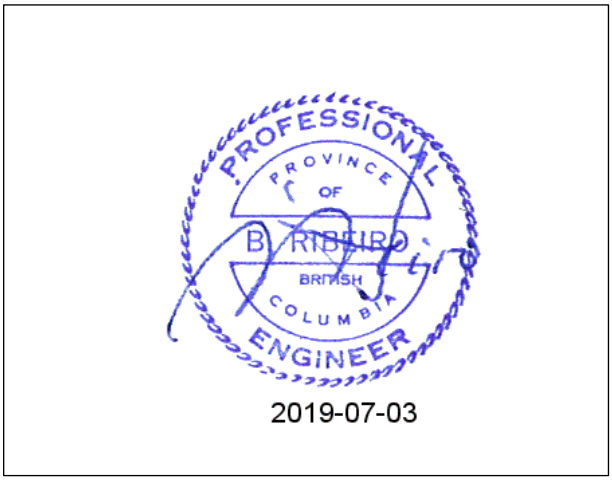

END OF SECTION

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DRAWING LIST

PHOTOGRAPHS

1.0 GENERAL

1.1 LOCATION

Pacific Biological Station, Taylor Building, 3190 Hammond Bay Road, Nanaimo, British Columbia V9T 6N7.

1.2 COMPLETION SCHEDULE

Project shall be completed no later than November 15, 2019, including submission of all final project closeout documentation.

1.3 REPORTING REQUIREMENTS

All communications shall be directed to the DFO Representative.

It is the responsibility of the Contractor to immediately report any unforeseen issues or errors that may be uncovered throughout the entire construction project to the Departmental Representative. The preferred way of communication is through a written document or email.

1.4 DESCRIPTION OF WORK

The work outlined below is general in nature. It is the Contractor's responsibility to provide all labour, material, equipment and supervision to complete the work outlined in this specification and the drawings taking into account all site conditions, noise restriction, work area restrictions, protection requirements, accessibility restrictions, etc. No extras will be entertained for inconveniences after the award of this Contract.

The general Scope of Work includes but is not limited to the following:

General Site

.1 Protect landscaping as required to mobilize scaffolding, lifting devices, hoarding, etc.

.2 Protect all items whether or not they are removed during the course of the Work.

.3 Maintain weathertight conditions at all times.

.4 Maintain access to the building throughout the duration of the project.

.5 Material storage will not be permitted on site.

.6 Provide overhead protection over areas of pedestrian travel as required.

Curtain Wall

.1 Remove and dispose of the existing windows on both sides of the link.

.2 Provide new Curtain Wall assemblies.

Parapets

.1 Reconstruct the parapets to accommodate the Curtain Wall.

.2 Extend the roof overflow scuppers through a section of Composite Panel.

Interior

.1 Remove and dispose of the existing interior guardrails but retain the handrails.

.2 Provide metal closure angles along the stairs and landings.

Existing Sealants

.1 Remove sealants from the concrete surfaces around all existing windows.

Concrete Repair/Restoration

.1 Repair/restore delaminated and spalled concrete uncovered after window removal. Repairs will be considered additional to the base contract unless concrete is damaged during the course of the work.

Typical Details

.1 The details shown on the drawings are typical only. Modifcations may be required of a typical detail to address a specific situation. Not all site conditions have been detailed. The intent is to provide a guideline for various types of details.

Mockups

.1 Provide mockups as required by the Departmental Representative to confirm the adequacy of a detail or to provide direction on modification to a detail at a similar location. This work is considered to be part of the base contract.

Hazardous Materials Abatement

.1 Include all WorkSafe BC requirements to remove and dispose of existing materials as required to complete the Work.

END OF SECTION

1.0 GENERAL

1.1 HOURS OF WORK

.1 The Pacific Biological Station hours of operation vary depending on the area within the site. Generally hours are between 8:00 a.m. and 4:30 p.m., Monday to Friday. If work is required to take place after normal hours of operation arrangements must be made in advance with the Departmental Representative

.2 Use of all equipment to be in accordance with City of Nanaimo noise bylaws.

1.2 TEMPORARY LIGHTING

.1 Provide and maintain temporary lighting for safe demolition and working conditions, conforming to WorkSafeBC regulations.

.2 Provide motion-activated lights on scaffolding as a security measure when the Contractor is not on Site. The Contractor is to ensure that no loose debris is left near the motion sensor, which may set off light.

1.3 TEMPORARY HEATING AND VENTILATION

.1 Provide and maintain supplementary heating as required to maintain sufficient application and curing temperatures for membranes as specified in the relevant material sections of these specifications.

.2 Provide and maintain supplementary ventilation as required. Ventilation requirements shall conform to British Columbia Occupational Health and Safety Standards. Coordinate ventilation requirements with the Owner.

.3 Temporary heat and ventilation used during construction, including cost of installation, fuel, operation, maintenance and removal of equipment shall be paid for by the Contractor. The use of direct-fired heaters discharging waste products into work areas will not be permitted.

1.4 ELECTRICAL POWER

.1 With the exception of those approved for use by the Departmental Representative prior to the close of the Bid period, the existing outlets are not to be used. Contractor to confirm locations with Departmental Representative. Contractor shall pay for any alterations to the electrical system, which may be required to accommodate the Contractor's equipment. Coordinate any required alterations with the Departmental Representative. Reinstate the system to the Departmental Representative's satisfaction upon completion.

1.5 WATER SUPPLY

.1 The Contractor shall pay for the cost of any connections or alterations that he requires to perform the Work. Reinstate the system to the Departmental Representative's satisfaction upon completion.

1.6 SANITARY FACILITIES

.1 Provide and maintain portable washrooms. Coordinate location with the Departmental Representative.

1.7 TRAFFIC CONTROL AND SIGNAGE

.1 Provide all required signage necessary to protect the public from the construction and work area, control of traffic flow through the Site, and to inform users that construction activity is in progress. Signage is to be of a professional quality with 6" (minimum) high letters, which are in direct contrast to background.

1.8 PROTECTION OF WORK AND PROPERTY

.1 Ensure all property is protected from dust and damage.

.2 Dust, dirt, construction debris, water and fumes from the work must not be permitted to enter areas of the building outside of the work area. All claims resulting are the responsibility of the Contractor.

.3 The Contractor is responsible for any damage to mechanical equipment, motors, etc., resulting from dust contamination.

.4 Protection shall be provided for all entrance and exit-ways, floors, walls and all standing fixtures, air intakes and equipment rooms.

.5 Provide a weather tight enclosure at all times.

In the event that security/dust protection to the inside is compromised, full height plywood sheathed hoarding shall be installed. If this hoarding covers existing windows and doors, a temporary door which opens from the inside only, must be installed for emergency egress.

.6 The Contractor shall patch and repair all finishes or painted surfaces damaged during the course of the work. Includes surfaces damaged by duct tape or similar materials during hoarding and protection.

.7 The Contractor shall ensure the building remains operational at all times and perform work as required to ensure that building exits are available at all times.

.8 The Contractor shall control traffic and redirect if necessary. Coordinate any required traffic rerouting and work sequence with the Departmental Representative.

.9 The Contractor shall protect all existing light standards, walls, plants, finishes, windows, doors, etc.

1.9 CONTRACTOR'S USE OF SITE

.1 Parking is limited on site. Parking arrangements for the Contractor will be made after award of contract.

.2 Contractor personnel are not permitted to smoke on Site.

.3 The Contractor shall co-ordinate the work schedule with the Departmental Representative so as to minimize disruptions of the Site. No work shall be performed until approved by Departmental Representative.

.4 Structures are to remain accessible and operational throughout the duration of the Work. The Contractor shall maintain safe means of access and egress for the occupants of the building at all times.

.5 Do not unreasonably encumber the Place of Work with materials or equipment. Construction related debris shall not be permitted to accumulate on Site. Remove daily.

.6 Material storage will not be permitted on Site except in areas designated by the Departmental Representative.

.7 Do not close or obstruct or store materials in roadways, sidewalks or passageways without prior approval from the Departmental Representative. Do not interfere with safe passage to and from the building and adjacent sidewalks and roads.

.8 The Contractor shall obtain and pay for all necessary approvals to locate equipment or materials on City property.

.9 Take all precautions and provide all required protection to ensure the safety of the general public including maintaining emergency evacuation routes at all times.

.10 Exercise caution during transportation of materials or equipment through occupied areas. All damage to be repaired at the Contractor's expense.

.11 Disposal bins, supply trucks, etc. will not be permitted on Site except in areas designated by the Departmental Representative.

.12 The Contractor shall return soft landscaping to a state equivalent to that prior to construction including but not limited to smoothing ruts and undulations resulting from the work and reseeding grass areas damaged during the Work.

1.10 OVERLOADING

.1 Load no part of the structure during construction with a load greater than its designed capacity.

.2 Submit equipment weights and construction procedures to the Departmental Representative for review prior to commencing the Work.

1.11 FIRE PROTECTION

.1 Take necessary precautions to eliminate fire hazards and to prevent damage to the Work, building materials, equipment and other property both public and private having to do with the Work. Inspect the Work at least once a week for this purpose.

.2 Store and locate products and equipment packed in cardboard cartons, wood crates and other combustible containers in orderly and accessible manner. Place approved types of firefighting equipment in vicinity of products packed in this type of crate or carton until permanent fire protection and equipment are available.

.3 Tarpaulins to be fire-resistant.

.4 Open fires or burning of rubbish or debris are not permitted on the Site.

1.12 PROTECTION OF EXISTING EXPOSED FACILITIES

.1 The Contractor shall make allowance in the price to cover all costs of temporary removal and replacement and/or relocation of existing electrical wiring and hardware required for completion of the work.

.2 All exposed conduit, fixtures, attached devices, wet sprinkler fire system plumbing, mechanical system components, louvers and ducts are to be protected or the Contractor shall correct damages at his own expense. The Contractor shall promptly report any damage to the Departmental Representative.

1.13 WALK-THROUGH INSPECTION OF SITE

.1 Prior to start of work, the Contractor and Departmental Representative will perform walk-through inspection of Site. The Contractor shall complete a list detailing all damaged property as well as all items that appear to be of poor working order or appearance.

.2 Upon receiving this notice, the Departmental Representative will verify the validity of the items listed.

.3 If written notice is not given within ten (10) days of commencement of work, it will be assumed that the Contractor has reviewed the Site and has accepted the condition of the property as being free of damage.

.4 Any damages not listed as part of the written notice of Clause 1.12.1 above, found after the completion of the work will be the sole responsibility of the Contractor to rectify. These rectifications shall be completed in a timely manner to a state equivalent or better than the state prior to construction.

1.14 LOCATION OF EXISTING UTILITIES

.1 The Contractor shall be responsible for arranging for the location of all existing utilities prior to construction and protection of it during construction.

1.15 OVERHEAD PROTECTION

.1 The Contractor shall erect and maintain pedestrian walkways, building access and egress, and parking access including roof and side covers complete with electrical lighting, to protect the public and property from injury or damage.

.1 Overhead protection to be a minimum of 3.0 m (10'-0") past exterior entrances and exits, as necessary to protect the occupants from construction activities.

.2 Minimum unobstructed overhead height of 2.4 m (8'-0"). Minimum unobstructed width of at least 2.0 m (8'-0") greater than the combined width or access doors and sidelights at entrances.

.3 Overhead protection shall be capable of supporting any load likely to be applied to it, and capable of supporting a load of at least 2.4 kN/m^2.

.4 Install and provide adequate temporary lighting within the entire length of the overhead protection. Type, quantity and attachment of light fixtures to be approved by the Owner.

.5 All overhead protection and enclosures to be marked with safety signage.

.6 All overhead enclosures and protection to be maintained daily, keeping them clean, orderly and graffiti free.

.7 Once work is complete, remove temporary facilities from Site promptly when directed by the Departmental Representative.

1.16 SITE ENCLOSURES

.1 The Contractor shall erect and maintain site enclosures as necessary to enclose the work area, to protect the public and property from injury or damage.

.1 Minimum extent of site enclosure as required by the conditions.

.2 Minimum site enclosure of construction area shall consist of either/or 1.2m (4’-0”) high snow fencing with supports @ 4’-0” o.c. or 4’-0” high metal chain link fence.

.3 All enclosures to be marked with safety signage.

.4 All enclosures and protection to be maintained daily, keeping them clean, orderly and graffiti free.

.5 Once work is complete, remove temporary facilities from Site promptly or when directed by the Departmental Representative.

1.17 TEMPORARY FIRST AID FACILITIES

.1 Provide a well-stocked and maintained first aid kit in the Site office adequate to handle requirements of hazards during the Work in accordance with WorkSafeBC requirements.

.2 Contractor shall retain a material safety data sheet for all material being used on the project on Site and readily available to the Departmental Representative and Contractor's forces.

1.18 CONSTRUCTION SAFETY

.1 The Contractor will be designated as Prime Contractor pertaining to safety at the Place of Work.

.2 Provide and maintain any temporary lighting required for safe working condition, conforming to British Columbia Occupational Health and Safety Standards.

.3 Lifts, hoists or similar equipment shall be operated only by qualified workers.

.4 Provide and maintain all traffic control, signage, scaffolds, hoarding and barricades where necessary to protect pedestrian and traffic areas.

2.0 PRODUCTS

Not applicable.

3.0 EXECUTION

Not applicable.

END OF SECTION

1.0 GENERAL

1.1 PROJECT CO-ORDINATION

.1 The Contractor is responsible for co-ordination of Trades. Lines of demarcation between Contractors and Trades or trade and trade are solely the responsibility of the Contractor. The Departmental Representative assumes no responsibility for the division of the work or for any jurisdictional involvements as a result of such division.

.2 Contractor is responsible for co-ordination with the Departmental Representative of all on-site activity as it affects the operation of the building.

1.2 NOTIFICATION FOR REVIEW

.1 The Contractor shall notify the Departmental Representative at least 24 hours in advance for reviews. No work shall be covered or concealed until reviewed by the Departmental Representative unless Contractor is informed that a review will not be performed. Such review does not absolve the Contractor from his responsibility to perform his work in accordance with the Contract Documents.

.2 The Departmental Representative shall notify the designated review company for material sampling and testing.

.3 The Contractor shall promptly provide the Departmental Representative with safe access to any part of the Work requiring review.

1.3 SUPERINTENDENCE

.1 The Contractor shall provide a full time Superintendent who shall be on-site on a continuous basis during the execution of the work and shall not be changed without Departmental Representative's consent. Superintendent shall have as a minimum, a mobile phone at all times during Working hours to allow for communication with Departmental Representative.

.2 The Superintendent shall be satisfactory to the Departmental Representative.

.3 Superintendence shall be deemed unsatisfactory and changes or additions to the superintendence may be demanded when control, organization or co-ordination of the Work is not satisfactory, or, the quality of the Work does not meet the requirements of the Contract Documents, or directions given in accordance with the Contract Documents are not followed, or, progress is behind schedule.

2.0 PRODUCTS

Not applicable

3.0 EXECUTION

Not applicable

END OF SECTION

1.0 GENERAL

1.1 DOCUMENTS

.1 This section, along with the drawings, forms part of the contract documents and is to be read, interpreted and co-ordinated with all other parts.

