



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada

NHRC Sloped Glazing Remedial Repairs

Specifications & Drawings

Project: PWRC-015 // VR21-110SP-24597

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TABLE OF CONTENTS REPLACEMENT ROOFING SCOPE OF WORK

No. of Pages

Division – 00 Procurement & Contracting Requirements

00 01 10 – Table of Contents	2
00 01 15 – List of Drawings	2

Division – 01 General Requirements

01 00 00 – General Requirements	12
01 11 00 – Summary of Work (Sloped Glazing)	6
01 14 00 – Work Restrictions	2
01 29 00 – Payment Procedures	2
01 32 16 – Construction Progress Schedule	4
01 33 00 – Submittal Procedures	8
01 35 23 – Health and Safety	4
01 56 00 – Temporary Barriers and Enclosures	4
01 74 20 – Waste Management & Disposal	2
01 77 00 – Closeout Procedures	4

Division – 02 Existing Conditions

02 41 19 – Selective Demolition and Removal	6
---	---

Division – 05 Metals

05 50 00 – Metal Fabrications	4
-------------------------------------	---

Division – 06 Wood, Plastics, & Composites

06 10 00 – Rough Carpentry	6
----------------------------------	---

Division – 07 Thermal & Moisture Protection

07 52 00 – SBS Modified Bituminous Membrane Roofing	34
07 62 00 – Prefinished Sheet Metal Flashings and Trim	8
07 92 00 – Joint Sealants	8

Division – 08 Windows and Skylights

08 51 00 – Metal Framed Windows	17
08 63 00 – Metal Framed Skylights	13
08 88 00 – Glazing	6

Drawings

Sloped Glazing and Details	6
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END OF TABLE OF CONTENTS

PART 1 - GENERAL

1.1 DESCRIPTION

- .1 This Section is intended to compliment Owner issued Supplementary Conditions, and as such is to be read and interpreted in conjunction with Owner supplied documents. In case of conflict between these documents and Environment and Climate Change Canada Real Property Management, Technical Service prepared documents, the more stringent condition shall apply.

1.2 RELATED SECTIONS

- .1 Section 01 35 23 - Health and Safety

1.3 DEFINITIONS

- .1 "Builders Lien Act" : Builders Lien Act, SBC 1997, c45.
- .2 "Certificate of Completion" means a certificate under section 7 stating that work under a contract or subcontract has been completed and includes an order made under section 7(5) of the Builders Lien Act.
- .3 "Contract" means Contract Documents referred to in Articles of Agreement.
- .4 "Contractor", or pronoun in place thereof, means individual, group, corporation identified in Agreement that has undertaken to perform Work.
- .5 "Day" means calendar day. "Working day" means days other than Saturdays, Sundays, and holidays which are observed by construction industry at Place of Work.
- .6 "Consultant" means Rimkus Consulting Group Canada Inc. dba IRC Building Sciences Group Inc., entity engaged by Owner to prepare Contract Documents and provide administration of Contract.
- .7 "Other Contractor" means any person or firm or corporation employed by or having a Contract directly or indirectly with Owner other than through Contractor.
- .8 "Owner" means Environment and Climate Change Canada Real Property Management, Technical Service, person or entity identified as such in Agreement.
- .9 "Owner's Representative" means authorized individual or group, other than Consultant, acting on behalf of Owner.
- .10 "Place of Work" means designated location or site where contracted work is to be performed.
- .11 "Sub-Contractor" includes any person, firm, or corporation having a contract for execution of a part or parts of Work included in Contract, or a person, firm, or corporation furnishing material called for in Contract and worked to a special design according to Contract Documents but does not include one who merely furnishes materials not so worked.
- .12 "Work" includes, subject only to any express stipulations in Contract to contrary, everything that is necessary to be done, furnished, or delivered by Contractor and by those for whom he is responsible, to completely perform Work of Contract.

- .13 "Drawings" includes all design drawings and shop drawings.
- .14 "Shop Drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by the Contractor to illustrate details of a portion of the work.

1.4 CODES AND STANDARDS

- .1 Conform to all rules and regulations of all Authorities having jurisdiction at Place of Work.
 - .1 Federal regulations, latest edition including all amendments up to project date.
 - .2 Provincial regulations, latest edition including all amendments up to project date.
 - .3 Municipal regulations, latest edition including all amendments up to project date.
 - .4 Workers Compensation Act, OHS Regulations, Policies, Guidelines, WCB Standards, and Other OHS Legislation.

1.5 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy of following:
 - .1 Specifications and Drawings,
 - .2 Addenda,
 - .3 Approved Work Schedule,
 - .4 Applicable Construction Permits,
 - .5 Change Orders and Change Directives,
 - .6 Supplementary Instructions or Field Orders,
 - .7 Other modifications to Contract,
 - .8 Field Observations and Testing Reports.

1.6 OWNERSHIP OF DRAWINGS AND MODELS

- .1 All Drawings, Specifications and copies thereof and all models furnished by Consultant are and to remain property of Consultant, and are not to be used on other work. If Consultant so requests, all such Drawings, Specifications and models, except for signed Contract set of Drawings and Specifications, to be returned upon completion of work.

1.7 FEES, TAXES, PERMITS AND CERTIFICATES

- .1 Pay applicable Federal, Provincial, and Municipal taxes.
- .2 Provide authorities having jurisdiction with information when and as requested.
- .3 Pay fees and obtain certificates and permits including building permit.
- .4 Furnish certificates and permits when requested.

1.8 SAMPLES

- .1 Submit samples for review, in duplicate unless specified otherwise, as requested in respective specification Sections.
- .2 Identify name of manufacturer and product.
- .3 Deliver samples pre-paid to Consultant's business address.
- .4 Notify Consultant in writing at time of submission of deviations in samples from requirements set forth in Contract Documents.
- .5 Adjustments of samples made by Consultant are not intended to change Contract Price or Schedule. If adjustments affect value of work, state in writing to Consultant prior to proceeding with performance of work.
- .6 Make changes in and to samples as requested by Consultant, consistent with Contract Documents.
- .7 Installed work to match reviewed and approved samples.

1.9 WORK SCHEDULE

- .1 Provide initial schedule within seven (7) working days after Award of Contract, unless specified otherwise, showing anticipated progress stages and final completion of work.
- .2 Provide a Construction Schedule in accordance with Deliverables attached in this Tender Documents, showing anticipated progress stages and final completion of work. Once approved, the Construction Schedule forms the baseline for tracking the progress of the construction to determine whether the work is proceeding on schedule.
- .3 Interim review of work progress based on work schedule will be conducted as decided by Consultant and schedule updated by Contractor in conjunction with and to approval of Consultant.
- .4 Coordinate all schedules with Owner's Representative and/or Consultant to suit Owner's occupancy and usage requirements.
- .5 Inclement weather is considered incidental and the Contractor shall allow for weather delays in their schedule while still achieving the Construction Completion Date.
- .6 Overtime required to catch up on work that is behind schedule shall be included in the Contract Price.

1.10 INCLEMENT WEATHER & WEATHER ENCLOSURES

- .1 All areas of work shall be made water tight at the end of each work day to protect the Work and prevent water ingress into the tenant space below. Include in the bid all costs associated with temporary waterproofing, tenting, and water damming required to protect from water ingress.
- .2 Tenting for working during inclement weather is the Contractors option and shall be at the expense of the Contractor.

1.11 WORKERS' COMPENSATION INSURANCE

- .1 Provide evidence of compliance with requirements of Province for Place of Work regarding Workers' Compensation Insurance including payments due thereunder, prior to commencing Work and prior to receiving payment on Substantial and Total Performance of Work.

- .2 Provide evidence of compliance and subcontractors' compliance, at any time during term of Contract, when requested by Owner or Consultant.

1.12 CONTRACTOR'S USE OF SITE

- .1 This is an occupied site and normal operations must be maintained during performance of work. Take proper care to avoid unnecessary noise, or obstruction in corridors, walkways, sidewalks, and roadways. Do not interfere with use or safe passage to and from building and adjacent public sidewalks and roads. Do not unreasonably encumber site with materials or equipment. Where excessive noise or obstruction is in certain instances unavoidable, advise Owner Representative ahead of time and make suitable arrangements..
- .2 Hours of Work:
 - .1 Perform Work between 7:00 AM and 6:00 PM, Monday through Friday, unless otherwise approved by Owner.
 - .2 Follow municipal or provincial bylaws.
 - .3 Working times must be coordinated with Owner's Representative prior to commencement of work.
- .3 Designated Parking & Office:
 - .1 A site office may be located on site in area designated by the Owner's Representative. Decision to locate a site office on site is to be pre-arranged prior to tender close.
 - .2 Limited parking may be provided on site, unless specified otherwise in Instructions to Bidders, at a location acceptable to Owner's Representative. Provide and pay for additional parking, if required.
- .4 Site Access:
 - .1 Access and egress from work site to be as per prescribed and designated routes only. Provide and arrange for traffic control where necessary for delivery of materials, removal of garbage, etc. as required by Owner's Representative and as required by laws, ordinances, rules and regulations relating to Place of Work.
 - .2 Ensure that privileges presently accruing to adjacent properties are maintained.
 - .3 Do not transport materials through building without prior approval from Owner's Representative. Access to building elevators, storage space for material and tools will be as specified by Owner's Representative.
- .5 Storage:
 - .1 Use of site for storage of materials and equipment will be at a location acceptable to Owner's Representative. Location of site storage provision for removal of debris must be coordinated with Owner and Consultant in advance. Obtain and pay for use of additional storage of work areas needed for operations.
 - .2 Do not store materials or use trucks, cranes, hoists or other equipment in a manner which would load existing building structure beyond its design capacity.
 - .3 Provide adequate weather tight sheds or trailers for storage of materials, tools, and equipment which are subject to damage by weather.

- .4 Move stored products or equipment which interfere with operations of Owner or other Contractors.
- .5 Contractor to prepare and provide a Site Logistics Plan for review by the Owner, indicating project execution goals, location of bins, storage, etc.
- .6 Sanitary Facilities:
 - .1 Provide on-site washroom facilities on ground level only. Contractor will not have access to building washroom facilities.
 - .2 Maintain Contractor's facilities in good and clean working condition.
 - .3 Workers will not be permitted to use any other sanitary facilities, intended for use of public or building personnel.
- .7 Signage:
 - .1 No signs or advertisements other than warning signs are permitted on site unless approved by Owner's Representative or Consultant.
 - .2 Provide sufficient signage to indicate safe access and egress routes around or through the Work, and to ensure public safety.

1.13 COORDINATION AND COOPERATION

- .1 Coordinate all construction work with Owner's Representative and Consultant to obtain access to work areas. All access to work area is to be from the exterior of the building, unless permission is given by the Owner or Owners Representative to access the work site from the interior of the building.
- .2 Coordinate all construction work with Sub-Contractors when work is related.
- .3 Adhere to approved project schedule as closely as possible so that proper pre-arranged access can be arranged.
- .4 Execute work with minimum disturbance to occupants, public and normal use of site and building.
- .5 Maintain access to building and exits.
- .6 Where security has been reduced by work of contract, provide temporary means to maintain security.

1.14 PROJECT MEETINGS

- .1 Hold project meetings as requested by Owner's Representative and/or Consultant.
- .2 Notify all concerned parties of meetings.
- .3 Record meetings and distribute to all parties within 3 days of meeting. Include in minutes all significant proceedings, decisions and identify action by appropriate party.

1.15 SETTING OUT OF WORK

- .1 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.
- .2 Provide devices needed to lay out and construct work.

- .3 Supply such devices as straight edges and templates required to facilitate Consultant's observation of work.

1.16 CUTTING, FITTING AND PATCHING

- .1 Execute cutting, fitting and patching required to make work fit properly.
- .2 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work.
- .3 Obtain Consultant's approval before cutting, boring or sleeving load-bearing members.
- .4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.
- .5 Fit work airtight to pipes, sleeves, ducts, and conduits.

1.17 EXISTING SERVICES

- .1 Where work involves breaking into or connecting to existing services, carry out work at times directed by governing authorities, with minimum of disturbance to building operations, pedestrian and vehicular traffic.
- .2 Before commencing work, establish location and extent of service lines in area of work and notify Consultant of findings.
- .3 Provide 48 hours' notice and submit schedule to, and obtain approval from, Owner's Representative and Consultant for any shut-down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties.
- .4 Where unknown services are encountered, immediately advise Owner's Representative and Consultant and confirm findings in writing.
- .5 Record locations of maintained, re-routed and abandoned service lines.

1.18 PERFORMANCE OF WORK

- .1 Perform Work with least possible interference or disturbance to occupants, public and normal use of premises, roadways, parking areas, sidewalks, alleys, or passageways. Arrange with Consultant to facilitate execution of work. All egress doors providing access to work areas to be controlled. This is to be coordinated with Owner's Representative.
- .2 Provide all protection necessary or as required by local by-laws including but not limited to: hoarding, covered walkways, guard rails, barriers, night lights, sidewalk or curb protection and warning notices in locations where renovation and alteration work is adjacent to areas used by building occupants or public.
- .3 Take all necessary precautions to keep dust, dirt, and debris to an acceptable level as directed by Owner's Representative and Consultant. Comply with all laws, ordinances, rules and regulations relating to work in connection with above.
- .4 Where work is performed adjacent to air intakes, Owner's Representative and Consultant must be notified so that appropriate measures can be taken.
- .5 Protect exterior surfaces of building and grounds from debris and damage.
- .6 Protect adjacent property and buildings against damage which may occur as a result of work. Make good, to satisfaction of Owner's Representative and Consultant, any damage resulting from work of this Contract.

1.19 SHOP DRAWINGS

- .1 'Shop drawings' means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of work.
- .2 Shop drawings should indicate method of construction, method of anchorage, fastening, sealing, as well as material type, thickness, finish and other pertinent data.
- .3 Cross-reference shop drawing information to applicable portions of Contract Documents.
- .4 Adjustments made on shop drawings by Consultant are not intended to change Contract Price. If adjustments affect value of work, state such in writing to Consultant prior to proceeding with work.
- .5 Make changes in shop drawings as Consultant may require consistent with Contract Documents. When re-submitting, notify Consultant in writing of any revisions other than those requested.
- .6 Submit three (3), unless otherwise specified, copies of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.
- .7 Submit three (3), unless otherwise specified, copies of product data sheets or brochures for requirements requested in specification Sections and as Consultant may reasonably request where shop drawings will not be prepared due to standardized manufacture of product.
- .8 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, copy to be returned and fabrication and installation work may proceed. If shop drawings are rejected, noted copy will be returned and re-submission of corrected shop drawings, through procedures indicated above, to be performed before fabrication and installation work may proceed.

1.20 ADDITIONAL DRAWINGS

- .1 Consultant may furnish additional drawings to assist proper execution of work. These drawings to be issued for clarification only. Such drawings to have same meaning and intent as if they were included with plans referred to in Contract documents.
- .2 Perform Work in accordance with such additional instructions. Contractor to do no additional work without written instructions from Consultant.

1.21 WASTE DISPOSAL

- .1 Provide for storage and removal of garbage as a result of work and obtain approval of storage location(s) from Owner's Representative and Consultant prior to commencement of work.
- .2 Disposal of debris and garbage from the roof to be on a daily basis with minimum disturbance to Owner and occupants, unless stockpiling is specifically agreed upon.
- .3 Recycling of waste materials when possible and prudent must be arranged by the Contractor, and meet municipal regulations.

1.22 CHANGES TO DESIGN AND SCOPE

- .1 Design Authority: IRC Building Sciences Group
- .2 All changes in the design or materials must be pre-approved by the Design Authority.
- .3 Contractor initiated design or material changes and submissions post contract award require extra time for the Design Authority to review. The Contractor will be responsible for supplying all

information necessary for evaluation of the submission, plus the Consultant fees for the extra work associated with the review based on their standard hourly fee schedule.

- .4 Contractor initiated design changes need to account for all impacts for the requested change. The costs of any extra work related to any consequential impact of the approval of Contractor requested changes shall be born by the Contractor.

1.23 QUALITY CONTROL

- .1 IRC has been retained to provide third party Quality Assurance Observations (QAO) for the roofing installation work. The fee is based on the roof installation work to be performed in accordance with the Contract Documents and in a timely fashion. Additional QAO services may be required as a result of the Contractor's performance and will be billed to the Contractor at a rate of \$750.00 per QAO site visit. Additional site visits will apply in the following circumstances:
 - .1 Significant portions of the work are rejected and require additional review for the remediation of the defect. Significant includes: areas larger than 1,000 SF, work valued at more than \$10,000.00, and work requiring more than 3 days to correct.
 - .2 Insufficient work force is allocated to the project resulting in the work duration exceeding the Contract Schedule.
 - .3 Deficiencies are identified during the Final QAO site visit, resulting in the requirement of one or more Post Final QAO site visits. Post Finals will be billed to the Roofing Contractor at a rate of \$750.00.
 - .4 Leaks are reported during the roofing work requiring IRC to attend the site to document the leak location(s) and leak related damages. If the damage to the building or roof area are over \$5000.00, Contractor is responsible for producing a leak incident report and providing it to the Quality Assurance Observer for review. Contractor is responsible for coordinating the leak review with the QAO in advance.
 - .5 The roof assembly is not maintained water tight during construction and becomes contaminated with moisture, requiring IRC to attend the site to map out the areas of contamination that will need to be remediated.
 - .6 Failure of the Contractor to advise IRC of the ongoing work schedule so that portions of work are installed without our knowledge and inhibiting our ability to schedule QAO for this area and necessitating extra visits with the Contractor to perform exploratory work to verify what was installed.
 - .7 Failure of a mock-up installation which requires a dedicated visit for second mock-up review.
- .2 The fees for the additional QAO site visits will be billed directly to the Contractor unless indicated elsewhere in the Contract. Alternatively and if agreed to upon all parties, additional QAO site visits will be billed to the Owner and charged back to the Contractor via Change Order or Setoff to the Contract.
- .3 Provide Consultant with date each phase of work will begin, 48 hours before commencing work.
- .4 Copies of observation and testing reports to be issued to Contractor and Owner.
- .5 Contractor to cooperate with Consultant to facilitate observation and documentation of existing substrate and details throughout demolition work.
 - .1 Correct defects and irregularities of performed work at no additional cost to Owner.

- .6 When initial tests and observations reveal work not to contract requirements, Contractor to pay for additional tests and observations required by Consultant for correction of work.
- .7 It will not be the responsibility of the Consultant, nor will he have control of construction means, methods, techniques, procedures, safety precautions and programs required for the work in accordance with applicable construction legislation, regulations, or general construction practice. Nor will it be the responsibility of the Consultant for acts of omissions of the Contractor, his Sub-Contractors, employees or other persons performing the work.

1.24 EQUIPMENT AND HOISTING

- .1 Provide all required hoisting equipment for removal of debris and for movement and placing of materials and equipment during construction. Debris chutes to be totally enclosed and inclined, with watering down facilities as necessary to control dust, fire hazards, and nuisance factors. Exercise extreme care in disposal of wash water.
- .2 Any damage caused by hoisting equipment or operator to be made good to satisfaction of Owner's Representative and Consultant.
- .3 Provide and maintain temporary ladders required to perform work. Ladders to be strongly constructed and to comply with all requirements of safety authorities having jurisdiction over work. All ladders to be secured and used only by methods approved by Authorities.
- .4 Provide all required scaffolding necessary to perform work. Erect scaffolding independent of walls. Construct, maintain and use scaffolding in accordance with CAN/CSA-S269.2M, Access Scaffolding for Construction Purposes.

1.25 TEMPORARY FACILITIES AND SERVICES

- .1 Provide and maintain temporary facilities to carry out work.
- .2 Provide and maintain sanitary facilities to be used by Contractor's forces.
- .3 Remove temporary facilities and services on completion of work.

1.26 LOCATION OF EQUIPMENT AND FIXTURES

- .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Consultant of impeding installation and obtain approval for actual location.
- .4 Submit field drawings to indicate relative position of various services and equipment when required by Consultant.

1.27 FIRE PREVENTION

- .1 The Contractor has sole responsibility for fire prevention and protection. The Consultant and the Owner assume no role in managing fire safety. Comments and observations may be made by the Consultant regarding fire protection materials, such as fire tape, that are incorporated into the roofing system to help ensure quality relating to the proper use and installation of the materials; this is not to be interpreted as approval of the adequacy for the fire prevention measures that the Contractor is using.

- .2 No open burning to be permitted within any construction at site.
- .3 Provide and maintain temporary fire protection equipment during performance of work required by insurance companies having jurisdiction and governing codes, regulations and bylaws. Provide a 20 lb. dry chemical fire extinguisher fully charged and in operable condition at every location where open flames are used.
- .4 Keep site free of waste materials, rubbish and debris.

1.28 WELDING AND CUTTING

- .1 Safety Provisions
 - .1 Ensure compliance with following regulations regarding welding and cutting operations and other operations generating flames, sparks, smoke, and heat;
- .2 Safety Procedures by Contractor
 - .1 Contactor shall establish Safety Procedures by task, and document such procedures to meet provincial regulations.

1.29 SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions at work site.

1.30 OCCUPATIONAL HEALTH AND SAFETY

- .1 Contractor to refer to the mold and worker safety clauses included in Specifications
- .2 The Contractor is deemed the Prime Contractor. The Contractor is responsible for ensuring that all persons on the work site abide by the Contractor's worksite safety plan.
- .3 Submit Notice of Project at the start of the project.
- .4 Conform to safe work practices in accordance with regulations and authorities having jurisdiction.
- .5 Promptly report to Owner and Consultant all accidents or if any claim is made against Contractor or Subcontractor on account of accident.
- .6 Provide at site, equipment to supply first aid.
- .7 Enforce proper work methods and act immediately on directions regarding safety and work practices given by authorities having jurisdiction or Owner, at no additional cost to Owner.
- .8 Failure to comply with verbal or written instructions or orders from Ministry of Labour inspector or other authorities as well as Owner or Consultant regarding safe work practices or provision of specified requirements under Act to be considered non-compliance with Contract.
- .9 Maintain on-site a copy of latest edition of Occupational Health and Safety Act and Regulations for Construction Projects.
- .10 Ensure that all personnel are adequately equipped to comply with safety regulations and that sufficient safety equipment is available.

1.31 EMERGENCY CONTACT

- .1 Provide 24-hr emergency contact telephone number in the event that an emergency arises as a result of the work being undertaken.

- .2 Ensure that emergency services has a maximum response time of 1hr and can accommodate all conditions that may arise, including water damage, hoarding, security, mechanical failure, electrical failure, gas service interruption, utility interruption, broken glass etc.

1.32 TEMPORARY POWER AND WATER

- .1 Coordinate with Consultant and Owner's Representative for use of temporary power and water supply.
- .2 If available, Owner will allow usage of typical site utilities such as electrical services and hose bibs.
- .3 Provide any necessary special wiring for lights, equipment, etc.
- .4 For non-typical uses, provide temporary power distribution wiring to comply with provincial Hydro Electrical Safety Code. Obtain inspection certificates for temporary electrical work from local authorities.

1.33 WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

- .1 Contractor to be familiar with WHMIS regulations and be responsible for compliance.
- .2 Controlled products shall be properly labelled.
- .3 Provide proper warning labels and training at the workplace.
- .4 Provide copies of material safety data sheets (MSDS) for any controlled product in the workplace.
- .5 Be responsible for all other requirements of the regulations as applicable to Employers.
- .6 Contractor shall, before commencing work, provide Owner with a proposal as to how hazardous materials will be stored and dispensed on-site. Specifically outline measures to be taken to prevent damage or injury in the event of an accidental spill.

1.34 CLEANING

- .1 Maintain project free of accumulated waste and rubbish. Disposal of debris and garbage to be on a per shift basis with minimum disturbance to Owner and tenants. Under no circumstances shall debris be allowed to accumulate on-site.
- .2 Final cleaning:
 - .1 Remove temporary protection.
 - .2 Remove dust, dirt and foreign matter from surfaces.
 - .3 Broom clean paved exterior surfaces.
- .3 Contractor's parking areas, storage areas, and access routes between work areas and aforementioned areas to be as defined by Owner's Representative and be strictly adhered to.
- .4 At end of project, landscaping to be repaired to match pre-existing conditions to satisfaction of Owner's Representative and Consultant.

1.35 SECURITY

- .1 Contractor shall be responsible for material or work stolen, lost, damaged, or destroyed.

- .2 Provide barricades, warning signs and lights as necessary for the protection of all people and property on or adjacent to the site. Alter and adapt as directed by the Consultant. Hold the Owners and his agent harmless from all claims in this regard. Conduct all construction operations in strict accordance with jurisdiction over work in this Contract.
- .3 The Contractor shall make arrangements to ensure security of materials, tools and equipment.

1.36 SUPERVISION

- .1 The Contractor is to provide a qualified supervisor, regularly engaged in work of comparable magnitude, to work on this project. Supervisor to be in constant attendance while work is in progress, including when work is performed by sub-contractors.

1.37 WARRANTIES

- .1 Refer to the respective Sections of Work for the required Warranties included in this specification. Performance bonds shall commence on the date of the Substantial Performance of the work and extend to the end of the warranty periods.

1.38 COVID DELAYS

- .1 Contractor is to follow all COVID-19 Regulations as part of this Contract, and as such financial remuneration cannot be claimed due to changes in the Regulations set out by Authorities having Jurisdiction. Duration of Contract (Schedule) can be negotiated with no financial changes to Contract.

1.39 CONTRACT CLOSE-OUT

- .1 Contractor is responsible for all equipment required to safely access the roof areas within the Scope of Work during the final review by the Consultant and/or Owner.
- .2 Expedite and complete deficiencies and defects identified by Consultant.
- .3 Submit required documentation such as statutory declarations, Workers' Compensation Certificates, warranties, certificates of approval or acceptance from regulating bodies.
- .4 Review observation and testing reports to verify conformance to intent of documents and that changes, repairs or replacements have been completed.
- .5 Provide on-going review, observation, and attendance to building, call-back, maintenance and repair problems during Warranty periods.
- .6 Provide warranties and bonds fully executed and notarized.
- .7 Execute transition of Performance of Labour and Materials Payment Bond to warranty period requirements.
- .8 Collect and assemble documents executed by Subcontractors, suppliers and manufacturers.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION - 01 00 00

PART 1 - GENERAL

1.1 DESCRIPTION

- .1 The Contractor is to provide all labour, equipment, and materials necessary to perform to completion Work as described in these Contract Documents for:

2022 Sloped Glazing (Skylights) Remedial Repairs and Related Works on designated areas at National Hydrology Research Centre (NHRC) , located at 11 Innovation Blvd., Saskatoon, Saskatchewan, S7N 3H5.
- .2 Contract Documents to be reviewed in their entirety with all sections, including Division 1-General Requirements, to be considered interrelated and form part of this section.
- .3 There may be roof replacement works concurrent to the Sloped Glazing (Skylights) remedial repairs. The Contractor will include proper transition details and coordination at the time of construction.
- .4 Hoarding/Temporary Weather Protection: Contractor will include in their bid price, the provision of temporary weather protection at the area of work to ensure that the building and its interior components are protected against inclement weather. Note that the Owner intends to use the building during the Construction period.
 - .1 Provide temporary hoarding / scaffolding necessary to perform work. Erect scaffolding independent of walls. Construct, maintain and use scaffolding in accordance with CAN/CSA-S269.2M, Access Scaffolding for Construction Purposes. The Contractor is responsible for the engineering design requirements of their hoarding.
 - .2 IRC / Owner will review the engineer-stamped temporary hoarding.
- .5 Target Schedule: The project should be Substantially Completed by March 31, 2023.

1.2 PROJECT SCHEDULE

- .1 Contractor to mobilize his forces and trades to commence work on site as soon as possible after Award of Contract, weather permitting.
- .2 Substantial Completion of Work to be completed by a specified date; to be announced later in consultation with Contractor.

1.3 EXAMINATION OF DRAWINGS, SPECIFICATIONS, AND WORKSITE

- .1 Carefully examine and study all Bid Requirements together with existing site conditions and any other necessary data or conditions that may affect performance of Work in order to determine full extent of Work.
 - .1 Under no circumstances will any claims be allowed against Owner resulting from failure to ascertain full extent of Work herein described, specified, or implied.
- .2 Contractor to verify to own satisfaction that existing site conditions, roof components, and measurements are accurately reported in Bid Requirements. Obtain or check all measurements and dimensions at worksite as may be necessary and required for performance of Work.
- .3 Promptly report in writing any discrepancies, errors, conflicts, or omissions to Consultant when discovered and prior to Bid Closing.

- .1 Drawings, specifications, and schedules are complementary to each other; what is called for by one to be binding as if called for by all.
- .2 Should any discrepancy appear between documents leaving doubt as to intent or meaning, most stringent requirement shall govern unless directed otherwise in writing by Consultant.
- .4 Bid submission to be based on products, equipment, and/or suppliers named and identified as approved or accepted in technical specifications and drawings.
 - .1 Bid Documents constitute acceptable roofing installations.
 - .2 No deviation from specifications, drawings, or approved shop drawings allowed without prior written approval by Consultant, and if applicable by Manufacturer.
- .5 Unless specifically identified in Bid Requirements, any hazardous materials encountered during Work that requires specialized handling and incurs additional cost to be added to Contract Price.
- .6 Weather conditions are considered incidental to Work and will not be considered additional to Bid Price.

1.4 OWNER OCCUPANCY

- .1 Owner will occupy premises during entire construction period for execution of normal operations.
- .2 Cooperate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

1.5 CONTRACTOR USE OF PREMISES

- .1 Contractor to limit use of premises for Work, for storage and access.
- .2 Coordinate use of premises under direction of Owner and Consultant.
- .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

1.6 GENERAL SITE REQUIREMENTS

- .1 Perform Work between hours of 07:00 to 18:00 hours, Monday through Friday. Consult with Client/Building Owner for special access times.
- .2 Temporary Barriers, enclosures and signage will be highly enforced given use of property.
- .3 Contractor to ensure safety and proper execution of public routing; ensuring temporary access to fire exits if and when they are affected as part of Work.
- .4 Obtain Construction/Building Permit and sidewalk/roadway occupation permits as required by local municipality.
- .5 Determine nature and extent of all site services above and below grade prior to commencement of Work.
- .6 Coordination of trades will be responsibility of Contractor to ensure work is completed as soon as possible. Provide weather protection and heating as required to perform Work if required and as specified.

- .7 Supply, set-up, maintain and remove scaffolding, man-lift platforms and/or swing-stages during performance of Work as required to access work areas. If scaffolding is to be used, Contractor to provide complete shop drawings bearing seal of a Professional Engineer, licensed to practice in Place of Work. Work to include review and approval of installed scaffolding by Designer. Allowance should be made for access to all elevations of building.
- .8 No public access to Work area to be allowed. Ensure access to fire exits are maintained and hoarded through Work area. Pedestrian access along sidewalks must be maintained as per Owner's requirements. No areas of access to or around building are to be restricted without approval of Owner.
- .9 Sanitary Facilities
 - .1 Provide on-site washroom facilities on ground level only, secured in a locked compound. The Contractor will not have access to the building washrooms.
 - .2 Maintain facilities in clean condition.
 - .3 Workers will not be permitted to use any other sanitary facilities, intended for the use of public or building personnel.
- .10 Install temporary protection at all locations of Work, as required to ensure safe, clean, orderly removal and disposal work, and to provide protection for all interior and exterior building components, vehicles, pedestrians and occupants.
- .11 Provide temporary support to existing structural and cladding components during performance of work if required.
- .12 Install temporary protection for all materials and building components, which have been exposed during demolition/removals as specified.
- .13 Dispose of all materials unable or unsuitable for recycling at landfill site authorized by authorities having jurisdiction.
- .14 Pay for any additional testing and observations required by Observer for correction of Work, without additional cost to Owner, when initial tests and observations reveal work failing to meet contract requirements and when construction extends beyond the schedule submitted by the contractor.

1.7 PROTECTION OF ROOFS

- .1 Protect all roof areas within area of Work and where equipment or materials are stored. Do not store equipment or materials directly on roof surface.
- .2 Protect existing roof systems to remain against damage from traffic generated by new Work.
- .3 Protection of existing and newly installed roof membranes to use sheets of 25mm (1") expanded polystyrene insulation cover with 13mm (0.5") plywood.

1.8 SCOPE OF WORK: SLOPED GLAZING (SKYLIGHT) REMEDIAL REPAIRS

- .1 Remove and dispose existing sloped glazing system (skylights) at 2 locations (North and South) and supply and install new sloped glazing (skylight) system in accordance with the IRC specifications and drawings provided.

- .1 There may be roof replacement and related works concurrent to the Sloped Glazing (Skylights) remedial repairs. The Contractor will include proper transition details and work coordination at the time of construction.
- .2 The Client would like to combine the use of translucent and vision IGUs at this remedial repairs. The Contractor is to make sure that the new metal-framed sloped glazing frame system is able to accommodate the transition details in between the translucent and the vision glazing units.
- .3 New sloped glazing systems are to be designed to suit the existing structural supports.
 - .1 Pre-approved sloped glazing frame manufacturers: Kawneer Canada
 - .2 Portion of the South sloped glazing will have vision glass. Refer to IRC drawings for more information.
 - .3 Glazing: The Client would like to combine Translucent and Vision Glazing Units.
 - .1 Pre-approved Translucent Glazing Unit products: Solera TR9 and TR18 manufactured by Advanced Glazings Limited, P.O. Box 1460 Station "A", Sydney, N.S. Canada, B1P 6R7, phone (902)794-2899, email info@advancedglazings.com shane.webb@advancedglazings.com
 - .2 Vision Glazing acceptable products will be Low-E coated acid-etched bird safe glass. Triple pane Solarban 70XL by Vitro Glass, with AviProtek E. Glass separated by ½" (13mm) argon-filled airspace.
- .4 Performance Requirements: Provide aluminum-framed windows which have been manufactured, fabricated, and installed to withstand loading required by current National Building Code of Canada. Provide performance criteria required by these specifications without defects, damage or failure. The new windows shall be designed in accordance with the following standards:
 - .1 National Building Code (Latest edition)
 - .2 National Energy Code of Canada for Buildings.
 - .3 North American Fenestration Standard (NAFS latest edition)
 - .4 CSA A440.2-04, Energy Performance of Windows and Other Fenestration Systems
- .5 Note that NAFS does not govern site built framed glazing systems; however, the intent is to apply these performance requirements to the design.
- .6 Acceptable frame manufacturers: Kawneer Canada
 - .1 Submit request for approval of equal pressure-plate system, at least 7 days PRIOR to tender closing.
- .7 Verify the existing condition of skylights supports on site prior to shop drawings preparation. Any additional structural supports needed to complete the skylight installation should be included in the scope of work, and will not be treated as extra to the contract.
- .8 The Contractor will submit an engineer-stamped shopdrawing together with engineering Letters of Assurance, to the Consultant and Owner.
- .9 Engineering, design, shop-drawings preparation, supply and installation of Metal-Framed Skylight system, including aluminum framing, integral closures, trim, perimeter flashings and surface reglets.

- .10 Engineering must include custom metal brackets to connect the aluminum framing to the building structure. Contractor shall verify the existing site condition prior to any shop drawing preparation.
- .11 Fasteners, anchors and related reinforcement of framing system as required to resist design loads.
 - .1 Contractor to request IRC to check the main structural supports and connection details prior to installing the new skylight system.
 - .2 Please advise IRC at least 24 hours of the requested review.
- .12 Include a temporary working platform / hoarding to seal off and weatherproof the skylight opening, and keep the building secure from any intruder once the old skylight has been removed. Equally, the public area beneath shall be protected to keep safe any occupants / pedestrians within the interior spaces.
- .13 Field water testing: Contractor to include for a third party water infiltration testing for the new skylight systems. Testing should be scheduled while the interior hoarding / scaffolding is still in place. Testing will be paid, coordinated and scheduled by the Contractor. A water test report should be submitted to the Consultant and Owner as part of the general requirements of this contract.
- .14 Sheet Metal Flashings and Accessories: Remove and replace related sheet metal flashings and accessories in accordance with IRC drawings provided. New sheet metal flashings shall be fabricated and installed in accordance with the IRC drawings and specifications. Contractor to submit colour samples for approval by the Consultant prior to facilitate proper installation of the new skylight and its accessories. Any damage as a result of the work will be repaired to the satisfaction of the Owner at the expense of the Contractor.
- .15 Roof Tie in: Contractor to provide necessary roof tie-in to insure proper drainage and function of the new skylight in relation to the existing roof. This will include but not limited to two-ply roof membrane, insulation, etc. all in accordance with IRC drawings provided.
- .16 Interior Repairs: Care shall be taken not to damage the interior components and finishes during demolition. Any damage will be repaired to the satisfaction of the Owner at the expense of the Contractor. This will include installation of drywall finishes and paint located around skylight openings to match existing.
 - .1 Contractor to provide proper interior scaffolding protection under the skylight area to allow for normal building operations and occupant access within the duration of the skylight replacement.
- .17 Existing lightings and accessories: Contractor to remove and reinstate existing lightings, cables and accessories to facilitate proper installation of the new skylight systems.
- .18 Work to include modifying existing curbs to meet the minimum height requirement above finish roof surface levels, and all associated costs. Contractor to submit shop drawings for approval prior to installation.
- .19 Miscellaneous Repairs: Contractor shall be able to identify other repairs not specifically mentioned on these specifications but are deemed to be necessary for the proper execution and completion of the skylight replacement.

1.9 SCOPE OF WORK: RELATED ROOFING WORKS

- .1 There may be roof replacement and related works concurrent to the Sloped Glazing (Skylights) remedial repairs. The Contractor will include proper transition details and work coordination at the time of construction.
- .2 On Roof Areas Related to the Sloped Glazing (Skylight) Repairs: Remove existing system components, projection and perimeter flashings, and old appurtenances down to existing steel deck and install new ½" gypsum overlay board, 2 ply SBS modified bitumen membranes, in accordance with Section 07 52 00.
 - .1 Install new prefinished metal flashings, hook strips, and trim at all perimeter and projection locations where indicated on drawings and detailed in related technical sections.
 - .2 All existing metal surfaces within the scope of Work not being replaced as part of the Work are to be painted with rust inhibiting paint. Paint all roof hatches, corroded pipes, pipe caps, goosenecks, and gas lines to match existing colour or colour preferred by the Owner or specified elsewhere in the project Documents. Paint to be Tremclad by Rustoleum.

