

# **Project Summary**

## **Victoria Coast Guard Base Administration Building Roof Renewal**

**9R111-00**

## **1.0 Introduction**

### **1.1 Title**

Victoria Coast Guard Base Administration Building Roof Renewal.

### **1.2 Project Introduction**

Roofing Construction Services are being sought for the renewal of the Administration building roof at the Victoria Coast Guard Base in Victoria, British Columbia. The Victoria Coast Guard Base is a Fisheries and Oceans Canada facility operated by its Real Property Branch.

## **2.0 Scope of Work**

### **2.1 Services Required**

Department of Fisheries & Oceans Canada (DFO) will retain a certified Roofing Contractor Association of British Columbia (RCABC) Contractor for the provision of construction services for this project. Bidders are to provide a lump sum quotation to furnish a complete job.

### **2.2 Overview of Scope**

The Contractor will provide all labour, materials, and equipment required to complete the removal and replacement and associated components of the roof on the Victoria Coast Guard Base (VB) Administration building. The contractor shall provide each component in accordance with the component descriptions in the attached specifications, general drawings, details, as well as comply with the overall intent of the National Building Code, the British Columbia Building Code, and the Roofing Contractors Association of British Columbia (RCABC) Roofing Practices Manual (RPM) to furnish a complete job.

Work of this contract is located on DFO owned land and the premises shall be considered occupied by Canadian Coast Guard and DFO employees during the course of work. Any required access is to be coordinated through the DFO Project Manager Representative. The contractor shall be responsible for notifying the occupants in writing prior to the commencement of work (min. 48 hours' notice). Work shall be performed between 08:00 to 16:00 hours, Monday to Friday inclusive.

### **2.3 Specifications and Standards**

- .1** Work performed under this contract shall meet the objectives laid out in the SOW, Specifications, General Drawings, and Details by taking a logical, structured and cost effective approach.
- .2** The workmanship is to be of a uniform, high quality finish in accordance with the

best trade practices.

- .3 The Contractor shall ensure work complies with the National Building Code, National Mater Specifications (NMS), the British Columbia Building Code, and the Roofing Contractors Association of British Columbia (RCABC) Roofing Practices Manual. Where conflict arises, the more stringent standard shall apply. The contractor is responsible for obtaining clarifications prior to Tender Closing in the time allotted.
- .4 The Contractor shall comply with all WorkSafe BC Health and Safety Standards and provide a Health and Safety Plan prior to commencement
- .5 The contractor is to provide the RoofStar 10 Year Guarantee
- .6 Roofing inspections are to be performed using an independent inspection company acceptable to the RCABC Guarantee Corp., the owner and the consultant, to be assigned by the RCABC Guarantee Corp.
- .7 Inspections are to be performed as required by the RCABC Guarantee Corp. under the RoofStar 10 Year guarantee program
- .8 Inspection costs are to be included in the Contractors bid
- .9 Hazardous materials survey (required) by Work Safe BC prior to commencing work (demolition), is to be developed and supplied by Contractor and included in the Contractors bid.

#### 2.4 Milestones

- .1 The following milestones (in calendar days) have been established for the implementation of this project. The Contractors detailed schedule should meet the milestones or match as closely as possible for each task.

<b>Project Milestone</b>	<b>Time-Frame</b>
Contract Award	Day 0
Pre-commencement Meeting	Award + 7 days
Contractor Shop Drawings/Submittals to DFO Project Manager	Award + 14 days
All new roofing material delivered to the site	By 31 March 2016
Existing roof ballast removed	By 31 March 2016
Contract Completion Date (CCD-100%)	Award + 120 days

- .2 Following the approval of the Contractor's schedule by the DFO Project Manager, the Contractor shall notify the tenants of the work schedule, and take the necessary measures to complete the work within the scheduled time-frame
- .3 Product submittals are required to ensure that the specified material and products are furnished and installed in accordance with design intent as expressed in the contract documents. Until submittals are reviewed and approved by the project authority, work involving relevant material or product may not proceed. Submittals will be reviewed by the project authority and responses provided within 3 working days.

## **2.5 Method and Source of Acceptance**

Unless otherwise noted, the manner in which the work will be judged as complete and satisfactory will only be accepted in writing from the RCABC Inspector.

## **2.6 Tender Prices**

Bidders are to provide a lump sum quotation.

## **3.0 Other Terms and Conditions of the SOW**

### **3.1 Change Management Procedures**

Any unforeseen changes in the project scope will be handled as follows:

- i. The Contractor or the Departmental Representative identifies a change in scope and provides written notice to the other party detailing the reason, impact and cost of this proposed change.
- ii. An agreement is negotiated on the change, or the change is rejected.
- iii. The Departmental representative issues a change order via DFO.

### **3.2 Communications Management**

All communications shall be directed to the DFO Project Manager.

### **3.3 Health and Safety**

Contractor is to submit a Notice of Project, form 52E49, to WorkSafe BC in accordance with OH&S Regulation 20.2 and B.C Reg 30/2015, at least 24 hours before start of work.

Contractor must provide their health and Safety Policy for this project and provide to DFO Project Manager for review and acceptance prior to commencing work. The Health and Safety Plan is to include but is not limited to the following;

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

- .9 Occupational Health and Safety Committee/Representative procedures.
- .10 Occupational Health and Safety meetings.
- .11 Occupational Health and Safety communications and recordkeeping procedures.

If the Contractor discovers conditions that pose an immediate significant threat to human health or the environment, the Contractor shall notify the DFO Project Manager immediately.

Contractor is 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.

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.

### **3.4 Site Control**

- a) Site area is an operational helicopter zone. Contractor must adhere to approved access areas only.
- b) Material is to be secured or tied down 100% of the time as to not become dislodged from helicopter rotor wash, or enter the flight areas. This includes materials on the roof and in the staging area.
- c) Contractor supplied disposal bins are to have a closable lid, and remain closed when being loaded.
- d) Clean-up, temporary fencing, and storage; The Contractor shall provide, install and maintain all necessary control measures to ensure the work does not impact the adjacent environment or occupants and that unauthorized individuals cannot access the work area during the day or afterhours. Provide secure temporary storage facilities and fencing for materials and equipment if necessary. Clean up debris daily from the work area and ensure all hazardous impediments are removed or adequately stored or protected. The jobsite shall be left clean, neat and in a safe condition at the completion of each workday to the satisfaction of the DFO representative.
- e) Adequate outdoor storage areas for material and equipment will be provided onsite for the Contractor for the duration of the project
- f) The contractor shall provide sanitary facilities for use by employees.
- g) Smoking is not permitted on the worksite.
- h) DFO will provide an engineer stamped letter detailing the maximum weight of any machinery or equipment that can be used on the roof structure
- i) DFO has obtained a Street Occupancy Permit from the City of Victoria to facilitate the shutdown of the adjacent sidewalk. During the demolition portion of the project only. Contractor also has the full use of the adjacent bus stop pull out for dump truck loading of the existing roof ballast for five(5) consecutive working days only

- j) Contractor responsible to adhere to all City of Victoria Bylaws.
- k) Contractor is responsible for facilitating the creation of a City wheelchair accessible temporary sidewalk with ramps, delineators and caution tape during the closure of the existing sidewalk
- l) Contractor is responsible for providing certified traffic control personnel to manage traffic and temporary sidewalk flow

**3.5 Security Requirements** – No Security required. Contractor will not be given access to sensitive information or areas. **Contractor will be escorted at all times.**

The Company working under this contract will not be given access to sensitive information or assets, and must be escorted at all times while on DFO premises.

#### **4.0 Site Parking**

Site parking will be made available for official “Company Marked” Vehicles only. Personal vehicles will not be permitted onsite.

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## 1 GENERAL

### 1.1 SECTION INCLUDES

- .1 General description of the scope of work for the renewal of the main roof membrane at the Victoria Coast Guard Base Administration building located at 25 Huron Street, Victoria BC.
- .2 This section provides only a general description of the scope of the work and process. This section is not definitive and the Work must be completed in accordance with all of the Contract Documents. The word 'install' means 'supply and install' unless there is a specific instruction that the materials or products are to be re-used or Owner supplied.

### 1.2 SCOPE OF WORK

- .1 The following scope of work is intended to outline the general nature of the project and is not intended to limit the extent of the Work. Contractors are required to complete the Work in compliance with the Contract Documents.
- .2 Start-Up
  - .1 Supply and maintain all temporary construction facilities and services.
  - .2 Make all submittals as described in the Contract Documents and ensure project schedules are submitted and accepted at project start-up.
  - .3 Clearly identify the value of the work in each area as a percentage of the total project value and break each area into tasks, attaching the value of the work of each task as a percentage of the total project value for the purpose of evaluating applications for payment and change orders. Submit these completed schedules prior to commencing with the work.
- .3 General
  - .1 Supply for distribution a minimum of every 2 weeks a written description of the project status and specific information about the work that will affect the Owners. Increase the frequency of the submissions as necessary to keep the Owners informed. Liaise with Owner's representative and Consultant with respect to all issues impacting the building occupant's use of the site and building.
  - .2 Prepare for and attend all project progress meetings.
  - .3 Identify any items, which will prevent the timely performance of the work. The Owner will make arrangements for removal and/or reinstatement of items that will interfere with the work.
  - .4 Supply and maintain suitable scaffolding, ladders and other necessary means to access the work safely for all trades and the Consultant's field representatives.



- .5 Provide sufficient sanitary facilities for workers in accordance with local health authorities. Maintain in clean condition, workers are not permitted to use facilities within the buildings and any workers urinating in locations other than sanitary facilities to be dismissed. An area for material laydown and site storage is indicated on the drawings. Protect the existing landscaping during the work.
  - .6 Obtain and pay for trade permits as required.
  - .7 The renewal work will be subject to a Roofing Contractors Association of British Columbia (RCABC) Ten (10) year RoofStar Guarantee to be paid for by the Contractor.
  - .8 Maintain all existing means of egress from the buildings at all times during work.
  - .9 Ensure all tools, equipment, materials, and debris are secure at all times. The work is within an active aircraft operation zone and objects are at risk of becoming dislodged during operations. Ensure all tools and materials are secure at all times, exceptional measures are expected.
- .4 Coast Guard Scope of Work
- .1 Owner will obtain and pay for the Building Permit if necessary. All other temporary permits, damage deposits, or other charges required by the Municipality for the execution of the work are to be obtained and paid for by the contractor.
- .5 Site Work
- .1 Coordinate for capping, removal, relocation, disconnection of all mechanical, irrigation and electrical services on the roof.
  - .2 Coordinate the removal of the tree and root system along east elevation.
  - .3 Coordinate the work around the lamp standard located on the east elevation along Dallas Road. Notify the Owner if the lamp standard will interfere with the work.
  - .4 Coordinate removal, storage, and reinstallation of the air conditioning unit at the southeast corner as required to accommodate the work. Include any necessary modifications to the concrete slab base.
  - .5 Excavate, trench, and provide an inspection and cleanout manhole complete with 48" inside diameter precast concrete basin ring and cone assembly, steel rim and lid to H-20 loading, ladder and rung assembly, and 72" diameter concrete base with smooth large-radius turn invert channel, 1" per foot slope. Depth to suit conditions of existing and new drain laterals, with no drop to exceed 12". Install in conformance with ASTM standards for circular concrete manholes and covers.
  - .6 Coordinate disconnection, reconnection or replacement of any ventilation equipment if required to facilitate the roofing work.
  - .7 Remove and store fencing along Dallas Road, reinstall in conformance with project documents following completion of the roof membrane renewal work.
- .6 Roof Work – Low-Slope Membrane Roof Assembly (Main Roof)

- .1 Protect adjoining assemblies not included in scope of work.
- .2 Remove and protect various fixtures including mechanical and electrical devices as well as any other fixtures or assemblies not specifically identified to be replaced.
- .3 Remove and dispose existing overburden (brick pavers, soil, concrete planter, etc.).
- .4 Remove and dispose all electrical, mechanical and irrigation lines, boxes and accessories as required to facilitate the roof membrane work. All services capped and terminated by others.
- .5 Remove and dispose existing concrete topping slab located above the existing waterproof membrane (refer to project demo plan for approximate extent)
- .6 Remove and dispose the concrete cover installed across the control joint in the structure. Includes metal plate cover.
- .7 Remove and dispose existing Bollards, benches, perimeter guards (wood rails with steel post), concrete walls, etc.
- .8 Carefully cut-off, remove and dispose of cantilevered concrete planter at southeast corner of roof.
- .9 Remove and dispose of brick pavers outside fence line at southeast corner. Provide sod infill as required.
- .10 Remove and dispose existing roof flashings, insulation, roof membrane, furring, blocking and all other accessories necessary to facilitate the work.
- .11 Remove/cut-off existing drain bodies flush with the dished concrete surface. Hone the inside of the existing drain pipe to accept new roof drain pipe and connection. Grind (dish) the concrete surrounding the existing drain bodies to a depth of 3/16" to a diameter of 24" around the drain.
- .12 Install parapet coping per the intent of the project details.
- .13 Extend existing HVAC curbs as required to facilitate curbs heights 8" above new membrane surface.
- .14 Excavate soil and install 18 Ga. stainless steel drainage trough to north elevation from the northeast corner to the west side of the northeast access gate, extend along the extent of the east elevation to terminate at the southeast corner. Include compacted soil as indicated, 10 Mil poly drape, waterproof SBS liner, drain rock and geotextile cloth as indicated, top soil, and sod. Slope soil to form a swale and sod as indicated.
- .15 Install SBS membrane assembly, drains, and associated accessories, per the intent of the project documents. Extend both cap and base sheet membrane over parapets and curbs. Retrofit drains are to sleeve into existing drain pipe c/w u-flow connection.
- .16 Install Situra Flamline roof control joint as indicated and in accordance with manufacturer recommendations.
- .17 Install drainage mat and extruded polystyrene insulation. Extend insulation into drainage trough as indicated. Install perforated 24ga. stainless steel ballast retainer between plies of insulation as indicated.