1.2 WORK INCLUDED

.1 Administration of Project Meetings.

.2 Pre-Construction Meetings.

.3 Progress Meetings.

1.3 ADMINISTRATION OF PROJECT MEETINGS

.1 The Departmental Representative will preside at meetings.

.1 A representative of the Departmental Representative will record the minutes, include significant proceedings and decisions, and identify "action by" parties.

.2 The Departmental Representative will reproduce and distribute copies of minutes to meeting participants.

.2 The Departmental Representative will:

.1 Schedule and administer project meetings unless otherwise noted.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each unscheduled meeting three (3) days in advance of meeting date to Contractor.

.3 Representatives of Contractor, Subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the party each represents.

1.4 PRE-CONSTRUCTION MEETING

.1 After award of Contract, a meeting of all parties in the Contract shall be held to review administrative procedures and responsibilities.

.2 Representatives of the Departmental Representative, Contractor, and major Subcontractors will attend.

.3 The Departmental Representative will establish a time and location of meeting and notify parties concerned five (5) days before meeting.

.4 Agenda to include the following:

.1 Appointment of official representatives of participants of the Work.

.2 Schedule of Work, progress scheduling.

.3 Shop drawings and schedule of shop drawing submissions.

.4 Requirements of temporary facilities, site signage, hoarding, dust protection, offices, storage sheds, utilities, fences.

.5 Delivery schedule of critical equipment.

.6 Site security.

.7 Contemplated change orders, procedures, approvals required.

.8 Take over procedures, acceptance, warranties.

.9 Monthly progress claims, administrative procedures, holdbacks.

.10 Appointment of inspection and testing agencies or firms.

.11 Insurance, transcript of policies.

1.5 PROGRESS MEETINGS

.1 During the course of the Work, the Departmental Representative will schedule progress meetings every two weeks. Further progress meetings may be scheduled by the Departmental Representative or Contractor as required to expedite the Work.

.2 The Departmental Representative, Contractor, and major Subcontractors involved in the Work are to attend.

.3 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems which impede construction schedule, conflicts.

.4 Progress, schedule during next work period.

.5 Corrective measures and procedures to regain projected schedule.

.6 Revisions to construction schedule.

.7 Review of off-site fabrication delivery schedules.

.8 Review submittal schedules; expedite as required.

.9 Maintenance of quality standards.

.10 Pending changes and substitutions, Notices of Proposed Change, Change Orders.

.11 Review proposed changes effect on construction schedule and on completion date.

.12 Other business.

2.0 PRODUCTS

Not applicable.

3.0 EXECUTION

Not applicable.

END OF SECTION

1.0 GENERAL

1.1 WORK INCLUDED

.1 Provide a progress schedule – Bar (GANTT) chart

1.2 DEFINITIONS

.1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.

.3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.6 Master Plan: summary-level schedule that identifies major activities and key milestones.

.7 Milestone: significant event in project, usually completion of major deliverable.

.8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.3 REQUIREMENTS

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.

.4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

1.5 PROJECT MILESTONES

.1 Project milestones form interim targets for Project Schedule.

.1 Demolition completed within 2 weeks
.2 Installation of curtain wall completed within 8 weeks
.3 Building closed-in and weatherproofed within 8 weeks
.4 Interior finishing and fitting work completed within 10 weeks
.5 Interim Certificate (Substantial Completion) within 10 weeks
.6 Project shall be completed no later than November 15, 2019, including submission of all final project closeout documentation

1.6 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

.2 Departmental Representative will review and return revised schedules within 5 working days.

.3 Revise impractical schedule and resubmit within 5 working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.7 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:

.1 Award.

.2 Shop Drawings, Samples.

.3 Permits.

.4 Mobilization.

.5 Demolition.

.6 Parapets.

.7 Curtain wall.

.8 Interior finishes.

.9 Testing and Commissioning.

1.8 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.9 PROJECT MEETINGS

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

.2 Weather related delays with their remedial measures will be discussed and negotiated.

2.0 PRODUCTS

Not applicable.

3.0 EXECUTION

Not applicable.

END OF SECTION

1.0 GENERAL

.1 This section specifies general requirements and procedures for Contractor's submissions of shop drawings, product data, samples and mock-ups to the Departmental Representative for review. Additional specific requirements for submissions are specified in the project specifications.

.2 Do not proceed with work until relevant submissions are reviewed by the Departmental Representative.

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

.4 Where items or information is not produced in metric units, converted values are acceptable.

.5 Contractor's responsibility for errors and omissions in submission is not relieved by the Departmental Representative's review of submissions.

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

.7 Contractor's responsibility for deviation in submission from requirements of Contract Documents is not relieved by the Departmental Representative's review of submission, unless the Departmental Representative gives their written acceptance of specified deviations.

.8 Make any changes in submissions which the Departmental Representative may require consistent with Contract Documents and resubmit as directed by the Departmental Representative.

.9 Notify the Departmental Representative in writing when resubmitting of any revision other than those requested by the Departmental Representative.

1.1 SUBMISSION REQUIREMENTS

.1 Coordinate each submission with requirements of work and Contract Documents. Individual submissions will not be reviewed until all related information is available.

.2 Submit one electronic copy of product data, manufacture's catalogue sheets, brochures, literature, performance charts and diagrams.

.3 Submit shop drawings for Curtain Wall assemblies including connection detailing. Shop drawings shall bear the seal of a Professional Engineer licensed to practice in British Columbia.

.4 Comply with the following requirements in regard to submission of product data:

.1 Delete information not applicable to project.

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

.3 Provide certification of compliance to applicable codes.

.4 Provide manufacture's certification as to current production.

.5 Allow 5 working days for the Departmental Representative's review of each submission.

.6 Accompany submissions with transmittal letter in duplicate, containing:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Identification and quantity of each shop drawing, product data and sample.

.5 Other pertinent data.

.7 Submission shall include:

.1 Date and revision dates.

.2 Project title and number.

.3 Name and address of:

.1 Subcontractor.
.2 Supplier.
.3 Manufacturer.

.4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

.5 Details of appropriate portions of Work as applicable:
.1 Fabrication.
.2 Layout, showing dimensions, including identified field dimensions and clearances.
.3 Setting or erection details.
.4 Capacities.
.5 Performance characteristics.
.6 Standards.
.7 Operating weight.
.8 Wiring diagrams.
.9 Single line and schematic diagrams.
.10 Relationship to adjacent work.

.6 After the Departmental Representative's review, distribute copies.

1.2 PRODUCT DATA

.1 Product data: manufactures catalogue sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products.

.2 Submit one electronic copy of product data.

.3 Delete information not applicable to project.

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

.5 Cross-reference product data information to applicable portions of Contract Documents.

1.3 SAMPLES

.1 Samples: examples of materials, equipment, quality, finishes, workmanship.

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

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

1.4 MOCK-UPS

.1 Mock-ups: field-erected examples of work complete with specified materials and workmanship.

.2 Provide mock-ups as requested by the Departmental Representative.

.3 Reviewed and accepted mock-ups will become standards of workmanship and material against which installed work will be verified.

2.0 PRODUCTS

Not applicable.

3.0 EXECUTION

Not applicable.

END OF SECTION

1.0 GENERAL

1.1 REFERENCE STANDARDS

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations

.2 Province of British Columbia

.1 Workers Compensation Act, RSBC 1996 - Updated 2012.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00- Submittals .

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan .

.3 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.4 Submit copies of incident and accident reports.

.5 Submit WHMIS MSDS - Material Safety Data Sheets.

.6 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor.

.7 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.8 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.

.9 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.3 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to beginning of Work.

.2 Contractor shall be responsible and assume the Principal Contractor role for each work zone location and not the entire complex. Contractor shall provide a written acknowledgement of this responsibility within 3 weeks of contract award.

.3 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

1.2 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.3 MEETINGS

.1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.4 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.5 RESPONSIBILITY

.1 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.

.2 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.

1.6 COMPLIANCE REQUIREMENTS

.1 Comply with Workers Compensation Act, B.C. Reg.

.2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.7 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

.2 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, advise Safety Officer and follow procedures in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

1.8 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have site-related working experience specific to activities associated with the work.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

.5 Be on site during execution of Work.

1.9 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Departmental Representative.

1.10 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

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

.3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.11 POWDER ACTUATED DEVICES

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

1.12 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

2.0 PRODUCTS

Not applicable

3.0 EXECUTION

Not applicable

END OF SECTION

1.0 GENERAL

1.1 MANUFACTURERS' INSTRUCTIONS

.1 Unless otherwise specified, comply with Manufacturer's latest printed instructions for materials and installation methods. Supply copy of these instructions to the Departmental Representative prior to commencing work.

.2 Notify Departmental Representative in writing of any conflict between the Contract Documents and Manufacturer's instructions.

1.2 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and maintain packaged materials with Manufacturer's seals and labels intact.

.2 Immediately remove rejected materials from the place of Work.

.3 Storage and handling of materials shall conform to WorkSafe BC Regulations and Manufacturer's instructions.

.4 Toxic or hazardous materials shall be secured in a locked storage area.

.5 All containers shall be labeled in accordance with WHMIS regulations.

.6 All containers shall be labeled with material expiration dates. Materials older than the expiry date shall not be used on the Work and shall be removed immediately from the job site.

.7 Provide Departmental Representative with Material Safety Data Sheets (MSDS) if requested.

2.0 PRODUCTS

2.1 MATERIALS

.1 Use new products unless otherwise specified.

.2 Provide three (3) hard copies and an electronic copy of maintenance instructions and material literature for finished surfaces prior to Substantial Performance.

3.0 EXECUTION

Not applicable.

END OF SECTION

1.0 GENERAL

1.1 DESCRIPTION OF WORK INCLUDED

.1 Provide all labour, material, equipment and services necessary to clean the structure, doors, windows etc. and dispose of all waste products and debris.

.2 Provide all labour, material, equipment and services necessary to clean the structure outside the work area if debris generated by construction has affected those areas.

1.2 GENERAL REQUIREMENTS

.1 Conduct cleaning and disposal operations to comply with the local and municipal ordinances and anti-pollution laws and the building management.

.2 Store volatile wastes in covered metal containers and remove from premises daily.

.3 Prevent accumulation of wastes which create hazardous conditions.

.4 Provide adequate ventilation during use of volatile or noxious substances.

.5 Co-ordinate requirements for ventilation and waste disposal operation with the Departmental Representative.

2.0 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

.1 Use only cleaning materials and equipment approved by the Manufacturer of the surface to be cleaned, and only as recommended by the cleaning material Manufacturer.

3.0 EXECUTION

3.1 PRIOR TO CONSTRUCTION

.1 Prior to the submission of a Bid for this project, the Contractor shall examine the site to determine its condition with respect to debris and dust.

.2 At the time when cleaning is to be performed, the Contractor shall be responsibe to clean the site of all debris generated by the construction as well as any existing debris, unless otherwise indicated in the contract documents.

.3 No extras will be entertained for site cleaning after the contract is awarded.

3.2 WASTE REMOVAL AND CLEANING DURING CONSTRUCTION

.1 The Contractor shall perform all required cleaning during construction.

.2 Maintain the place of the Work and adjacent public properties free from accumulations of waste materials and rubbish.

.3 Provide on-site containers for collection of waste materials and rubbish.

.4 Store volatile wastes in covered metal containers. All wastes, which create hazardous conditions, must be removed from the premises daily.

.5 Disposal of all waste products to be performed in strict accordance with the product Manufacturer's Material Safety Data Sheet, and in accordance with the provincial Waste Control Regulations.

.6 Seal off all work areas to prevent dust and debris being generated from affecting other areas, including construction access requirements. Any dust and debris which escapes from the work area, is to be cleaned up in a timely fashion. If deemed by the Departmental Representative, this cleaning operation has not been performed in a timely fashion, the Departmental Representative may contract an independent cleaner to rectify the situation. The cost of which will be back charged to the Contractor.

.7 Cover drains as required to debris or any other material from entering the drains. Ensure that drains continue to operate as required during construction.

.8 Drainage systems shall not be used to dispose of Project wastes and materials.

3.3 FINAL CLEANING

.1 Contractor is responsible to clean all areas affected by the Work to an as new condition. Remove all debris generated by construction.

.2 Remove all grease, dust, dirt, stains, labels, fingerprints, over-spray and other foreign materials immediately prior to the Departmental Representative’s final review. Clean to "as new" condition.

.3 Prior to the work being considered Substantially Performed, the Contractor shall remove his surplus products, tools, construction machinery and equipment not required for the performance of the remaining work. Contractor shall also remove waste products and debris other than that caused by other Contractors or their employees not involved with the Work and leave the Site clean and suitable for occupancy unless otherwise specified.

.4 Prior to the Work being considered Totally Performed, the Contractor shall remove his remaining products, tools, construction machinery and equipment.

.5 All vertical and horizontal surfaces, systems, fixtures and equipment, etc. shall be cleaned of all dust, grease or spray accumulations.

END OF SECTION

1.0 GENERAL

1.1 SUMMARY

.1 This Section includes requirements for management of construction waste and disposal, which forms the Contractor's commitment to reduce and divert waste materials from landfill and includes the following:

.1 Preparation of a Draft Construction Waste Management Plan that will be used to track the success of the Construction Waste Management Plan against actual waste diversion from landfill.

.2 Preparation of a Construction Waste Management Plan that provides guidance on a logical progression of tasks and procedures to be followed in a pollution prevention program to reduce or eliminate the generation of waste, the loss of natural resources, and process emissions through source reduction, reuse, recycling, and reclamation.

.3 Preparation of monthly progress reports indicating cumulative totals representing progress towards achieving diversion and reduction goals of waste materials away from landfill and identifying any special programs, landfill options or alternatives to landfill used during construction.

.4 Preparation of a Construction Waste Management Report containing detailed information indicating total waste produced by the project, types of waste material and quantity of each material, and total waste diverted and diversion rates indicated as a percentage of the total waste produced.

.2 Departmental Representative has established that this project shall generate the least amount of waste possible and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors be employed by the Contractor.

1.2 REFERENCE STANDARDS

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

.1 ASTM E1609 01, Standard Guide for Development and Implementation of a Pollution Prevention Program

.2 Recycling Certification Institute (RCI):

.1 RCI Certification Construction and Demolition Materials Recycling.

1.3 DEFINITIONS

.1 Clean Waste: Untreated and unpainted; not contaminated with oils, solvents, sealants or similar materials.

.2 Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction operations.

.3 Hazardous: Exhibiting the characteristics of hazardous substances including properties such as ignitability, corrosiveness, toxicity or reactivity.

.4 Non hazardous: Exhibiting none of the characteristics of hazardous substances, including properties such as ignitability, corrosiveness, toxicity, or reactivity.

.5 Non toxic: Not poisonous to humans either immediately or after a long period of exposure.

.6 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

.7 Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

.8 Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form; recycling does not include burning, incinerating, or thermally destroying waste.

.9 Return: To give back reusable items or unused products to vendors for credit.

.10 Reuse: To reuse a construction waste material in some manner on the project site.

.11 Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

.12 Sediment: Soil and other debris that has been eroded and transported by storm or well production run off water.

.13 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

.14 Toxic: Poisonous to humans either immediately or after a long period of exposure.

