental Representative or Departmental Representative may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.5 MOCK-UPS

.1 Erect mock-ups in accordance with 01 45 00 - Quality Control and specific specification sections.

1.6 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in standard resolution as directed by Departmental Representative.

1.7 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

.2 Submit transcription of insurance immediately after award of Contract.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCE

.1 Government of Canada.
- .1 Canada Labour Code - Part II
- .2 Canada Occupational Health and Safety Regulations.

.2 National Building Code of Canada, current edition (NBC):
- .1 Part 8, Safety Measures at Construction and Demolition Sites.

.3 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

.4 National Fire Code of Canada 2010 (as amended)
- .1 Part 5 – Hazardous Processes and Operations and Division B as applicable and required.

.5 Province of British Columbia:
- .1 Workers Compensation Act Part 3-Occupational Health and Safety.
- .2 Occupational Health and Safety Regulations

1.2 RELATED SECTIONS

.1 Refer to the following current sections as required:
- .1 Section 01 14 00 – Work Restrictions
- .2 Section 01 33 00 – Submittals
- .3 Section 01 51 00 – Temporary Utilities
- .4 Section 01 56 00 – Temporary Barriers and Enclosures
- .5 Section 06 10 00 – Rough Carpentry
- .6 Section 07 52 00 – Modified Bituminous Membrane Roofing
- .7 Section 07 62 00 – Metal Flashings and Trim
- .8 Section 07 92 00 – Sealants

1.3 WORKERS' COMPENSATION BOARD COVERAGE

.1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the work.

.2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.4 COMPLIANCE WITH REGULATIONS

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

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

1.5 SUBMITTALS

.1 Submit to Departmental Representative submittals listed for Review in accordance with Section 01 33 00.

.2 Submit the following:

.1 Site Specific Health and Safety Plan.

.2 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.

.3 Copies of incident and accident reports.

.4 Complete set of current Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.

.3 The Departmental Representative will review the Contractor's Site Specific Health and Safety Plan and emergency procedures, and provide comments to the Contractor within 5 days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative.

.4 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.

.5 Submission of the Site Specific Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:

.1 Be construed to imply approval by the Departmental Representative.

.2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.

.3 Relieve the Contractor of his legal obligations for theprovision of health and safety on the project.

1.6 RESPONSIBILITY

.1 Assume responsibility as the Prime Contractor, pertaining to safety at the work site, for work under this contract.

.2 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.3 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable Federal, Provincial, Territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.7 HEALTH AND SAFETY COORDINATOR

.1 The Health and Safety Coordinator:

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

.2 Be responsible for implementing, revising, daily enforcing, and monitoring the Site Specific Health and Safety Plan.

.3 Be on site during execution of work.

1.8 GENERAL CONDITIONS

.1 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.

.2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.

.3 Refer to Section 01 51 00 – Temporary Utilities and Section 01 56 00 – Temporary Barriers and Enclosures

1.9 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:
- .1 Multi-employer work site.
- .2 Federal employees and general public.
- .3 See Preliminary Hazard Assessment Form Appendix A.

1.10 UTILITY CLEARANCES

.1 The Contractor is solely responsible for all utility detection and clearances prior to starting the work

.2 The Contractor will not rely solely upon the Reference Drawings or other information provided for utility locations.

1.11 REGULATORY REQUIREMENTS

.1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at site.

.2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

1.12 WORK PERMITS

.1 Obtain specialty permit[s] related to project before start of work.

1.13 FILING OF NOTICE

.1 The General Contractor is to complete and submit a Notice of Project as required by Provincial authorities.

.2 Provide copies of all notices to the Departmental Representative.

1.14 HEALTH AND SAFETY PLAN

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

.2 Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:

.1 Primary requirements:

.1 Contractor's safety policy.
.2 Identification of applicable compliance obligations.
.3 Definition of responsibilities for project safety/organization chart for project.
.4 General safety rules for project.
.5 Job-specific safe work procedures.
.6 Inspection policy and procedures.
.7 Incident reporting and investigation policy and procedures.
.8 Occupational Health and Safety Committee/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 workers.

.3 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.

.4 Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.

.5 The review of Health and Safety Plan by the Departmental Representative 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.

1.15 EMERGENCY PROCEDURES

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

.2 Regulatory agencies applicable to work and as per legislated regulations.
.3 Local emergency resources.
.4 Departmental Representative.

.2 Include the following provisions in the emergency procedures:
.1 Notify workers and the first-aid attendant, of the nature and location of the emergency.
.2 Evacuate all workers safely.
.3 Check and confirm the safe evacuation of all workers.
.4 Notify the fire department or other emergency responders.
.5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
.6 Notify Departmental Representative.

.3 Provide written rescue/evacuation procedures as required for, but not limited to:
.1 Work at high angles.
.2 Work in confined spaces or where there is a risk of entrapment.
.3 Work with hazardous substances.
.4 Workplaces where there are persons who require physical assistance to be moved.

.4 Design and mark emergency exit routes to provide quick and unimpeded exit.

1.16 HAZARDOUS PRODUCTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.

.2 Where use of hazardous and toxic products cannot be avoided:
.1 Provide adequate means of ventilation in accordance with Section 01 51 00.
.2 The contractor shall ensure that the product is applied as per manufacturers recommendations.
.3 The contractor shall ensure that only pre-approved products are brought onto the work site in an adequate quantity to complete the work.

1.17 HAZARDOUS MATERIAL

.1 Carry out any activities involving hazardous material in accordance with applicable Provincial regulations.

.2 Removal and handling of hazardous materials in accordance with provincial regulation and WorkSafe BC. Refer to the Hazardous Assessment Report in Appendix B.

.3 Contractor to assume all paint on site contains lead and to follow WorkSafe BC procedures when disturbing any painted surface.

.4 If any other such materials are detected on site, the Contractor is to immediately notify the Department Representatives so that the appropriate measures can be determined and implemented.

1.18 ELECTRICAL SAFETY REQUIREMENTS

.1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.

.1 Before undertaking any work, coordinate required energizing and de-energizing of new and existing circuits with Departmental Representative.

.2 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.

1.19 OVERLOADING

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

1.20 FALSEWORK

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

1.21 SCAFFOLDING

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

1.22 FIRE SAFETY AND HOT WORK

.1 Obtain Departmental Representative's authorization before any welding, cutting or any other hot work operations can be carried out on site.

.2 Hot work includes cutting/melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which produces sparks.

1.23 FIRE SAFETY REQUIREMENTS

.1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

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

1.24 FIRE PROTECTION AND ALARM SYSTEM

.1 Fire protection and alarm systems shall not be:
- .1 Obstructed.
- .2 Shut off.
- .3 Left inactive at the end of a working day or shift.

.2 Do not use fire hydrants, standpipes and hose systems for purposes other than firefighting.

.3 Be responsible/liable for costs incurred from the fire department, the building owner and the tenants, resulting from false alarms.

1.25 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.

1.26 MEETINGS

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

1.27 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.

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

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures.

1.2 REFERENCES

.1 Refer to General Conditions.

1.3 FIELD REVIEW

.1 Refer to General Conditions.

.2 Provide Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, provide access to such Work whenever it is in progress.

.3 Give timely notice requesting review if Work is designated for special tests, reviews or approvals by Departmental Representative instructions, or law of Place of Work.

.4 If Contractor covers work to be reviewed or tested by the Departmental Representative, uncover such Work, have reviews or tests satisfactorily completed and make good such Work.

.5 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 at no additional cost.

1.4 INDEPENDENT REVIEW AGENCIES

.1 Independent Review/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 review and testing by appointed agencies.

.3 Employment of review/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during review and/or testing, appointed agency will request additional review and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised at no cost to Departmental Representative. Contractor is responsible for costs of retesting and additional reviews.

1.5 ACCESS TO WORK

.1 Provide review/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.6 PROCEDURES

.1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in 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.

1.7 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents at no additional cost.

.2 Make good other Contractor's work damaged by such removals or replacements promptly at no additional cost.

.3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative 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 the Departmental Representative.

1.8 REPORTS

.1 Submit one copy of field review and test reports to Departmental Representative.

.2 Provide copies to subcontractor of work being reviewed or tested, manufacturer or fabricator of material being reviewed or tested.

1.9 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.

.2 Construct in locations acceptable to Departmental Representative.

.3 Prepare mock-ups for Departmental Representative's 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 may remain as part of Work, if acceptable to Departmental Representative.

1.10 MILL TESTS

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

.1 For Federal Government Projects, Division 01 Sections take precedence over technical specifications in other Divisions of this Project Manual.

1.2 RELATED REQUIREMENTS

.1 Section 06 10 00 – Rough Carpentry

.2 Section 07 52 00 – Modified Bituminous Membrane Roofing

.3 Section 07 62 00 – Metal Flashing and Trim

.4 Section 07 92 00 – Sealants

1.3 REFERENCES

.1 CSA Group

.1 CAN/CSA-Z809-08, Sustainable Forest Management.

.2 Environmental Choice Program

.1 CCD-016-97(R2005), Thermal Insulation Materials.

.2 CCD-045-95, Sealant and Caulking Compounds.

.3 CCD-046-95, Adhesives.

.4 CCD-047-98(R2005), Architectural Surface Coatings.

.5 CCD-048-95(R2006), Surface Coatings - Recycled Water-Borne.

.6 CCD-127-95, Recycled Plastic Products.

.7 CCD-144-2003, Naturally-Derived Phenol Substitutes.

.8 CCD-150-2004, Steel for Use in Construction Products.

.3 Forest Stewardship Council (FSC)

.1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.

.4 Green Seal Environmental Standards (GS)

.1 GS-03-97, Environmental Criteria for Anti-Corrosive Paints.

.2 GS-11-11, Standard for Paints and Coatings.

.5 Sustainable Forestry Initiative (SFI)

.1 SFI-2010-2014 Standard.

1.4 SUBMITTALS

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

1.5 HAZARDOUS MATERIALS

.1 Refer to Section 01 35 33 and Appendix B for Hazardous Material Assessment Report.

1.6 GENERAL CONSTRUCTION MATERIALS/PRACTICES

.1 Materials and Resources

.1 Incorporate reused building materials, where possible..

.2 Provide list of non-endorsed products and services, provided the green labelled product or services are capable of meeting specified performance requirements.

.2 Construction Waste Management

.1 Follow recommendations and requirements of this projects construction, renovation and demolition (CRD) waste management plan in accordance with Section 01 74 19 - Waste Management And Disposal.

.2 Recycled Content

.1 Use materials with post-consumer and post-industrial recycled content, where possible.

.3 Local/Regional Materials

.1 Use local systems and materials, where possible.

.4 Rapidly Renewable Materials

.1 Use systems and materials that originate from renewable sources, where possible.

.5 Wood

.1 Use lumber sourced from independently certified well-managed forests in accordance with CAN/CSA-Z809 or FSC or SFI.

.2 Materials made from composite wood materials or agricultural products: must not contain urea-formaldehyde resins.

1.7 PAINTS, STAINS, AND VARNISHES

.1 Use paints and coatings with low VOC.

1.8 SEALANTS, ADHESIVES AND COMPOUNDS

.1 Refer to Section 07 92 00.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

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

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.3 WATER SUPPLY

.1 Departmental Representative will provide continuous supply of potable water for construction use.

.2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.

1.4 TEMPORARY HEATING AND VENTILATION

.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Provide temporary heat and ventilation in enclosed areas as required to:

- .1 Facilitate progress of Work.
- .2 Protect Work and products against dampness and cold.
- .3 Prevent moisture condensation on surfaces.
- .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
- .5 Provide adequate ventilation to meet health regulations for safe working environment.

.3 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.

.4 Ventilating:

- .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
- .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
- .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
- .4 Ventilate storage spaces containing hazardous or volatile materials.
- .5 Ventilate temporary sanitary facilities.
- .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.5 Maintain strict supervision of operation of temporary heating and ventilating equipment to:

.1 Conform with applicable codes and standards.
.2 Enforce safe practices.
.3 Prevent abuse of services.
.4 Prevent damage to finishes.
.5 Vent direct-fired combustion units to outside.

.6 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.5 TEMPORARY POWER AND LIGHT

.1 Power is not available on site. Contractor to provide all electrical requirements for the project.

.2 Provide and maintain temporary lighting throughout project, where required.

1.6 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on site.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Refer to General Conditions.

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.3 HOARDING

.1 Erect temporary site enclosures using 38 x 89 mm construction grade lumber framing at 600 mm centres and 1200 x 2400 x 13 mm exterior grade fir plywood to CSA O121. Enclosure to be 8ft high.

.2 Apply plywood panels vertically flush and butt jointed.

.3 Provide one lockable entrance door as directed and conforming to applicable traffic restrictions on adjacent streets.

.4 Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.

.5 Maintain public side of enclosure in clean condition.

.6 Erect temporary site enclosure using new 1.2 m high fence wired to rolled steel "T" bar fence posts spaced at 2.4 m on centre. Provide one lockable gate. Maintain fence in good repair.

.7 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.4 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around open edges of roofs.

1.5 ACCESS TO SITE

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

1.6 PUBLIC TRAFFIC FLOW

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

1.7 FIRE ROUTES

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

1.8 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.9 PROTECTION OF BUILDING FINISHES

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with Departmental Representative prior to installation.

.4 Be responsible for damage incurred due to lack of or improper protection.

1.10 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Refer to General Conditions.

.2 Within text of each specifications section, reference may be made to reference standards.

.3 Conform to these reference standards, in whole or in part as specifically requested in specifications.

.4 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.

.5 Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 QUALITY

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.

.3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

.5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

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

1.4 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.5 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

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

.7 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.5 TRANSPORTATION

.1 Contractor to pay costs of transportation of products required in performance of Work.

1.6 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.7 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. 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.

1.8 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.

1.9 REMEDIAL WORK

.1 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.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.10 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Departmental Representative of conflicting installation. Install as directed.

1.11 FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.12 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Bolts may not project more than one diameter beyond nuts.

.3 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.13 EXISTING UTILITIES

.1 When connecting to existing services or utilities, where previously coordinated and accepted by Departmental Representative, execute Work at times directed by Departmental Representatives, with minimal disturbance to Work, and/or building occupants and pedestrian and vehicular traffic.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by Departmental Representative. Stake and record location of capped service.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 BONDS

.1 Refer to Generation Conditions for project bonding requirements.

1.2 WARRANTY/GUARANTY PERIOD

.1 All of the Work of the Contract: Five (5) year guaranty, secured by Performance Bond, for the first two (2) years and unsecured for the remaining three (3), commencing on the completion date and as verified by the Departmental Representative.

.2 All of the Work of the Contract: Refer to General Conditions.

.3 Refer to applicable specification sections for required warranty/guarantee submissions.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 REMEDIAL WORK UNDER GUARANTY/WARRANTY

.1 The Departmental Representative shall provide written notice to the Contractor, within thirty (30) days of the discovery of any defect in the system under normal usage. The Contractor shall immediately take necessary steps to protect the area against further damage and shall take corrective action to make good any damage incurred. The Contractor shall schedule all repair work with the Departmental Representative and shall make every attempt to make good the defects in a timely manner.

.2 Remedy is to include, at no cost to the Departmental Representative, labour, materials, equipment, services required to make good defective areas of the work, and to make good damages incurred in obtaining access to defective areas. The Contractor will reimburse the Departmental Representative for any resulting investigation costs to define the extent of defective areas and to retest to confirm acceptability of repairs.

.3 Warranty periods for areas requiring repair are to be extended by the amount of time between notification that the remedial work is necessary and the completion of the remedial work, thereafter the warranty/guaranty period will recommence upon completion of the remedial work.

.4 Warranties/Guaranties are not to be deemed to restrict any liability of the Contractor arising out of any applicable law.

.5 The more stringent requirements between this specification and the thir party warranty provider shall be adhered to.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Refer to General Conditions.

1.2 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Departmental Representative or other Contractors.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

.3 Clear snow and ice from access to building, if required.

.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.5 Provide on-site containers for collection of waste materials and debris. Coordinate location with Departmental Representative.

.6 Provide and use marked separate bins for recycling. Refer to Section 01 74 19 - Waste Management and Disposal.

.7 Dispose of waste materials and debris off site.

.8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.9 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.10 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

.12 Review finishes, fitments and equipment and ensure specified workmanship and operation.

.13 Clean roofs, downspouts, and drainage systems.

.14 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Text, schedules, and procedures for systematic Waste Management Program for construction
  .1 Diversion of Materials

1.2 DEFINITIONS

.1 Waste Audit (WA): relates to projected waste generation. Involves controlled separation of waste.

.2 Waste Reduction Workplan (WRW): a written report which addresses opportunities for reduction, reuse or recycling of materials.

.3 Materials Source Separation Program (MSSP): consists of a series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.

1.3 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures

1.4 DOCUMENTS

.1 Maintain at job site, one (1) copy of following documents
  .1 Recycling List

1.5 MATERIALS SOURCE SEPARATION PROGRAM (MSSP)

.1 Before project start-up, prepare Materials Source Separation Program and provide separate containers to deposit reusable and/or recyclable materials of the following
  .1 Metals
  .2 Wood
  .3 Rigid Insulation
  .4 Protection Board and Roofing Membranes

.2 Other materials as indicated in technical sections.