1.10 SCOPE OF WORK: RELATED VERTICAL GLAZING SYSTEMS (WINDOWS)

- .1 Provide labour, materials and equipment necessary to complete work of this section.
- .2 Base bid: Remove existing vertical glazing assembly (frame and glass) where indicated on the drawings. Replace with new vertical glazing assembly.
 - .1 Alternate scope is to retain the framing and replace the glazing only. This can be explored more at the time of the Construction.
- .3 Performance Requirements: Provide aluminum-framed windows which have been manufactured, fabricated, and installed to withstand loading required by current National Building Code of Canada. Provide performance criteria required by these specifications without defects, damage or failure. The new windows shall be designed in accordance with the following standards:
 - .1 National Building Code (Latest edition)
 - .2 National Energy Code of Canada for Buildings.
 - .3 North American Fenestration Standard (NAFS latest edition)
 - .4 CSA A440.2-04, Energy Performance of Windows and Other Fenestration Systems
- .4 Note that NAFS does not govern site built framed glazing systems; however, the intent is to apply these performance requirements to the design.
- .5 Acceptable frame manufacturers: Kawneer Canada
- .6 Acceptable Translucent Glazing Unit product. Solera TR9 and TR18 manufactured by Advanced Glazings Limited, P.O. Box 1460 Station "A", Sydney, N.S. Canada, B1P 6R7, phone (902)794-2899, email info@advancedglazings.com shane.webb@advancedglazings.com
- .7 Acceptable Vision Glazing: Vision Glazing acceptable products will be Low-E coated acid-etched bird safe glass. Triple pane Solarban 70XL by Vitro Glass, with AviProtek E. Glass separated by ½" (13mm) argon-filled airspace.

- .8 Verify the existing condition of supports on site prior to shop drawings preparation. Any additional structural supports needed to complete the installation should be included in the scope of work, and will not be treated as extra to the contract.
- .9 The Contractor will submit an engineer-stamped shopdrawing together with engineering Letters of Assurance, to the Consultant and Owner.
- .10 Engineering, design, shop-drawings preparation, supply and installation of Aluminum-Framed window system, including aluminum framing, integral closures, trim, perimeter flashings and surface reglets.
- .11 Engineering must include custom metal brackets to connect the aluminum framing to the building structure. Contractor shall verify the existing site condition prior to any shop drawing preparation.
- .12 Fasteners, anchors and related reinforcement of framing system as required to resist design loads.
- .13 Field water testing: Contractor to include for a third party water infiltration testing for the new fenestration systems.

1.11 SCOPE OF WORK – HOARDING / TEMPORARY WEATHER PROTECTION

- .1 Hoarding/Temporary Weather Protection: Contractor will include in their bid price, the provision of temporary weather protection at the area of work to ensure that the building and its interior components are protected against inclement weather. Note that the Owner intends to use the building during the Construction period.
 - .1 Provide temporary hoarding / scaffolding necessary to perform work. Erect scaffolding independent of walls. Construct, maintain and use scaffolding in accordance with CAN/CSA-S269.2M, Access Scaffolding for Construction Purposes. The Contractor is responsible for the engineering design requirements of their hoarding.
 - .2 IRC / Owner will review the engineer-stamped temporary hoarding.

1.12 RELATED PHOTOGRAPHS

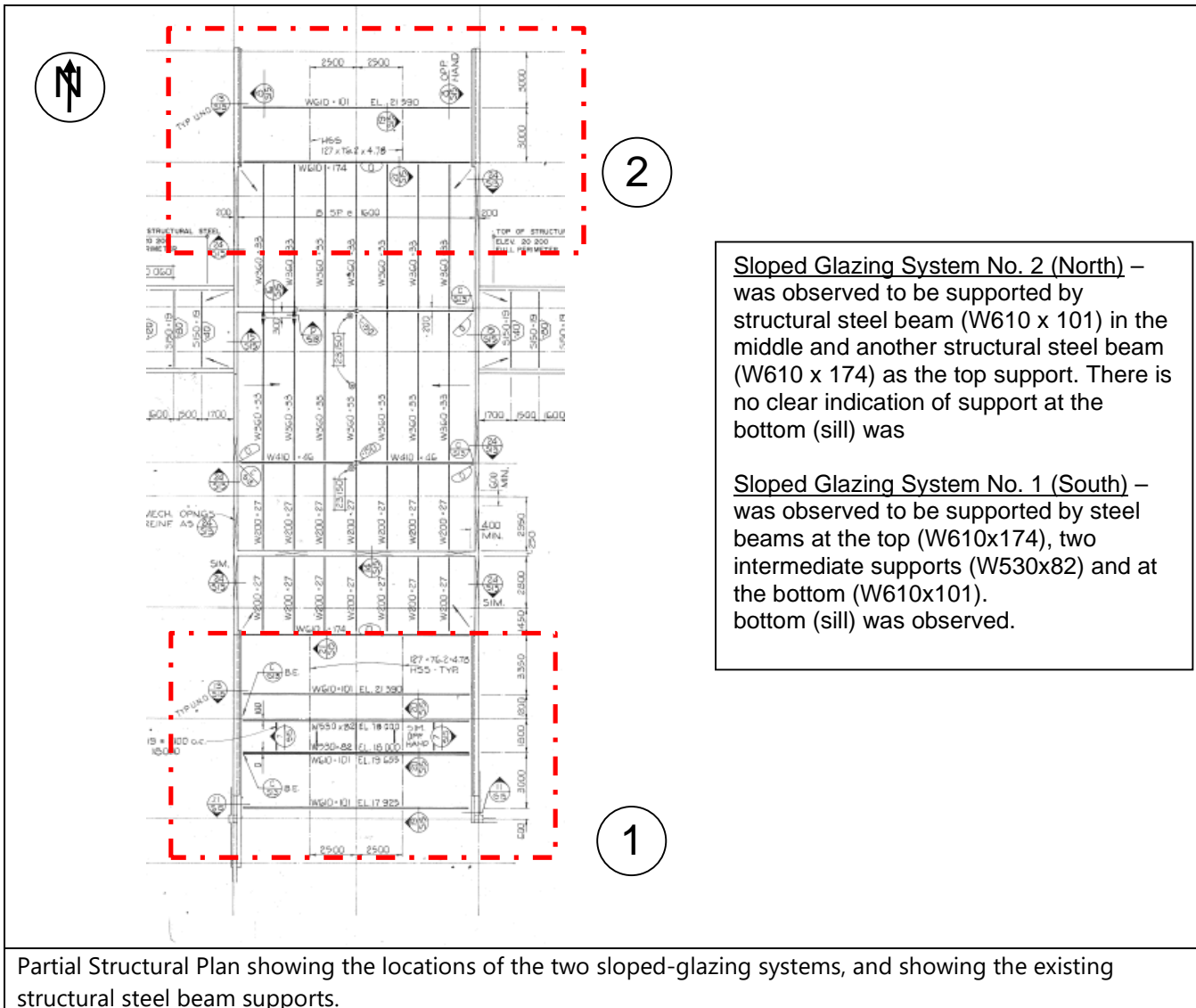




Photo 1 Shows the roof configuration with the first sloped glazing system (Skylight 1) located at the South side; while the second sloped glazing system (Skylight 2) is located at the North side



Photo 2 Shows the building's South elevation.



Photo 3 Overview at the transition of sloped glazing to the existing building wall.



Photo 4 – Overview at the top transition of roof to the sloped glazing.

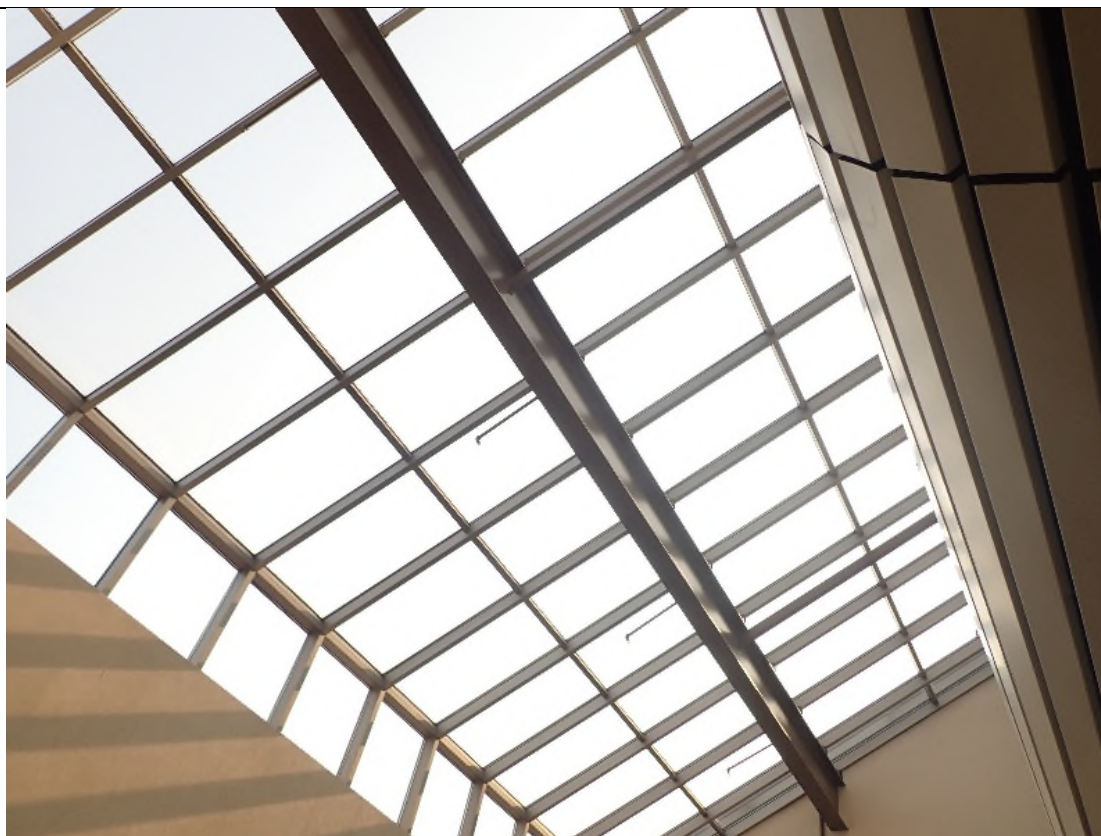


Photo 5 : The existing sloped glazing was observed to be bearing on top of the steel beam W610. The sloped glazing transitions to a vertical fenestration system at the exterior of the building.

END OF SECTION - 01 11 00

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PART 1 - GENERAL

1.1 ACCESS AND EGRESS

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

1.2 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
- .2 Maintain existing services to building and provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 Departmental Representative will assign sanitary facilities for use by Contractor's personnel. Keep facilities clean.
- .5 Closures: protect work temporarily until permanent enclosures are completed.

1.3 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

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

1.4 EXISTING SERVICES

- .1 Notify, Departmental Representative utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative [48] hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.

1.5 SPECIAL REQUIREMENTS

- .1 Carry out noise generating Work Monday to Friday from 18:00 to 07:00 hours and on Saturdays.
- .2 Submit schedule in accordance with Section 01 32 16 - Construction Progress Schedule - Bar (GANTT) Chart.
- .4 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .5 Keep within limits of work and avenues of ingress and egress.
- .6 Deliver materials outside of peak traffic hours 17:00 to 07:00 and 13:00 to 15:00 unless otherwise approved by Departmental Representative.

- .7 Prior to cutting or drilling horizontal or vertical surfaces including concrete, concrete block or other structural substrate, determine location of reinforcing, service lines, pipes, conduits or other items by x-ray, ground penetrating radar or other appropriate method. Submit findings to Departmental Representative prior to cutting or drilling.

1.6 SECURITY

- .1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.
- .2 Security clearances:
 - .1 Obtain requisite clearance, as instructed, for each individual required to enter premises.
 - .2 Personnel will be checked daily at start of work shift and provided with pass which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.

1.7 BUILDING SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions. Smoking is not permitted within 6m of a door, window or fresh air intake.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

- .1 This section includes Applications for Progress Payments, Schedule of Values, and for draws against specified Allowances.

1.2 SUBMITTALS

- .1 Application for Progress Payment: One (1) written application to Consultant in accordance with Section 01 33 00 – Submittal Procedures, by courier, fax, or email requesting certification of payment and including all required accompanying forms, letters, and certificates.

1.3 APPLICATIONS FOR PROGRESS PAYMENT

- .1 Date applications for payment for last day of each month and ensure amount claimed is for value of Work, proportionate to amount of Contract Price, performed and Products delivered to Place of Work by that date.
- .2 Submit to Consultant at least ten (10) working days before first Application for Payment, preliminary Schedule of Values for parts of Work, aggregating total amount of Contract Price, to help facilitate Consultant's evaluation of Contractor's Applications for Payment.
- .3 Schedule to follow Contractor's breakdown of Applications for Payment. Item number and descriptions to follow outline as designated in Bid Form.
- .4 Application for First Progress Payment to include:
 - .1 Contractor's dated and numbered invoice; indicating project name and areas included,
 - .2 Contractor's Schedule of Values,
 - .3 WCB Letter of Good Standing & Clearance Letter, certificate dated within ten (10) working days of invoice date.
- .5 Application for Subsequent Progress Payments up to and including penultimate to include:
 - .1 Contractor's dated and numbered invoice; indicating project name and areas included,
 - .2 Contractor's Schedule of Values,
 - .3 WCB Letter of Good Standing & Clearance Letter, certificate dated within ten (10) working days of invoice date,
- .6 Application for Final Progress Payment to include:
 - .1 Contractor's dated and numbered invoice; indicating project name and areas included,
 - .2 Contractor's Schedule of Values,
 - .3 WCB Letter of Good Standing & Clearance Letter, certificate dated within ten (10) working days of invoice date,

1.4 ALLOWANCES

- .1 Any allowances that are drawn upon during progress or final payments to be included as follows:

- .1 Invoices as supplied to Contractor to be attached to Contractor's Application for Payment. If invoice are not attached, any claim on Contractor's Application for Payment to be deducted from Consultant's Certificate of Payment.
- .2 Allowance breakdowns to be included as part of Schedule of Values.

PART 2 - PRODUCTS

- .1 Following table represents minimum information required on a submitted Schedule of Values:

Schedule of Values											
Project:									Date:		
Areas Included:									Progress No.:		
Description			Bid Rate			Actual Quantity			Value		
Item No.	Item	Unit	Bid Quantity	Unit Rate	Amount	To Date	Previous	Current	To Date	Previous	Current
Bid:											
1	Sample	Lump Sum	#	N/A	\$	%	%	%	\$	\$	\$
Allowances:											
A1	Sample	/linear ft.	#	\$/ft.	\$	%	%	%	\$	\$	\$
Changes Orders:											
CO1	Sample	/ ft ²	#	\$/ft ²	\$	%	%	%	\$	\$	\$
Totals:											
Sub-Total:					Sum Amount						Sum Current Value
G.S.T.:					Calc GST						Calc GST
Total:					Sum Amount incl. GST						Sum Current Value +GST
Allowance Breakdown											
Item No.	Item	Quantity	Unit	Rate	Markup	Amount					
A1	Labour 1	#	Hours	\$/hr	%	\$					
	Labour 2		Hours								
	Materials		Kg								
	Reciept										
	Other										
Total:						Sum Amount					

PART 3 - EXECUTION (NOT USED)

END OF SECTION - 01 29 00

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 11 00 – Summary of Work.
- .2 Section 01 56 00 – Temporary Barriers and Enclosures
- .3 Section 02 41 19 – Selective Demolition and Removal
- .4 Section 07 52 00 – SBS Modified Bitumen Membrane
- .5 Section 07 62 00 – Prefinished Sheet Metal Flashings and Trim

1.2 DEFINITIONS

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

1.3 REQUIREMENTS

- .1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to (5) working days, to allow for progress reporting.
- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to the Departmental Representative within (5) working days of the contract awarding, a Bar (GANTT) Chart that will serve as the Master plan. The Master plan will be used to plan, monitor, and set dates for progress report submission.
- .3 Submit the Project Schedule to the Departmental Representative within (2) working days of the Master Plan final approval.

1.5 PROJECT MILESTONES

- .1 Project milestones form interim targets for Project Schedule.
 - .1 Shop drawing submittal must be complete no later than four weeks of the contract award.
 - .2 The substantial completion certificate must be delivered no later than twelve weeks of the contract award.

1.6 MASTER PLAN

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 The Departmental Representative and Consultant will review and return revised schedules within (2) working days following review of the Master Plan.
- .3 If the Project Schedule is not realistic, review it and submit it no later than (2) working days after reception.
- .4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.7 PROJECT SCHEDULE

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 The detailed Project Schedule must include the following activities:
 - .1 Contract award.
 - .2 Shop drawings and samples.
 - .3 Permits.
 - .4 Mobilization.
 - .5 Hazmat Abatement and installation of vapour retarder / temporary roof.
 - .6 Installation of the new roofing system.
 - .7 Sheet Metal Flashing.
 - .8 Demobilization.
 - .9 Close-out package.

1.8 PROJECT SCHEDULE REPORTING

- .1 Update Project Schedule on a weekly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.9 PROJECT MEETINGS

- .1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not used.

END OF SECTION - 01 32 16

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PART 1 - GENERAL

1.1 DESCRIPTION

- .1 This section details procedures to be followed for delivery of Submittals identified and required by other specification sections, consisting of but not limited to:
 - .1 System Letter if required for CSA 123.21-14 Wind Uplift
 - .2 Shop drawings
 - .3 Samples
 - .4 Mock-ups
 - .5 Certificates and transcripts

1.2 GENERAL REQUIREMENTS

- .1 Transmittal for Submissions: Accompany all submittals with transmittal letter containing:
 - .1 Date of transmittal,
 - .2 Sequential number for tracking of each submission,
 - .3 Project title and number,
 - .4 Identification and quantity of each shop drawing, product data sheet, sample, etc,
 - .5 Contractor's business name and address,
 - .6 Name of reviewer for Contractor,
 - .7 Contractor's review stamp: completed, dated, and signed certifying submittal has been reviewed, checked, and approved for compliance with Contract documents.
- .2 Delivery: Direct submittals identified and required by individual technical sections to Consultant for review at following address, unless otherwise directed in writing:
 - .1 Attention: Andrew Kuffner
Office: RIMKUS CONSULTING GROUP CANADA Inc. dba IRC Building
Sciences Group Inc.
Address: 2825 Saskatchewan Drive, Suite 202, Regina, Saskatchewan, S4T 1H3

Telephone: 306.570.8309
Facsimile: 306.949.0202
Email: akuffner@ircgroup.com
 - .2 All deliveries prepaid by Contractor.
- .3 Time and Scheduling:
 - .1 Deliver submittals with reasonable promptness and in orderly sequence to avoid delay in progress of Work.
 - .2 Allow up to ten (10) working days for Consultant's review of each submission.
 - .3 Time for review to begin and be noted upon receipt of submittal by Consultant.

- .4 No adjustments to Contract Time or Price allowed due to delay in progress of Work caused by review, rejection, and re-submission process.
- .4 Deviations from Contract Requirements: Notify Consultant in writing of any deviations from Contract Document requirements and state reasons for said deviations at time of submission:
 - .1 Contractor is responsible for errors and omissions in submission and is not relieved by Consultant's review.
 - .2 Contractor is responsible for deviations in submission from requirements of Contract Documents and is not relieved by Consultant's review.
- .5 Review Before Delivery: Contractor to:
 - .1 Review each submittal for completeness and compliance with Contract Documents.
 - .2 Ensure that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work.
 - .3 Verify co-ordination of field measurements and affected adjacent Work.
- .6 Incomplete Submissions:
 - .1 Entire submission package to be returned to Contractor if deemed incomplete during a preliminary review, for reasons including:
 - .1 Insufficient number of copies provided,
 - .2 Transmittal for submission incomplete, missing, or unsigned,
 - .3 Submittal not stamped, completed, signed, dated, or identified to specific project.
- .7 Re-submissions:
 - .1 Use same procedure indicated here and above for re-submission.
 - .2 Clearly identify each correction or change made to submittal.
 - .3 Use original submittal number with appended suffix at end to indicate revision number.
- .8 Acceptance and Rejection:
 - .1 Where review by Consultant discovers no errors and omissions or only minor corrections, min. two (2) copies to be returned for fabrication and installation of Work to proceed.
 - .1 One copy of accepted submission to be retained by Consultant for project record.
 - .2 If submittals are rejected or require significant modification, noted copies to be returned to Contractor and marked with request for correction and re-submittal.
 - .1 One copy of rejected submission to be retained by Consultant for project record.
 - .3 Re-submit corrected submittals using same procedure indicated above and listed in this section. Include required number of copies for subsequent re-submission.
- .9 Distribution:
 - .1 Proceed with Work affected by submittals only after Consultant's review is complete.

- .2 Distribute copies of accepted submittals as required. Deliver one copy to Owner or Owner's Representative for project management.
- .3 Keep one copy of each reviewed submittal on site during performance of Work.

1.3 ACTION SUBMITTALS

- .1 Manufacturer's System Letter:
 - .1 Upon award of the work, and prior to loading, the roofing contractor must provide a System Letter from the membrane manufacturer, which clearly states the appropriate mechanical fastening and / or adhesive fastening patterns for the specified assembly based upon CSA 123.21-14 Wind Uplift testing.
 - .2 System letter shall include reference to the Specified Wind Uplift Pressures stated Scope of Work.
 - .3 System Letter shall include a copy of the applicable Roof System Assessment Report of Wind Uplift Resistance (or proprietary equivalent), including specific sizes / gauges / TPI of fasteners, size and shape of insulation or membrane plates, and size of adhesive row(s).
 - .1 Shop drawings of required fastener and plate or adhesive row placement is encouraged from the manufacturer to assist the field forces of the roofing contractor.
 - .4 Work performed prior to receipt of System Letter may be rejected if not compliant with the Design Letter.
- .2 Shop Drawings:
 - .1 Definition: "Shop Drawings" to mean drawings, diagrams, illustrations, schedules, performance charts, brochures and other data to illustrate details of a portion of Work.
 - .2 Number of Copies: Submit three (3) copies of shop drawings for each requirement identified and requested in technical sections, and as many additional copies as Consultant may reasonably request.
 - .1 Where shop drawings will not be prepared due to standardized manufacture of product, submit copies of product data sheets or brochures.
 - .3 Identify and Indicate: Products and materials to be used, methods of construction, attachment or anchorage, erection diagrams, connection diagrams, explanatory notes, and any other information necessary for completion of Work.
 - .1 Where articles or equipment attach to or connect to other articles or equipment, indicate that such items have been coordinated; regardless of Section under which adjacent items to be supplied and installed. Indicate cross references to design drawings and specifications.
 - .4 Drawings and Diagrams:
 - .1 Field Measurements: Note critical dimensions established by field measurement and any relationships to other critical features of Work.
 - .2 Project specific information and dimensions to be drawn accurately to scale.

- .3 Manufacturer's Standard Drawings: Supplement standard information to provide detail specifically applicable to project. Modify to delete information not applicable to project.
- .4 Measurements and Units: Present shop drawings, product data, samples, and mock-ups in SI Metric units. Where items or information are not produced in SI Metric units, converted values are acceptable.
- .5 Submittals to Include:
 - .1 Date and revision dates,
 - .2 Project title and number,
 - .3 Name and address of Subcontractor, Supplier, and Manufacturer,
 - .4 Contractor's stamp, signed by authorized representative certifying approval of submissions, verification of field measurements, and compliance with Contract Documents,
 - .5 Where required, licensed Engineer's signed and dated stamp or seal, valid for Place of Work,
 - .6 Details for appropriate portions of Work, as applicable including:
 - .1 Fabrication,
 - .2 Dimensioned layouts, including field dimensions and clearances,
 - .3 Setting or erection details,
 - .4 Capacities,
 - .5 Performance characteristics,
 - .6 Standards,
 - .7 Operating weight,
 - .8 Wiring diagrams,
 - .9 Single line and schematic diagrams,
 - .10 Relationship to adjacent work.
- .6 Changes and Adjustments:
 - .1 Make noted changes to shop drawings as Consultant may require, consistent with Contract Documents. When re-submitting notify Consultant in writing of any revisions other than those requested.
 - .2 Adjustments to shop drawings made by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.
- .3 Samples:

- .1 Number of Copies: Submit duplicate (2) samples for each requirement identified and requested in technical sections, and as many additional sample copies as Consultant may reasonably request.
 - .2 Identify and Indicate: Label sample's source or manufacture, material, size, model number, and intended usage in Work.
 - .3 Sample Size:
 - .1 Full size samples, cured and finished, as indicated in technical sections,
 - .2 Physically identical to product proposed for use in Work,
 - .3 Prepared from same materials and methods to be used for installation of Work.
 - .4 Mount, display, or otherwise package samples in sufficient way to facilitate review of sample for quality.
 - .5 Where colour, pattern, or texture is criterion, submit full range of samples.
 - .6 Notify Consultant in writing, at time of submission, of any deviations in samples provided from requirements of Contract Documents.
 - .7 Changes and Adjustments:
 - .1 Make noted changes to samples as Consultant may require, consistent with Contract Documents.
 - .2 Adjustments to samples made by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.
 - .8 Do not proceed with any Work associated with samples until each has been reviewed and accepted by Consultant.
 - .1 Acceptance of samples to be noted in writing by Consultant.
 - .9 At least one of each accepted sample to be returned to Contractor to store on site.
 - .10 Reviewed and accepted samples to become standard of workmanship and material referenced for comparison and verification of finished Work.
- .4 Mock-ups:
- .1 Erect sample mock-ups for each requirement identified and requested in technical sections, and as requested by Consultant.
 - .2 Mock-ups to be full scale and in section sizes as identified in technical section or as requested by Consultant.
 - .3 Coordinate location for onsite installation of mock-ups with Consultant.
 - .4 Deliver one submittal letter noting completion of mock-up installation and requesting on site review by Consultant.
 - .5 Do not proceed with any Work associated with mock-up until it has been reviewed and accepted by Consultant.

- .1 Acceptance of mock-ups to be noted in writing by Consultant.
- .6 Accepted mock-up to constitute minimum project standard of workmanship and material to be maintained throughout performance of Work.
- .7 Maintain and protect mock-ups on site during progress of Work as reference for comparison and verification of finished Work.
 - .1 Any Work completed after review not meeting mock-up standard to be removed and reinstalled, at Consultant's discretion, with new materials at no additional cost to Owner.

1.4 INFORMATIONAL SUBMITTALS

- .1 General:
 - .1 Number of Copies: Unless otherwise noted, submit three (3) copies for each requirement identified and requested in technical sections, and as many additional copies as Consultant may reasonably request.
- .2 Copy of the Scope appropriate Notice of Project (NOP) filed with WorkSafe BC for Place of Work.
- .3 Insurance and Bonds: True copies of transcripts for specified insurance and bonds:
 - .1 Naming Owner as Additional Insured,
 - .2 Indicating amount and type of coverage,
 - .3 Notarized and executed.
- .4 Manufacturer's Safety Data Sheets (SDS):
 - .1 Published or written information documenting physical and chemical characteristics of products to be installed with handling, safety, and first aid guidelines, including:
 - .1 Manufacturer's name,
 - .2 Product name and model number,
 - .3 Current and latest edition.
- .5 Trade or Installer Qualifications:
 - .1 Present accreditation cards or tickets, or true copy of, to QA Observer at start of Work and whenever Observer requests, containing:
 - .1 Name and photo of qualifying individual,
 - .2 Identification of training type or certification received,
 - .3 Date achieved or received, or expiry of certification.
- .6 Applications for Payment:
 - .1 One copy by courier, fax, or email with all required accompanying submittals and documentation in accordance with Section 01 29 00 – Payment Procedures. Send additional copies to Diane Schibild of IRC at dschibild@ircgroup.com.

.7 Closeout Submittals:

- .1 Upon completion and acceptance of Work, deliver copies of submittals in accordance with Section 01 77 00 – Closeout Submittals.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION - 01 33 00

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1. SUBMITTALS

- 1.1 Make Submittals in accordance with Section 01 11 55 "General Instructions".
- 1.2 Submit a site-specific Health and Safety Plan, within 7 days after Notice to Proceed and prior to commencement of Work. The Health and Safety Plan must include:
 - 1.2.0 Site-specific safety hazard assessment.
 - 1.2.1 Safety and health risk or hazard analysis for site risks and operation.
- 1.3 Submit Construction Safety Checklists after completion.
- 1.4 Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.
- 1.5 Submit copies of incident and accident reports.
- 1.6 Submit to Engineer with Material Safety Data Sheets (MSDS).
- 1.7 Personal training requirements including as follows:
 - 1.7.1 Names of personnel and alternates responsible for site safety and health, hazards present on site, and use of personal protective equipment.
- 1.8 The Engineer will review the Contractor's site-specific Health and Safety Plan and provide comments to the Contractor within 7 days after receipt of the plan. Revise the plan as appropriate and resubmit plan to the Engineer within 3 days after receipt of comments from the Engineer.
- 1.9 Medical Surveillance: Within 7 days after date of the Notice to Proceed and prior to mobilization to the site, submit certification of medical surveillance for site personnel, and submit additional certifications as personnel are sent to the site.
- 1.10 On-site Contingency and Emergency Response Plan: Address the standard operating procedures to be implemented during emergency situations.

2. FILING OF NOTICE

- 2.1 File Notice with Provincial authorities prior to commencement of Work.

3. SAFETY ASSESSMENT

- 3.1 Perform a site-specific safety hazard assessment related to the project.

4. MEETINGS

- 1.1. Pre-construction meetings: The Contractor shall attend a Pre-Construction Meeting.

5. REGULATORY REQUIREMENTS

- 5.1 The Contractor shall comply with the specified standards and regulations to ensure safe operations. The latest editions are applicable.
 - 5.5.1. Canada Labour Code Part II
 - 5.5.2. Canada Occupational Safety and Health Regulations
 - 5.5.3. National Building Code Part 8 – Safety Measures at Construction & Demolition Sites
 - 5.5.4. National Fire Code Part 4 – Flammable and Combustible Liquids
 - 5.5.5. National Fire Code Part 5 – Hazardous Process and Operations
 - 5.5.6. Provincial Health and Safety Act and Regulations including;

6. CONTRACTOR RESPONSIBILITY

- 6.1 The Contractor shall be responsible for the Health and Safety of persons on site, safety of property on site and for the protection of persons adjacent to the site and environment to the extent that they may be affected by the conduct of Work.
- 6.2 The Contractor shall comply with and enforce compliance by their employees with the safety requirements of the Contract Documents, applicable federal, provincial, local statutes, regulations, ordinances, and site-specific Health and Safety Plan.
(i.e. Occupational Health and Safety Acts and Regulations for Construction Projects, Canada Labour Code Part II)

7. CONTRACTOR ACCIDENT AND INCIDENT REPORT

- 7.1 The Contractor shall advise the Engineer of any accident, injury, near-miss incident, fire, explosion or chemical spill occurring at the Work site and any visit to the site by a governmental enforcement official.

8. UNFORSEEN HAZARDS

- 8.1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, the Contractor shall immediately stop work and advise the Engineer verbally and in writing.

9. WORK STOPPAGE

- 9.1 The Engineer and/or designated Health and Safety personnel may stop work for health and safety considerations.

10. CORRECTION OF NON-COMPLIANCE

- 10.1 The Contractor shall immediately address health and safety non-compliance issues identified by the Engineer and/or other designated Health and Safety personnel.
The Engineer may stop Work if non-compliance of health and safety regulations is not corrected by the Contractor.

11. DISCIPLINARY ACTIONS

- 11.1 The Contractor's disregard and/or lack of compliance to health and safety measures, procedures and policies shall lead to disciplinary action by the Engineer.

12. SITE HEALTH AND SAFETY POLICIES AND DIRECTIVES

- 12.1 The Contractor shall comply and follow all prescribed site Health and Safety Policies and Directives including but not limited to the following;

12.1.1 Worker Profile Sheet: The Contractor shall submit to the Engineer a completed Worker Profile Sheet c/w all attachments including copies of licenses, certificates and permits for supporting qualifications to perform required work for a given project for each individual worker requiring access to the site. The completed Worker Profile Sheets are required for each individual worker prior to working on site.

12.1.2 Hot Work Permit: The Contractor shall submit a completed Hot Work Permit to the Engineer for review and approval. The Engineer's approval is required prior to initiating hot work.

12.1.3 Hot Tap Permit: The Contractor shall submit a completed Hot Tap Permit to the Engineer for review and approval. Approval by the Engineer is required prior to initiating hot tap work.

12.1.4 Lock Out and Tag Out (LOTO) – Isolation Procedures: The Contractor shall submit a completed LOTO Isolation Form (Zero Energy) to the Engineer for review and approval for all work requiring LOTO. The Engineer's approval of isolation form is required prior to initiating LOTO work.

12.1.5 Live Work Procedure: The Contractor shall submit a completed Live Work Procedure Form to the Engineer for review and approval for all work requiring Live Work procedures. The Engineer's approval of the Live Work Form is required prior to initiating Live Work.

12.1.6 Emergency and Fire Evacuation Route: The Contractor shall obtain training on procedures of evacuating the site under emergency and/or fire situations. Contractor training and sign-off is required prior to initiating site work.

12.1.7 Trades Qualifications and Apprenticeship Act: The Contractor shall sign-off confirming that the Trades Qualifications and Apprenticeship Act shall be observed and followed. Contractor sign-off is required prior to initiating site work.

END OF SECTION

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PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Barriers
- .2 Environmental Controls
- .3 Fall Arrest
- .4 Traffic Controls
- .5 Fire Routes

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CGSB 1.189M – Primer, Alkyd, Wood, Exterior
 - .2 CGSB 1.59 – Alkyd Exterior Gloss Enamel
- .2 Canadian Standards Association (CSA)
 - .1 CSA O121M – Douglas Fir Plywood
- .3 Occupational Health and Safety Act and regulations for Construction Projects.
- .4 Canadian Standards Association (CSA), CSA S350-M, Code of Practice for Safety in Demolition of Structures.
- .5 Comply with National Building Code of Canada, Part 8, “Safety Measures at Construction and Demolition Sites”, and Provincial requirements.

1.3 INSTALLATION AND REMOVAL

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

1.4 WORK AREA HOARDING

- .1 Erect temporary site enclosures where required using:
 - .1 38 x 89mm (2" x 4") construction grade lumber framing at 600mm (2') centres and 1200 x 2400 x 13mm (4' x 8' x .5") exterior grade fir plywood to CSA O121. Apply plywood panels vertically flush and butt jointed.
 - .2 1800 mm (6') high interlocking steel fence, with openings no greater than 38 mm (1.5")
- .2 Where required provide a minimum of one lockable truck entrance gate and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.
- .3 Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.

- .4 Paint public side of site enclosure in selected colours with one coat primer to CAN/CGSB 1.189M and one coat exterior paint to CAN/CGSB 1.59. Maintain public side of enclosure in clean condition.
- .5 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.5 COVERED HOARDING

- .1 Covered hoardings will be required when working over exits that serve as fire exits and locations where entrance or exit is required to remain open during work as stipulated by Owner.
- .2 Covered hoardings to be erected from vertical face of exit/entrance a minimum of:
 - .1 A line from top of work extending on 60° angle from vertical, or
 - .2 6000mm (20') long.
- .3 Covered hoardings to be provided when work occurs overhead of following:
 - .1 Emergency exits
 - .2 Safe Areas
 - .3 Emergency access roads
 - .4 Entrances and exits determined by Owner to remain open during work
 - .5 Entrances and exits required to remain open to provide adequate egress in and out of building.
- .4 Covered hoardings for pedestrian traffic to be constructed as follows:
 - .1 Scaffolding frames with X-bracing at 2400mm (8') o/c;
 - .2 2"x10' planks across top of frames tight together fastened to scaffolding frames;
 - .3 19 mm (.75") plywood fastened to top of 2"x10' planks;
 - .4 Minimum 12.7 mm (.5") plywood on 38 x 89 mm framing side walls set inside of overhead framing;
 - .5 Hoarding to be constructed to provide unobstructed sight lines both into and out of any enclosed spaces, with 203mm (8") open spaces between sheathing. Netting or mesh strips are to be used to cover the openings.
 - .6 Provide and maintain lighting to a minimum of 50 lux, constructed in a fashion that will mitigate vandalism.
- .5 Covered hoardings for Access roads and Safe Areas to be designed by a Professional Engineer licensed in province for Place of Work under guidelines of provincial Occupational Health and Safety Act and with local authorities having jurisdiction.

1.6 WORKING FROM ROOF

- .1 If and when work is performed on roof, existing roof composition to be protected by following:
 - .1 Minimum 25mm (1") rigid insulation;

- .2 12.7 mm (.5") plywood sheathing.

1.7 FALL ARREST

- .1 Conform to requirements of Occupational Health and Safety Act and regulations for Construction projects. Refer to Section 01 35 23 for additional information.
- .2 Any modifications or additions to the building such as guardrails, fall restraint systems, etc. are to be removed from the site at the completion of the work and the work made good.
 - .1 Any inability to restore the work to an as built condition is to be brought to the attention of the Consultant and Owner for review and discussion.

1.8 WEATHER ENCLOSURES

- .1 Weather to be considered incidental to work and to not be claimed as additional.
- .2 Applicable standard to be used for materials or building components when enclosures and/or heating is required to complete work.
- .3 Provide weather tight closures for, but not limited to:
 - .1 Unfinished door and window openings;
 - .2 Openings in floors and roofs;
 - .3 Openings through walls;
 - .4 Locations where daily work is not completed in a day's work and components left exposed are sensitive to weather conditions;
 - .5 Protection of materials used that are sensitive to weather conditions.
- .4 Design enclosures to withstand wind pressure, snow loading etc.

1.9 DUST TIGHT SCREENS

- .1 Provide dust tight screens to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2 Maintain and relocate protection until such work is complete.
- .3 Provide means for ventilating area if work is to occur in an interior or confined space.
- .4 Ventilate work area when it corresponds with areas used by tenants or patrons concurrently for parking or egress. If dust generation will affect tenants or patrons provide sealed enclosure with adequate ventilation for health and safety of workers.

1.10 ACCESS TO SITE

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.
- .2 Provide all appropriate signage directing public and building occupants away from work area
- .3 Emergency exits: Maintain clear and unobstructed use of all existing exit doors and routes. This may include provision of overhead protection and enclosed exit walkways in case of overhead work. Provide adequate lighting for 24 hour use.

1.11 PUBLIC TRAFFIC FLOW

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

1.12 FIRE ROUTES

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.
- .2 Provide all required signage to inform emergency vehicles of temporary route for access if modified as part of work.

1.13 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

1.14 PROTECTION OF BUILDING FINISHES

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

END OF SECTION - 01 56 00

PART 1 - GENERAL

1.1 CONSTRUCTION & DEMOLITION WASTE

- .1 Carefully deconstruct and source separate materials/equipment and divert, from D&C waste destined for landfill to maximum extent possible. Target for this project is 75% diversion from landfill. Reuse, recycle, compost, anaerobic digest or sell material for reuse except where indicated otherwise. On site sales are not permitted.
- .2 Source separate waste and maintain waste audits in accordance with the Environmental Protection Act,
 - .1 Provide facilities for collection, handling and storage of source separated wastes.
 - .2 Source separate the following waste:
 - .1 Brick and portland cement concrete.
 - .2 Corrugated cardboard.
 - .3 Wood, not including painted or treated wood or laminated wood.
 - .4 Gypsum board, unpainted.
 - .5 Steel.
 - .6 Items indicated in a Deconstruction and Waste Products Workplan Summary.
- .3 Submit a waste reduction workplan indicating the materials and quantities of material that will be recycled and diverted from landfill.
 - .1 Indicate how material being removed from the site will be reused, recycled, composted or anaerobically digested in a Deconstruction and Waste Products Workplan Summary.
- .4 Submit proof that all waste is being disposed of at a licensed land fill site or waste transfer site. A copy of the disposal/waste transfer site's license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

- .1 Not Used.