.15 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

.16 Volatile Organic Compounds (VOC’s): Chemical compounds common in and emitted by many building products over time through outgassing:

.1 Solvents in paints and other coatings;

.2 Wood preservatives; strippers and household cleaners;

.3 Adhesives in particleboard, fiberboard, and some plywood; and foam insulation.

.4 When released, VOC's can contribute to the formation of smog and can cause respiratory tract problems, headaches, eye irritations, nausea, damage to the liver, kidneys, and central nervous system, and possibly cancer.

.17 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

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

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate waste management requirements with all Divisions of the Work for the project, and ensure that requirements of the Construction Waste Management Plan are followed.

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

1.5 SUBMITTALS

.1 Provide required information in accordance with Section 01 33 00 – Submittals.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Draft Construction Waste Management Plan (Draft CWM Plan): Submit to Departmental Representative a preliminary analysis of anticipated site generated waste by listing a minimum of five (5) construction or demolition waste streams that have potential to generate the most volume of material indicating methods that will be used to divert construction waste from landfill and source reduction strategies; Departmental Representative will provide commentary before development of Contractor's Construction Waste Management Plan.

.2 Construction Waste Management Plan (CWM Plan) : Submit a CWM Plan for this project prior to any waste removal from site and that includes the following information:

.1 Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials, and incorporate into CWM Plan.

.2 Alternative Waste Disposal: Prepare a listing of each material proposed to be salvaged, reused, recycled or composted during the course of the project, and the proposed local market for each material.

.3 Landfill Materials: Identify materials that cannot be recycled, reused or composted and provide explanation or justification; energy will be considered as a viable alternative diversion strategy for these materials where facilities exist and are operated in accordance with LEED® Construction and Demolition Waste Management requirements.

.4 Landfill Options: The name of the landfill where trash will be disposed of; landfill materials will form a part of the total waste generated by the project.

.5 Materials Handling Procedures: A description of the means by which any recycled waste materials will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.

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

1.6 PROJECT CLOSEOUT SUBMISSIONS

.1 Record Documentation: Submit as constructed information in accordance with Section 01 78 00– Closeout Submittals as follows:

.1 Construction Waste Management Report (CWM Report) : Submit a CWM Report for this project in a format acceptable to LEED® submittal requirements and that includes the following information:

.1 Accounting: Submit information indicating total waste produced by the project.

.2 Composition: Submit information indicating types of waste material and quantity of each material.

.3 Diversion Rate: Submit information indicating total waste diverted from landfill as a percentage of the total waste produced by the project.

.4 Diversion Documentation Transportation Documentation: Submit copies of transportation documents or shipping manifests indicating weights of materials, and other evidence of disposal indicating final location of waste diverted from landfill and waste sent to landfill.

.5 Alternative Daily Cover (ADC): Submit quantities of material that were used as ADC at landfill sites, and that form a part of the total waste generated by the project.

.6 Multiple Waste Hauling: Compile all information into a single CWM Report where multiple waste hauling and diversion strategies were used for the project.

.7 Photographs: Submit photographs of waste diversion facilities documenting location and signage describing usage of waste separation containers.

1.7 QUALITY ASSURANCE

.1 Resources for Development of Construction Waste Management Report (CWM Report): The following sources may be useful in developing the Draft Construction Waste Management Plan:

.1 Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials, and incorporate into CWM Plan.

.2 Waste-to-Energy Systems: Investigate local waste-to-energy incentives where systems for diverting materials from landfill for reuse or recycling are not available.

.2 Certifications: Provide proof of the following during the course of the Work:

.1 Compliance Certification: Provide proof that recycling center is third party verified and is listed as a Certified Facility through the registration and certification requirements of the Recycling Certification Institute.

1.8 DELIVERY, STORAGE AND HANDLING

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

.2 Handling Requirements: Clean materials that are contaminated before placing in collection containers and ensure that waste destined for landfill does not get mixed in with recycled materials:

.1 Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.

.2 Arrange for collection by or delivery to the appropriate recycling or reuse facility.

.3 Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations.

2.0 PRODUCTS

Not applicable.

3.0 EXECUTION

3.1 (CWM PLAN) IMPLEMENTATION

.1 Manager: Contractor]is responsible for designating an on site party or parties responsible for instructing workers and overseeing and documenting results of the CWM Plan for the project.

.2 Distribution: Distribute copies of the CWM Plan to the job site foreman, each Subcontractor, the Departmental Representative and other site personnel as required to maintain CWM Plan.

.3 Instruction: Provide on site instruction of appropriate separation, handling, and recycling, salvage, reuse, composting and return methods being used for the project to Subcontractor's at appropriate stages of the project.

.4 Separation Facilities: Lay out and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, composting and return:

.1 Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.

.2 Hazardous wastes shall be separated, stored, and disposed of in accordance with local regulations.

.5 Progressive Documentation: Submit a monthly summary of waste generated by the project to ensure that waste diversion goals are on track with project requirements:

.1 Submission of waste summary can coincide with application for progress payment, or similar milestone event as agreed upon between the Departmental Representative.

.2 Monthly waste summary shall contain the following information:

a. The amount in tonnes or $m^3$and location of material landfilled,

b. The amount in tonnes or $m^3$and location of materials diverted from landfill, and

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

3.2 SUBCONTRACTOR'S RESPONSIBILITY

.1 Subcontractor's shall cooperate fully with the Contractor to implement the CWM Plan.

3.3 SAMPLE CONSTRUCTION WASTE MANAGEMENT FORMS

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

.2 SAMPLE WASTE MANAGEMENT FORM

Material Stream	Diverted Waste by Report Date	Total	Units				
Sept	Oct	Nov	Dec				
Material Streams Contributing to Credit	Plastic	1.25	2.5	10	5	18.75	m^3
Carpet	2.5	2.5	2.5	0	7.5	m^3	
Paper/Cardboard	5	2.5	2.5	5	15	m^3	
Clean Wood	0	25	0	1.25	26.25	m^3	
Metal	1.25	2.5	5.5	7	16.25	m^3	
Gypsum Board	2.5	2.5	4	5	14	m^3	
Brick/Concrete	10.5	2.5	5.5	8.75	27.25	m^3	
Asphalt Shingles	10	0	0	0	10	m^3	
Total Diverted Waste	135	m^3					
Material Streams not Contributing to Credit	Landfill	10.75	7.5	15	10	43.25	m^3
Screen Fines (ADC)	5	1.25	0	2.5	8.75	m^3	
150 mm Minus (ADC	1.25	1.25	5	5.5	13	m^3	
Total Landfill/ADC Waste	65			m^3			
Total Waste	200	m^3					
Percent Diverted	67.5	%					

END OF SECTION

1.0 GENERAL

1.1 TAKE OVER PROCEDURE

.1 **Contractor's Review**

.1 The Contractor shall conduct a review of the Work and correct all deficiencies.

.2 The Contractor shall notify the Departmental Representative, in writing, of satisfactory completion of the "Contractor's Review" and request "Departmental Representative's Review".

.2 **Departmental Representative's Review**

.1 The review team shall consist of the Departmental Representative and the General Contractor.

.2 During the "Departmental Representative Review" a list of all deficiencies will be drawn up and signed by the Departmental Representative.

.3 The Contractor shall correct all deficiencies in a timely and satisfactory manner.

.3 **Final Review**

.1 When the Contractor is satisfied that all deficiencies have been corrected, the Contractor shall request, in writing, a "Final Review".

.2 The "Final Review" shall be conducted by the Departmental Representative and the General Contractor.

.4 **Certificate of Substantial Performance**

.1 The Contractor must submit a request in writing to the Departmental Representative for a Certificate of Substantial Completion.

.2 Once the Contractor has received a copy of the Certificate of Completion, he shall comply with the following:

.1 The requirements of the Construction Lien Act.

.2 The requirements of the Workers Compensation Act.

.3 Supply all guaranties, and review certificates in accordance with the requirements of the Contract Documents.

.4 All other contractual requirements

.5 **Total Performance**

.1 Immediately following the issuance of the Certificate of Substantial Performance of the work, the Departmental Representative, in consultation with the Contractor, will establish a reasonable date for the "Total Performance of the Work".

.6 **Release of Holdback**

.1 If at the time holdback is to be released and all deficiencies noted in subsequent site reports have not been completed to the satisfaction of the Departmental Representative, the holdback value associated with these deficiencies as determined by the Departmental Representative will be retained from the holdback to be released. The remainder of the holdback amount will be released provided there are no outstanding claims pursuant to the Construction Lien Act. The portion of the holdback retained for the deficiencies will be held until such time the deficiencies have been rectified to the satisfaction of the Departmental Representative.

2.0 PRODUCTS

Not applicable

3.0 EXECUTION

Not applicable

END OF SECTION

1.0 MANUAL

.1 Submit in both hard and electronic copy an organized compilation of maintenance and renewal data including detailed technical information, documents and records describing maintenance of individual products or systems as specified in individual sections of the specifications.

2.0 GENERAL

.1 Assemble, coordinate, bind and index required maintenance and renewal data into Maintenance and Renewal Manual.

.2 Submit a review electronic copy of the completed Maintenance and Renewal Manual to the Departmental Representative two (2) weeks prior to application for Certificate of Completion of project. Attach draft or example copies of specific warranties/guaranties if required.

.3 Submit **three (3) copies** in English and an electronic copy after acceptance by the Departmental Representative under Clause 2.2.

.4 Organize data into same numerical order as contract specifications.

.5 Material: Label each section with tabs protected with celluloid covers fastened to dividing sheets.

.6 Type lists and notes. Handwritten summaries will not be accepted.

.7 Drawings, diagrams and manufacturers literature must be legible. Provide direct print offs, in colour where applicable, from manufacturers websites. Copies of re-faxes will not be accepted.

3.0 BINDERS

.1 Binders: vinyl, hard covered, 3” "D" ring, loose leaf, sized for 215 x 280 mm paper, with spine pocket.

.2 Identify contents of each binder on spine.

4.0 CONTENTS

.1 A USB drive containing the electronic copy of the manual in each binder.

.2 Cover sheet containing:

.1 Date submitted.

.2 Project title, location and project number.

.3 Maintenance and Renewal Manual, including but not limited to the following:

.1 General Introduction – explain the nature of operations and maintenance items, as well as items that constitute renewals.

.2 Contacts – Include a summary sheet of contact names, telephone, fax, e-mail and mailing addresses for all applicable parties. Include such parties as:

.1 General Contractor
.2 Specific trades
.3 Specific manufacturers
.4 Related consultants
.5 Etc.

.3 Materials and Components Summary- include, in tabular form, a summary outlining the specific materials involved in the construction. Include the product, the product manufacturer, the trade involved in its application or installation, the warranty and technical data sheet supplied by the manufacturer. Include such items as:

.1 Curtain Wall
.2 Membranes
.3 Sealants
.4 Flashings
.5 Etc.

.4 Shop Drawings – attach record copies of all final applicable shop drawings.

END OF SECTION

1.0 GENERAL

1.1 RECORD DRAWINGS

.1 The Contractor shall maintain project record drawings and record accurately deviations from Contract documents.

.2 Record changes in red and mark on one set of prints.

.3 At completion of contract and prior to final inspection, neatly transfer "as-built" records to second set of white prints using a fine red marker. Neatly print lettering and numbers in size to match original. Lines may be drawn free-hand, but shall be neat and accurate. Add at each drawing title block note: "AS-BUILT RECORD". Circle on List of Drawings each title and number of drawings marked with "as-built" records.

.4 Submit both sets of "as-built drawings" record drawings to Departmental Representative on completion of contract and before the final payment to prepare CAD as-built drawings. Contractor shall arrange and pay for the CAD as-built drawings.

.5 Record following information:

.1 Field changes of dimension and detail.

.2 Changes made by Change Order and/or Supplemental Instructions.

.3 Significant deviations that are concealed in construction and cannot be identified by visual inspection.

.4 Type and location of structural repairs, delaminations, etc.

.6 Make project record drawing available at all times for reference purposes and for review by the Departmental Representative. Provide reproducible prints to Departmental Representative at regular intervals but not less than once each month.

.7 If project is completed without significant deviations from contract drawings, declare this in writing and submit to Departmental Representative in lieu of project record documents.

1.2 OPERATION AND MAINTENANCE MANUALS

.1 Submit three (3) reviewed and accepted copies of Manufacturers printed operation and maintenance manuals for requirements requested within those specification Sections. Include as-built drawings and a USB drive in each copy containing the electronic copy of the operation and maintenance manual inclusive of PDF and CAD drawings

.2 Provide original Manufacturers parts list, illustrations, assembly drawings and diagrams required for maintenance as requested within the related specification sections.

2.0 PRODUCTS

Not applicable.

3.0 EXECUTION

Not applicable.

END OF SECTION

1.0 GENERAL

1.1 REFERENCE STANDARDS (Most recent version unless noted otherwise)

.1 ASTM A53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Steamless.

.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 CAN/CGSB-1.40, Anti-corrosive Structural Steel Alkyd Primer.

.5 CAN/CGSB-1.108, Bituminous Solvent Type Paint.

.6 CAN/CGSB-1.181, Ready-mixed, Organic Zinc-Rich Coating.

.7 CAN/CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel.

.8 CAN/CSA-G164, Hot Dip Galvanizing for Irregularly Shaped Articles.

.9 CAN/CSA-S16.1, Limit States Design of Steel Structures.

.10 CSA W48.1, Carbon Steel Covered Electrodes for Shielded Metal Arc Welding.

.11 CSA W48.2, Corrosion-Resisting Chromium and Chromium-Nickel Steel Covered Welding.

.12 CSA W48.3, Low Alloy Steel Covered Electrodes for Shielded Metal Arc Welding.

.13 CSA W48.4, Saolid Carbon Steel Filler Metals for Gas Shielded Arc Welding.

.14 CSA W48.5, Carbon Steel Electrodes for Flux- and Metal-Cored Arc Welding.

.15 CSA W48.6, Fluxes and Carbon Steel Electrodes for Submerged Arc Welding.

.16 CSA W59, Welded Steel Construction (Metal Arc Welding).

1.2 SUBMITTALS

.1 Submittals to be made in accordance with Section 01 33 00 – Submittals.

.2 If requested, submit three (3) certified copies of mill reports covering chemical and mechanical properties, and coating designation of steel used in this work.

.3 Submit samples of framing and fastener components to Departmental Representative if requested.

.4 Product Data

.1 Submit product data for mechanical fasteners, indicating sizes, shear, and pull-over loading capacity where applicable. Provide data indicating thickness and type of corrosion protection coating.

.2 Submit product data indicating suitability of explosive powder actuated fasteners for application.

.5 Shop drawings:

.1 Submit shop drawings indicating materials, core thicknesses, finishes, connections, joints, methods of anchorage, number of anchors, supports, reinforcement, details and accessories.

.6 Submit evidence of welder qualifications specified in this Section.

1.3 QUALITY ASSURANCE

.1 Contractor to provide proof of manufacturer training for installation of proprietary fastener systems.

.2 Welding shall be by company certified by the Canadian Welding Bureau to CSA W47.1-92, Certification of Companies for Fusion Welding of Steel Structures.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver and store material undamaged in original wrapping or containers, with manufacturer's labels intact.