- .18 Install filter fabric and new gravel ballast uniformly over surface of insulation. Gravel ballast to be installed to a depth of 2" or a minimum of 12lbs per square foot.
  - .19 Install PMMA lockout stripping between SBS membrane and concrete at all terminations (i.e. mechanical penthouse, skylight, etc.). Follow the profile of openings in the curb (louvres, door, etc.).
  - .20 Install curb and parapet metal flashings.
  - .21 Terminate insulation at change in slab elevation at walkway bridge entrance (gridline A), extend the drainage mat to the top of the change in elevation. Extend the filter fabric from the insulation onto the walkway bridge. Install transition flashing from the insulation to the walkway bridge with minimum 4" legs installed onto each of the insulation and walkway.
  - .22 Install new gutter assembly to underside of stair assembly as indicated.
  - .23 Terminate waterproof membrane at top of stair access and install PMMA lockout as indicated. Recoat with PMMA and broadcast quartz granules to rejection.
  - .24 Seal all joints and penetrations.
  - .25 Install new side mounted guardrail/fences at the southeast and northeast corners of the roof as indicated.
  - .26 Re-install fixtures, devices and assemblies previously removed.
- .7 Metal Roof Work – New Sloped Metal Roof Assembly
- .1 Remove and dispose existing metal roofing, underlayment, flashings, concrete curb, etc.
  - .2 Install sloped wood coping to concrete curbs at top of roof structure.
  - .3 Apply new underlayment, extend up and over concrete at sides and top of roof, terminate 2" below wood coping.
  - .4 Extend underlayment onto the terminated SBS at the base of the roof assembly.
  - .5 Install eave flashing to extend over the vertical parapet flashing installed with the SBS roof membrane below.
  - .6 Install metal roof panels in accordance with manufacturer's recommendations. At sides of roof install metal counterflashing to extend to top of concrete. Install with new cap flashing over counter flashing to cover underlayment on opposite side.
  - .7 Install counter flashing and closer at top of roof assembly, extend counter flashing to top of concrete. Install new cap flashing to match new slope over counter flashing to cover underlayment on opposite side.
- .8 Skylight Work – New Sloped Glazing Assembly
- .1 Remove and dispose of existing skylight assembly, flashings, concrete curb, etc. Modify interior finishes as required to accept new sloped glazing assembly.
  - .2 Install sloped wood coping concrete curbs at top of structure.

- .3 Install sloped glazing assembly in accordance with manufacturer's recommendations and as indicated.
- .4 Make good interior finishes.
- .9 Site Clean-up
  - .1 Ensure site is kept clean and free of debris.
  - .2 Clean site as directed in documents. Ensure that no construction debris is left on site.

### 1.3 WORK SEQUENCE

- .1 Undertake Work in stages to accommodate Owner's continued use of premises during construction.

### 1.4 OWNER OCCUPANCY

- .1 Owner will occupy premises during entire construction period under normal occupancy.
- .2 Co-operate with owner in scheduling operations to minimize conflict and to facilitate Owner usage.

## 2 PRODUCTS (NOT APPLICABLE)

## 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

## 1 GENERAL

### 1.1 SUMMARY

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- .1 Work included: labour, materials, equipment and services necessary for the following:
  - .1 Removal and disposal of existing roofing and building materials as indicated.

### 1.2 REFERENCES

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- .1 WCB
- .2 CSA S350-M1980, Code of Practice of Safety in Demolition of Structures.
- .3 CAN/CSA-S269.2-M87 Access Scaffolding for Construction Purposes.

### 1.3 EXISTING CONDITIONS

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- .1 Take over structures to be demolished based on their condition on date that tender is accepted.
- .2 Recording of existing conditions:
  - .1 The Contractor shall co-ordinate with the Owner when it is necessary to access, measure and/or photograph existing conditions prior to execution of the work.

### 1.4 DEMOLITION DRAWINGS

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- .1 Where required by authorities having jurisdiction, submit for approval drawings, diagrams or details showing sequence of disassembly work and supporting structures.
- .2 Submissions to bear stamp of qualified professional engineer registered in Province of British Columbia.

### 1.5 PROTECTION

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- .1 Prevent movement, settlement or damage of adjacent parts of existing building to remain. Provide bracing, shoring as required. Make good damage caused by demolition.
- .2 Take precautions to support affected structures and, if safety of building being demolished or adjacent structures or services appears to be endangered, cease operations and notify Owner.

- .3 Prevent debris from blocking surface drainage system, elevators, mechanical and electrical systems which must remain in operation.
- .4 Protect all adjacent surfaces and glazing.

## **2 PRODUCTS (NOT USED)**

## **3 EXECUTION**

### 3.1 WORK

- .1 Dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction.
- .2 The following is a partial list of items that require removal and disposal:
  - .1 Overburden (pavers, soil, etc.).
  - .2 Roofing including insulation, flashing, and wood framing.
  - .3 Concrete (planters, topping, benches, etc.).
  - .4 Fences and guards as indicated.
  - .5 Sloped glazing and metal roof panels and flashing.
  - .6 Existing mechanical and electrical devices.
  - .7 Tree along east elevation (Dallas Road).

### 3.2 SAFETY CODE

- .1 Unless otherwise specified, carry out demolition work in accordance with Section 01 00 10 and CSA S350-M1980 Code of Practice of Safety in Demolition of Structures.

### 3.3 PREPARATION

- .1 If required, coordinate disconnect and re-route electrical lines in accordance with authorities having jurisdiction and Coast Guard representatives. Post warning signs on electrical lines and equipment that must remain energized to serve other properties during period of demolition.
- .2 If required, coordinate disconnect and cap designated mechanical services in accordance with authorities having jurisdiction and Coast Guard representative.
- .3 Do not disrupt active or energized utilities designated to remain undisturbed.
  - .1 All services are designated to remain active.
- .4 Label, and identify locations, orientation and layout of assemblies identified for reinstallation.

- .5 Remove and store in a safe location, assemblies identified for reinstallation.

### 3.4 DEMOLITION

- .1 Perform work in a safe manner at all times in accordance with WCB, project, and reference standard safety requirements and protocols.
- .2 Demolish parts of building to permit remedial work as indicated.
- .3 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as work progresses.
- .4 At the end of each day's work, leave work in safe condition so that no part is in danger of toppling or falling. Protect interiors of parts, and adjacent elements not to be demolished from exterior demolition at all times.
- .5 Provide clean straight cut lines at the extent of all removals as indicated to allow future tie-ins.
- .6 Concrete substrates are to be protected. Do not over cut.
- .7 Demolish to minimize dusting, airborne fungi, and other debris. Keep materials wetted as directed by Owner.
- .8 Do not sell or burn materials on site.
- .9 Remove contaminated or dangerous materials as defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

END OF SECTION

## 1 GENERAL

### 1.1 SUMMARY

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- .1 This section covers the labour, materials, equipment and services necessary for the design, fabrication, and installation of all guardrails as indicated.

### 1.2 REFERENCES

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- .1 B.C. Building Code.
- .2 Canadian Standards Association (CSA)
  - .1 CAN3-S157-M83 Strength Design in Aluminum.
  - .2 CSA W47.2-M1987 Certification of Companies for Fusion Welding of Aluminum.
  - .3 CSA W59.2-M1991 Welded Aluminum Construction.
- .3 Canadian General Standards Board (CGSB).
  - .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass
  - .2 CAN/CGSB-1.108 M89 Bituminous Solvent Type Paint.
- .4 American Architectural Manufacturers Association (AAMA)
  - .1 AAMA 2603-02 Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
  - .2 AAMA 2604-02 Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
  - .3 AAMA 2605-02 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- .5 American Society for Testing and Materials (ASTM).
  - .1 ASTM A193/A193M-94b Specification for Alloy-Steel and Stainless Steel Bolting.
  - .2 ASTM B 221M-93 Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tube (Metric).
  - .3 ASTM B308/B308M-93 Aluminum-Alloy Standard Structural Shapes, Rolled or Extruded.
  - .4 ASTM B766-86 Standard Specification for Flat Glass.
  - .5 ASTM E488-90 Test Method for Strength of Anchors in Concrete and Masonry Elements.
- .6 Aluminum Association, Inc. (AA).
  - .1 AA 45 Designation System for Aluminum Finishes.
- .7 American Welding Society (AWS).
  - .1 AWS A5.10, Specification for Bare Aluminum and Aluminum Alloy Welding Electrodes and Rods.



### 1.3 QUALITY ASSURANCE

- .1 Work under this section shall be under one Contractor who will be required to furnish proof of qualifications including licence or approval by manufacturer, and shall have completed similar works.
- .2 Manufacture and installation shall be performed in conformance with the shop drawings approved by the Consultant.

### 1.4 WARRANTY

- .1 Paint on aluminium railings.
- .2 Paint for the railings is to meet the paint specification requirements as laid out in AAMA guidelines for a five year period including gloss, colour and fade resistance.

### 1.5 SHOP DRAWINGS

- .1 Submit shop drawings for review.
- .2 Provide shop drawings, indicating sizes, quantities, details, materials, fastenings, finishes, dimensions, etc., for the Consultant's review before commencing fabrication. Dimensions shown on drawings to be verified on site before fabrication. Indicate methods and materials on shop drawings.
- .3 Shop drawings for guards (new and reused), including all connection detailing, and shall be sealed by a professional engineer registered in B.C. Suitability of base structure for guardrail attachment is the responsibility of the Consultant.
- .4 Schedules: The Engineer who sealed the shop drawings shall submit to the Consultant the APEGBC Model Schedule S-B Assurance of Design and Commitment for Field Review for Supporting Registered Professional with the initial shop drawing submission. The Engineer who sealed the shop drawings shall provide field review of the installation. On completion of the installation the Engineer shall submit to the Consultant the APEGBC Model Schedule S-C Professional Assurance of Professional Field Review and Compliance.

### 1.6 SUBMITTALS

- .1 Submit shop drawings for review.
- .2 Submit duplicate colour samples of finished aluminum extrusions used in modifications to the Consultant for colour selection. Label samples indicating manufacturer's name, brand, type, finish and colour.

## 1.7 DESIGN CRITERIA

- .1 Design and install guards and anchorage to conform to the B.C. Building Code including lateral loading requirements. Design of the guard rails, connections and localized reinforcement of the structure is the responsibility of the railing supplier's engineer. Reuse of any existing anchor bolts must also be reviewed and approved by the railing supplier's engineer.
- .2 Design guards to meet BC Building Code requirements including minimum guardrail height of 42" (1070mm) above finished surfaces, maximum opening size of 4" (100mm), and no element located between 4" (100mm) and 36" (900mm) above the level protected by the guard will facilitate climbing. Provide infill panels as required to prevent climbing between railing posts and adjacent wall/column assembly.
- .3 All railing anchors to concrete must be installed after membrane work/finished surface is completed.

## 1.8 MOCK-UP

- .1 Construct mock-up for:
  - .1 Guardrailing secured to exterior face of parapet.
- .2 Mock-up to be reviewed by Consultant. Mock-up may form part of the finished work.

## **2 PRODUCTS**

### 2.1 MATERIALS

- .1 Guards: All guards are new painted aluminium product.
- .2 Aluminum Extrusions: Shapes as required to fulfil specified 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.
- .3 Anchoring System and Fasteners:
  - .1 Concrete Structures: All new railings are to be provided with new anchor bolts. Type of anchor bolt to observe available edge distance, slab depth and post tension cabling if present.
  - .2 All bolt types to be 300 or 400 Series stainless steel complete with lock washers as required. Size and spacing as determined by railing supplier's engineer.
- .4 Neoprene pads:
  - .1 To be 80 Shore A Durometer hardness.
  - .2 Alternates must have sufficient hardness and durability and resistance to UV and moisture. Submit details for review.

- .3 Neoprene pads to be silicone compatible unless other means of acceptable separation are used.
- .5 Structural steel – Grade 44W for angles, beams and plates and Grade 50W Class C for HSS members. All steel is hot dipped galvanized.
- .6 Structural steel bolts – A325 grade, corrosion protection to match the steel components being fastened.

## 2.2 FABRICATION

- .1 Verify all dimensions on site prior to proceeding with shop fabrication.
- .2 Grind smooth sharp edges, angles and corners.
- .3 Fabricate all work in accordance with shop drawings.
- .4 Fabricate items from aluminum, unless otherwise noted.
- .5 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws. Screws to be located in concealed areas and be flush with finished product.
- .6 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.
- .7 Bolted work shall be carefully tightened with threads of bolts nicked to prevent subsequent loosening.

## 2.3 PAINTED FINISH

- .1 Thermosetting powder coating that is polyester based and TGIC free.
- .2 Superdurable polyester paint meeting the requirements of AAMA standard 2604-98.
- .3 Multi-stage cleaning and chemical conversion pre-treatment system as per paint manufacturer's recommendations is required.
- .4 Colour: Colour is black to match existing.
- .5 Minimum paint thickness is 2.5 mil.
- .6 Specular Gloss: 80 to 90. Provide sample for approval.
- .7 Powder paint coatings shall be certified by the manufacturer using independent laboratory tests. Paint supplier must submit documentation supporting paint properties as tested including UV resistance for chalking and fading.
- .8 Acceptable products:
  - .1 AAMA 2604-98 Series 68 by Tiger Drylac.
  - .2 Approved alternate.
- .9 All exposed surfaces to be free of visible defects and scratches.
- .10 Provide painted aluminium railing sample for approval.

### **3 EXECUTION**

#### **3.1 EXAMINATION**

- .1 Inspect to ensure all existing building conditions are suitable for securing guardrails. This includes any reinforcement required of the existing structure. All reviews to be done before reinforced areas are covered.
- .2 For concrete structures, any existing anchor bolts which are reused must be reviewed by the railing supplier's engineer for acceptability and reuse. Damaged or cracked concrete around anchor bolts is not acceptable and must be repaired prior to installing railings. Existing anchor bolts that are not reused must be cut off flush with the concrete surface.
- .3 At concrete walls, ensure new railing post attachments are located to avoid drains and flashings.

#### **3.2 FABRICATION**

- .1 New railings are to be constructed to match existing for general arrangement, pickets, top and bottom rails. Minimum post size is 2" (50mm). Fabricate items from new aluminum, unless otherwise noted. Railings to be constructed as per the approved shop drawings.
- .2 Adjust post heights to ensure that the top rail of the guard is level around the balcony perimeter. Maintain height minimums and maximum gaps.
- .3 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws. Screws to be located in concealed areas and be flush with finished product.
- .4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.
- .5 Grind smooth sharp edges, angles and corners.
- .6 Provide side drain holes in posts just above baseplate level.