END OF SECTION

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PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Consideration of Substantial Performance
- .2 Review and QA Observations required for applications of Substantial Performance and Total Completion
- .3 Closeout Submittals

PART 2 - (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION AND DECLARATION

- .1 Contractor and all Subcontractors to conduct a review of Work; identify deficiencies and defects in preparation of list for application of Substantial Performance.
- .2 Consultant will schedule date within time allowance of Contract documents for both Consultant and Contractor to perform review of Work and to confirm Work identified on submitted list.
- .3 Consultant will within time allowance of Contract documents provide a breakdown of costs associated with deficiencies and defects for Consideration of Substantial Performance.
- .4 If Work is deemed incomplete in Consideration of Substantial Performance, complete outstanding items and request additional review following same protocol.
- .5 When Contractor is satisfied that Work is completed make application for final review by Consultant. Consultant will within allowances of Contract documents perform final review of Work.
- .6 Any deficiencies and defects to be tabulated with associated costing for Consideration of Completion.
- .7 If Work is deemed incomplete by Consultant, complete outstanding items and request additional review.
- .8 Defective products will be rejected, regardless of previous review and observations. Replace products with new at no expense to Owner.

3.2 MAINTENANCE AND RECORD DOCUMENTS

- .1 Following to be submitted to Owner at completion of Work:
 - .1 Maintenance manuals for, but not limited to, operating instructions, maintenance manuals, record of "as built" drawings, spare parts, maintenance of materials, special tools for completeness.
 - .2 Record of substantial and project completion correspondence inclusive, but not limited to Contractor lists, Consultant tabulations and certificates.
 - .3 Compile all shop drawings that have been submitted.

3.3 RECORDING ACTUAL SITE CONDITIONS

- .1 Submit Actual Conditions as outlined in following sentences.

- .2 Record information on set of Project Specifications provided by Consultant.
- .3 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .4 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .5 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .2 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .3 Field changes of dimension and detail.
 - .4 Changes made by change orders.
 - .5 Details not on original Contract Drawings.
 - .6 References to related shop drawings and modifications.
- .6 Specifications: legibly mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.

3.4 WARRANTIES AND BONDS

- .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
- .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
- .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after certification of completion.
- .4 Verify that documents are in proper form, contain full information, and are notarized.
- .5 Co-execute submittals when required.
- .6 Retain warranties and bonds until time specified for submittal.

3.5 FORMAT

- .1 Organize data in form of an instructional manual.
 - .1 Binders to be vinyl, hard covered, 3 'D' ring, loose leaf 219mm x 279mm (8.5" x11") with spine and face pockets.
 - .2 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

- .3 Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .4 Arrange content under Section numbers and sequence of Table of Contents.
- .5 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .6 Manufacturer's printed data, or typewritten data will be accepted.
- .7 Drawings to be provided with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

3.6 CONTRACT CLOSE-OUT

- .1 Expedite and complete deficiencies and defects identified by Consultants.
- .2 Submit required documentation such as statutory declarations, Workers' Compensation Certificates, warranties, certificates of approval or acceptance from regulating bodies.
- .3 Review QA Observation and testing reports to verify conformance to intent of documents and that changes, repairs or replacements have been completed.
- .4 Provide on-going review, examination and attendance to building, call-back, maintenance and repair problems during Warranty periods.
- .5 Provide warranties and bonds fully executed and notarized.
- .6 Execute transition of Performance of Labour and Materials Payment Bond to warranty period requirements.
- .7 Collect and assemble documents executed by Subcontractors, suppliers and manufacturers.

END OF SECTION - 01 77 00

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PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 11 00 – Summary of Work
- .2 Section 01 56 00 – Temporary Barriers and Enclosures
- .3 Section 07 52 00 – SBS Modified Bitumen Roofing Membrane
- .4 Section 08 63 00 – Metal Framed Skylights
- .5 Section 08 80 00 - Glazing

1.2 REFERENCES

- .1 Latest edition of all listed references to apply:
 - .1 Canadian Standards Association CSA S350, Code of Practice for Safety in Demolition of Structures.
 - .2 National Building Code of Canada, Part 8, "Safety Measures at Construction and Demolition Sites", and Provincial requirements.
 - .3 Occupational Health and Safety Act and regulations for Construction Projects.
 - .4 Canadian Environmental Protection Act (CEPA).
 - .5 Canadian Environmental Assessment Act (CEAA).
 - .6 Transportation of Dangerous Goods Act (TDGA).

1.3 ASBESTOS AND DESIGNATED SUBSTANCES

- .1 Contractor is to review the Pre-construction Hazmat Survey Report and prepare Safe Work Procedures to include all temporary protection, abatement and disposal of materials impacted by the Scope of Work of the project. Procedures must conform to the WorkSafe Saskatchewan requirements as a minimum. Contractor is to submit the Safe Work procedures plan to the Consultant prior to start of Work; however, the Consultant will not review the plan for conformance to WorkSafe Saskatchewan requirements as this obligation remains entirely with the Contractor.
 - .1 ACM and lead containing coatings or materials Work is to be in compliance with current standards, rules and regulations of all Authorities having jurisdiction for Place of Work.
- .2 Demolition and / or cutting of concrete can be hazardous to health.
 - .1 As per WSBC Risk Advisory RA 2015-06, cutting, breaking, crushing, drilling, grinding, or blasting concrete or stone releases silica dust.
 - .2 The Contractor is responsible for following guidelines laid out in Section 5.57 of the WSBC OHS Regulation and Guidelines, and implement an Exposure Control Plan (ECP). The ECP should incorporate protection for the public.
 - .1 WorkSafe Saskatchewan Guidance Document for developing an ECP can be found here:

- .3 Contractor is responsible for the removal and disposal of any/all asbestos containing materials outlined within the pre-renovation hazardous materials survey report.
- .4 All ACM work and lead containing coatings to be in compliance with current codes, standards, rules and regulations of all Authorities having jurisdiction for Place of Work.
- .5 Abatement procedures for Asbestos Containing Materials (ACM) pertinent to successful performance of Work to be paid for by Contractor, preapproved by Consultant.

1.4 STORAGE AND PROTECTION

- .1 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Consultant and at no cost to Owner.
- .2 In all circumstances, ensure that demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
- .3 Protect trees, plants and foliage on site and adjacent properties where indicated.

1.5 EXISTING CONDITIONS

- .1 Prior to start of any demolition work, remove contaminated or hazardous materials from site and dispose of at designated disposal facilities. All metals to be recycled.
- .2 Record and discuss with Consultant any deviations from existing assumed conditions as indicated by drawings and/or specifications.

1.6 REGULATORY REQUIREMENTS

- .1 Ensure all work is performed in compliance with CEPA, CEAA, TDGA, and all applicable provincial regulations.

1.7 NOTICE

- .1 Provide a minimum twenty-four (24) hour notice to Consultant and Owner prior to proceeding with any work that may disrupt building access or services.

PART 2 - NOT USED

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Examine site with Consultant and verify extent and location of items designated for removal, disposal, recycling, salvage and items to remain. Removal of HVAC units require confirmation by Owner's Representative.
- .2 Locate and protect utilities where applicable. Notify and obtain approval of utility companies before starting demolition.
 - .1 Prior to any digging, ensure BC One is contacted at 1-800-474-6886 and confirm locations of gas lines, electrical service lines, or telephone / data lines. Failure to do so may result in repair costs being applied to the Contractor.

3.2 GENERAL PROTECTION

- .1 Prevent movement, settlement, or other damage to adjacent structures, utilities, and parts of building to remain in place. Provide engineered bracing and shoring as required.
- .2 Minimize noise, dust, and inconvenience to occupants.
- .3 Protect existing building systems, services and equipment.
- .4 Provide temporary dust screens, covers, railings, supports and other protection as required.
- .5 Provide required signage, barricades, hoarding, overhead protection and temporary egress.
- .6 Support affected structure or building components and if safety of structure being demolished or adjacent structures or services appears to be endangered, take preventative measures and then cease operations and notify Consultant immediately.
- .7 Ensure that demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
- .8 Do not dispose of waste or volatile materials such as: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers. Ensure proper disposal procedures are maintained throughout project.
- .9 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.
- .10 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.
- .11 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.
- .12 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

3.3 DEMOLITION SALVAGE AND DISPOSAL

- .1 Remove parts of existing structure or roof system to permit repairs or new installation. Sort materials into appropriate piles for recycling and or reuse.
- .2 Carry in Base Bid Price all costs to salvage, protect from harm, and re-use following components, unless indicated otherwise elsewhere in specifications:
 - .1 Existing skylights, mechanical equipment, cladding, stairs and ladders, satellite and communications equipment, electrical lines, and service lines, etc.
- .3 Refer to drawings and specifications for items identified for reuse or salvage, if applicable.
- .4 Remove items to be reused, store in a protected location, and reinstall under appropriate section of specification.
- .5 Trim edges of partially demolished building elements to suit future use.
- .6 Include for disposal of removed materials to appropriate landfill and/or recycling facilities, except where specified otherwise, and in accordance with authority having jurisdiction.

- .1 Where possible, all existing recyclable materials, gravel, asphalt products, etc. to be transported to an appropriate recycling facility.
- .2 Provide location of local facility receiving removed recyclable materials to Owner and Consultant.
- .7 Dispose of debris on a continuous basis. Do not stockpile debris in a manner which would overload structure, or impede access around site.

3.4 SEQUENCE OF OPERATION

- .1 Removal:
 - .1 Remove items as indicated in technical sections, including roofing ballast or gravel, metal roofing flashings, roofing membrane and flashings, roofing insulation, and or vapour retarder.
 - .1 Do not disturb items designated to remain in place.
 - .2 Restrict roofing demolition work to sections in limited size that will be restored and made watertight by end of working day.
 - .3 Use extreme caution when performing demolition work around skylights, sloped glazing, and other force and vibration sensitive roof projections.
- .2 Removal From Site:
 - .1 Interim removal of stockpiled material may be required, if it is deemed to interfere with operations of Owner.
 - .2 Do not overload existing roof structures.
- .3 Salvage:
 - .1 Carefully dismantle items containing materials for salvage and stockpile salvaged materials at locations acceptable to Owner and Consultant.
- .4 Disposal of Material:
 - .1 Dispose of materials not designated for salvage or reuse on site to be hauled to an authorized disposal site and or recycling facilities.
- .5 Backfill:
 - .1 Backfill in areas as indicated.

3.5 ABANDONED AND UNUSED ITEMS

- .1 Items of unused and/or abandoned rooftop equipment, units, service lines, cabling, and any related supports which are not operational or in use are to be removed and disposed of.
- .2 Existing services for abandoned equipment to be dismantled to below roof deck, and closed off in accordance with local bylaws and Code requirements. Confirm all electrical lockout procedures with Owner's representative.
- .3 Existing roof deck openings to be closed using following guidelines:
 - .1 Openings up to 152mm (6") in diameter or 152mm x 152mm (6" x 6"):

- .1 Metal Decking: Install 610mm x 610mm (24" x 24") galvanized steel plate, min. 18ga. secured with 4 screws per side to existing decking.
- .2 Openings greater than 152mm (6") in diameter or 152mm x 152mm (6" x 6"):
 - .1 Wood Planking: Replace with SPF #1 grade boards to match existing thickness. All replacement decking shall have 3 points of bearing. Provide new framing to match original as required.
 - .2 Plywood Decking: Replace with No.1 construction grade plywood sheathing, Good One Side (G1S), to match existing thickness. All replacement decking shall have 3 points of bearing and installed in logical rectangular shapes. New plywood decking to be supported by at least half thickness of roof joist, truss, or rafter underneath. Provide galv. H-clips to existing decking on unsupported sides.
 - .3 Steel Decking: Obtain ruling from Engineer whether decking is to be replaced or suitably overlaid with identical decking. Secure all decking with TEK screws at each lower flute bearing point structure; welding is not permitted.
 - .4 Concrete Deck: Refer to detail drawing.
- .3 Openings greater than 915mm x 915mm (3' x 3'):
 - .1 Consult Structural Engineer for deck review and design of new framing, decking, securement, and any other required support.

3.6 DECK REPAIRS

- .1 Wood Decking: Areas of deteriorated wood planking or plywood decking to be cut out and replaced with new to match existing.
- .2 Metal Decking: Areas of corroded steel decking not requiring replacement to be cleaned using a wire brush to completely remove all evidence of corrosion. Remove all dust and coat with zinc rich epoxy primer to completely cover all areas where corrosion was evident.
- .3 Concrete Decking: Areas of concrete decking with pitted or deteriorated surfaces to be cleaned sufficiently to receive repair material. Repairs to be completed with quick set masonry repair grout trowelled to a smooth even finish flush with surrounding areas.

3.7 RESTORATION

- .1 Restore areas and existing works outside areas of demolition to match condition of adjacent, undisturbed areas.
- .2 Use only soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

3.8 CLEANUP

- .1 Upon completion of work, remove debris, trim surfaces and leave work site clean.
- .2 Use only cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

END OF SECTION - 02 41 19

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PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 08 63 00 – Metal Framed Skylights

1.2 REFERENCES

- .1 CAN/CSA-G40.20-04/G40.21-04 - General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA-G164-M92(R2003) - Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CSA W47.1-03 - Certification of Companies for Fusion Welding of Steel Structures.
- .4 CSA W47.2-M1987(R2003) - Certification of Companies for Fusion Welding of Aluminum.
- .5 CSA W48-06 - Filler Metals and Allied Materials for Metal Arc Welding
- .6 CSA W55.3-1965(R2003) - Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .7 CSA W59-03 - Welded Steel Construction (Metal Arc Welding).
- .8 CSA W59.2-1991(R2003) - Welded Aluminum Construction.
- .9 SSPC (The Society for Protective Coatings) (formerly SSPC - Steel Structures Painting Council) - Steel Structures Painting Manual.
- .10 ASTM A153/A153-05 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .11 ASTM A307-04e1 - Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

1.3 SUBMITTALS FOR REVIEW

- .1 Welders' Certificates: Submit to Section 01 33 00 requirements, certifying welders employed on the Work, verifying qualification within the previous 12 months to CSA W47.1 (steel), CSA W47.2 (aluminum), and CSA W55.3.
- .2 Shop Drawings:
 - .1 Provide engineer-stamped shop drawings.
 - .2 Indicate materials and profiles and provide scaled details for all components.
 - .3 Provide structural and physical characteristics of framing members and anchors. Indicate dimensional limitations and special installation requirements, if applicable.
 - .4 Indicate assembly details, installation details, and sequencing.

1.4 QUALITY ASSURANCE

- .1 Contractor shall verify the actual site condition (structural soundness of the wall or member to which the framing is to be attached) and report to the Consultant any discrepancy observed in comparison with the drawings provided.
- .2 Welders' Certificates: Submit to Section 01 33 00 requirements, certifying welders employed on the Work, verifying qualification within the previous 12 months to CSA W47.1 (steel), CSA W47.2 (aluminum), and CSA W55.3.

- .3 All welding shall conform to CSA W47.1 and welders are to be certified under division 1 or 2.1.

PART 2 - PRODUCTS

2.1 MATERIALS - STEEL

- .1 All structural steel shall be designed as per CSA/CAN-S16.1-M94.
- .2 All steel sections: Grade 350W in accordance with CSA/CAN-G40.21-M81
- .3 Steel Pipes: ASTM A53/A53M Grade A Schedule 40 galvanized finish.
- .4 Stainless steel is to be type 316 for cable and type 304 for members as per ASTM A193.
- .5 All anchor bolts shall be stainless steel type 304 with compatible nuts and washers.
- .6 All rivets are to be stainless steel type 304.
- .7 Exposed Mechanical Fastenings: Flush countersunk screws or bolts; consistent with design of stair structure.
- .8 Touch-up primer for Galvanized surfaces: CAN/CGSB-1.181 zinc rich

2.2 FABRICATION

- .1 Fit and shop assemble items in largest practical sections, for delivery to site.
- .2 Fabricate items with joints tightly fitted and secured.
- .3 Continuously seal joined members by continuous welds.
- .4 Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- .5 Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- .6 Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FABRICATION TOLERANCES

- .1 Squareness: 3 mm maximum difference in diagonal measurements.
- .2 Maximum Offset Between Faces: 1.5 mm.
- .3 Maximum Misalignment of Adjacent Members: 1.5 mm.
- .4 Maximum Bow: 3 mm in 1.2 m.
- .5 Maximum Deviation From Plane: 1.5 mm in 1.2 m.

2.4 FINISHES - STEEL

- .1 Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- .2 Do not prime surfaces in direct contact with concrete or where field welding is required.
- .3 Prime paint items with two coats. The primer used is NOT to contain any lead.

- .4 Structural Steel Members: Galvanize after fabrication to CAN/CSA-G164. Provide minimum 600 g/sq m galvanized coating.
- .5 Non-structural Items: Galvanize after fabrication to CAN/CSA-G164. Provide minimum 380 g/sq m galvanized coating.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verify that field conditions are acceptable and are ready to receive work.
- .2 Verify dimensions, tolerances, and method of attachment with other work.
- .3 Verify supporting structural members and confirm these are as per the drawings before installation. Report any deviation at once, to the Consultant.

3.2 PREPARATION

- .1 Clean and strip primed steel items to bare metal and aluminum where site welding is required.
- .2 Do not embed aluminum products into cementitious materials due to inevitable corrosion deterioration.

3.3 INSTALLATION

- .1 Install items plumb and level, accurately fitted, free from distortion or defects.
- .2 Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- .3 Field weld components indicated on Drawings.
- .4 Perform field welding to CSA requirements.
- .5 Obtain approval prior to site cutting or making adjustments not scheduled.
- .6 After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete. Apply finish coat of paint to match shop applied coating, or apply zinc rich paint to touch up galvanized coatings.

3.4 ERECTION TOLERANCES

- .1 Maximum Variation From Plumb: 6 mm per story, non-cumulative.
- .2 Maximum Offset From True Alignment: 6 mm.
- .3 Maximum Out-of-Position: 6 mm.

END OF SECTION - 05 50 00

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PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 11 00 – Scope of Work
- .2 Section 01 56 00 – Temporary Barriers and Enclosures
- .3 Section 02 41 19 – Selective Demolition and Removal
- .4 Section 07 52 00 – SBS Modified Bituminous Roofing
- .5 Section 07 62 00 – Sheet Metal Flashing and Trim
- .6 Section 08 63 00 – Metal Framed Skylights

1.2 REFERENCES

- .1 Latest edition of all listed references to apply:
 - .1 American Lumber Standards Committee (ALSC): Softwood Lumber Standards.
 - .2 American Plywood Association (APA) Product Guide: Grades and Specifications.
 - .3 American Wood Preservers Assoc. (AWPA): Timber Products Pressure Treatment.
 - .4 Canadian Standards Association (CAN/CSA):
 - .1 CAN/CSA B111: Wire Nails, Spikes and Staples.
 - .2 CAN/CSA-G164M: Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CAN/CSA O121M: Douglas Fir Plywood.
 - .4 CAN/CSA-O141-91: Softwood Lumber.
 - .5 CAN/CSA O151M: Canadian Softwood Plywood.
 - .6 CAN/CSA-O325.0: Construction Sheathing.
 - .5 National Forest Products Association (NFPA): Grading Rules.
 - .6 National Lumber Grades Authority (NLGA): Stnd. Grading Rules, Canadian Lumber.

1.3 QUALITY ASSURANCE

- .1 Lumber identification to be by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Plywood identification to be by grade mark in accordance with applicable CSA standards.
- .3 Plywood, OSB and wood based composite panel construction sheathing identification to be by grademark in accordance with applicable CSA standards.
- .4 At all times during Work, Contractor will have on site a qualified project supervisor. It will be Supervisor's responsibility to ensure that Work is carried out in an efficient manner, according to Plans and Specifications.

- .5 Provide shop drawings of carpentry details or interfaces for Consultants review.
- .6 Where requested, mock-up of exposed carpentry shall be made available for review of Owner and Consultant. This may be submitted by partial constructed components..

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Protect lumber and other products from dampness both during and after delivery at site.
- .2 Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.
- .3 Stack plywood and other board products so as to prevent warping.
- .4 Locate stacks on well drained areas, supported at least 152mm (6") above grade and cover with tarpaulins with sufficient to protect lumber from driving rain.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Set aside damaged wood and dimensional lumber off-cuts for acceptable alternative uses (e.g. bracing, blocking, cripples, bridging, finger-joining, or ties). Store this separated reusable wood waste convenient to cutting station and area of work.
- .2 Separate and recycle waste materials in accordance with applicable local, provincial and national regulations. Include for tipping fees associated with landfills and recycling depots
- .3 Unused preservatives and fire retardant materials are to be diverted from landfill through disposal at a special wastes depot.
- .4 Do not burn scrap at project site.
- .5 Fold up metal banding, flatten, and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 LUMBER MATERIALS

- .1 Materials to be best merchantable lumber, straight and sized and shaped to correct dimensions from nominal sizes noted on drawings. Lumber to be selected from well seasoned stock, free from loose resinous knots, shakes, waxed edges, splits, dry rot or other defects which would impair strength or durability.
- .2 Lumber in accordance with following standards:
 - .1 CAN/CSA-O141.
 - .2 NLGA Standard Grading Rules for Canadian Lumber.
- .3 Unless specified otherwise all framing members to be No.1/No.2 SPF.
- .4 All materials directly exposed to exterior or concrete surfaces to be pressure treated unless noted otherwise on drawings or elsewhere in specification.
- .5 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers to be pressure treated where exposed to exterior or concrete elements.
- .6 Moisture Content:
 - .1 At time of delivery and maintained at site.

- .1 Boards and lumber 51mm (2") and less in thickness: 19% or less.
- .2 Lumber over 51mm (2") thick: 25% or less.
- .7 Preservative Treatment:
 - .1 All wood exposed to exterior environmental conditions, in contact with concrete or masonry to be treated with roof preservative.
 - .2 Do not treat Heart Redwood and Western Red Cedar.
 - .3 Treat wood members and plywood exposed to weather or in contact with plaster, masonry or concrete, including framing of open roofed structures; sills, sole plates, furring, and sleepers that are less than 610mm (24") from ground; nailers, edge strips, blocking, crickets, curbs, cant, vent strips and other members used in connection with roofing and flashing materials.
 - .4 Treat other members specified as preservative treated (PT).
 - .5 Preservative treatment by pressure method to ASTM D1760; except any process involving use of prohibited Chromated Copper Arsenate (CCA) or Alkaline Copper Quaternary (ACQ).

2.2 PANEL MATERIALS

- .1 Douglas fir plywood (DFP): to CSA O121, standard construction, Good one side (G1S) when in contact with roofing membrane.
- .2 Canadian softwood plywood (CSP): to CSA O151, standard construction, Good one side (G1S) when in contact with roofing membrane.
- .3 Plywood, OSB and wood based composite panels: to CAN/CSA-O323.

2.3 ACCESSORIES

- .1 Bent metal plate: 18ga or 22ga, galvanized metal sheet, formed as required or as indicated on drawings to provide support for wood blocking or roof assembly components.
- .2 Anchorage to hollow masonry and gypsum walls: Galvanized toggle bolts.
- .3 Anchorage to solid masonry or concrete: Expansion shields and lag bolts:
 - .1 Rawl mushroom head lead anchors, min 6mm (0.25") diameter for sheathing,
 - .2 Hilti Kwik-Bolts for structural members.
- .4 Anchorage of wood members to sheet steel studs: Corrosion coated screws, min #14 thread, of length to penetrate minimum 19mm (0.75") through material into base.
- .5 Nails: Minimum 6d, hot dip galvanized spiral or ring shank nails, length to penetrate through material 38mm (1.5") into base. Common nails are not acceptable.
- .6 Anchorage of wood blocking to masonry: Masonry screws, Tapcon anchors of sufficient length to penetrate 32mm (1.25") into masonry surfaces.
- .7 Batt Insulation: Stone wool mineral fiber batt insulation, Rockwool by Roxul Inc.
- .8 Explosive actuated fastening devices are prohibited for use on this project.

2.4 ACCESSORY FINISHES

- .1 Galvanizing: to CAN/CSA-G164:
 - .1 Galvanized fasteners for all exterior work unless otherwise specified.
 - .2 Galvanized fasteners for all high interior humid areas unless otherwise specified.
- .2 Use stainless steel type 304 where noted on drawings.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Comply with safety regulations and applicable bylaws governing work included in this section. Provide and maintain necessary barriers, guards and rails.
- .2 Scope of work includes parapet wall, roof joint, and wall modifications as indicated on drawings or as required to provide a secure, smooth surface to receive the new roof and flashing assembly:
 - .1 Install wood blocking secured into existing surfaces adequately to resist movement and wind uplift forces as per FMG 1-49, minimum 200 pounds/foot.
 - .2 Install mineral fiber insulation at all voids and as indicated on drawings.
 - .3 Install plywood sheathing to drawings.
- .3 Complete wood blocking and sheathing to walls, curbs and drains as indicated on drawings.

3.2 SITE APPLIED WOOD TREATMENTS

- .1 Treat only wood blocking which will remain exposed to the elements.
- .2 Treat ends of site cut surfaces of materials delivered to site with wood preservative.
- .3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.
- .4 Apply wood treatments following manufacturer's instructions, and handle as per Safety Data Sheet instructions.

3.3 INSTALLATION

- .1 Comply with requirements of local Building Codes:
 - .1 Ensure continuity and completeness of vapour retarder membrane as coinciding with new wood blocking installation.
 - .2 Provide mineral wool insulation to fill voids at roof deck level or as otherwise required or indicated on detail drawings.
 - .3 Install furring and blocking as required to space-out and support new walls, window projections and louver extensions, fascia, soffit, siding and other work as required.
 - .4 Align and plumb faces of furring and blocking to tolerance of 1:600.
 - .5 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

- .6 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure with adequate fasteners.
- .7 Install sleepers as indicated.

3.4 ERECTION

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

END OF SECTION - 06 10 00

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PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Installation of a new roof system over prepared substrate.
- .2 Existing roofing components and related appurtenances to be removed including all unused curbs, sleepers and equipment as noted on the Roof Plan and specified herein in preparation for installation of a new 2 ply SBS roof membrane roof system at areas affected by the Sloped Glazing Remedial Repairs.
 - .1 Areas Affected by the Sloped Glazing Remedial Repairs
 - .1 Existing steel deck,
 - .2 13mm (1/2") siliconized gypsum overlay board, adhered,
 - .3 4% backslope polyisocyanurate insulation crickets between drains at location shown on Roof Plan, adhered,
 - .4 63.5mm (1/4") asphaltic over top of polyisocyanurate insulation crickets only, adhered,
 - .5 1 ply modified bitumen base sheet and flashings torch applied, and self-adhered at combustible surfaces,
 - .6 1 ply granular modified bitumen cap sheet and flashings, torch applied,
 - .7 Drainage mat layer, loose laid,
 - .8 R40 extruded polystyrene (XPS) insulation, loose laid,
 - .9 1 layer of geotextile filter cloth, loose laid,
 - .10 New stone ballast or reuse existing ballast, loose laid,
 - .11 Prefinished flashings and trim.
 - .12 Reinstall existing concrete pavers at locations shown on Roof Plan.

1.2 RELATED SECTIONS

- .1 Section 02 41 19 – Selective Demolition and Removal.
- .2 Section 06 10 00 – Rough Carpentry.
- .3 Section 07 62 00 – Prefinished Sheet Metal Flashing & Trim.
- .4 Section 07 92 00 – Joint Sealants.
- .5 Section 08 63 00 – Metal Framed Skylights
- .6 Section 08 80 00 - Glazing

1.3 REFERENCES

- .1 Latest edition of all listed references; most stringent requirements to govern in conflicts:

- .1 American Society for Testing and Materials (ASTM) International:
 - .1 C578: Rigid, Cellular Polystyrene Thermal Insulation.
 - .2 C726: Mineral Fibre Roof Insulation Board.
 - .3 C1177(M): Standard Specification for Glass Mat Gypsum Substrate.
 - .4 C1289: Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - .5 C1396(M): Standard Specification for Gypsum Board.
 - .6 D41: Asphalt Primer Used in Roofing, Damp proofing, and Waterproofing.
 - .7 D312: Asphalt Used in Roofing.
 - .8 D2822: Asphalt Roof Cement.
 - .9 D4601: Standard for Asphalt Coated Glass Fibre Base Sheet Used in Roofing.
 - .10 D6162: SBS Mod. Bit. Sheets Using Polyester & Glass Fiber Reinforcements.
 - .11 D6163: SBS Mod. Bit. Sheets Using Glass Fiber Reinforcements.
 - .12 D6164: SBS Mod. Bit. Sheets Using Polyester Reinforcements.
- .2 Canadian Standards Association (CAN/CSA):
 - .1 A123.21: Wind Uplift.
 - .2 A123.2: Asphalt Coated Roofing Sheets.
 - .3 A123.15: Polymer-Modified Bitumen Sheet, Prefabricated and Reinforced.
 - .4 A123.16: Asphalt Coated Glass Base Sheets.
 - .5 A231.1: Precast Concrete Paving Slabs.
 - .6 0121M: Douglas Fir Plywood.
 - .7 0151M: Canadian Softwood Plywood.
- .3 Canadian General Standards Board (CAN/CGSB):
 - .1 37.29M: Rubber-Asphalt Sealing Compound
 - .2 37-GP-9M: Primer, Asphalt, unfilled, for Asphalt Roofing and Waterproofing.
 - .3 37-GP-15M: Application of Asphalt Primer for Asphalt Roofing & Waterproofing.
 - .4 37-GP-56M: Membrane, Bituminous, Prefabricated and Reinforced for Roofing.
 - .5 51.26M: Thermal Insulation, Urethane and Isocyanurate, Boards, Faced.
 - .6 51.33M: Vapour Barrier Sheet, Excluding Polyethylene, for use in Construction.
 - .7 51.34M: Vapour Barrier Sheet, Polyethylene Sheet for use in Construction.
- .4 Underwriters Laboratories of Canada (CAN/ULC):
 - .1 S701: Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 - .2 S702: Thermal Insulation, Mineral Fibre, for Buildings.
 - .3 S704: Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Fixed.
- .5 Canadian Roofing Contractors Association (CRCA): Roofing and Waterproofing Manual.

1.4 STANDARDS

- .1 Saskatchewan Roofing Contractors Association (SRCA): Roof Practices Manual, Latest Revision, and includes Technical Updates issued at the time of tender.
- .2 Canadian Roofing Contractors Association (CRCA): Roofing and Waterproofing Manual.
- .3 Manufacturer's Published Installation Guide(s).

1.5 SUBMITTALS

- .1 Provide to Quality Assurance Observer, within five (5) working days after Notice of Award:

- .1 Initial project work schedule showing anticipated progress stages and final completion of work from Start Date. Do not commence Work before project schedule has been provided and reviewed.
- .2 Provincial Ministry's Notice of Project form or equivalent for Place of Work notarized and executed.
- .2 Provide to Quality Assurance Observer, at Prestart Meeting:
 - .1 Submittals as identified in other Sections.
 - .2 Finalized project work schedule listing start date, anticipated number of working days working, and manpower assignments for project.
 - .3 Safety Data Sheets (SDS) pertaining to all proposed materials to be used on site to perform Work.
 - .4 Letter by Contractor certifying that all specified roof system components are compatible, are approved by Manufacturer, meet specified warranty terms, and are compatible with existing substrates.
 - .5 Applicable shop drawings for tapered insulation layout and other specified items to be reviewed by Consultant prior to prefabrication and delivery.
 - .6 Appropriate securement patterns for mechanical fastening of insulation and deck overlay boards, and adhesive pattern for overlay boards as applicable.
 - .7 List of "Trained Membrane Approved Applicators" to work and be present during performance of Work.
 - .8 Contact list and phone numbers for anticipated project personnel and twenty-four (24) hour emergency contact numbers.

1.6 CONTRACTOR QUALIFICATION

- .1 Roofing Contractor to perform specified Work must:
 - .1 Have a minimum ten (10) years' work experience with materials specified or similar comparable products,
 - .2 Be a member in good standing with Saskatchewan Roofing Contractors Association (SRCA),
 - .3 And be licensed and insured for Place of Work.
- .2 Roofing Contractor must be pre-approved and certified by Membrane Manufacturer for specified materials and installation type.
 - .1 Contractor's installers must be certified for installation of specified materials.
 - .2 Owner reserves right to reject any proposed Subcontractor for reasonable cause.

1.7 QUALITY ASSURANCE

- .1 Compatibility between components of roofing system and wall system is essential. Provide written declaration to Consultant stating that materials and components, as assembled in new system will meet this requirement.

- .2 Perform Work in accordance with Contracts Documents and Manufacturer's written instructions.
- .3 Make no deviation from Project Specifications or approved shop drawings without prior written approval by Consultant and, if applicable, Manufacturer.
- .4 Contractor to arrange for a Technical Representative of Manufacturer to review installed roof system wherever a Standard or System Warranty requirement has been specified.
- .5 Upon completion of new installation, provide certification that all work has been done in strict accordance with Contract Documents and to Manufacturer's requirements.

1.8 QUALITY ASSURANCE OBSERVATION

- .1 Rimkus Consulting Group Canada Inc. dba IRC Building Sciences Group Inc., hereafter known as "Observer", is an independent Quality Assurance Observation Agency appointed by Owner to observe performance of roof Work:
 - .1 Roofing Contractor to arrange Prestart site meeting with Observer no more than three (3) weeks prior to commencement of Work on site. Obtain Observer's instructions and reference procedures to be followed on project.
 - .2 Provide to Observer date when each phase of work will begin, at least forty-eight (48) hours prior to commencement of Work for phase.
 - .3 Arrange Final Observation and examination of installed roof with both Observer and Manufacturer's Technical Representative.
 - .4 Review Section 01 00 00 General Requirements, Item 1.21 Quality Control.
- .2 When required, provide roof sampling where directed by Observer and make good without additional cost to Owner.
- .3 When initial tests and observations reveal work failing to meet contract requirements, pay for any additional testing and observations required by Observer or third party testing agency for correction of Work, without additional cost to Owner.
- .4 Copies of Q.A. Observation Reports to be issued by Observer to Owner and Prime Contractor.
 - .1 Costs of Post Final Field Review(s) or extra field reviews due to Contractor not completing the work by the contractual Completion Date, if required, shall be charged back to the Contractor at a rate of \$750.00 per inspection.

1.9 DELIVERY, STORAGE, AND HANDLING

- .1 Site storage is limited. Where applicable, location of storage and related facilities to be coordinated with Prime/General Contractor.
- .2 All materials to be delivered and stored in their original packaging bearing manufacturers label, grade and product weight, including all other related standards, specifications, and like.
 - .1 Some manufacturers may have specific storage requirements, such as insulation or gypsum products. Follow manufacturer's published storage requirements. This may require removal of factory packaging and subsequent air spaces and covers. Failure to follow manufacturer's storage requirements may result in rejection of material and removal from site at no cost to the Owner.

- .3 All materials to be adequately protected from inclement weather conditions and stored in a dry, well ventilated and weather protected location. Use only dry materials and apply only during weather that will not introduce moisture into roofing system.
- .4 Only materials to be installed on same day to be removed from protected location to work site.
- .5 During extreme temperature, materials to be stored in a heated location with a 4.4°C (40°F) minimum temperature and removed only as needed.
- .6 Modified bitumen rolls to be kept clear of all flames and sparks when not being applied to roof.
- .7 All materials in a rolled configuration to be stored on end, elevated off ground, and on a pallet or skid to protect bottom surface from foreign debris and moisture.
- .8 Restrict stockpiling of material in one location on roof to prevent exceeding specified deck live load capacity. Avoid point loading that may compromise structural integrity of roof.
- .9 Handle and store products in a manner to prevent damage and deterioration.
- .10 Remove and replace damaged products at own expense and to satisfaction of Consultant.

1.10 ENVIRONMENTAL REQUIREMENTS

- .1 Do not apply roofing materials to damp, wet, or frozen deck or substrates.
- .2 Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.
- .3 Only install as much new roofing as can be made weather-tight each day, including all flashing and detail work. All seams to be sealed or heat welded before leaving job site that work day.
- .4 All work to be scheduled and executed without exposing interior building areas to effects of inclement weather. Existing building and its contents to be protected against all risks.
- .5 All new and temporary construction, including equipment and accessories, to be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.
- .6 Uninterrupted water-stops to be installed at end of each day's work and to be completely removed before proceeding with next day's work. Water-stops to not emit dangerous or unsafe fumes and to not remain in contact with finished roof as installation progresses. Contaminated membrane to be replaced at no cost to Owner.
- .7 Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, provide all necessary protection and barriers to segregate work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over felt or plywood over insulation board to be provided for all new and existing roof areas that receive rooftop traffic during construction.
- .8 Prior to and during application, all dirt, debris and dust to be removed from surfaces by vacuuming, sweeping, blowing with compressed air, and/or similar methods.
- .9 All roofing, insulation, flashings and metal work removed during construction to be immediately taken off site to a legal area authorized to receive such materials. Hazardous materials, such as materials containing asbestos, are to be removed and disposed of in strict accordance with applicable Local, Provincial, and National requirements.

- .10 All new roofing waste material (i.e., scrap roof membrane, empty cans of adhesive) to be immediately removed from site by Contractor and properly transported to a legal dumping area authorized to receive such material.
- .11 Take precautions that storage and/or application of materials and/or equipment does not overload roof deck or building structure.
- .12 Flammable adhesives and deck primers to not be stored and not be used in vicinity of open flames, sparks and excessive heat.
- .13 All rooftop contamination that is anticipated or that is occurring to be reported to manufacturer to determine corrective steps to be taken.
- .14 Verify that all roof drain lines are functioning correctly (not clogged or blocked) before starting work. Contractor to report any such blockages in writing to Consultant for corrective action prior to installation of roof system.
- .15 Immediately stop work if any unusual or concealed condition is discovered and immediately notify Consultant of such condition in writing in order to obtain additional instruction.
- .16 Site cleanup, including both interior and exterior building areas that have been affected by construction, to be completed to satisfaction of Consultant.
- .17 All landscaped areas damaged by construction activities to be repaired at no cost to Owner.
- .18 Do not install membrane under following conditions without consulting Manufacturer's Technical Department for precautionary steps:
 - .1 Roof assembly permits interior air to pressurize membrane underside.
 - .2 Any exterior wall has 10% or more of surface area comprised of opening doors or windows.
 - .3 Wall to deck intersection permits air entry into wall flashing area.
- .19 Take precautions when using adhesives at or near rooftop vents or air intakes. Avoid adhesive odours from entering building. Coordinate operation of vents and air intakes in such a manner as to avoid intake of adhesive odour while ventilating building. Keep lids on unused cans at all times.
- .20 Protective wear to be worn when using solvents or adhesives or as required by job conditions.