.2 Prevent damage to materials during handling and storage. Any damaged materials will be rejected by the Departmental Representative.

1.5 SITE CONDITIONS

.1 Ensure temperature and ventilation conditions are maintained for various components and materials of the system, as required by manufacturer.

.2 Protect work of other sections and subtrades from damage resulting from work of this section.

.3 Take necessary care to avoid damage of adjacent surfaces.

.4 Examine the underlying visible surfaces and adjoining work and report defects at time of installation, which might impair the work of this section to the Departmental Representative, in writing.

.5 Commencement of work shall imply acceptance of surfaces.

.6 Cooperate with other trades to accommodate fixtures and attachments in the system.

2.0 PRODUCTS

2.1 MATERIALS

.1 Steel Sections and Plates: To CAN3-G40.21, Grade 300W, hot dipped galvanized.

.2 Steel angles/lintels: To CAN3-G40.21, Grade 300W, hot dipped galvanized for exterior use sizes indicated for openings.

.3 Welding Materials: To CSA W59.

.4 Welding electrodes: To CSA W48 Series.

.5 Bolts and Anchor Bolts: To ASTM A307.

.6 Shop Primer: To CGSB 1-GP-40M.

2.2 FABRICATION

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

.2 Fabricate items from steel and use hot dipped galvanized steel for exterior items, unless indicated otherwise.

.3 Where possible, fit and shop assemble items, ready for erection.

.4 Exposed joints and connections shall be tight, flush and smooth unless otherwise indicated.

.5 Where work of other Sections is to be attached to work of this Section, prepare work by drilling and tapping holes as required to facilitate installation of such work.

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

.7 Insulate contact surface to prevent electrolysis due to metal-to-metal contact or between metal and masonry or concrete. Use bituminous paint, butyl tape, building paper or other approved means.

2.3 ANCHORING DEVICES

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

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

.3 Explosive Powder Actuated Fasteners: as recommended by manufacturer for the application, subject to approval by the Departmental Representative.

2.4 FRAMING CONNECTION DEVICES

.1 Screws: self-tapping and self-drilling, and as follows:

.1 Case hardened, non-corrosive screw, #10 or heavier with pan type washer heads, ½ inch diameter.

.2 Sheet metal screws shall be stainless steel or steel with a minimum coating thickness of 0.008 mm of zinc or cadmium. Other coatings providing equal or better corrosion protection may be used.

.3 Length: adequate to penetrate not less than 3 fully exposed threads beyond joined materials.

.4 Thread types and drilling capability shall conform to the manufacturer's recommendations.

.5 Screws covered by sheathing materials shall have low profile heads.

.2 Welding Electrodes: minimum tensile strength series of 480 MPa, suitable for material being welded.

2.5 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

.3 Grind smooth sharp projections.

2.6 STEEL FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m^2 to CAN/CSA-G164.

.2 Shop Coat Primer: To CAN/CGSB-1.4.

.1 Prime with one (1) shop coat of paint to a 2 mil (0.05 mm) thickness. Do not paint when temperature is lower than 7°C.

.2 Exterior steel shall be commercially sandblasted in accordance with SSPC-SP6 to remove mill scale prior to application of primer.

.3 Do not prime the following surfaces:

.1 Steel to be encased in concrete.
.2 Nonferrous metals.
.3 Surfaces and edges to be field welded. If painted, remove paint for field welding for a distance of at least 2" (50 mm) in all sides of the paint.

.3 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181. Apply one coat of zinc rich paint to all surfaces exposed or damaged after erection to minimum dry film thickness of 60 micrometres. Apply coating immediately after cleaning. Touch-up welds.

.4 Bituminous paint (isolation coating): To CAN/CGSB-1.108. Apply an isolation coating to contact surfaces of following components in contact with cementitious materials and dissimilar metals except stainless steel: (1) exterior components (2) interior components exposed to high humidity conditions.

3.0 EXECUTION

3.1 GENERAL

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

3.2 ERECTION

.1 Erect items square, plumb, straight and true, fitted accurately, with tight joints and intersections.

.2 Make all field measurements necessary to insure the proper fit of all members.

.3 Provide suitable means of anchorage acceptable to the Departmental Representative by dowels, anchor clips, bar anchors, expansion bolts and shields, toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Make field connections with high tensile bolts to CAN/CSA-S16.1 or weld.

.6 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.

.3 Touch-up welds with zinc rich paint.

.7 Connections to the post-tensioned concrete slabs must be by power-driven fasteners. Refer to drawings for embedment and clearances.

3.3 TOUCH-UP AND CLEANING

.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

1.0 GENERAL

1.1 REFERENCE STANDARDS

.1 CSA O80 Series, Wood Preservation.

.2 CAN/CSA O141, Softwood Lumber.

.3 CSA O121, Douglas Fir Plywood.

.4 CSA O151, Canadian Softwood Plywood.

.5 CSA O153, Poplar Plywood.

.6 CAN/CSA 0325.0 (R1998), Construction Sheathing

.7 CAN 0437 Series-93, Standard on OSB and Waferboard

.8 CSA B111, Wire Nails, Spikes and Staples.

.9 National Lumber Grades Authority (NLGA) Standard Grading Rules for Canadian Lumber, Latest Edition.

1.2 REGULATORY REQUIREMENTS

.1 Comply with applicable requirements of the British Columbia Building Code, latest edition.

1.3 SOURCE QUALITY CONTROL

.1 Lumber Identification: By grade stamp of an agency certified by Canadian Lumber Standard Accreditation Board.

.2 Plywood Identification: By grade make in accordance with applicable CSA standards.

.1 Supply other panel products marked with a recognized, visible grade stamp.

1.4 QUALIFICATION

.1 Qualification of Installers: The Contractor shall maintain a qualified crew of carpenters throughout the duration of the work. Only qualified journeymen shall be engaged in framing and each journeyman shall have a B.C. Certificate of Proficiency.

1.5 SUBMITTALS

.1 Submittals to be made in accordance with Section 01 33 00 – Submittals.

.2 Product Data

.1 For products treated with preservative by vacuum-pressure impregnation submit following information certified by authorized signing officer of treatment plant:

.1 Information listed in AWPA.M2 and revisions specified in CAN/CSA-080 Series, Supplementary Requirement to AWPA Standard M2 applicable to specified treatment.

.2 Moisture content after drying following treatment with water-borne preservative.

.2 Submit product data for double hot-dipped galvanized nails confirming compliance with ASTM-153.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Protect materials from moisture upon delivery to job site.

.2 Store materials on raised supports. Cover materials with waterproof covering. Provide adequate air circulation and ventilation.

.3 Do not store seasoned materials in wet or damp areas.

2.0 PRODUCTS

2.1 LUMBER MATERIALS

.1 Lumber: Preservative treated. Except as indicated or stated otherwise lumber to be softwood, S-P-F, S4S, kiln-dried, moisture content 15% or less in accordance with the following standards:

.1 CAN/CSA O141.

.2 Graded and stamped in accordance with the National Lumber Grades Authority (NLGA) Standard Grading Rules for Canadian Lumber.

.3 Finger jointed lumber is not acceptable.

.2 Furring, Blocking: S-DRY, Douglas fir species. Preservative treated

.1 Board Sizes: “Standard” grade to NLGA, Paragraph 114c.

.2 Dimension Sizes: “Standard” grade to NLGA, Paragraph 122c.

.3 Curbs, Nailers, Blocking, Cants for Roofing: Paragraph 2.1.2.

2.2 FASTENERS

.1 Nail, Spikes and Staples:

.1 To CSA B111.

.2 Use common spiral nails and spiral spikes, except where indicated otherwise, for interior work.

.3 All nails, spikes and staples in contact with borate treated lumber to be hot-dipped galvanized finished steel. All such fasteners in contact with ACQ treated lumber to be stainless steel.

.2 Bolt, nut, washer, screw and pin type fasteners: 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 stated otherwise.

.3 Do not combine stainless steel fasteners with galvanized hardware or vice-versa.

2.3 PRESERVATIVE TREATMENT

.1 Treat all lumber and plywood in accordance with applicable CAN/CSA 080 commodity standard using "Advance Guard" borate-pressure treatment to obtain minimum net retention of 2.7 kg/m3 of wood. Materials to be kiln-dried after treatment. Lumber shall carry the Canadian Wood Preserver's Bureau Quality Mark ("Advance Guard" quality mark).

.2 Inspection of products treated with preservative by vacuum-pressure impregnation will be carried out by an accredited inspection agency of the Canadian Wood Preservers Bureau (CWPB).

.3 All treated lumber and plywood shall bear an identifying stamp in accordance with the CWPB, CSA 080 or AWPA requirements.

.4 Following water-borne preservative treatment, dry material to maximum moisture content of 15%.

.5 Surfaces exposed in preservative treated materials by cutting, trimming or boring must be field treated.

2.4 ACCESSORY MATERIALS

.1 Field applied wood preservative:

.1 For ACQ or CA preservative wood: Organic solvent, copper naphthenate, prepared in accordance with CSA O80.15, coloured green.

.2 For borate preservative wood: Water-based, borate-based, prepared in accordance with CSA O80.15, tint green.

.2 Polyethylene Film: to CAN/CGSB-51.34-M86, 100 micrometre thick.

.3 Sealing Tape: minimum 60 mm width, polypropylene sheathing tape with acrylic adhesive, or duct tape of same width.

.4 Sill Gaskets: closed-cell vinyl foam, with moisture-resistant properties.

3.0 EXECUTION

3.1 FIELD TREATMENT OF PRESERVATIVE TREATED AND EXISTING PRODUCTS

.1 Treat field cuts made in preservative-treated items using preservative, in accordance with AWPA M4.

.2 Apply preservative in accordance with manufacturer's instructions. Apply by dipping, by brush or by spray to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and one minute soak on plywood. Allow to dry 24 hours prior to covering.

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

.4 Preservative field treat all existing lumber and plywood sheathing that is located on the interior of the moisture barrier (sheathing paper).

3.2 WOOD FURRING AND BLOCKING

.1 Provide wood furring and blocking at locations indicated on drawings and as specified.

3.3 NAILING STRIPS, GROUNDS AND ROUGH BUCKS

.1 Install rough bucks, nailer and linings to rough openings as required to provide backing for frames and other work.

.2 Erect all wood framing members level and plumb. Construct to framing member's full height without splices.

3.4 STORAGE OF MATERIALS

.1 All materials to be stored in a dry environment. No materials having a moisture content of over 15% to be covered up.

END OF SECTION

1.0 GENERAL

1.1 SECTION INCLUDES

.1 Provide all labour, materials, equipment, and supervision to detail transitions with a poly methyl methacrylate (PMMA) waterproofing system as indicated on the drawings.

1.2 REFERENCE STANDARDS

.1 ASTM C957-87: Standard Specification for High-Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with Integral Wearing Surface

.2 ASTM D412-87: Standard Test Methods for Rubber Properties in Tension

.3 ASTM D4541-89: Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers

.4 ASTM E96: Test Methods for Water Vapour Transmission of Materials

.5 ICRI Technical Guideline No. 310.2: Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

1.3 SITE EXAMINATION

.1 Surface preparation of each substrate, sufficient to receive the PMMA coating shall be included in the Work. Rough surfaces may require additional surface preparation after shotblast cleaning. All costs of surface preparation and patching of rough surfaces are to be included. No extras for surface preparation or additional material will be allowed.

1.4 PERFORMANCE REQUIREMENTS

.1 The PMMA (poly methyl methacrylate) coating system shall satisfy the following requirements for the duration of the warranty:

.1 The system shall be totally waterproof, flexible and thermally compatible with the substrate under applicable service conditions.

.2 The system shall not allow moisture penetration at termination details, upturns, or splices.

.3 The system shall withstand active cyclical crack movements to a maximum of 1.5 mm and remain waterproof.

.4 Adhesion of the PMMA coating, primer, or surface patching to the concrete substrate shall meet or exceed 1.0 MPa.

.5 Adhesion of all layers of the system to each other shall meet or exceed 1.0 MPa.

.6 The system shall not debond, crack, or wear excessively. Loss of aggregate in any area will constitute failure.

.7 The PMMA coating system shall not support combustion.

.8 The PMMA coating system shall be UV stable.

1.5 SUBMITTALS

.1 Contractor is to submit installation procedures to the Departmental Representative for review prior to starting work, including slab preparation requirements.

.2 The Contractor shall submit a 200 mm x 200 mm product sample indicating proposed finish and material thickness to be obtained for each specific membrane application included in the Work. These samples will represent the quality of finish of completed installation.

.3 Contractor shall provide an electronic copy of maintenance instructions for finished surfaces prior to Substantial Performance.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Store PMMA coating materials away from heat, open flame, and sources of ignition.

.2 Special care shall be taken while handling poly methyl methacrylate (PMMA) waterproofing products. Personal protection equipment shall be worn as required by the Occupational Health and Safety Act/Regulation of the Province of BC and as required by WHMIS. Personal protection equipment to include, but not limited to, impermeable gloves, safety glasses and NIOSH approved respiratory protection.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Do not install PMMA coating when ambient air temperature or substrate temperature is less than 10 degrees C. If this temperature is not reached, installation of temporary heaters is required.

.2 Maintain air temperatures and substrate base temperature of installation area above 10 degrees C for 12 hours before, during and 6 hours after installation, or until materials have adequately cured.

.3 Protect materials from moisture damage or dust contamination until adequately cured.

.4 All working conditions shall meet the requirements of the Occupational Health and Safety Act/Regulation of the Province of BC.

.5 Contractor to provide forced air circulation during period for enclosed applications.

2.0 PRODUCTS

2.1 REINFORCED LIQUID APPLIED POLYMETHYL METHACRYLATE (PMMA)

.1 Substrate Primer: Two-component, PMMA-based, rapid cure, coverage rate in accordance with the manufacturer's recommendations, based on substrate surface finish.

.2 Field Surface Membrane: Two-component, PMMA-based liquid membrane, Minimum 2 flood applications. Coverage rate in accordance with manufacturers recommendations for waterproof application.

.3 Membrane Flashings: Two-component, PMMA-based, liquid membrane, reinforced with fleece fabric.

.4 Colour Finish: Two-component, PMMA-based, clear liquid resin, coloured to match adjacent paint finish.

.5 Transitional Flashing: Two-component, PMMA-based, liquid membrane.

.6 PMMA coating to be reinforced with non-woven needle-punched polyester fleece.

.7 Material thickness specified are minimum neat (i.e. without aggregate) dry film thickness, not average. Contractor shall grind down or patch rough surfaces to ensure minimum thickness of membrane is applied everywhere; or if approved by manufacturer, additional membrane may be applied to achieve minimum thickness.

2.2 SURFACE PATCH MATERIALS

.1 Products used to patch rough surfaces shall be compatible with chosen product. PMMA coating material may be used to fill rough areas if approved by manufacturer.

3.0 EXECUTION

3.1 PREPARATION

.1 Preparation of slab and vertical surfaces is to be in strict accordance with the requirements of the system manufacturer's recommendations and these Contract Documents including the following: preparation and smoothing of rough surfaces, and detailing of slab cracks, joints and voids as required. In the event of a conflict between the requirements of these documents and the manufacturer's recommendations, the more stringent requirement shall govern.