#### **3.3 PAINTING**

- .1 Painting of railings is to be done in controlled shop conditions in accordance with paint manufacturer's recommendations.

#### **3.4 ERECTION**

- .1 Install units plumb, level and true to lines in accordance with the reviewed shop drawings.
- .2 All anchor bolts must have lock washers or other measures to prevent loosening over time and normal use.

- .3 Ensure baseplates are shimmed to be plumb. Use stainless steel shims on concrete surfaces. Provide gasket on stucco surfaces.
- .4 Ensure all baseplates and mounting plate perimeters are caulked including bolt heads and nuts. Provide separation tape between gasket and silicone caulking if gasket is not silicone compatible.

### 3.5 PROTECTION AND CLEAN-UP

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- .1 Protect the work of other sections from damage resulting from the work of this section. As work proceeds, and at completion, remove all surplus materials and deposit debris in containers provided or remove from site as directed.
- .2 Clean all guards at completion of work.
- .3 Touch up paint scratches and other damage with custom colour spray bombs or brush applied paint. Paint to be as recommended by the paint manufacturer for touch up work.

END OF SECTION

## 1 GENERAL

### 1.1 SUMMARY

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- .1 Work includes labour, materials, equipment and services necessary to provide roof / deck waterproofing membrane assemblies for the Administration building located at the Victoria Coast Guard Base.

### 1.2 REFERENCES

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- .1 B.C Building Code.
- .2 CSA A123.3-M1979 Asphalt or Tar Saturated Roofing Felt.
- .3 CSA A123.4-M1979 Bitumen for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems.
- .4 Roofing Contractors' Association of B.C., Roofing Practices Manual.
- .5 CGSB 37.50-M89 Hot Applied, Rubberized Asphalt for Roofing and Waterproofing.
- .6 CGSB 37-GP-9Ma Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
- .7 CGSB 37-GP-15M Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing.
- .8 37-GP-19M Cement, Plastic, Cutback Tar.
- .9 CGSB 37.29-M89 Rubber-Asphalt Sealing Compound.
- .10 CGSB 37-GP-56M Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
- .11 CAN/CGSB-51.20-M87 Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .12 ASTM D412 Tension Test for Vulcanized Rubber and Thermoplastic Elastomers.
- .13 Guide Specification for Parapro 123 Reinforced Catalyzed Resin Flashing System.
- .14 Roofing Contractors' Association of B.C., Roofing Practices Manual.

### 1.3 RCABC WARRANTY

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- .1 Conform to the latest guarantee standards of the RCABC as published in the RGC ("RCABC Guarantee Corporation") roofing practices manual for a 10 (ten) year guarantee. Provide RoofStar 10 (ten) year guarantee certificate.
- .2 Independent inspection.
  - .1 To be performed by RDH Building Engineering Ltd certified RCABC inspector as acceptable to the RGC and in accordance with the RGC RoofStar 10 year Warranty Program.
- .3 Prior to shipment of materials to site the Contractor shall make application for warranty to RCABC.

- .4 The 2, 5 and 8 year re-inspection fees and Guarantee fees are to be paid to RCABC by the Contractor.
- .5 RCABC inspection fees to be paid to the inspection firm by the Contractor.

#### 1.4 MANUFACTUER'S WARRANTY

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- .1 Provide the Owner with a manufacturer's warranty stating the roofing system shall remain watertight and free from material and workmanship defects for a total of ten (10) years after the final completion date. The warranty shall be a term type, without deductibles or limitations on coverage amount, and shall be issued at no additional cost to the Owner. This guarantee shall not exclude random areas of ponding from coverage.
- .2 Prior to shipment of materials to site the Contractor shall make application for warranty to the membrane manufacturer.

#### 1.5 LABORATORY TESTING

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- .1 If required by Consultant, manufacturers of Elastomeric Asphalt materials to provide, at no cost, the results of tests and chemical analysis on the Elastomeric Asphalt materials supplied.
- .2 Tests are conducted to verify conformance to CGSB 37-GP-56M.

#### 1.6 QUALIFICATIONS

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- .1 Roof/deck waterproof membrane Contractor is required to submit evidence that the contractor has successfully completed similar work over a period of not less than 5 years.
- .2 The Contractor must be officially recognized as an authorized installer by the waterproofing materials' manufacturer.

#### 1.7 JOB MOCK-UP

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- .1 Fabricate, install and pay for mock-ups as required. Mock-ups will be typically used to confirm details and may remain as part of the finished product if found acceptable by the Consultant.

#### 1.8 QUALITY ASSURANCE

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- .1 Installer Qualifications: Only competent, qualified tradesmen experienced with membranes shall execute the work of this section.
- .2 A crew of qualified tradesmen is defined as follows:
  - .1 The foreman shall hold a three-year Apprenticeship Certificate; at least one other man shall hold a three year Apprenticeship Certificate; the balance of the crew should have completed some portion of the Apprenticeship program, but shall at least have submitted application for the certification as "Roofer". A Journeyman Certificate is acceptable in lieu of an Apprenticeship Certificate.

- .2 The Foreman and one other member of the crew must have attended an Application Seminar provided by the membrane manufacturer.
- .3 Confirm that surfaces to which modified membrane is to be applied are in a condition suitable for this application. Notify the Consultant in writing if substrate is unacceptable.
- .4 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.
- .5 Notify Consultant in writing of any conflict between these specifications and manufacturers instructions. Consultant will designate which document is to be followed.

### 1.9 SUBMITTALS

- .1 Provide bills of lading to the Consultant, as requested.
- .2 Letter from the proposed primary roof/deck membrane manufacturer confirming that the roof/deck membrane contractor is authorized to install the proposed system.
- .3 Letter from the primary roof/deck membrane manufacturer stating that the proposed application will comply with the manufacturer's requirements in order to qualify the project for the specified warranty.
- .4 Upon completion of the waterproofing work submit executed manufacturer and RCABC warranty to Owner.

### 1.10 STORAGE AND HANDLING

- .1 Deliver and store all materials in their original packaging, bearing the manufacturer's name, related standards and any other specifications or reference standards.
- .2 Store materials out of direct exposure to the elements.
- .3 Store materials delivered in rolls carefully on end, with selvage edges up.
- .4 Store roll goods on a clean, flat and dry surface. All material stored on the roof/deck shall be stored on pallets.
- .5 As required, materials stored on the roof/deck shall be weighted to prevent "blow off" due to wind.
- .6 Store materials on the roof/deck in a manner so as to preclude overloading of roof/deck and building structure.
- .7 Maintain storage location at minimum +5°C.
- .8 Store all materials such as solvents, membranes, adhesives and asphalt cutback products away from open flames, sparks or excessive heat.
- .9 Protect and permanently store all materials in a dry, well-ventilated and weatherproof location. Remove from this location only materials to be used the same day. Cover all material using a



breathable cover such as a canvas. Polyethylene or other non-breathable plastic coverings are not acceptable.

- .10 Prevent water-based materials from freezing.
- .11 Place plywood runways or similar over completed work to prevent damage to roof/deck membrane during the course of the work, if required.

#### 1.11 ENVIRONMENTAL REQUIREMENTS

- .1 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.
- .2 Before commencing work, Contractor to ensure that forecasted meteorological conditions shall permit work to be carried out without interruption during the course of the day.
- .3 Do not install roofing when temperature remains below +1 °C for torch, or an equivalent temperature allowing for wind-chill factor.
- .4 Minimum temperature for solvent-based adhesive is -5 °C.
- .5 All exposed areas of the work shall be protected at the end of each working day or during any interruption of work.
- .6 If water penetrates through the assembly due to inadequate protection, Contractor to cut and inspect damages, remove, replace and re-install all materials to eliminate all traces of water in the assembly. All costs to be borne by the Contractor.
- .7 Membrane system must be watertight at end of each shift.

#### 1.12 PROTECTION

- .1 Protect all adjacent surfaces from any damage that may result from the work of this section. This includes the installation of fireguard protection, as required and/or as directed by the Consultant. The roof/deck membrane contractor shall make good any damage resulting from the work.
- .2 When working with Torch Applied Materials:
  - .1 Fire Extinguishers: maintain one cartridge operated type with shut-off nozzle, ULC labeled for A, B and C class protection. Size 2.25 kg on roof/deck per torch applicator, within 10m of torch applicator.
  - .2 A fire watch shall be maintained in conformance with roof/deck membrane contractor's insurance provider after each day's roof/deck waterproofing operations cease or as required to satisfy the requirements for all insurance providers involved with the building and/or the work.
- .3 Provide a written roof/deck fall protection plan in conformance with WorkSafe BC and OH&S Regulations. A copy of the fall protection plan must be available at the workplace before work with a risk of

falling begins. The plan shall include but is not limited to the following:

- .1 A roof/deck plan sketch indicating the fall hazards expected in each work area.
- .2 The fall protection system or systems to be used in each area.
- .3 The procedures to assemble, maintain, inspect, use and disassemble the fall protection system or systems.
- .4 The procedures for rescue of a worker who has fallen and is suspended by a personal fall protection system or safety net, but is unable to effect self rescue.

Location of nearest medical facility, complete with shortest route directions.

### 1.13 MANUFACTURER'S REPRESENTATIVE

- .1 Manufacturer Requirements:
  - .1 The primary roof/deck waterproofing materials' manufacturer shall provide direct trained company personnel to attend necessary job meetings, perform base sheet and cap sheet inspections and conduct a final inspection upon successful completion of the project.
  - .2 Manufacturer's representative to provide a written copy of the report to the Consultant after each visit to the site.
- .2 Contractor to permit and facilitate access to site and roofs/decks, at all times, by above mentioned manufacturer's representative.

## **2 PRODUCTS**

### 2.1 MEMBRANE SYSTEM DESIGNATIONS

- .1 Two-Ply SBS Modified Bitumen Insulated Protected System:
  - .1 Acceptable system components:
    - .1 Base sheet: Paradiene 20 TG F by Siplast
    - .2 Base sheet flashing: Paradiene 20 HTTG F by Siplast
    - .3 Cap sheet: Teranap 1M TG by Siplast
    - .4 Parapro 123 Flashing membrane by Siplast
  - .2 Approved alternative system:
    - .1 Request for alternative system must be submitted to the Consultant in writing and must include product data sheets, warranty provisions and cost implications.

2.2 SBS MODIFIED  
BITUMEN  
MEMBRANE  
MATERIALS

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- .1 Base sheet conforming to CGSB 37-GP-56M, Styrene-Butadiene-Styrene (SBS) elastomeric polymer, prefabricated sheet, random fibrous glass mat reinforcement. The membrane must also meet the following minimum criteria:
  - .1 Type 2
  - .2 Class C
  - .3 Grade 1
  - .4 Thermofusible elastomeric asphalt: Mix of selected bitumen and SBS thermoplastic polymer. Minimum 12% polymer content.
  - .5 Topside to be protected with perforated polyolefin film.
  - .6 Bottom surfaces shall be protected by a thermofusible polyolefin film.
  - .7 Average thickness:
    - .1 2.9 mm
  - .8 Tear strength to ASTM D 5147
    - .1 40lbf (0.18kN)
  - .9 Ultimate elongation (average) at 23°C:
    - .1 50%
  - .10 Low temperature flexibility:
    - .1 No cracking at -30°C
  - .11 Acceptable product:
    - .1 Paradiene 20 TG F as manufactured by Siplast.
    - .2 Approved alternative:
      - .1 Requests for alternative must be submitted to the Consultant in writing and must include product data sheet.
- .2 Base sheet flashing conforming to CGSB 37-GP-56M, Styrene-Butadiene-Styrene (SBS) elastomeric polymer, prefabricated sheet, fibreglass scrim/fibreglass mat composite reinforcement. The membrane must also meet the following minimum criteria:
  - .1 Type 2 (fully adhered, torch applied)
  - .2 Class C
  - .3 Grade 2
  - .4 Thermofusible elastomeric asphalt: Mix of selected bitumen and SBS thermoplastic polymer. Minimum 12% polymer content.
  - .5 Topside to be protected with perforated polyolefin film.
  - .6 Bottom surfaces shall be protected by a thermofusible polyolefin film.
  - .7 Average thickness:
    - .1 2.9 mm

- .8 Tensile strength or Peak Load at 23°C:
    - .1 935 N/5 cm
  - .9 Ultimate elongation (average) at 23°C:
    - .1 100%
  - .10 Low temperature flexibility:
    - .1 No cracking at -30°C
  - .11 Acceptable product:
    - .1 Paradiene HTTG F as manufactured by Siplast.
    - .2 Approved alternative:
      - .1 Requests for alternative must be submitted to the Consultant in writing and must include product data sheet.
- .3 Cap sheet and cap sheet flashing conforming to CGSB 37-GP-56M, Styrene-Butadiene-Styrene (SBS) elastomeric polymer, prefabricated sheet, fibreglass scrim/polyester mat reinforcement. The membrane must meet the following minimum criteria:
- .1 Type 1
  - .2 Class A
  - .3 Grade 2
  - .4 Top side to be protected with No. 11 ceramic coloured granules from manufacturers standard color range.
  - .5 Bottom surfaces shall be protected by a thermofusible polyolefin film.
  - .6 Thermofusible elastomeric asphalt: Mix of selected bitumen and SBS thermoplastic polymer. Minimum 12% polymer content.
  - .7 Average thickness at selvedge:
    - .1 3.0 mm
  - .8 Tensile strength or Peak Load at 23°C:
    - .1 785 N/5 cm
  - .9 Ultimate elongation at Peak Load at 23°C:
    - .1 60%
  - .10 Low temperature flexibility:
    - .1 No cracking at -30°C
  - .11 Acceptable material:
    - .1 Teranap 1M TG as manufactured by Siplast.
    - .2 Approved alternative:
      - .1 Requests for alternative must be submitted to the Consultant in writing and must include product data sheet.
- .4 Catalyzed Resin Flashing System (Parapro): Fluid-applied reinforced membrane, conforming to ASTM C 836. Materials shall also conform to the following requirements.
- .1 Approved alternative:

- .1 Requests for alternative must be submitted to the Consultant in writing and must include product data sheet.
- .1 Solvent: A clear solvent used to clean and reactivate transition areas of in-place catalyzed resin flashing membranes at tie-ins, repairs, and between staged coats of resin. The solvent shall also be used to prepare metal and plastic surfaces prior to application of catalyzed resin flashing membranes.
  - .1 Acceptable material:
    - .1 Pro Prep by Siplast
  - .2 Paste: A multi-component, fast curing resin paste used for remediation of depressions in substrate surfaces or other irregularities.
    - .1 Acceptable material:
      - .1 Pro Paste Resin by Siplast
  - .3 Primers: A two component, fast curing acrylic primer for use over concrete, concrete repair materials, masonry substrates, wood/plastic substrates, and asphaltic materials.
    - .1 Acceptable material:
      - .1 Pro Primer R, T or W by Siplast
  - .4 Resin: A multi-component, flexible acrylic resin for use in combination with fleece fabric to form a monolithic, reinforced flashing membrane used in conjunction with a granule surfaced modified bitumen flashing system.
    - .1 Acceptable material:
      - .1 Parapro Membrane Resin by Siplast
  - .5 Fleece: A non-woven, 360° needle punched polyester fabric used as reinforcement in catalyzed resin flashing membranes.
    - .1 Acceptable material:
      - .1 Pro Fleece by Siplast
  - .6 Catalyst: A reactive agent used to induce curing of acrylic resins.
    - .1 Acceptable material:
      - .1 Pro Catalyst by Siplast
  - .7 Approved alternative:
    - .1 Requests for alternative must be submitted to the Consultant in writing and must include product data sheet.