.3 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.

.4 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.

1.6 DISPOSAL OF WASTES

.1 Submission of tender is deemed to be confirmation of the fact that the Tenderer has researched the existence of a local recycling centre and has determined if that facility could accept the materials and quantities that would be expected to be transferred.

.2 Do not bury rubbish or waste materials.

.3 Do not dispose of waste volatile materials, mineral spirits, paint thinner into waterways, storm sewers, or sanitary sewers.

.4 Keep records of construction waste, including:
- .1 Number and size of bins
- .2 Waste type of each bin
- .3 Total tonnage generated
- .4 Tonnage reused or recycled
- .5 Reused or recycled waste destination

1.7 SCHEDULING

.1 Coordinate Work with other activities at site to ensure timely and orderly progress of Work.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

.1 Provide copies of manifests to Departmental Representative to confirm that materials that are intended to be recycled have gone to a transfer station and that the remaining debris has gone to an approved landfill.

3.1 APPLICATION

.1 Materials in separate condition: collect, handle, store on site, and transport off site to an approved and authorized recycling facility. Provide documentation to Departmental Representative to confirm transfer. Provide documentation to confirm that debris that cannot be recycled has gone to an approved landfill.

3.2 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

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 31 19 – Project Meetings

.2 Section 01 33 00 – Submittal Procedures

.3 Section 01 45 00 – Quality Control

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one week prior to contract completion with contractor's representative, Departmental Representative in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify Project requirements.

.2 Review warranty requirements, and manufacturer's installation instructions.

.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.

1.3 SUBMITTALS

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

.2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative.

.3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.

1.4 FORMAT

.1 Organize data as instructional manual and provide two (2) hard copies as well as in electronic PDF format.

.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 system under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab.

.1 Bind in with text; fold larger drawings to size of text pages.

1.5 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume: provide title of project;

.1 Date of submission; names.

.2 Addresses, and telephone numbers of Contractor with name of responsible parties.

.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:

.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data.

.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

1.6 PROJECT RECORD DOCUMENTS AND SAMPLES

.1 Maintain, in addition to requirements in General Conditions, at site for the Departmental Representative one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.

.1 Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.

.1 Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition.

.1 Do not use record documents for construction purposes.

.5 Keep record documents and samples available for review by Departmental Representative.

1.7 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of drawings, provided by Departmental Representative.

.2 Provide felt tip marking pens for recording information, maintaining separate colours for each major system.

.3 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:

.1 Measured depths of elements of foundation in relation to finish first floor datum.

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.

.5 Changes made by change orders.

.6 Details not on original Contract Drawings.

.7 References to related shop drawings and modifications.

.5 Specifications: mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, and field test records, required by individual specifications sections.

.7 Provide digital photos, if requested, for site records.

1.8 EQUIPMENT AND SYSTEMS

.1 For each item of equipment and each system include description of unit or system, and component parts.

.1 Give function, normal operation characteristics and limiting conditions.

.2 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.3 Include manufacturer's printed maintenance instructions.

.4 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.5 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.6 Include test reports as specified in Section 01 45 00 - Quality Control.

.7 Additional requirements: as specified in individual specification sections.

1.9 MATERIALS AND FINISHES

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

.1 Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional requirements: as specified in individual specifications sections.

1.10 MAINTENANCE MATERIALS

.1 Extra Materials:

.1 Provide maintenance information as specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site; place and store where directed.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

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

1.11 WARRANTIES AND BONDS

.1 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.

.2 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten (10) days after completion of applicable item of work.

.4 Verify that documents are in proper form, contain full information, and are notarized.

.5 Co-execute submittals when required.

.6 Retain warranties and bonds until time specified for submittal.

.3 Except for items put into use with the Departmental Representative's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.4 Include information contained in warranty management plan as follows:

.1 Provide list for each warranted system indicating:

.1 Name of system.

.2 Location where installed.

.3 Name and phone numbers of manufacturers or suppliers.

.4 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.

.5 Cross-reference to warranty certificates as applicable.

.6 Starting point and duration of warranty period.

.7 Summary of maintenance procedures required to continue warranty in force.

.8 Cross-Reference to specific pertinent Operation and Maintenance manuals.

.9 Organization, names and phone numbers of persons to call for warranty service.

.5 Respond in timely manner to oral or written notification of required construction warranty repair work.

.6 Written verification to follow oral instructions.

.1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

1.12 COMPLETION

.1 Submit a written certificate that the following have been performed

.1 Work has been completed and inspected for compliance with the Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Equipment and systems have been tested, adjusted, and balanced and are fully operational.

.4 Operation of systems has been demonstrated to the personnel indicated by the Departmental Representative.

.5 Work is complete and ready for final review.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Furnish all labour, materials and equipment necessary for the complete supply and installation of fixed ladder and ladder support brackets as indicated on the Drawings.

1.2 RELATED SECTIONS

.1 Section 01 33 00 Submittal Procedure.

1.3 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

- .1 ASTM A53/A53, Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated Welded and Seamless
- .2 ASTM A269, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
- .3 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
- .4 ASTM A53/A53M, Specification for Pipe, Steel, Black and Hot Dipped, Zinc coated Welded and Seamless
- .5 ASTM A123/A123M, Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
- .6 ASTM A500, Specification for Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
- .7 ASTM A501, Specification for Hot Formed Welded and Seamless Carbon Steel Structural Tubing

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB 1.40, Anti corrosive Structural Steel Alkyd Primer
- .2 CAN/CGSB 1.181, Ready Mixed, Organic Zinc Rich Coating

.3 Canadian Standards Association International (CSA)

- .1 CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel
- .2 CAN/CSA G164, Hot Dip Galvanizing of Irregularly Shaped Articles
- .3 CAN/CSA S16.1, Limit States Design of Steel Structures
- .4 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co operation with the Canadian Welding Bureau)
- .5 CSA W59, Welded Steel Construction (Metal Arc Welding) (Imperial Version)
- .6 CSA W59, Welded Steel Construction (Metal Arc Welding)

.4 American National Standard for Fixed Ladders (ANSI 14.3)

1.4 DESIGN CRITERIA

.1 Design is based on Limit States Design principles using factored loads and resistances.

.2 Loads and load factors are determined in accordance with the National Building Code, current edition, and the bylaws of the local municipality.

.3 Resistances and resistance factors are determined in accordance with the National Building Code, current edition, and CSA-S136.

.4 Install components or assemblies to accommodate specified erection tolerances of the structure.

.5 Work of this Section, which will support other items or will be required to support structural loads of any nature shall be designed by a Professional Structural Engineer registered in British Columbia and who shall affix his/her professional seal and signature to the shop drawings for such items.

1.5 SUBMITTALS

.1 Product Data for proprietary equipment and pre-engineered products:

.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 Submittal Procedures. Literature must contain documentation products meet or exceed WorkSafe BC Regulation.

.2 Submit two copies of WHMIS MSDS Material Safety Data Sheets in accordance with Section 01 33 00 Submittal Procedures. Indicate VOC's for finishes, coatings, primers and paints.

.2 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 33 00 Submittal Procedures.

.2 Shop drawings shall be prepared under the direction of a Specialty Engineer for those connections and components designed by the fabricator. This Engineer or their representative shall visit the site to review the work designed by the Engineer to satisfy themselves that the work comply with their design as shown on the shop drawings.

.3 Shop drawings of components and connections designed by the fabricator's Specialty Engineer shall be signed and sealed by this Specialty Engineer.

.4 Drawings, which accompany these specifications, are to be used for estimating purposes only, and show in general the type of construction that shall be followed, but must not be considered as fabrication drawings.

.5 The Departmental Representative's review of the shop drawings is for general conformance only and does not relieve the Contractor of the responsibility for errors or omissions that may be present in the shop drawings.

.6 Shop drawings shall show complete details necessary for fabrication and erection of the component parts of the structure, including location, type, size and extent of all welds, as well as all mechanical/electrical openings required. Splices not shown on the shop drawings will not be accepted.

.7 Upon request by the Departmental Representative, the Contractor shall revise and resubmit the shop drawings.

.8 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.6 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 All guards are to be designed to meet the requirements of WorkSafe BC – Occupational Health and Safety Regulation – Section 4.54.

.4 Perform welding to CSA W59.

.5 All permanent fixed ladders to meet ANSI 14.3 and WorkSafe BC – Occupational Health and Safety Regulation – Part 13.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Storage and Protection:

.1 Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job site.

.2 Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

Part 2 Products

2.1 MATERIALS

.1 Steel sections and plates: to CAN/CSA G40.21, Grade 300W

.2 Steel pipe: to ASTM A53/A53M standard weight, galvanized finish

.3 Welding materials: to CSA W59

.4 Welding electrodes: to CSA W48 Series

.5 Bolts and anchor bolts: to ASTM A307

.6 Stainless steel tubing: to ASTM A269, Type 302 Commercial grade Seamless welded with AISI NO.4 finish.

.7 Stainless steel bolts: to ASTM F1554 unless otherwise noted.

.8 Aluminum to CAN/CSA-S157

2.2 ANCHORING DEVICES

.1 Drilled Inserts: steel, cadmium plated or hot-dip galvanized, sizes as indicated on drawings.

.2 Bolts and nuts: to ASTM A307, sizes as indicated on drawings, with large flat type steel washers, sized to suit fasteners, hot-dip galvanized.

2.3 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Use self tapping shake proof flat headed screws on items requiring assembly by screws or as indicated.

.3 Exposed Mechanical Fastenings: flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

.4 Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

.5 Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.

.6 Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

.7 Accurately assemble components to each other and to building structure.

.8 Accommodate for expansion and contraction of members and building movement without damage to connections or members.

.9 Where possible, fit and shop assemble work, ready for erection.

.10 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.4 FINISHES

.1 All exposed steel to be Galvanized: hot dipped galvanizing with zinc coating 600g/m^2 to CAN/CSA G164.

.2 Shop coat primer: to CAN/CGSB-1.40.

.3 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.5 FIXED STEEL LADDERS

.1 All permanent fixed ladders designed to WorkSafe BC Part 13 and ANSI 14.3 Standard for Fixed Ladders.

.2 Galvanizing: to CAN/CSA –G164, provide minimum 600g/sq m galvanized coating

.1 Touch Up Primer for Galvanized Surfaces: to CAN/CGSB – 140

.3 Provide sealed shop drawings by specialty engineer in accordance with Section 01 33 00: Submittal Procedures.

2.6 LADDER SUPPORT BRACKETS

.1 Provide ladder support brackets as outlined on drawings. Position of final location of bracket(s) to allow for portable ladder to be used in accordance with recommended WorkSafe BC portable ladder use procedures. Confirm location with Departmental Representative prior to installation.

.2 Construction and fabrication to be with corrosion inhibiting materials.

.3 Connection to base structure to not penetrate the roofing system. Protect adjacent roofing materials from wear and damage.

2.7 SURFACE PREPARATION

.1 Thoroughly clean and suitably pretreat steel prior to finishing.

.2 Remove loose mill scale, rust, oil, grease, dirt and other foreign matter using one or more of the following methods:

.1 Solvent cleaning
.2 Wire brushing
.3 Power wire brushing
.4 Sandblasting
.5 Grind smooth sharp projections.

.3 Grind smooth sharp projections.

Part 3 Execution

3.1 GENERAL

.1 Fabrication and erection shall conform to the shop drawings. Modifications required to accommodate as-built conditions, other than minor dimensional changes, shall be submitted for approval.

.2 Construction review by the testing agency or the Departmental Representative does not relieve the Contractor of his responsibility to furnish materials and workmanship in accordance with the Drawings and Specifications.

3.2 EXAMINATION

.3 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for guardrails and ladders installation in accordance with manufacturer's written instructions.

.1 Visually review substrate and provide Departmental Representative documentation of this review.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Departmental Representative.

3.3 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 Touch up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.

.8 Touch up galvanized surfaces with zinc rich primer where burned by field welding or where damaged during transport or installation.

.9 Ensure separation between aluminum and steel using an appropriate bituminous material with a minimum thickness of 1.5 mm to prevent galvanic corrosion.

.10 Ensure the installation of all proprietary materials and systems is performed in accordance with manufacturers specifications and installation procedures.

.11 Do welding in accordance with CSA W59 as follows:

1. Companies engaged in welding shall be certified by the Canadian Welding bureau to CSA Standard W47.1. Companies shall have welding procedures approved and welders qualified for the base material types and thicknesses that are to be welded.

2. For material less than 3.0 mm thick, shop drawings may show nominal weld leg sizes. For such material, the effective throats of welds shall not be less than the thickness of the thinnest connected part.

.12 Touch-up welds with zinc rich paint

3.4 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers

.3 Ensure the cleaning of proprietary materials and systems is performed in accordance with manufacturers specifications and installation procedures.

3.5 TOUCH-UPS

.1 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection using zinc-rich paint for galvanized components to match original finish.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 55 00 – General Instructions

.2 Section 01 47 15 – Sustainable Requirements - Construction

.3 Section 01 61 00 – Common Product Requirements

.4 Section 01 74 19 – Waste Management and Disposal

.5 Section 07 52 00 – Modified Bitumen Membrane Roofing and Waterproofing

.6 Section 07 92 00 – Sealants

1.2 REFERENCES

.1 ASTM International

.1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM D1761-06, Standard Test Methods for Mechanical Fasteners in Wood.

.2 CSA International

.1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

.2 CSA O112.9-10, Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).

.3 CSA O141-05(R2009), Softwood Lumber.

.4 CAN/CSA-Z809-08, Sustainable Forest Management.

.3 Forest Stewardship Council (FSC)

.1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.

.4 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber 2010.

.5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards

.1 SCAQMD Rule 1113-A2011, Architectural Coatings.

.2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

.6 Sustainable Forestry Initiative (SFI)

.1 SFI-2010-2014 Standard.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for wood products and accessories, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Sustainable Design Submittals: Refer to Section 01 47 15.

1.4 QUALITY ASSURANCE

.1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 74 19 – Waste Management and Disposal.

Part 2 Products

2.1 FRAMING STRUCTURAL AND PANEL MATERIALS

.1 Lumber: softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:

.1 CSA O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Glued end-jointed (finger-jointed) lumber is not acceptable.

.3 Framing and board lumber: in accordance with NBC, current edition.

.4 Furring, blocking, nailing strips, grounds, rough bucks and curbs:

.1 Board sizes: "Standard" or better grade, to NLGA

.2 Dimension sizes: "Standard" light framing or better grade, to NLGA

.3 Post and timbers sizes: "Standard" or better grade.

2.2 ACCESSORIES

.1 Sealants: in accordance with Section 07 92 00 - Sealants.

.2 Nails, spikes and staples: to CSA B111.

.1 Use common spiral nails and spiral spikes, except where specified otherwise, for interior work.

.2 Fasteners in contact with borate treated lumber: hot-dipped galvanized finished steel.

.3 Fasteners in contact with ACQ treated lumber: stainless steel.

.3 Bolts: complete with nuts and washers. hot-dipped galvanized finished steel for all fasteners in contact with borate treated lumber or stainless steel for all fasteners in contact with ACQ treated lumber, unless specified otherwise.

.4 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer. Refer to notes on Drawings.

.5 Fastener Finishes:

.1 Galvanizing: to ASTM A123/A123M, use hot dip galvanized fasteners for exterior work, interior highly humid areas, pressure-preservative lumber.

.2 Stainless steel: use stainless steel for pressure treated wood blocking.

.3 Use wood screws into wood substrate.

.4 Use self-drilling, self-tapping screws wood into metal screws into metal substrate.

.6 Wood Preservative:

.1 Preservative Coating: in accordance with manufacturer's recommendations for surface conditions:

.1 Preservative: VOC limit 350 g/L maximum to SCAQMD Rule 1113.

.2 Coatings: VOC limit 350 g/L maximum to SCAQMD Rule 1113.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Visually review substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed Departmental Representative.

3.2 PREPARATION

.1 Treat surfaces of material with wood preservative, before installation.

.2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber.

.3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

.4 Treat material as follows:

.1 Wood curbs on roof deck.

3.3 INSTALLATION

.1 Install members true to line, levels and elevations, square and plumb.

.2 Construct continuous members from pieces of longest practical length.

.3 Install spanning members with "crown-edge" up.

.4 Install furring and blocking as required to space-out and support casework, roof finishes, facings, electrical equipment mounting boards, and other work as required.

.5 Install nailers, curbs and other wood supports as required and secure using galvanized fasteners.

.6 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.7 Countersink bolts where necessary to provide clearance for other work.

3.4 CLEANING

.1 Refer to Section 01 74 11 – Cleaning.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by rough carpentry installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 50 00 – Metal Fabrications

.2 Section 06 10 00 – Rough Carpentry

.3 Section 07 62 00 – Metal Flashing and Trim

.4 Section 07 92 00 – Sealants

1.2 REFERENCES

.1 ASTM International Inc.

.1 ASTM C1396/C1396M, Standard Specification for Gypsum Board

.2 ASTM D5147-02, Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material

.3 ASTM D6162-00a, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.