1.11 PREPARATORY WORK

- .1 Review roof levels and advise Consultant of any deviation from specified tolerances.
- .2 Review roof drain locations and number. Advise Consultant of any deviation or alteration from specifications.
- .3 Sweep roof deck free of dust, dirt or gravel and remove all debris prior to any installation work.
- .4 When removing vents, skylights, etc, ensure the openings are covered to prevent moisture or odour infiltration into the building. Openings beyond a certain size may require to be identified as a fall hazard and protected appropriately.
 - .1 Any skylights should be removed and reinstalled by a glazing sub-contractor.

1.12 SAFETY AND PROTECTION

- .1 Refer to Section 01 35 23 - Health and Safety.

1.13 WIND UPLIFT

- .1 A wind load calculation (NRCA Wind Load Calculation for roof covering and add-ons) has been performed on this building. Contractor is required to confirm this calculation and interpretation with the primary membrane manufacturer.
- .2 Roof Areas 1.1 to 1.12:
 - .1 Field area is defined as areas not identified as perimeter or corner zones and must meet a wind uplift pressure of -1.4kPa (-29psf).
 - .2 Perimeter area is defined as a 1.09m (3.5') picture frame at the edge of the building and must meet a wind uplift pressure of -2.0kPa (-42psf).
 - .3 Corner area is defined as 1.09m x 1.09m (3.5'x3.5') and must meet a wind uplift pressure of -3.0kPa (-62psf).
- .1 Roof Areas 2.1, 3.1 to 3.3:
 - .1 Field area is defined as areas not identified as perimeter or corner zones and must meet a wind uplift pressure of -1.5kPa (-31psf).
 - .2 Perimeter area is defined as a 3.91m (12.8') picture frame at the edge of the building and must meet a wind uplift pressure of -2.1kPa (-44psf).
 - .3 Corner area is defined as 3.91m x 3.91m (12.8'x12.8') and must meet a wind uplift pressure of -3.1kPa (-65psf).
- .2 Roof Area 4.1:
 - .1 Field area is defined as areas not identified as perimeter or corner zones and must meet a wind uplift pressure of -1.5kPa (-31psf).
 - .2 Perimeter area is defined as a 2.6m (8.5') picture frame at the edge of the building and must meet a wind uplift pressure of -2.2kPa (-46psf).
 - .3 Corner area is defined as 2.6m x 2.6m (8.5'x8.5') and must meet a wind uplift pressure of -3.2kPa (-67psf).

1.14 WARRANTY

- .1 Roof Replacement Workmanship Warranty:
 - .1 Contractor is to supply Owner with a five (5) year Contractor's Warranty for Workmanship on a form acceptable and pre-approved by IRC Group or on Contractor's letterhead, signed, authorized, and executed.
 - .1 In event any work related to roofing, flashing, or metal is found to be within Contractor's warranty term, defective or otherwise not in accordance with Contract Documents, Contractor to repair that defect at no cost to Owner. Applicator's warranty obligation to run directly to Owner with a copy sent to Manufacturer.
- .2 Roof Replacement System Warranty:

- .1 Contractor is to supply Owner with Manufacturer's Labour, Material and Workmanship System Warranty for a period of ten (10) years on roof replacement areas from date of Substantial Completion.
- .1 Owner to notify both membrane Manufacturer and Contractor of any leak that occurs during time period while warranties remain in effect.
- .3 All other items not specifically noted above to be supplied with a two (2) year Contractor's Warranty for materials and workmanship.
- .4 Cost of all warranties to be included in Bid Price.

PART 2 - PRODUCTS

2.1 GENERAL

- .1 All system materials are to be sourced from a single manufacturer with accessory products meeting manufacturer's material compatibility requirements to achieve required System Warranty and other specified warranties.
- .1 Equivalent systems that meet design intent may be proposed in writing, a minimum 5 days prior to project close. All accessory materials must be supplied and / or approved by the primary membrane manufacturer.
- .2 Proposals must include a side-by-side material comparison table showing both the specified and proposed materials and must comply fully with the experience and job reference requirements of Section 1.6 Quality Assurance of these specifications. See Section 01 33 00 Submittal Procedures.
 - .1 Support documents such as Technical Data Sheets shall provide all figures to allow comparisons to base materials requirements.
 - .2 Support documents shall also indicate CSA 123.21-14 Wind Uplift testing to meet the building use and location.
- .3 Equivalent systems shall qualify for all specified warranties.
- .2 Components to be used that are other than those supplied or manufactured by membrane manufacturer may be submitted for review and acceptance by membrane manufacturer. Letters of acceptance from the primary manufacturer should be provided for the project record.
- .3 Specifications, installation instructions, limitations, and/or restrictions of respective manufacturers must be reviewed by QA Observer for acceptability for intended use with membrane manufacturer's products.

2.2 FASTENERS, PLATES & FASTENING BARS

- .1 All fasteners and plates to meet requirements of Factory Mutual Global 4470 Standard for wind uplift and corrosion resistance in roofing.
 - .1 Insulation
 - .1 Self tapping, epoxy coated carbon steel or solid stainless steel deck screws approved by membrane Manufacturer to meet warranty requirements, complete with securement plates in a fastening pattern meeting CSA 123.21 requirements:

- .1 Parafast Roofing Fasteners by Siplast or Manufacturer approved equal in a gauge and length appropriate for the Work.
- .2 Wood to Steel: Phillips Modified Truss Head fastener as manufactured by UCAN Fastening Products or Master Driller Wafer Plymetal or Wafer Reamer as manufactured by Leland Industries, of sufficient length to penetrate into substrate a minimum 6mm (.25"), zinc plated. Install according to manufacturer's instructions.
 - .1 When Alkaline Copper Quaternary (ACQ) treated wood is present, fasteners shall be upgraded to hot-dipped galvanized steel, stainless steel, silicon bronze, copper or specially coated suitable for use in ACQ such as DT1700.
- .3 Wood to Wood: No. 8 screws of a suitable length to penetrate into substrate a minimum 19 mm (0.75"). Install according to manufacturer's instructions.
 - .1 When Alkaline Copper Quaternary (ACQ) treated wood is present, fasteners shall be upgraded to hot-dipped galvanized steel, stainless steel, silicon bronze, copper or specially coated suitable for use in ACQ such as DT1700.
- .4 Steel to Steel: Master Gripper Self-Drilling Screws with wafer head as manufactured by Leland Industries, of sufficient length to penetrate into substrate a minimum 6mm (.25"). Install according to manufacturer's instructions.
- .5 Wood/steel to concrete or concrete block: 5/16" Ultracon Fastener as manufactured by Elco Construction Products or equal approved by membrane Manufacturer, to penetrate substrate by 32mm (1.25").
- .6 Steel/aluminum to aluminum: 410 Case-Hardened Stainless-Steel Master Gripper MDP Self-Drilling Screws with wafer head as manufactured by Leland Industries, of sufficient length to penetrate into substrate a minimum 19mm (.75"). Install according to manufacturer's instructions.
- .7 Termination bar for membrane:
 - .1 Extruded aluminum, 1.5mm (0.060") thick x 25mm (1") wide x 3.05m (10') long with 6mm x 9.5mm (.25" x .375") slotted holes on 203mm (8") o/c. Acceptable material: TB-120 aluminum termination bar by Tru-Fast or equal approved by membrane Manufacturer.
- .8 Termination bar fastener for wood, steel or aluminum:
 - .1 Tru-Fast Ultra Solid Stainless Steel fastener to penetrate substrate by 19mm (.75") c/w EPDM galvanized steel sealing washers or Construction Fasteners Inc. Woodgrip #14 screw complete with Senti coating on threads, Chromagard colour match head and EPDM washer, or equal approved by membrane Manufacturer.
- .9 Termination bar fastener for concrete or masonry:
 - .1 Tru-Fast Tap Grip Truss Head fastener with Perma-Coat Z3 corrosion protection or equal approved by membrane Manufacturer, to penetrate substrate by 32mm (1.25") c/w EPDM galvanized steel sealing washers.
- .10 Membrane to wood:
 - .1 Galvanized round top roofing nails with minimum 25mm (1") diameter heads or plate and head combination, to penetrate substrate a minimum 32mm (1.25").
- .11 Wood Sleeper to rooftop condensing unit:

- .1 Hanger bolt: Grade 18-8 stainless steel, minimum 9.5mm (.375" {3/8"})-16 diameter, in length suitable to penetrate minimum 51mm (2") into sleeper and extend minimum 51mm (2") above, with 15.9mm (.625" {5/8"}) plain centre.

2.3 ROOFING BOARD ADHESIVE

- .1 Polyurethane Adhesive for Deck Overlay and Insulation Boards:
 - .1 Ribbons of one or two component polyurethane foamable adhesive:
 - .1 Parafast Adhesive by Siplast or Owner Approved Equivalent

2.4 DECK OVERLAY BOARD

- .1 Overlay Board: Dimensionally stable, fire resistant, gypsum based roof board with treated core for moisture and mould resistance; size no larger than 1.2m x 2.4m (4'x8'). Roof board to have factory laminated enhanced glass-mat facer meeting ASTM C 1177.
 - .1 Steel Decks: 12.7mm (0.5") minimum thickness, unless stated otherwise in the project Documents.
 - .1 Dens Deck Prime Eonic as manufactured by Georgia-Pacific LP.

2.5 TAPERED POLYISOCYANURATE INSULATION

- .1 Closed-cell polyisocyanurate foam rigid insulation boards to ASTM C1289 Type II, Class 1, 2, or 3, Grade 2, manufactured with HCFC-free blowing agent (Pentane) bonded during manufacturing process to inorganic coated glass facers on top and bottom surfaces:
 - .1 Approved and listed for a Class 1 Roof Assembly meeting requirements of CSA123.21 and fire resistance without use of sprinkler protection.
 - .2 Meet physical property requirements of ASTM C 1289 and CAN/ULC S704 with a min. compressive strength of 138 kpa (20 psi).
 - .3 Dimensional stability change of less than 2% conforming to ASTM D 2126.
 - .4 Conformity to CAN/ULC S704 and Can/ULC S770 for Long Term Thermal Resistance in polyisocyanurate insulation. Acceptable Products:
 - .1 Paratherm CG polyisocyanurate by Siplast Inc.
- .2 Insulation Board Size: Individual panel size no larger than 1.22m x 1.22m (4' x 4').
- .3 Insulation Thickness:
 - .1 As recommended by supplier and confirmed via submitted sloped insulation shop drawing.
- .4 Insulation Layer Size: Tapered insulation as indicated within the Roof Plan/s.
- .5 Tapered Drainage Sumps:
 - .1 Size to be 1.2m x 1.2m (4' x 4') and provide a 4% slope to drain. Provide a minimum 1" base layer within the sump or notify QA Observer of any discrepancies found with the slope package.
- .6 Tapered Crickets:

- .1 Crickets shall be tapered at 4% slope with an appropriate ratio to promote drainage and located as shown in the roof plans as recommended by supplier and confirmed via submitted sloped insulation shop drawing.
- .2 Curbs or rooftop penetrations wider than 610mm (24") are to receive a 4% slope cricket sized appropriately to divert water around the curb, and / or as indicated on drawings.
- .7 All tapered insulation to be factory cut and mitered.
- .8 Submit all shop drawings to QA Observer for review prior to prefabrication.

2.1 COVER BOARD

- .1 Asphaltic Cover Board: Mineral fortified, asphaltic roof substrate board with glass fiber facers.
- .1 Protectoboard 6.4mm (0.25") minimum thickness as manufactured by IKO Inc.

2.2 MEMBRANE PRIMER

- .1 General Purpose:
 - .1 Solvent Based Primer: Composed of volatile solvents, synthetic polymers, and/or adhesive enhancing resins to prepare surfaces for membrane application:
 - .1 PA-917 by Siplast.
- .2 High-tack for Self-Adhered Membranes:
 - .1 Solvent Based Primer: Composed of volatile solvents, synthetic polymers, and/or adhesive enhancing resins to prepare surfaces for self-adhered membranes:
 - .1 TA-119 or TA-325 by Siplast.

2.3 MODIFIED BITUMEN MEMBRANE

- .1 Base Sheet Membrane:
 - .1 Torch Applied: Torch grade SBS modified bitumen, min. 2.9 mm thick, mass 3.7kg/m², Type 2, Class C, Grade 2, with a lightweight random fibrous glass mat reinforcement, impregnated and coated with SBS modified bitumen, and conforming to CGSB 37-GP-56M.
 - .1 Paradiene 20 TG by Siplast Inc. or Owner Approved Equivalent
 - .2 Adhered: Self adhered grade SBS modified bitumen, min. 2.5 mm thick, mass 3.7kg/m², Type 2, Class C, Grade 2, with a lightweight random fibrous glass mat reinforcement, impregnated and coated with SBS modified bitumen and conforming to CGSB 37-GP-56M. Back surface to have proprietary acrylic coating between adhesive stripes.
 - .1 Paradiene 20 SA by Siplast Inc. or Owner Approved Equivalent
- .2 Base Sheet Flashing:
 - .1 Base Sheet Flashing to Plywood/Blocking: Self adhering SBS modified bitumen, minimum 2.5 mm thick, mass 3.5 kg/m², with a lightweight random fibrous glass mat reinforcement, impregnated and coated with SBS modified bitumen, and conforming to CGSB 37-GP-56M.

- .1 Paradiene 20 SA by Siplast Inc. or Owner Approved Equivalent
- .3 Cap Sheet Field Membrane:
 - .1 Torch grade SBS modified bitumen, min. 3.9mm, mass 5.7 kg/m², with fiberglass scrim /polyester mat composite reinforcement, Type 1, Class A, Grade 2, impregnated and coated with SBS modified bitumen, and conforming to CGSB 37-GP-56M. Top and bottom surfaces are to be covered with a silica parting agent.
 - .1 Teranap 1M Sand by Siplast Inc.
- .4 Cap Sheet Flashings:
 - .1 Torch grade SBS modified bitumen, min. 4.1 mm, mass 5.2 kg/m², with fiberglass scrim/polyester mat composite reinforcement, Type 1, Class A, Grade 2, impregnated and coated with SBS modified bitumen, and conforming to CGSB 37-GP-56M.
 - .1 Parafor 30 TG by Siplast Inc. or Owner Approved Equivalent

2.4 DRAINAGE MAT

- .1 Two-part prefabricated sheet drain and protection board consisting of a formed polystyrene core covered on one side with a woven polypropylene filter fabric designed for high compression applications.
- .1 Paradrain Drainage Mat by Siplast Inc. or Owner Approved Equivalent.

2.5 EXTRUDED POLYSTYRENE INSULATION (XPS)

- .1 Insulation Type: Closed cell, HCFC free, extruded polystyrene foam insulation boards with continuous skin surface on top and back face meeting requirements of CAN/ULC S701 Type IV (4) or ASTM C578 Type VI (6) insulation, manufactured for roofing applications.
- .2 Compressive Strength: Minimum 240 kPa (35 psi) to ASTM D1621.
- .3 Thermal Resistance: R-value of 0.88 RSI (R 5.0) per 25mm (1.0") in thickness.
- .4 Panel Edge Treatment: Shiplap edges preferred when 51mm (2.0") or thicker.
- .5 Insulation Thickness: To provide minimum **R40**.
- .1 Extruded Polystyrene Roofmate by Dow Chemical Company

2.6 FILTER FABRIC

- .1 Drainage Filter Cloth: High strength drainage slit film geotextile consisting of woven polyethylene tapes.
- .1 Paradrain 40 Filter Fabric by Siplast Inc. or Owner Approved Equivalent.

2.7 ROOFING BALLAST

- .1 Stone Ballast: new aggregate comprised of 38.1mm to 51mm (1.5" to 2.0") diameter, clean round stone, with no jagged edges or fractures, conforming to ASTM D448 No. 4, and with no more than 10% out of size.

- .1 Ensure an equal distribution of stone ballast across the roof area. Install existing stone ballast at 125mm (5") thick at 37 lb/sf. Supply and install additional ballast as required to achieve specified rate. Ballast to conform to ASTM D448 No.4.
- .2 Submit a 10 lb sample of proposed ballast to Consultant for review prior to delivery to Worksite. Contractor to absorb all costs associated with shipment and return of improper and/or inappropriate ballast, with no cost to Owner.

2.8 CONCRETE PAVERS (IF REQUIRED)

- .1 Roof Walkways, Access Points, HVAC Units, and AC Supports.:
 - .1 Hydra-Pressed Slabs Concrete Utility Walkway Pavers:
 - .1 2' x 2' X 2" Texada, Natural or Charcoal, and as preferred by the Owner.

2.9 LIQUID APPLIED RESIN MEMBRANE & FLASHINGS

- .1 Flexible, polymethylmethacrylate (PMMA) based resin system combined with a thixotropic agent for use in combination with fleece fabric to form a monolithic, reinforced flashing membrane:
 - .1 Parapro 123 resin flashing system by Siplast:
 - .2 PMMA Resin: Polymethylmethacrylate based resin combined with a thixotropic agent. Where applicable, resin colour to be chosen by Owner from standard pallet of available colours from manufacturer.
 - .3 PMMA Catalyst: Pro Catalyst by Siplast
 - .4 Thixotropic agent: Liquid additive used to increase viscosity of PMMA-based resin products, allowing resins to be applied over vertical or sloped substrates; Pro Thixo by Siplast.
 - .5 Fleece reinforcement: Non-woven, 110 g/m², needle punched, polyester fabric reinforcement as supplied by system manufacturer; Pro Fleece by Siplast.
- .2 PMMA Accessories:
 - .1 Cleaning solution/solvent: Clear solvent used to clean and prepare transition areas of in-place catalyzed resin to receive subsequent coats of resin and to clean substrate materials to receive resin; Pro Prep by Siplast.
 - .2 Preparation paste: PMMA based paste used for remediation of depressions in substrate surfaces or other irregularities; Pro Paste Resin by Siplast.
 - .3 Repair mortar: Two component, PMMA based, aggregate filled mortar used for remediation of depressions or patching concrete substrates; Pro Repair Mortar by Siplast.
 - .4 Tape: White, flexible, coated cotton cloth tape designed for treatment of insulation

2.10 ROOFING ACCESSORIES

- .1 Roofing accessories to be manufactured from spun aluminum or copper as required, and complete with removable caps where applicable. Unless otherwise designated by QA Observer, pitch pockets are strictly prohibited. Flanges to be primed with rubberized asphalt compatible primer. Drain materials must meet CSA-B79 and ASME A112.6.4 standards and be listed with QAI Laboratories.

- .1 Existing cast drains and flow control hardware are to be re-used where possible. Supply and install new or reuse existing cast metal strainers, plastic strainers are not acceptable.
- .2 Roof Drains or for additional drain installations: 76mm (3") Clamp-Tite by Menzies Metal Products or Owner approved equivalent.
 - .1 Additional drains: refer to Section 3.2.7.1 herein with respect to the evaluation of roof drainage upon completion of the base sheet and before cap sheet is installed.
- .3 Overflow Drains: 76mm (3") Clamp-Tite Overflow Scupper Drain by Menzies Metal Products, or Owner Approved Equivalent.
- .4 Supply and install new aluminum or copper through wall box scuppers, with the following requirements:
 - .1 Welded full 102mm (4") flange.
 - .2 Incorporated clamping collar.
 - .3 Exterior cleanout box sized to fit drain outlet.
 - .4 76mm (3") downspout on outlet cleanout box.
 - .5 Drain to include strainer kit specifically designed to fit this scupper drain type
 - .1 Materials to be manufactured by Menzies Metal Products, or Owner approved equivalent.
- .5 Drain Seals: Fernco Couplings and associated hose clamps, or Owner Approved Equivalent.
 - .1 Use of other mechanical seals to be confirmed in advance with the QA Observer.
 - .1 If and when internal mechanical seals are accepted, seals shall be U-Flow by OMG Roofing Products. Allow for potential delays for ordering.
 - .2 Substitution of specified Copper drains and mechanical seals with Hercules Drains by OMG Products can be discussed with QA Observer.
- .6 Plumbing Stack Flashing: Welded Aluminum by Menzies Metal Products or Owner Approved Equivalent. Flashings to have been tested to CSA B272 standard and be marked by way of adhesive label or die stamp.
- .7 B-Vent Flashing or similar round duct penetrations: spun Aluminum penetration hardware as manufactured by Menzies Metal Products or Owner Approved Equivalent, or site constructed curbs complete with shop fabricated 'square-to-round' flashings, or Owner Approved Equivalent complete with 2 caulked storm collars on each "B-Vent" flashing. Top of penetration hardware or curb to be a minimum of 8" above finished roof surface. Contractor is to ensure that the piping below deck is fully secured prior to removing the B-Vent flashing or any similar type of flashing.
- .1 Roof Walkways:
 - .1 51mm x 610mm x 610 mm (2" x 2' x 2') Concrete Utility Paver by Abbotsford Concrete Products or Owner Approved Equivalent.

- .2 25mm (1") type IV extruded polystyrene, Roofmate by Dow Chemical Company or Owner Approved Equivalent.
- .2 Conduit & gas piping supports: fabricated from UV resistant re-cycled rubber complete with 14ga galvanized channel:
 - .1 C-Port C-Series Roof Blocks as manufactured by Clearline Technologies Inc. or Owner Approved Equivalent.
- .3 Membrane Tools: Use tools, hand rollers, weighted rollers, squeegees, etc. as recommended by membrane Manufacturer for installation of their product to ensure compatibility and avoid damaging of pressure sensitive membranes.
- .4 Pourable Sealer: As recommended by primary membrane manufacturer.
- .5 Sealing Compound: Rubberized Sealing Compound to CAN/CGSB-37.29, and as recommended by primary membrane manufacturer.
- .6 Spray Urethane foam: One or two component polyurethane spray foam insulation. Use low pressure spray foam insulation at force sensitive areas.
- .7 Fire Protection in flame sensitive locations, as determined by the Contractor: 165mm wide tape consisting of a glass fleece reinforcement and SBS modified bitumen, and as recommended by primary membrane manufacturer.
- .8 Firestop Sealant: One component, neutral cure silicone sealant meeting ASTM E84 and CAN4-S115M, designed for firestop applications at joints and through-wall penetrations; TREMstop Fyre-Sil silicone sealant (red) by Tremco or Owner Approved Equivalent.
- .9 Foam Gaskets for mechanical curbs: Self-adhering tape seal made from open polyurethane foam impregnated with a water based acrylic. MST by EmSeal LLC or better.
- .10 Sheet Metal Flashings and Trim: As per Section 07 62 00 and fabricated from SMP coated gauge pre-painted steel. Hook strips to be 2 gauges heavier than flashings. Colour to be determined by Owner.
- .11 Sealants: As per Section 07 92 00. Colour of sealants to match component applied to.
- .12 All existing metal surfaces within the scope of Work not being replaced as part of the Work are to be painted with rust inhibiting paint. Paint all roof hatches, corroded pipes, pipe caps, and goosenecks to match existing colour. Paint to be Tremclad by Rustoleum.

PART 3 - EXECUTION

3.1 WORKMANSHIP

- .1 Perform roofing work which is not specifically covered by these Specifications in accordance with applicable industry standards and good roofing practices of:
 - .1 Canadian Roofing Contractors Association (CRCA),
 - .2 Canadian Modified Bitumen Manufacturer's Association's recommendations,
 - .3 Manufacturer's preprinted and published technical specifications,
 - .4 ULC Design No. S-107 criteria,

- .5 CSA 123.21-14 testing protocols.
- .6 Compliance with local fire insurance requirements,
- .7 Compliance with local building codes.
- .2 Procedures for application of materials should be in accordance with Manufacturer's printed instructions and recommendations.
 - .1 Advise Consultant of adjustments to specified roofing procedures recommended by Manufacturer or due to site conditions.
 - .2 Written approval by Consultant is required to make any adjustments to specified procedures.
- .3 All work to be carried out in accordance with drawings, and specifications provided.
 - .1 All supplied drawings and details constitute acceptable installations. Any deviance from these details must first approved by Consultant prior to installation.
- .4 While work is in progress, all steps must be taken to safeguard building from damage due to weather, fire, and structural overloading.
- .5 Examine underside of roof deck when installing mechanical fasteners, where possible, to avoid accidental damage to existing services.
- .6 Apply each part of roofing system when surfaces are free of moisture for successful application.
- .7 Do priming for asphalt roofing in accordance with CAN/CGSB 37-GP-15M and as recommended by membrane manufacturer.
 - .1 Adhesives or sealants and liquid primers will not be applied until surfaces are dry.

3.2 EXAMINATION OF SITE CONDITIONS

- .1 Examine existing site conditions and substrates upon which work of this section is dependent. Report to Consultant in writing any defects or discrepancies. Commencement of work implies acceptance of existing conditions and assumption of full responsibility for finished condition of work.
- .2 Defective work resulting from application to unsatisfactory conditions will be considered responsibility of those performing work of this section.

3.3 PROTECTION

- .1 Adjacent Buildings and Tenants:
 - .1 Take care to not damage any adjacent or closely located buildings and all related grounds in vicinity of Work during roofing operations.
 - .2 Protect against infiltration of dust, debris, and other such contaminants and occurrences.
 - .3 Locate garbage chutes to minimize exposure to adjacent building, its grounds, and its occupants.
 - .4 Protect walls by means of tarpaulins where garbage chutes and hoisting equipment are located and operated.

- .5 Cover dumpsters and bins to prevent debris from blowing away.
- .6 Cover openings in the roof such as curbs for mechanical or skylight, to prevent moisture, dirt / debris, and odour entering the structure.
- .7 Do not use spray installation methods on days with significant wind.
- .8 Damage to adjacent buildings, grounds, and vehicles to be rectified by Contractor at no additional cost.
- .2 Adjacent Roof Areas and Completed Work:
 - .1 Take care not to damage any previously performed work or existing roofs.
 - .2 If work area is accessed across existing roof areas, provide protection to existing roof system. Use continuous protection walkways consisting of 19mm (0.75") plywood sheathing over 38mm (1.5") expanded polystyrene insulation.
 - .3 Protect newly installed roof work from traffic and damage using Protection Walkways where warranted by traffic requirements.
 - .4 Comply with any precautions deemed necessary by Consultant.
- .3 Material Storage:
 - .1 Deliver all materials to site in undamaged condition with original manufacturer's label intact and clearly visible for easy verification of specified materials.
 - .2 Provide security fencing at all times for equipment and materials stored at ground level.
 - .3 Protect rolls from flattening by storing on ends on skids.
 - .4 Whenever possible, store roof materials off roof at designated, protected storage area.
- .4 Structural Integrity of Roof:
 - .1 Use only equipment that will not adversely affect, damage, or alter roof deck.
 - .2 Do not create point loads that may adversely affect performance of existing deck when storing materials on roof.
- .5 Inclement Weather:
 - .1 Immediately halt work during inclement weather, including but not limited to rain fall, snow, drizzle, fog, and hail. Protect exposed building substrates, open building cavities, and moisture sensitive products.
 - .2 At end of each work day or when stoppage occurs due to inclement weather, provide suitable protection from elements for completed work and materials out of storage.
 - .3 Place in to heated storage any temperature sensitive materials such as membranes, adhesives, and sealants when temperature falls below 5 °C (40 °F).
 - .4 Protect all vents, stacks, drains and related deck openings from inclement weather and contamination from debris.
- .6 Roof Safety, Access, and Egress:

- .1 Use warning signs and barriers. Maintain in good order until completion of work.
- .2 Access to roof to remain unobstructed. Access to be via ladder/scaffold stair tower. No interior access is allowed.
- .3 Keep doorways and fire routes clean and clear of any obstacles.
- .4 Protect and safeguard all man-size or larger openings in roof deck with warning flags and suitable temporary barriers or railings.
- .7 Damage and / or Defective Work:
 - .1 Avoid use on roof of any petroleum based and other chemical products that are corrosive and/or damaging to membrane. Provide protection to membrane from any accidental spills or drips. Any damage to roof system caused by non-compatible products to be cut out and replaced at no cost to Owner.
 - .2 Investigate and examine any damage caused by execution of Work for this contract, and repair or replace with new materials to match original finish. Restoration and repair work to be reviewed and approved by Consultant.
 - .3 Defective Work resulting from application of material on unsatisfactory surface or substrate to be rectified by Contractor at no additional cost.
 - .4 Defective Work resulting from improper installation of materials to be rectified by Contractor at no additional cost.

3.4 SURFACE PREPARATION

- .1 Preparation:
 - .1 Examine all roof decks and existing site conditions to ensure that they are in satisfactory condition for commencement of work in this section.
 - .2 Divide work into logical sections and only tear-off as much existing roof as can be made watertight in same working day to prevent damage to building interior.
 - .3 Prior to removal of any roof components, all existing openings (drains, vents, air intakes, etc.) to be covered or plugged to prevent any debris or contaminate from entering building below. All such coverings are to be removed at end of each working day and reinstalled prior to next day's start up.
 - .4 Disconnect and reconnect Electrical Services and Mechanical Equipment as required.
 - .1 Any roof top equipment requiring disconnection to be responsibility of Contractor in consultation with Owner unless otherwise specified elsewhere in contract documents.
- .2 Existing Roof Removal:
 - .1 At areas designated for roof removal and replacement, remove existing projection and perimeter metal flashings, ballast, filter cloth, rigid insulation, built-up membranes, fiberglass insulation and old appurtenances in preparation for installation of new roof system. Dispose removed items to an appropriate site for building material waste.
 - .1 Retain existing stone ballast and concrete pavers for reinstallation. Do not structurally overload the roof deck by stock piling stone ballast and/or pavers in one location. Keep weight distributed across field of the roof. Do not create

point loads that may adversely affect performance of existing deck when storing materials on deck.

- .2 All unused and abandoned pitch pockets, vents, curbs, sleepers, projections, etc. are to be removed from designated areas and disposed of.
 - .1 Obtain verification and authorization from Client before removing and disposing of any suspected unused or abandoned projections.
 - .2 Install new roof decking as required to close off any deck openings before proceeding with new roof system installation.
 - .3 Where existing insulation is exposed, examine insulation for any damage and deterioration required to be cut out and repaired with new compatible materials.
- .3 Substrate Review:
 - .1 Exposed roof deck surfaces to be reviewed by Contractor with Consultant. Ensure to review entire roof area to satisfy any warranty requirements from the manufacturer for the new roof membrane system.
 - .1 Notify Consultant of review at least forty-eight (48) hours prior to site review.
 - .2 Report any anomalies found that may impact soundness and structural integrity of roof system to Consultant and Owner immediately. Areas with damaged decking must be replaced or repaired before any further work may take place on that particular section.
 - .3 Ensure roof decks are firm, straight, smooth, dry, free of snow, ice, frost, oils and gravel or other contaminants. Decking must be properly cleaned of any dust and debris prior to proceeding with new installation. Test whether specified adhesion to deck will be obtained where required.
 - .4 Prior to application of vapour retarder, examine deck and ensure any defect of level or construction is correct before proceeding with work.
 - .5 Verify that roof drains have been installed at proper elevations relative to finished roof surface to allow for sufficient drainage of roof surface.
 - .6 Review securement of existing projections and equipment (electrical conduit, gas lines, etc.). If inadequate securement is found, inform QA Observer and halt work around that area until situation is rectified.
 - .7 Review securement of existing plywood sheathing, wood blocking, and cant strips. Do not install new roofing unless such items are adequately secured to withstand stresses imposed by thermal movement of new roofing components.

3.5 CARPENTRY

- .1 Refer to detail drawings for carpentry requirements. Install wood blocking, plywood, and cant strips to accommodate required slopes, insulation, roofing membranes, and prefinished sheet metal and trim. Carpentry alterations to be performed to accepted trade practices.
- .2 Add new wood blocking as necessary to maintain minimum heights at perimeters and roof curbs.
 - .1 At Existing Roof Curbs: Minimum height to be 203mm (8") above finished roof membrane.

- .1 At metal roof curbs: Where extension height required is greater than 102mm (4.0"), install new galvanized metal C-Channel, prefab curb extension, prefab curb adapter or reducer to raise curb as required to suit new height.
- .2 At Existing Parapets: Minimum height to be 125mm (5") above finished roof membrane, unless otherwise indicated on detail drawings.
 - .1 Wood cant exists at the base of the wall, remove cant to blocking or deck level.
 - .2 If fibre-cant exists, remove and install blocking to suit to receive new plywood sheathing.
- .3 Replace any seriously damaged or deteriorated wood at perimeters and projections with new construction grade SPF wood blocking or exterior grade plywood, good one side, to match existing. Determination of suitability to re-use or replace existing wood to be at discretion QA Observer.
 - .1 Ensure existing wood blocking remaining at perimeters and curbs is securely fastened to existing substrate before installing new blocking and plywood.
- .4 Install wood blocking as required to ensure that all roof curbs and sleepers supporting HVAC and mechanical equipment are level.
- .5 Wood to wood, wood to metal, wood to masonry or concrete to be secured at 305mm (12") on center with alternating fasteners in a staggered pattern.
 - .1 Avoid protruding fastener heads. Where possible, all fasteners to be flush with or slightly sunk below surface of wood blocking being secured.
- .6 All wood blocking and plywood is to be considered part of roof, and to be made watertight by end of each work day to eliminate moisture infiltration into roof system.

3.6 DECK OVERLAY – ADHERED

- .1 Install deck overlay boards over existing deck in accordance with membrane manufacturer's instructions. Deck overlay is to be adhered.
- .2 Do not install more overlay board than can be covered with membrane by end of work day or before onset of inclement weather.
- .3 Do not install warped, curled, damaged, or wet insulation boards.
- .4 Install overlay boards in parallel rows and butt tightly together with joints staggered by one half board length.
 - .1 Where multiple layers of insulation are required, stagger all board joints at least 305mm (12") between rows.
- .5 Adhere overlay to substrate using continuous beads of polyurethane foamable roofing adhesive. Follow manufacturer's installation instructions.
 - .1 Install continuous ribbons of polyurethane adhesive in parallel lines to meet CSA A123.21 requirements. Use a "Z" pattern over an application area no larger than 3.66m (12'-0") at a time. Minimum securement pattern:
 - .1 Adhesive ribbons to be no less than 13mm (1/2") to 19mm (3/4") in width at time of application.

- .2 Parallel rows of adhesive ribbons to be no more than 305mm (1'-0") apart in field of roof.
- .3 Along 3.05m (10'-0") wide perimeter zones, rows of adhesive to be no more than 127mm (6") apart.
- .4 Rows of adhesive to be no more than 102mm (4") apart in corner zones.
- .2 Do not allow rising foam adhesive to skin-over. Place panels immediately into wet adhesive.
- .3 Walk-in board panels to ensure positive adhesion of substrate across full panel. Repeat walk-in every five (5) minutes until board is firmly attached.
- .6 Custom cut overlay boards as required at perimeters and projections to suit. Field cuts to be neat and provide tight fit around penetrations, projections, and at perimeters.

3.7 TAPERED POLYISOCYANURATE INSULATION – ADHERED

- .1 Install / adhere insulation over prepared substrate according to layout on reviewed shop drawings and roof plan drawing(s) and in accordance with insulation manufacturer's written instructions. Report any discrepancies to Consultant before proceeding.
- .2 Do not install more insulation board than can be covered with membrane by end of work day or before onset of inclement weather.
- .3 Do not install warped, curled, damaged, or wet insulation boards.
- .4 Where adhered, ballast or walk-in board panels to ensure positive adhesion to substrate across full panel.
- .5 Tapered insulation package shall be installed in soldier fashion as per supplier installed layout.
- .6 Tapered and/or cricket packages shall be placed between flat stock insulation on multi-layer systems, or on the bottom of single layer systems.
- .7 The Contractor is responsible for confirming attachment rates with the primary membrane manufacturer and providing it in writing to the QA Observer prior to start.

3.1 COVER BOARD - ADHERED

- .1 Install a layer of field cover board panels with joints offset and staggered, adhered over installed insulation crickets only per manufacturer's written instructions and to meet CSA 123.21-14 requirements. Refer to manufacturer's design letter.
- .1 Non-Asphaltic adhesive primer may be used to increase adhesion on highly absorbent substrates. Consult Manufacturer on use of suitable epoxy coatings, chlorinated rubber, wash primer or other adhesive primers.
- .2 The Contractor is responsible for confirming adhesive attachment rates with the primary membrane manufacturer and providing it in writing to the QA Observer prior to start. Inadequate attachment will result in additional fastening to meet manufacturer's published CSA123.121-14 testing data.
- .2 Do not use wet or damaged deck overlay panels. Panels must be dry for proper installation.
- .3 Custom cut deck overlay boards at perimeters and projections to suit. Install boards tightly together with no gaps between adjacent boards larger than 0.125" (3mm).

- .1 Cut boards as required to fit snug at all perimeters, walls, and roof projections.
- .2 Cut straight lines using proper tools and snap chalk lines.
- .3 Cut boards cleanly where slope changes direction. Do not break boards by stepping on them to acquire changes in deck slope.
- .4 Install continuous ribbons of polyurethane adhesive in parallel lines centered over top of deck flutes or ribs to meet FM requirements. Use a "Z" pattern over an application area no larger than 12'-0" (3.66m) at a time to minimum securement pattern per the membrane manufacturers requirements.
- .5 Do not allow rising foam adhesive to skin over. Place roof board panels immediately into wet adhesive.
- .6 Ballast boards immediately after placing them into position.
 - .1 Do not walk in boards, ballast continuously until adhesive is set.
 - .2 Do not remove and re-apply board once laid in. If board must be moved, remove any set adhesives and apply new adhesive ribbons.
- .7 Where insulation cover board is field primed, allow sufficient time for applied primers to dry and flash-off. Roof board surface must be thoroughly dry before installation of membrane.
- .8 Where field membrane is to be torch applied across deck overlay boards, install 6" (152mm) wide, continuous strips of self-adhering modified bitumen base sheet membrane across all joints and around perimeters.

3.2 MODIFIED BITUMEN MEMBRANE APPLICATION

- .1 Install 2 ply SBS modified bitumen membranes over top of prepared substrate.
- .2 All membrane materials are to be supplied by same manufacturer in order to meet material compatibility requirements necessary to achieve required System Warranty.
- .3 All membrane installations to conform to membrane manufacturer's printed literature, recommendations, guidelines, and instructions.
- .4 All membrane and flashing applications to be free of sags, blisters, wrinkles, and fish-mouths.
- .5 Base Sheet Field Membrane and flashings, Torch applied.
 - .1 Field measure and cut membrane to length of run required and roll up for installation.
 - .2 Base Sheet Flashing, Self-Adhered Installation: Starting at low point on roof, perpendicular to slope, unroll base sheet, align and re-roll from both ends.
 - .3 Unroll and install base sheet carefully in straight and parallel rows keeping majority of flame on membrane roll.
 - .4 Base sheet to be torched across flat of roof, overtop of cover board, and terminated at perimeters and vertical surfaces ensuring a good bond.
 - .5 Lap sheets 76mm (3") for side laps and a minimum 152mm (6") for end laps.