.5 Roof Membrane Accessories:

  - .1 Waterproof Expansion Joint.
    - .1 Situra Inc. Waterproof Expansion Joints
  - .1 Membrane adhesive: Non asbestos fiber, asphalt cutback.
    - .1 PA-311M by Siplast
  - .2 Vapour barrier membrane adhesive: Solvent based primer.
    - .1 PA- 325 by Siplast (solvent based)
    - .2 TA-119 by Siplast (water based)
  - .3 Primer: Asphalt solvent blend.

- .1 PA-917 LS by Siplast
- .4 Flashing Cement for setting metal flanges and drains:
  - .1 PA-1021 by Siplast
- .5 Approved alternative:
  - .1 Requests for alternative must be submitted to the Consultant in writing and must include product data sheet.

## 2.3 ACCESSORY MATERIALS

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- .1 Insulation: Extruded polystyrene to meet CGSB 51.20 Type 4, R5 per inch R-value minimum. Insulation to provide an overall R30.
  - .1 Acceptable products:
    - .1 DOW Roofmate Type 4
    - .2 Approved alternative:
      - .1 Requests for alternative must be submitted to the Consultant in writing and must include product data sheet.
  - .2 Polyurethane Spray Foam Adhesive;
    - .1 Parastik by Siplast.
    - .2 Approved alternative:
    - .3 Requests for alternative must be submitted to the Consultant in writing and must include product data sheet.
  - .3 Roof/Deck Drains:
    - .1 As directed by Consultant to suit roof assembly and application.
      - .1 Menzies Clamp Tite copper spun drain with U-flow.
    - .2 New drain body pipe to sleeve into existing drain pipe whenever possible. Install blue seal to connect to existing drain pipe. Hone the existing pipe to ensure a positive seal.
    - .3 All work to be in accordance to British Columbia Plumbing Code.
    - .4 Acceptable product:
      - .1 Spun copper Clamp-Tite by Menzies Metals.
      - .2 Approved alternative:
        - .1 Requests for alternative must be submitted to the Consultant in writing and must include product data sheet.
  - .4 Sealant: For sealing SBS membrane leading edges.
    - .1 Acceptable product:
      - .1 Flexseal by Epmar Corporation .
      - .2 Approved alternative:
        - .1 Requests for alternative must be submitted to the Consultant in writing and must include product data sheet.

- .5 Water Cut-Off Mastic: Once component low viscosity self-wetting butyl blend mastic to be used as a sealing agent at membrane terminations.
  - .1 Acceptable product:
    - .1 Water Cut-Off Mastic by Carlisle
    - .2 Preapproved equivalent
- .6 Ceramic Granules:
  - .1 No. 11 grade specification ceramic granules of colour scheme matching the granule surfacing of the finish ply.
- .7 Drain Mat Installation at Roof/Deck:
  - .1 Drain mat to have a maximum thickness of 3/8" (9.5 mm) with integral filter fabric on top side.
  - .2 Acceptable Product:
    - .1 Paradrain Extensive by Siplast
    - .2 Approved Alternate
- .8 Filter Fabric: Industrial synthetic fabric consisting of high density polyethylene tapes coated on one side with low density polyethylene.
  - .1 Filter fabric to contain ultraviolet inhibitors and be suitable for outdoor applications.
  - .2 Acceptable Product:
    - .1 Fabrene VIIIE9 by Fabrene Inc.
    - .2 Approved Alternate
- .9 Ballast:
  - .1 River washed rock used to ballast the insulation assembly shall meet the ASTM D 448 #57 requirements. Diameter of the rock particles shall maintain a nominal 3/4 inch to a maximum 1-1/2 inch range.

### 3 EXECUTION

#### 3.1 WORKMANSHIP

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- .1 Install roof/deck waterproof membrane in accordance with applicable standard in R.C.A.B.C. Roofing Practices Manual, the membrane manufacturer's requirements, or this specification; whichever is more stringent.
- .2 Install primer for asphalt waterproof membrane in accordance with CGSB 37-GP-15M.
- .3 Install waterproofing elements on clean dry substrate in accordance with the manufacturer's written instructions (attached). Where there is a discrepancy between the manufacturers' recommendations and the specifications, the more stringent will govern.

- .4 Waterproofing work shall be scheduled and performed in a sequence such that no component of the assembly is left unprotected when operations are interrupted.

### 3.2 PROTECTION

- .1 Cover walls and adjacent work where materials hoisted or used.
- .2 Use warning signs and barriers. Maintain in good order until completion of work.
- .3 Clean off drips and smears of bituminous material immediately.
- .4 Ensure installed membrane is protected during the course of the work. Place plywood runways, or similar, over completed work as required to ensure the movement of materials and other traffic does not damage completed work. Comply with precautions deemed necessary by Consultant.
- .5 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for work areas and materials out of storage. Maintain area in a watertight condition at all times.
- .6 Provide fireguard for all adjacent surfaces to protect from any damage that may result from the work of this section, as required. The contractor shall make good any damage resulting from the work at no cost to the Owners.

### 3.3 EXAMINATION OF ELEMENTS

- .1 Examine work areas and immediately inform Consultant in writing of any defects.
- .2 Prior to commencement of work ensure that all substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris
- .3 Contractor shall inspect and approve substrate condition prior to commencement of work. Commencement of work implies acceptance of the surface condition.

### 3.4 REUSED DECK AND ROOF DRAINS

- .1 Grind down drain body to 3/16" below concrete deck. Grind concrete deck to create a "dish" to a radius of 24". Hone out existing drain pipe to ensure new drain and U-flow fit.

### 3.5 MODIFIED BITUMINOUS MEMBRANE SYSTEMS

- .1 Details of waterproof membrane are for schematic purposes. Membrane systems to be installed in accordance with intent of



- details, along with manufacturer's recommendations and RCABC guidelines. The most stringent shall apply.
- .2 Use materials in accordance with manufacturer's recommendations.
  - .3 Prime all metal to receive direct membrane application. All metal surfaces to receive membrane must be buffed or etched prior to asphalt primer application.
  - .4 Remove only as much of the existing roof/deck membrane as can be stripped in with base stripping ply in the same day. At the conclusion of each day's work provide water tight "night seals" that facilitate the continuation of the roof/deck membrane work the next day.
  - .5 Installation of base sheet:
    - .1 Starting at low point of roof, perpendicular to slope, unroll base sheet dry on deck, align, and reroll from both ends. Care must be taken to ensure good alignment of the first roll.
    - .2 Install the base sheet by heating the backside of the membrane roll so that there is a free flowing puddle of asphalt in front of the roll at all times. Apply extra heat as necessary to ensure a full and continuous bond to the substrate. Ensure there is a minimum bleed out of 1/8" (3mm) at all seams.
    - .3 Terminate base sheet at the bottom of vertical returns.
    - .4 Application shall provide a smooth surface without air pockets, wrinkles, fishmouths or tears.
    - .5 Cut a dog ear angle at the end laps on overlapping selvage edges.
    - .6 Seal T-laps immediately following sheet application by applying pressure with a round nosed trowel.
    - .7 End laps to be staggered a minimum of 36" (914mm).
    - .8 After installation of the base sheet, check all lap seams on the base sheet.
  - .6 Installation of base sheet stripping (flashing):
    - .1 Upon the completion of the base ply field membrane, but before application of the second ply, provide membrane flashings at the intersection of the membrane and walls, curbs, and where a vertical member passes through the roof.
    - .2 Ensure that substrates are dry, smooth, even and adequately covered with overlay fireguard protection.
    - .3 At perimeters, install base sheet flashing ply up vertical surfaces a minimum of 8" (200mm) and extend onto the horizontal surface of the roof/deck a minimum of 4" (100mm). Extend the stripping ply over the parapet as indicated.
    - .4 Provide gussets over the base sheet at all inside and outside corners. Gusset size to be 4" (100mm) wide x 6" (150mm) long facilitating a 2" (50mm) return on either side of the corner. Extend gusset 2" (50mm) on to horizontal surface.
    - .5 Install a 36" x 36" (914 mm by 914 mm) base sheet flashing ply at all vents, and other protrusions as required.

- .6 Lap side joints 3" (75mm). Stagger laps joints a minimum of 12" (300mm) from base sheet field laps.
  - .7 Exert pressure on the flashing sheet during application with a wet sponge, or similar, to ensure complete contact with the wall/roof surfaces to ensure no sags, blisters, fishmouths or wrinkles exist.
  - .8 Membrane manufacturer to review and approve, in writing, base sheet installation prior to cap sheet installation.
- .7 Installation of cap sheet:
- .1 Once the base sheet has been applied and does not show any defects, the cap sheet can then be laid.
  - .2 Cap sheet shall be unrolled starting from the low point on the roof. Cap sheet shall be rerolled from both ends prior to torching. Care must be taken to ensure alignment of the first roll.
  - .3 Cap sheet shall be torch welded in accordance with the recommendations of the membrane manufacturer, to the base sheet membrane. During this application, both surfaces shall be simultaneously melted, forming an asphalt bead that shall be pushed out in front of the cap sheet.
  - .4 Care must be taken not to burn the membranes, and their respective reinforcements.
  - .5 Base and cap sheet seams shall be staggered a minimum of 300 mm.
  - .6 Cap sheet shall have side laps of 90 mm and end laps of 150 mm. Surface granules on end laps shall be embedded prior to installation of following sheet. Touch up seams with loose granules.
  - .7 Terminate field cap sheet edges at the base of the retained vertical membrane at the perimeter.
  - .8 Ensure the membranes are properly welded, without air pockets, wrinkles, fishmouths or tears.
  - .9 After installation of the cap sheet, check all lap seams on the cap sheet.
  - .10 During installation, ensure there is a minimum 2mm bleed out at all seams.
  - .11 Membrane manufacturer to review and approve, in writing, cap sheet installation prior to drain mat, insulation and ballast installations.
- .8 Installation of cap sheet stripping (flashing):
- .1 Cap sheet stripping shall be laid in strips one metre wide. Side laps shall be 90 mm, and shall be staggered a minimum of 300 mm from cap sheet laps in order to avoid excessive thickness.
  - .2 Using a chalk line, lay-out a straight line on the cap sheet surface, parallel to deck edge, 150 mm inside roof from the base of the deck corner.
  - .3 Using a torch and round-nosed roofing trowel, embed the surface granules into the heated and soft bitumen, from the chalk line to edge of the cap sheet.

- .4 Cap sheet stripping shall be torch welded directly on its base sheet proceeding from bottom to top. Torching shall soften the two membranes and ensure a uniform weld.
  - .5 Cap sheet stripping shall be applied from the exterior face to extend across top of curb, down interior vertical surface and on to flat deck a distance of 150 mm, to the extent of area of embedded granules. Cut roll into required lengths and use width of roll (1 metre) down length of roof, maintaining specified 90 mm side laps.
  - .6 Ensure application is free of air pockets, wrinkles, fishmouths or tears.
  - .7 After installation, check all lap seams.
- .9 Installation of Catalyzed Resin Flashing System, as required:
- .1 Install resin flashing system in conformance with manufacturers' recommendations.
  - .2 Mock-up must be performed prior to the commencement of the work. Upon acceptance the mock-up may be used as part of the finished work.

### 3.6 DRAIN MAT

- .1 Installation at Roof/Deck:
  - .1 Drain mat to have a maximum thickness of 3/8" (9.5 mm) with integral filter fabric on top side. Install drain mat over the waterproof membrane and vertically as indicated.
  - .2 Protect all exposed edges of drain mat with filter fabric.

### 3.7 INSULATION

- .1 Install Type IV extruded polystyrene rigid insulation over drain mat. Ensure boards are snug fitting and completely cover the membrane. Cut insulation as required at drains.

### 3.8 FABRIC FILTER

- .1 Installation of Fabric Filter (Fabric filter to be black woven polyolefin fabric, resistant to ultra-violet degradation).
  - .1 Provide new fabric filter. Install filter fabric in a shingle manner against the slope to drain to ensure most surface water is directed to the drain body.
  - .2 Return fabric up the vertical perimeters.

### 3.9 ROOF BALLAST ASSEMBLY

- .1 Install new gravel roof ballast over filter cloth as required. Ensure that the gravel is uniform layer of roof ballast to completely cover the membrane. Minimum thickness is 2".

### 3.10 QUALITY CONTROL

- .1 The contractor is responsible to notify the Consultant and membrane manufacturer 48 hours prior to the commencement of the work.
- .2 The membrane manufacturer will provide periodic review during the waterproofing applications and submit field reports to the Consultant after each visit.
- .3 The membrane manufacturer is to be notified upon the completion of the waterproofing work.
- .4 All deficiencies are to be corrected.
- .5 Submit executed warranty upon completion of waterproofing work.

### 3.11 CLEANING

- .1 At completion of work, all debris and remaining materials resulting from the work of this Section are to be removed from site in a timely manner.
- .2 Clean all adjacent surfaces affected during the course of work.