.4 ASTM D6163-00e1, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 37-GP-56M-, Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing

.3 Underwriters' Laboratories of Canada

.1 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.2 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.3 CAN/ULC-S704-11, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced.

.4 Roofing Contractors Association of BC (RCABC)

.1 Roofing Practices Manual.

.5 Canadian Standards Association (CSA International)

.1 CSA A123.21-14, Standard Test Method for the Dynamic Wind Uplift Resistance of Membrane-Roofing Systems

.2 CSA O121-08, Douglas Fir Plywood.

.3 CAN/CSA-A247-M86, Insulating Fireboard

.6 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.7 National Building Code of Canada, current edition.

1.3 SUBMITTALS

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

.2 Product Data:

.1 Provide two copies of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Provide two copies of WHMIS MSDS in accordance with Section 01 35 33 - Health and Safety Requirements.

.3 Provide shop drawings:

.1 Indicate flashing details.

.2 Provide layout for tapered insulation and crickets, indicating roof perimeters, penetrations, curbs, slopes, ridges, valleys, low points, sumps and roof drain locations. Identify conflicts between insulation heights and existing installed features.

.4 Samples: submit two (2) sample 304.8 mm long pieces of granulated cap sheet.

.5 Mock-up:

.1 Assemble mock-up of roof system in location acceptable to Departmental Representative showing typical details and all roofing components for review by Departmental Representative.

.2 Do not commence roof installation until Departmental Representative has reviewed and approved the mock-up.

.3 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work.

.6 Manufacturer's Certificate: certify that products meet or exceed specified requirements.

.7 Test and Evaluation Reports: submit laboratory test reports certifying compliance of membranes with specification requirements.

.8 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.

.9 Manufacturer's field report: in accordance with Section 01 45 00 - Quality Control.

.10 Maintenance Data: Submit data covering the care, cleaning and maintenance as per Section 01 78 23 Maintenance and Renewal Manual.

1.4 QUALITY ASSURANCE

.1 Installer qualifications: company or person specializing in application of modified bituminous roofing systems with 5 years documented experience.

.2 Installation of membranes is to be in accordance with manufacturer's written instructions and following RCABC Manual.

.3 Sustainability Standards Certification:

.1 Refer to Section 01 47 15 – Sustainable Requirements – Construction.

1.5 FIRE PROTECTION

.1 Fire Extinguishers:

- .1 Maintain one stored pressure rechargeable type with hose and shut-off nozzle,
- .2 ULC labelled for A, B and C class protection.
- .3 Size 9 kg on roof per torch applicator, within 6 m of torch applicator.

.2 Strictly adhere to all safety guidelines for the torching of modified bituminous membrane.

.3 Maintain fire watch for 2 hours after each day's roofing operations cease.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.

.2 Storage and Handling Requirements:

- .1 Store membrane rolls with selvage edge up.
- .2 Remove only in quantities required for same day use.
- .3 Place plywood runways over completed Work to enable movement of material and other traffic.

1.7 PRECAUTIONS

.1 Ambient Conditions

- .1 Roofing application shall not be carried out when materials are damp, or when ambient temperatures are less than –10°C. Postpone roofing work when inclement weather appears imminent. Minimum temperature for solvent-based adhesive is 10°C. Strictly follow manufacturer's instruction where temperature is less than 10°C.
- .2 Should it become necessary to carry out roofing application below 10°C, consult with the material manufacturer and follow their recommendations.

.2 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

.3 All adjacent parts of the building shall be protected from damage caused by roofing operations. Cover walls and other surfaces in the vicinity of hoisting apparatus with heavy canvas or other suitable protective material. Any damage caused under this contract shall be repaired to match the original materials and appearance.

.4 Conduct operations so as to leave deck exposed for minimum period of time. Protect, as required, to prevent water infiltration or environmental damage to building interior.

.5 Where work must continue over finished roofing membrane, protect surface with minimum 12.5 mm thick plywood sheets. Provide plywood runways where required to protect roofing assembly.

.6 Any sharp projections, that in the opinion of the Departmental Representative may penetrate the membrane, shall be grounded smooth and flush.

1.8 STANDARDS

.1 In the event that the drawings and specifications differ from the manufacturer's printed instruction, to such a degree that the specified warranties may be affected, consult the Departmental Representatives for their written instructions.

1.9 WARRANTY

.1 Roofing System Installer Warranty

.1 The roof system installer must warrant for a period of five (5) years from the date of Substantial Completion, secured by bond for the first two (2) years. The roof system, as installed, is free from defects in installation workmanship, to include the roof membranes, flashing, insulation, accessories, adhesives, attachments, and sheet metal installation integral to a complete watertight roof system assembly.

.2 Provide a written warranty directly to the Departmental Representatives issued on the corporate letterhead, signed and sealed by an authorized signing officer for roof system material and workmanship meeting the following requirements.

.3 Make all necessary repairs and replacements, within 48 hours of receipt of written notification, of all defective workmanship and replacement of damaged or affected materials are the responsibility of the roof system installer. All costs associated with the repair or replacement work are the responsibility of the installer.

.4 Defects include but are not limited to: : ponding (maximum 2 square meters, maximum 10 mm deep), open seams, lap edges, fishmouths at laps, blisters, splits, delamination, granule loss, excessive weathering due to defective materials or installation workmanship, unbonded areas of the membrane and areas where overheating has resulted in distortion to the reinforcing. Contractor to verify that slope package provides adequate slope before covering with cap sheet.

.5 Nothing contained in this article shall be construed as in any way restricting or limiting the liability in common law and statutory liability of the Contractor.

.2 Roof Membrane Manufactures Warranty

.1 Obtain from the membrane manufacturer for and on behalf of the Departmental Representatives a written material warranty stating that the roofing membrane, membrane flashings and adhesives shall: be free of manufacturing defects, not prematurely deteriorate, not debond, degranulate and will not leak for a ten (10) year warranty period. Separate Price Items for extended fifteen (15) and twenty (20) year warranty periods covering material, installation and workmanship.

.2 Warranty shall be issued in the joint names of the Departmental Representatives and Contractor. Contractor to confirm names prior to issuance of warranty.

.3 RCABC Members please provide an RCABC Guarantee Request (Separate Price Item):

.1 Quality Assurance

.1 Workmanship Standards:

.1 Conform to latest Guarantee Standards of Roofing Contractors Association of British Columbia (RCABC) as published in the "RGC Roofing Practices Manual", unless modified by contract documents to exceed those minimums.

.2 Independent Roof Review:

.1 RGC Roof Reviews to be performed by design authority.
.2 Perform as required by RCABC under the ten (10) year Guarantee Program.

.3 Inspection costs are to be included in the Contract price.

.2 Guarantee (If Applicable):

.1 Provide the standard Roofing Contractors Association of British Columbia (RCABC) ten (10) year Guarantee.

Part 2 Products

2.1 PERFORMANCE CRITERIA

.1 Compatibility between components of roofing system is essential. Provide written declaration to Departmental Representatives stating that materials and components, as assembled in system, meet this requirement.

.2 The roofing system shall be installed to resist wind uplift values in accordance with the National Building Code of Canada, current edition, and shall meet the requirements of CSA A123.21 for wind uplift resistance, or as per RCABC minimum standards, whichever are more stringent:

.3 Shall resist the wind uplift loads as defined by the Part 4 of the National Building Code 2010.

2.2 GYPSUM SHEATHING

.1 Exterior Gypsum Board Sheathing: minimum 12.7 mm thick; 1200 mm x 2400 mm sheets; type X core; conform to ASTM C1396/ C 1396M (note that flame spread rating shall be determined according to CAN/ULC-S102).

2.3 DECK PRIMER

.1 Asphalt primer: to CGSB 37-GP-9Ma.

.2 Primers as recommended by membrane manufacturer for vapour retarder membrane.

2.4 VAPOUR RETARDER

.1 Self adhesive air/vapour barrier, SBS modified bitumen membrane, laminated to polyethylene facer, with silicone release film, minimum 0.8mm thickness.

.2 Air leakage through air vapour barrier system within roof area: not to exceed 0.15 l/s*m2 @ 75 Pa.

2.5 FACTORY TAPERED INSULATION AND CRICKETS

.1 Type 3, rigid, closed cell, expanded bead type Expanded Polystyrene insulation CAN/ULC-S701, thickness and slopes as indicated, square edges.

.1 Modules shall be factory cut to correct slopes and clearly marked to match shop drawings.

.2 All valley corners shall be factory mitered.

.3 Supply factory tapers at all transitions. Leave no steps in insulation due to stepped ends of tapered insulation.

.4 Insulation shall be distinct separate layer with joints staggered from the polyisocyanurate insulation above.

.5 Crickets and back slopes shall have a minimum of 2% slope to drain.

.6 Slope to zero insulation to be used at all slope transitions. Rigid mineral wool insulation to be used at drain sumps to CAN/ULC-S107.

2.6 INSULATION

.1 Polyisocyanurate insulation CAN/ULC-S704-11, insulation thickness to be 89mm or as outlined on drawings, Type 2, Class 3 manufactured using HCFC-free blowing agents and integrally laminated to heavy, non-asphaltic, fiber reinforced, non-organic glass fibre facers. Maximum panel dimension shall be 1219mm. Install in two layers minimum, with joints staggered 300mm between layers.

2.7 OVERLAY BOARD

.1 Overlay Board: 4.8 mm thick asphalt based recovery board consisting of asphalt core, between asphalt saturated, non-woven fibreglass facers to CAN/CSA-A247-M, as recommended by the membrane manufacturer.

.1 Install two layers of specified overlay board over insulation to provide torch safe surface or one layer with joint covered with fire tape as specified by manufacturer.

2.8 MEMBRANES

.1 Base sheet: to CGSB 37-GP-56M, polyester and glass fibres to ASTM D6162.

.1 Styrene-Butadiene-Styrene (SBS) elastomeric polymer, prefabricated sheet, fibreglass or composite reinforcement.

.2 Type 2, torch applied.

.3 Class C - plain surfaced.

.4 Grade 2 - heavy duty service.

.5 Top and bottom surfaces:

.1 Thermofusible film.

.6 Base sheet membrane properties: to ASTM D5147.

.1 Minimum thickness: 2.5 mm

.2 longitudinal/transversal): 50-65 %.

.3 Tear resistance (longitudinal/transversal): 125 N min.

.4 Cold bending at -26 degrees C: no cracking.

.5 Softening point: ≥ 110 degrees C.

.6 Dimensional Stability (longitudinal/transversal): 0.2 % max

.2 Cap sheet membrane: to CGSB 37-GP-56M, combination of polyester and glass fibres.

.1 Styrene-Butadiene-Styrene(SBS) elastomeric polymer, prefabricated sheet, composite reinforcement.

.2 Type 1, torch applied.

.3 Class A-granule surfaced.

.1 Colour for granular surface: to be selected by Departmental Representative from manufacturer's range of standard colours.

.4 Grade 2 - heavy duty service.

.5 Bottom surface: thermofusible film.

.6 Cap sheet membrane properties: to ASTM D5147.

.1 Minimum thickness: 4.0 mm.

.2 Tensile Strength: 11.4 kN/m min.

.3 Ultimate elongation (longitudinal/transversal): 60-65 %.

.4 Cold bending at -30 degrees C: No cracking.

.5 Static puncture resistance: > 245 N

.6 Dimensional Stability: -0.5/0.5 % max.

2.9 WALKWAYS AND PERIMETER WARNING STRIP

.1 Walkways to consist of one additional ply of cap sheet membrane. Colour to be different from field membrane as selected by Departmental Representative from manufacturer's standard colour range.

.2 Perimeter Warning Strip to consist of one additional ply of cap sheet membrane. Colour to be red.

2.10 ROOF DRAINS

.1 Roof drains: epoxy coated, cast iron roof drain, with deep sump, membrane clamping ring, and self-locking, vandal-proof aluminum dome strainer.

.1 Roof drains to be of same diameter as existing.

2.11 REINFORCED PMMA FLASHING

.1 Polymethyl methacrylate (PMMA) based liquid membrane flashing system complete with non-woven, needle punched, polyester fleece reinforcing fabric.

.1 Flashing resins and reinforcing fleece shall be made by the same manufacturer and shall be compatible with each other.

.2 Contractor to ensure PMMA flashing system is compatible with the membranes onto which they are applied, as well as all other adjacent products.

2.12 PENETRATION FLASHINGS

.1 Vent Stack Flashings: spun aluminum sleeve to fit over the vent stack with sufficient space to insulate, spun aluminum cap to fit outside the sleeve and inside the vent stack.

.1 The cap is not to restrict the vent stack inside diameter.

2.13 ACCESSORIES

.1 Drainage Mat: a composite drainage system consisting of a three-dimensional, crush resistant, drainage core and filter fabric.

.2 Roof perimeter gutter: Refer to Section 07 62 00 – Sheet Metal Flashing and Trim.

.3 Wood blocking: refer to Section 06 10 00 – Rough Carpentry.

2.14 SEALERS

.1 Plastic cement: asphalt.

.2 Sealing compound: rubber asphalt type.

.3 Sealants: see Section 07 92 00 - Sealants.

2.15 FASTENERS

.1 Sheathing: meet CSA A123.21 standard for wind uplift and corrosion resistance.

Part 3 Execution

3.1 QUALITY OF WORK

.1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and RCABC Roofing Practices Manual, particularly for fire safety precautions, and to CSA A123.21 standards.

.2 Do priming in accordance with manufacturers written recommendations.

.3 The interface of the walls and roof assemblies will be fitted with durable rigid material sheet metal providing connection point for continuity of air barrier.

.4 Assembly, component and material connections will be made in consideration of appropriate design loads, with reversible mechanical attachments.

.5 Patching of the cap sheet membrane shall be carried out utilizing patches with a minimum size of roll width by 1000 mm.

.6 Minimum length of cap sheet on flat run of roof shall not be less than 3000 mm.

.7 Wrinkled or deformed ends of cap sheet rolls will not be tolerated and therefore must be discarded prior to application.

.8 Following completion of new roofing, torch soften and apply a liberal application of approved bulk type mineral granules to cap sheet membrane edges where asphalt has extruded or flowed beyond clean lines and to all surface damage.

.9 Splices in delivered rolls of membrane are to be removed. Cut back the roll 450 mm on both sides of the splices and remove prior to installation.

3.2 EXAMINATION OF ROOF DECKS

.1 Verification of Conditions:

.1 Review deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets with Departmental Representative to determine readiness to proceed.

.2 Evaluation and Assessment:

.1 Prior to beginning of work ensure:

.1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.

.2 Curbs have been built.

.3 Roof drains have been installed at proper elevations relative to finished roof surface.

.4 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.

.3 Do not install roofing materials during rain or snowfall.

3.3 PROTECTION OF IN-PLACE CONDITIONS

.1 Cover walls and adjacent work where materials hoisted or used.

.2 Use warning signs and barriers. Maintain in good order until completion of Work.

.3 Clean off drips and smears of bituminous material immediately.

.4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.

.5 Protect roof from traffic and damage. Comply with precautions deemed necessary by Departmental Representative.

.6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.

.7 Metal connectors and decking will be treated with rust proofing or galvanization.

3.4 GYPSUM SHEATHING

.1 Install gypsum sheathing over steel deck as indicated on the drawings and details.

.2 Install gypsum sheathing boards with long sides at right angles to flutes of deck.

.3 Terminate ends of boards on top of the flutes.

.4 Use maximum lengths possible to minimize number of joints. Terminate ends of boards on top of the flutes. Trim as required.

.5 Mechanically fasten each board to the steel deck. Number of fasteners shall meet local wind loading requirements.

3.5 PRIMING DECK

.1 Apply deck primer to wood deck roofing substrate at the rate recommended by manufacturer.

3.6 VAPOUR RETARDER

.1 For self-adhering vapour retarder:

.1 Prime deck as recommended by manufacturer.
.2 Install under new wood blocking as detailed on Drawings.

.3 Install membrane with minimum 75mm side laps and 150mm end laps.
.4 Apply pressure to membrane surface to ensure adequate adhesion. Avoid fish mouths, buckles, or any other application defect. Stagger end laps by a minimum of 300mm.
.5 Roll membrane per manufacturer's requirements.
.6 Overhang vapour retarder at all edges and extend up verticals 400mm minimum or as detailed. Wrap over ends of insulation boards at roof perimeter and penetrations.
.7 Ensure that vapour retarder at roof edges and vertical building surfaces maintains, together with wall vapour retarder, integrity of vapour retarder system for the building.

.2 Maintain integrity of building envelope using air barriers and vapour retarders and avoid thermal bridging to provide thermal comfort and prevent condensation.