- .6 Where required as determined by the contractors' fire safety risk assessment weld all side and end laps of membrane with hot air gun or torch. Laps to be bonded to the satisfaction of QA Observer.
- .6 Base Sheet Flashing, Self-Adhered Installation:
 - .1 Field measure and cut flashing membrane to length required for flashing at each detail and roll up for installation.
 - .2 If pre-stripped, install membrane gusset flashing onto substrate in strips one membrane roll wide (40" or 1m) by 200mm (8") to tie base sheet into previously installed base stripping.
 - .3 Install base sheet flashing centered between the 90° transition from field of roof to vertical area, so that 76mm (3") of gusset extends onto the flat of the roof and 76mm (3") up wall or curb.
 - .1 Ensure the 90° transition is kept tight and adequately bonded.
 - .2 Bridging will be directed to be cut out and repaired.
 - .4 Overlap each preceding flashing sheet by min. 76mm (3") on side laps and align bottom edge to a chalk reference line along base sheet membrane. Lap membrane flashing onto field membrane a minimum 102mm (4").
 - .5 Membrane gusset reinforcement to be installed using hot air gun or torch application on top of base sheet membrane at all inside and outside corners. Consultant to review gusset installation before installation of cap sheet membrane.
 - .6 If base flashings were not pre-stripped, refer to Item 3.7.4 for application method.
 - .7 Where required as determined by the contractors' fire safety risk assessment weld all side and end laps of membrane with hot air gun or torch. Laps to be bonded to the satisfaction of QA Observer.
- .7 Cap Sheet Field Membrane, Torch Installation:
 - .1 Prior to the installation of the cap sheet field membrane installation contact the consultant to review the completed base sheet installation with regards to locating and installing extra spun copper roof drains to enhance and improve drainage. Failure to observe this milestone and proceeding with cap sheet installation before drainage is evaluated will result in any capped areas being fully degranulated and recapped at no expense to the owner.
 - .2 Complete installation of base sheet flashing prior to installing membrane cap sheet and cap sheet flashings.
 - .3 Field measure and cut membrane to length of run required and roll up for installation.
 - .4 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and re-roll from both ends.
 - .5 Unroll and install cap sheet carefully in straight and parallel rows keeping majority of flame on membrane roll.
 - .6 Cap sheet to be torched across flat of roof, overtop of base sheet, and terminated at perimeters and vertical surfaces ensuring a good bond.

- .7 Lap sheets 76mm (3") for side laps and a minimum 152mm (6") for end laps. Offsetside laps in cap sheet 305mm (12") minimum from those of base sheet.
- .8 Where required as determined by the contractors' fire safety risk assessment weld all side and end laps of membrane with hot air gun or torch. Laps to be bonded to the satisfaction of QA Observer.
- .8 Cap Sheet Flashing, Torch Installation:
 - .1 Cap sheet membrane flashing to be torched up and over perimeter parapet details, extending to the outer edge of the sloped blocking.
 - .2 Install membrane flashing onto substrate in strips one membrane roll wide (40" or 1m) and extend up perimeters as shown on detail drawings
 - .3 Field measure and cut flashing membrane to length required for flashing at each detail and roll up for installation.
 - .4 Set cap sheet flashing membrane to offset base sheet flashing joints by 50% and extend a minimum of 152mm (6") onto degranulated cap field sheet. All end lap joints to be offset a minimum 305mm (12") from base stripping side laps.
 - .5 Align bottom edge to a chalk reference line along cap sheet membrane.
 - .6 Overlap each preceding cap sheet flashing sheet by min. 76mm (3") on side laps.
 - .7 Properly secure flashings to their support, without sags, blisters, fish-mouths or wrinkles with terminations as indicated on drawings and details.
 - .8 Where required as determined by the contractors' fire safety risk assessment weld all side and end laps of membrane with hot air gun or torch. Laps to be bonded to the satisfaction of QA Observer.
- .9 General Requirements for Application:
 - .1 Tools, Rollers, & Squeegees: Use membrane manufacture's recommended tools and accessories. Keep tools clean during performance of work and frequently replace application roller tips and squeegee heads with new when clogged.
 - .2 Surface Review: Apply over wood, metal, gypsum board and concrete decks which are clean, smooth, and free of snow, ice, moisture, and debris. Concrete decks must have all holes filled with quick drying cement and rough patches removed.
 - .3 Application of Primer: Priming is required for all substrates prior to installation. Avoid pooling primer and allow to completely dry before membrane installation. Drying time will vary according to absorptive qualities of material and ambient weather conditions.
 - .4 First Roll Starting Point: Base sheet to begin at drain level with side lap aligned to centre of drain. Run rolls perpendicular to slope. Cap sheet to be installed over base sheet covering base sheet overlap. Center of cap sheet to align up with centre of drain.
 - .5 Relaxing of Roll Membrane: All roll membranes are to be fully unrolled and allowed to relax for a min. of 15 minutes prior to installation. Wait longer in cooler temperatures. Trace Z pattern with torch as recommended by manufacturer over membranes that are covered with thermofusible film.

- .6 Staggering of Sheets: End laps between base and cap sheets to be offset a min. of 305mm (12"). Side laps between base and cap sheets to be offset a min. of 305mm (12"), centered alignment preferred. Laps in same membrane layer to be min. 76mm (3") wide for side laps and min. 152mm (6") wide for end laps. When selvedge side laps of base and cap sheets are unequal, adjust cap roll width occasionally to maintain alignment.
 - .1 If installing a half sheet to restore stagger, ensure cut edge is straight and true.
- .7 Procedure to Seal Voids: Where voids are created by overlapping rolls of membrane, cut off corner of selvedge edge where covered by next roll of material.
- .8 Selvedge Edge Protection: Granules along edge of membrane to be primed prior to application of adhesive to provide good adhesion of laps.
- .9 Membrane Flashings: Base flashings to extend min. 102mm (4") onto field of roof. Cap flashings to overlap base sheet flashings and extend min. 152mm (6") onto field or roof. Use wider overlap widths where required by manufacturer for warranty requirements.
- .10 Compound Flow (bleed out) at Seams: When torch applying membrane, provide consistent, continuous bleed-out along all seams, no less 3mm (.125") and no greater than 6mm (.25") in width.
- .11 All Seams: Check all seams in all sheets with a round nosed trowel while work is in progress. Repair found deficiencies immediately and before continuing roof installation.
- .12 Base Sheet Seams: Butter all seams and laps. Provide additional bitumen at point of 90° upturns in base sheet flashings. Recheck self-adhered membrane seams left exposed within forty-eight (48) hours of installation to repair any revealed seam deficiencies with clean, heated trowel.
- .13 Cap Sheet Seams: At all end laps and membrane flashing overlaps, degranulate area (embed granules) of surface to be bonded by embedding ceramic granules into bitumen of membrane using clean, heated trowel to push in. Measure and use chalk lines to mark outline of areas requiring degranulation. Achieve a uniform black surface of bitumen across 100% of embedment areas to be overlapped.
- .14 Primer Application: Sanded membrane left exposed overnight or longer to be primed before continuing membrane installation to ensure good adhesion.
- .15 Torch Application: During windy periods, slow application rate down to ensure good bond with proper level of heat. Stop and periodically check for proper adhesion.
- .10 Correction Requirements for Defects and Deficiencies to as per Manufacturers Published directions, with the following exceptions:
 - .1 Membrane Patches: Cap sheet membrane patches to be installed from seam to seam. Minimum size of membrane patch to be 915 x 915 mm (36" x36"). Smaller sizes are not acceptable. Neatly cut / remove the selvedge edge from cap sheet prior to application, ensuring a straight edge.
 - .2 Correction of granule loss or degranulated area with primer and granules is not acceptable. If liquid applied membranes and granules are intended by the contractor, discuss first with QA Observer, and ensure all applications are installed straight and with a clean edge, and extended from edge to edge of the membrane being repaired.
 - .3 The intent of all repairs is to look like the work was intended.

3.1 DRAINAGE MAT

- .1 Install drain mat overtop cap sheet. Lap fabric side and end laps per membrane manufacturer's published directions.

3.2 INSULATION – LOOSE LAID

- .1 Install loose-laid insulation boards over prepared membrane in accordance with insulation manufacturer's instructions.
- .2 Do not install warped, curled, damaged, or wet insulation boards.
- .3 Install base insulation boards if required, in parallel rows and butt tightly together with joints staggered by one half board length. Where multiple layers of insulation are required, stagger all board joints at least 305mm (12") between rows.
- .4 Custom cut insulation boards as required at perimeters and projections to suit. Field cuts to be neat and provide tight fit around penetrations, projections, and at perimeters.
- .5 For uneven surfaces, trimming or slitting of boards may be necessary. Fill all gaps larger than 3mm (0.125") with insulation slivers.

3.3 GEO-TEXTILE FILTER FABRIC

- .1 Install a filter fabric overtop of rigid insulation in a loose laid configuration.
- .2 Overlap all side and ends joints by a minimum of 305mm (12") following manufacturer's guidelines.
- .3 Install sheet with printed side facing up or as directed by manufacturer's installation guidelines.
- .4 Extend sheet up perimeter edges, cants, and roof protrusions a minimum of 102mm (4") and place un-bonded ends under counter flashings.

3.4 ROOFING BALLAST

- .1 Over filter fabric, install a continuous layer of the new or existing stone ballast ensuring that the ballast is evenly distributed and meets the specified depth.
- .2 Do not structurally overload roof deck by piling-up stone ballast and/or pavers in one spot. Keep weight distributed across field of roof.

3.5 CONCRETE PAVERS

- .1 Install existing concrete pavers as indicated on Drawings and to suit existing paver locations. Ensure purpose made temporary gapping hardware is installed, providing 3mm (1/8") spaces between pavers and vertical surfaces.
 - .1 For patios or roof deck, paving stones shall have a consistent minimum 1% to 2% slope away from the building to promote drainage unless used as a walkway and water passes thru to sloped deck below, which manages the movement of water to designated drains. The slope is to be achieved with the specified pedestals.
- .2 Cut concrete pavers as required to suit installation at perimeters, at drain locations, and around all roof penetrations. Minimize gaps between pavers and at all cut-outs.
- .3 Ensure pavers are true and level to the satisfaction of the Consultant and/or Owners Representative, utilizing specified levelling plates, as needed.

- .4 Follow current Regulations and Contractor supplied Environmental Controls Procedures for minimizing and controlling the production of silica dust.
- .5 Contractor is to carefully plan paver layout to provide a level, uniform, and consistent appearance, with pavers equally cut at each perimeter edge. Based upon a 610mm x 610mm (2'x2') paver size with a 3mm (1/8") gap between pavers, pavers shall be planned to provide no less than a 304mm x 304mm (12" x 12") surface and be evenly spaced at edges.
- .6 Provide paver layout plan to the Consultant and/or Owners Representative for review. Do not cut pavers until approved layout is provided.
- .7 Do not structurally overload roof deck by piling-up concrete pavers in one spot. Keep weight distributed across field of roof.

3.6 LIQUID APPLIED PMMA RESIN FLASHINGS

- .1 Where specifically indicated in detail drawings and at any junctions where conventional installation of membrane flashings are not feasible, install new liquid applied resin flashing system.
- .2 Resin system to be a layered application consisting of two coats of thixotropic catalyzed polymethylmethacrylate (PMMA) resin encapsulating a layer of polyester fleece reinforcement.
- .3 Installation of liquid applied flashing system to follow in strict accordance with manufacturer's written instructions.
- .4 Ensure that substrates are free from gross irregularities, loose, unsound or foreign material such as dirt, ice, snow, water, grease, oil, bituminous products, release agents, laitance, paint, loose particles/friable matter, rust or any other material that would be detrimental to adhesion of catalyzed primer and/or resin to substrate.
 - .1 Some surfaces may require scarification, shot-blasting, or grinding to achieve a suitable substrate. Wipe surfaces with a clean cloth saturated with specified cleaner/solvent to remove grease, oils or dust that may affect adhesion and to cured PMMA surfaces to receive a subsequent coat of resin.
 - .2 Concrete substrates to receive an application of specified PMMA roofing system to have a maximum moisture content of 6% and a maximum internal relative humidity of 75%.
- .5 Preparation/Mixing/Catalyzing Resin Products:
 - .1 Pour desired quantity of resin into a clean container and using a spiral mixer or mixing paddle, stir liquid for time period specified by resin manufacturer.
 - .2 Calculate amount of catalyst powder needed using manufacturer's guidelines and add pre-measured catalyst to resin component.
 - .3 Mix again for time period specified by resin manufacturer, ensuring that product is free from swirls and bubbles.
 - .4 Ensure that air is not entrained into product during mixing process. To avoid aeration, do not use a spiral mixer unless spiral section of mixer can be fully contained in liquid during mixing process.
 - .5 Mix only enough product to ensure it can be applied before expiration of resin pot life.
- .6 Primer Application:

- .1 Apply primer resin using a roller or brush at minimum rate specified by primer manufacturer over poured reinforced concrete substrates.
- .2 Apply primer resin using a roller or brush at increased rate specified by primer manufacturer over DensDeck, DensDeck Prime, Densdeck Prime Eonic and granule surfaced membrane substrates.
- .3 Increase application rates over other absorbent substrates. Do not let resin pool or pond. Do not under-apply or over-apply primers as this may interfere with proper primer catalyzation.
- .4 Make allowances for saturation of roller covers and application equipment.
- .7 Paste Application:
 - .1 Allow primer to set and apply catalyzed preparation paste using a trowel.
 - .2 Before application of resin over catalyzed paste surface, specified cleaner/solvent, wipe surface of paste using specified cleaner/solvent and allow to dry.
 - .3 Treat surface again if not followed up by resin application within 60 minutes.
- .8 Flashing Membrane Application:
 - .1 Using masking tape, mask perimeter of area to receive flashing system.
 - .2 Apply resin primer to substrates requiring additional preparation and allow primer to set.
 - .3 Pre-cut fleece to ensure a proper fit at transitions and corners prior to membrane application.
 - .4 Apply an even, generous base coat of flashing resin using a roller at minimum rate specified by resin manufacturer to prepared surfaces requiring flashing coverage.
 - .5 Work fleece into wet, catalyzed resin using a brush or roller to fully embed fleece in resin and remove trapped air.
 - .6 Lap fleece layers a minimum of 51mm (2") and apply an additional coat of catalyzed resin between layers of overlapping fleece.
 - .7 Again using a roller, apply an even top coat of catalyzed resin at minimum rate specified by resin manufacturer immediately following embedment of fleece, ensuring full saturation of fleece.
 - .8 Ensure that flashing resin is applied to extend a 6mm (0.25") beyond fleece. Remove tape before catalyzed resin sets. Make allowances for saturation of roller covers and application equipment.
 - .9 Should work be interrupted for more than 12 hours or surface of catalyzed resin becomes dirty or contaminated by elements, wipe surface to be lapped with new flashing resin using specified cleaner/solvent.
 - .10 Allow surface to dry for a minimum 20 minutes and a maximum 60 minutes before continuing work.

3.7 ROOF PENETRATIONS & ACCESSORIES

- .1 Install vent stack flashings, support flashings, and other roof penetration flashings, and seal with roof membrane in accordance with Manufacturer's instructions and as indicated on detail drawings.
- .2 Coordinate and cooperate with the supply and installation of fall protection anchors and related accessories / accessories. Ensure all penetrations and installations are sealed and watertight at the end of each day.
 - .1 Prime all metal flanges with modified bitumen compatible primer and allow any solvents to flash-off and dry completely prior to installation.
 - .2 Set metal flange in bed of manufacturer recommended and system compatible roofing cement applied over base sheet membrane, ensuring a positive bond.
 - .3 Install an additional ply of base sheet membrane flashing over metal flange prior to installing cap sheet membrane. Additional ply of base membrane to extend a minimum of 152mm (6") past all edges of metal flange.
 - .4 Install cap sheet ply over base flashing ensuring a full bond to base ply membrane.
 - .5 Apply continuous bead of manufacturer's recommended and system compatible sealant around penetration at point where membrane terminates.

3.8 ROOF DRAINS

- .1 General Practice:
 - .1 Contractor shall reuse if possible, existing cast iron drain bowls, with new bolts, clamping rings and cast strainers at locations shown on roof plan and as indicated on the details. The new components shall be installed as per manufacturer's written instructions.
 - .2 Reuse cast roof drains and include for drilling and tapping in new studs and the replacement of clamping rings and screens if the existing ones are damaged or broken.
 - .1 Drain inserts and seals are not approved without prior approval from the consultant.
 - .3 Ensure existing roof drains, rain gutters, and down pipes are clear of debris and are free flowing prior to installation of new roof system.
 - .1 Any blockages are to be reported prior to start of Work. Once Work has begun, Contractor assumes responsibility for free flowing drains and clearing blockages at no additional cost to Owner.
 - .4 Prior to installation of new roof, ensure that all drains are located at a height where new roof system is able to clear majority of roof top water caused by rainfall within a seventy-two (72) hour period.
 - .5 Once work has begun, no roof area to be left overnight without adequate provision for drainage.
 - .6 Install drains in accordance with detail drawings and as per manufacturer's written instructions and guidelines.

- .2 Where applicable, downpipes to be connected to all existing subsurface drains. Fabricate and install a new, fully soldered square to round transition to attach new downpipe to existing subsurface drain as required.
- .3 Roof Drain Installation:
 - .1 Re-use existing cast drain body; install new threaded rod & bolts, clamps and strainers.
 - .1 Clean drain ring receivers of all contaminants.
 - .2 If existing threaded rod(s) cannot be removed, tap new threaded holes as necessary to allow installation of new hardware.
 - .3 Notify Consultant of any concerns with reuse of the existing drains.
 - .2 Drain Inserts (If required and approved in advance by the Consultant): Menzies Clamp Tite spun copper or aluminum drains. Flange to be secured to substrate with min. four (4) fasteners per drain as required to properly secure drain body.
 - .1 Affix Fernco connector seal to bottom of drain stem before insert into existing storm drainage pipe.
 - .2 Set metal flange of drain body into continuous bed of manufacturer recommended and system compatible roofing cement applied over base sheet membrane.
 - .3 Mechanically secure drain body to deck and substrate with min. four (4) fasteners per drain through drain flange or by underdeck clamping ring.
 - .3 Additional drains: refer to Section 3.2.7.1 herein with respect to the evaluation of roof drainage upon completion of the base sheet and before cap sheet is installed.
 - .1 Additional, unit cost, drains where required shall be specified spun copper and installed as noted herein and sealed or covered over to prevent drainage until such time that internal plumbing can be supplied and installed by others.
 - .4 At all existing roof drains employing control flow weir devices, it is mandatory to reinstate existing devices or provide new control flow devices with equivalent flow rates inside new roof drains.
 - .5 Install target patch of membrane reinforcement over metal drain flange. Use a square of 1m x 1m (39" x 39") base sheet membrane and install over drain at a 45° angle to direction of base sheet rolls.
 - .6 Install cap sheet over base sheet membrane with drain in center of roll and without seams in drain area.
 - .1 All end laps of cap sheet to be min. 915mm (36") away from drain.
 - .2 Where seams of cap sheet do not align properly with drain location, install cap sheet over drain area first and picture-frame cap sheet into remainder of roof.
 - .3 At drain sump areas larger than 1.2m x 1.2m (4' x 4'), install cap sheet over sump area first without any end laps and picture-frame into remainder of roof.
 - .7 Place Clamping Ring over raised bolt studs. Install stainless steel self-locking nuts to tighten Clamping Ring against membrane flashings until secure.

- .8 Install cast ballast guard strainer dome and secure with cotterless pin or wing nut screw.

3.9 PLUMBING

- .1 Interior plumbing drain connections where required for the Work shall be the responsibility of the Roofing Contractor, and to be conducted by a certified plumbing contractor.
- .2 Contractor shall provide any plumbing hook-up to drains as part of the contract and to co-ordinate the installation of same with the Client.
- .3 Test all existing drains to verify that they are free flowing.

3.10 MISCELLANEOUS MECHANICAL & ELECTRICAL

- .1 Unless stated in writing elsewhere, contractor is responsible for all Mechanical and Electrical Work required to perform complete installation of new roofing. Any and all costs associated with HVAC disconnection, lifting, removal, and reconnection, including modification of gas and conduit lines, to be included in Bid Pricing, unless specified otherwise on Bid Form.
- .2 Unless stated in writing elsewhere, contractor is responsible to lift all mechanical units to facilitate roofing under this Section.
- .3 Unless stated in writing elsewhere, contractor is responsible for restoring the mechanical unit functions at the end of each day.
- .4 When lifting mechanical units, remove existing foam gasket and replace with new specified foam gasket. Ensure surface receiving new gasket is clean and dry, with no remnants of the old gasket.
 - .1 Notify QA Observer if existing mechanical curb is of bolt together type and has open corners.
- .5 Coordinate any planned disruptions 5 working days in advance with the Owner, in order to minimize inconvenience.
- .6 The following is a step-by-step procedure for removal and re-installation of all Mechanical and Electrical Equipment consisting of:
 - .1 Combined heat/cool units.
 - .2 Cooling only units.
 - .3 Split systems (cooling only).
 - .4 Exhaust Fans.
 - .5 Removal of units.
- .7 Combined heating and cooling units:
 - .1 Locate power source in store and turn off, lock out or tag.
 - .2 Check power source at unit on roof and disconnect.
 - .3 Shut off gas and disconnect gas piping and cap both ends to keep out moisture and dirt.
 - .4 Disconnect duct work.

- .5 Lift unit using slings, spreaders where necessary and A-Frame with wheels and move to neutral area over plywood sheets.
- .6 Upon completion of roofing, replace unit.
- .7 If unit has been raised; modify duct work, insulation, electrical and gas piping to suit.
- .8 Reseal same to make watertight.
- .9 Turn power on in store, recheck at unit, restart unit.
- .8 Cooling only units:
 - .1 Locate power source in store and turn off, lock out or tag.
 - .2 Check power source at unit on roof and disconnect.
 - .3 Disconnect duct work.
 - .4 Lift unit using slings, spreaders where necessary and A-Frame with wheels and move to neutral area over plywood sheets.
 - .5 Upon completion of roofing, replace unit.
 - .6 If unit has been raised; modify duct work, insulation, electrical piping to suit. Reseal same to make watertight.
 - .7 Turn power on in store, recheck at unit, restart unit.
- .9 Split systems (cooling only):
 - .1 Check power source in store and turn off, lock out or tag.
 - .2 Check power at unit and disconnect.
 - .3 Remove refrigerant into cylinders and store for re-use.
 - .4 Final removal of refrigerant will be accomplished by using approved reclaimer.
 - .5 Disconnect and cap refrigerant lines to keep moisture out.
 - .6 Remove unit using slings, spreaders and A Frame with wheels to a neutral area.
 - .7 *Recharge only with refrigerant removed and stored; not responsible if unit is short of refrigerant.
 - .8 Set unit back on sleepers after reroofing.
 - .9 Reconnect piping and modify as required if unit has been raised.
 - .10 Leak test and evacuate system and recharge with stored refrigerant only.
 - .11 Reconnect electrical, turn power on, turn unit on.
- .10 Exhaust fans:
 - .1 Locate power source in store and turn off tag or lock out.
 - .2 Check power at unit and disconnect electrical and duct work.

- .3 Raise and move unit using slings and A Frame with wheels to a neutral area.
- .4 Put unit back on sleepers or curb after reroofing.
- .5 Reconnect electrical and duct work with modifications as required.
- .6 Reseal duct work to provide watertight seal.
- .11 Removal:
 - .1 Locate and disconnect power to unit, tag or lock out.
 - .2 Remove electrical to below roof level and disconnect electrical at source and make safe.
 - .3 Tag disconnected line as to location at both ends.
 - .4 Disconnect and remove duct work to below roof level.
- .12 Electrical Instructions:
 - .1 Contractor shall carry the costs of the following electrical work associated with the roof replacement:
 - .1 Where existing Roof Top HVAC Units to be raised or relocated temporarily (to replace curbs etc.), these units should be disconnected, existing feeders to be extended to be extended to the temporary location connected. When the necessary work is completed the units will be disconnected at the temporary locations and reconnected at the permanent locations.
 - .2 Where existing Telephone / Cellular / Cable / Satellite cables run on the existing roof, these cables shall be raised in sections to follow the phasing of the roof replacement and placed back on the new roof. The Contractor to co-ordinate this work with Service Provider.
- .13 Remove and dispose of identified and designated abandoned, redundant, and unused HVAC equipment from roof and worksite.
- .14 Gas Lines and Conduits: Disconnect, modify, and reconnect all gas lines, electrical lines, and conduits as required to suit new roof installation height and configuration of projection detailing.
 - .1 All gas line work must be performed by a qualified Gas Fitter and must conform to requirements of CSA B149.1-10.
 - .2 Re-install gas lines and conduits at a height of 150mm (6") to 200mm (8") above finished roof surface. Secure all loose cabling and conduits off surface of roof membrane.
 - .3 Ensure that all gas line penetrations are separated from all electrical line penetrations with their own roof flashing supports. Provide any new sleeves, goosenecks, or curbs required using IRC Group approved flashing supports and installation methods.
 - .4 At threaded gas line piping, which cannot be permanently enclosed or covered, construct new insulated and waterproof dog house detail with removable lid for periodic thread inspection.
 - .5 Paint all gas lines on areas of roof work with exterior grade, yellow paint for metal surfaces; Rust Paint by Tremclad or Consultant approved equivalent.

- .15 Underdeck Securement: Where existing sections of roof decking are to be removed, ensure any cabling, conduits, and attachments (plumbing, electrical wiring, lighting fixtures, etc.) secured to underside are disconnected, removed, and relocated. Notify Owner's Representative, if necessary, to have interior services disconnected, removed, and relocated by Owner. Provide adequate interior protection to protect items of concern.
- .16 Temporary Security: Provide overnight security, at no additional cost to Owner, where removal of any venting or HVAC equipment results with an opening in roof deck that cannot be permanently sealed on same day. Security company must be preapproved by both Owner and Consultant in advance.

3.11 TEMPORARY WATER CUT-OFFS (NIGHT SEALS)

- .1 All membrane flashings to be installed concurrently with roof membrane in order to keep roof system watertight during performance of work.
- .2 Temporary waterproof seals to be placed on daily work as required. All temporary water-stops to be constructed to provide a one hundred (100) percent watertight seal.
- .3 Temporary seals to include for a new temporary drain (Econo drain by Menzies Metals) and a U-Flow mechanical seal.
- .4 Edge of roof membrane to be sealed in a continuous heavy application of sealant. Temporary seals to be removed and cleaned up before proceeding with remaining work.
- .5 When work resumes, cut out and dispose of all contaminated membrane. All sealant, contaminated membrane, insulation fillers, etc. to be removed from work area and properly disposed of offsite. Reuse of these materials in new work is strictly prohibited.
- .6 If inclement weather occurs while a temporary water-stop is in place, Contractor to provide all necessary labour required to monitor situation and maintain watertight condition.
- .7 If any water is allowed to penetrate under newly completed roofing, then affected area to be cut out, removed, and replaced with new materials at Contractor's own expense.

3.12 METAL FLASHINGS

- .1 On All Roof Replacement Areas: After installation of roof membrane and membrane flashings, new perimeter metal and metal flashings to be installed as detailed in Section 07 62 00 and as indicated on detail drawings.

3.13 SEALANTS

- .1 On All Roof Replacement Areas: After installation of roof membrane and membrane flashings, install sealants as per Section 07 92 00 – Sealants and as recommended by membrane manufacturer.

3.14 CLEAN-UP

- .1 On All Roof Replacement Areas: Clean up and remove from job site on a daily basis, all rubbish and surplus materials resulting from this work.
- .2 Drag a magnetic bar across work area and grounds to ensure removal of all discarded fasteners and sharp metal debris.

END OF SECTION - 07 52 00

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Supply and installation of new prefinished sheet metal flashings and counter flashings to complete roof system installation. Unless specifically indicated otherwise, all references to Sheet Metal Flashings in specifications and drawings to refer to new pre-painted steel.
- .2 Form, break, and install metal flashings to suit perimeter and projection details as specified and as shown on detail drawings.
- .3 Coordination of all work in this section with other sections and trades as required to ensure proper installation of specified components.

1.2 RELATED SECTIONS

- .1 Section 02 41 19 – Selective Demolition & Removal
- .2 Section 06 10 00 – Rough Carpentry
- .3 Section 07 52 00 – SBS Modified Bituminous Membrane Roofing
- .4 Section 07 92 00 – Joint Sealants
- .5 Section 08 63 00 – Metal Framed Skylights
- .6 Section 08 80 00 – Glazing

1.3 REFERENCES

- .1 Latest edition of all listed references; most stringent requirements to govern in conflicts:
 - .1 American National Standards Institute/Single Ply Roofing Industry (ANSI/SPRI):
 - .1 ES-1: Wind Design Standard for Edge Systems (Low Slope Roofing).
 - .2 American Society for Testing and Materials (ASTM).
 - .1 A606: Steel Sheet, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
 - .2 A653/A653M: Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.
 - .3 A792/A792M: Steel Sheet, 55% Alum.-Zinc Alloy-Coated by Hot-Dip.
 - .3 Canadian Standards Association (CAN/CSA):
 - .1 B111: Wire Nails, Spikes and Staples.
 - .4 Canadian General Standards Board (CAN/CGSB):
 - .1 51.32M: Sheathing, Membrane, Breather Type.
 - .2 93.1-M: Sheet, Aluminum Alloy, Prefinished.
 - .5 Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

- .1 Architectural Sheet Metal Manual
- .6 Saskatchewan Roofing Contractors Association (SRCA): Roof Practices Manual, Latest Revision, and includes Technical Updates issued at the time of tender.
- .7 Canadian Roofing Contractors Association (CRCA): Roofing and Waterproofing Manual.

1.4 SUBMITTALS

- .1 Mock-ups: Create mock-up sample of irregular metal flashing details and related accessories for review by Consultant. Examples: irregular parapet saddle flashings or gum edge flashings.
 - .1 Provide any additional mock-up samples as reasonably requested by Consultant.
 - .2 Mock up must include at least one outside or inside corner.
 - .3 Finished and approved mock-ups to remain as example of standard to be met, and may remain in place as part of installed and completed work.
- .2 Warranty: Upon completion of the project provide Owner with guarantees and warranties listed in Section 1.8 of this specification.

1.5 CONTRACTOR QUALIFICATIONS

- .1 Sheet metal installers must be pre-approved by membrane manufacturer and Consultant if installing membranes.
- .1 Contractor must be a member in good standing with Saskatchewan Roofing Contractors Association (SRCA) and have a minimum ten (10) years relevant experience with similar roof materials.

1.6 STORAGE AND HANDLING

- .1 Do not store metals in direct contact with earth, road surface, roof deck, or other metals.
- .2 Provide protection where sheet metal flashings will be stored on finished roof surfaces.
- .3 Place suitable supports or pallets under metal stock upon delivery. Protect metal from scratches, dents, punctures, and moisture.
- .4 Store caulking and sealants at +5°C minimum.
- .5 Handle and store products in a manner to prevent damage, oxidization, and deterioration.
- .6 Remove and replace damaged products at own expense and to satisfaction of Quality Assurance Observer/Consultant.
- .7 Store membranes and related accessory materials in accordance with Manufacturer's recommendations.

1.7 SAFETY AND PROTECTION

- .1 References:
 - .1 CAN/CSA S269.2M: Access Scaffolding for Construction Purposes.
 - .2 FCC No. 301: Standard for Construction Operations.

- .3 Comply with all safety requirements as per current printed edition of applicable health and safety Act, Regulations, and Code applicable in the jurisdiction for the Work, and with SRCA standards.
- .2 Solvents, Adhesives and Membranes
 - .1 Store only enough solvents and adhesives on roof for same day's use.
 - .2 Manufacturer supplied adhesives should be stored in their overnight containers. Minimum temperature for solvent based adhesives and primers is -5°C.
- .3 Hoisting:
 - .1 Protect walls and roof perimeters where hoisting is required.
 - .2 Protect roofs from damage due to traffic and material handling until completion of project.

1.8 WARRANTY

- .1 Sheet Metal Flashings:
 - .1 Material and Workmanship Warranty covering sheet metal flashing material and workmanship for five (5) years on Contractor's letterhead.

1.9 QUALITY ASSURANCE OBSERVATION

- .1 Rimkus Consulting Group Canada Inc. dba IRC Building Sciences Group Inc., hereafter known as "Observer", is an independent Quality Assurance Observation agency appointed by Owner to observe installation of sheet metal flashing Work:
 - .1 Arrange Prestart site meeting with Observer no more than three (3) weeks prior to commencement of Work on site. Obtain Observer's instructions and reference procedures to be followed on project.
 - .2 Provide to Observer date when work will begin, at least forty-eight (48) hours prior to commencement of Work for phase.
 - .3 Arrange Final Review of installed work with QA Observer, and where required with membrane Manufacturer's technical representative.
- .2 Cooperate with Observer and afford all facilities necessary to permit full Quality Assurance Observations during performance of Work. Act immediately on instructions given by Observer.
- .3 When required, provide cut-outs and samples in field where directed by Observer and make good without additional cost to Owner.
- .4 Pay for any additional testing and observations required by Observer for correction of Work, without additional cost to Owner, when initial tests and observations reveal work failing to meet contract requirements and when construction extends beyond the schedule submitted by the contractor.
- .5 Copies of Q.A. Observation Reports to be issued by Observer to Owner and Prime Contractor.

1.10 PREPARATORY WORK

- .1 Examine drawings and specifications and any other necessary data which may affect installation to determine extent of Work involved in this Section. No additional claims against Owner to be allowed resulting from failure to ascertain full extent of Work required as described or implied.

- .2 Prior to application of flashings, review roof perimeters and projections.
- .3 Examine installed membrane flashings for any defect of level or construction before proceeding with work.
- .4 Advise Consultant of any deficiencies that may affect performance of roof system and any deviations from specified tolerances.
- .5 Defective or improper work must be corrected before proceeding with installation of sheet metal flashings.

PART 2 - PRODUCTS

2.1 PRE-FINISHED METAL FLASHINGS

- .1 Compatibility between materials is essential. Use only materials that are known to be compatible when incorporated in a completed assembly.
- .2 Prefinished Metal Flashing: 24 gauge (0.026" or 0.66mm) steel with G90 (Z275) zinc coating conforming to ASTM A653A/A653M. Surface with Silicone Modified Polyester (SMP) factory-baked finish. Colour selected by Owner from Manufacturer's standard colour range.
- .3 Cascadia Metals Inc. and Makin Metals are pre-approved manufacturers. An alternate manufacturer requires Approval by Owner.
- .4 Cleats and Hook Strips Not Otherwise Specified: Two gauges heavier of material matching that of flashing being employed; minimum 22 gauge (0.032" or 0.82mm).

2.2 ACCESSORIES

- .1 Underlay: To be specified base sheet and cap sheet membranes unless otherwise detailed. Self-adhered membrane conforming to CSA A123.3M, minimum 1.0mm thick of SBS modified bitumen, with a top surfacing of tri-laminate polyethylene film and an underside with a protective release film.
- .2 Joint Filler: Extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 210 kilopascals (20 to 30 psi), 25% to 30% wider than joint to be caulked.
- .3 Touch-up paint: As recommended by pre-finished material manufacturer.
- .4 Sealants: as per Section 07 92 00.

2.3 FASTENERS

- .1 Use galvanized, copper, aluminum, stainless steel or coated screws most compatible with materials being employed. Use fasteners as most generally suitable to not cause a galvanic reaction.
- .2 Wood to Wood: No. 8 screws of a suitable length to penetrate into substrate a minimum 19 mm (0.75"). Install according to manufacturer's instructions.
 - .1 When Alkaline Copper Quaternary (ACQ) treated wood is present, fasteners shall be upgraded to hot-dipped galvanized steel, stainless steel, silicon bronze, copper or specially coated suitable for use in ACQ such as DT1700.
- .3 Wood to Steel: Phillips Modified Truss Head fastener as manufactured by UCAN Fastening Products or Master Driller Wafer Plymetal or Wafer Reamer as manufactured by Leland

- Industries, or Owner Approved Equal, of sufficient length to penetrate into substrate a minimum 6mm (.25"), zinc plated. Install according to manufacturer's instructions.
- .4 Steel to Steel: Master Gripper Self-Drilling Screws with wafer head as manufactured by Leland Industries, or Owner Approved Equal, of sufficient length to penetrate into substrate a minimum 6mm (.25"). Install according to manufacturer's instructions.
 - .5 Steel/aluminum to aluminum: 410 Case Hardened Stainless Steel Master Gripper MDP Self-Drilling Screws with wafer head as manufactured by Leland Industries, or Owner Approved Equal, of sufficient length to penetrate into substrate a minimum 19mm (.75"). Install according to manufacturer's instructions.
 - .6 Fasteners to Masonry or Concrete: MNA635R Nylon Drive Screw Anchor as manufactured by UCAN Fastening Products of a suitable length to penetrate into substrate minimum 38mm (1.5" or 5/16") Ultracon Fastener as manufactured by Elco Construction Products or Owner Approved Equal, to penetrate substrate by 32mm (1.25"), minimum unless otherwise shown. Install according to manufacturer's instructions.
 - .1 Drill hole 32mm (.75") deeper than embedment.
 - .2 Install colour matching plastic cap or paint to match sheet metal flashings.
 - .7 Exposed Fasteners: UDrill Self-Drilling Screws with hex washer head and bonded EPDM fastener as manufactured by UCAN Fastening Products, or Owner Approved Equal, of sufficient length to penetrate into substrate a minimum 19mm (.75"). Install according to manufacturer's instructions.
 - .1 Hex Head and washer assembly are to be powder coated or 2 part epoxy painted to match metal flashings.
 - .2 Unless otherwise identified in drawings, fasteners are to be case hardened steel.
 - .3 Fasteners to be #8 or better.
 - .8 Pop Rivets: 3mm (0.125") shank diameter, all stainless steel, blind pop rivets meeting ASME/ANSI B18.1.1. Head diameter to be 6mm (0.25") and with a grip range of 4.7mm to 6.4mm (0.1875 to 0.25"). Body and mandrel to be constructed from high-shear, 300 series stainless steel.

2.4 FABRICATION

- .1 Fabricate all possible work in shop in 3.05m (10') lengths by brake forming, bench cutting, drilling and shaping.
 - .1 On vertical sections over 305mm (12") and under 1.22m (36") in elevation. Profiled metal to include cross or horizontal stiffener breaks.
 - .2 On high vertical sections over 1.22m (36") in elevation. Install metal in 1.5m (60") sections with profiled metal to include cross or horizontal stiffener.
- .2 On coping or flashing with a horizontal dimension of 508mm (20") or greater, use 25mm (1") lock folded standing seam joints.
 - .1 Clips for Standing Seams must be a minimum 24 gauge in thickness, 38 mm (1-1/2") wide.