END OF SECTION

## 1 GENERAL

### 1.1 SUMMARY

---

- .1 Work described in this section includes but is not limited to the following:
  - .1 All labour, materials, equipment and services necessary for the application of self-adhesive membrane.

### 1.2 REFERENCES

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- .1 ASTM D412 Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension.
- .2 CGSB 37-GP-9 Primer, Asphalt, Unfilled, for Asphalt Roofing, Damproofing and Waterproofing.
- .3 CGSB 37-GP-15 Application of Asphalt Primer for Asphalt Roofing, Damproofing and Waterproofing.
- .4 CGSB 37.29 Rubber-Asphalt Sealing Compound.
- .5 CGSB 37-GP-56 Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.

### 1.3 STORAGE AND HANDLING

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- .1 Provide and maintain dry, off-ground weatherproof storage.
- .2 Store rolls of membrane in upright position.
- .3 Remove only in quantities for same day use.

### 1.4 ENVIRONMENTAL REQUIREMENTS

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- .1 Do not install membrane system when ambient temperatures are at or below 5°C for 24 hours before application, and only during dry conditions.
  - .1 Use cold weather products where required by manufacturers guidelines.
- .2 Minimum temperature for installation of primer is 5°C.
  - .1 Use cold weather products where required by manufacturer's guidelines.
- .3 Install membrane on dry substrates, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into membrane system.

- .4 If water penetrates through the membrane assembly due to inadequate protection including from interior sources, Contractor to cut and inspect damages, remove and replace all materials at his own cost, to eliminate all trace of water in the assembly.
- .5 Do not allow membrane to remain exposed longer than 6 weeks.

## 1.5 QUALITY ASSURANCE

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- .1 Applicator: Company specializing in performing the work of this section with minimum two years documented experience. Provide list of previous projects and references upon request by the Consultant.

## 2 PRODUCTS

### 2.1 MEMBRANE – BELOW METAL ROOFS AND FLASHINGS

---

- .1 SBS modified bitumen self adhesive membrane to meet the following minimum criteria:
  - .1 Membrane is to be 40 mils thick (including release film) and must have a release film to protect the adhesive surface.
  - .2 The membrane system must not show any signs of softening, flow or deterioration at temperatures 110 °C or below.
  - .3 Acceptable products:
    - .1 Lastobond Shield HT, by Soprema
    - .2 Blueskin PE 200 HT, by Monsey Bakor
    - .3 Approved equivalent.

### 2.2 ACCESSORIES

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- .1 Primer: High tack SBS rubber based primer: to CGSB 37-GP-9Ma as recommended by manufacturer.
- .2 Mastic sealant: As recommended by the manufacturer.
- .3 Termination bars:
  - .1 Minimum 18 Ga. for steel, 1/16" for aluminium
  - .2 G200 galvanized steel or aluminium
  - .3 1.5" (38 mm) wide x continuous lengths where possible.
  - .4 Gum lip as required.
- .4 Fasteners: ITW Buildex Tapcons with Climaseal coating or approved alternative.
- .5 Metal termination flashings: Refer to 07620 Metal Flashings and Trim.
- .6 Sealant: Refer to 07 92 00 Joint Sealants.

### **3 EXECUTION**

#### **3.1 EXAMINATION OF SURFACES**

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- .1 Examine surfaces to have membrane installed and immediately inform Consultant in writing of defects.

#### **3.2 PREPARATION**

---

- .1 Protect adjacent surfaces not designated to receive membrane.
- .2 Clean and prepare surfaces to receive membrane in accordance with manufacturer's recommendations. Surfaces are to be clean, dry and free of foreign matter.
- .3 Ensure substrate is continuous. Provide solid backing as required. Unsupported membrane of 8 mm or greater is unacceptable. Fill voids as required or reinstall sheathing to meet maximum gap requirement.
- .4 All sharp metal edges to be rounded or smoothed off to prevent puncture of membrane.

#### **3.3 INSTALLATION**

---

- .1 Install membrane in accordance with manufacturer's instructions. Observe temperature and humidity limitations for application.
- .2 Prime areas to receive membrane in accordance with manufacturer's recommendations. Primer must be dry prior to application of membrane. Primer is typically required on all surfaces including underlying layers of membrane. Membrane must be applied to primed area that same day.
- .3 Roll out sheets. Discard wrinkled or bubbled membrane.
- .4 Remove release paper layer. Roll out on substrate with a mechanical roller to encourage full contact bond. Use heat gun as required to achieve adequate continuous bond.
- .5 Lap sides and ends in accordance with manufacturer's instructions and with the project details. All laps to be a minimum of 50 mm.
- .6 All exposed laps except shingle laps to be sealed with mastic.
- .7 Prestrip membrane as required to ensure shingle fashion laps at tie-ins.
- .8 Patch deficient areas with membrane extending 150 mm minimum in all direction from affected area. Seal top and sides of patch with mastic.
- .9 Extend membrane onto items protruding to or penetrating assembly and seal termination with mastic.

- .10 Ensure no membrane or membrane accessories extend to future exterior sealant locations or on finished surfaces. Clean any affected areas as required.
- .11 Install termination bars (if required) onto membrane to continuously secure as indicated and directed by Consultant. Fasten as required to provide continuous support of membrane and to eliminate bowing of termination bar (minimum 6" o/c).
- .12 Seal leading edge with mastic at the end of each day's work.

### 3.4 CLEAN UP AND PROTECTION

---

- .1 Clean off drips and smears of bituminous material and primers off adjacent materials immediately.
- .2 At end of each day's work, provide protection for completed work and materials out of storage.

END OF SECTION



## 1 GENERAL

### 1.1 SUMMARY

---

- .1 Work includes: labour, materials, equipment and services necessary to provide flashings and trim as indicated including: parapet sloping, cap flashing, counter flashings, metal roof panels, miscellaneous roof flashing, gutters and downpipes.

### 1.2 REFERENCES

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- .1 Canadian Sheet Steel Building Institute (CSSBI) S8-2001: Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products.
- .2 AAMA 621 Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
- .3 ASTM A792 /A792M Specification for Steel Sheet, Aluminum-Zinc Alloy-Coated by the Hot-Dip Process with a minimum zinc coating designation Z150.
- .4 ASTM A653/653M Specification for Sheet Steel, Zinc-Coated or Zinc-Iron Alloy Coated by the hot dip process, with a minimum zinc coating designation Z275
- .5 ASTM D523 Test Method for Specular Gloss.
- .6 ASTM B32 Specification for Solder Metal.
- .7 Aluminium Association Designation System for Aluminium Finishes.
- .8 Aluminium Association Aluminium Sheet Metal Work in Building Construction.
- .9 CSA B111 Wire Nails, Spikes and Staples.
- .10 CAN/CGSB-93.1 Sheet, Aluminum Alloy, Prefinished, Residential.
- .11 Canadian Roofing Contractors Association (CRCA).
- .12 SMACNA Architectural Sheet Metal Manual.
- .13 CGSB 1-GP-171M, Type 1 Inorganic Zinc Rich Primer
- .14 SSPC Paint 20, Type 1-B Inorganic Zinc Rich Primer
- .15 Roofing Contractors Association of British Columbia (RCABC).

### 1.3 SUBMITTALS

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- .1 Submit shop drawings for review.

- .2 Submit duplicate 150 x 150 mm samples of each type of sheet metal material, colour and finish.
- .3 Submit documentation identifying sheet metal source, testing results to specified standards and finish.

#### 1.4 MOCK-UPS

- .1 Provide for approval prior to fabrication and installation and as part of the exterior wall assembly, mock-up for review by the Consultant, a sample of each flashing assembly detailed for the project.

#### 1.5 DESIGN REQUIREMENTS

- .1 General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- .2 Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - .1 Temperature Change: Low of -15 deg C to a high of 70 deg C for material surfaces.
- .3 Water Infiltration: The metal roof system is to be designed and installed to not allow any infiltration of water into the building interior. All laps of metal flashing and connections of roof panels shall be installed to allow moisture to run over and off the material. Where possible, install continuous sheets of metal roofing with no laps.
- .4 Sheet metal roofing shall be designed to resist positive and negative wind loads in accordance with the BC Building Code, local wind pressures 1 in 50 years without failure or permanent set.
- .5 Sheet metal roofing and cladding shall be designed to resist snow and rain loads in accordance with the BC Building Code for the 1 in 50 year return period without failure or permanent set. Roof system to be anchored at continuous horizontal line for drag loads caused by retained snow and ice load. Determination of the retained snow and ice load is by the Engineer engaged by the roofing contractor.
- .6 Provide for positive drainage, to the exterior face of the wall, any water entering at joints and/or any condensation occurring within the wall construction.
- .7 The roof system shall accommodate, by means of expansion joints, any movement in the roof itself and between the roof and the building structure, caused by structural movements (deflection and

wracking, etc.) and/or thermal expansion and contraction without permanent distortion, damage to infills, cracking of joints, breakage of seals, or water penetration.

- .8 Maintain the following tolerances:
  - .1 Maximum variation from plane: 10mm/10m of length.
  - .2 Maximum offset from true alignment between two adjacent members abutting end to end, in line: 0.75mm.
- .9 Design roof openings, flute and batten closures, thermal clips and other flashings and accessories in accordance with the manufacturer's recommendations.

## 1.6 SHOP DRAWINGS

- .1 Submit Shop Drawings for review by Consultant indicating:
  - .1 Plans and details of typical assembly, profiles, fastening, and perimeter and interface conditions.
  - .2 All materials to be used.
  - .3 Design loading for wind and snow.
  - .4 Loads and their locations to be transferred to supporting structure below the roof cladding including drag forces.
  - .5 Engineer's seal covering the design of the roof cladding system.
- .2 Letters of Assurance: The Engineer who sealed the shop drawings shall submit to the Consultant the APEG BC Schedule S-B Assurance of Design and Commitment for Field Review. The Engineer who sealed the shop drawings shall provide field review of the installation. On completion of the installation the Engineer shall submit to the Consultant Schedule S-C Assurance of Professional Field Review and Compliance.

## 1.7 WARRANTY ON FINISHES

- .1 Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
- .2 Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
  - .1 Color fading more than 5 Hunter units when tested according to ASTM D 2244.
  - .2 Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
  - .3 Film Integrity: there shall be no evidence of cracking, chipping, peeling, crazing, spotting, flaking, checking or loss of adhesion.
- .3 Finish Warranty Period: Twenty (20) years from date of Substantial Completion.

## 1.8 QUALITY ASSURANCE

---

- .1 Roofing installers must have a minimum of 3 years' experience with the respective roofing product on this project.

## 2 PRODUCTS

### 2.1 PREFINISHED SHEET STEEL

---

- .1 General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- .2 Base Metal to be:
  - .1 Aluminium-zinc coated (Galvalume) steel sheet conforming to the requirements of ASTM A792 (or A792M) with a minimum coating of AZ50(AZM150).
  - .2 24 gauge thickness (unless noted otherwise).
- .3 Exposed Coil-Coated Finish: <select one of these>
  - .1 Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions. Dry film thickness of not less than 1.0 mil (0.025 mm) for primer and topcoat.
    - .1 Preapproved product:
      - .1 Cascadia Metals 12000 Series PVDF coated
      - .2 Approved alternate.
  - .4 Color: As selected by Owner from Manufacturer's standard colour range minimum 30 colours. Both top and underside of flashing exposed to view to be finished with the same colour.
  - .5 Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

### 2.2 UNFINISHED STEEL

---

- .1 Form all customized flashings and other unfinished steel flashing products including sub flashing, back-up panels, cleats, etc. of gauge specified in drawings, minimum sheet steel according to the following:
  - .1 Base Metal to be:
    - .1 Aluminium-zinc coated (Galvalume) steel sheet conforming to the requirements of ASTM A792 (or A792M) with a minimum coating of AZ50(AZM150).

- .2 Formed flashings to be typically folded and sealed and as approved by Consultant. Avoid soldering flashings. Use clinched joints whenever possible.
- .3 Paint off site after fabrication to match prefinished flashing (when exposed to weather). Type and method of paint application must be preapproved by the Consultant. Paint must be a baked on finish.

### 2.3 METAL ROOFING

- .1 Profile to be an interlocking vertical rib system. Width between upstanding ribs is to be a minimum of 12" and a maximum of 18". All fastenings to be concealed. Maximum rib height is 2". Roofing attachment system must be able to attach to concrete deck below roof membrane.
  - .1 Preapproved Product:
    - .1 Westform Proloc
    - .2 Approved alternate

### 2.4 ACCESSORIES

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .3 Touch-up paint: as recommended by prefinished material manufacturer.
- .4 Cleats, clips, and splice plates: Ga. as noted on drawings, coating, and temper as sheet metal, minimum 50mm wide.
- .5 Perforated Metal Flashing: Stainless steel, gauge as indicated, with minimum 1/8" perforations staggered.
- .6 Fasteners:
  - .1 Into wood:
    - .1 Steel pan head screws with coarse thread for wood.
      - .1 #8 x 1" (minimum) long stainless steel suitable for metal flashing application. Stainless to be 300 Series when exposed otherwise 300 or 400 Series is acceptable.
      - .2 For exposed conditions use hex-head stainless steel screws, with neoprene washer, hex heads coloured to match flashing.
    - .2 Into masonry, concrete, stone:
      - .1 One piece steel screw set into predrilled hole in concrete or masonry for medium duty connections.
        - .1 1/4" diameter x 1-3/4" long Kwik Con II Stainless by Hilti. Hex head for easier installation, Philips head for softer materials such as concrete block. Provide

- stainless steel washers to hold metal securely.  
Minimum 5/8" diameter.
- .2 For exposed conditions, provide stainless steel washer with bonded neoprene gasket.
  - .2 Steel pan head screws with stainless steel washers set into plastic plugs predrilled into concrete or masonry for lighter duty connections. Plastic plug version is required in softer materials such as brick or stucco.
    - .1 #8 x 1" long stainless steel pan head screws with 5/8" diameter stainless steel washers. For exposed conditions, provide washers with bonded neoprene gaskets. Stainless to be 300 Series when exposed otherwise 300 or 400 Series is acceptable.
    - .2 Plastic plugs to be 1-1/8" long Mungo plugs, MUN 6 by UCAN.
  - .3 Into sheet steel:
    - .1 Steel pan head screws with fine thread for metal. Can be self tapping or self drilling.
      - .1 #8 x 1/2" (minimum) long stainless steel suitable for metal flashing application. Stainless to be 300 Series when exposed otherwise 300 or 400 Series is acceptable.
      - .2 For exposed conditions use pan head stainless steel screws, with neoprene washer, heads coloured to match flashing.
    - .4 Into structural steel (non-exposed): Self drilling screws, corrosion resistant capable of salt spray testing per ASTM B117 providing 2000 hours red rust and 30 cycles Kesternich SO<sub>2</sub>.
      - .1 Leland Industries Inc DT2000 Long Life Coated Plating System - #10 x 3/4" complete with washers as required.
      - .2 Provide washers to match the screw coating or stainless. In exposed conditions, provide washers with bonded neoprene gaskets. Minimum 5/8" diameter washers.
  - .7 Solder: to ASTM B32 Standard Specifications For Metal Solders
  - .8 Touch-up paint: as recommended by prefinished material Manufacturer.