.2 Minimum standard of slab cleaning shall be shot blast or equivalent, leaving slab surfaces free of all laitance with minimum texture and finish of Concrete Surface Profile (CSP) Level 5.

.3 Minimum standard of vertical surface cleaning shall be dry sandblast for all systems.

.4 All rough surfaces, vertical amplitude exceeding 40 mils (1.0 mm), must be ground and/or filled to provide a smooth surface.

.5 Sawcut cracks or joints shall be straight sided and follow the extent of crack. Locations of crack sealing shall be as directed by Departmental Representative. Do not overcut beyond actual extent of crack. Sandblast sawcut surfaces.

.6 Remove all existing crack sealants and sandblast-exposed surfaces.

.7 Fill sawcut cracks and joints with approved sealant materials flush with slab surface. Application to be in strict conformance to the Manufacturer's recommendations and these Contract Documents.

.8 Surfaces shall be cleaned of all grease and oil with an emulsifier or degreaser where necessary to ensure that surface contaminants have been removed. Cleaning products shall not affect the performance of the coating. Do not apply coating until water spot testing confirms that water drops penetrate into the concrete, with no surface beading.

.9 Install a continuous 20 mm fillet bead of compatible sealant at the base of vertical surfaces receiving coating prior to application of PMMA coating basecoat.

.10 Provide double application of membrane at all vertical surfaces and at cracks and joints up to 1.6 mm wide.

.1 Joints greater than 1.6 mm wide to be specially detailed. Submit details to Departmental Representative for review.

.11 The coating shall be turned up all vertical surfaces a minimum of 150 mm. Mask top of upturn to ensure neat straight finish to coating. All vertical surface irregularities to be patched prior to coating application.

.12 Commencement of work shall imply Contractor's acceptance of the prepared concrete surfaces and assumption of full responsibility for the surfaces prepared to receive the primer and membrane.

.13 Application procedures that result in toxic fumes or flammable solvent collecting or endangering workmen or building occupants are not permitted.

3.2 INSTALLATION

.1 Install system in accordance with the manufacturer's specifications. Reinforce as required by manufacturer's installation recommendations.

.2 Finished surfaces shall be of uniform appearance, with minimal variations in light reflection, surface roughness, or ridges in sloped areas.

END OF SECTION

1.0 GENERAL

1.1 SECTION INCLUDES

.1 Self-adhering membranes as indicated on the drawings and as specified herein.

1.2 REFERENCE STANDARDS

.1 CGSB 19-GP-14M - Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

1.3 QUALITY ASSURANCE

.1 Obtain all materials from a single manufacturer.

.2 All membrane work shall be carried out by a specialist applicator, approved by the membrane manufacturer, who can substantiate successful installation of similar membrane systems over a minimum period of five years.

.3 A technical representative from the membrane manufacturer shall ensure compliance with the manufacturer's directions. The technical representative shall be present when the applications start and shall make periodic inspections during applications, as required.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver and store all materials in their original packaging in undamaged condition, sealed with labels intact, having manufacturer's name, brand, weight, and applicable reference standards clearly shown.

.2 Protect materials from damage, weather and store in a dry place.

.3 Handle materials in accordance with the manufacturer's recommendations. Promptly remove damaged or deteriorated materials from site.

2.0 PRODUCTS

2.1 WALL MEMBRANE FLASHINGS

.1 Self-adhering SBS rubberized asphalt compound integrally laminated to polyethylene or polyprolylene film.

2.2 HIGH TEMPERATURE FLASHING

.1 Self-adhering SBS rubberized asphalt compound integrally laminated to polyethylene or polyprolylene film providing a continuous air and vapour seal.

2.3 ACCESSORIES

.1 Primers, Mastics, Sealants, Liquid Membrane, Control Joint Materials: as required or recommended by membrane manufacturer.

3.0 EXECUTION

3.1 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept the work of this Section.

.2 Report any unsatisfactory conditions or surfaces to the Departmental Representative in writing. Starting work shall imply acceptance of surfaces and conditions.

.3 Take all necessary measurements and levels at the building. Lay out the work accurately to fit the conditions at the building and adjacent work.

.4 Notify the Departmental Representative of any variations beyond acceptable tolerances in the substrate or in the adjacent work.

3.2 PREPARATION

.1 Prepare all surfaces to receive membrane, including substrates, joints, cracks, and coves, in accordance with the membrane manufacturer's directions.

.2 Ensure that all substrate surfaces are smooth, dry and firm. Remove any frost, ice, loose particles, ridges, laitance, cracks, grease, asphalt, oil and other foreign matter which could prevent adhesion of the membrane to the substrate.

.3 Ensure that concrete surfaces are free from surface pitting and honeycombing. Remove projections and other irregularities which could puncture the membrane. Fill voids, surface pitting and honeycombing. Repair pour joints and provide a surface satisfactory for application of membrane.

3.3 PRIMING

.1 Clean and prime substrate surfaces to receive self-ahdering membrane in accordance with membrane manufacturer's instructions.

.2 Ensure substrate and ambient air are within manufacturer recommended temperature range for application.

.3 Open time to be inaccordance with the primer manufacture's recommendations.

3.4 MEMBRANE APPLICATION

.1 Application of membrane, including temperature limitations, curing requirements and all other application procedures shall be in accordance with membrane manufacturer's written directions.

.2 Cut and seal membrane around protrusions to form tight seal.

.3 Apply trowelled bead of mastic to all terminations at end of each day's work.

.4 Inspect membrane thoroughly before being covered and make any corrections immediately. Repair misaligned or inadequately capped seams, punctures, or other damage by patching and sealing in accordance with membrane manufacturer's directions.

.5 At all detail areas, take extra care to ensure continuity of the membrane.

.6 Apply membrane in a "shingle", to direct water in a downwards fashion with joints lapped a minimum 100mm.

.7 Extend all membrane patches a minimum of 150mm from repair location or penetration. Seal all around patches with tooled mastic.

.8 Seal all side laps and all reverse laps with mastic.

.9 Bridge all joints or gaps wider than 6mm with galvanized steel sheet, wood or other suitable backing and apply 300mm piece of membrane over joints prior to application of the field membrane.

.10 Coordinate installation of membrane with other related work to minimize exposure of membrane.

3.5 PROTECTION

.1 Repair, remove and clean all mastic, primer or other smears on exposed finished surfaces or surfaces to be subsequently finished. Clean off immediately to the satisfaction of the Departmental Representative. Protect all adjacent surfaces from damage due to membrane operations.

END OF SECTION

1.0 GENERAL

1.1 REFERENCE STANDARDS

.1 RCABC Roofing Practices Manual and Roofstar Guarantee Program.

.2 ASTM A653/A653M-15, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM A792/A792M-10(2015), Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.4 ASTM B32-08(2014), Standard Specification for Solder Metal.

.5 ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

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

.7 Architectural Sheet Metal Manual, Sheet Metal and Air Conditioning Contractors National Association, Inc (SMACNA).

.8 CSSBI S8-2008, Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products.

1.2 SUBMITTALS

.1 Submittals to be made in accordance with Section 01 33 00 – Submittals.

.2 Samples:

.1 Submit samples of each condition including sill, head, jamb, saddle, etc.

.2 Submit samples of each type of material and colour to be used.

.3 Product Data: Provide manufacturer's technical data for each type of material to be used.

.4 Maintenance Data:

.1 Provide in accordance with Section 01 78 23 – Maintenance and Renewal Manual.

1.3 MOCK-UP

.1 Construct mock-up in accordance with Section 01 33 00 – Submittals.

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

.3 Mock-ups may remain part of finished work.

.4 Allow 24 hours for Departmental Representative's review of mock-ups before proceeding with work.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Do not expose Products to wetting or damage. Store neatly, properly stacked.

.2 Transport, handle and store Products so as to prevent damage. Stack preformed Products in manner to prevent twisting, bending and rubbing.

.3 Remove all units or components that are stained, watermarked, cracked, bent, chipped, scratched or otherwise unsuitable for installation and replace with new.

.4 Protect finish and edges in accordance with manufacturer's directions.

.5 Store material in accordance with manufacturer's directions.

.6 Prevent contact of dissimilar metals during storage and protect from acids, flux, and other corrosive materials and elements.

2.0 PRODUCTS

2.1 SHEET METAL MATERIALS

.1 Carbon Steel:

.1 G90 galvanized steel sheet: to ASTM A653/A653M, commercial quality with Z275 designation zinc coating. Thickness: 24 gauge (0.6070mm).

.2 Finish:

.1 Prefinished steel with factory applied polyvinylidene fluoride on primer, both paint and primer back cured. Include paint system coating to reverse side of coil stock to prevent corrosion of backside surfaces and uniform colour.

.2 Performance Level: "CSSBI S8-2008. Coating thickness not less than 25 micrometres +/- 3 micrometres.

.3 Colour: As selected by the Departmental Representative; colours from the manufacturer's standard colour range.

2.2 ACCESSORIES

.1 Plastic Cement: cutback asphalt type, to CAN/CGSB 37.5.

.2 Underlay for Metal Flashing: refer to Section 07 65 16 – Self-Adhering Membrane. Self-adhering membrane or equivalent with compatible primers and sealants. Acceptable Products:

.3 Sealants: in accordance with Section 07 92 00 – Building Enclosure Sealants.

.4 Cleats and Starter Strips: of same material, and temper as sheet metal, minimum 50 mm wide x thickness same as sheet metal being secured.

.5 Fasteners: of same material as sheet metal, corrosion resistant, to CSA B111, flat head roofing nails of length and thickness suitable for metal flashing and trim application.

.6 Washers: of same material as sheet metal, 1.0 mm thick with rubber packings.

.7 Solder: to ASTM B32, alloy composition 50% pig lead and 50% block tin.

.8 Flux: commercial quality as recommended by sheet metal manufacturer.

.9 Touch-Up Paint: as recommended by the prefinished material manufacturer.

2.3 FABRICATION

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable RCABC and SMACNA details and specifications.

.2 Fabricate aluminum flashings and other sheet aluminum work in accordance with Aluminum Association Sheet Metal Work in Building Construction.

.3 Form to maximum 2400mm lengths using one piece for each flashing section. Make allowance for expansion at joints.

.4 Use flat-lock folded seams for all joints and splices of thru-cavity flashings. S-lock joints may be used if all flashing surfaces are sloped greater than 3:1.

.5 Use standing seams for all joints and splices for cap flashings. Use flat-lock seams where cap flashings are accessible to occupants.

.6 Hem exposed edges on underside 12 mm; mitre and seal corners with sealant.

.7 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.8 Ends of thru-cavity flashing shall have 50mm folded upturn, creating an end dam. Do no cut and caulk upturns.

.9 Form metal flashing on a bending brake with shaping trimmed. Perform hand seaming on a bench, as far as practicable, with proper sheet metal working tools. Make angles of bends and folds for interlocking metal with full regard to expansion and contraction to avoid buckling and damage to metal.

.10 Form flashings to profiles indicated on Drawings and as required to complement and finish membrane roofing and wall systems.

3.0 EXECUTION

3.1 EXAMINATION

.1 Examine surfaces to receive flashings. Notify the Departmental Representative of surfaces which are considered unacceptable to receive the work of this Section.

3.2 PREPARATION

.1 Protect the work of other Sections from damage by the work of this Section.

3.3 INSTALLATION - GENERAL

.1 Install sheet metal working accordance with applicable RCABC standards.

.2 Use concealed fastenings throughout, except where approved by the Departmental Representative prior to start of the work.

.3 Provide underlay under sheet metal; secure in place and lap joints 100 mm.

.4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flashing joints using standing seams forming tight fit over hook strips.

.5 Use flat-lock joints for all metal flashing except roof. S-pocket and standing seams are acceptable. Lock end joints and caulk with sealant.

3.4 CAP FLASHINGS

.1 Supply and install continuous metal starter strips, secure at 600mm o.c., maximum of 50mm above drip edge, with fastener of sufficient length to penetrate a minimum of 25mm into the substrate.

.2 Supply and install metal cleats at 600mm o.c. and as detailed. Use fastener of sufficient length to penetrate a minimum of 25mm into substrate.

.3 Form cap flashings to profiles shown on Drawings and ensure positive drainage to the interior roof surface areas.

3.5 TOUCH-UP AND CLEAN-UP

.1 Remove grime and dirt from flashing materials by dry wiping as the material is erected.

.2 Remove all excess solder. Remove excess sealant with sealant manufacturer recommended solvent that will not harm finish.

.3 Wipe off all hand prints, smudges, and other superficial stains.

.4 Remove and replace all dented and damaged materials.

END OF SECTION

1.0 GENERAL

1.1 SECTION INCLUDES

.1 Interior and exterior building enclosure sealants.

1.2 REFERENCE STANDARDS

.1 All Reference Standards are latest editions, unless noted otherwise.

.2 CGSB 19-GP-5M, Sealing Compound, One Component, Acrylic Base, Solvent Curing.

.3 CAN/CGSB-19.13, Sealing Compound, One Component, Elastomeric, Chemical Curing.

.4 CGSB 19-GP-14M, Sealing Compound, One Component, Butyl-polyisobutylene Polymer Base, Solvent Curing.

.5 CAN/CGSB-19.17, One-Component Acrylic Emulsion Base Sealing Compound.

.6 CAN/CGSB-19.18, Sealing Compound, One Component, Silicone Base, Solvent Curing.

.7 CAN/CGSB-19.21, Sealing and Bedding Compound Acoustical.

.8 CAN/CGSB-19.24, Multi-component, Chemical Curing Sealing Compound.

.9 Sealant, Waterproofing and Restoration Institute (SWRI) publication, *Sealants: The Professionals' Guide 1995.*

1.3 PERFORMANCE REQUIREMENTS

.1 The system shall satisfy the following requirements for the duration of the warranty.

.1 The installed sealant shall be totally waterproof, flexible and thermally compatible with the substrate under applicable service conditions.

.2 The installed sealant shall provide a weathertight seal and shall not allow moisture penetration.

.3 The system shall withstand active cyclical movements of 50% of the joint width and remain bonded and watertight.

.4 The system shall not debond, crack or craze.

.5 The sealed joints shall not leak.

.2 Reference to products does not relieve the manufacturer of responsibility to comply fully with all specified criteria.

1.4 SUBMITTALS

.1 Submittals to be made in accordance with Section 01 33 00 – Submittals.

.2 Maintanance

.1 Submit data covering the care, cleaning and maintenance as per Section 01 78 23 – Maintenance and Renewal Manual.

.2 Leave one sealed tube of each sealant type and colour on site upon completion of project.

1.5 ENVIRONMENTAL AND SAFETY CONDITIONS

.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 acceptable to Labour Canada.

.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.3 Sealant and substrate materials to be minimum 5°C.

.4 Should it become necessary to apply sealants below 5°C, consult with the sealant manufacturer and follow their recommendations.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, handle, store and protect materials as recommended by materials manufacturer.

.2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

.3 Maintain containers and labels in undamaged condition.

2.0 PRODUCTS

2.1 MATERIALS

.1 Joint Cleaner: Xylol, methylethylketone, alcohol, or non-corrosive type recommended by sealant manufacturer and compatible with joint forming materials.