3.7 INSULATION SYSTEM

.1 For fully adhered, cold-adhesive attachment:

.1 Install insulation to meet thickness and R-Value as required in scope of work and indicated on the drawings.
.2 In sump area around drain reduce base insulation by 25 mm. Slope to zero insulation boards as detailed.
.3 Stagger all joints in the boards and adhere using adhesive.
.4 Install sloped insulation in areas indicated on the drawings, and adhere with adhesive. Ensure modules are placed in parallel rows, in a pre-designed order and as indicated on the shop drawings.
.5 Install insulation adhesive in minimum 19 mm (3/4") continuous bead. For adhesive application patterns, edge zone width shall be taken as 2400 mm (8'). Offset adhesive bead as follows:

	Field	**Edge**	**Corner**
Adhesive Bead Offset (mm):	300	150	100

.6 Following adhesive instructions as outlined by manufacturer or RCABC, whichever is more stringent.

.7 Ensure that insulation fillers are completely adhered in place as specified.

.8 Cap all insulation as detailed with an insulation overlay board, set into compatible adhesive.

.9 All systems to have additional adhesive at slope transitions such as valleys, sumps, slope to flat, etc., to prevent movement of membrane, overlay board and insulation.

3.8 INSULATION OVERLAY BOARD

.1 Install one layer of overlay board and install tape at all joints. Adhere the overlay board, offsetting the joints from those of the adjacent boards and layers below.

.2 Stagger overlay board joints by a 1/2 sheet with adjacent sheets on each side.

.3 Lay overlay board with joints offset minimum 300 mm from underlying layer.

.4 Install overlay board adhesive in minimum 19 mm continuous bead. For adhesive application patterns, edge zone width shall be taken as 2400 mm. Offset adhesive bead as follows:

	Field	**Edge**	**Corner**
Adhesive Bead Offset (mm):	300	150	100

3.9 MEMBRANE APPLICATION

.1 Base sheet application (Torch-applied):

.1 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and reroll from both ends.

.2 Ensure base sheet is unrolled to enable membrane to relax prior to installation. Time required for relaxation will vary with weather conditions.

.3 Unroll and torch base sheet onto substrate taking care not to burn membrane or its reinforcement or substrate.

.4 Lap sheets 75 mm minimum for side and 150 mm minimum for end laps.

.5 At all head laps where "T" joints occur, cut corner of membrane to be overlapped, on a 45 degree angle.

.6 Reinforce around projections and drains using additional ply of base sheet as per manufacturer's instructions.

.7 Application to be free of blisters, wrinkles and fishmouths.

.8 Seal all joints and adhered all laps as recommended by manufacturer.

.2 Cap sheet application (Torch-applied):

.1 Plan membrane application so that laps are not superimposed over laps of the base sheet. Mark a chalk line where the first course is to start. Unroll 2.0 m to 3.0 m of the membrane and line it up to the chalk line or to selvage edge. Reroll

and commence application. If the roll goes out of line by more than 12 mm, cut and realign.

.2 With a torch, adhere one-ply of the membrane, granule side up. Carefully heat underside of membrane and slowly unroll. Constantly check adhesion to ensure proper bonding is achieved. Take care not to burn membrane or its reinforcement.

.3 Side laps shall cover the selvage edge and be a minimum of 75 mm. End laps must be 150 mm.

.4 Using a torch and round nosed roofing trowel, embed surface granules into heated and soft bitumen, from the chalk line to the edge of the cap sheet at the top of the horizontal surface (a minimum distance of 200 mm from the edge of the cap sheet).

.5 Application to be free of blisters, fishmouths and wrinkles.

.6 Do membrane application in accordance with manufacturer's recommendations.

.3 Membrane Flashings:

.1 Complete installation of flashing base sheet stripping prior to installing membrane cap sheet.

.2 Plan two-ply membrane stripping application so that laps are not superimposed over the laps on the underlying membrane.

.3 Install membrane stripping with full roll widths perpendicular to the deck.

.4 Install reinforcing gussets at all inside and outside corners as per the manufacturer's recommendations.

.5 Install base sheet stripping prior to horizontal cap sheet application. Extend base sheet membrane stripping 150 mm onto horizontal surface and seal by torch weld. Extend base sheet flashing up verticals as indicated on the detail drawings. Set base sheet membrane by adhering for material specified previously.

.6 Install cap sheet stripping after application of horizontal cap sheet. Using a chalk line, lay out a straight line on the cap sheet surface. Set line parallel to the roof edge and 250 mm from the base of the wall.

.7 Extend cap sheet membrane stripping 250 mm onto horizontal surface and seal by torch weld. Extend cap sheet stripping up verticals as indicated on the detail drawings.

.8 Where membrane stripping will overlap onto a granulated membrane surface, first prepare selvage edge of the underlying granulated membrane by embedding the granules.

.9 Use a roller to press the membrane stripping for full and continuous contact to the substrate. Ensure air bubbles are removed and ensure wrinkles and fishmouths are not present.

.10 At all head laps, where "T" joints occur, cut corner of membrane to be overlapped, on a 45 degree angle. Apply manufacturer approved mastic seal to cover granule portion at overlap areas and to fill the step where the membrane "T" overlaps.

.11 Secure all membrane strippings to verticals with continuous securement strips installed along the top edge of membrane strippings and fastened at 225 mm o.c. or as detailed. Lap all strips to the selvage a minimum of 75 mm and seal the laps securely.

.12 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.

.13 Do work in accordance with manufacturer's recommendations and Section 07 62 00 - Sheet Metal Flashing and Trim.

.4 Membrane walkways and perimeter warning zone:

.1 Install walkway membranes in accordance with manufacturer's instructions, and as indicated.

.2 Apply primer to cap sheet membrane and torch apply, ensuring selvage edge is removed.

.3 Walkways and perimeter warning zone shall be a distinct, additional third ply of membrane, and shall not be incorporated into the 2-ply membrane system.

.4 Plan membrane application prior to application of membrane. Mark a chalk line where the first course is to start. Unroll 2.0 m to 3.0 m of the membrane and line it up to the chalk line. Reroll and commence application. If the roll goes out of line by more than 12 mm, cut and realign.

.5 Width of walkways and perimeter warning strip to be as indicated on drawings.

.6 Provide 150mm breaks in walkways where walkway crosses perpendicular to slope, so as not to impede drainage.

.7 Take care to minimize bitumen bleed out at edges of walkways and warning strip. Cast appropriate colour granules in areas with excessive bleed out.

.8 Ensure all corners and edges of walkways and warning strips are well adhered to the substrate. Heat weld corners and edges of walkways and warning strips as necessary to achieve good adhesion.

3.10 STACK VENT PENETRATIONS

.1 Install spun aluminum vent stack covers at all existing vent pipes. Extend existing vent pipes as required to a minimum height of 200 mm above the completed membrane surface. Provide sufficient allowance for pipe expansion or contraction.

.2 Prime aluminum flange, centre over existing vent stack and set into heated base sheet membrane. Flash with one-ply of base sheet membrane for reinforcement, to extend a minimum of 200 mm beyond flange. Complete installation with the application of the cap sheet membrane.

.3 Seal as detailed.

.4 Secure caps with self-tapping screws into steel deck or wood strews into wood decks.

3.11 REINFORCED PMMA FLASHING

.1 Preparation of substrates to be in strict accordance with the requirements of the system manufacturer's recommendations and these Contract Documents, whichever is more stringent.

.2 Surfaces shall be cleaned of all grease and oil with an emulsifier or degreaser where necessary, to ensure that surface contaminants have been removed.

.3 The coating shall be turned up all vertical surfaces as detailed. Mask top of upturn to ensure neat straight finish to coating.

.4 Pre-cut fleece to ensure a proper fit at transitions and corners prior to base coat application. Embed fleece reinforcement into base coat with minimum overlap of 50mm. Apply additional lift of base coat between layers of fleece reinforcement.

.5 Finished surfaces shall be of uniform appearance, with minimal variations in surface roughness.

3.12 ROOF DRAINS

.1 Set to permit proper drainage and not retard water flow after completion of roof membrane flashings plies.

.2 Install base sheet, a reinforcing ply of base sheet flashing material to extend 250 mm beyond drain limits and then complete the operation with the cap sheet application over the first two (2) plies.

.3 Trim roofing membrane and set clamping ring.

.4 New roof drains to be installed with mechanical compression seal joints to existing plumbing. U-flow seals may be used as temporary drain connectors only, and shall not remain in place for more than five (5) business days.

3.13 DRAINAGE MAT

.1 Install under all horizontal flashings.

.2 Install drainage course on horizontal and vertical surfaces in accordance with the manufacturer's recommendations.

.3 Layout and position drainage course and allow to lay flat. Cut and fit drainage course to perimeter and penetrations.

3.14 COMPLETION OF DAY'S WORK

.1 Install water cut-offs at the end of each day's work; Construct water cut-off as a permanent insulation cell wall. Note location of each insulation cell on record drawings. Where a day's work is more than 200m^2, construct additional cell walls in order to keep insulation cells to 200 m^2 maximum.

.2 Construct cell dividers using self-adhered or cold applied adhesive base sheet or vapour barrier materials.

.3 Inspect all laps of the membrane application to ensure they are properly bonded. Repair any deficiencies prior to leaving the site for the day.

.4 Base sheet applications should not be left exposed overnight unless all seams are sealed prior to leaving the work site.

.5 Provide a two (2) hour fire watch at the end of each day when torching membrane. Walk the day's entire production area to check for smoke and hot spots.

.6 Remove progressively from the site all debris created by the execution of Work and dispose of same at certified disposal location. Contractor may be asked to produce proof of disposal location.

3.15 FIELD QUALITY CONTROL

.1 Field Review:

.1 Field review and testing of roofing application will be carried out by independent inspectors approved by the RCABC and the Departmental Representative.

.2 The Departmental Representative reserves the right to have cut tests made to establish quality of work. Such tests shall be made in the presence of the Contractor. Cost of tests and subsequent repairs shall be borne by the Contractor.

3.16 CLEANING

.1 Remove bituminous markings from finished surfaces.

.2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.

.3 Repair or replace defaced or disfigured finishes caused by work of this section.

.4 Refer to Section 01 74 11 – Cleaning.

.5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 – Rough Carpentry

.2 Section 07 52 00 – Modified Bituminous Membrane Roofing

.3 Section 07 92 00 – Sealants

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM A653/A653M-07, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM B370-03, Standard Specification for Copper Sheet and Strip for Building Construction.

.2 Roofing Contractors Association of BC (RCABC)

.1 Roofing Practices Manual.

.3 Canadian Standards Association (CSA International)

.1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.5 Architectural Sheet metal Manual, Sheet metal and Air Conditioning Contractors National Association, Inc (SMACNA).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, finishes and colours.

.4 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.

.1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling, in accordance with Section 01 74 19 - Construction Waste Management Plan.

1.5 MOCK-UP

.1 Construct mock-up in accordance with Section 01 45 00 – Quality Control.

.2 Assemble a mock-up of each condition (i.e., cap, saddle, counter-flashings, etc.) on the project site for review and acceptance by the Departmental Representative. Mock-up shall include all components of the system, including typical joints and connection hardware, and typical tie-ins to adjoining systems, all finished as specified.

.3 Modify the mock-ups at no additional cost to the contract as may be required to meet design and performance requirements.

.4 Mock-up may be part of finished work upon acceptance by the Departmental Representative.

Part 2 Products

2.1 SHEET METAL MATERIALS

.1 Sheet copper to ASTM B370, cold rolled temper, weighing not less than 13.4 kg/sq m unless otherwise specified herein.

.2 G90 galvanized steel sheet: 0.6070 mm (24 gauge) thickness, commercial quality to ASTM A653/A653M, with Z275 designation zinc coating.

2.2 PREFINISHED STEEL SHEET

.1 Prefinished steel with factory applied silicone modified polyester.

.1 Class F1S.

.2 Colour and gloss: to be selected by Departmental Representative from standard options available.

.3 Coating thickness: not less than 25 micrometres.

.4 Resistance to accelerated weathering for chalk rating of 8, colour fade 7 units or less to ASTM D822 as follows:

.1 Outdoor exposure period 1000 hours.

.2 Humidity resistance exposure period 1000 hours.

2.3 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Plastic cement: to CAN/CGSB 37.5.

.3 Underlay for metal flashing:

.1 Membrane: 2-ply modified bitumen roofing, or self-adhered, high temperature membrane as recommended by manufacturer with compatible primers and sealants as required or as outlined on the project drawings.

.2 Drainage mat as outlined in the drawings. Refer to Section 07 52 00 for material.

.4 Sealants: refer to Section 07 92 00 – Sealants.

.5 Cleats and starter strips: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.

.6 Fasteners: of same material as sheet metal, to CSA B111, flat head roofing nails of length and thickness suitable for metal flashing and trim application.

.7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

.8 Touch-up paint: as recommended by prefinished material manufacturer.

2.4 FABRICATION

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable RCABC and SMACNA details.

.2 Form flashings, copings and fascias to profiles indicated and as required to complement and finish the membrane installation, with pre-finished sheet steel flashings.

.3 Form pieces in 2400 mm maximum, 1000 mm minimum lengths, using one (1) piece for each flashing section. Make allowance for expansion at joints.

.4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.5 Metal flashing shall be formed on a bending brake with shaping trimmed.

.6 Hand seaming shall be done on a bench, as far as practicable, with proper sheet metal working tools. Angles of bends and folds for interlocking metal shall be made with full regard to expansion and contraction to avoid buckling and damage to metal.

2.5 COUNTER FLASHINGS

.1 Form metal counter flashings from pre-finished sheet steel in accordance with RCABC details.

.2 Counter flashing shall have crimped bottom edge, stiffening break and shall extend up verticals as detailed and extend down to minimum 19 mm above the horizontal plane of the roof surface.

2.6 CAP FLASHINGS

.1 Form metal cap flashings from pre-finished sheet steel in accordance with RCABC details.

.2 Form cap flashings to profiles as shown on the detail drawings and ensure positive drainage to the interior (roof surface) areas. 10% slope for s-lock and 5% slope for standing seam.

2.7 SCUPPERS

.1 Form scuppers from copper sheet metal.

.2 Sizes and profiles as indicated.

2.8 GUTTER

.1 Roof perimeter gutter (Roof Areas C, D and F): galvanized and painted to match, 22 gauge box gutter to match existing size.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install sheet metal work in accordance with applicable RCABC specifications.

.2 Use concealed fastenings throughout, except where approved by the Departmental Representative prior to start of the work.

.3 Provide underlay beneath sheet metal flashings as detailed.

.4 Mechanically fasten flashings in place with continuous cleats.

.5 Use flat-lock folded seams for all joints and splices of thru-cavity flashings. Contractor may use S-lock joints if all surfaces of flashings are sloped greater than 3:1.

.6 Use standing seams for all corner joints and splices for cap flashings. Flat-lock or S-pocket joints to be used where cap flashings are accessible to occupants.

.7 Hem exposed edges on underside 12 mm. Mitre and seal corners with sealant.

.8 Ends of thru-cavity flashing to have 1/2" folded upturn, creating an end dam. Cutting and caulking of upturns will not be accepted.

.9 Insert metal counter flashing under cap flashing, to form weather tight junction.

3.3 METAL FLASHINGS

.1 Secure metal flashing with continuous cleats fastened at 300 mm o/c. Use fasteners of sufficient length to penetrate at least 25 mm into substrate.

3.4 COUNTER FLASHINGS

.1 Install metal counter flashings as soon as possible after membrane flashings are in place and reviewed by the Departmental Representative.

.2 Secure sections in S-pocket joints and allow sufficient tolerance for expansion and contraction between each piece.

.3 Secure metal counter flashing a minimum of 300mm above roof membrane or as detailed. Use fasteners of sufficient length to penetrate at least 25mm into substrate.

3.5 CAP FLASHINGS

.1 Supply and install continuous metal cleats, secure at 300 mm o.c., maximum of 50mm above drip edge, with fastener of sufficient length to penetrate a minimum of 25mm into the substrate.

3.6 SCUPPERS

.1 Install scuppers in accordance with applicable RCABC specifications.

.2 Provide necessary fastenings.

3.7 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Leave work areas clean, free from grease, finger marks and stains.

.4 Remove and replace all dented and damaged materials

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 – Rough Carpentry

.2 Section 07 52 00 – Modified Bituminous Membrane Roofing

.3 Section 07 62 00 – Metal Flashing and Trim

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Manufacturer's product to describe:

.1 Sealant compound.

.2 Primers.

.3 Submit one copy of WHMIS MSDS in accordance with Section 01 35 33 - Health and Safety Requirements.

.3 Samples:

.1 Submit one sample of each type of material and colour for selection by the Departmental Representative.

.2 Cured samples of exposed sealants for each colour where required to match adjacent material.

.4 Manufacturer's Instructions:

.1 Submit instructions to include installation instructions for each product used.

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

1.6 SITE CONDITIONS

.1 Ambient Conditions:

.1 Proceed with installation of joint sealants only when:

.1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 5 degrees C. Should it become necessary to apply sealants below 5 degrees C, consult with the sealant manufacturer and follow their recommendations.

.2 Joint substrates are dry.

.3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.2 Joint-Substrate Conditions:

.1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

Part 2 Products

2.1 SEALANT MATERIALS

.1 Do not use sealant that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity sealants are not possible, confine usage to areas which off gas to exterior, or are contained behind air barriers.

.3 Where sealants are qualified with primers use only these primers.