### 3 EXECUTION

#### 3.1 FABRICATION

- .1 Fabricate metal flashings and sheet metal work other than aluminium in accordance with applicable CRCA 'FL' series details and SMACNA Architectural Sheet Metal Manual.
- .2 Fabricate aluminium flashings and other sheet aluminium work in accordance with Aluminium Association Aluminium Sheet Metal Work in Building Construction.

- .3 Form pieces in 2400 mm maximum lengths. Make allowance for expansion at joints. Use maximum length sections possible to minimize joints.
- .4 Hem exposed edges on underside 12 mm. Mitre and seal corners with sealant.
- .5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .6 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.
- .7 Form joints between lengths of flashing sections with standing seams whenever possible. S-locks can only be used if approved by the Consultant.
- .8 All exposed or visible metal flashing and trim to be finished in selected colour as indicated including exposed rear faces of end dams, joints, etc. No exposed or visible steel or aluminium flashing work to be unfinished.
- .9 Fabricate custom flashing details and saddles to minimize solder joints.
- .10 Install sealant at flashing joints.
- .11 Reglets And Cap Flashings
  - .1 Prefinished sheet metal as detailed and in accordance with RCABC Roofing Practices Manual and SMACNA Architectural Sheet Metal Manual details. Provide slotted fixing holes and hot dipped galvanized steel/plastic washer fasteners.
- .12 Custom flashing fabrications
  - .1 Shop fabricate custom flashing as indicated.
  - .2 Form custom flashing fabrications to minimize the number of metal seams and joints. Whenever possible form flashing with standing or breadpan seams.
  - .3 Use clinched joints whenever possible to avoid soldering.
  - .4 Soldered joints must be preapproved by the Consultant.
    - .1 Fully solder joints.
    - .2 Neutralize solder flux with neutralizing bath prior to painting.
  - .5 Paint off site after fabrication to colour specified. Type and method of paint application must be preapproved by the Consultant. Paint must be a baked on finish application after fabrication.

### 3.2 ROOF WORK PROCEDURE

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- .1 Remove the existing roof cladding system. This will include all sloped metal roof areas, underlayment, and flashings.

- .2 Install self adhered membrane system as indicated. Refer to the Section 07 27 13. Refer to details for detailing at edge flashings.
- .3 Install new roof cladding system complete with associated accessories.
- .4 Clean roof surface.

### 3.3 INSTALLATION

- .1 Install sheet metal work in accordance with RCABC details, SMACNA Architectural Sheet Metal Manual and Aluminium Sheet Metal Work in Building Construction as shown.
- .2 Use concealed fastenings except where approved before installation.
- .3 Provide underlay under sheet metal as required. Secure in place and lap underlayment joints 100 mm.
- .4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock and standing seams forming tight fit over hook strips.
- .5 Lock end joints and caulk with sealant.
- .6 Install surface mounted reglets true and level, and caulk top of reglet with sealant.
- .7 Install flashings lapped "shingle" style with membranes to divert water to the exterior.
- .8 Custom flashing fabrications
  - .1 Install custom soldered flashing fabrications as indicated.

END OF SECTION



## 1 GENERAL

### 1.1 SUMMARY

---

- .1 Work described in this section includes but is not limited to the following:
  - .1 Sealing of metal panel joints and metal panel assemblies.
  - .2 Caulking and sealants not specified in other Sections.

### 1.2 REFERENCES

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- .1 CAN/CGSB-19.24 Multi-component, Chemical Curing Sealing Compound
- .2 CAN/CGSB-19.13, Sealing Compound, One Component, Elastomeric, Chemical Curing.
- .3 ASTM C 1193, Standard Guide for Use of Joint Sealers
- .4 ASTM C920 Standard Specification for Elastomeric Joint Sealants
- .5 Sealant, Waterproofing and Restoration Institute, Sealants: The Professional Guide

### 1.3 SAMPLES

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- .1 Prior to starting the work contractor shall submit:
  - .1 Manufacturer's product data and specifications for each sealant required.
  - .2 Sealant manufacturer's project recommendations stating recommended surface preparation for each substrate, and type of primer required (if necessary) for proposed sealant.
  - .3 Submit samples of each type of material and colour.

### 1.4 MOCK-UPS

---

- .1 Construct mock-up of each typical condition to show location, joint preparation, colour, size, shape and depth of joints complete with back-up material, primer, caulking and sealant. Typical conditions include but are not limited to window perimeters and stucco joints. Mock-up may be part of finished work.
- .2 Provide 48 hours notification to Consultant and sealant manufacturer prior to application of mock-up for review. Cured adhesion and application to be reviewed by Consultant and manufacturer before proceeding with sealant work.
- .3 Manufacturer to review mock-ups as required.

### 1.5 ENVIRONMENTAL AND SAFETY REQUIREMENTS

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- .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 WCB.

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

## 2 PRODUCTS

### 2.1 SEALANT MATERIALS

---

- .1 Sealants acceptable for use on this project to be listed on CGSB Qualified Products List issued by CGSB Qualification Board for Joint Sealants. Where sealants are qualified with primers use only those primers.

### 2.2 SEALANT MATERIAL DESIGNATIONS

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- .1 Sealant
  - .1 Type 1 Exterior Joints:
    - .1 Single component neutral cure silicone to CAN/CGSB 19.13, colour to match adjacent finish and to be selected by the owner from the range of manufacturer's standard colours.
    - .2 Acceptable materials:
      - .1 Dow Corning 795
      - .2 Dow Corning Contractors Weatherproofing Sealant
      - .3 Dow Corning 790 (where both sides consist of cementitious substrates)
      - .4 Dow Corning CCS (where both sides consist of cementitious substrates)
      - .5 G.E. Silpruf SCS 2000
      - .6 G.E. Silpruf SCS 2700
      - .7 Tremco Spectrum 3
      - .8 Pre-approved equivalent
    - .2 Type 2 Gutter applications:
      - .1 Tremco Gutter Seal
      - .2 Pre-approved equivalent
  - .2 Primer: as recommended by manufacturer.
  - .3 Preformed Compressible and Non-Compressible back-up materials.
    - .1 Backer Rod:
      - .1 Compressible closed cell standard foam backer rod (hard) for use with all types of sealants not requiring curing from backside.
      - .2 Compressible closed and open cell foam backer rod (soft) for use with all types of sealants not requiring curing the backside and not in joints that are subject to

submergence. Rod must not be susceptible to outgassing if cut.

- .3 Open cell foam backer rod for use with any sealant type requiring curing from backside such double sealed joints. Do not use in joints subject to submergence in water.
- .4 Size: oversize 30 to 50%.
- .2 Refer to the Sealant Manufacturer for specific products that are recommended with their sealants.
- .3 Bond Breaker Tape.
  - .1 Polyethylene bond breaker tape that will not bond to sealant

### 2.3 SEALANT SCHEDULE

1. Sealant and primer selection to be approved by the consultant and manufacturer during mock-ups prior to the undertaking of the work.
2. Self adhered membrane transition flashings and termination bars: Type 1.
3. Perimeters of exterior openings where frames or penetrations meet exterior facade of building: Type 1
4. Transitions in metal roof assemblies: Type 1
5. Duct extensions to existing duct assemblies: Type 1
6. Sealant joints in eavestroughs and gutters. Type 2

### 2.4 JOINT CLEANER

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

## **3 EXECUTION**

### 3.1 PROTECTION

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

### 3.2 PREPARATION OF JOINT SURFACES

- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
- .2 Clean bonding joint surfaces of harmful matter substances including existing sealants, dust, rust, oil grease, and other matter that may impair work.
- .3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

- .4 Ensure joint surfaces are dry and frost free.
- .5 Examine joint sizes and correct as required to allow for anticipated joint movement and to achieve proper width/depth ratio per manufacturer's recommendation for specified sealant.
- .6 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
- .7 Prepare surfaces in accordance with manufacturer's recommendations.

### 3.3 BACKUP MATERIAL

- .1 Install joint filler to consistently achieve correct joint depth and shape, with approximately 30% compression. Install backer rod without stretching, twisting, braiding or puncturing its outer skin. For high heat locations use high heat resistant foam backer rod.
- .2 Apply bond breaker tape where required and to manufacturer's instructions.

### 3.4 PRIMING

- .1 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.
- .2 Prime only as much area as can be sealed in the same day.

### 3.5 MIXING

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

### 3.6 APPLICATION

- .1 Sealant.
  - .1 Apply sealant as detailed and in accordance with manufacturer's written instructions.
  - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
  - .3 Apply sealant in continuous beads.
  - .4 Apply sealant using gun with proper size nozzle.
  - .5 Use sufficient pressure to fill voids and joints solid.
  - .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
  - .7 Tool exposed surfaces before skinning begins to ensure firm full contact at joint interfaces, to give slightly concave and uniform shape free of ridges, wrinkles, sags, air pockets and embedded impurities. Care must be taken when using tooling aids to prevent contamination of substrates and sealant.
  - .8 Minimum exterior fillet beads to be  $\frac{3}{8}$  by  $\frac{3}{8}$  inch, with bond breaker used at all exterior joint locations.
  - .9 Remove excess compound promptly as work progresses and upon completion.

- .10 Remove masking tape immediately after tooling of joints.
- .2 Curing.
  - .1 Cure sealants in accordance with sealant manufacturer's instructions.
  - .2 Do not cover up sealants until proper curing has taken place.
- .3 Cleanup.
  - .1 Clean adjacent surfaces immediately and leave work neat and clean.
  - .2 Remove excess and droppings, using recommended cleaners as work progresses.

END OF SECTION

## 1 GENERAL

### 1.1 SUMMARY

---

- .1 Work includes labour, materials, equipment and services for design, supply and installation of aluminium skylights, as indicated.

### 1.2 SYSTEM DESCRIPTION

---

- .1 Supply and installation of aluminum framed skylights with aluminium extruded sections with thermal break, pressure plates, interior gutter drainage system, exterior glazed with insulating glass units and with pressure plates and caps at vertical locations and structural silicone glazing at horizontal locations (as required). Skylights to include all interface support brackets and/or angles to allow support by the existing and new structural systems. Included in the work is the modification to the extent of the skylights to work around existing structural elements.

### 1.3 REFERENCES

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- .1 B.C. Building Code
- .1 Glazing Systems Specifications Manual by GCA of BC
- .2 CAN3-S157, 'Strength Design in Aluminum'
- .3 CAN/CGSB-12.20, 'Structural Design of Glass for Buildings'
- .4 CAN/CSA-G40.21-M87, "Structural Quality Steels".
- .5 CSA W47.2-M1987, "Aluminum Welding Qualification Code".
- .6 CAN/CGSB-1.108-M89, "Bituminous Solvent Type Paint".
- .7 CAN/CGSB-63.14, 'Plastic Skylights'
- .8 CSA-A440-00, 'Windows'
- .9 IGMAC 'Glazing Recommendations for Sealed Insulating Glass Units'
- .10 IGMAC 'Sloped Glazing Guidelines'
- .11 Laboratory Test Methods
  - .1 ASTM E 283 – 91, "Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors"
  - .2 ASTM E 330 – 96, "Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference"
  - .3 ASTM E 331 – 93, "Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference"

- .4 ASTM E 547 – 96, “ Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Difference”
- .12 Field Test Methods
  - .1 ASTM E 783 – 93, “ Field Measurement of Air Leakage though Installed Exterior Windows and Doors”
  - .2 ASTM E 1105 –96, “Field Determination of Water Penetration of Installed Exterior Curtain Walls and Doors, by Uniform or Cyclic Static Air Pressure Difference”
  - .3 AAMA 501.2 – 94, “Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems, for Water Leakage”
- .13 Finishing Standards
  - .1 AAMA 2603-98, “Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminium Extrusions and Panels”
  - .2 AAMA 2604-98, “Voluntary Specification for High Performance Organic Coatings on Aluminium Extrusions and Panels”
  - .3 AAMA 2605-98, “Voluntary Specification for High Performance Organic Coatings on Aluminium Extrusions and Panels”
  - .4 AAMA 610.1-1979, “Voluntary Guide Specification for Cleaning and Maintenance of Painted Aluminium Extrusions and Curtain Wall Panels”
- .14 Other Standards
  - .1 CSA W59.2 –M91, “Welded Aluminum Construction”
  - .2 AAMA CW – 10 – 1982, “Care and Handling of Architectural Aluminum from Shop to Site”

#### 1.4 PERFORMANCE REQUIREMENTS

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- .1 Design fabricate and install assembly to withstand the positive and negative pressures on the skylight in accordance with the BCBC requirements for snow, wind (use 1 in 30 values) and seismic and L/240 maximum deflection; however, in no instance shall the maximum deflection be greater than 13 mm.
- .2 Provide a continuous interlocking rigid PVC thermal break around the perimeter of each glazing unit forming an unbroken thermal separation of the interior and exterior environments.
- .3 Provide for expansion and contraction of all parts for an exterior temperature range from -15°C to +65°C and a building interior temperature range from +10°C to +35°C. Movement shall not displace, twist, distort or buckle any part of the assembly and shall be absorbed into freely functioning expansion and contraction joints through a system of moving bearing and supports.
- .4 Air tightness: maximum allowable rate of air leakage to be 1.10m<sup>3</sup>/h/m of crack length when tested according to ASTM E783 at an air pressure difference of 75 Pa.