.2 Primers: Types recommended by sealant manufacturer.

.3 Joint Back-Up: Round closed cell foam, polyethylene, Shore A hardness of 20, tensile strength >200 kPa, oversized 30-50%, compatible with sealant and primer, non-adhering to sealant, and non-gassing.

.4 Bond Breaker: Pressure-sensitive plastic tape that will not bond to sealants.

.5 Vent/Weeping tubes: non-metallic, 6mm inside diameter minimum.

.6 Sealants:

.1 Type 1 - CAN/CGSB 19.13, one (1) component Polyurethane.

.2 Type 2 - CAN/CGSB 19.17, acrylic latex polymer.

.3 Type 3 - CAN/CGSB 19.21, single component synthetic rubber.

.4 Type 4 – CAN/CGSB 19.24, multi-component polyurethane.

.5 Type 5 - CAN/CGSB 19.13, one-part silicone.

.7 Colour of Sealants: Selected by the Departmental Representative to match adjacent finishes. Contractor to provide colour samples to facilitate selection.

3.0 EXECUTION

3.1 PROTECTION

.1 Protect installed work from staining or contamination.

3.2 PREPARATION

.1 Ensure environmental and site conditions, as recommended by the manufacturer, are suitable for installation of work of this section.

.2 Ensure all existing caulking and extruded tapes are removed and surfaces prepared and primed in accordance with the manufacturer's recommendations.

.3 Preparation of surfaces is to be in strict accordance with the manufacturer's recommendations, including preparation and smoothing of rough surfaces, and detailing of cracks, joints and voids as required.

.4 Joint surfaces are to be sound and free of all moisture, dust, oils and other materials that may adversely affect sealant bond. Minimum standard of cleaning of existing materials shall be wire brush, or equivalent for concrete surfaces to remove all traces of existing sealant and to expose clean concrete. Metal flashings and mullions to be cleaned so as not to damage surface finishes. After cleaning, joints must be thoroughly dry, dust free and frost free before applying sealant.

.5 No primer or first coat shall be applied until the surface preparations has been inspected and accepted in writing by a representative of the sealant manufacturer if requested by the Departmental Representative.

.6 Examine joint sizes and correct to achieve depth ratio one-half (1/2) of joint width with minimum width and depth of 6.0 mm, maximum width 25 mm.

.7 Install joint back-up to achieve correct joint depth.

.8 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.9 Apply bond breaker tape where required to manufacturer's instructions.

.10 Prime sides of joints to manufacturer's directions immediately prior to caulking.

.11 Interior splines are to be installed prior to caulking of exterior glass bead.

3.3 APPLICATION

.1 Apply sealants to manufacturer's instructions. Apply using gun with proper size nozzle. Use sufficient pressure to fill voids and joints solid. Superficial pointing with skin bead is not acceptable.

.2 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities. Tool surface neatly to produce slight concave joint.

.3 Application procedures that result in toxic fumes or flammable solvents collecting or endangering workers or building occupants are not permitted.

.4 Type 1: apply sealant to following exterior locations.

.1 Joints between window or door frames to adjacent building components.

.2 Around perimeter of exterior wall penetrations (window framing to cladding).

.3 At junctions of dissimilar material (i.e., frame construction to concrete construction).

.4 Where detailed.

.5 Type 2 : apply sealant to following interior locations:

.1 Joints between window or door frames to adjacent building components.

.2 Around perimeter of wall and penetrations for exposed acoustical applications.

.3 At junctions of dissimilar material (i.e., gypsum board casing bead-to-other construction).

.4 Where detailed.

.6 Type 3 : apply sealant to the following locations:

.1 Around perimeter of wall and penetrations for "concealed" acoustical and air/vapour barrier applications.

.2 At existing polyethelyne air/vapour barrier

.7 Type 4: apply sealant to the following locations:

.1 Building control and expansion joints except where preformed joint inserts are used.

.8 Type 5: apply sealant to the following locations:

.1 Between metal substrates

.2 Where detailed.

.9 Cure sealants in accordance with sealant manufacturer’s instructions. Caulked joints shall be protected by the Contractor until sufficiently cured.

.10 Clean adjacent surfaces immediately and leave work neat and clean. Remove excess sealant and droppings, using recommended cleaners as work progresses. Remove masking tape after tooling of joints.

3.4 REVIEW AND TESTING

.1 Periodic review of the various phases of the work is to be performed by the Departmental Representative. Contractor is to provide safe access.

.2 Additional tests may be performed at the discretion of the Departmental Representative to confirm in-situ material thickness.

END OF SECTION

1.0 GENERAL

1.1 WORK INCLUDED

.1 Furnish all labour, materials, equipment and services necessary for the design, fabrication, supply and installation of the glass and aluminum curtain wall system.

1.2 REFERENCE STANDARDS (Most recent version unless noted otherwise)

.1 British Columbia Building Code 2018

.2 American Architectural Manufacturers Association (AAMA).

.1 AAMA CW-DG-1, Aluminum Curtain Wall Design Guide Manual.

.2 AAMA CW-10, Care and Handling of Architectural Aluminum From Shop to Site.

.3 AAMA CW-11, Design Wind Loads for Buildings and Boundary Layer Wind Tunnel Testing.

.4 AAMA 501, Methods of Test for Exterior Walls.

.5 AAMA 503, Voluntary Specification for Field Testing of Metal Storefronts, Curtain Wall and Sloped Glazing Systems.

.6 AAMA 611, Voluntary Specifications for Anodized Finishes Architectural Aluminum.

.3 American Society for Testing and Materials International, (ASTM).

.1 ASTM A36/A36M-103a, Specification for Carbon Structural Steel.

.2 ASTM E-90, Standard Method for Labortory Measurement of Airborne Sound Transmission.

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

.4 ASTM A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

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

.6 ASTM B209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.7 ASTM B221, Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

.8 ASTM E283, Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

.9 ASTM E330, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls, by Uniform Static Air Pressure Difference.

.10 ASTM E331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Static Air Pressure Difference.

.11 ASTM E413, Classification for Rating Sound Insulation.

.12 ASTM E1105, Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.

.4 Canadian General Standards Board (CGSB).

.1 CAN/CGSB 1.108, Bituminous Solvent Type Paint.

.2 CAN/CGSB-12.20, Structural Design of Glass for Buildings.

.3 Canadian Standards Association (CSA International).

.4 CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.

.5 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.

.6 CSA-S136, North American Specification for the Design of Cold-Formed Steel Structural Members.

.7 CAN3-S157-M, Strength Design in Aluminum.

.8 CSA W59.2-M, Welded Aluminum Construction.

1.3 FABRICATION AND INSTALLATION RESPONSIBILITY

.1 The fabrication and erection of the curtain wall system as required to meet performance specifications shall be the complete responsibility of the contractor.

.2 The design intent for the curtain wall system is to provide systems which incorporate insulated, sealed flush glazed lights of glass completely retained within an aluminum framing system and with glass faced and aluminum faced insulated spandrel panels, where indicated.

.3 The details shown indicate the preferred profiles and dimensions necessary to achieve the design intent. Minor dimension adjustments to that shown may be made in the interest of fabrication or erection methods or techniques, the weatherability factor, or the ability of the design and performance requirements specified, provided that the design intent and the intent of the specifications are maintained.

.4 Design details indicated on the drawings will not relieve this contractor of responsibility for the fabrication, erection and performance of the curtain wall system.

1.4 DESIGN AND PERFORMANCE CRITERIA

.1 Aluminum curtain wall system shall be thermally broken.

.2 Overall system U-Value to be U 2.5 W/m^2 K or better.

.3 Curtain wall aluminum framing shall incorporate a pressure equalized “rain screen” system with a complete air and vapour seal, allowing any water entering the framing to drain to the exterior and also allow air into the pressuring chamber to provide nearly instantaneous pressure equalization. Vents and drain holes (orifices) shall be inconspicuously located and in such positions as not to contribute to staining, streaking or marking of the glass, spandrels or mullions. Vertical and horizontal compartmenting must be incorporated in the design of the system, due to the spatial distribution of wind pressures.

.4 The connection of the curtain wall to the structure of the building shall be detailed in such a way that only horizontal and vertical forces are transmitted. No bending moments shall be applied by the curtain wall to edges of the slabs.

.5 Anchorage shall be designed to accommodate all thermal, seismic and building movements without any harmful effect to the curtain wall including glass and glazing and sealant applications.

.6 The curtain wall system shall accommodate expansion and contraction of component materials over an exterior air temperature range of -18°C to +40°C and a possible solar heating range to 70°C, and an interior temperature range of +10°C to +30°C without causing; distortion of aluminium members, pinching or distortion or breakage of glass, failure of joint seals necessary for air and watertightness of the system, failure of perimeter seals at interfaces to adjacent wall systems, overstressing of fasteners, or other harmful effects.

.7 The curtain wall system shall withstand permanent deformation, weld or fastener failure, component disengagement or breakage under loading equal to 1.5 times the design loads.

.8 Curtain wall shall be designed, assembled and secured to the building structure in a manner that will keep any stresses on sealants within manufacturer's recommended maximum.

.9 Movement of joints due to structural and thermal modes shall be accommodated without loss of air tightness.

.10 The curtain wall system shall be fabricated and installed square, level and plumb to AAMA standards. The following erection tolerances shall apply:

.1 Maximum variation from plumb: 1.5 mm/m or 12 mm/30 m, whichever is less.

.2 Maximum alignment of two adjoining members abutting in plane: 0.8 mm.

.3 Maximum sealant space between curtain wall and adjacent construction: 13 mm.

.11 The glazing system shall be installed so that it forms a continuous unbroken air seal on the room side of the assembly. The air seal shall extend from the glazing assembly to adjoining wall components at all interfaces. Air tightness of the curtain wall system and interfaces shall restrict infiltration and exfiltration of air through the system to 0.1 L/s/m^2 when tested in accordance with ASTM standard E283 at a pressure differential of 300 Pa.

.12 Watertightness of the glazing system shall prevent water appearing on the inside finished surfaces of the glazing system when tested in accordance with ASTM standard E331 at a pressure differential of 700 Pa.

.13 Glass in accordance with Section 08 80 00.

.14 The insulating glass units shall have true and parallel faces prior to installation of units on site.

.15 All fastenings and fixings shall be concealed.

.16 Labels and trademarks, including applied labels, shall not be visible on the finished work, except identification of safety glass as required by Code.

.17 All movements of curtain wall to be noiseless.

1.5 SUBMITTALS

.1 No work shall be fabricated until the shop drawings and all other related submittals, documentation, certifications, samples and test report have been reviewed by the Departmental Representative, unless otherwise directed by the Departmental Representative in order to reduce the fabrication period.

.2 Shop Drawings:

.1 Submit shop drawings for the curtain wall system complete with a seal of a Professional Engineer registered to practice in British Columbia certifying that the works of this Section meet or exceed the wind, guard, seismic and snow loading requirements of the BC Building Code. Indicate design loads on all submitted shop drawings.

.2 Shop drawings shall incorporate plans, elevations, sections and full size details for all work included in this section. The details shall show:

.1 frame sections, glazing unit to frame connection, anchorage assemblies, integrations to existing and retrofit wall components at the perimeter of the work;

.2 metal, gasket, glass, and accessory material type, thickness and finishes. The type, size, and thickness employed in manufacture of the glass units, minimum frame lap or edge of glass restraint shall be shown on the shop drawings;

.3 line of the air seal, both internal to the system and at the point of continuity with the surrounding air barrier system. All joinery on the line of the air seal must be gasketed or sealed with a properly designed sealant joint and accommodate all structural and thermal movement.

.4 areas to be sealed and sealant type;

.5 all attachment points, schedule of anchorage assemblies (fasteners, connectors, anchors, washers, accessory items and welds), and layout of all anchorage assemblies. Indicate all forces applied to the connection to the structure.

.6 type, size, spacing of welds.

.7 direction and magnitude of expected thermal movements, and method at locations where thermal expansion and contraction are accommodated;

.8 fabrication and erection tolerances;

.9 schedule of all glazing accessory parts, gaskets, fasteners, and sealants, including designation of locations to be used and including specification sheets where applicable.

.3 In addition to the shop drawing submission requirements, provide the following information:

.1 Letters of Assurance: The Registered Professional Engineer who signed and sealed the shop drawings shall perform sufficient field reviews in order to provide a letter of professional assurance after completion of the Work, giving assurance that the Work has been fabricated and installed in general conformance with the sealed shop drawings. Approved forms are BC Building Code Letters of Assurance (Schedule S-B and S-C). Written inspection reports of field reviews shall be submitted promptly as the field reviews are made.

.2 The applicable glass manufacturers shall submit with the shop drawings, written certification for the Departmental Representative's review stating that all glass and glazing materials and requirements as detailed and specified on the shop drawings (designating the shop drawings reviewed by enumerating sheet number, dates and revisions) have been reviewed and approved for use relative to their specific application(s), dimensional design and profile parameters, and conformance to all requirements as detailed and as specified in the drawings and specifications.

.4 Samples:

.1 Submit duplicate colour samples of aluminum finish to the Departmental Representative for final selection and approval of colour.

.5 Maintenance Manuals: Prior to Substantial Performance of the Work, submit to the Departmental Representative electronic copies of detailed procedures for the periodic inspections, maintenance and cleaning of all applicable elements of the curtain wall system including glass and finishes.

.6 Provide test reports for thermal and air leakage performance in accordance with NFRC 100 and NFRC 400.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Protect the complete curtain wall system during fabrication, shipping, storage and erection. Work which is scratched, bent, broken or otherwise damaged, shall be replaced by this contractor prior to erection.

.2 All materials delivered shall match the approved samples in all respects. Packaged materials shall be delivered in the original unopened labelled containers of the approved manufacturers. Components shall be protected against soiling and damage during shipment and storage. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.7 WARRANTY

.1 The curtain wall frames and integral seals shall be designed to have an expected service life of 30 years. All seals, gaskets, corrosion protection, coatings, and attachments are expected to be serviceable at the end of this service period.

.2 The complete curtain wall system contractor shall represent and warrant to the Departmental Representative that the work included in this section will be free of defects and deficiencies which appear during a period of five years from certified date of Substantial Performance of the Project.

.3 The curtain wall system contractor agrees to correct promptly at its own expense all defects and deficiencies in the work included in this section. In all cases, defective or deficient work shall be removed and replaced with work acceptable to the Departmental Representative, at no additional cost to the Departmental Representative and at such times as the Departmental Representative may designate.

.4 For the purposes of this clause but without limiting the generality of this clause; defects or deficiencies shall include:

.1 Defects or deficiencies in design, workmanship or materials forming part of the work of this section.

.2 Any failure of the work of this section to remain a weathertight and watertight installation or to fully comply with the performance and quality requirements of this section.

.3 Any failure of the faces of the curtain wall to remain straight, true and plumb in every respect, provided that a tolerance will be permitted as specified.

.4 Air leakage greater than that specified.

.5 With respect to aluminum materials, excessive non-uniformity, pitting or corrosion of aluminum, including any non-uniform fading during the warranty period to the extent that adjacent panels have a gloss and/or colour range greater than originally accepted glass and/or colour range samples as approved by the Departmental Representative and any pitting or other type of corrosion discernible from a 3 metre distance.