.4 Vent/Weeping tubes: non-metallic, 6mm inside diameter minimum.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Silicones and polyurethane one part: to CAN/CGSB-19.13.

.2 Preformed compressible and non-compressible back-up materials:

.1 Polyethylene, urethane, neoprene or vinyl foam:

.1 Extruded closed cell foam backer rod.

.2 Size: oversize 30 to 50 %.

.2 Bond breaker materials:

.1 Polyethylene bond breaker tape which will not bond to sealant.

.2 Silicone sealant as bond break where polyurethane sealant is to be used.

2.3 SEALANT SELECTION

.1 Apply one part silicone or polyurethane sealant to the following exterior locations:

.1 Metal flashing joints and flashing-to facade joints

.2 Penetration flashings and storm collars

.3 Precast Concrete Panel Joints.

.4 At junctions of dissimilar material

2.4 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.

.2 Primer: in accordance with sealant manufacturer's written recommendations.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for joint sealants installation in accordance with manufacturer's written instructions.

.1 Visually review substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 SURFACE PREPARATION

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

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 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.

.4 Ensure environmental and site conditions, as recommended by the manufacturer, are suitable for installation of work of this section. .

.5 Ensure joint surfaces are dry and frost free.

.6 Prepare surfaces in accordance with manufacturer's directions.

.7 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.8 Apply bond breaker where required to manufacturer's instructions.

3.3 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.

3.4 BACKUP MATERIAL

.1 Apply bond breaker where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 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 Apply sealant in continuous beads.

.4 Apply sealant using gun with proper size nozzle.

.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 Tool exposed surfaces before skinning begins to give slightly concave shape.

.8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing:

.1 Cure sealants in accordance with sealant manufacturer's instructions. Sealed joints shall be protected by the Contractor until sealant has sufficiently cured.

.2 Do not cover up sealants until proper curing has taken place.

3.6 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Clean adjacent surfaces immediately.

.3 Remove excess and droppings, using recommended cleaners as work progresses.

.4 Remove masking tape after initial set of sealant.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by joint sealants installation.

END OF SECTION

Part 1 General

1.1 SUMMARY OF WORK

.1 Supply and installation of permanent engineered fall protection anchors as shown on the drawings and as specified in these Documents. Work includes but is not limited to:

- .1 Materials and labour to install permanent fall protection anchors
- .2 All associated structural framing and reinforcement.
- .3 Retrofit repairs to roofing system to provide watertight tie-in to existing.
- .4 Load testing of permanent anchors following installation and/or retrofit repairs in accordance with Section 11 24 32 – Anchorage Testing and as directed by the Departmental Representative.

1.2 RELATED SECTIONS

.1 Section 11 24 32: Fall Protection Anchor Testing
.2 Section 11 24 31: Flexible Anchorages

1.3 REFERENCES

.1 Canadian Standards Association (CSA)

- .1 CSA G40.20/G40.21-04, General Requirement for Rolled or Welded Structural Quality Steel
- .2 CSA W47.1-1983, Certification of Companies for Welding of Steel Structures.
- .3 CSA W59-03, Welded Steel Construction - Metal ARC Welding.
- .4 CSA G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .5 CAN/CSA Z271-10: Safety Code for Suspended Elevating Platforms
- .6 CSA Fall Arrest Systems – Practical Essentials
- .7 CSA/CAN Z259.15-12: Anchorage Connectors
- .8 CSA Z259.16-04: Design of Active Fall Protection Systems
- .9 CSA Z259.2.1-98: Fall Arresters, VLL, and Rails
- .10 CSA Z259.2.2-98: Self-Retracting Devices for Personal Fall Arrest Systems
- .11 CSA Z259.11-05: Energy Absorbers and Lanyards
- .12 CSA Z259.12-01: Connecting Components for Personal Fall Arrest Systems (PFAS)
- .13 CAN/CSA Z91-02 Health and Safety Code for Suspended Equipment Operations

.2 American Society for Testing and Materials International (ASTM)

- .1 ASTM A167-99, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 ASTM A500-03, Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

1.4 REGULATORY REQUIREMENTS

.1 Conform to British Columbia Occupational Health and Safety regulations, Part 11 Fall Protection, published by WorkSafe BC.

.2 Conform with the National Building Code, current edition, and requirements of CAN/CSA Z91 (Safety Code for Suspended Equipment Operations), CAN/CSA Z271-10 (Safety Code for Suspended Elevating Platforms), & CAN/CSA Z259.16 (Design of Active Fall-Protection Systems)

1.5 DESIGN AND COORDINATION

.1 Permanent fall protection anchorages are to be designed to resist without fracture a pull-out force of 5000 lbs (22.2 kN), applied in the most adverse direction.

.2 Pre-engineered fall protection anchorages are to have testing certification. Testing must have been completed within the last ten (10) years.

.3 Coordinate work of this Section with structural steel fabrication to ensure structural framing and reinforcement for permanent anchor loading as required.

.4 Coordinate work of this Section with roofing and waterproofing to provide continuous waterproofing protection.

1.6 SUBMITTALS

.1 Coordinate with Section 01 33 00.

.2 Submit shop drawings for all pre-engineered proprietary systems and/or components in accordance with Submittals Specification Section. Shop drawings are to include, but are not limited to, the following requirements:

.1 Show complete anchor layout and configuration of the system, including all components and accessories.

.2 Fall protection components and system layout must meet or exceed the performance requirements of CSA Z91, CSAZ271, CSA Z259.16 and WorkSafe BC Occupational Health and Safety Guidelines.

.3 Include dimensions, detail drawings of attachment to structure and design details.

.4 Indicate method of attachment to the building structure. Professional Engineer must certify the attachment point for required loads.

.5 Drawings to be stamped by a Professional Engineer.

.6 Manufacturer's descriptive literature for each product, including section or other type details

.7 Manufacturer's written installation instructions and quality assurance statements describing fabrication quality control measures.

.3 Submit test data from a qualified testing laboratory indicating that all pre-engineered

proprietary anchors have been load tested in accordance with CSA Z91 and CSA Z271.

1.7 WELDER QUALIFICATIONS

.1 Welders Certificates: furnish welders' qualifications to Departmental Representative.

.2 Welding procedures, welders and welding operations shall be qualified in accordance with Canadian Welding Bureau Standards.

.3 Structural steel fabricator shall have not less than five (5) years experience in the fabrication of structural steel.

.4 Steel fabricators must be certified under requirements of CSA W47.1.

.5 Each welder to possess identification symbol issued by authority having jurisdiction.

.6 Certification of companies for fusion welding of steel structures to be in accordance with CSA-W47.1.

.7 Manufacturer Qualifications: company specializing in manufacturing Products specified in this section with minimum three years documented experience.

1.8 QUALITY ASSURANCE

.1 Submit design data in accordance with Submittals Specification Section.

.2 Submit Test Reports and substantiating engineering data and test results of previous tests by independent laboratory which purport to meet performance criteria, and other supportive data. Testing must have been completed within the last ten (10) years.

.3 Welding to be visual and non-destructive (magnetic particle) tested prior to galvanising by a qualified testing agency. Contractor to coordinate inspection of welds (co-ordinate with weld inspection agency) prior to application of hot-dip galvanising, primer, paint etc. Fabricator to conduct testing and provide proof of quality assurance. Departmental Representative may, at his discretion conduct testing of materials and assemblies including in shop testing at the point of manufacture. Contractor to completely remove and replace deficient welds at his own cost. Replacement welds to be re-inspected.

.4 Design structural support framing components and site inspect the installation under direct supervision of a Professional Structural Engineer experienced in design of this Work.

.5 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

.6 Co-ordinate the Work with installation of structural steel fabrication and erection, roofing assembly, and sheet metal work.

1.9 WARRANTY

.1 Warrant products installed under this section of work to be free of defects in materials and/or manufacture for a period of 5 years (from the date of project completion) when installed in accordance with the manufacturer's written instructions.

Part 2 PRODUCTS

2.1 MANUFACTURER

.1 Fall protection anchor and system manufacturer(s) to be a company specializing in the design and installation of permanent fall arrest and fall restraint safety systems.

.1 Fall protection anchor and system manufacturer to have minimum 5 years documented experience in the fabrication and installation of fall protection systems.

2.2 FALL PROTECTION ANCHORAGE REQUIREMENTS

.1 All installed and/or retrofitted permanent anchorage components are to be in accordance with CAN/CSA Z259.16-04: Design of Active Fall Protection Systems, CAN/CSA Z271-10: Safety Code for Suspended Elevating Platforms, and CAN/CSA Z91-02 Health and Safety Code for Suspended Equipment Operations.

.1 Strength requirements: All fall arrest anchors are to be designed to withstand 22.2 kN (5000 lbf) without fracture and/or pull out and 11.1 kN (2500 lbf) without permanent deformation of any component of the anchor system, if subject to load testing after installation.

.2 Anchoring systems shall be made of stainless steel, aluminum, hot-dipped galvanized, or other corrosion-resistant material as approved by the Departmental Representative. Bolts and hardware shall be stainless steel.

.3 Anchorage connection points shall be made of a closed loop not less than 19 mm diameter material, with eye opening of not less than 35 mm diameter or equivalent.

.2 Anchor Bolts to be stainless steel per ASTM F593 CW2 (316) or 180 3506 –I A4-70.

2.3 MATERIALS

.1 Welded Anchors:

.1 Welded anchors are to be supplied and installed on site in accordance with the drawings and as directed by the Departmental Representative.

.2 Exposed structural units: Stainless Steel, Type 304 or better.

.3 Cast in place material: Stainless Steel, Type 304 or better.

.4 Welding materials: in accordance with CSA W59.

.5 Hollow Structural sections for Pier style anchors to be CAN3-G40.21 -350 W class C, hot dip galvanized for exposed locations, pier to be filled with urethane foam insulation.

.6 Fasteners: Stainless Steel Type 304 or better, lock washers and hex nuts. Epoxy adhesive system HVA adhesive by Hilti (Canada Ltd.), and stainless steel type

304 inserts.

.2 Bolted Anchors:

.1 Bolted anchors assemblies shall be manufactured by Thaler Metal Industries, Access Safety Ltd, Suspended Stages Inc., or equivalent. Alternative assemblies shall be submitted to the Departmental Representative in accordance with Submittals Specification Section by the Contractor for review.

.2 Exposed structural units: Stainless Steel, Type 304 or better.

.3 Cast in place material: Stainless Steel, Type 304 or better.

.4 Welding materials: in accordance with CSA W59.

.5 Hollow Structural sections for Pier style anchors to be CAN3-G40.21 -350 W class C, hot dip galvanized for exposed locations, pier to be filled with urethane foam insulation

.6 Fasteners: Stainless Steel Type 304 or better, lock washers and hex nuts. Epoxy adhesive system HVA adhesive by Hilti (Canada Ltd.), and stainless steel Type 304 inserts.

2.4 FABRICATION

.1 Fit and shop assemble items in largest practical sections, for delivery to site.

.2 Fabricate items with joints tightly fitted and secured.

.3 Continuously seal joined members by intermittent welds and plastic filler.

.4 Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

.5 Exposed Mechanical Fastenings: screws or bolts; consistent with design of component.

.6 Furnish and install components required for anchorage of fabrications.

.7 Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

.8 Seal weld to prevent water ingress into void spaces such as within pedestal or pier anchors and fill with expanding foam to prevent moisture accumulation.

2.5 FINISHES

.1 Prepare uncoated steel surfaces: SSPC-SP 2, no more than 4 hours before applying epoxy primer.

.2 Concealed steel anchors, clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

.3 Do not prime surfaces in direct contact with concrete or where field welding is required.

.4 Concealed Structural Components and Anchors: galvanize after fabrication to CAN/CSA-

G164 to minimum 600 g/sq m galvanized coating.

2.6 ROOFING

.1 Partially remove standing seam metal roofing and underlying roof materials, as required, to install anchors.

.2 Patch anchor location with Polymethyl methacrylate (PMMA) based liquid membrane flashing system complete with non-woven, needle punched, polyester fleece reinforcing fabric and overlap existing membrane minimum 100mm.

.3 Infill cavity with sheathing, insulation and sheet metal, as required, to complete watertight patch in standing seam metal roof at anchor location.

Part 3 EXECUTION

3.1 EXAMINATION

.1 Report to the Contractor in writing, defects of work prepared by other trades and other unsatisfactory site conditions.

.2 Verify site dimensions before commencement of work. Final placement of anchors must ensure coverage of exterior surfaces as intended by the anchor layout shown on the drawings.

.3 Commencement of work will imply acceptance of prepared work.

.4 For roofs employing tapered roofing systems, height adjustments may be necessary i.e. ensure anchor eye is minimum 229 mm above roof surface.

3.2 PREPARATION

.1 Existing anchors to be tested prior to installation of horizontal life lines. Contractor to coordinate testing and provide access for review by Departmental Representative.

.2 For retrofit work, remove existing roof assembly as necessary to allow for installation of roof anchors.

.3 In the event of structural deficiencies, deck corrosion or deterioration, ensure that a structural engineer has assessed and approved all surfaces upon which the work of this Section depends. Institute repairs and/or reinforcement where necessary. Repairs to be completed under Contingency Allowance, as directed by Departmental Representative.

.4 If necessary, protect building interior and contents against ingression of water, dust, debris or other material.

3.3 INSTALLATION

.1 Install all anchors and equipment in accordance with manufacturer's printed instructions, shop drawings and as specified.

.2 Ensure anchors and equipment is installed under the supervision of a Professional Engineer.

.3 Where necessary, provide protection against deterioration due to contact of dissimilar materials.

.4 Where bolting is used for fastening anchors, no fewer than two threads are to be exposed.

.5 Ensure work is inspected prior to application of roofing.

.6 Install roof support flashing in accordance with manufacturer's printed instructions.

3.4 FIELD QUALITY CONTROL

.1 All new and/or retrofitted anchor installations to be tested using non-destructive load testing by a qualified testing agency as determined by the Departmental Representative upon completion of work. Testing is to be conducted in accordance with Section 11242 - Anchorage Testing.

3.5 ADJUSTING AND FINAL INSPECTION.

.1 Verify that all manufactured units have been installed in accordance with specifications and details, and will function as intended. Adjust any items where necessary to ensure proper operation.

3.6 CLEANING

.1 Remove all debris and scrap resulting from the execution of this trade.

.2 Clean manufactured units using materials and methods approved by manufacturer. Do not use cleaners or techniques which could impair performance of the roofing system.

END OF SECTION

Part 1 General

1.1 SUMMARY OF WORK

.1 Supply and installation of engineered horizontal life line (HLL) and exterior building maintenance system as shown on the drawings and as specified in the Contract Documents. Work includes but is not limited to:

1. Material and labour to install horizontal life line and fall protection systems and shown on the drawings or as directed by the Departmental Representative.

2. All associated framing and hardware connections.

1.2 RELATED SECTIONS

.1 Section 11 24 30: Fall Arrest Anchors
.2 Section 11 24 32: Anchor Testing

1.3 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA G40.20/G40.21-04, General Requirement for Rolled or Welded Structural Quality Steel
.2 CSA W47.1-1983, Certification of Companies for Welding of Steel Structures
.3 CSA W59-03, Welded Steel Construction - Metal ARC Welding.
.4 CSA G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.
.5 CAN/CSA Z271-10: Safety Code for Suspended Elevating Platforms
.6 CSA Fall Arrest Systems – Practical Essentials
.7 CSA Z259.16-04: Design of Active Fall Protection Systems
.8 CSA Z259.2.1-98: Fall Arresters, VLL, and Rails
.9 CSA Z259.2.2-98: Self-Retracting Devices for Personal Fall Arrest Systems
.10 CSA Z259.11-05: Energy Absorbers and Lanyards
.11 CSA Z259.12-01: Connecting Components for Personal Fall Arrest Systems (PFAS)
.12 CAN/CSA Z91-02 Health and Safety Code for Suspended Equipment Operations

.13 CAN Z259.13-04: Flexible Horizontal Lifeline Systems.

.14 CSA G4-09: Steel Wire Rope for General Purpose and for Mine Hoisting and Mire Haulage

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM A167-99, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.2 ASTM A500-03, Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

1.4 REGULATORY REQUIREMENTS

.1 Conform to British Columbia Occupational Health and Safety Regulations, Part 11 Fall Protection, published by WorkSafe BC.

.2 Fall arrest components and system layout must meet or exceed the National Building Code, current edition, and requirements of CAN/CSA Z91 (Safety Code for Suspended Equipment Operations) and CAN/CSA Z259.16 (Design of Active Fall-Protection Systems).

1.5. DESIGN AND COORDINATION

.1 End anchors and all components for life line systems are to be designed to resist without fracture a pull-out force of 5000 lbs (22.2 kN), applied in the most adverse direction.

.2 Design of lifeline system shall limit the maximum arrest force (MAF) on a worker's full body harness to 6kN or less.

.3 Pre-engineered life line systems are to have testing certification. Testing must have been completed within the last five (5) years.

.4 Coordinate work of this Section with Section: 11 24 30 Fall Arrest Anchors as well as roofing and waterproofing specifications to provide continuous waterproofing protection and coordination of installations.