- .3 All joints of sheet metal cap flashing or wall flashing shall utilize an s-lock type joint unless impractical, such as at corners.
 - .1 End joints incorporating standing seam methods shall only be acceptable for corners, coping areas wider than 508mm (20"), or if discussed and agreed to by the Consultant.
 - .2 Lap joints are not acceptable.
- .4 Form bends with straight sharp lines, angles and corners into true planes, free from twists, buckles, dents and other visual distortions.
- .5 Double-back exposed metal edges at least 12.7mm (0.5"). Raw edges will not be permitted.
- .6 Drip edge flashings that will engage a hook strip shall be hemmed to allow a full 12.7mm (.5") of engagement.
- .7 Supply all accessories required for installation of sheet metal work of this Section. Fabricate accessories of same materials to which they will be used.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install sheet metal flashings at copings, walls, joints, roof openings and other components required to protect membrane flashings as shown on drawings, or otherwise required.
 - .1 Wall flashings shall fully cover exposed vertical surfaces, and shall be on average 25mm (1") from contact with the primary membrane. Taper panels as necessary to follow sloped insulation.
- .2 Install continuous concealed hook strips at all exterior faces. Install cleats as required to protect membrane roofs and flashings from damage at lock joints and as required to permanently hold flashing in place. Secure cleats at 305mm (12") on center keeping fastener within 32mm (1.25") of drip edge to a maximum 76mm (3") away from drip edge. Use of screw type fasteners are required, nails are not acceptable.
 - .1 No fastening of flashing is permitted within 89mm (3.5") of the roof surface.
 - .2 Discontinuous clips are not to be used without design authority written approval and the request shall have just cause.
- .3 Install in a uniform manner, true to line, free of dents, warping and distortion.
- .4 Install sheet metal with concealed fasteners at lock joints. Exposed fastening will be permitted only with approval of Consultant. Space all fasteners evenly in an approved manner. Use of screws are required, nails are not acceptable. Use nylon plugs and screws where fasteners are exposed, otherwise use concrete drive fasteners where metal flashings are installed over concrete or masonry..
- .5 Install underlay under sheet metal, installed directly over wood or masonry surfaces. Overlap joints 51mm (2") and turn up 76mm (3") at edges where horizontal surfaces intersect vertical planes.
- .6 Join sheet metal by "S" lock seams, or other methods if Consultant approval has been provided. Space joints evenly where exposed. Form inside and outside corners by means of standing seams. Do not use pop rivets.

- .1 Lap seams on vertical corners are acceptable only where the vertical run is less than 100 mm (4"). Otherwise corner mating to be completed with a standing seam.
- .2 For s-lock applications 1 screw every 200mm (8") of width is required within the seams.
- .3 For standing seam applications at corners or if prior approval has been given, clips must be secured with a minimum 2 screws, and placed a minimum of 1 clip every 200 mm (8") of width.
- .7 Acceptance of a particular seaming method on one project does not create a precedent for future projects. All seaming method decisions are on a project to project basis.
- .8 The top surfaces of all walls (parapets, expansion joints, roof dividers, etc) will be constructed to provide a minimum of 2% drainage to the interior of the roof.
 - .1 All cap flashings shall be fully supported by a rigid substrate, shims are not acceptable
 - .2 Do not form open joints or cupping that fails to drain water.
- .9 Caulk all sheet metal joints.
- .10 Where existing reglets cannot be reused, provide new saw cut into substrate sized minimum 25mm (1") deep and to suit site conditions.
 - .1 Clean saw cuts free of contaminates and dust.
- .11 At reglets or sawcuts wider than 10mm (.375") and deeper than 19mm (.75") provide polyethylene rod, 25% wider than joint width. Caulk all reglets to provide a continuous waterproof seal. Use colour to match materials. Conform to manufacturer's latest printed recommendations for use of products being employed.
- .12 Gum edge or gum lip flashings (also known as surface reglets) should be avoided in all circumstances. If job conditions allow for no other alternative, written permission from Consultant for use of gum edge flashing must be obtained.
 - .1 Unless otherwise detailed or stated all surface reglet flashings shall be double gum lip flashings.
- .13 Install sheet metal saddle flashings at parapet to wall locations, over membrane flashings, and secure in place. Saddles flashings are to direct water flow away from the sensitive vertical to horizontal transition joint.
 - .1 Punch lock seams are acceptable, however will require appropriate sealants.
- .14 Prepare cut sheet and mock-up installations of metal flashing details for approval by QA Observer prior to installation of sheet metal flashings.
 - .1 If existing substrate conditions are expected to create deflection or oil-canning in the finished flashings, the concern should be brought to the attention of the design authority for discussion prior to installation. Installation of the flashing will indicate the roofing contractors' acceptance of the existing conditions.

3.2 FINISH

- .1 At project's conclusion, leave surface and adjacent work areas free of damage and clean of debris. Finished surfaces of formed metal flashings to be free of oil canning, dents and be perfectly colour matched.

- .2 Changes in colour between sheets and dented or oil canned surfaces that detract from visual appearance of finished product will be rejected. Remove and replace damaged, defaced or defective work.
- .3 Paint all exposed metal due to cutting.
- .4 After erection touch-up finish surfaces damaged during handling and erection in conformance with manufacturer's recommendations. Refinish shop applied finishes as approved by Consultant.
- .5 Remove deposits or protections and wash metals left unpainted and exposed to view as specified by metal manufacturer.

3.3 CLEAN-UP

- .1 Daily as work proceeds and on completion, remove all surplus materials and debris resulting from foregoing work.
- .2 Drag a magnetic bar across work area and grounds to ensure removal of all discarded fasteners and sharp metal debris.
- .3 Remove all stains, caulking or other adhesive from all affected surfaces.

END OF SECTION - 07 62 00

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 02 41 19 – Selective Demolition and Removal
- .2 Section 07 52 00 – SBS Modified Bituminous Roofing Membrane
- .3 Section 07 62 00 – Prefinished Sheet Metal Flashing & Trim
- .4 Section 08 63 00 – Metal Framed Skylights
- .5 Section 08 80 00 - Glazing

1.2 REFERENCES

- .1 All codes, standard specifications and by-laws referred to in this section shall be current editions including all revisions, addenda and supplements.
 - .1 ASTM C719 – Standard Test Method for Adhesion and Cohesion of Elastomeric Sealant Joints Under Cyclic Movement (Hockman Cycle).
 - .2 ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
 - .3 ASTM C1193 – Standard Guide for Use of Joint Sealants.
 - .4 ASTM C1311 – Standard Specification for Solvent Release Sealants.
 - .5 ASTM C1330 – Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
 - .6 ASTM C1481 – Standard Guide for Use of Joint Sealants with Exterior Insulation and Finish Systems (EIFS).
 - .7 CAN/CGSB-19.13-M87 – Sealing Compound, One-component, Elastomeric, Chemical Curing.
 - .8 CGSB 19-GP-5M – Sealing Compound, One Component, Acrylic Base, Solvent Curing.
 - .9 CGSB 19-GP-14M – Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.
 - .10 CAN/CGSB-19.17 – One-component Acrylic Emulsion Base Sealing Compound.
 - .11 CAN/CGSB-19.24 – Multi-component, Chemical Curing Sealing Compound.
 - .12 SWRI (Sealant, Waterproofing and Restoration Institute) – Sealant and Caulking Guide Specification.
 - .13 Sealants: The Professionals' Guide, Sealant, Waterproofing and Restoration Institute.

1.3 SUBMITTALS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Manufacturer's Installation Instructions: Indicate special procedures, surface preparation, perimeter conditions requiring special attention, and field quality control testing.

1.4 QUALITY ASSURANCE OBSERVATION

- .1 Observation of work will be carried out by designated QA Observer.
- .2 Prior to mobilizing on site, prepare and install sealant samples for adhesion testing, a minimum of two (2) samples for each substrate combination, according to manufacturer's written guidelines. Test sealant in contact with samples of materials to be caulked to ensure that proper adhesion will be obtained and no staining of material will result. Testing to be completed prior to mobilization on site. Do not proceed with Work until samples have been approved.
- .3 Adhesion tests on new sealant will be performed at random locations at discretion of Owner's representative. Any work that is found to be sub-standard, is to be removed and replaced at no cost to Owner. Contractor is to assist with sealant adhesion tests as directed.
- .4 Execute Work of this Section by Subcontractors approved by manufacturers of materials incorporated in Work; who has equipment, adequate for Project, and skilled tradesmen to perform it expeditiously; and is known to have been responsible for satisfactory installations similar to that specified during a period of at least immediate past five years.
- .5 Remove sealant and re-caulk disapproved joints.
- .6 Approved joints will establish minimum acceptable quality of workmanship and will serve as standard by which subsequent Work will be compared for Acceptance.

1.5 MOCK-UP

- .1 Construct mock-up with specified sealant types and with other components noted.
- .2 Construct mock-up at test area to show location, size, shape and depth of joints complete with back-up material, primer, caulking and sealant.
- .3 Locate where directed.
- .4 Mock-up may be part of finished Work.
- .5 Allow 48 hours for inspection of mock-up by Consultant before proceeding with Sealant Work.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 ENVIRONMENTAL AND SAFETY REQUIREMENTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labeling and provision of material safety data sheets acceptable to local Labour regulations.
- .2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Place materials defined as hazardous or toxic waste in designated containers.
- .2 Ensure emptied containers are sealed and stored safely for disposal away from children.

- .3 Dispose of surplus chemical and finishing materials in accordance with federal regulations.
- .4 Fold up metal banding, flatten, and place in designated area for recycling.
- .5 Use trigger operated spray nozzles for water hoses.
- .6 Return solvent and oil soaked rags for contaminant recovery and laundering or for proper disposal.
- .7 Use least toxic sealants, adhesives, sealers, and finishes necessary to comply with requirements of this section.
- .8 Close and seal tightly all partly used sealant containers and store protected in well ventilated fire-safe area at moderate temperature.
- .9 Place used hazardous sealant tubes and other containers in areas designated for hazardous materials.

1.9 WARRANTY

- .1 Contractor shall provide five (5) year warranty for Workmanship.
- .2 Include coverage for installed sealants and accessories which fail to achieve air tight seal, water tight seal, and exhibit loss of adhesion or cohesion, or do not cure.

PART 2 - PRODUCTS

2.1 SEALANT MATERIALS

- .1 Sealant shall be a high performance, high movement, single component, low modulus, low VOC, UV Stable, non-sag hybrid sealant.
- .2 Sealants and caulking compounds must:
 - .1 Meet or exceed all applicable industrial safety and performance standards.
 - .2 Be manufactured and transported in such a manner that all steps of process, including disposal of waste products arising therefrom, will meet requirements of all applicable governmental acts, by laws and regulations.
 - .3 Be of a hybrid nature, utilizing silyl-modified polyurethanes, also identified as an MS Polymer.
- .3 Sealant and caulking compounds must be accompanied by detailed instructions for proper application so as to minimize health concerns and maximize performance, and information describing proper disposal methods.
- .4 Caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant to not be used in or near air handling units.

2.2 SEALANT MATERIAL DESIGNATIONS

- .1 Acceptable single component neutral cure silicone sealants for skylight related work include:
 - .1 Tremco Dymonic FC or Approved Alternate Hybrid Sealants discussed with Consultant
Colour of sealant to be selected to match cladding components.
 - .2 Primer: As recommended by sealant manufacturer to assure adhesion of compound, to prevent staining of substrate.

- .3 Joint Backing: Polyethylene, urethane, neoprene, or vinyl, extruded closed cell foam in circular shape with diameter 25% greater than joint width before installation; joint breaking tape approved by sealant manufacturer where specified.
- .4 Cleaning Material: As recommended by sealant manufacturer.
- .2 Concealed Sealants: To be Tremco Dymonic FC or Approved Alternate Hybrid Sealants discussed with Consultant.
- .3 Butyl (for concealed skylight related sealant joints): Tremco Curtainwall Sealant or approved alternate.
- .4 Primers:
 - .1 TREMprime Silicone Porous Primer for porous surfaces and TREMprime Silicone Metal Primer for metals or plastics, or primers as recommended by sealant manufacturer.
- .5 Cleaners:
 - .1 Acceptable cleaners:
 - .1 Dow Corning Primer/Surface Prep Solvent,
 - .2 Methyl ethyl ketone (MEK)
 - .3 Isopropyl Alcohol
 - .2 Surfaces to receive sealants are to not be cleaned with Xylo.
 - .3 All substrate materials to be cleaned with compatible cleaners.

2.3 PREFORMED COMPRESSIBLE AND NON-COMPRESSIBLE BACK-UP MATERIALS

- .1 Polyethylene:
 - .1 Extruded closed cell foam backer rod.
 - .2 Size: oversize 30 to 50 %.
- .2 Bond Breaker Tape.
 - .1 Polyethylene bond breaker tape.
- .2 Compatibility: All materials in a sealant system to be compatible with each other, with substrate and any coating or waterproofing to be installed. Sealants used with elastomeric coating or waterproofing systems must be approved by coating or waterproofing manufacturer.

2.4 JOINT PRIMER

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

PART 3 - EXECUTION

3.1 PROTECTION

- .1 Protect existing facades from staining or contamination.
- .2 Protect public from falling debris during installation.

- .3 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed work and materials out of storage. At no time shall unsealed joints be left open. If protection is required, then entire drop/bay to be adequately protected.

3.2 EXAMINATION

- .1 Before commencing Work, verify that joint configuration and surfaces have been provided as specified under Work of other Sections to meet intent of sealant Specification, that joint conditions will not adversely affect execution, performance or quality of completed Work and that they can be put into acceptable condition by means of preparation specified in this Section. Verify site conditions together with manufacturer's representative of sealant to be applied.
- .2 Examine existing conditions and substrates upon which work of this section is dependent. Report to Consultant in writing any defects or discrepancies. Commencement of work implies acceptance of existing conditions and assuming full responsibility for finished condition of work.
- .3 Ascertain that sealers applied to sealant substrates are compatible with sealant used and that full bond between sealant and substrate is attained. Request samples of sealed or coated substrate from their fabricators for testing of compatibility and bond if necessary.
- .4 Examine sealant configuration for width and depth. Depth of joint should be 1/2 joint width with a minimum depth of 6mm (0.25") and a maximum depth of 13mm (0.5") unless specified otherwise. For fillet joints, a minimum of 6mm (0.25") adhesion between sealant and substrate must be achieved on both sides of joint unless specified otherwise.
- .5 Defective work resulting from application to unsatisfactory joint conditions will be considered responsibility of those performing work of this section.

3.3 SURFACE PREPARATION

- .1 Prepare surfaces in accordance with manufacturer's directions.
- .2 Before any sealant repairs are made, type of existing sealant to be determined. If uncertain as to type, then a sealant manufacturer technical representative to be contacted to confirm type. Only sealant compatible with existing to be installed as part of repairs. Urethane based sealants are not to be applied over existing silicone sealants.
- .3 Where existing, remove sealant completely. In no case shall new sealant be applied over old. In addition:
 - .1 Remove existing sealants, dust, oil, grease, oxidation, mill scale, coatings and all other loose material by cutting, brushing, scrubbing, scraping and/or grinding. In no case, however, shall components be damaged during surface preparation.
 - .2 Clean substrates with recommended solvent cleaner. Apply solvent with a clean cloth, pad or soft paper towel. Applicator cloth or towel to not leave fiber residue on substrate surface. Surface should be wiped clean and dried with a second clean cloth to ensure removal of contaminants. If substrate surfaces is still not clean, repeat procedures as needed. Change cloths frequently to prevent depositing contaminants from cloth onto substrate surface.
 - .3 Use method of surface preparation suitable for substrate, as recommended by sealant manufacturer and that does not damage existing finishes.
- .4 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

- .5 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.
- .6 Ensure joint surfaces are dry and frost free.
- .7 Remove loose particles present or resulting from routing by sweeping particles out with a dry brush, blowing out joints with oil free compressed air or by vacuuming joints prior to solvent cleaning.

3.4 PRIMING

- .1 Where necessary to prevent staining or for neat appearance, mask adjacent surfaces prior to priming and caulking.
- .2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.
- .3 Use only primer approved by sealant manufacturer for particular installation, applying in strict accordance with manufacturers printed recommendations.
- .4 Always pour primers onto rag or brush, do not dip rag or brush into container.
- .5 Prime only as much area that can be packed and caulked in a single day.
- .6 Do not apply excess primer, and apply primer only to areas which it will be contacted by sealant.

3.5 BACKUP MATERIAL

- .1 Apply bond breaker tape where installation of backer rod is not possible, three point adhesion needs to be eliminated or throat to width ratio needs to be created as per manufacturers recommendations.
- .2 When using backing material comprised of tubular or rod stock, avoid lengthwise stretching of material. Do not twist or braid backer material.
- .3 Provide a stiff blunt-surfaced wood or plastic installation tool, having shoulders designed to ride on finished surface and a protrusion of required dimensions to assure a uniform depth of backup material below sealant. Do not puncture exterior skin or surface of backer material. A screwdriver is prohibited for use on this project.
- .4 Using approved tool, smoothly and uniformly place backup material to depth indicated on drawings or otherwise required, compressing backer material 25% to 50% and securing a positive fit.
- .5 Install backing material to a depth to provide a caulked joint meeting depth requirement as set out in sealant manufacturer's specifications.

3.6 MIXING

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

3.7 APPLICATION

- .1 Sealant:
 - .1 Apply sealant in accordance with manufacturer's written instructions.

- .2 Mask edges of joint where irregular surface or sensitive joint border exist to provide neat joint.
- .3 Apply sealant in continuous beads.
- .4 Apply sealant using gun with proper size nozzle.
- .5 Ensure that new sealant is adhered to substrates a minimum of 6 to 10 mm at each side of joint.
- .6 Use sufficient pressure to fill voids and joints solid.
- .7 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
- .8 Tool exposed surfaces before skinning begins to give slightly concave shape. Tooling to be performed by proper metal or wood tool. Finger tooling joints will not be accepted.
- .9 Remove excess compound promptly as work progresses and upon completion.
- .2 Curing:
 - .1 Cure sealants in accordance with sealant manufacturer's instructions.
 - .2 Do not cover up sealants until proper curing has taken place.

3.8 CLEAN-UP

- .1 Clean adjacent surfaces immediately and leave work neat and clean.
- .2 Remove excess and droppings, using recommended cleaners as work progresses.
- .3 Remove masking tape after initial set of sealant.

END OF SECTION - 07 92 00

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PART 1 - GENERAL

1.1 SUMMARY

- .1 The work includes labour, materials, equipment and services for design, supply and installation of aluminum windows as indicated. Requirements of Section 08 80 00 Glazing apply and are to be read in conjunction with this section.
- .2 Base bid: Remove existing vertical glazing assembly (frame and glass) where indicated on the drawings. Replace with new vertical glazing assembly.
 - .1 Alternate scope is to retain the framing and replace the glazing only. This can be explored more at the time of the Construction.
- .3 The Scope of Work will include but not limited to the following:
 - .1 Verify the existing condition of supports on site prior to shop drawings preparation. Any additional structural supports needed to complete the installation should be included in the scope of work, and will not be treated as extra to the contract.
 - .2 The Contractor will submit an engineer-stamped shopdrawing together with engineering Letters of Assurance, to the Consultant and Owner.
 - .3 Engineering, design, shop-drawings preparation, supply and installation of Aluminum-Framed window system, including aluminum framing, integral closures, trim, perimeter flashings and surface reglets.
 - .4 Engineering must include custom metal brackets to connect the aluminum framing to the building structure. Contractor shall verify the existing site condition prior to any shop drawing preparation.
 - .5 Fasteners, anchors and related reinforcement of framing system as required to resist design loads.
 - .6 Field water testing: Contractor to include for a third party water infiltration testing for the new window systems.

1.2 RELATED WORKS

- .1 Section 02 41 19 – Selective Demolition & Removal
- .2 Section 07 62 00 – Sheet Metal Flashings and Trims
- .3 Section 07 92 00 – Joint Sealants
- .4 Section 08 80 00 - Glazing

1.3 REFERENCES

- .1 National Building Code (Latest edition)
- .2 National Energy Code of Canada for Buildings.
- .3 CAN/CSA 3-S157.20-M83 Strength Design in Aluminum
- .4 CAN/CGSB-12.20-M89 Structural Design of Glass for Buildings
- .5 North American Fenestration Standard (NAFS latest edition)

- .6 AAMA 501.2-09 Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems.

1.4 SYSTEM DESCRIPTION

- .1 Performance Requirements: Provide aluminum-framed windows which have been manufactured, fabricated, and installed to withstand loading required by current National Building Code of Canada. Provide performance criteria required by these specifications without defects, damage or failure. The new windows shall be designed in accordance with the following standards:
 - .1 National Building Code (Latest edition)
 - .2 National Energy Code of Canada for Buildings.
 - .3 North American Fenestration Standard (NAFS latest edition)
 - .4 CSA A440.2-04, Energy Performance of Windows and Other Fenestration Systems
 - .5 Note that NAFS does not govern site built framed glazing systems; however, the intent is to apply these performance requirements to the design.
- .2 Saskatoon Climatic Data, Required Thermal Characteristics of Fenestration, and other Minimum Performance Requirements:
 - .1 Degree Days below 18°C = 5700
 - .2 Degree Days below 15°C = 4800
 - .3 Overall Thermal Transmittance of Fenestration = 1.9 W/m².K (NECB 2017 3.2.2.3)
 - .4 Snow Loads: S_S = 1.7 kPa, S_R = 0.1 kPa
 - .5 Hourly Wind Pressures 1/10: 0.33 kPa ; 1/50: 0.43 kPa
 - .6 Impact loads for security consideration.
 - .7 Water Tightness: shall meet B5 rating with no water infiltration at 500 Pa when tested in accordance with CSA A440-00 and ASTM E1105.
- .3 Design safety glass requirements in accordance to building code. This is in addition to any minimum tempered glass, laminated glass, and security glass requirements explicitly specified in the contract.
- .4 The new system is to be designed to suit the existing structural supports.
- .5 Extruded aluminum thermally broken double glazed windows.
- .6 Aluminum frame: extruded sections of 6063-T5 Alloy; with aluminum head deflection channels, aluminum installation angles and plates.
- .7 Glazing: to be designed in conformance with CAN/CGSB 12.20-M89. Refer to Section 08 80 00 Glazing for other requirements.
- .8 All glass, gaskets, splines, setting blocks and sealants.
- .9 All necessary internal concealed reinforcing members, posts, brackets, anchors, screws, and bolts etc. to ensure a first class installation, and to ensure compliance with the specific performance criteria and the requirements of the National Building Code of Canada and local Provincial Codes.

- .10 All exterior and interior aluminum flashing, closures, cover plates and trim, and self adhering perimeter frame membrane required in connection with window installations.
- .11 All fastenings, anchors, brackets, straps, shims, bolts, and nuts etc. required to be attached to building structure for the support of the aluminum framing.
- .12 Sealants between all metal contacts of aluminum framing components to ensure a weather-tight and waterproof assembly, and sealants between aluminum framing and adjoining construction.

1.5 MORE DESIGN AND PERFORMANCE REQUIREMENTS

- .1 Notwithstanding the approved type of aluminum framing is specified herein, design, fabricate and install component parts of the aluminum framing and windows to meet or exceed NAFS requirements.
- .2 Air Tightness: maximum allowable rate of air leakage to be $1.10\text{m}^3/\text{h}/\text{m}$ of crack length when tested according to ASTM E783 at an air pressure difference of 75 Pa.
- .3 An air seal consistent with the rainscreen 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.
- .4 Water Resistance: No water to penetrate the curtainwall / windows assembly or be retained within any frame member, when tested in accordance with ASTM E1105 at air pressure difference of 500 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.
- .5 Condensation Resistance Index: minimum Temperature Index of 58, as determined by CSA A440.
- .6 The Aluminum framing shall be designed to withstand local positive and negative wind pressure loads in accordance with requirements of the National Building Code of Canada.
- .7 Aluminum framing members, anchors and connections shall be designed to conform to seismic restraint requirements of the National Building Code of Canada.
- .8 The maximum deflection in a direction normal to the plane of the aluminum framing of any metal framing member when carrying its full design load, shall not exceed $L/240$ of its clear span; however in no instance shall the maximum deflection be greater than 13mm. The maximum deflection of any member in a direction parallel to the plane of the wall, when carrying its full design load, shall not exceed 75% of the design clearance dimension between that member and the top of glass of any part immediately below it. For sections next to concrete walls, limit deflection to less than 6mm.
- .9 Head members and anchors for aluminum framing shall be designed and installed to accommodate the deflection of the building structure over.
- .10 Aluminum framing shall be so designed and constructed as to provide for such expansion and contraction of component materials as will be caused by an exterior temperature range of -15°C to $+40^{\circ}\text{C}$, and building interior temperature range of $+10^{\circ}\text{C}$ to $+29^{\circ}\text{C}$ without causing harmful buckling, glass breakage, failure of joint seals, undue stress on fasteners or other detrimental effects. Aluminum framing shall be so designed and constructed as to provide for such expansion and contraction of component materials as will be caused by an exterior temperature range of -15°C to $+40^{\circ}\text{C}$, and building interior temperature range of $+10^{\circ}\text{C}$ to $+29^{\circ}\text{C}$ without causing harmful buckling, glass breakage, failure of joint seals, undue stress on fasteners or other detrimental effects.

- .11 Aluminum framing shall withstand permanent deformation, weld or fastener failure, component disengagement or breakage under loading equal to 1.5 times the design loads according to ASTM E330.
- .12 Anchor assemblies or connectors including all related connections and fasteners for and related to the aluminum framing, shall be designed, engineered, furnished and installed to conform to CSA-A440.4, and as required for full compliance with the specified performance criteria.
- .13 Aluminum framing shall be designed, assembled and secured to the structure to accommodate the building structure dead and live load deflections.
- .14 For conformance to ASHRAE 90.1, the manufacturer shall submit, with the shop drawings, a signed and dated certification listing the U-factor (NFRC 100), SHGC (NFRC 200), and air leakage rate (NFRC 400) for site specific systems (windows, window wall, sliding doors, curtain walls, storefront, etc.).
- .15 The expected service life of the glazing systems shall be a minimum of 25 years. Throughout this period, the systems are to maintain their air tightness, water tightness, and structural performance as originally specified. Any maintenance that is required to ensure that this requirement is met is to be clearly identified by the manufacturer.
- .16 Contractor to verify the existing windows on site. All new windows shall suit the existing condition of support.

1.6 SUBMITTALS

- .1 Engineer-stamped shop drawings for all work included in this Section shall be submitted to the Consultant for review.
 - .1 The shop drawings should illustrate the integration of the window system into the building envelope and anchorage methods. The shop drawings should also note all materials and products used, demonstrate drainage paths, note conformance to applicable standards and list performance results.
 - .2 Do not proceed with the work until shop drawings are acceptable to the Consultant/Owner
 - .3 Submit Letters of Assurance by a Professional Engineer registered with the Association of Professional Engineers and Geoscientists of Saskatchewan.
- .2 Samples
 - .1 Submit one representative sample of each proposed assembly type. Sample window supplied must be identical to the windows described in the submitted test report, in terms of any components which may affect the performance ratings. These samples will clearly demonstrate all operational features and noted locations.
- .3 **Test Reports Upon Request:**
 - .1 Submit verification of Window System U-Value certified by a Professional Engineer registered with the Association of Professional Engineers and Geoscientists of Saskatchewan.
 - .2 Include manufacturer's air and water resistance test reports showing compliance with specified performance requirements.
 - .3 Certification for Structural Sealant: Submit written documentation from sealant manufacturer stating that the sealant selected has been tested for adhesion and compatibility on representative samples of metal, glass and other glazing components,

and that the sealant joint design and application procedures shown on the shop drawings are suitable for this project.

.4 Close Out Submittals: These are to be submitted PRIOR to application of Substantial Completion.

- .1 Provide as-built drawings in PDF and DWG format.
- .2 Provide Letters of Assurance (LOA).
- .3 Provide Operations and Maintenance Manual to be submitted to the Consultant with the following documents included:
 - .1 Maintenance instruction for materials, finishes, operation and cleaning.
 - .2 Parts list indicating make, size, serial number, manufacturer, telephone number and address of the suppliers.
 - .3 Arrange with and demonstrate to the Consultant, cleaning, reglazing and general maintenance procedures.
- .4 **Warranty:** Submit warranty documents specified herein.

1.7 QUALITY ASSURANCE

- .1 Manufacturer and Installer Qualifications:
 - .1 Provide fabrications specified in this Section only by a manufacturer and erector who has adequate plant, equipment, and skilled tradesmen to perform it expeditiously, and are known to have been responsible for satisfactory fabrication similar to that specified during a period of at least the immediate past five years.
 - .2 Installation shall be by the window company or its approved installer using only skilled workers in this trade and in sealant trade as applicable. Installers to have a minimum of 5 years of experience on similar projects.
 - .3 Submit proof of experience upon Consultant's request.
- .2 Mock-Up: Install one complete prototype window assembly, including related accessories, in accordance with approved shop drawings, at location designated by the Owner. The prototype shall be complete in all respects, including unit finishing, sealants, trim and painting.
- .3 Conduct Field Water Testing.

1.8 FIELD TESTING

- .1 Contractor to coordinate and pay for an independent testing company to conduct Field Water Test in accordance with ASTM E1105.
- .2 A water test report should be submitted to the Consultant and Owner as part of the general requirements of this contract. Testing will be conducted using the following procedures:
 - .1 ASTM Standard E1105 (latest edition), Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.
- .3 The Owner may conduct additional random testing of the window units during the installation. Failure to meet the test requirements specified will result in modifications to the window unit by the Contractor and re-testing by the Owner at the Contractor's expense. Upon successful passing

of subsequent testing the Contractor will be responsible for modifying all windows previously installed and to be installed in the same fashion as the successfully tested unit.

- .4 Failure to perform to the required test levels will mean modification such that they pass and re-testing will be conducted by the Owner, at the Contractor's expense.
- .5 Contractor to arrange for sealant representative to be on site during installation of Mock-up. Sealant representative to return after curing period has elapsed and perform pull test, providing report to Owner, Consultant and Contractor.
- .6 The inspection and testing service does not relieve the Contractor of his responsibility for quality control of production and for subsequent mistakes.

1.9 PROJECT SITE CONDITIONS

- .1 Field Measurements: Verify actual measurements / openings by taking field measurements before fabrication. Show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.
- .2 Field-verify existing dimension against approved submittal drawings and advise Consultant of any deviations prior to commencing installation.

1.10 DELIVERY, STORAGE AND HANDLING

- .1 Before shipment, brace frame units to prevent distortion in shipment and handling, and protect finished surfaces by sturdy protective wrappings.
- .2 Maintain squareness of the windows during packaging and hoisting.
- .3 Store on site on wood platforms with waterproof sheds.
- .4 Store in vertical position with spacers between to prevent damage.

1.11 WARRANTY

- .1 **Contractor's Obligation:** The contractor must submit a signed written warranty to the Consultant for the installation of work specified in this Section covering for a period of five (5) years from date of the Certificate for Substantial Performance. The window unit's installation warranty shall include but not be restricted to:

- .1 Leaking, loosening of whole or of parts of units, glass breakage from excessive stresses developed exterior of the insulating glass unit (other than by accidental cause exterior to the glazed unit), or deformation of unit framing due to installation.

Window Manufacturers Obligation: Provide a warranty stating that the installation of new sealed insulating glass units specified in this Section shall not cause any deleterious effect on the air and water tightness and wind load resistance performance of the window, remain watertight and free of defects which shall include without being limited to breakage and loss of seal. Fogging of glass inside sealed units or failure of a field dew point test will be considered sufficient evidence of loss of seal. This warranty shall be for a period of ten (10) years from date of Substantial Performance. The warranty shall include all required materials and their installation, at no additional cost to the Owner.

- .2 Repair leaks into building within 24 hours of notification. Any repairs required shall be carried out in accordance with the recommendations of the Consultant.
- .3 Inspect glazing 30 days before expiry of warranty period and correct defects within 15 days of inspection.

- .4 Any repairs required shall be carried out in accordance with the recommendations of the Consultant at no cost to the Owner.
- .5 The cost of all warranties shall be included in the Contract price.

PART 2 - PRODUCTS

2.1 WINDOW MANUFACTURERS

- .1 Acceptable window manufacturers provided they meet all requirements of this specification. Contractors must submit test reports with bid submission.
 - .1 Kawneer Company Canada
 - .2 Starline Windows
 - .3 Contractor may use an equivalent product from another manufacturer, provided that all supporting test data, material testing and certifications will be attached upon bid submission.

2.2 MATERIALS

- .1 Window Types: Aluminum fixed and operable.
- .2 Extrusions:
 - .1 Aluminum Frame: Extruded sections of 6063-T5 alloy and temper.
 - .2 Aluminum head deflection channel: Extruded sections of 6065-T5 alloy and tempered.
 - .3 Aluminum installation angle: Extruded section of 6063-T6 alloy and temper.
 - .4 Main Frame and mullions: Extruded aluminum, thermally-broken.
 - .5 Sash: Extruded aluminum, thermally-broken.
 - .6 Minimum metal thickness for window sash and frame shall be 2.36 mm and 1.58 mm for glazing beads.
 - .7 Sheet Steel: Stainless steel or hot-dipped zinc coating at least equal to ASTM A525M coating designated Z275 and with sufficient ductility to permit necessary forming operation.
 - .8 Exposed Aluminum Sheet and Plate: AA1100-H14, alloy and temper.
- .3 All extruded sections shall be CAN/CSA-A440 extruded from T5 or T6 Aluminum alloy. Stops to be square snap-in type extruded aluminum without exposed screws and all exterior stops shall be tamper-proof. Fasteners shall be 300/400 Series stainless steel or cadmium plated of the size and type to suit the intended performance.
- .4 Aluminum Finish: Coating to be selected by the Owner prior to any fabrication start.
 - .1 Finishing Standards:
 - .1 AAMA 2603-98 "Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels."
 - .2 AAMA 2604-98 "Voluntary Specifications for High Performance Organic Coatings on Aluminum Extrusions and Panels."

- .5 Exterior Aluminum Sills:
 - .1 Extruded: Utility grade minimum 1.60 mm thick, extruded aluminum complete with jamb drip deflectors, chairs and anchors, reinforced with integral stiffening ribs. Use 1.95 mm thick extruded aluminum when not reinforced. Sills to be interlocked to frame. Brake formed shapes and exposed fasteners will not be accepted. Anodized finish of sill to match windows.
 - .2 Drip Deflectors: 25 mm x 25 mm x 3 mm rounded corners, extruded aluminum jamb deflectors, finish to match window sills. Secure to window sill using aluminum rivets as outlined under PART 3 – EXECUTION.
- .6 Glass: Provide sealed insulating glass units in accordance with CAN/CGSB-12.8, composed of two panes of glass factory sealed and separated by argon gas 'air' space. Refer to Section 08 80 00 for other details.
 - .1 Glass Stops: Extruded aluminum glass stops, finish to match windows.
- .7 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/m², thickness as required to sustain imposed load and in no case less than 4.8mm thick.
- .8 Installation anchors to be specified by Professional Engineer and indicated on shop drawings.
 - .1 Galvanized steel, aluminum or stainless steel anchors.
 - .2 Length, diameter and spacing to suit application, and as indicated on engineered shop drawings to provide adequate securement such that all loads subjected to the window will be transferred to and be carried by the anchors and anchor support systems (All anchors to be designed to meet loads and stresses as dictated by the Building code).
 - .3 All fasteners to be concealed.
- .9 Sheet aluminum flashings: Alloy 1100, F temper, 0.040" minimum thickness exposed sheet finished to match framing.
- .10 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.
- .11 Thermal separator: Polyvinylchloride, 50 Shore A durometer hardness +5.
- .12 Isolating Coating: Alkali resistant bituminous enamel paint conforming to CGSB 1-GP-108M to prevent deterioration due to corrosion or electrolytic action, as recommended by manufacturer. Isolate aluminum from following components:
 - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
 - .2 Concrete, mortar and masonry.
 - .3 Wood.
- .13 Thermal break: Extruded rigid cellular PVC conforming to CGSB 41-CP-19M, or poured in polyurethane. Poured and de-bridged thermal break installation must follow AAMA guidelines, and employ cavity serration technique to mitigate dry shrinkage.

- .14 The perimeter of window frames shall be supplied with integrally attached “peel and stick” air barrier minimum width of 203 mm (8”). Acceptable Products: Protecto-wrap;
- .15 Ventilator Windows: Shall be side hung, thermally broken type to suit window type specified. Ventilators shall be weather-stripped with fin-seal weather-stripping. Ventilators shall be equipped with heavy duty zinc coated steel Anderberg hinges (Type 33ST) and zinc die cast white bronze cam handle. Acceptable Vent Type: Starline Series 9000 Window; or other pre-approved type.
- .16 Anti rotation blocks: Extruded PVC.
- .17 Weather-stripping:
 - .1 To be constructed of material resistant to weathering and aging.
 - .2 Weather-stripping shall be compatible with associated materials.
 - .3 Open celled or surface applied or glued weather-stripping shall not be used.
 - .4 All weather-stripping shall be continuous (including mitred joints of awning vents) and installed in specially extruded parts and mechanically secured to prevent shrinkage, movement or loss when removing sash for cleaning or glass replacement
 - .5 Must be mechanically fastened in a manner to ensure easy replacement.
 - .6 Pile weather-stripping used in sliding sashes must have fins on interior pair only. Exterior pairs of sashes to have only pile weather-stripping.
- .18 Operating Hardware (windows):
 - .1 Conform to CAN/CGSB 69 series "Builders Finishing Hardware"
 - .2 Unless noted otherwise, provide zinc-plated 1018 steel or 304 stainless steel for operating hardware, nuts, washers, bolts, rivets and other fastening devices incorporated in the windows.
 - .3 Equip operable sashes with strong, durable lifts, pulls and latches as required. Pulls shall be continuous and integral with sash.
 - .4 Security Latches: Provide zinc die cast spring-loaded security latches to provide automatic locking in closed position. No vinyl latches are to be used.
 - .5 Safety Restrictors:
 - .1 All operable vents will be restricted to 4" opening for safety, structural and envelope performance requirements.
 - .2 Provide controlled sash operation to restrict, when engaged, the opening of the operable sash to not more than 100 mm, in accordance with National Building Code of Canada.
 - .3 Safety restrictors shall allow manual by-pass to allow full opening of sash and automatically reset when the sash is moved to the closed position.
 - .4 Do not use spring loaded pins requiring holes in main frame.
 - .5 Provide means to prevent sash lifting over latch when latch is installed at bottom rail only. (e.g. metal block in head track as approved by the Owner).