- .5 Water Resistance: no water to penetrate the skylight assembly, or be retained within any frame member, when tested in accordance with ASTM E1105 at air pressure difference of 290 Pa or tested in accordance with AAMA 501.2 without the pressure caps and exterior seals in place. There is to be no “water infiltration” as defined by CSA A440.
- .6 Condensation Resistance: skylight framing to have a minimum Temperature Index of 58, as determined by CSA A440.
- .7 Durability: The life expectancy of the skylight assemblies is a minimum of 25 years. It is expected that with adequate maintenance, the skylight assemblies will maintain the air tightness, water tightness, and structural performance requirements over their expected life. For the purpose of measuring durability, the air and water leakage performance of the windows shall be not less than that specified for field testing.
- .8 An air seal consistent with the rain screen principle shall be continuously installed at the glass line perimeter and connected to the structure as an integral part of the design to provide a complete impervious air and vapour barrier.

#### 1.5 MOCK-UP

- .1 Construct mock-up of one selected skylight. Accepted mock-up may form part of completed work
- .2 Allow 48 hours for inspection of mock-up by Consultant before proceeding with remaining skylights.

#### 1.6 QUALITY ASSURANCE

- .1 Provide copies of test reports showing system complies with above paragraph "Performance Requirements", as requested by the Consultant.
- .2 Fabricator shall have a minimum of 5 years of successful experience in the fabrication and erection of glazed aluminum framed skylight systems of similar sizes, shapes and finishes to the units required for this project and shall have ample facilities to produce, furnish and supply the units as required for installation without delay to the work.
- .3 Retain a professional engineer registered in B.C. experienced in structural design in glass and aluminum to design system and connections, to ensure the adequacy of the structural aspects of the design, manufacture, and installation of system.
- .4 Glass and glazing work to conform to IGMAC 'Glazing Recommendations for Sealed Insulating Glass Units' and 'Guidelines for Sloped Glazing'.
- .5 Employ an organization qualified by the Canadian Welding Bureau under CSA W47.1 (for Steel) and CSA 47.2 (for aluminum) to do any welding required.



- .6 Field testing of representative area(s) of skylight assemblies may be performed as selected by Consultant for air leakage and water penetration. Cost of initial testing to be paid for by the Owner. Retesting of assemblies that failed to meet the project requirements may be performed at the Contractors expense as determined by the Consultant. The contractor will correct any deficiencies and apply corrections to other locations as required to achieve specified performance criteria.

## 1.7 SHOP DRAWINGS

- .1 Submit shop drawings for the review and written approval of the Consultant prior to fabrication.
- .2 Show scale elevations, sections, dimensions, and quantity of units. Indicate rough opening requirements and maximum tolerances of adjacent construction.
- .3 Provide full size details of perimeter and interface conditions. Show relationship to other work, including attachment of flashings, continuity of air and moisture barriers, and location of sealants. Show extrusion profiles and engagement of glass and infill materials.
- .4 Show methods of structural reinforcement and attachment to building, including provisions for thermal movement and building movements. Identify structural fasteners.
- .5 Schedule glass types and sealed unit makeup. Identify materials to be used including finishes, sealants, gaskets, shims, location of isolation coatings, and any other information required to indicate compliance with contract documents.
- .6 Submit shop drawings under seal of Registered Professional Engineer.
- .7 Letters of Assurance: The Engineer who sealed the shop drawings shall submit to the Consultant the APEGBC Schedule S-B Assurance of Design and Commitment for Field Review. The Engineer who sealed the shop drawings shall provide field review of the installation. On completion of the installation the Engineer shall submit to the Consultant Schedule S-C Assurance of Professional Field Review and Compliance.

## 1.8 SUBMITTALS

- .1 Submit shop drawings for review.

- .2 Submit samples of each of the following with finishes selected on actual base metal as requested by the Consultant: Aluminum framing: horizontal/vertical junction, 600 mm long.
- .3 Show design loads and temperature range on the shop drawings.

#### 1.9 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials so as to avoid damage, following the recommendations contained in AAMA publication CW-10, "Care and Handling of Architectural Aluminum from Shop to Site".
- .2 Keep handling to a minimum. Do not move the materials except as needed to install the curtain wall.
- .3 Store materials inside when possible, in a clean, well-drained area free of dust and corrosive fumes. Keep water away from stored assemblies.
- .4 Contractor to provide designated interior storage in a clean dry area free of dust and corrosive fumes. If interior storage cannot be provided, cover materials with tarpaulins or plastic hung on frames so as to provide air circulation and prevent contaminants from contacting aluminum or glass.

#### 1.10 PROTECTION

- .1 Contractor to take all precautions necessary to protect materials, before and after installation, from lime, mortar, water run-off from concrete or copper, careless handling of tools, weld spatter, acids, roofing tar, solvents, abrasive cleaners, and other items that could damage the glass surfaces and aluminum finishes.

#### 1.11 SITE CONDITIONS

- .1 Do not install any aluminum work or glazing until all nearby welding, grinding, sandblasting, waterproofing, mortar work and acid etching are complete.
- .2 Report to the Consultant 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 Glaze with compounds, sealants, or tapes only when glazing surfaces are at temperatures recommended by the manufacturer, and when the substrates are free of moisture.
  - .1 When temperature of glazing surfaces is below that recommended by sealant manufacturer, obtain Consultant's approval for glazing methods and protective measures, which are to be used under these conditions.

#### 1.12 SCHEDULING/ COORDINATION

- .1 Schedule activities such as welding, sandblasting and grinding of steel or concrete, mortar work, acid etching and any other work harmful to aluminum finishes or glass, to be completed before start of metal and glass installation.
  - .1 When such activities must be carried out in the vicinity of stored or installed aluminum work or glass, provide hoarding or other suitable protection as required and in conjunction with the Construction Manager.
- .2 Coordinate the installation of anchors and structural connections with the appropriate Sections.
- .3 Coordinate the installation of air and moisture barriers.
- .4 Coordinate work with related trades to ensure rough openings, structural supports, curbing and flashing are installed correctly to complement the work of this section
- .5 Coordinate wiring access and power supply requirements for electrically operated hardware as required.

#### 1.13 WARRANTIES

- .1 New glazing assemblies to be free from defects in material and workmanship, and continue to perform satisfactorily for five years (10 years for glass sealed units) from the date of Substantial Performance of the Work.
  - .1 Satisfactory performance means compliance with the performance criteria and the testing and construction standards of this specification, and with the reviewed shop drawings. This includes the performance of finishes, hardware, glass and glazing materials, structural attachment, sealants and flashings.
  - .2 Correct all deficiencies, which appear during the warranty period, including removal and replacement of failed sealed insulating units, at no cost to the Owner.
- .2 Provide manufacturer's standard warranty stating that the sealed insulating units will be free from material defects obstructing vision for a period of ten years from the date of substantial completion. Contractor to obtain, on behalf of the owner, copies of standard product warranties from the respective manufacturers to be included in the project maintenance manual.

## 2 PRODUCTS

### 2.1 IDENTIFIED MANUFACTURER /PRODUCT

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- .1 The following products have been identified and could meet the requirements of this specification. Reference of these products does not relieve the manufacturer of the responsibility to comply fully with all specified and illustrated criteria.
  - .1 Kawneer Company Canada Limited: 2000 Series.
  - .2 Pre-approved alternative.

### 2.2 MATERIALS

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- .1 Aluminum: Extruded sections of AA6063-T5 alloy.
- .2 Glass: Insulating, safety glass units as specified below.
- .3 Supporting angles, plates, bars, rods, and other steel accessories: mild steel CAN/CSA-G40.21-M87, hot dipped galvanized to ASTM A123 min. coating of 610 g/m<sup>3</sup>, thickness as required to sustain imposed load and in no case less than 4.8 mm thick.
- .4 Sealant:
  - .1 Sealants and primers to be as recommended by manufacturer unless noted otherwise.
  - .2 Corner blocks: Thermoplastic sealant as approved by manufacturer and consultant.
    - .1 Tremco TRS 600
    - .2 Pre-approved alternate.
  - .3 Frame joints, glazing, structural, weather seals and other sealant areas within skylight system: neutral cure silicone to meet ASTM C719 (+- 50% movement minimum) and as recommended by manufacturer.
    - .1 Dow Corning 795 with primer.
    - .2 Pre-approved alternate.
  - .4 Other: refer to Sealants Section.
- .5 Dielectric separator: Bituminous paint CAN/CGSB-1.108-M89.
- .6 Thermal separator: Polyvinylchloride, 50 Shore A durometer hardness +5.
- .7 Anti-rotation blocks: Extruded PVC.
- .8 Fasteners: Stainless steel, of suitable size and grade to sustain imposed loads.
  - .1 Exposed fasteners to be 300 series stainless steel.
  - .2 Concealed fasteners partially exposed to moisture to be 300 or 400 series stainless steel or Leyland Industries DT2000.

- .9 Sheet aluminum flashings: Alloy 1100, F temper, 0.040" minimum thickness exposed sheet finished to match framing.
- .10 Galvanized sheet metal as used as liner and back-pan, 24 gauge minimum (use heavier gauge as required for mechanical strength) with minimum AZ150 galvanizing.
- .11 Steel supports and reinforcing to be hot dipped galvanized and size as required.
- .12 Membrane: Refer to Self Adhesive Membrane Section.
- .13 Insulation: Roxul Cavity Rock Mineral Fibre insulation.

### 2.3 FABRICATION

- .1 Fabricate all Work to high quality standards and to approved shop drawings to provide the specified performance standards.
- .2 Fabricate components free of twists, bends or visual distortion. Seal or continuously weld corner joints.
- .3 Fabricate all fittings and anchors required to securely install skylights to building and frame structures.
- .4 Skylights: provide extrusions with raised leg capable of containing water which will pass by the primary seals and into the glazing rabbet and at the same time elevating the sealed units so that the units do not rest at the level of the water, which will exist to the height required to flow for drainage. All functions or overlaps are to be designed in such a fashion as to drain from upper to lower in shingle fashion and so that the flow of water will not be disrupted in the lower member/element and will not cause the water to bridge any sealing joints. The water should drop or flow directly from rabbet to rabbet to waterproof membrane (see details).
- .5 Condensation pans: provide sealed and continuous aluminum condensation pans below skylight assemblies.
- .6 Provide all closures, caps, trims, flashing, accessories as required for a complete installation.

### 2.4 ALUMINUM BREAKSHAPES

- .1 Shop fabricate sheet aluminum to profiles and sizes indicated.
- .2 Brake aluminum to profiles prior to painting and/or anodizing unless permission has been given in writing by the Consultant for breaking subsequent to finishing.

### 2.5 FINISHES

- .1 Finish to meet:
  - .1 Thermosetting enamel coating meeting requirements of CAN/CSA-A440 and CAN/CGSB-82.1:

- .2 AAMA 2604-98 with a minimum dry film thickness of 1.2 mils. Multi-stage cleaning and chemical conversion pre-treatment system is required.
- .3 Specular gloss range is to be 45 to 55 in accordance with ASTM D 523.
- .4 Acceptable products:
  - .1 AAMA 2604-98 Acrynar by PPG
  - .2 Preapproved alternates
- .2 Colour:
  - .1 Exterior and interior surfaces: Brown to match existing skylight assemblies and as approved by Consultant.
- .3 Associated components of the skylight system including metal panels are to match the finish of skylight framing. Hardware to have the manufacturer's standard finish.
- .4 Minor scratches and blemishes shall be repairable with the coating manufacturer's recommended product or system. Such repairs shall match the original finish for colour and gloss and shall adhere to the original finish as per the adhesion requirements for the original paint
  - .1 Finish exposed areas of flashings and trim to match finish of aluminium window and door framing.
- .5 All exposed surfaces to be free of visible defects and scratches.

### **3 EXECUTION**

#### **3.1 INSPECTION /PREPARATION**

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- .1 Obtain all measurements affecting work of this Section from job site.
- .2 Install as required and verify position of framing to receive skylight system.
- .3 Ensure roof curbs are properly framed and roofing has been completed before installing skylights.
- .4 Ensure building air/vapour/moisture barrier membranes can be properly sealed to skylight system.

#### **3.2 FABRICATION**

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- .1 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm.

#### **3.3 INSTALLATION**

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- .1 Install and glaze skylights in accordance with the manufacturer's instructions as modified by reviewed shop drawings and instructions herein.
- .2 Erect components in proper alignment.

- .3 Skylights shall be installed, glazed and adjusted by experienced workers in accordance with the manufacturer's instructions and approved shop drawings. All items in this section shall be set in their correct location and shall be level, square, plumb and all proper elevations and alignment with other work.
- .4 Install membrane support flashings to provide continuous support of membranes.
- .5 Install membranes as required to provide continuous air/moisture barriers within and at interfaces of skylight system.
- .6 Protect skylights and other materials from damage during and after installation until acceptance by the general contractor. Thereafter it shall be the responsibility of the general contractor to maintain protection and provide final cleaning.
- .7 Install metal sills and flashing with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. All metal flashings shall be installed with a minimum 5% slope to the exterior. Metal sill flashings that allow water to pond against the window frame or caulking will not be accepted.
- .8 The cavity between the frame and the rigid roof insulation at the head, jamb and sill shall be insulated with semi rigid fibreglass insulation, with a minimum 10mm drainage gap between the insulation and flashing or panel.
- .9 All aluminum main frame surfaces and flashings that contact dissimilar metals and interior finishes, shall be coated with a suitable alkali-resistant material such as a bituminous paint or epoxy resin solution.
- .10 Condensation gutter at sill is to be continuous. Make watertight all joints in gutter system. Seal around penetrations with silicone sealant.
- .11 Seal joint connections of framing with butyl tape 3.5mm minimum thick and sealant. Extend tape to seal joint between interior gaskets. Provide drips at ends of gutters.
- .12 Allow space between the curb and the counterflashing for the metal base flashing to be installed.
- .13 Build-in and provide any supplementary reinforcing, framing required by assembly load requirements.
- .14 Install glazing to details and instructions, using material specified.
- .15 Gaskets shall be keyed in place and sized for glazing system for both inside and outside. Snap covered and pressure plates shall be of a continuous length from corner to corner, and be fitted at corners to allow for thermal expansion.
- .16 All preformed gaskets shall be of a continuous length corner to corner and shall be cut over length to allow for shrinkage of

gaskets. Gaskets shall be installed from the starting junction and installed by pushing back toward the starting corner. Do not stretch gaskets.