1.6 SUBMITTALS

.1 Coordinate with Section 01 33 00.

.2 Submit shop drawings and/or manufacturer's documentation for all proprietary engineered systems or components in accordance with Submittals Specification Section. Shop drawings are to include, but are not limited to, the following requirements:

.1 Show complete horizontal life line system and anchorage connection layout and configuration, including all components, hardware, and accessories.

.2 Fall Arrest components and system layout must meet or exceed the performance requirements of CSA Z91, CSA Z259.16, CSA Z259.13-04 and WorkSafe BC Occupational Health and Safety Guidelines.

.3 Include dimensions, detail drawings of attachment to structure and design details.

.4 Indicate method of attachment to the building structure. Professional Engineer must certify the attachment point for required loads.

.5 Drawings to be stamped by a Professional Engineer licensed in the Province of British Columbia.

.6 Manufacturer's descriptive literature for each product, including section or other type details.

.7 Manufacturer's written installation instructions and quality assurance statements describing fabrication quality control measures.

.3 Submit test data from a qualified testing laboratory indicating that the lifeline system components and anchorage connectors have been load tested in accordance with CSA Z259.13-04 and CSA Z259.15-12.

.4 Contractor to provide the following upon installation of the horizontal life line:

a. Unstrained length of cable (with no tension):
b. Distance between supports (+/- 25mm):

i. Span 1:
ii. Span 2:
iii. Span 3:
iv. Span n:

c. Installation Sag:
i. Span 1:
ii. Span 2:
iii. Span 3:
iv. Span n:

d. Installation Temperature (degrees C):

1.7 QUALITY ASSURANCE

.1 Submit design data in accordance with Submittals Specification Section.

.2 Submit Test Reports and substantiating engineering data and test results of previous tests by independent laboratory which purport to meet performance criteria, and other supportive data. Testes must have been conduction within the last five (5) years.

.3 Design structural support framing components and site inspect the installation under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the Province of British Columbia.

.4 Lifeline fall protection system manufacturer to have minimum 5 years documented experience in the design and fabrication of fall protection systems.

.5 Co-ordinate the Work with installation of roofing assembly and sheet metal work as required.

1.8 WARRANTY

.1 Warrant products installed under this section of work to be free of defects in materials and/or manufacture for a period of 5 years (from the date of project completion) when installed in accordance with the manufacturer's written instructions.

Part 2 Products

2.1 MANUFACTURER

.1 Life line manufacturer to be a company specializing in the design and installation of permanent lifeline and fall protection safety systems with minimum 5 years documented experience in the design and fabrication of fall protection systems.

.2 Horizontal life lines to be include DBI Sala Zorbit in-line energy absorbers or approved equivalent. Proprietary manufacture's documentation demonstrating equivalency in accordance with performance requirements of this specifications are to be submitted to the Consultant for approval.

2.2 HORIZONTAL LIFE LINE REQUIREMENTS

.1 Life line systems and all components are to be in accordance with CSA Z259.13-04, CAN/CSA Z271-98, and CSA Z259.16-04.

.2 All metal components are to be stainless steel or galvanized steel unless otherwise noted.

.3 All metal components shall show no evidence of corrosion that would affect their function.

.4 Components made of materials that are vulnerable to degradation by exposure to sunlight or other environmental conditions shall be protected against such degradation by proper shielding or other suitable means.

.5 Design and material specifications of all components shall ensure durability and reliability of operation in temperatures from -35 C to +35 C (-31 F to +95 F) and in course of handling under normal field conditions.

.6 Components shall not contain any combination of metals that have the potential, when combined, to cause an adverse galvanic reaction.

.7 All components within the lifeline system are to be compatible in that they are installed to meet the design intent and preserve their intended function as outlined in this Section, the drawings, and the Contract Documents.

2.3 MATERIALS

.1 Horizontal Life Line Wire Rope:

.1 Wire ropes lines shall comply with CSA G4-09.

.2 Wire rope to be stainless steel (Type 304 or better)

.3 Minimum wire rope diameter shall be 10mm – Stainless Steel 6x19 IWRC or 7x19 Aircraft Cable.

.4 Minimum breaking strength 53 kN.

.2 Vertical Life Line Wire Rope:

.1 Wire ropes lines shall comply with CSA G4-09.

.2 Wire rope to be stainless steel (Type 304 or better)

.3 Minimum wire rope diameter shall be 10mm – Stainless Steel 6x19 IWRC or 7x19 Aircraft Cable.

.4 Minimum breaking strength 53 kN.

.5 Tensile strength of not less than 27 kN when tested in accordance with ASTM Standard E8.

.6 Wire rope terminations in accordance with manufacturer's specifications, subject to the following:

.7 Knots and other terminations shall not reduce strength of rope below 22 kN

.8 Properly sized thimble shall be part of factory-formed eye termination.

.9 Formed eye terminations shall have a minimum strength of 22 kN when tested in accordance with ASTM Standard E8.

Part 1 General

1.1 SUMMARY OF WORK

.1 Load testing of all fall protection anchors as shown on the Drawings or as directed by the Departmental Representative. Load testing includes all existing anchors and new anchors following completion of installation.

1.2 RELATED SECTIONS

.1 Section 11 24 30: Fall Arrest Anchors
.2 Section 11 24 31: Flexible Anchorages

1.3 REFERENCES

.1 Canadian Standards Association (CSA)

- .1 CSA Fall Arrest Systems – Practical Essentials
- .2 CSA Z259.13-04: Flexible Horizontal Lifeline Systems
- .3 CSA Z259.16-04: Design of Active Fall Protection Systems
- .4 CAN/CSA Z271-10: Safety Code for Suspended Elevating Platforms
- .5 CAN/CSA Z91-02: Health and Safety Code for Suspended Equipment Operations

1.4 REGULATORY REQUIREMENTS

.1 Conform to British Columbia Occupational Health and Safety regulations, Part 11 Fall Protection, published by WorkSafe BC.

.2 Conform with the National Building Code, current edition, and requirements of CAN/CSA Z91 (Safety Code for Suspended Equipment Operations) & CAN/CSA Z259.16 (Design of Active Fall-Protection Systems)

1.5. DESIGN AND COORDINATION

.1 Conduct visual review of specified fall protection systems.

.2 Conduct load testing in accordance with regulatory requirements and safe work practices and as directed by the Departmental Representative.

1.6 SUBMITTALS

.1 Coordinate with Section 01 33 00.

.2 Submit test reports in accordance with Submittals Specification Section. Test reports are to include, but are not limited to, the following requirements:

.1 Show anchor layout and location of tests.

.2 Configuration of the testing apparatus.

.3 Certificate of Calibration for testing apparatus dated within 6 months of the date of testing.

.4 Observations from visual review.

.5 Results from load testing including: anchors tested, final load, observations of movement and/or deformation.

Part 2 Products

2.1 EQUIPMENT

.1 Ensure all load testing equipment, including connecting components, to be capable of resisting the ultimate load with a factor of safety of 5.

.2 Calibrate load testing equipment prior to anchor testing.

.3 Submit calibration certificates upon request by Departmental Representative, in accordance to Submittals Specification Section.

Part 3 Execution

3.1 EXAMINATION

.1 Report to the Departmental Representative in writing, defects of work prepared by other trades and other unsatisfactory site conditions.

3.2 PREPARATION

.1 Protect building interior and contents against ingression of water, dust, debris or other material.

.2 Contractor to provide adequate hoarding and protection of testing apparatus and adjacent surroundings in the event of catastrophic failure of the anchor assembly as a result of load testing.

3.3 TESTING

.1 Notify Departmental Representative at least 48 hours prior to start of testing. Departmental Representative must be present during testing.

.2 When practicable, test loading to be in direction(s) that generate the most critical effect on the anchorage system, unless otherwise directed by the Departmental Representative. Conduct anchor load testing with test loads as follows:

.1 Initial Load – 7.1 kN (1600 lbs) maintain for a minimum of 10 seconds.

.2 Final load – 11.1 kN (2500lbs) maintain for a minimum of 10 seconds.

.3 Make notes on movement during load testing and permanent deformation, if any.

.4 Conduct visual review on fall protection components, documenting deterioration, including but not limited to: corrosion, damage, deployment of energy absorbers, and tampering of components.

.5 Components of the fall protection system may be tagged for removal from service, at the discretion of the Departmental Representative.

END OF SECTION

APPENDIX A

Preliminary Hazard Assessment Form

Public Works and Government Services Canada | Travaux publics et Services gouvernementaux Canada

PRELIMINARY HAZARD ASSESSMENT FORM

Project Number: R.075896.001	
Location: # 202-97 th St. Osoyoos B.C. V0H-1V1	
Date:	
Name of Departmental Representative:	
Name of Client:	
Name of Client Project Co-ordinator	

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

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

TYPES OF HAZARDS TO CONSIDER	Potential Risk for:				COMMENTS
Examples: Chemical, Biological, Natural, Physical, and Ergonomic Listed below are common construction related hazards. Your project may include pre-existing hazards that are not listed. Contact the Regional Construction Safety Coordinator for assistance should this issue arise.	**PWGSC, OGD's, or tenants**		**General Public or other contractors**		Note: When thinking about this pre-construction hazard assessment, remember a **hazard** is anything that may cause harm, such as chemicals, electricity, working from heights, etc; the **risk** is the chance, high or low, that somebody could be harmed by these and other hazards, together with an indication of how serious the harm could be.
	Yes	**No**	**Yes**	**No**	
Typical Construction Hazards					
Concealed/Buried Services (electrical, gas, water, sewer etc)	x		x		
Slip Hazards or Unsound Footing	x		x		
Working at Heights	x		x		
Working Over or Around Water					
Heavy overhead lifting operations, mobile cranes etc.	x		x		
Marine and/or Vehicular Traffic (site vehicles, public vehicles, etc.	x		x		
Fire and Explosion Hazards	x		x		
High Noise Levels	x		x		
Excavations					
Blasting					
Construction Equipment					
Pedestrian Traffic (site personnel, tenants, visitors, public)	x		x		
Multiple Employer Worksite	x		x		Example: Contractor working in an occupied Federal Employee space.
Electrical Hazards					
Contact With Overhead Wires	x		x		
Live Electrical Systems or Equipment	x		x		
Other:					
Physical Hazards					
Equipment Slippage Due To Slopes/Ground Conditions	x		x		
Earthquake	x		x		
Tsunami					
Avalanche					
Forest Fires	x		x		
Fire and Explosion Hazards	x		x		

TYPES OF HAZARDS TO CONSIDER	Potential Risk for:				COMMENTS
Examples: Chemical, Biological, Natural, Physical, and Ergonomic Listed below are common construction related hazards. Your project may include pre-existing hazards that are not listed. Contact the Regional Construction Safety Coordinator for assistance should this issue arise.	PWGSC, OGD's, or tenants		General Public or other contractors		Note: When thinking about this pre-construction hazard assessment, remember a **hazard** is anything that may cause harm, such as chemicals, electricity, working from heights, etc; the **risk** is the chance, high or low, that somebody could be harmed by these and other hazards, together with an indication of how serious the harm could be.
	Yes	No	Yes	No	
Working in Isolation	x		x		
Working Alone	x		x		
Violence in the Workplace	x		x		
High Noise Levels	x		x		
Inclement weather	x		x		Falling snow and ice from roof
High Pressure Systems	x		x		
Other:					
Hazardous Work Environments	x		x		
Confined Spaces / Restricted Spaces					Review and provide confined space assessment(s) from PWGSC or client confined space inventories. Refer to PWGSC Standard on Entry into Confined Spaces. Contact the Regional Construction Safety Coordinator.
Suspended / Mobile Work Platforms	x		x		
Other:					
Biological Hazards	x		x		
Mould Proliferations	x		x		
Accumulation of Bird or Bat Guano	x		x		
Bacteria / Legionella in Cooling Towers / Process Water					
Rodent / Insect Infestation	x		x		
Poisonous Plants	x		x		
Sharp or Potentially Infectious Objects in Wastes	x		x		
Wildlife	x		x		
Chemical Hazards	x		x		
Asbestos Materials on Site					If "yes" a pre-project asbestos survey report is required. Provide Contractor with DP – 057 ELF Form 16 "Contractor Notification and Acknowledgement"
Designated Substance Present					If "yes" a pre-project designated substance survey report is required.
Chemicals Used in work	x		x		
Lead in paint					If "yes" a pre-project lead survey report is required.
Mercury in Thermostats or Switches					If "yes" a pre-project mercury survey report is required.
Application of Chemicals or Pesticides	x		x		
PCB Liquids in Electrical Equipment					
Radioactive Materials in Equipment					
Other:					
Contaminated Sites Hazards					
Hazardous Waste					
Hydrocarbons	x		x		
Metals					
Other:					
Security Hazards					
Risk of Assault	x		x		
Other:					

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

Other Compliance and Permit Requirements[1]	YES	NO	Notes / Comments[2]
Notice of Project Required	x		
Site Specific Orientation Provided at Project Location	x		
Is a Building Permit required?	x		
Is an Electrical permit required?			
Is a Plumbing Permit required?			
Is a Sewage Permit required?			
Is a Dumping Permit required?			
Is a Hot Work Permit required?			
Is a Permit to Work required?			Mandatory for ALL AFD managed work sites.
Is a Confined Space Entry Permit required?			Mandatory
Is a Confined Space Entry Log required			Mandatory for all Confined Spaces
Discharge Approval for treated water required			

Notes:

(1) Does not relieve Service Provider from complying with all applicable federal, provincial, and municipal laws and regulations.

(2) TBD means To Be Determined by Service Provider.

Service Provider Acknowledgement: We confirm receipt and review of this Pre-Project Hazard Assessment and acknowledge our responsibility for conducting our own assessment of project hazards, and taking all necessary protective measures (which may exceed those cited herein) for performance of the work.			
Service Provider Name			
Signatory for Service Provider		**Date Signed**	
RETURN EXECUTED DOCUMENT TO PWGSC DEPARTMENTAL REPRESENTATIVE PRIOR TO ANY WORK COMMENCING			

APPENDIX B

Building Hazardous Materials Assessment Report - Total Safety

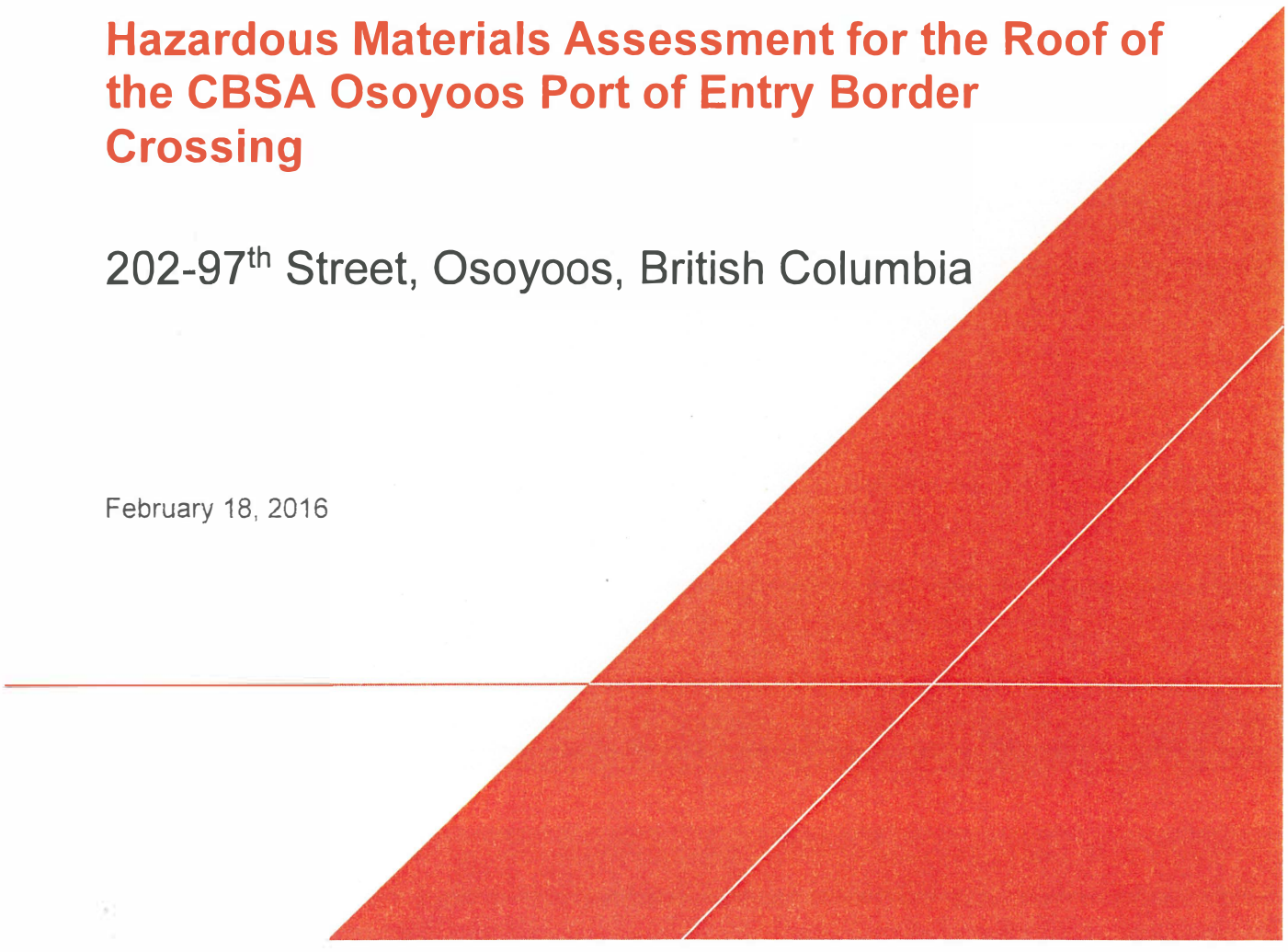
ARCADIS Design & Consultancy for natural and built assets

Public Works and Government Services Canada

Hazardous Materials Assessment for the Roof of the CBSA Osoyoos Port of Entry Border Crossing

202-97th Street, Osoyoos, British Columbia

February 18, 2016



HAZARDOUS MATERIALS ASSESSMENT

Roof of the CBSA Osoyoos Port of Entry Border Crossing

Wayne J. Cormack, M.Eng., CIH
Senior Consultant

Prepared for:

Public Works and Government Services Canada

Prepared by:

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Our Ref.:

702358-007

Date:

February 18, 2016

1 INTRODUCTION

Arcadis Canada Inc. (ARCADIS) was retained by Public Works and Government Services Canada (PWGSC) Pacific Region, on behalf of Canada Border Services Agency (CBSA), to conduct a hazardous materials assessment of the roof of the Osoyoos CBSA Port of Entry Border Crossing.