- .6 Operable sashes to be fitted with concealed nylon rollers on upstanding monorails to remain operable despite accumulation of dust and dirt on sill.
- .7 Where windows latching devices are located in excess of 1900 mm above floor level, equip sliding units with hardware or design sash to permit remote operation (pole, coaxial crank etc.).
- .19 Perimeter Insulation: Polyurethane Foam: non-shrinking, low expansion (25%), closed cell, no CFC, single component polyurethane foam, complying with CAN/CGSB 51-GP-23M "Urethane, Foamed-in-place Insulation", such as Enerfoam manufactured by Dow Chemical Company, or an approved equivalent.
- .20 Sealant: See Sealant Section 07 92 00

2.3 FABRICATION

- .1 Fabricate windows in accordance with NAFS-08.
- .2 Workmanship: All work shall be performed by skilled workers, especially trained and fully experienced in the applicable trades employed and in full conformity with applicable provisions of the listed references and standards and/or as specified herein. Work shall be carefully fabricated and assembled with proper and approved provision for thermal expansion and contraction, fabrication and installation tolerances and adjoining building component tolerances and design criteria. All extruding, forming, welding and cutting operations shall be done prior to finishing.
- .3 All work shall be true to detail with sharp, clean profiles, straight and free from defects, dents, marks, indentations, waves or flaws of any nature impairing strength or appearance; fitted with proper joints and intersections and with specified finishes. All members shall be extruded unless otherwise indicated on the drawings and shall be securely engaged into adjacent components. Extrusions shall allow tolerances to eliminate any edge projection or misalignment at joints.
- .4 Expansion joints within aluminum framing shall be so designed and constructed to provide noiseless and free movement and remain, permanently watertight.
- .5 No field forming, cutting and/or alterations of aluminum framing members will be allowed. All framing members will be shop fabricated and finished. No unfinished surfaces will be permitted on exposed surfaces.
- .6 Protection of Metals: Provide PVC separators or other suitable protection against galvanic action wherever dissimilar metals are in contact, as applicable.
- .7 Joints in Metal Work: All exposed work shall be carefully matched to produce continuity of line, design and finish. Joints in exposed work shall be temporarily assembled in the shop and marked before disassembly to ensure proper assembly later on the project site.
- .8 Shop Assembly: In a far as practicable, all fitting and assembly of the work shall be done in the shop. Work than cannot be permanently shop assembled shall be temporarily assembled in the shop and marked before disassembly to ensure proper assembly later on the project site.
- .9 Fasteners: All fasteners, connectors, anchors including washers and accessory items shall be scheduled and designated on the reviewed shop drawings.
- .10 Tolerances:
 - .1 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for vertical, horizontal, and diagonal dimensions of units under 1830 mm, and plus or minus 3 mm for dimensions greater than 1830 mm.

- .2 Fabricate mullions to ensure under specified wind loads a maximum deflection of $L/175$ of mullion span or 19 mm, whichever is less.
- .3 Fabricate horizontal mullions, for the worst condition of loading, to ensure under specified gravity loads a maximum deflection of $L/360$ of mullion span or 3 mm or smaller than the gap to the adjacent component, whichever is less.
- .11 Dimensions shown on drawings are diagrammatic only. Field measurements of rough window opening shall be performed by contractor and shown on submitted shop drawings. Maintain sight lines indicated and clearances to other construction components.
- .12 Mechanically joined sections shall have hairline joints.
- .13 Reinforce members for attachment of hardware.
- .14 Ensure that glazing rabbet is provided with depth and width to accommodate specified glass in accordance with glass manufacturer's recommendations.
- .15 Finish steel clips and reinforcement with 380 g/m zinc coating to CAN/CSA-G164.
- .16 Assembly of Units:
 - .1 Join members by welding where practicable, using materials recommended by manufacturers of metals being welded. Remove flux completely following welding, and grind and polish joints smooth and clean.
 - .2 Join members where welding is impractical by mechanical methods. Reinforcement or fasteners visible on exposed faces of members when window is in the closed position will not be acceptable.
 - .3 Incorporate weep holes to drain off pocketed water. Baffle weep holes to prevent entry of driven water to conform to specified performance.
 - .4 Except where shipping makes impossible, fabricate units in shop and ship completely assembled with operating hardware attached.
 - .5 All butt joints in the window assembly must be sealed prior to assembly by the use of tapes. Surface application of sealant at butt joints shall not be accepted as a suitable alternative.
 - .6 Deburr and make smooth all sharp milled edges and corners of frames.
- .17 Window Pannings and Brake Formed Shapes:
 - .1 All exterior exposed blocking at window perimeters shall be covered by extruded aluminum panning, interlocked to frame. Brake formed shapes and exposed fasteners will not be accepted.
- .18 Aluminum Flashings:
 - .1 Fabricate flashings and starter strips to dimensions and profiles indicated on reviewed shop drawings and to meet specified requirements. Determine dimensions from site measurements.
 - .2 Provide required joint covers and concealed anchoring devices. Do not use exposed fasteners or anchors except these indicated on reviewed shop drawings.
 - .3 Hem all exposed edges a minimum of 13 mm for appearance and stiffening.

- .19 Fastenings:
 - .1 Where fastenings are exposed, use Series 300 stainless steel for steel-to-steel, aluminum for aluminum-to-aluminum.
 - .2 Where fastenings are not exposed to dampness or moisture, cadmium plated steel may additionally be used for all combinations of metal noted in preceding subparagraphs.
- .20 Thermal Movement: Fabricate units and assemblies to provide for expansion and contraction of component members and between units when subjected to surface temperatures from -34°C to 82°C.
- .21 Anchors:
 - .1 Incorporate anchorage to structure as required by the reviewed Shop Drawings.
 - .2 Allow for complete adjustment in anchorage for levelling and positioning of units during installation.
- .22 Cut rigid insulation to fit snugly in frame sections, without voids.
- .23 Place manufacturers and identification name plates in semi-concealed locations.

PART 3 - EXECUTION

3.1 PRELIMINARY WORK

- .1 Examine job conditions before commencement of work. Commencement of work will denote acceptance of existing conditions unless the client has been notified in writing of unacceptable conditions prior to commencement.
- .2 Remove existing blinds, drape tracks, hardware, and store for reinstallation by Contractor after all interior finishing is completed.
- .3 All work shall be erected in strict accordance with the reviewed shop drawings by the erection force of the fabricator of the aluminum framing under the direct supervision of the fabricator.

3.2 WINDOW INSTALLATION

- .1 All vertical members shall be plumb, all horizontal members shall be level; all sections shall be set in perfect alignment throughout and be securely and rigidly fastened in place.
- .2 As erection progresses, the members shall be securely connected to take care of all dead loads, wind and erection stresses. Any failure to make proper and adequate provisions for stresses during erection shall be entirely at sole risk and responsibility of this Contractor.
- .3 Provide all necessary shims and blocking where required, to suit the existing site condition. Locate shims under each fastener to prevent frame bowing.
- .4 Install perimeter wood blocking as required to suit the existing site condition.
- .5 Securely install frames plumb, true, square and straight in openings and free from distortion. Do not exceed 3 mm in 3m (1/8" in 9'-0") variation from plumb and level.
- .6 Arrange components to prevent abrupt variation in colour.
- .7 Completed installation shall be satisfactory in all respects, so that any unit can be tested in-situ and meet the minimum performance criteria of the approved window unit.

- .8 At door sill locations, use polymer modified cementitious repair mortar to fill any holes or irregularities in the sill from anchorage, closers, etc. Install mortar as per manufacturers written guidelines.

3.3 POLYURETHANE FOAM INSTALLATION

- .1 Fill cavity between window frames and rough opening with foam insulation, as described below. Ensure cavity is completely filled to CAN/CGSB 51-GP-39M for foam insulation. Control quantity of insulation to avoid main frame from deforming.
- .2 Use brand new materials only.
- .3 Store materials at 24°C (74°F), in a clean dry area. Do not store at temperatures at above 49°C (120°F). Avoid prolonged storage in direct sunlight or near heat sources. Store a partially used kit with the safety latch on and the tank valves turned off. Remove the used nozzle, reapply petroleum jelly to the face of the gun and reinsert the used nozzle. Once used, the remainder must be used within 60 days.
- .4 The nozzle must be replaced if more than 30 seconds elapses between each use. Foam will harden in the nozzle after this time.
- .5 The foam is organic and combustible and may constitute a fire hazard if improperly used.
- .6 Avoid contact with eyes and skin. Always wear protective eyewear, gloves and clothing when operating. Use only with adequate ventilation and certified respiratory protection. In unventilated areas, do not remove respirator for at least 15 minutes after use.
- .7 Install specified polyurethane foam sealant to perimeter of new window installation. Ensure that cavity is completely filled and free of air pockets, particularly around shims. Avoid contact with other surfaces.
- .8 Allow foam to set prior to trimming and installing sealants.

3.4 SILL INSTALLATION

- .1 Install wood blocking ensuring positive slope to exterior.
- .2 Sills shall be continuous at column locations. Trim back vertical leg to allow continuation.
- .3 Prior to installation of sill, install specified waterproofing membrane flashing at sill opening onto sloped blocking. Membrane at sill to be upturned at interior stool and at jambs (minimum 50 mm upturn at jambs).
- .4 Install specified membrane flashing at jambs. Jamb membrane to overlap sill membrane. The design intent is to prevent water that may enter at the window sill or jamb from entering the wall cavity below.
- .5 Install sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. Use maximum length possible, allowing for expansion. Where opening is greater than 3600 mm (12'0"), multiple pieces will be permitted.
- .6 Maintain 6.35 mm to 9.5 mm (1/4 to 3/8") space between butt ends of continuous sills for sills over 1219 mm (4') in length and maintain 0.125 mm to 6.35 mm (1/8 to 1/4") space at each end.
- .7 Secure drip deflectors to sill as described below.
 - .1 Install drip deflectors at sills of all windows as shown on Drawings.

- .2 Secure deflector to window sill using aluminum rivets. Deflector to be installed a maximum 5 mm from the surface of the adjacent surface.
- .3 Install sealant under deflector prior to installation, and between deflector and masonry, as shown on Drawings.
- .8 All sharp and protruding corners, as determined by the Consultant shall be trimmed and made smooth.
- .9 Secure sills in place with anchoring devices located at ends, joints of continuous sills and evenly spaced at 600 mm o.c. (2'0") in between.

3.5 SELF ADHERING MEMBRANE INSTALLATION

- .1 Shall be self-adhering strips shall be minimum 150 mm (6") wide applied to the perimeter of all window and door frames and over all junctions, penetrations and transitions to ensure the integrity of the infiltration barrier.
- .2 Remove loose or foreign matter which might impair adhesion of materials.
- .3 Ensure all substrates are clean of oil or excess dust; all masonry joints struck flush, open joints are filled; and all concrete surfaces are free of large voids, spalled areas or sharp protrusions.
- .4 Ensure all substrates are free of surface moisture prior to application of self-adhesive membrane and primer.
- .5 Ensure metal closures, existing cut metal brick masonry ties are free of sharp edges and burrs.
- .6 Apply primer to prepared and approved substrate and allow minimum of 30 minutes open time. Only apply primer in area that can be completed within the allowable time as specified by manufacturer. Primed surface does not covered during the same working day must be re-primed.
- .7 Extend membrane to all adjacent surfaces ensuring a seal below metal closures.
- .8 Apply primers and membranes within recommended application temperature ranges. Consult manufacturer when materials cannot be applied within these temperature ranges.

3.6 SEALANT

- .1 Apply sealant in accordance with Section 07920 - Joint Sealants.
- .2 Apply sealant and joint packing to joints between aluminum framing and adjoining construction.
- .3 Sealant materials shall be used in strict accordance with manufacturer's written instructions and shall be applied only by mechanics specially trained for application of sealants. Before applying sealant, all mortar, dirt, dust, moisture and other foreign matter shall be completely removed from surfaces it will contact. Adjoining surfaces shall be masked.
- .4 All joints shall be tooled and exposed sealed joints both tapes and tooled. All joints to be sealed shall be thoroughly pre-treated to ensure the full bond capabilities of the sealant. Tapes shall be removed as soon as possible after tooling.
- .5 Sealants, tapes, gaskets, separators, joint fillers and back-up materials shall be physically and chemically compatible with each other and with adjacent materials. Items shall be installed so that they will not become dislodged during or after assembly of units.
- .6 All metal to metal joints between elements shall be thoroughly sealed by buttering joints with sealant immediately prior to final assembly of abutting sections. Clean off all excess sealant.

- .7 Seal all joints as per the applicable sealant manufacturer's recommendations. Clean all excess sealant from exposed surfaces.

3.7 FIELD QUALITY CONTROL

- .1 Verify that substrate conditions are acceptable for product installation in accordance with manufacturer's instructions.
- .2 The Owner/Consultant maintains the right at any time during the work to test any window units in accordance with CAN/CSA-A440 in a completed in-situ location.
- .3 Tested windows shall meet or exceed requirements of this Section as indicated above in Section 1.7 Field Testing.
- .4 Copies of test reports will be provided to Contractor.
- .5 Air infiltration testing will be performed before water penetration testing.
- .6 Work failing any tests shall be repaired or replaced without cost to Owner. Such failure will also require retesting of subject window to satisfaction of the Consultant and Owner. All costs for additional testing to be paid by Window Contractor.
- .7 Contractor to provide pull tests of sealants as requested by Consultant/Owner.

3.8 PROTECTION AND CLEANING

- .1 Protect installed product's finish surfaces from damage during construction. Protect aluminum window system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.
- .2 Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.
- .3 Final cleaning of window installation shall be performed by the Contractor.
- .4 Upon completion of the work of this section, remove protective coverings from exposed surfaces, and clean surfaces free of all smears, marks and discoloration. Cleaning shall be in accordance with applicable provisions of listed standards and the requirements of the aluminum manufacturer; where doubt exists, make spot tests
- .5 Be responsible for immediately cleaning off all smears, marks, etc. caused during erection of the aluminum entrances, curtain wall, window wall and windows.
- .6 Provide the Owner with four (4) copies of recommended cleaning procedures for the aluminum framing including materials and methods to be used which will not stain or harm the aluminum components, and for glass, sealants and glazing materials, in any manner whatsoever. All cleaning requirements and/or recommendations during and after erection shall be coordinated with the Contractor.

END OF SECTION - 08 51 00

PART 1 - GENERAL

1.1 SUMMARY

- .1 Provide labour, materials and equipment necessary to complete work of this section. This is a performance specification and is issued in conjunction with the drawings which indicate the general arrangement of work, the dimensions, structural system, and the major elements of the construction. As performance documents, the drawings and specifications do not necessarily indicate or describe all items required for the full design, performance and completion of work of this section.
- .2 The Client would like to combine the use of translucent and vision IGUs at this remedial repairs. The Contractor is to make sure that the new metal-framed sloped glazing frame is able to accommodate the transition details in between the translucent and the vision glazing units.
 - .1 Type 1: Sloped Vision glazing at the lower portion of the South skylight. See drawings for the location. Acceptable products: will be Low E coating Solarban 60, Cardinal 270, or Guardian SN68, on Surface 2 or 3. Glass separated by ½" (13mm) argon-filled airspace.
 - .2 Type 2 Sloped Translucent Glazing Units at the upper portion of the South skylight, and where indicated on the drawings. Acceptable product is Solera TR9 manufactured by Advance Glazing Limited.
 - .3 Type 3 Sloped Translucent Glazing Units at the entire North skylight, and where indicated on the drawings. Acceptable product is Solera TR18 manufactured by Advance Glazing Limited.
 - .4 Type 4 Vertical Translucent Glazing Units at both South and North wall transitions. and where indicated on the drawings. Acceptable product is Solera TR18 manufactured by Advance Glazing Limited.
- .3 The Skylight Contractor Scope of Work will include but not limited to the following:
 - .1 Verify the existing condition of skylights supports on site prior to shop drawings preparation. Any additional structural supports needed to complete the skylight installation should be included in the scope of work, and will not be treated as extra to the contract.
 - .2 The Contractor will submit an engineer-stamped shopdrawing together with engineering Letters of Assurance, to the Consultant and Owner.
 - .3 Engineering, design, shop-drawings preparation, supply and installation of Metal-Framed Skylight system, including aluminum framing, integral closures, trim, perimeter flashings and surface reglets.
 - .4 Engineering must include custom metal brackets to connect the aluminum framing to the building structure. Contractor shall verify the existing site condition prior to any shop drawing preparation.
 - .5 Fasteners, anchors and related reinforcement of framing system as required to resist design loads.
 - .6 Include a temporary working platform / hoarding to seal off and weatherproof the skylight opening, and keep the building secure from any intruder once the old skylight has been removed. Equally, the public area beneath shall be protected to keep safe any occupants / pedestrians within the interior spaces.

- .7 Field water testing: Contractor to include for a third party water infiltration testing for the new skylight systems. Testing should be scheduled while the interior hoarding / scaffolding is still in place. Testing will be paid, coordinated and scheduled by the Contractor. A water test report should be submitted to the Consultant and Owner as part of the general requirements of this contract.
- .4 Refer to drawings in conjunction with this specifications.
- .5 Completion of this work may be performed in conjunction with the roof replacement of the adjacent roof areas.
- .6 Section includes:
 - .1 Structural design, engineering, and fabrication of complete Metal-Framed Skylight system, including aluminum framing, integral closures, trim, perimeter flashings and surface reglets.
 - .2 Glass and glazing for metal-framed skylight system including gaskets, sealants, spacers, blocking and related materials.
 - .3 Fasteners, anchors, and related reinforcement of framing system as required to resist design loads.

1.2 RELATED WORKS

- .1 Section 02 41 19 – Selective Demolition & Removal
- .2 Section 07 52 00 – SBS Modified Bitumen
- .3 Section 07 62 00 – Sheet Metal Flashings and Trims
- .4 Section 07 92 00 – Joint Sealants
- .5 Section 08 80 00 - Glazing

1.3 REFERENCES

- .1 National Building Code (Latest edition)
- .2 National Energy Code of Canada for Buildings.
- .3 CAN/CSA 3-S157.20-M83 Strength Design in Aluminum
- .4 CAN/CGSB-12.20-M89 Structural Design of Glass for Buildings
- .5 North American Fenestration Standard (NAFS latest edition)
- .6 AAMA 501.2-09 Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems.

1.4 SYSTEM DESCRIPTION

- .1 Performance Requirements: Provide metal-framed skylights which have been manufactured, fabricated, and installed to withstand loading required by current National Building Code of Canada. Provide performance criteria required by these specifications without defects, damage or failure.
- .2 The skylight system shall be designed in accordance with the following standards:

- .1 National Building Code (Latest edition)
- .2 National Energy Code of Canada for Buildings.
- .3 North American Fenestration Standard (NAFS latest edition)
- .4 CSA A440.2-04, Energy Performance of Windows and Other Fenestration Systems
- .5 Note that NAFS does not govern site built framed glazing systems; however, the intent is to apply these performance requirements to the skylight design.
- .3 Saskatoon Climatic Data, Required Thermal Characteristics of Fenestration, and other Minimum Performance Requirements:
 - .1 Degree Days below 18°C = 5700
 - .2 Degree Days below 15°C = 4800
 - .3 Overall Thermal Transmittance of Fenestration = 1.9 W/m².K (NECB 2017 3.2.2.3)
 - .4 Air Infiltration / Exfiltration = fixed
 - .5 Snow Loads: S_S = 1.7 kPa, S_R = 0.1 kPa
 - .6 Hourly Wind Pressures 1/10: 0.33 kPa ; 1/50: 0.43 kPa
 - .7 Impact loads for Fall Protection
 - .8 Water Tightness: Skylight water tightness shall meet B5 rating with no water infiltration at 500 Pa when tested in accordance with CSA A440-00 and ASTM E1105.
- .4 Design safety glass requirements in accordance to building code. This is in addition to any minimum tempered glass, laminated glass, and security glass requirements explicitly specified in the contract.
- .5 New Skylight System is to be designed to suit the existing structural supports.
- .6 Skylight systems must have adequate resistance to pressure differentials.
- .7 Skylight systems must have adequate provision for live, dead, wind, snow and rain load without failures, distortion, or fracture.
- .8 Skylight systems must have adequate provision for thermal movement without thermal fractures of framing members, glazing and/or sealants.
- .9 Skylight systems must have adequate support and anchorage of components taking into consideration all loading factors and combination.
- .10 Skylight systems must have a water and weather-tight installation with gaskets, seals, and sealants to effectively prevent water entry into building.
- .11 Skylight system must conform with the "open rainscreen principle" (i.e., be pressure-equalized and self-drained to the exterior). Provide pressure equalized and self-drained vents at exterior frame members without causing air flow around glazing.
- .12 Skylight system must have continuous air and vapour seals to control transfer of moisture vapour into system of insulated glass units.

1.5 SUBMITTALS

- .1 **Engineer-Stamped Shop drawings:** Submit shop drawings showing layout, profiles and product components, including anchorage, accessories, finish colours, patterns and textures.
 - .1 New Skylight System is to be designed to suit the existing structural supports.
 - .2 Design safety glass requirements in accordance to building code. This is in addition to any minimum tempered glass, laminated glass, and security glass requirements explicitly specified in the contract.
 - .3 Submit shop drawings for review and approval by the Owner/Consultant prior to fabrication. Include detailed plans, elevations, details of framing members, glazing infill materials (if any), sealants, fasteners, anchors and thicknesses and types of formed flashing and closures and relationship with adjacent materials. Indicate maximum horizontal and vertical forces at rafter anchors.
 - .4 Do not proceed with the work until shop drawings are acceptable to the Owner.
 - .5 Submit Letters of Assurance by a Professional Engineer registered with the Association of Professional Engineers and Geoscientists of Saskatchewan.
- .2 **Product Data:** Submit product data, including manufacturer's product literature for specified system.
- .3 **Samples:** Submit selection and verification samples for finishes, colours and textures, 2 weeks upon contract award.
 - .1 Aluminum Finish: Submit 2 sets colour charts or range samples for initial color selection. Submit finished sample of color selected for use.
 - .2 Glazing Materials: Submit 2 pieces verification sample 12" square, of the specified glass, including any integral tints, coatings as specified.
 - .3 Submit standard sealant colours for selection and approval.
- .4 **Test Reports Upon Request:**
 - .1 Submit verification of Skylight System U-Value certified by a Professional Engineer registered with the Association of Professional Engineers and Geoscientists of Saskatchewan.
 - .2 For conformance to ASHRAE 90.1, the manufacturer shall submit, with the shop drawings, a signed and dated certification listing the U-factor (NFRC 100), SHGC (NFRC 200), and air leakage rate (NFRC 400) for site specific systems.
 - .3 Include manufacturer's air and water resistance test reports showing compliance with specified performance requirements.
 - .4 Certification for Structural Sealant: Submit written documentation from sealant manufacturer stating that the sealant selected has been tested for adhesion and compatibility on representative samples of metal, glass and other glazing components, and that the sealant joint design and application procedures shown on the shop drawings are suitable for this project.
- .5 **Close Out Submittals: These are to be submitted PRIOR to application of Substantial Completion.**
 - .1 Provide as-built drawings in PDF and DWG format.

- .2 Provide Letters of Assurance (LOA).
- .3 Provide Operations and Maintenance Manual to be submitted to the Consultant with the following documents included:
 - .1 Maintenance instruction for materials, finishes, operation and cleaning.
 - .2 Parts list indicating make, size, serial number, manufacturer, telephone number and address of the suppliers.
 - .3 Arrange with and demonstrate to the Consultant, cleaning, reglazing and general maintenance procedures.
- .4 **Warranty:** Submit warranty documents specified herein.

1.6 QUALITY ASSURANCE

- .1 Skylight System Manufacturer shall have a minimum Ten (10) years experience in the fabrication and installation of custom architectural metal-framed skylights. Manufacturer shall be capable of providing structural calculations, applicable independent product test reports, installation instructions, review of the application methods, customer approval, and periodic field service representation during construction.
- .2 Skylight System Installer shall have a minimum Ten (10) years experience in glazing and installation of metal-framed skylights. Installer shall be experienced to perform work of this section and has specialized in the installation of work similar to that required for this project and who is acceptable to product manufacturer.
- .3 Mock-Up: Install one complete assembly, including related accessories, in accordance with approved shop drawings, at location designated by the Consultant/Owner.
- .4 **The Contractor, in the presence of the Consultant and the Owner, will perform field water testing after installation of the skylight framing and glazing, but prior to the installation of the exterior beauty caps. The testing shall be deemed fail if any water enters the building or past the drainage channels during or after the testing.**
- .5 Skylights failing to perform to the required test levels will be modified such that they pass and re-testing will be conducted by the Consultant at the Contractor's expense.
- .6 The inspection and testing service does not relieve the Contractor of his responsibility for quality control of production and for subsequent mistakes.

1.7 FIELD TESTING

- .1 Field water testing: Contractor to include for a third party water infiltration testing for the new skylight systems. Testing should be scheduled while the interior hoarding / scaffolding is still in place. Testing will be paid, coordinated and scheduled by the Contractor. A water test report should be submitted to the Consultant and Owner as part of the general requirements of this contract. Testing will be conducted using the following procedures:
 - .1 ASTM Standard E1105 (latest edition), Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.
 - .2 No water shall penetrate the fenestration assembly and cause wetting of the interior room surfaces.
- .2 Skylight systems shall conform, meet or exceed the following ratings:

- .1 Air Tightness:
 - .1 Fixed – 0.2 L/(s.m²) of crack length (as per Fixed Rating).
- .2 Water Tightness:
 - .1 Skylight water tightness shall meet B5 rating with no water infiltration at 500 Pa when tested in accordance with CSA A440-00 and ASTM E1105.
 - .2 No water shall penetrate the assembly and cause wetting of the interior room surfaces.
- .3 Failure to perform to the required test levels will mean modification such that they pass and re-testing will be conducted by the Owner, at the Contractor's expense.
- .4 Contractor to arrange for sealant representative to be on site during installation of Mock-up. Sealant representative to return after curing period has elapsed and perform pull test, providing report to Owner, Consultant and Contractor.
- .5 The inspection and testing service does not relieve the Contractor of his responsibility for quality control of production and for subsequent mistakes.

1.8 PROJECT SITE CONDITIONS

- .1 Field Measurements: Verify actual measurements / openings by taking field measurements before fabrication. Show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.
- .2 Field-verify existing dimension against approved submittal drawings and advise Consultant of any deviations prior to commencing installation.

1.9 STORAGE AND HANDLING

- .1 Deliver materials with identification labels and in unopened, undamaged containers.
- .2 Store materials protected from exposure to harmful weather conditions, temperature, and humidity. Handle skylight material and components to avoid damage. Protect skylight material against damage from sunlight, weather, excessive temperatures, construction activities, and other hazards.

1.10 WARRANTY

- .1 Contractor's Obligation: The Skylight System & Glazing Contractor/sub-contractor must submit a signed written labour and material warranty to the Consultant for the installation of work specified in this Section covering for a period of Five (5) Years from date of the Certificate for Substantial Performance. This guarantee shall include all glass and glazing, gaskets, tapes and sealants.
 - .1 Labour and material warranty to include, but is not limited to, costs to remedy any defects in materials, replacement of failed IGU's, remedy any leaks including removal and reinstatement of IGU's to access the framing drainage system (surface repairs using sealant are not an acceptable leak repair).
 - .2 Defective work shall be removed and replaced with acceptable work at no cost to the Owner, and at such times as designated by the Owner.
 - .3 Excessive Non-Uniformity: Any non-uniform fading during guarantee period.

- .4 Pitting or Corrosion: No pitting or other type of corrosion resulting from natural elements in local atmosphere.
- .5 Sealants: Guarantee shall state that installed sealants are guaranteed against:
 - .1 Adhesive, cohesive or shear failure of joints.
 - .2 Staining of surfaces adjacent to joints by sealant or primer by migration through building materials in contact with them.
 - .3 Chalking or visible colour change on surface of the cured sealant materials.
 - .4 Contractor to arrange for sealant representative to be on site during installation of Mock-up. Sealant representative to return after curing period has elapsed and perform pull test, providing report to Owner, Consultant and Contractor.
- .6 Glass: Guarantee to remove and replace at the Subcontractor's expense any and all glass lights that fail to meet the design and performance requirements. Insulated sealed double glazing (vision) units shall be guaranteed against obstruction of vision as a result of dust or film formation on the inner glass surfaces for a period of ten (10) years from the date of Substantial Performance. Any units failing to comply with this guarantee shall be replaced without cost to the Owner. See specific glazing requirements in Section 08 80 00 – Glazing.
 - .1 The expected service life of the glazing systems shall be a minimum of 25 years. Throughout this period, the systems are to maintain their air tightness, water tightness, and structural performance as originally specified. Any maintenance that is required to ensure that this requirement is met is to be clearly identified by the manufacturer.
 - .2 Defective work shall be removed and replaced with acceptable work at no cost to the Owner, and at such times as designated by the Owner.
 - .3 The cost of all warranties shall be included in the Contract price.

PART 2 - PRODUCTS

2.1 METAL-FRAMED SKYLIGHTS

- .1 Acceptable Manufacturers/Products: Kawneer Canada (Kawneer 2000), Kawneer Series 1600, or other approved equal.
- .2 Contractor must submit a request for approval of equal system, complete with brochures and technical data, at least 7 days prior to tender closing.

2.2 MATERIALS

- .1 All skylight materials are to be sourced out from a single manufacturer with accessory products meeting manufacturer's material compatibility requirements to achieve required System Warranty and other specified warranties.
- .2 Extrusions: Extrusions to be designed in accordance with CAN/CSA-S157.
 - .1 Extruded aluminum: Aluminum Association Alloy AA6063-T5 with minimum yield strength 110 MPa for thickness up to 12.7 mm.

- .2 Sheet Steel: Stainless steel or hot-dipped zinc coating at least equal to ASTM A525M coating designated Z275 and with sufficient ductility to permit necessary forming operation.
- .3 Exposed Aluminum Sheet and Plate: AA1100-H14, alloy and temper. Minimum thickness of flashings shall be 1.0 mm (0.040") for exposed flashings and 0.6mm (0.024") for interior or concealed flashings.
- .4 The main frame depth shall be not less than 62mm (2-1/2") complete with frame extension if necessary (confirm existing conditions).
- .3 Aluminum Finish: Clear anodized finish:
 - .1 Finish aluminum components in accordance with "Aluminum Association Designation System for Aluminum Finishes – AAC22A31
 - .2 Anodized to attain a Type II (Class 1 for exterior) and (Class 2 for interior) anodic coating; exterior coating not less than 0.7mil (18 microns); interior coating not less than 0.4 mil (10 microns).
 - .3 Coating mass when tested to ASTM B137; Class 2, density shall not be less than 24.0 g/m² except for interior trim which shall have a minimum coating area density of 12.0 g/m².
 - .4 Exposure to Salt Spray to ASTM B117: Class 2, capable of withstanding 250h of exposure without pitting; interior trim Class 3, minimum time exposure of 100h without pitting.
- .4 Powder Coat – Colour to be as per the Finish Schedule or if not specified, as selected by the Owner from the standard selection of colours. Submit colour samples for approval by the Owner/Consultant.
- .5 General Configuration:
 - .1 Skylight shall incorporate internal drainage systems.
 - .2 Glazing shall be fixed with external pressure plates at both the purlins and rafters.
 - .3 Purlins to incorporate a structural sealant joint with no exposed pressure plates.
 - .4 Rafter pressure plates shall be provided with a snap cap.
 - .5 Silicone sealant needle bead shall be installed at all of the up-slope sides of the purlin pressure plates and extended a minimum of 150mm (6") up the adjacent rafters.
 - .6 Both purlins and rafters shall be provided with internal condensate gutters.
 - .7 All joints between purlins and rafters shall be fully sealed with butyl tape.
- .6 Glazing: See specific glazing requirements in Section 08 80 00 – Glazing.
- .7 Sealants: Refer to Section 07 92 00 Sealants.
- .8 Isolating Coating: Alkali resistant bituminous enamel paint conforming to CGSB 1-GP-108M to prevent deterioration due to corrosion or electrolytic action, as recommended by manufacturer. Isolate aluminum from following components:
 - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.

- .2 Concrete, mortar and masonry.
- .3 Wood.
- .9 Perimeter Insulation: Non-shrinking, low expansion (25%), closed cell, no CFC, single component polyurethane foam, complying with CAN/CGSB 51-GP-23M. Minimum R-5 per inch.
- .10 Fasteners: Screws, nuts, bolts, etc. to be of 300/400 series stainless steel where exposed to dampness and moisture. Cadmium plated steel may be used where fastenings are not exposed to dampness and moisture.
- .11 Thermal Break: Continuous high density polyurethane. As recommended by the Skylight Manufacturer.
- .12 Glazing Gaskets: As recommended by Skylight Manufacturer.
- .13 Exterior Sealant: As recommended by Skylight Manufacturer and conforms to applicable CGSB-19-GP Series.

2.3 FABRICATION

- .1 Fabricate components per manufacturer's installation instructions and with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- .2 Accurately fit and secure joints and corners. Make joints flush, hairline and weatherproof.
- .3 Dimensions shown on drawings are diagrammatic only. Field measurements of rough skylight opening shall be performed by contractor and shown on submitted shop drawings. Maintain sight lines indicated and clearances to other construction components.
- .4 Aluminum Flashings:
 - .1 Fabricate flashings and starter strips to dimensions and profiles indicated on reviewed shop drawings and to meet specified requirements. Determine dimensions from site measurements.
 - .2 Provide required joint covers and concealed anchoring devices. Do not use exposed fasteners or anchors except these indicated on reviewed shop drawings.
 - .3 Hem all exposed edges a minimum of 13 mm for appearance and stiffening.
- .5 Fastenings:
 - .1 Where fastenings are exposed, use Series 300 stainless steel for steel-to-steel, aluminum for aluminum-to-aluminum.
 - .2 Where fastenings are not exposed to dampness or moisture, cadmium plated steel may additionally be used for all combinations of metal noted in preceding subparagraphs.
- .6 Thermal Movement: Fabricate units and assemblies to provide for expansion and contraction of component members and between units when subjected to surface temperatures from -34°C to 82°C.
- .7 Anchors:
 - .1 Incorporate anchorage to structure as required by the reviewed Shop Drawings.

- .2 Allow for complete adjustment in anchorage for levelling and positioning of units during installation.
- .8 Place manufacturers and identification name plates in semi-concealed location.

2.4 FINISHES

- .1 Submit colour samples for approval by the Owner prior to any fabrication start.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install Skylights plumb and level , and true to line, without warp or rack of frames with manufacturer's prescribed tolerances and installation instructions. Provide support and anchor in place.
- .2 Dissimilar Materials: Provide separation of aluminum materials from sources of corrosion action contact points.
- .3 Glazing: Glass shall be outside glazed and held in place with extruded aluminum pressure plates anchored to the rafters using stainless steel fasteners.
- .4 Water Drainage: Water shall be typically diverted to the rafters and exit to the exterior of the building through weeps in the baffle and gutter. Typical horizontal covers and pressure plates will not require weep holes.
- .5 Comply with manufacturer's product data, including product technical bulletins, product erection / installation instructions, and product carton instructions for installation.

3.2 FIELD QUALITY CONTROL

- .1 Contractor shall expose the top and bottom supports of the existing Skylight systems, and advise the Consultant / Owner of any discrepancy found between the drawings and on site prior to any shop drawing submittal. Failure to do so will mean that Contractor has accepted all the site conditions and are all found to be consistent with what is stated on the contract documents.
- .2 Verify that substrate conditions are acceptable for product installation in accordance with manufacturer's instructions.
- .3 Field water testing: Contractor to include for a third party water infiltration testing for the new skylight systems. Testing should be scheduled while the interior hoarding / scaffolding is still in place. Testing will be paid, coordinated and scheduled by the Contractor. A water test report should be submitted to the Consultant and Owner as part of the general requirements of this contract. Testing will be conducted using the following procedures:
- .4 Contractor to arrange for sealant representative to be on site during installation of Mock-up. Sealant representative to return after curing period has elapsed and perform pull test, providing report to Owner, Consultant and Contractor.
- .5 The inspection and testing service does not relieve the Contractor of his responsibility for quality control of production and for subsequent mistakes.

3.3 PROTECTION AND CLEANING

- .1 Protect installed product's finish surfaces from damage during construction. Protect aluminum skylight system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

- .2 Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.
- .3 Final cleaning of skylight installation shall be performed by the Contractor.

END OF SECTION - 08 63 00

PART 1 - GENERAL

1.1 SUMMARY

- .1 Provide labour, materials and equipment necessary to complete work of this section. This is a performance specification and is issued in conjunction with the drawings which indicate the general arrangement of work, the dimensions, structural system, and the major elements of the construction. As performance documents, the drawings and specifications do not necessarily indicate or describe all items required for the full design, performance and completion of work of this section.
- .2 The Client would like to use different types of glazing units: (see drawings for more details)
 - .1 Type 1: Sloped Vision glazing at the lower portion of the South skylight. See drawings for the location. Acceptable products: will be Low-E coated acid-etched bird safe glass. Triple pane Solarban 70XL by Vitro Glass, with AviProtek E. Glass separated by ½" (13mm) argon-filled airspace.
 - .2 Type 2 Sloped Translucent Glazing Units at the upper portion of the South skylight, and where indicated on the drawings. Acceptable product is Solera TR9 manufactured by Advance Glazing Limited.
 - .3 Type 3 Sloped Translucent Glazing Units at the entire North skylight, and where indicated on the drawings. Acceptable product is Solera TR18 manufactured by Advance Glazing Limited.
 - .4 Type 4 Vertical Translucent Glazing Units at North wall transition and where indicated on the drawings. Acceptable product is Solera TR18 manufactured by Advance Glazing Limited.
 - .5 Type 5 Vertical Vision Glazing Units at South wall. See drawings for the location. Acceptable products: will be Low-E coated acid-etched bird safe glass. Triple pane Solarban 70XL by Vitro Glass, with AviProtek E. Glass separated by ½" (13mm) argon-filled airspace.
- .3 Contractor / sub-contractor is responsible to submit engineer-stamped shopdrawings prior to any procurement or fabrication.
- .4 Hoarding/Temporary Weather Protection: Contractor will include in their bid price, the provision of temporary weather protection at the area of work to ensure that the building and its interior components are protected against inclement weather. Note that the Owner intends to use the building during the Construction period.
 - .1 Provide temporary hoarding / scaffolding necessary to perform work. Erect scaffolding independent of walls. Construct, maintain and use scaffolding in accordance with CAN/CSA-S269.2M, Access Scaffolding for Construction Purposes. The Contractor is responsible for the engineering design requirements of their hoarding.
 - .2 IRC / Owner will review the engineer-stamped temporary hoarding.