- .17 Seal all joints in gaskets.
- .18 Install ramp seals as required to prevent retention of water at pressure caps where applicable.
- .19 Clean all contact surfaces of glazing with solvent and wipe dry. Ensure all glazing channels are clean, true to line, and free of dirt or debris and that weep and drainage vents are open.
- .20 Install anti-rotation aluminum or PVC channel and mechanically fasten with stainless steel screws, to retain members.
- .21 Insulation installation: Groove vertically at plane of membrane as required to provide drainage.
- .22 Exterior flashings installed in neat shingle fashion with allowance for movement.

### 3.4 CLEANING

- .1 Remove all protective materials from metalwork and glazing. Remove all labels, and deposits which affect appearance or operation. Remove all excess sealants from exposed surfaces.
- .2 Aluminium work
  - .1 Clean painted finishes according to AAMA 610.1
- .3 Glass
  - .1 Clean glass surfaces according to instructions provided by glass fabricator or window/door manufacturer.
  - .2 Glass cleaning solutions to conform to CAN/CGSB-2.55
- .4 Do not use vigorous cleaning methods. Avoid scratching glass or aluminium finish. Contractor to be responsible for damages resulting from the use of other cleaning methods.

END OF SECTION



## 1 GENERAL

### 1.1 SUMMARY

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1. Work includes labour, materials, equipment and services for design, supply and installation of glazing at aluminium skylights as indicated.

### 1.2 REFERENCES

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1. BCBC
2. Glazing Systems Specifications Manual by GCA of BC
3. IGMAC 'Glazing Recommendations for Sealed Insulating Glass Units'
4. IGMAC 'Sloped Glazing Guidelines'
5. GANA 'Glazing Manual'
6. CAN/CGSB-2.55, Glass Cleaner
7. CAN/CGSB-19.18, Sealing Compound, Silicone Base, Solvent Curing.
8. CAN/CGSB-19.2, Glazing compound, non-hardening, modified oil type.
9. CAN/CGSB-12.1, 'Glass Safety, Tempered or Laminated'
10. CAN/CGSB-12.3, 'Glass, Polished Plate or Float, Flat, Clear'
11. CAN/CGSB-12.8, Insulating Glass Units
12. CAN/CGSP-12.9, 'Spandrel Glass'
13. CAN/CGSB-12.11, 'Glass, Wired, Safety'
14. CAN/CGSB-12.20 'Structural Design of Glass for Buildings'
15. ASTM C 1048, 'Standard Specification for Heat-treated Flat Glass – Kind HS, Kind FT Coated and Uncoated Glass'

### 1.3 DESCRIPTION OF WORK

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1. Work of this section includes, but is not restricted to, the following:
  - .1 Supply and Installation of new glazing units into the aluminum framed curtain wall and skylight systems.

### 1.4 DESIGN REQUIREMENTS

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1. Structural Design:
  - .1 Design glass according to CAN/CGSB-12.20. Limit glass deflection to  $L/175$ , to a maximum of 20mm for any single light of glass.
  - .2 Design for loads as applicable by BCBC including wind (positive and negative), snow, seismic and other as required.

- .3 Energy Efficiency - Metal framed skylights and associated vertical glazing elements:
  - .1 Maximum U-value = 2.57 W/(m<sup>2</sup> x K) [0.45 Btu/h•ft<sup>2</sup>•°F]

## 1.5 SUBMITTALS

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- 1. Quality Control Documents:
  - .1 Submit letter from insulating glass fabricator stating current IGMAC compliance number and identifying the types of edge construction covered by that number.
- 2. Maintenance Data:
  - .1 Submit maintenance data for cleaning glass and polycarbonate units for inclusion in the project maintenance manual.
- 3. Warranties.

## 1.6 QUALITY ASSURANCE

---

- 1. Glass and glazing work of this section to conform to good glazing practice as described in the IGMAC 'Glazing Recommendations for Sealed Insulating Glass Units', IGMAC 'Sloped Glazing Guidelines', and the GANA 'Glazing Manual'.
- 2. All glass to bear manufacturers labels identifying glass type and thickness. Labels to remain on glass until final cleaning.
- 3. Sealed insulating unit manufacturer to be a member in good standing of IGMAC, and be prepared to submit evidence of current membership to the Consultant upon request.

## 1.7 MOCK-UP

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- 1. The first glazing unit installed will serve as mock-up to show location, size, shape and depth of new glazing tape, glazing spline, and sealants. Do not proceed with any other glazing work until the mock-up has been reviewed and approved by the Consultant.

## 1.8 DELIVERY, STORAGE, AND HANDLING

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- 1. Cases of glazing units must be kept upright, and blocked or strapped to prevent falling. Storage areas should be ventilated and dry. Units should not be stored in direct sunlight, and cases stored outside must be covered and ventilated to prevent damage from rain and condensation.
- 2. When removing glazing units from cases or handling loose units extreme care must be taken to prevent breakage, edge damage or seal damage. Carry glazing units upright using straps or vacuum cups on both sides. Do not slide glazing units on their sealed edges.
- 3. Loose units must be set at a slight tilt off vertical on blocks at quarter points. Blocking must be tapered or wedged to provide a flush support to the edge of the units at right angles to the unit surfaces so that individual lites cannot slide out of alignment causing seal failure or breakage.

## 1.9 WARRANTY

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1. All glass to be free from defects in material and workmanship, and continue to perform satisfactorily for a period of 10 years from the date of Substantial Performance of the Work.
  - .1 Satisfactory performance means compliance with the performance criteria and the testing and construction standards of this specification, and with the reviewed shop drawings. This includes the performance of glass and glazing materials, structural attachment, and sealants.
  - .2 Correct all deficiencies which appear during the warranty period, including removal and replacement of failed sealed insulating units, at no cost to the Owner.
2. Provide manufacturer's standard warranty stating that the sealed insulating units will be free from material defects obstructing vision for a period of ten years from the date of substantial completion.
  - .1 Contractor to obtain, on behalf of the owner, copies of standard product warranties from the respective manufacturers.

## 2 PRODUCTS

### 2.1 GLASS PRODUCTS

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1. All materials to be new, and to comply with the quality, fabrication and testing standards listed below:
  - .1 Float glass, Glazing Quality to CAN/CGSB-12.3
  - .2 Heat treated glass (tempered and heat strengthened): flatness and visual quality tolerances to CAN/CGSB-12.1
    - .1 Glass fabrication (holes, notching) of heat treated glass, to fabrication requirements of ASTM C1048-92
  - .3 Laminated glass: interlayer to be minimum 0.76 mm (0.030") thick for sloped glazing.
  - .4 Glass colour to match existing skylight colour which is light green.

### 2.2 SEALED INSULATED GLASS UNITS

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1. Sealed insulating glass units shall be certified to comply with either CAN/CGSB-12.8-M97 or ASTM E2190-10 for the edge seal construction, glass substrate and spacer type required to meet the energy performance requirements of this specification.
2. Glass thickness and heat strengthening to be determined according to CAN/CGSB-12.20-M89 to meet structural requirements but shall not be less than 3 mm thick.
  - .1 All skylight and associated vertical glazing is to be laminated tempered outer lite with a minimum 0.030 in PVB interlayer with heat strengthen inner lite.
3. Coatings: Low-e coating shall have emissivity required to meet specified energy performance and solar heat gain requirements.

- .1 Provide dual silver (or equivalent) solar gain coating that is has neutral colour that is similar in appearance to the retained glazing on the lower floors. Maximum SHGC is 0.30. Minimum VLT of the low E coating on clear glazing is 50%. Consultant to approve type and colour of coating.
- .2 Gas fill: Provide gas fill as required to meet specified energy performance requirements.
- .3 Insulating glass spacer type: as required to meet specified energy performance requirements.
4. Support angles to be designed to support window assembly, and to be either hot dipped galvanized steel or aluminum with complete with isolation as required.

### 2.3 GLAZING ACCESSORY MATERIALS

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1. Setting Blocks: extruded, Silicone, shore "A" 80-90 Durometer hardness, width to match glazing unit thickness.
2. Glazing Tape:
  - .1 Preformed, 100% solids macro-polyisobutylene butyl, paper release incorporating an integral spacer rod sized to provide adequate glazing clearances and pressures. Minimum thickness of 1/8".
  - .2 .Acceptable Materials: Tremco (Canada) Polyshim II.
3. Foam Tape
  - .1 Silicone compatible, self adhesive polymer foam spacer.
  - .2 Acceptable Materials: Norton Thermalbond V2100 Spacer - 1/4" thick.
4. Glazing Splines and Gaskets: Frame manufacturer's standard dry neoprene glazing splines and gaskets. Provide keyed type for fixed glazing stops and keyed or roll-in type for removable glazing retaining devices. Size glazing splines to provide recommended edge clamping pressure.
5. Glazing sealants are to be neutral cure silicone and must be compatible with each other and all must be compatible with the insulating glass unit sealant.
6. Sealants used as heel beads or air and weather seals in contact with the unit must remain pliable under all temperature conditions.
7. The glazing contractor shall verify with the sealant manufacturer that the life expectancy and performance of the product to be used is satisfactory and should obtain the correct application techniques including the use of primers if required.

### 2.4 FABRICATION

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1. Fabricate units to requirements of CAN/CGSB-12.8 using dual seal consisting of a polyisobutylene primary seal and a silicone secondary seal. Maintain separation of panes with non-corrosive desiccant filled spacer core. Dehydrate air space and hermetically seal inner and outer panes at periphery with flexible sealant.

2. Separators shall be made of a corrosion resistant material, chromium-nickel, stainless steel or aluminum alloy.
3. Each glazing unit shall be legibly and permanently marked so that the marking is visible after installation of the glazing unit, with the manufacturer's name or trade name and the year of manufacture.
4. Metal spacer core shall be straight and evenly set into the glass units and the primary sealant shall not extend past the inside edge of the spacer core by more than 1 mm.
5. Insulating glass units shall be manufactured to conform to IGMAC recommendations and the manufacturer shall be a member of IGMAC.
6. Both primary and secondary seals shall provide a completely continuous seal around the perimeter of each unit. Glazing units containing discontinuities in either the primary or secondary seals at the corners or along the length of the spacer bars will not be accepted.
7. All preformed tapes or gaskets shall be of a continuous length corner to corner and shall be cut over length to prevent stretching. Joints splices and corners shall be mitred and sealed.
8. Glazing units with vents, crushes, or shells along any edge of the glass will not be accepted.

### **3 EXECUTION**

#### **3.1 GENERAL**

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1. Install materials according to instructions from product manufacturers. Ensure materials which contact each other are compatible.

#### **3.2 EXAMINATION**

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1. Prior to installation, examine openings and frames prepared into which glazing is to be installed. Verify that all openings to receive glazing are square and plumb, correctly sized, and within acceptable tolerances to maintain uniform face and edge clearances. Notify Consultant of conditions which will prevent proper installation of work on this section. Do not glaze unsatisfactory locations until such conditions have been made good.
2. Field check all dimensions prior to fabricating glazing units.

#### **3.3 REMOVALS**

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1. Remove all required glazing stops, glazing splines, pressure plates, snap caps and all other accessories required to allow installation of the glazing units.

#### **3.4 GLAZING - GENERAL REQUIREMENTS**

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1. Remove protective coatings and clean contact surfaces with manufacturer approved solvent and wipe dry.

2. Clean sealing surfaces at perimeter of glass and sealing surfaces of rabbets and stop beads before applying tapes, splines or gaskets. Use solvents and cleaning agents recommended by manufacturer of sealing materials. Ensure surfaces are free of moisture and frost.
3. Install glazing tapes, splines and gaskets uniformly with accurately formed corners and bevels. Ensure that proper contact is made with glass and rabbet interfaces.
4. Place setting blocks as per manufacturer's instructions. Use two setting blocks placed at quarter points (1/4 of the unit width from each corner) or not closer than 150 mm (6") from the corners of the unit. Block thickness of 6 mm (1/4") is recommended. Thickness may be less for small units in sash glazing. Setting block width should slightly exceed the thickness of the glazing unit to support all component lites of glass equally. Setting blocks should be a minimum of 25 mm (1") long for every 1 sq. m. (10 sq. ft.) of glass area with a minimum length of 50 mm (2 inches).
5. Provide edge clearances as recommended by the glass manufacturer and to a minimum of 3mm between the edge of the glazing units and the adjacent frame.
6. Install dry glazing splines in one continuous strip around the perimeter of the window. Glazing spline must be installed in such a way to prevent rebound of the spline once installed. Spaces between the ends of the spline due to improper cutting or rebound will not be accepted.
7. Edge clamping pressure should be sufficient to achieve an air and water-tight seal but should not exceed 1.75 N/mm (10lbs/inch) to avoid the risk of unit damage. Preshimmed tape should be compressed 16% of nominal tape thickness for 1/8" and 3/16" tape and 20% for 1/4" tape.

### 3.5 GLAZING

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1. Install new glazing spline on the interior glazing fin seal corners and splices water and air tight.
2. Install glazing units, rest on setting blocks, ensure full contact and adhesion with glazing tape or spline at the perimeter.
3. Provide required edge and face clearances and glass bite.
4. Ensure vent and weep holes and passages remain free of obstructions.
5. Install spacer tape or spline, pressure plate and snap caps.
6. Install silicone sealant at corners and non-positively sloped surfaces of snap caps and pressure plates to ensure positive drainage.
7. Remove excess glazing and sealant compounds, dirt and other substances from glass and adjacent surfaces at completion of glazing work.

### 3.6 FINAL CLEANING

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1. Remove all protective materials, labels and other deposits from glazing.
2. Clean glass according to manufacturer's recommendations.

3. Glass cleaning solutions to meet CAN/CGSB-2.55 to avoid damage to glass surface. Confirm with manufacturer prior to cleaning of polycarbonate sealed units to confirm appropriate cleaning methods.
4. Do not use vigorous cleaning methods. Avoid scratching glass. Notify Consultant of any scratched units for review.
5. Clean and restore stained or damaged surfaces in accordance with manufacturer's recommendations. Replace damaged or defective glass at no cost to the Owner.
6. The Contractor shall complete a final cleaning of all glazing and frames. This final cleaning is to be performed after rehabilitation work as directed by the Consultant.

END OF SECTION