According to information provided by PWGSC, The Osoyoos CBSA Port of Entry Border Crossing, located at #202-97th Street in Osoyoos, BC, will be undergoing a roof replacement. A hazardous material assessment of the roof is required for the tender package. The roof has undergone various renovations and is approximately 13 years old.

A roof plan showing the study area is provided in Appendix A.

The survey was undertaken to report on the presence or suspected presence of readily observable hazardous materials.

1.1 Scope of Work

The scope of work for our investigation included:

- review of existing information provided by PWGSC;
- Conducting a hazardous building materials assessment of the low sloped roof areas shown on the Roof Drawing Plan in Appendix A as roof areas A,B,C,D,E,F and H (including but not limited to assessment of asbestos-containing materials, mercury thermostats, PCB-containing equipment, lead (based paints), and halocarbon-containing equipment);
- obtaining representative bulk samples of materials which could contain asbestos and paint chip samples;
- laboratory analyses of bulk samples for asbestos content and analysis of paint chip samples for lead content; and
- preparation of a report outlining the findings of the investigation.

Mr. Kenny Luong visited the site on February 1, 2016 to conduct the hazardous materials survey.

2 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.

2.1 Asbestos

Asbestos has been widely used in buildings, both in friable applications (materials which can be crumbled, pulverized or powdered by hand pressure, when dry) such as pipe and tank insulation, sprayed-on fireproofing and acoustic texture material and in non-friable manufactured products such as floor tile, gaskets, cement board and so on. The use of asbestos in friable applications was curtailed around the mid-1970s. The use of asbestos in certain non-friable materials continued beyond the mid-1970s.

Control of exposure to asbestos is governed in British Columbia by B.C. Reg. 296/97 – Occupational Health and Safety Regulations. The WorkSafe BC publication *Safe Work Practices for Handling Asbestos* provides additional guidance.

B.C. Reg. 296/97 states that "asbestos-containing material" means the following:

(a) a manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos if tested in accordance with one of the prescribed methods.

(b) vermiculite insulation that would be determined to contain any asbestos if tested in accordance with the prescribed EPA method.

B.C. Reg. 296/97 prescribes certain requirements for asbestos management in buildings.

For on-going asbestos management in buildings, employers are required to:

- develop and implement an exposure control plan if a worker is or may be exposed to potentially harmful levels of asbestos;
- prepare an inventory (i.e., asbestos survey report) of all asbestos-containing materials in the workplace; keep the inventory at the workplace and keep the inventory current;
- ensure that a risk assessment is conducted by qualified person on asbestos-containing material identified in the inventory, with due regard for the condition of the material, its' friability, accessibility and likelihood of damage, and the potential for fibre release and exposure of workers;
- ensure that before a work activity that involves working with or in proximity to asbestos-containing material begins, the work activity is assessed by a qualified person and classified as a low, moderate or high risk activity;
- ensure that all friable asbestos-containing materials in the workplace are controlled by removal, enclosure or encapsulation so as to prevent the release of airborne asbestos fibre;
- prohibit any work that would disturb asbestos-containing material unless necessary precautions have been taken to protect workers;
- ensure that procedures for handling or using asbestos-containing material prevent or minimize the release of airborne asbestos fibres;
- ensure that the procedures for control, handling or use of asbestos are in accordance with procedures acceptable to the board;
- provide training for staff who are at risk of exposure to asbestos;

"Waste asbestos" is classified as a "hazardous waste" and is defined in the British Columbia Hazardous Waste Regulation (B.C. Reg. 63/88) as "a waste containing friable asbestos fibres or asbestos dust in a concentration greater than 1% by weight". Section 40, Part 6 of the regulation provides requirements for management of asbestos waste.

2.2 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."

2.3 Mercury

Mercury has been used in electrical equipment such as alkaline batteries, fluorescent light bulbs (lamps), high intensity discharge (HID) lights (mercury vapour, high pressure sodium and metal halide), "silent switches" and in instruments such as thermometers, manometers and barometers, pressure gauges, float and level switches and flow meters. Mercury-containing lamps, the bulk of which are 1.22 m (four foot) fluorescent lamps contain between 7 and 40 mg of mercury each. Mercury compounds have also been used historically as additives in latex paint to protect the paint from mildew and bacteria during production and storage.

The intentional addition of mercury to Canadian-produced consumer paints for interior use was prohibited in 1991. Mercury may have remained in paints after 1991, however, as a result of impurities in the paint ingredients or cross-contamination due to other manufacturing processes. The *Surface Coating Materials Regulations* made under the Hazardous Products Act set a maximum total mercury concentration of 10 mg/kg (0.001 percent) for surface coating materials (including paint). This criterion level applies to the sale and importation of new surface coating materials.

Mercury-containing thermostats and silent light switches are mercury tilt switches which are small tubes with electrical contacts at one end of the tube. A mercury tilt switch is usually present when no switch is visible. Mercury switches often have the word "TOP" stamped on the upper end of the switch, which is visible after removing the cover plate. If mercury switches are to be removed, the entire switch should be removed and placed into a suitable container for storage and disposal.

Waste light tubes generated during renovations or building demolition and waste mercury from equipment must either be recycled or disposed of in accordance with the requirements of B.C. Reg. 63/88 – *Hazardous Waste Regulation*.

Waste mercury is classified as "leachable toxic waste" if the extraction criterion value prescribed in Table 1 of Schedule 4 of the regulation is exceeded. Waste mercury from mercury switches or gauges should be properly collected and shipped to a recycling facility or disposed of as a hazardous waste. Removal of mercury-containing equipment (e.g., switches, gauges, controls, etc.) should be carried out in a manner which prevents spillage and exposure to workers.

2.4 Silica

Silica exists in several forms of which crystalline silica is of most concern with respect to potential worker exposures. Quartz is the most abundant type of crystalline silica. Some commonly used construction materials containing silica include brick, refractory brick, concrete, concrete block, cement, mortar, rock and stone, sand, fill dirt, topsoil and asphalt containing rock or stone.

Employers in British Columbia are required to develop an exposure control plan (ECP) when workers are or may be exposed to airborne silica dust in excess of 50 percent of the exposure limit. The WorkSafe BC guidance document "Developing a Silica Exposure Control Plan" provides information on each of the required elements of an ECP, including safe work procedures for controlling exposure to silica during construction activities.

2.5 PCBs

In most institutional and commercial facilities and in smaller industrial facilities, the primary source of equipment potentially containing PCBs is fluorescent and H.I.D. light ballasts. Small transformers may also be present. In larger industrial facilities, larger transformers and switch gear containing, or potentially containing, PCBs may also be present.

PCBs were also commonly added to industrial paints from the 1940s to the late 1970s. PCBs were added directly to the paint mixture to act as a fungicide, to increase durability and flexibility, to improve resistance to fires and to increase moisture resistance. The use of PCBs in new products was banned in Canada in the 1970s. PCB amended paints were used in speciality industrial/institutional applications prior to the 1970s including government buildings and equipment such as industrial plants, radar sites, ships as well as non-government rail cars, ships, grain bins, automobiles and appliances.

Removal of in-service equipment containing PCBs, such as fluorescent light ballasts, capacitors and transformers, is subject to the requirements of the federal *PCB Regulations*.

The *PCB Regulations*, which came into force on 5 September 2008, were made under the *Canadian Environmental Protection Act*, 1999 (CEPA 1999) with the objective of addressing the risks posed by the use, storage and release to the environment of PCBs, and to accelerate their destruction. The PCB Regulations set different end-of-use deadlines for equipment containing PCBs at various concentration levels.

The Regulations Amending the PCB Regulations and Repealing the Federal Mobile PCB Treatment and Destruction Regulations were published on 23 April 2014, in the Canada Gazette, Part II, and came into force on 1 January 2015. The most notable part of the amendments is the addition of an end-of-use deadline date of 31 December 2025 for specific electrical equipment located at electrical generation, transmission and distribution facilities.

"PCB wastes" are defined in B.C. Reg. 63/88 – *Hazardous Waste Regulation as PCB liquid, PCB solid and PCB equipment that have been taken out of service for the purpose of treatment, recycling, reuse or disposal or for the purpose of storage prior to treatment, recycling, reuse or disposal*. "PCB liquid" means any liquid containing more than 50 parts per million by weight of chlorobiphenyls. "PCB solid" means any material or substance other than PCB liquid that contains or is contaminated with chlorobiphenyls at a concentration greater than 50 parts per million by weight of chlorobiphenyls. "PCB equipment" means a manufactured item that contains or is contaminated with PCB liquids or PCB solids and includes transformers, capacitors and containers.

2.6 Ozone-depleting Substances and Halocarbons

In Canada, the federal, provincial and territorial governments have legislation in place for the protection of the ozone layer and management of ozone-depleting substances and their halocarbon alternatives. The use and handling of these substances are regulated by the provinces and territories in their respective jurisdictions, and through the *Federal Halocarbon Regulations*, 2003 (FHR 2003) for refrigeration, air-conditioning, fire-extinguishing and solvent systems under federal jurisdiction.

The FHR 2003 were published in August 2003 and amended in July 2009 under the authority of the *Canadian Environmental Protection Act*, 1999. The purpose of the FHR 2003 is to reduce and prevent emissions of ozone-depleting substances and of their halocarbon alternatives to the environment from air-conditioning units, refrigeration, fire-extinguishing and solvent systems that are:

- located on federal or aboriginal lands; or
- owned by federal departments, board agencies, Crown corporations, or federal works and undertakings.

The FHR 2003 replaced the former *Federal Halocarbon Regulations* and incorporated new provisions to achieve an orderly transition from CFCs and Halons to alternative substances and technologies, reflecting *Canada's Strategy to Accelerate the Phase-Out of CFC and Halon Uses and to Dispose of the Surplus Stocks.*

Under the FHR 2003, a person who installs, services, leak tests, or charges a refrigeration system or an air conditioning system or does any other work on the system that may result in the release of a halocarbon must do so in accordance with the *Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems.*

Some of the requirements of FHR 2003 include:

- certification is required for all persons testing, repairing, filling or emptying equipment containing ozone-depleting substances and their halocarbon alternatives;
- no person shall store, transport or purchase a halocarbon unless it is in a container designed and manufactured to be refilled and to contain that specific type of halocarbon;
- before dismantling, decommissioning or destruction of any system, a person shall recover all halocarbons contained in the system into a container designed and manufactured to be refilled and to contain that specific type of halocarbon;
- before dismantling, decommissioning or destruction or destroying a system, a person shall affix a notice to the system containing information as required in Column 3, Item 1 of Schedule 2. This information includes the name and address of the owner of the system; name of the operator of the system, specific location of the system before its dismantling, decommissioning or destruction; description of the system; name of service technician who recovered the halocarbons; certificate number of the service technician (if applicable); name of employer of service technician (if applicable); type and quantity of halocarbon and date recovered; type and charging capacity of the system; and final destination of the system; and
- in the case of dismantling, decommissioning or destruction of any system, the owner shall keep a record of the information contained in the notice as described above.

2.7 Mould

Moulds are forms of fungi that are found everywhere both indoors and outdoors all year round. Outdoors, moulds live in the soil, on plants and on dead and decaying matter. More than 1000 different kinds of indoor moulds have been found in buildings. Moulds spread and reproduce by making spores, which are all small and light-weight, able to travel through air, capable of resisting dry, adverse environmental conditions, and hence capable of surviving a long time. Moulds need moisture and nutrients to grow and their growth is stimulated by warm, damp and humid conditions.

Recommended work practices are outlined in the following document:

- *Mould Guidelines for the Canadian Construction Industry*. Standard Construction Document CCA 82 2004. Canadian Construction Association.

2.8 Urea Formaldehyde Foam Insulation (UFFI)

Urea formaldehyde foam insulation (UFFI) is a polymer manufactured at point-of-use by blending urea formaldehyde resin with a phosphoric acid catalyst and compressed air at a nozzle tip. This nozzle was used to inject the freshly mixed foam.product into enclosed wall cavities. UFFI was introduced in Canada

in the 1970s. In response to concerns about the health effects of formaldehyde gas, the installation of UFFI was banned in Canada in 1980.

3 METHODOLOGY

3.1 Asbestos

Bulk sampling and analysis was performed in general accordance with the requirements specified in B.C. Reg. 296/97 and in the WorkSafe BC publication *Safe Work Practices for Handling Asbestos*.

Determination of the locations of asbestos-containing materials was made based on the results of bulk sample analyses, visual observations and physical characteristics of the applications as well as our knowledge of the uses of asbestos in building materials.

The roof membrane was not cut by Arcadis, however, samples of roofing membrane obtained from Read Jones Christoffersen Ltd. were submitted for laboratory analysis for asbestos.

Analysis of bulk samples was performed following EPA Method 600/R-93/116 in conformity with the requirements specified in B.C. Reg. 296/97.

3.2 Lead

Samples of select, representative paint applications collected during the course of the site inspection were forwarded to the Maxxam Analytical Inc. laboratory in Mississauga, Ontario for analysis of lead content.

3.3 Mercury

The presence of equipment which may contain mercury, such as fluorescent light tubes, thermometers, gauges, etc. observed during the course of our site inspection was recorded.

3.4 Silica

The presence of silica-containing materials observed during the course of our site inspection was documented. Silica is known to be a constituent of brick, concrete, cement, etc. Sampling and laboratory analysis are not required to make this determination.

3.5 PCBs

The presence or absence of fluorescent lights was documented during the course of our survey to determine whether there were any of the TI2 type which may therefore contain PCB ballasts.

3.6 Ozone-Depleting Substances and Halocarbons

Information on the presence of any air-conditioning equipment, cooling equipment (refrigerators, etc.), etc. was recorded during the site inspections by ARCADIS staff.

3.7 Mould

The presence of any "suspect" mould observed during the course of our site inspection was documented. "Suspect" mould is typically a coloured, textured substance or discolouration or staining on a building material surface which, based on our experience, may be mould growth. The adjective "suspect" is used where the presence of mould has not been confirmed by laboratory analysis

3.8 Urea Formaldehyde Foam Insulation

Investigations for the potential presence of UFFI entailed inspection for evidence of previous openings (i.e., "nozzle holes") made for installation of insulation.

4 RESULTS AND DISCUSSION

4.1 Asbestos

During the course of our hazardous materials assessment, representative bulk samples of materials were collected by ARCADIS staff. Roofing membrane samples were provided to Arcadis by Read Jones Christoffersen Ltd. (RJC). Roof two cut locations are shown on the roof plan provided in Appendix A. The samples were forwarded to EMSL Canada Inc. for asbestos analyses. EMSL holds a current Certificate of Accreditation for Bulk Asbestos Fibre Analysis under the Voluntary Accreditation Program (NVLAP). The results of the bulk sample analyses for asbestos content are provided in Table 4.1, and the laboratory report is provided in Appendix B.