.6 With respect to sealant materials, any defects or deficiencies in sealants resulting in adhesive, cohesive or shear failure of joints, staining of surfaces adjacent to joints by sealant or primer by migration through building materials and contact with them and chalking or visible colour change on the surface of cured sealed materials.

.7 With respect to sealed glazing units, hermetic seal failure, fogging, reflective coating defects, low emissivity coating defects, breakdown due to edge flaws (chips, gouges, etc.) migration of edge spacers and breakage due to thermal stress.

.8 "Materials" shall include glass and glazing, aluminum, gaskets, tapes and sealants.

.5 On or before the certified date of Substantial Performance of the Project, this contractor shall obtain and deliver to the Departmental Representative written warranties or guarantees, in the name of the Departmental Representative, from manufacturers of materials against defects or deficiencies of the type described in this clause.

1.8 MOCK-UP

.1 Assemble and set up on-site a curtain wall mock-up assembly. The mock-ups shall be comprised each of the actual systems used incorporating as a minimum (1) one typical vertical storey including floor and ceiling slabs above and below, by a typical panel width. Co-ordinate with trades of adjacent sections as required. The mock-ups are to be complete in every respect to the final product; this shall include but not be limited to the following:

.2 Construct mock-ups where directed.

.3 Allow sufficient time for mock-ups and site testing, evaluation alterations and adjusting as required so as not to interrupt the construction progress schedule of the project.

.4 Allow 24 hours for review of mock-up by Departmental Representative.

.5 Modify and alter mock-ups as necessary to obtain required approvals.

.6 Upon successful completion of sample mock-up panels, the completed mock-up may become part of finished work unless major changes which affect the aesthetics of the unit are required to pass the performance requirements.

.7 Complete mock up shall serve as the minimum project requirements.

1.9 QUALITY ASSURANCE

.1 Site Performance Testing:

.1 Contractor to arrange performance testing with a qualified testing agency; submit name of testing agency with qualifications to the Departmental Representative.

.2 All costs, including those of the testing agency, are to be included in Lump Sum Contract Price.

.3 A minimum of 2 curtain wall panels are to be tested:

.4 Testing shall include:

.1 Water Penetration: Field testing to be in accordance with ASTM E1105-00, by using AAMA 502-02 Test Method B

.5 In the event that assemblies fail to pass the performance requirements initially, the costs to repair/replace/adjust the assemblies and the costs for subsequent testing to confirm conformance shall be borne by the Contractor.

.6 Departmental Representative to be present for testing and test report submitted to Departmental Representative.

2.0 PRODUCTS

2.1 MANUFACTURERS

.1 Manufacturers shall develop materials and products of this section to achieve the design intent as specified and as indicated on the drawings.

2.2 MATERIALS

.1 General: Thickness, gauges, alloys and tempers of aluminum steel and stainless steel shall be as required for forming and finishing operations and to meet design criteria and performance requirements specified.

.2 Aluminum Extrusions: Shapes as indicated and as required to fulfill performance requirements of suitable alloy and proper temper for extruding and fabricating with adequate structural characteristics to meet design and performance requirements specified, and suitable for finishing as specified. The aluminum alloy to be used for aluminum framing shall meet BC Building Code requirements for fire resistance.

.3 Pressure Plates: All sections with caps must incorporate a full width 19mm pressure plate system. One piece fixed cap systems are not acceptable.

.4 Slip Mullions: Fourway joints in the split mullion curtain wall system to have splice plate with mechanically compressed gasket water seals and sealant cap bead.

.5 Aluminum Sheet: Standard alloys: to AA Aluminum Standards and Data and to ASTM B209.

.1 Use one of the following alloys:

.1 Alloy 3003: H14 sheet and plate meeting ASTM B209.

.2 Alloy 3004: sheet and plate meeting ASTM B209.

.3 Temper: H14.

.4 Temper: H134 for embossed sheet.

.2 For anodized aluminum use appropriate alloy and temper to achieve the specified color and surface finish.

.3 Use a minimum 0.81mm aluminum sheet thickness.

.6 Thermal Separators: Polyvinylchloride, 50 Shore A durometer hardness plus or minus 5, or Polyamide with glass fibre reinforcing, minimum U value .35 W/m2K.

.7 Shims: Rigid PVC.

.8 Dissimilar Materials: Separate with bituminous paint, nylon or dielectric separator.

.9 Membrane Stripping Tie-ins to Aluminum Work, Door Framing and Behind Flashing areas: minimum 2.7 mm thick SBS membrane sheet reinforced with non-woven polyester or glass fleece. Stripping to be a minimum 150 mm wide. Or use sheet steel 24 gauge galvanized with bituminous coating.

.10 Aluminum Sandwich Panels: Provide insulated aluminum sandwich panels incorporated as part of the curtain wall system. Fabricate exposed panels from aluminum sheet. Provide reinforcement and stiffeners at panels to meet wind load requirements.

.11 Steel Shapes Required to Join or Reinforce Assembly of Aluminum Components: Shall conform to CSA G40.21, Grade 300 W; galvanized or if galvanizing is not compatible with alloy of component parts, shop paint with zinc chromate primer. Galvanize or paint after cutting to size.

.12 Miscellaneous Steel (Anchors and Reinforcement): CSA G40.21 Grade 300 W minimum, hot dip galvanized after fabrication.

.13 Covers, Closure Strips, Copings, Flashings: as specified in Section 07 62 00 – Metal Flashing and Trim. Aluminum cover strips, closure strips, coping and flashing shall be as required; fabricated from aluminum sheet or extruded shapes of thickness as required to suit installation and provide rigidity and suitable for finish specified.

.14 Glass Units: Refer to Section 08 80 00.

.15 Gaskets: EPDM, neoprene or silicone rubber of sufficient durometer to create a positive seal and lip pressure. All gaskets to be dense rubber. Outdoor gaskets to be neoprene or silicone; indoor gaskets to be EPDM, neoprene or silicone. Gaskets to conform to ASTM C 864-79. Gaskets to be continuous at corners (vulcanized, or fused corners) and throughout glass perimeter at inboard glass line.

The actual profiles and/or design parameters dimensions, lengths and/or locations and the Shore A durometer hardness shall all be as required to meet the specified

performance criteria and shall be as recommended, in writing, by the applicable neoprene manufacturer.

.16 Glazing splines and air seals: Shall be pressure fitted, extruded neoprene ("dry-dry" seals) with continuous integral locking projections to engage into the metal glass holding member, and be designed to be in contact, at all times, with adjacent elements. Seals to the glass formed by adhesive tape alone will not be accepted. (Tremco's Vision Strip is acceptable as exterior gasket).

.17 Spacer blocks: Shall be neoprene (80 durometer) or non-ferrous metal and designed to be fully bedded in glazing materials, to give minimum 3mm clearance and as required by glass weights and light sizes.

.18 Spacers at glazing pockets: Where single glass, aluminum sheet or membrane is glazed into double-glazing pockets, provide continuous rigid PVC spacers or extruded aluminum infill strips. Polystyrene infill strips will not be accepted.

.19 Sealants: as specified in Section 07 92 00.

2.3 FINISHES

.1 Interior exposed aluminum surfaces: clear anodized finish in accordance with Aluminum Association AA-M12C22A31, Class I specifications. Coating thickness shall be minimum 0.4 mils.

.2 Exterior exposed aluminum surfaces: clear anodized finish in accordance with Aluminum Association AA-M12C22A41, Class 1 specifications. Coating thickness shall be minimum 0.7 mils.

.3 All concealed aluminum may have standard mill finish.

.4 All exposed aluminum shall have factory applied removable protective film covering.

.5 All exposed parts of hardware shall match adjacent aluminum finish and colour.

.6 All exposed hardware and fasteners to be stainless steel and corrosion resistant.

3.0 EXECUTION

3.1 FABRICATION

.1 All work shall be performed by skilled workmen, especially trained and experienced in the applicable trades employed and in full conformity with applicable provisions of the listed references and standards and/or as specified herein. Work shall be carefully fabricated and assembled with proper and approved provisions for thermal expansion and contraction, fabrication and installation tolerances and adjoining

building component tolerances and design criteria. All forming, welding and cutting operations shall be done prior to finishing.

.2 All work shall be true to detail with sharp, clean profiles, straight and free from defects, dents, marks, indentations, waves or flaws of any nature impairing strength or appearance; fitted with proper joints and intersections and with specified finishes. All members shall be extruded unless otherwise indicated on the drawings and shall be securely engaged into adjacent components. Extrusions shall be toleranced to eliminate any edge projection or misalignment at joints.

.3 No field forming, cutting and/or alteration of aluminum framing members will be allowed. All framing members will be shop fabricated and finished. No unfinished surfaces will be permitted on exposed surfaces.

.4 Expansion Joints: Expansion joints within aluminum framing shall be so designed and constructed to provide noiseless and free movement, and be and remain, permanently watertight.

.5 Protection of Metals: Aluminum surfaces to be placed in contact with masonry, concrete, steel supporting members or other dissimilar parts shall, before shipment from the fabricating plant, be given a heavy coat of an alkali resistant bituminous paint. The paint shall be applied, without the addition of any thinner, in strict accordance with the paint manufacturer's instructions. Such paint shall be allowed to dry before assembly of parts.

.6 Joints in Metal Work: All exposed work shall be carefully matched to produce continuity of line, design and finish. Joints in exposed work, unless otherwise required, shall be accurately fitted, rigidly secured with hairline contacts and sealed watertight. Where two or more sections of metal are used in building up members, the surface in contact shall be brought to a smooth, true and even surface and secured together so that the joints shall be absolutely tight without the use of any pointing materials.

.7 Shop Assembly: Insofar as practicable, all fitting and assembly of the work shall be done in the shop. Work that cannot be permanently shop assembled shall be temporarily assembled in the shop and marked, before disassembly, to ensure proper assembly later on in the works.

.8 Do not bridge thermal barriers with flashings or other conductive materials.

.9 Conceal fasteners whenever possible.

.10 Welding of Steel to Conform to CSA W59-M84: Welders to be fully approved by the CWB and comply with CSA W47.1-83, Division 3.

.11 Welding of Aluminum shall be as per the CSA W47.2-67 qualification code.

3.2 EXAMINATION AND CO-ORDINATION

.1 Verify all dimensions and tolerances of supporting structure by field measurement. Surfaces that are considered not acceptable to receive the work of this section must be reported to the general contractor/project manager. The commencement of work shall imply the acceptance of previous construction.

.2 Submit written notification to the Departmental Representative and Contractor documenting any and all field dimensions and/or conditions which are at variance with those on the reviewed shop drawings, the contract documents and/or which are detrimental to the proper and timely erection of the complete curtain wall system. The decision regarding corrective measures shall be obtained from the Departmental Representative. The Curtain Wall contractor shall ensure the compatibility of existing and adjacent items in relationship to this work.

.3 Co-ordinate the installation of anchors and fixings with the appropriate trade as well as the sealing between work of this section and other sections. The continuity of all air/vapour seals at areas of adjoining trades must be ensured.

.4 Co-ordinate the delivery of glass and other materials so as not to interfere with the work of other sections of this specification.

.5 Protect work of other trades as necessary from damage resulting from work of this section. Damage caused by this contractor shall be corrected and made good at no expense to the Departmental Representative.

.6 Ensure that conditions of temperature, humidity and precipitation are suitable for installation, in accordance with manufacturer's instructions. No glazing shall be installed when framing members and other glazing materials are wet or frosted.

3.3 INSTALLATION

.1 All work of this section shall be installed in strict accordance with the reviewed shop drawings, by the erection forces of the fabricator of the curtain wall under the direct supervision of the fabricator.

.2 Install all anchor bracket assemblies, anchor brackets, anchor straps, shims, stud bolts, nuts, washers, splice plates, bracing, etc. as required to be attached to and/or built into building frame as required for support of the curtain wall and glazing assemblies.

.3 Provide alignment attachments and shims to permanently fasten system to building structure. Welding shall be done with electrodes and/or by methods recommended by suppliers of metal being welded. Clean weld surfaces; apply pure zinc or zinc chromate primer to field welds and adjacent surfaces.

.4 Anchorage of the curtain wall to the structure shall be in strict accordance with reviewed shop drawings.

.5 All vertical members shall be plumb, all horizontal members shall be level; free of warp or twist. Maintain assembly dimensional tolerances.

.6 As erection progresses, the members shall be securely connected to take care of all dead loads, wind and erection stresses. Any failure to make proper and adequate provisions for stresses during erection shall be entirely at sole risk and responsibility of this sub-contractor.

.7 Accurately fit and frame components carefully to produce continuity of line and design. Provide flush, hairline joints and connections.

.8 Provide deflection head framing members for curtain walls, window framing at head, sill and jamb sections as required to meet differential movement and deflection requirements.

.9 Provide thermal isolation where components penetrate or disrupt building insulation.

.10 All glazing shall be carried out in accordance with Departmental Representative reviewed shop drawings. Install glass in accordance with Section 08 80 00 – Glass and Glazing.

.11 Coordinate attachment and seal of perimeter air barrier and vapour retarder materials. All connections of the air/vapour/waterproofing barrier membrane to be mechanically attached to the window section and wall assembly.

.12 Install all gaskets, tapes and sealants as required to provide watertight, weathertight and airtight joints between mullions, copings and all other metal-to-metal contacts of the complete curtain wall system. Apply sealant in accordance with Section 07 92 00– Building Enclosure Sealants.

.13 Furnish and install associated metal panel covers, louvers, closures, flashings and trim in accordance with Section 07 62 00 – Metal Flashing and Trim. Work to conform to profiles shown on the drawings and as required to make the work watertight, weathertight and airtight.

.14 Apply all joint packing and sealants to joints in curtain wall, at all penetrations through curtain wall and at joints between curtain wall and adjoining construction Apply sealant in accordance with Section 07 92 00 – Building Enclosure Sealants. Adjacent materials which have been soiled shall be cleaned immediately before the sealant hardens or stains the adjoining surface.

3.4 TOUCH-UP

.1 Where permitted by Departmental Representative, touch-up minor scratches, abrasions and other minor defects in coating finishes.

.2 After connecting anchors have been completely attached, prime paint exposed surfaces of anchor embeds and touch up all welds and damaged surfaces of anchors with prime paint.

3.5 CLEANING

.1 Upon Substantial Performance of the Work, remove factory-applied protective coverings, from exposed surfaces, and clean surfaces free of all smears, marks and discolouration. Cleaning shall be in accordance with applicable provisions of listed standards and the requirements of the curtain wall manufacturer. All cleaning materials shall be acceptable to the applicable aluminum and glass manufacturers; where doubt exists, make spot tests.

.2 Be responsible for immediately cleaning off all smears, marks, etc., caused during erection of the curtain wall system.

3.6 PROTECTION

.1 Protect finished work from damage/staining during and after installation.

END OF SECTION

1.0 GENERAL

1.1 WORK INCLUDED

.1 Furnish all labour, materials, equipment and services necessary for the design, fabrication, and supply of all glass and glazing work as indicated on the drawings and as specified. The work of this section shall include, but shall not necessarily be limited to, the following:

.1 Sealed insulating glass units to curtain wall system framing.

.2 Glazing materials, sealants, and glass setting materials that are not normally supplied as part of the framed glazing system, but that are required to glaze the system to the requirements of this specification, and in keeping with published good glazing practices in areas not addressed by this specification.

1.2 REFERENCE STANDARDS (Most recent version unless noted otherwise)

.1 ANSI/ASTM E330, Test Method for Structural Performance of Exterior Windows, Curtainwalls and Doors by Uniform Static Air Pressure Difference.

.2 ASTM D2240, Test Method for Rubber Property- Durometer Hardness.

.3 ASTM E84, Test Method for Surface Burning Characteristics of Building.

.4 ASTM F1233, Test Method for Security Glazing Materials and Systems.

.5 CAN/CGSB-12.1, Tempered or Laminated Safety Glass.

.6 CAN/CGSB-12.8, Insulated Glass Units.

.7 CAN/CGSB-12.9, Spandrel Glass.

.8 CAN/CGSB-12.20, Structural Design of Glass for Buildings.

.9 Glazing Contractors' Association of British Columbia (GCABC) Manual.

.10 Insulating Glass Manufacturers Alliance (IGMA) Manual.

.11 Glass Association of North America (GANA) Glazing Manual.

.12 Flat Glass Manufacturers Association (FGMA) Glazing Manual.

.13 Laminators Safety Glass Association Standards Manual.

.14 Sealant, Waterproofing and Restoration Institute (SWRI) publication, *Sealants: The Professionals' Guide 1995.*

1.3 DESIGN AND PERFORMANCE CRITERIA

.1 Provide continuity of the building enclosure vapour and air barrier:

.1 Utilising the inner light of multiple light sealed units.

.2 Utilising resilient gasket material to transfer the seal from the glass to the frame of the assembly.

.2 Design glass to CAN/CGSB 12.20 using an annual probability factor of 1/10 years for the reference wind velocity, and 8 in 1000 glass failure rate under this load assuming glass strength has a coefficient of variation of 0.25. Limit glass deflection to L/175 to a maximum of 20mm under wind load.

.3 Design glass to withstand guard loads as required by the BC Building Code. Limit deflection to 12mm under guard load.

.4 Design glass to withstand thermal stresses imposed in service.

.5 If areas of vision glass are required to be heat strengthened or glass thickness increased due to wind pressure loads at high pressure zones, then all vision glass on the same elevation shall either be heat strengthened or glass thickness increased to ensure the appearance of all vision glass when viewed from the exterior is consistent. Except where noted specifically otherwise, the decision as to whether the vision glass is required to be heat strengthened or thickened to meet the performance specifications rests solely with the glazing contractor.

.6 Allow for deflection of building structure and framing members. Ensure no structural loads are imposed on glass.

1.4 SUBMITTALS

.1 Submittals to be made in accordance with Section 01 33 00 – Submittals.

.2 Quality Control Documents:

.1 Provide glass manufacturer's product data sheets confirming that glass performance meets the requirements of this specification.

.2 Submit letter from insulating glass fabricator stating current IGMA compliance number and identifying the types of edge construction covered by that number.

.3 The applicable glass manufacturers shall submit with the shop drawings, written certification stating that all glass and glazing materials and requirements as detailed and specified on the shop drawings (designating the shop drawings reviewed by enumerating sheet number, dates and revisions) have been reviewed and approved for use relative to their specific application(s), dimensional design and profile parameters, and conformance to all requirements as detailed and as specified in the drawings and specifications. Identify any specified requirements that are in error or cannot legitimately be met, and provide alternatives that meet the intent of the specification for the Departmental Representative's approval.

.4 Submit evidence that glazing contractor is a member in good standing of the Glazing Contractors Association of B.C.

.3 Samples: Submit duplicate samples of various types of glass units specified to the Departmental Representative for final approval. Samples shall be minimum 300 x 300 mm. Samples to be typical production run quality, complete with tint, frit, primary and secondary edge seals, as applicable. Clearly label each sample with product name, manufacturer's name and project name. Do not order the material without prior approval of colour, tint and appearance by the Departmental Representative.

.4 Manufacturer's Instructions: Submit manufacturer's installation instructions.

.5 Closeout Submittals: Provide maintenance data including cleaning instructions for incorporation into manual specified in Section 01 78 12 - Maintenance and Renewal Manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Prevent damage to materials during handling and storage.

.2 Store packaged material in original containers, with manufacturer's seals and labels intact.

.3 Packaging and packing of glass to be in accordance with best commercial practice.

.4 Keep handling to a minimum. Install glass as soon as possible after delivery to site. Avoid prolonged storage of glass at jobsite.

.5 Store glass vertically, blocked off the floor, in a weather-tight enclosure, in an area not subject to rain, dripping water, condensation, or sunlight. To prevent occurrence of condensation between leaves of stored glass, store at a constant temperature above the dew point.

.6 Make good or replace scratched or damaged materials as directed, at no additional cost.

1.6 WARRANTY

.1 All glass and glazing materials to be free from defects in material and workmanship, and continue to perform satisfactorily for a period of five (5) years from certified date of Substantial Performance of the Project.

.2 The insulated glass units (IGU) are to have a 10-year written warranty.

.3 The Contractor agrees to correct promptly at its own expense all defects and deficiencies in the work included in this section. In all cases, defective or deficient work shall be removed and replaced with work acceptable to the Departmental Representative, at no additional cost to the Departmental Representative and at such times as the Departmental Representative may designate.

.4 For the purposes of this clause but without limiting the generality of this clause; defects or deficiencies shall include:

.1 Defects or deficiencies in design, workmanship or materials forming part of the work of this section.

.2 "Materials" shall include glass and glazing, aluminum, gaskets, tapes and sealants.

.3 With respect to sealed glazing units, hermetic seal failure, fogging, reflective coating defects, low emissivity coating defects, breakdown due to edge flaws (chips, gouges, etc.) migration of edge spacers and breakage due to thermal stress.

.5 On or before the certified date of Substantial Performance of the Project, this contractor shall obtain and deliver to the Departmental Representative written warranties or guarantees, in the name of the Departmental Representative, from manufacturers of materials against defects or deficiencies of the type described in this clause.

1.7 MOCK-UP

.1 Construct mock-ups in accordance with Section 01 33 00 – Submittals.

.2 Supply and install glass to mock-up framing on building site Construct mock-ups to include glass glazing, and perimeter air barrier and vapour retarder seal.

.3 Construct mock-ups where directed.

.4 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with work.

.5 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.

1.8 QUALITY ASSURANCE

.1 Glass and glazing work under this section shall conform to the Insulating Glass Manufacturers Alliance (IGMA) and to the recommendations and specifications of the Glazing Contractors Association of B.C. - Glazing Systems Specification Manual and of the glass and sealed glazing unit manufacturers.

.2 All glass to bear manufacturer's labels identifying glass type and thickness. Labels to remain on glass until final cleaning.

.3 Tempered glass is to have permanent etched label.

2.0 PRODUCTS

2.1 GLASS PRODUCTS

.1 Glass: to CAN/CGSB-12.3, glazing quality float unless noted otherwise. Glass thickness not less than 5mm nor less than that scheduled. Structural requirements may require a greater thickness.

.2 Heat Treated Glass (tempered and heat strengthened):

.1 Flatness and visual quality tolerances to CAN/CGSB-12.1.

.3 Insulating Glass Units: To CAN/CGSB-12.8, double glazed unit, 25 mm overall thickness, IGMA certified.

.1 Unit edge construction to be manufacturer's standard dual seal, with a thermally broken u-shaped metal.

.4 Laminated glass: 0.76 mm PVB interlayer with protective edge treatment where weather exposed.

.5 Safety Glass: to CAN/CGSB-12.1, tempered.

2.2 GLAZING MATERIALS

.1 Exterior and interior glazing gaskets, tapes, sealants, and adhesives; manufacturer's standard, as used in assemblies tested to meet performance criteria for air infiltration and water penetration.

.2 Glass setting and edge blocks: framing manufacturer's standard products designed to support glass, prevent frame contact, and maintain drainage and venting within the system.

.3 All glazing materials to be compatible with materials they contact.

.4 Setting blocks to be compatible with insulating glass edge sealants.

.5 Sealants in contact with edges of insulating glass to be compatible with insulating glass edge sealants.

.6 Heel, toe and cap sealants to be compatible with glazing gaskets and glazing tapes.

3.0 EXECUTION

3.1 GENERAL

.1 Install all materials according to instructions from all product manufacturers. Ensure all materials are compatible with the materials they contact.

3.2 EXAMINATION

.1 Verify that openings for glazing are correctly sized and within tolerance.

.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

.3 Ensure that conditions of temperature, humidity and precipitation are suitable for installation, in accordance with manufacturer's instructions. No glazing shall be installed when framing members and other glazing materials are wet or frosted.

.4 Co-ordinate glass and glazing activities with trades of other sections of this specification when required. Do not install any glazing until all nearby welding, grinding, sandblasting, waterproofing, mortar work and acid etching are complete. When such activities must be carried out in the vicinity of stored or installed glass, provide hoarding or other suitable protection.

.5 Report to the Departmental Representative in writing any defects in existing work, or unsatisfactory site conditions. Start no work until conditions are satisfactory. Starting work shall imply acceptance of existing conditions and surfaces.

3.3 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.4 INSTALLATION

.1 Install all materials according to manufacturer's instructions, reviewed shop drawings and best practices as described in IGMA and GANA glazing manuals.

.2 Provide specified edge and face clearances and glass bite.

.4 Ensure all weep holes and passages remain free of obstruction.

.5 Provide safety markings to installed glass by attaching streamers or tape to face of sash. Do not apply tape directly to the glass. Do not mark glass with paint or other substance that is difficult to remove or could leave permanent stains.

3.5 CLEANING

.1 Remove all protective materials, labels, and other deposits from glazing.

.2 Clean glass according to instructions from glazing contractor. Cleaning solutions to CAN/CGSB-2.55.

3.6 GLAZING SCHEDULE

.1 Curtainwall:

.1 Glazing Type G (vision glass)

.1 25 mm overall hermetically sealed unit
.2 outer lite 6 mm (minimum) tempered or approved alternate
.3 inner lite 6 mm (minimum) tempered
.4 overall performance:
.1 SHGC = 0.30
.2 VLT = 0.62-0.68
.3 U-Value = 1.36 W/m^2K
.4 Low E coating on surface #2
.5 All units 90% argon gas filled

END OF SECTION

APPENDIX A – Lewkowich Engineering Associates Ltd., Bulk Asbestos Sample Analysis

Lewkowich Engineering Associates Ltd.
geotechnical • environmental health & safety • materials testing

Pacific Biological Station, Fisheries and Oceans Canada
3190 Hammond Bay Road
Nanaimo, BC
V9T 6N7

File Number: F2412-277
Date: March 14, 2019

Attention: Ms. Diane Burger

PROJECT: 3190 HAMMOND BAY ROAD, NANAIMO, BC (PACIFIC BIOLOGICAL STATION – TAYLOR BUILDING)

SUBJECT: BULK ASBESTOS SAMPLE ANALYSIS

Dear Madam,

Please find attached our laboratory's results for analysis of material submitted for identification of Asbestos.

Sample examination was conducted in accordance with the NIOSH 9002 analytical method using polarized light microscopy and dispersion staining techniques. The detection limit of this method is listed as <1%.

This report relates only to material tested and any extrapolation of the results by the client is the responsibility of the client. Samples will be disposed of after one month, unless otherwise instructed by you.

If Asbestos containing materials (ACM – defined by WorkSafe BC as containing at least 0.5% Asbestos and >0% for Vermiculite insulation) are identified in this report and remediation is indicated, the requirements of the B. C. Occupational Health & Safety Regulation Part 6.0 and related Guidelines should be met. This will require completion of a Risk Assessment by a 'Qualified Person' as described in Section 6.6.4. of the Regulations.

This report is not a 'Hazardous Materials Assessment' (Report), as defined in Section 20.112. In addition to this report, WorkSafe BC may require Section 20.112 to be met prior to commencement of work.

If further clarification is required, please contact the undersigned. Thank you for the opportunity to be of service to you.

Yours truly,

LEA ENVIRONMENTAL HEALTH & SAFETY

REGISTERED PROFESSIONAL INDUSTRIAL HYGIENIST
JOHANNE PICARD
10710215

Laurie Clark, B.Sc.
Hygiene Lab Analyst
EPA-AHERA Building Inspector #AR-2017-0053
Email: lclark@lewkowich.com

Johanne Picard, B.Sc., RPIH
Supervising Analyst
EPA-AHERA Building Inspector #13-0407
Email: jpicard@lewkowich.com

Attachments (2): Certificate of Analysis
ACM Sample Log

Lewkowich Engineering Associates Ltd.

2019-03-14

Bulk Asbestos Certificate of Analysis

Project #: F2412-277 **Client: Pacific Biological Station, Fisheries and Oceans Canada** **Site Address: 3190 Hammond Bay Road, Nanaimo, BC (Taylor Building)** **Sampled By: LEA (KT/EB)**

Analyzed in accordance with NIOSH 9002 Asbestos (Bulk) by PLM
(Note: Estimated Limit of Detection (LOD) is <1% asbestos)

Legend:
ND Not Detected

Lab Sample #	Sample Description	Location	Phase Description	Phase %	Asbestos / Type	Asbestos %	Other Material Type	Other Material %	Analyst
F2412-277-1	Window Caulking White	Taylor Building Connector Exterior, Front of Building	Paint - Rust Off White Mix	10 90	NO NO	ND ND	Non-Fibrous Non-Fibrous	100 100	LC LC
F2412-277-2	Window Caulking White	Taylor Building Connector Interior, 2nd Floor	Off White Mix	100	NO	ND	Non-Fibrous	100	LC
F2412-277-3	Window Caulking White	Taylor Building Connector Interior, 3rd Floor	Off White Mix	100	NO	ND	Non-Fibrous	100	LC
F2412-277-4	Window Caulking Dark Brown	Taylor Building Connector Exterior Courtyard	Brown Mix	100	NO	ND	Non-Fibrous	100	LC
F2412-277-5	Window Caulking Dark Brown	Taylor Building Connector Exterior Courtyard	Brown Mix	100	NO	ND	Non-Fibrous	100	LC
F2412-277-6	Window Caulking Dark Brown	Taylor Building Connector Exterior Courtyard	Brown Mix	100	NO	ND	Non-Fibrous	100	LC

Lewkowich Engineering Associates Ltd.
geotechnical • health, safety & environmental • materials testing

ACM SAMPLE LOG

Site Address:	3190 Hammond Bay Road, Nanaimo BC (Pacific Biological Station - Taylor Bld)		
Date Sampled:	March 12 / 19	LEA Project No.:	F2412 - 277
Sampled By:	KT/EB	Received By:	L. Clarke 12 Mar 2019

	Sample Type	Sample Location	Other Locations
1	Window Caulking - White	Taylor Bldg Connector - Exterior Front of Bldg	
2	" -	" - Interior 2nd Floor	
3	" -	" - Interior 3rd Floor	
4	" - Dark Brown	" - Exterior Courtyard	
5	" - "	" - "	
6	" - "	" - "	
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