Table 4.1: Summary of Results of Analyses of Bulk Samples for Asbestos Content

Sample No.	Location	Description	Asbestos Content
A1A	Roof Area A	black window mastic	None detected
A1B	Roof Area A	black window mastic	None detected
A1C	Roof Area A	black window mastic	None detected
A2A	Roof Area B	grey window sealant	None detected
A2B	Roof Area B	grey window sealant	None detected
A2C	Roof Area B	grey window sealant	None detected
A3A	Roof Area B	tan flashing caulking	None detected
A3B	Roof Area A	tan flashing caulking	None detected
A3C	Roof Area A	tan flashing caulking	None detected
A4	Roof Area B	roof membrane – layer 1 – grey	None detected
A4	Roof Area B	roof membrane – layer 2 – brown	None detected
A4	Roof Area B	roof membrane – layer 3 – grey/black	None detected
A5	Roof Area A	roof membrane – layer 1 – grey	None detected
A5	Roof Area A	roof membrane – layer 2 – grey/black	None detected
A6	Roof Area A	roof membrane – layer 1 – grey	None detected
A6	Roof Area A	roof membrane – layer 2 – grey/black	None detected
A7	Roof Area E	roof membrane – layer 1 – grey	None detected
A7	Roof Area E	roof membrane – layer 2 – grey/black	None detected

On the basis of our visual observations and results of laboratory analyses of bulk samples, no asbestos-containing materials were found to be present associated with the low-sloped roof areas on the subject building.

Roof plans are provided in Appendix A. Photographs are provided in Appendix C.

If any materials which may contain asbestos and which were not tested during the course of the designated substances survey are discovered during any construction/renovation activities, the work shall not proceed until such time as the required notifications have been made and an appropriate course of action is determined.

4.2 Lead

One sample of paint was collected by Arcadis from the only painted surface on the low-sloped roof. The sample was submitted to EMSL Canada Inc. for analysis of lead content. The results of the analyses are presented in Table 4.2, and the laboratory report is provided in Appendix B.

Lead was detected at a level of 1,900 mg/kg which is above the WorkSafe BC guideline value of 600 mg/kg.

The paint application was noted to be generally in good 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.

Table 4.2. Sample Table Summary of Results of Analyses of Paint Samples for Lead Content

Sample No.	Location	Description	Condition	Lead Content (mg/kg)
L1	Roof Areas A/H	steel frame	Good	**1,900**

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).
mg/kg - milligrams lead per kilogram paint.
1 mg/kg - 1 part per million (ppm).

4.3 Mercury

No mercury-containing equipment was observed on the low-sloped roof areas during the course of our site inspections.

4.4 Silica

Materials observed in the study areas which could contain silica were limited to window sealant and flashing caulking.

The WorkSafe BC guidance document Developing a Silica Exposure Control Plan, provides guidance in controlling exposure to silica dust during construction/renovation activities.

4.5 PCBs

No suspect PCB-containing equipment was observed during the course of our site inspection.

4.6 Ozone-depleting Substances and Halocarbons

No suspect ODS- or halocarbon-containing equipment was observed during the course of the investigation.

4.7 Mould

No suspect mould was observed during the course of our site inspection.

4.8 Urea Formaldehyde Foam Insulation (UFFI)

UFFI was not observed during the course of the investigation.

5 RECOMMENDATIONS

We recommend the following on the basis of the findings of the hazardous materials assessment outlined in this report:

1. Ensure that a risk assessment is performed and an exposure control plan for lead and silica are developed prior to disturbance or work affecting the lead-containing paint applied to steel framing and the possible silica-containing sealant and caulking.

6 USE AND LIMITATIONS OF HAZARDOUS MATERIALS SURVEY REPORT

This report, prepared for Public Works and Government Services Canada, on behalf of Canada Border Services Agency, does not provide certification or warranty, expressed or implied, that the investigation conducted by Arcadis identified all hazardous materials associated with the low-sloped roof areas at the subject facility. The work undertaken by Arcadis was directed to provide information on the presence of hazardous materials in building construction materials based on visual inspection of readily accessible areas of the low-sloped roof and on the results of laboratory analysis of a limited number of bulk samples of material for asbestos content and laboratory analysis of a limited number of paint samples for lead content.

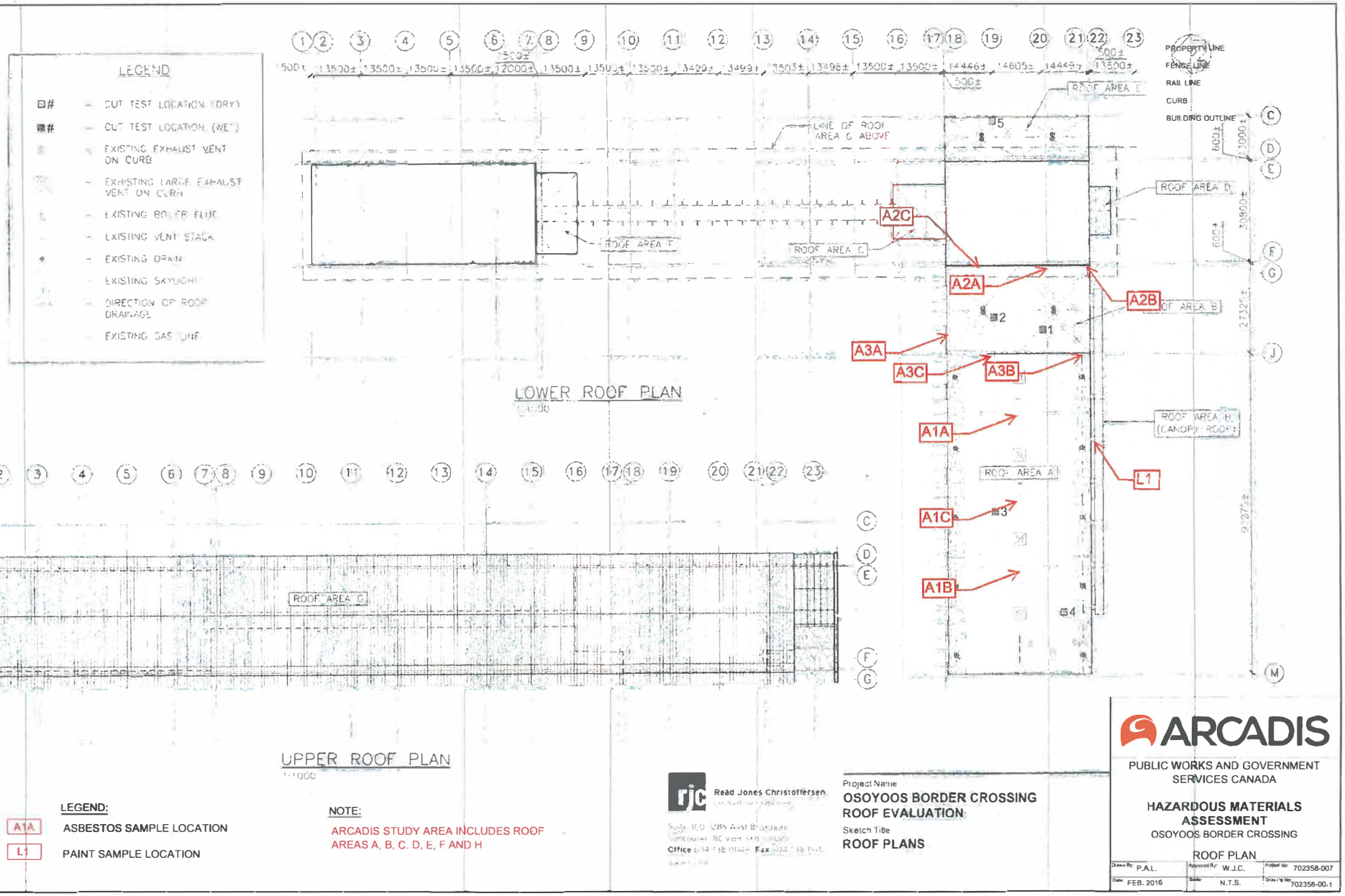
The material in this report reflects Arcadis' best judgment in light of the information available at the time of the investigation, which was performed on February 1, 2016.

This report is not intended to be used as a scope of work or technical specification for remediation of designated substances or hazardous materials.

This report was prepared by Arcadis for Public Works and Government Services Canada, on behalf of Canada Border Services Agency. Any use which any other party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such parties.

APPENDIX A

Roof Plan



LEGEND:

A1A — ASBESTOS SAMPLE LOCATION

L1 — PAINT SAMPLE LOCATION

NOTE:

ARCADIS STUDY AREA INCLUDES ROOF AREAS A, B, C, D, E, F AND H

Read Jones Christoffersen

Project Name
OSOYOOS BORDER CROSSING ROOF EVALUATION

Sketch Title
ROOF PLANS

ARCADIS

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

HAZARDOUS MATERIALS ASSESSMENT
OSOYOOS BORDER CROSSING

ROOF PLAN

Drawn By: P.A.L.	Approved By: W.J.C.	Project No: 702358-007
Date: FEB. 2016	Scale: N.T.S.	Drawing No: 702358-00-1

Z:\702000 Series\702358-007\702358-007 roof plan dwg LAYOUT: PH 1 ESA SAVED: 2/16/2016 10:24 AM PLOTTED: 2/16/2016 2:53 PM BY: PAUL LANDRY

APPENDIX B

Laboratory Reports

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: 604-757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 691600113
Customer ID: 55DCSL97
Customer PO: 702358-007
Project ID:

Attn: Wayne Cormack
ARCADIS Canada Inc.
121 Granton Drive
Unit 12
Richmond Hill, ON L4B 3N4

Phone: (905) 882-5984
Fax: (905) 882-8962
Collected:
Received: 2/10/2016
Analyzed: 2/11/2016

Proj: 702358-007

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: A1A **Lab Sample ID:** 691600113-0001
Sample Description: BLACK WINDOW MASTIC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/10/2016	Black	0%	100%	None Detected	

Client Sample ID: A1B **Lab Sample ID:** 691600113-0002
Sample Description: BLACK WINDOW MASTIC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/10/2016	Black	0%	100%	None Detected	

Client Sample ID: A1C **Lab Sample ID:** 691600113-0003
Sample Description: BLACK WINDOW MASTIC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	2/11/2016	Black	0.0%	100%	None Detected	

Client Sample ID: A2A **Lab Sample ID:** 691600113-0004
Sample Description: GREY WINDOW SEALANT

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/10/2016	Gray	0%	100%	None Detected	

Client Sample ID: A2B **Lab Sample ID:** 691600113-0005
Sample Description: GREY WINDOW SEALANT

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/10/2016	Gray	0%	100%	None Detected	

Client Sample ID: A2C **Lab Sample ID:** 691600113-0006
Sample Description: GREY WINDOW SEALANT - Sealant

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	2/11/2016	Gray	0.0%	100%	None Detected	

Client Sample ID: A3A **Lab Sample ID:** 691600113-0007
Sample Description: TAN FLASHING CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/10/2016	Gray	0%	100%	None Detected	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: 604-757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 691600113
Customer ID: 55DCSL97
Customer PO: 702358-007
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: A3B **Lab Sample ID:** 691600113-0008
Sample Description: TAN FLASHING CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/10/2016	Gray	0%	100%	None Detected	

Client Sample ID: A3C **Lab Sample ID:** 691600113-0009
Sample Description: TAN FLASHING CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	2/11/2016	Gray	0.0%	100%	None Detected	

Client Sample ID: A4-Layer 1 **Lab Sample ID:** 691600113-0010
Sample Description: ROOF MEMBRANE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/10/2016	Gray	90%	10%	None Detected	

Client Sample ID: A4-Layer 2 **Lab Sample ID:** 691600113-0010A
Sample Description: ROOF MEMBRANE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/10/2016	Brown	85%	15%	None Detected	

Client Sample ID: A4-Layer 3 **Lab Sample ID:** 691600113-0010B
Sample Description: ROOF MEMBRANE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/10/2016	Gray/Black	0%	100%	None Detected	
PLM Grav. Reduction	2/11/2016	Gray/Black	0.0%	100%	None Detected	

Client Sample ID: A5-Layer 1 **Lab Sample ID:** 691600113-0011
Sample Description: ROOF MEMBRANE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/10/2016	Gray	90%	10%	None Detected	

Client Sample ID: A5-Layer 2 **Lab Sample ID:** 691600113-0011A
Sample Description: ROOF MEMBRANE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/10/2016	Gray/Black	0%	100%	None Detected	
PLM Grav. Reduction	2/11/2016	Gray/Black	0.0%	100%	None Detected	

Client Sample ID: A6-Layer 1 **Lab Sample ID:** 691600113-0012
Sample Description: ROOF MEMBRANE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/10/2016	Gray	90%	10%	None Detected	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: 604-757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 691600113
Customer ID: 55DCSL97
Customer PO: 702358-007
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: A6-Layer 2 ***Lab Sample ID:*** **691600113-0012A**

Sample Description: ROOF MEMBRANE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/10/2016	Gray/Black	0%	100%	None Detected	
PLM Grav. Reduction	2/11/2016	Gray/Black	0.0%	100%	None Detected	

Client Sample ID: A7-Layer 1 ***Lab Sample ID:*** **691600113-0013**

Sample Description: ROOF MEMBRANE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/10/2016	Gray	90%	10%	None Detected	

Client Sample ID: A7-Layer 2 ***Lab Sample ID:*** **691600113-0013A**

Sample Description: ROOF MEMBRANE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/10/2016	Gray/Black	0%	100%	None Detected	
PLM Grav. Reduction	2/11/2016	Gray/Black	0.0%	100%	None Detected	

Analyst(s):

Alice Feng PLM (15)
Kathleen Cruz PLM Grav. Reduction (7)

Reviewed and approved by:

Alice Feng, Laboratory Manager
or Other Approved Signatory

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. Burnaby, BC

Initial report from: 02/11/201614:56:34

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	551601437
CustomerID:	55DCSL97
CustomerPO:	702358-007
ProjectID:	

Attn: **Wayne Cormack**
ARCADIS Canada Inc.
121 Granton Drive
Unit 12
Richmond Hill, ON L4B 3N4

Project: **702358-007**

Phone:	(905) 882-5984
Fax:	(905) 882-8962
Received:	02/11/16 10:25 AM
Collected:	

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

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Lead Concentration*
L1	*551601437-0001*		2/11/2016	1900 ppm
	Site: STEEL FRAME			

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, LLC, unless specifically indicated otherwise.

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

Initial report from 02/12/2016 07:48:38

APPENDIX C

Photographs

Project Photographs

Hazardous Materials Assessment for the Roof of the CSBSA – Osoyoos, British Columbia

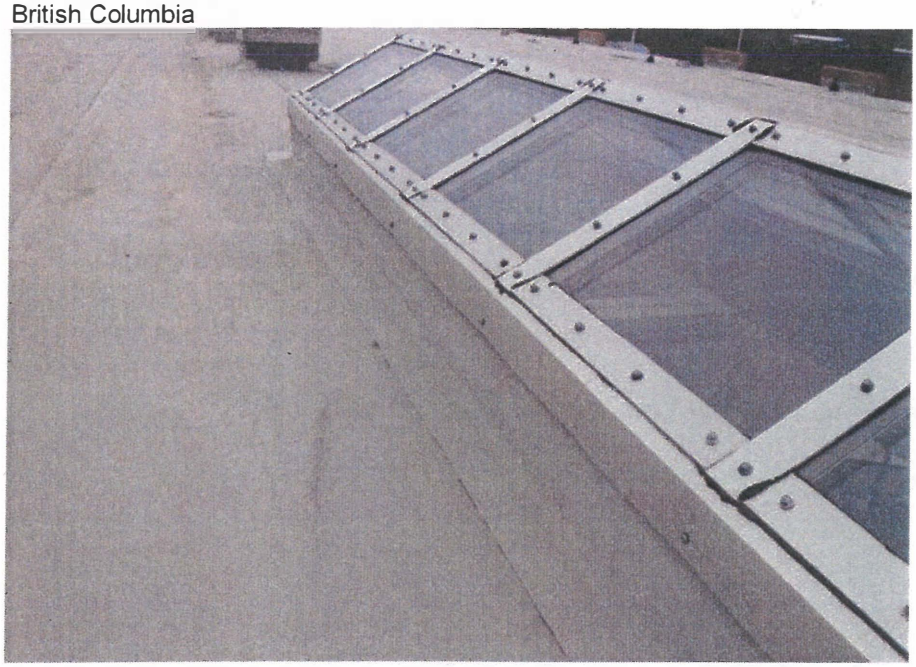


Photo: #1

Date:
February 1, 2016

Description:
Typical skylight with black window mastic – bulk samples A1A,B,C

Photo: #2

Date:
February 1, 2016

Description:
Grey window caulking/mastic – bulk samples A2A, B,C

Location:
Base of window mullions

Project Photographs

Hazardous Materials Assessment for the Roof of the CSBSA – Osoyoos, British Columbia

Photo: #3

Date:
February 1, 2016

Description:
Precast cement panels – caulking at gaps between each panel – samples A3A, B,C

Photo: #4

Date:
February 1, 2016

Description:
Canopy glass removed, metal structure remaining – Sample L1 – silver/grey paint

Project Photographs

Hazardous Materials Assessment for the Roof of the CSBSA – Osoyoos, British Columbia

Photo: #5

Date:
February 1, 2016

Description:
Roof membrane RJC test cut location.

Photo: #6

Date:
February 1, 2016

Description:
Sample A3 – tan caulking between flashing and cement panel parapet.

ARCADIS Design & Consultancy for natural and built assets

Arcadis Canada Inc.

121 Granton Drive, Suite 12, Richmond Hill, Ontario L4B 3N4

Tel 905 882 5984

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