1.2 RELATED SECTIONS

- .1 Section 02 41 19 – Selective Demolition & Removal
- .2 Section 07 62 00 – Prefinished Sheet Metal Flashings and Trims
- .3 Section 07 92 00 – Joint Sealants

.4 Section 08 51 00 – Metal- Framed Windows

.5 Section 08 63 00 – Metal- Framed Skylights

1.3 REFERENCES

- .1 National Building Code (Latest edition)
- .2 CAN/CGSB-12.1, Tempered or Laminated Safety Glass
- .3 CAN/CGSB-12.3, Flat, Clear Float Glass
- .4 CAN/CGSB-12.8, Insulating Glass Units
- .5 CAN/CGSB-12.9, Spandrel Glass
- .6 CAN/CGSB-12.10, Glass, Light and Heat Reflecting
- .7 CAN/CGSB-12.20, Structural Design of Glass for Buildings
- .8 CAN/CGSB-19-GP-14M, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing

1.4 SUBMITTALS

- .1 Submit to the Owner and Consultant:
 - .1 Submit two (2) sets of glass material / coating samples to the Owner/Consultant for approval.
 - .2 Submit two (2) sets of glazing details and technical data including written installation recommendations from the manufacturer for each product which will be used in this section.
- .2 Provide to the Consultant, written confirmation from the manufacturer as to the compatibility of all materials to be used.
- .3 Insulated Glass Units (IGUs) must bear the IGMAC stamp. IGUs without a stamp will be rejected and will require replacement at no additional cost to the Owner or Consultant.

1.5 PROJECT CONDITION

- .1 Before commencing work each day, ensure that all surfaces to receive glazing tapes, sealants or primers are clean and dry.
- .2 Apply glazing tapes and sealants at air and substrate temperatures not less than the minimum recommended by the material manufacturer. Work shall not be carried out during inclement weather conditions.
- .3 Proceed with glazing only when glazing surfaces are accumulating no moisture from rain, mist or condensation.
- .4 Obtain approval from the manufacturer, when temperature of glazing surfaces is below 4°C, for the glazing methods and protective measures which will be used during glazing operations.

1.6 PERFORMANCE REQUIREMENTS

- .1 Design safety glass requirements in accordance to building code. This is in addition to any minimum tempered glass, laminated glass, and security glass requirements explicitly specified in the contract.
- .2 Design in accordance with:
 - .1 National Building Code (Latest edition)
 - .2 National Energy Code of Canada for Buildings.
 - .3 North American Fenestration Standard (NAFS latest edition)
 - .4 CSA A440.2-04, Energy Performance of Windows and Other Fenestration Systems
 - .5 CSA A460
- .3 Note that NAFS does not govern site built framed glazing systems; however, the intent is to apply these performance requirements to the design.
- .4 Minimum Performance Requirements:
 - .1 Overall Thermal Transmittance of Fenestration = $1.9 \text{ W/m}^2\cdot\text{K}$ (NECB 2017 3.2.2.3)
 - .2 Air Infiltration / Exfiltration = fixed
 - .3 Snow Loads: $S_S = 1.7 \text{ kPa}$, $S_R = 0.1 \text{ kPa}$
 - .4 Hourly Wind Pressures 1/10: 0.33 kPa ; 1/50: 0.43 kPa
 - .5 Impact loads (for Fall Protection) should be accounted for in the design.
 - .6 Water Tightness: Skylight water tightness shall meet B5 rating with no water infiltration at 500 Pa when tested in accordance with CSA A440-00 and ASTM E1105.

1.7 WARRANTY

- .1 Provide a warranty stating that the installation of new sealed insulating glass units specified in this Section shall not cause any deleterious effect on the air and water tightness and wind load resistance performance of the skylight system, remain watertight and free of defects which shall include without being limited to breakage and loss of seal. Fogging of glass inside sealed units or failure of a field dew point test will be considered sufficient evidence of loss of seal. This warranty shall be for a period of ten (10) years from date of Substantial Performance. The warranty shall include all required materials and their installation, at no additional cost to the Owner.
- .2 Repair leaks into building within 24 hours of notification. Any repairs required shall be carried out in accordance with the recommendations of the Consultant.
- .3 Inspect glazing 30 days before expiry of warranty period and correct defects within 15 days of inspection.
- .4 The cost of all warranties shall be included in the Contract price.

PART 2 - PRODUCTS

2.1 GLAZING

- .1 The Client would like to combine the use of translucent and vision IGUs at this remedial repairs. Please refer to the issued drawings for details.
- .2 Glazing will insulated sealed triple-glazed units. Component design to maximize energy performance as established by the project criteria.
- .3 Manufacturer of IGU must be IGMA certified.
- .4 Sealed Insulating Glass Units: IGMAC certified to meet specified requirements of CAN/CGSB-12.8 with a dual perimeter edge seal, 13 mm air space and glass which meets the specified requirements of CAN/CGSB-12.3.
- .5 The Translucent Glazing Unit shall be of a design such as to present a monolithic glass section without visible internal framing, support or other solid member inside of the perimeter spacer. The ability to use nearly any type or manufacture of architectural flat glass shall enable the visual integration of translucent surfaces with those of nearby vision glass as well as ensuring that the appearance of the translucent glazing surfaces does not deteriorate over the life of the building. The employment of separate technologies for thermal insulation and light diffusion shall be such as to ensure that different thermal insulation specifications do not affect light transmission.
 - .1 Acceptable Translucent Glazing Units , TR9 and TR18 Solera by Advance Glazing Limited .
 - .2 Contact: Advanced Glazings Ltd. Phone: 647-870-762 Fax: 902-794-186
shane.webb@advancedglazings.com www.advancedglazings.com
- .6 Vision Glazing: Appropriate bird-friendly design including glass fritting, etching or film application, to meet CSA standard for bird-friendly glazing.
 - .1 Acceptable vision glass (where designated on the drawings) will be Low-E coated acid-etched bird safe glass. Triple pane Solarban 70XL by Vitro Glass, with AviProtek E. Glass separated by ½" (13mm) argon-filled airspace.
 - .2 Sloped Glazing: Minimum ¼" (6mm) thick pane, fully tempered, laminated.
 - .3 Vertical Glazing: Heat strengthened glass to reduce the risk of breakage.
 - .4 Spacers: thermally improved as required, to meet specified energy performance requirements. Non-thermally broken aluminum spacers ARE NOT ACCEPTABLE.

2.2 GLAZING ACCESSORIES

- .1 Ensure that glazing tapes, sealants, splines, and setting blocks are completely compatible with insulating glass unit sealants.
- .2 Setting Blocks: Neoprene, EPDM or Silicone with Durometer hardness of Shore "A" 80 to 90. Thickness to be 6 mm. Width of setting blocks to slightly exceed width of sealed insulating glass unit. Length of setting blocks to be 25 mm for every 1 square metre of glass with a minimum length of 50 mm. Setting blocks shall be compatible with all adjacent components, including edge seal and must not inhibit water by blocking weep holes. Wood spacers, shims or setting blocks are not acceptable.
- .3 Silicone Glazing Sealant: To comply with CAN/CGSB 19.18-M80-Type 2.

- .4 Pre-shimmed Glazing Tape: Pre-shimmed glazing tape such as POLYshim II Tape as manufactured by Tremco Ltd., or approved equivalent.
- .5 Exterior Glazing Material: Tremco VisionStrip co-extruded EPDM gasket with butyl glazing tape.
- .6 Glazing Spline: Neoprene, silicone or polyvinyl chloride standard glazing spline to suit glass stops, Polyshim II glazing Spline, as manufactured by Tremco, or an approved equivalent.
- .7 Exterior Gaskets: Extruded neoprene, or EPDM conforming to CAN/CGSB 41-GP-20M
- .8 Cleaning Material: MEK, Xylol, Toluol, or as recommended by glazing and sealant manufacturer.
- .9 Primers: To comply with glass and sealant manufacturer's recommendation.

2.3 FABRICATION

- .1 Fabricate glass to fit openings and to allow clearances, which will ensure that glass, is held firmly in place while providing clearances for thermal expansion and contraction, but not less than 3mm on each side.
- .2 Replace oversize or flared lights with entirely new units of proper dimensions.
- .3 Label each piece of glass to indicate manufacturer, type, and quality. Remove labels on glass units at time of installation.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Check new skylight IGU opening dimensions prior to fabricating glass units.
- .2 Commencement of work implies acceptance of existing conditions and assuming full responsibility for the finished condition of the work.
- .3 Protect existing roof surface along skylight during performance of repairs. Work shall not be conducted without suitable protection consisting of insulation and plywood/ sheathing type substrate.
- .4 Apply glazing tapes and sealants at air and substrate temperatures not less than the minimum recommended by the material manufacturer. Work shall not be carried out during inclement weather conditions.
- .5 Clean glazing rebate surfaces of all traces of sealant, dirt, dust, or other contaminants.
- .6 Ensure that projections have been removed from the glazing surfaces and that sufficient width and depth clearances are provided for the glass units.
- .7 Prime all surfaces to receive glazing tapes or sealants per sealant manufacturer's recommendations to provide a positive and permanent adhesion and to prevent staining. Apply primers per manufacturer's directions and test substrates for adhesion. Primer shall be suitable for materials affected.
- .8 Do not cut or nip tempered glass to fit. Replace oversize or flared lights with new units of correct dimensions. Do not cut or abrade tempered, heat strengthened or coated glass.

3.2 INSTALLATION

- .1 Position and glaze sealed insulating glass units into the framing, in accordance with IGMAC glazing recommendations and as indicated on the reviewed Shop Drawings. Centre the sealed insulating glass units in openings.
- .2 When requested by the owner or consultant, arrange for the presence of a technical representative of the glazing materials manufacturer to advise on procedures and methods when glazing commences.
- .3 Support the bottom of the sealed insulating glass units on setting blocks placed at quarter points of each lite (1/4 of the unit width from each corner) but not closer than 150 mm (6") from the corners of the units.
- .4 Set shims when required to allow a space of no less than 6 mm (1/4") between shim edges and sight lines. Spacer shims are not required where glazing tape is used.
- .5 Provide edge clearance of 3 mm (1/8") or to manufacturer's recommendation.
- .6 Cut tape or gasket to full length of opening. Ensure glazing material is fully sealed at corners. Glazing tape: Butt tape tightly at corners and knead all joints to form one continuous strip. Dap with compatible sealant. Glazing Gasket: Butt tightly at corners and seal with compatible sealant. Do not overlap gaskets or tape at corners.
- .7 Apply sealants with backing where indicated on reviewed shop drawings as specified in Section 07 92 00 – Joint Sealing. Use glazing sealants without addition of thinners from new and unopened containers clearly marked with the product name, batch number, and product manufacturer. Tool newly applied sealants with a slight bevel away from the glass surface.
- .8 Ensure that glazing sealants, gaskets, tapes, and splines are in full contact with glazing surfaces.
- .9 Install glazing and ensure compression to glazing tape is achieved.
- .10 Remove protective coating from new glazing.

3.3 CLEANING

- .1 Remove as work progresses all corrosive and foreign materials which may set or become difficult to remove at time of final cleaning or which may damage components of the window system. Examine all surfaces as often as required to ensure cleanliness.
- .2 Clean and polish interior and exterior surfaces of glass after installation to the satisfaction of the Consultant and Owner, with a commercial glass cleaner or water and household hand dishwashing detergent solution.
- .3 Remove excess sealants, stains, deposits, marks or blemishes from work of this section and all adjacent surfaces, by methods not harmful to the surfaces. Replace or make good all defective, scratched or damaged materials.
- .4 Remove labels and perform final cleaning after completion of entire installation and immediately prior to Date of Substantial Performance.
- .5 Collect broken glass and cuttings in boxes and remove from site.

END OF SECTION - 08 80 00

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Environment and Climate Change Canada Real Property Management, Technical Service

2022 Sloped Glazing (Skylights) Remedial Repairs

**NATIONAL HYDROLOGY RESEARCH CENTRE
(NHRC)**

DRAWINGS & DETAILS

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SLOPED GLAZING SYSTEM REPLACEMENT GENERAL NOTES

A. GENERAL NOTES

1. THE INTENT OF THE REPAIRS IS TO REPLACE THE EXISTING SLOPED GLAZING SYSTEM & RELATED AT THE EXISTING BUILDING. THE WORK IS LIMITED TO THE RENOVATION AREA SHOWN ON THE DRAWINGS. OTHER UPGRADING OF OTHER PARTS OF THE EXISTING BUILDING INCLUDING UPGRADING TO CARRY GRAVITY AND SEISMIC LOADS ARE NOT INCLUDED IN THE SCOPE OF WORK.
2. REFER TO THE HAZMAT REPORT, CONSTRUCT IN ACCORDANCE WITH CURRENT NATIONAL BUILDING CODE OF CANADA.
3. READ THE DRAWINGS IN CONJUNCTION WITH SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS.
4. THE CONTRACTOR SHALL VERIFY ALL INFORMATION PERTAINING TO EXISTING CONDITIONS BY ACTUAL MEASUREMENT AND OBSERVATION ON THE SITE. ALL DISCREPANCIES BETWEEN ACTUAL CONDITIONS AND THOSE SHOWN IN THE CONTRACT DOCUMENTS SHALL BE REPORTED TO THE OWNER’S REPRESENTATIVE / CONSULTANT FOR EVALUATION BEFORE THE AFFECTED CONSTRUCTION IS PUT IN PLACE. FAILURE TO NOTIFY OWNER’S REPRESENTATIVE / CONSULTANT WILL NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO PERFORM THE WORK AS INTENDED IN THE CONTRACT DOCUMENTS.
5. CONTRACTOR SHALL PROVIDE TEMPORARY SHORING AND BRACING AND MAKE SAFE OF ALL THE BUILDING COMPONENTS INCLUDING BUT NOT LIMITED TO ROOFS, WALLS, FLOORS, PERSONAL PROPERTIES INSIDE, BUILDING OCCUPANTS AND ADJACENT PROPERTY AS PROJECT CONDITION REQUIRE.
6. CONTRACTOR TO ENSURE THAT ALL WORK IS CARRIED OUT BY THE RULES AND CUSTOMS OF THE BEST TRADE PRACTICES AND THEIR SPECIFICATIONS BY SKILLED TRADES PEOPLE KNOWLEDGEABLE OF THE TYPE OF CONSTRUCTION.
7. THE IRC DRAWINGS SHOW THE COMPLETED PROJECT AND DO NOT SHOW COMPONENTS WHICH MAY BE NECESSARY FOR CONSTRUCTION SAFETY. CONTRACTOR IS RESPONSIBLE FOR SAFETY ON AND ABOUT THE JOB SITE DURING CONSTRUCTION. MINOR DETAILS NOT USUALLY SHOWN OR SPECIFIED, BUT NECESSARY FOR PROPER CONSTRUCTION OF ANY PART OF THE WORK SHALL BE INCLUDED AS IF THEY WERE INDICATED IN THE DRAWINGS.
8. THE CONTRACTOR SHALL MAINTAIN THE STRUCTURAL STABILITY AND INTEGRITY OF EXISTING STRUCTURE DURING THE CONSTRUCTION OPERATIONS.
9. NOTIFY IRC BUILDING SCIENCES GROUP AT LEAST 48 HOURS IN ADVANCE FOR CONSTRUCTION REVIEW.
10. SUBMIT 3 COPIES OF SHOPDRAWINGS TO IRC BUILDING SCIENCES GROUP FOR REVIEW PRIOR TO ANY FABRICATION OR INSTALLATION.
11. ALL DIMENSIONS TO BE FIELD VERIFIED BY THE CONTRACTOR. FIELD MEASUREMENTS ARE REQUIRED OR ROUGH OPENINGS, HIDDEN CONDITIONS, ETC.
12. EXAMINE JOB CONDITIONS BEFORE COMMENCEMENT OF WORK. COMMENCEMENT OF WORK WILL DENOTE ACCEPTANCE OF EXISTING CONDITIONS UNLESS THE CLIENT HAS BEEN NOTIFIED IN WRITING OF UNACCEPTABLE CONDITIONS PRIOR TO COMMENCEMENT. CONTRACTOR IS RESPONSIBLE TO VERIFY EXISTING SITE CONDITIONS PRIOR TO BID SUBMISSION.
13. VERIFY THAT SUBSTRATE CONDITIONS ARE ACCEPTABLE FOR PRODUCT INSTALLATION IN ACCORDANCE WITH MANUFACTURER’S INSTRUCTIONS.
14. REFER TO ALL ADDENDA. ALL WORK, MATERIALS, AND METHODS SHALL BE IN CONFORMANCE WITH THE LOCAL CODES AND REGULATIONS HAVING JURISDICTION.
15. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH SPECIFICATIONS AND RELATED TECHNICAL SECTIONS.

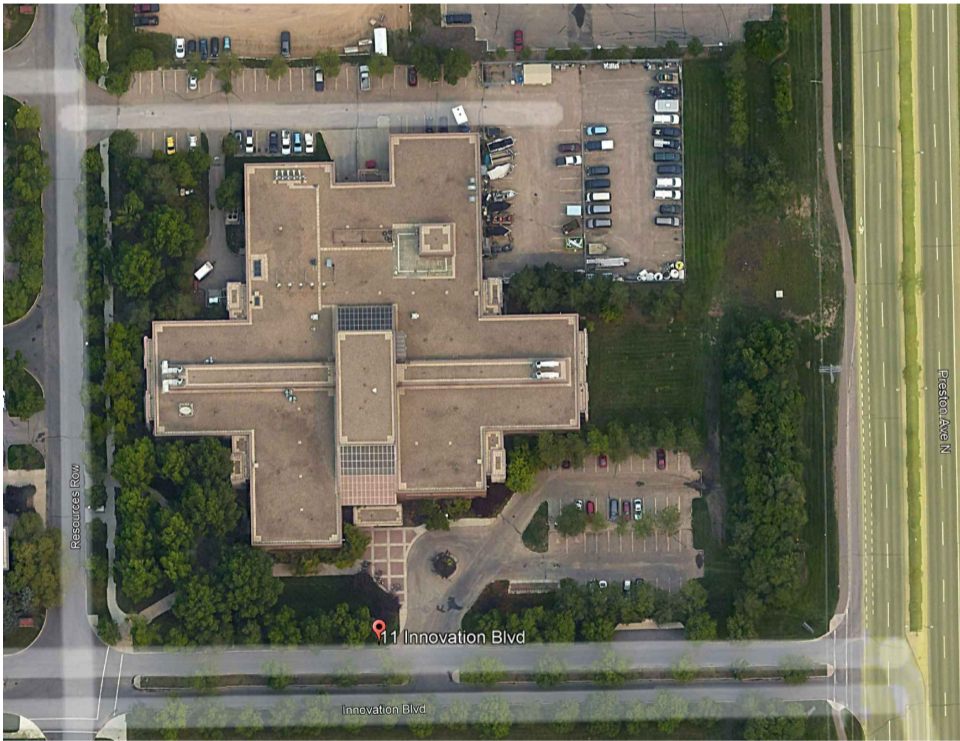
B. REPLACEMENT SCOPE OF WORK

1. PROVIDE LABOUR, MATERIALS AND EQUIPMENT NECESSARY TO COMPLETE WORK OF THIS SECTION. THIS IS A PERFORMANCE SPECIFICATION AND IS ISSUED IN CONJUNCTION WITH THE DRAWINGS WHICH INDICATE THE GENERAL ARRANGEMENT OF WORK, THE DIMENSIONS, STRUCTURAL SYSTEM, AND THE MAJOR ELEMENTS OF THE CONSTRUCTION. AS PERFORMANCE DOCUMENTS, THE DRAWINGS AND SPECIFICATIONS DO NOT NECESSARILY INDICATE OR DESCRIBE ALL ITEMS REQUIRED FOR THE FULL DESIGN, PERFORMANCE AND COMPLETION OF WORK OF THIS SECTION.
2. THE SLOPED GLAZING CONTRACTOR SCOPE OF WORK WILL INCLUDE BUT NOT LIMITED TO THE FOLLOWING:
 - 2.1. VERIFY THE EXISTING CONDITION OF SLOPED GLAZINGS SUPPORTS ON SITE PRIOR TO SHOP DRAWINGS PREPARATION. ANY ADDITIONAL STRUCTURAL SUPPORTS NEEDED TO COMPLETE THE SLOPED GLAZING INSTALLATION SHOULD BE INCLUDED IN THE SCOPE OF WORK, AND WILL NOT BE TREATED AS EXTRA TO THE CONTRACT.
 - 2.2. THE CONTRACTOR WILL SUBMIT AN ENGINEER–STAMPED SHOPDRAWING TOGETHER WITH ENGINEERING LETTERS OF ASSURANCE, TO THE CONSULTANT AND OWNER.
 - 2.3. ENGINEERING, DESIGN, SHOP–DRAWINGS PREPARATION, SUPPLY AND INSTALLATION OF METAL–FRAMED SLOPED GLAZING SYSTEM, INCLUDING ALUMINUM FRAMING, INTEGRAL CLOSURES, TRIM, PERIMETER FLASHINGS AND SURFACE REGLETS.
 - 2.4. ENGINEERING MUST INCLUDE CUSTOM METAL BRACKETS TO CONNECT THE ALUMINUM FRAMING TO THE BUILDING STRUCTURE. CONTRACTOR SHALL VERIFY THE EXISTING SITE CONDITION PRIOR TO ANY SHOP DRAWING PREPARATION.
 - 2.5. FASTENERS, ANCHORS AND RELATED REINFORCEMENT OF FRAMING SYSTEM AS REQUIRED TO RESIST DESIGN LOADS.
 - 2.6. INCLUDE A TEMPORARY WORKING PLATFORM / HOARDING TO SEAL OFF AND WEATHERPROOF THE SLOPED GLAZING OPENING, AND KEEP THE BUILDING SECURE FROM ANY INTRUDER ONCE THE OLD SLOPED GLAZING HAS BEEN REMOVED. EQUALLY, THE PUBLIC AREA BENEATH SHALL BE PROTECTED TO KEEP SAFE ANY OCCUPANTS / PEDESTRIANS WITHIN THE INTERIOR SPACES.
 - 2.7. FIELD WATER TESTING: CONTRACTOR TO INCLUDE FOR A THIRD PARTY WATER INFILTRATION TESTING FOR THE NEW SLOPED GLAZING SYSTEMS. TESTING SHOULD BE SCHEDULED WHILE THE INTERIOR HOARDING / SCAFFOLDING IS STILL IN PLACE. TESTING WILL BE PAID, COORDINATED AND SCHEDULED BY THE CONTRACTOR. A WATER TEST REPORT SHOULD BE SUBMITTED TO THE CONSULTANT AND OWNER AS PART OF THE GENERAL REQUIREMENTS OF THIS CONTRACT.
3. TEMPORARY WEATHER PROTECTION & WORKING PLATFORM:

THE SLOPED GLAZING CONTRACTOR WILL INCLUDE IN THEIR PRICE, THE PROVISION OF TEMPORARY PROTECTION AT THE AREA OF WORK TO ENSURE THAT THE BUILDING AND ITS INTERIOR COMPONENTS ARE PROTECTED AGAINST INCLEMENT WEATHER AND FROM FALLING OBJECTS. PROVIDE SCAFFOLDING NECESSARY TO PERFORM WORK IN ACCORDANCE WITH CAN/CSA–S269.2M, ACCESS SCAFFOLDING FOR CONSTRUCTION PURPOSES. THE CONTRACTOR WILL SUBMIT TO THE OWNER AND CONSULTANT AN ENGINEER–STAMPED SCAFFOLDING DRAWINGS PRIOR TO SITE MOBILIZATION.
4. ROOFING AND PERIMETER TIE-IN: CONTRACTOR TO ALLOW FOR THE REPAIR OF THE EXISTING ROOF AND WALLS ADJACENT TO THE NEW SLOPED GLAZINGS, TO FACILITATE PROPER INSTALLATION AND TIE-IN OF THE NEW SLOPED GLAZING SYSTEM. CONTRACTOR SHALL VERIFY THE ACTUAL SITE CONDITION PRIOR TO THE PREPARATION OF SHOP DRAWINGS.
5. REFER TO THE ENTIRE CONTRACT DOCUMENTS.

C. PERFORMANCE REQUIREMENTS

1. PERFORMANCE REQUIREMENTS: PROVIDE METAL–FRAMED SLOPED GLAZINGS WHICH HAVE BEEN MANUFACTURED, FABRICATED, AND INSTALLED TO WITHSTAND LOADING REQUIRED BY CURRENT NATIONAL BUILDING CODE OF CANADA. PROVIDE PERFORMANCE CRITERIA REQUIRED BY THESE SPECIFICATIONS WITHOUT DEFECTS, DAMAGE OR FAILURE.
2. THE SLOPED GLAZING SYSTEM SHALL BE DESIGNED IN ACCORDANCE WITH THE FOLLOWING STANDARDS:
 - 2.1. NATIONAL BUILDING CODE (LATEST EDITION)
 - 2.2. NATIONAL ENERGY CODE OF CANADA FOR BUILDINGS.
 - 2.3. NORTH AMERICAN FENESTRATION STANDARD (NAFS LATEST EDITION)
 - 2.4. CSA A440.2–04, ENERGY PERFORMANCE OF WINDOWS AND OTHER FENESTRATION SYSTEMS
 - 2.5. NOTE THAT NAFS DOES NOT GOVERN SITE BUILT FRAMED GLAZING SYSTEMS; HOWEVER, THE INTENT IS TO APPLY THESE PERFORMANCE REQUIREMENTS TO THE SLOPED GLAZING DESIGN.
3. SASKATOON CLIMATIC DATA, REQUIRED THERMAL CHARACTERISTICS OF FENESTRATION, AND OTHER MINIMUM PERFORMANCE REQUIREMENTS:
 - 3.1. DEGREE DAYS BELOW 18°C = 5700
 - 3.2. DEGREE DAYS BELOW 15°C = 4800
 - 3.3. OVERALL THERMAL TRANSMITTANCE OF FENESTRATION = 1.9 W/M².K (NECB 2017 3.2.2.3)
 - 3.4. AIR INFILTRATION / EXFILTRATION = FIXED
 - 3.5. SNOW LOADS: S_S = 1.7 KPA, S_R = 0.1 KPA
 - 3.6. HOURLY WIND PRESSURES 1/10: 0.33 KPA ; 1/50: 0.43 KPA
 - 3.7. IMPACT LOADS FOR FALL PROTECTION
 - 3.8. WATER TIGHTNESS: SLOPED GLAZING WATER TIGHTNESS SHALL MEET B5 RATING WITH NO WATER INFILTRATION AT 500 PA WHEN TESTED IN ACCORDANCE WITH CSA A440–00 AND ASTM E1105.
4. DESIGN SAFETY GLASS REQUIREMENTS IN ACCORDANCE TO BUILDING CODE. THIS IS IN ADDITION TO ANY MINIMUM TEMPERED GLASS, LAMINATED GLASS, AND SECURITY GLASS REQUIREMENTS EXPLICITLY SPECIFIED IN THE CONTRACT.
5. NEW SLOPED GLAZING SYSTEM IS TO BE DESIGNED TO SUIT THE EXISTING STRUCTURAL SUPPORTS.
6. SLOPED GLAZING SYSTEMS MUST HAVE ADEQUATE RESISTANCE TO PRESSURE DIFFERENTIALS.
7. SLOPED GLAZING SYSTEMS MUST HAVE ADEQUATE PROVISION FOR LIVE, DEAD, WIND, SNOW AND RAIN LOAD WITHOUT FAILURES, DISTORTION, OR FRACTURE.
8. SLOPED GLAZING SYSTEMS MUST HAVE ADEQUATE PROVISION FOR THERMAL MOVEMENT WITHOUT THERMAL FRACTURES OF FRAMING MEMBERS, GLAZING AND/OR SEALANTS.
9. SLOPED GLAZING SYSTEMS MUST HAVE ADEQUATE SUPPORT AND ANCHORAGE OF COMPONENTS TAKING INTO CONSIDERATION ALL LOADING FACTORS AND COMBINATION.
10. SLOPED GLAZING SYSTEMS MUST HAVE A WATER AND WEATHER–TIGHT INSTALLATION WITH GASKETS, SEALS, AND SEALANTS TO EFFECTIVELY PREVENT WATER ENTRY INTO BUILDING.
11. SLOPED GLAZING SYSTEM MUST CONFORM WITH THE "OPEN RAINSCREEN PRINCIPLE" (I.E., BE PRESSURE–EQUALIZED AND SELF–DRAINED TO THE EXTERIOR). PROVIDE PRESSURE EQUALIZED AND SELF–DRAINED VENTS AT EXTERIOR FRAME MEMBERS WITHOUT CAUSING AIR FLOW AROUND GLAZING.
12. SLOPED GLAZING SYSTEM MUST HAVE CONTINUOUS AIR AND VAPOUR SEALS TO CONTROL TRANSFER OF MOISTURE VAPOUR INTO SYSTEM OF INSULATED GLASS UNITS.



SITE PLAN



SLOPED GLAZING 1 INTERIOR VIEW



SLOPED GLAZING 1 INTERIOR VIEW 2



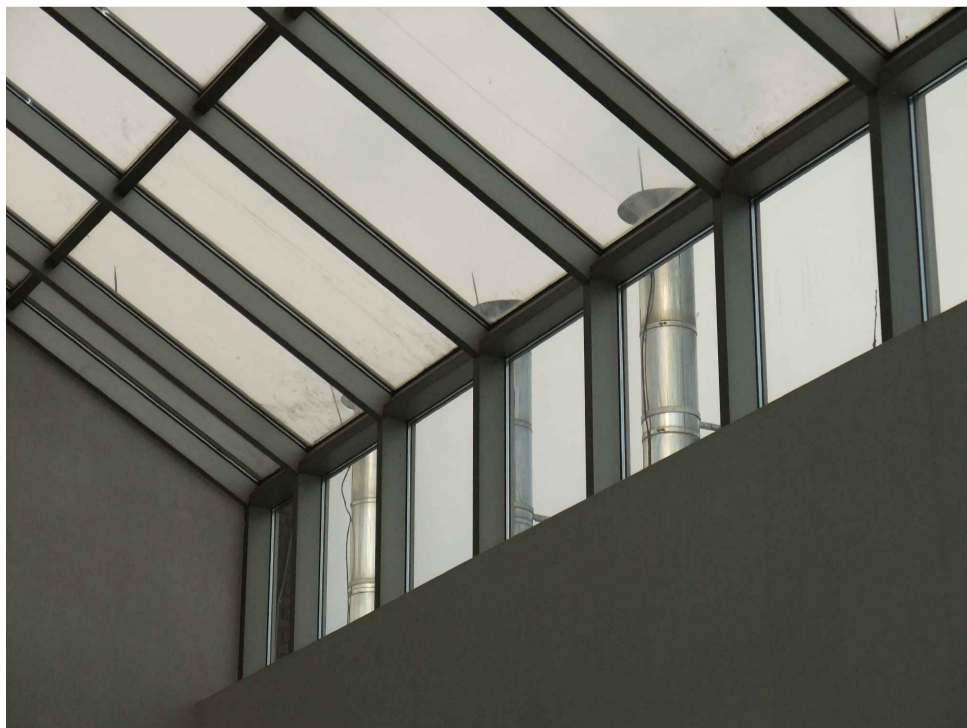
SLOPED GLAZING 1 INTERIOR VIEW 3



SLOPED GLAZING 2 FRONT VIEW



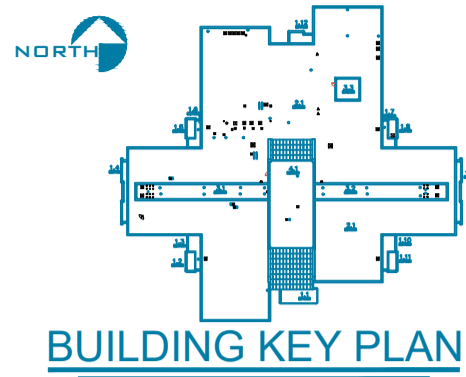
SLOPED GLAZING 2 INTERIOR VIEW 1



SLOPED GLAZING 2 INTERIOR VIEW 2



PROPOSE INTERIOR VIEW



BUILDING KEY PLAN

LEGEND

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PERMIT TO PRACTICE NO. 1000288

03	ISSUED FOR TENDER	14-MAR-2022
02	ISSUED FOR 100% DESIGN	08-FEB-2022
01	ISSUED FOR 60% REVIEW	25-OCT-2021
REV	Description	Date

A	A detail no. no. du detail	A
C	B location drawing no. sur dessin no.	B C
	C drawing no. dessin no.	

project	projet
2022 SLOPED GLAZING (SKYLIGHTS) & RELATED REMEDIAL REPAIRS AT	
NATIONAL HYDROLOGY RESEARCH CENTRE	
11 INNOVATION BLVD SASKATOON, SK S7N 3H5	
ENVIRONMENT CANADA	
335 River Rd	
Ottawa ON, K1V 1C7	

drawing	dessin
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GENERAL NOTES

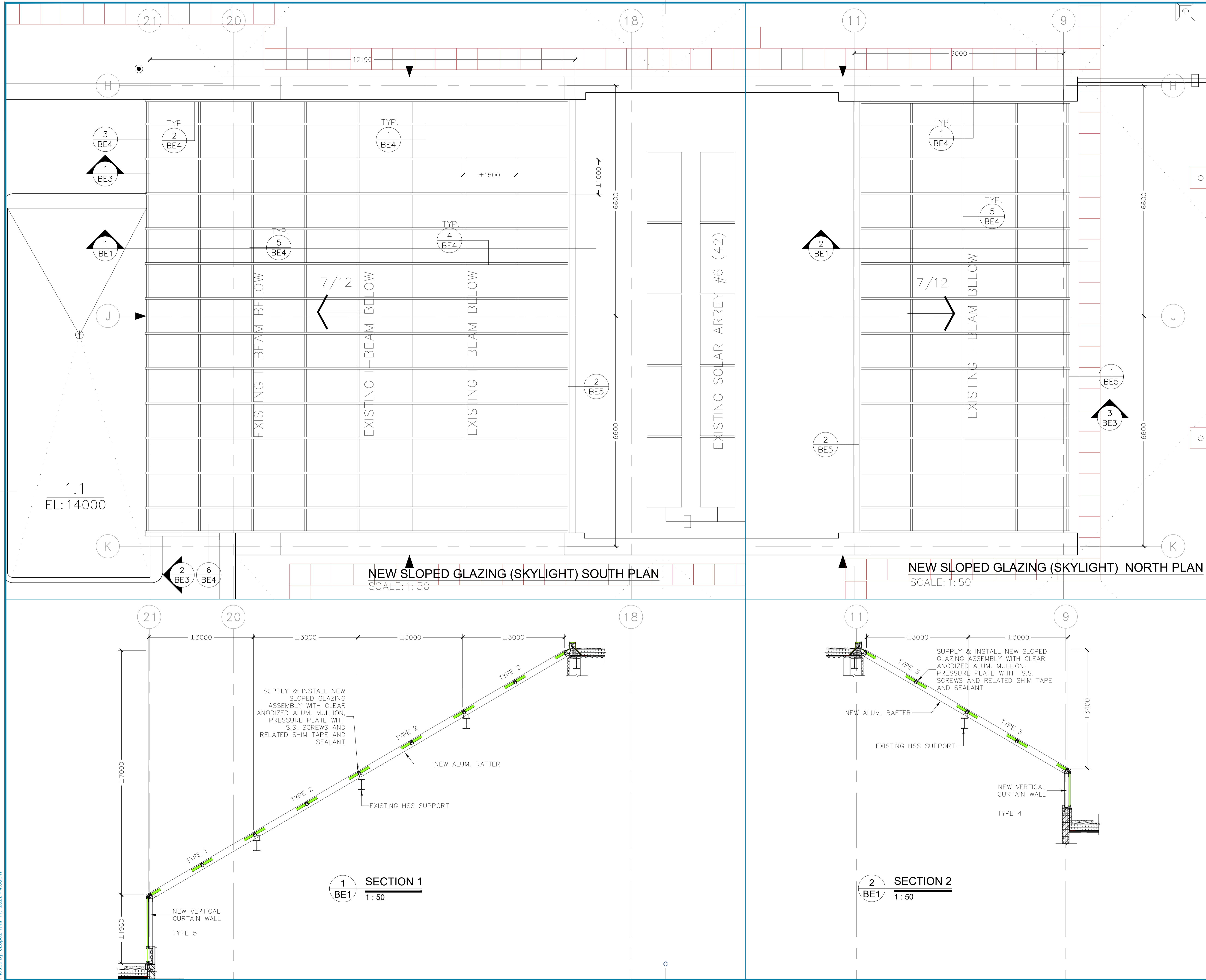
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Date	2022/02/08	(yyyy/mm/dd)
Drawn By	IRC GROUP B.W.	Dessiné par
Date	2021/10/25	(yyyy/mm/dd)
Reviewed By	IRC GROUP A.G.	Examiné par
Date	2022/02/08	(yyyy/mm/dd)
Approved By		Approuvé par
Date		(yyyy/mm/dd)
Tender		Soumission
Project Manager	Administrateur de projets	
EC PMDI Proj no.	Consultant Proj no.	


Drawing no.	No. du dessin
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BE0

Plotted by: JLopez, Mar 11, 2022 - 4:56pm

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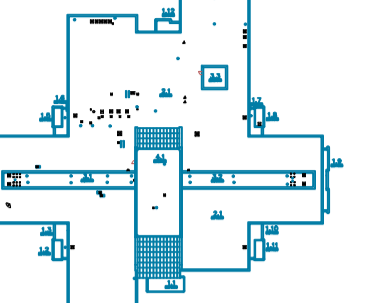





Environment Canada
Environnement Canada

Real Property
Management Division
Technical Services

Division Gestion
des biens immobilier
Services Techniques



BUILDING KEY PLAN

LEGEND

NOT FOR CONSTRUCTION

PERMIT TO PRACTICE NO. 1000288

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03	ISSUED FOR TENDER	14-MAR-2022
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01	ISSUED FOR 66% REVIEW	25-OCT-2021

A detail no.
no. du detail

B location drawing no.
sur dessin no.

C drawing no.
dessin no.

A

B

C

project

2022 SLOPED GLAZING (SKYLIGHTS) & RELATED REMEDIAL REPAIRS AT
NATIONAL HYDROLOGY RESEARCH CENTRE
11 INNOVATION BLVD SASKATOON, SK S7N 3H5
ENVIRONMENT CANADA
335 River Rd
Ottawa ON, K1V 1C7

drawing

dessin

SLOPED GLAZING PLAN
& SECTION VIEW

Designed By
Date
2022/02/08

RIMKUS / IRC GROUP
(yyyy/mm/dd)

Conçu par

Drawn By
Date
2021/10/25

IRC GROUP B.W.
(yyyy/mm/dd)

Dessiné par

Reviewed By
Date
2022/02/08

IRC GROUP A.G.
(yyyy/mm/dd)

Examiné par

Approved By

Approuvé par

Date

(yyyy/mm/dd)

Tender

Soumission

Project Manager
EC PMDI Proj no.

Administrateur de projets
Consultant Proj no.

Drawing no.

No. du dessin

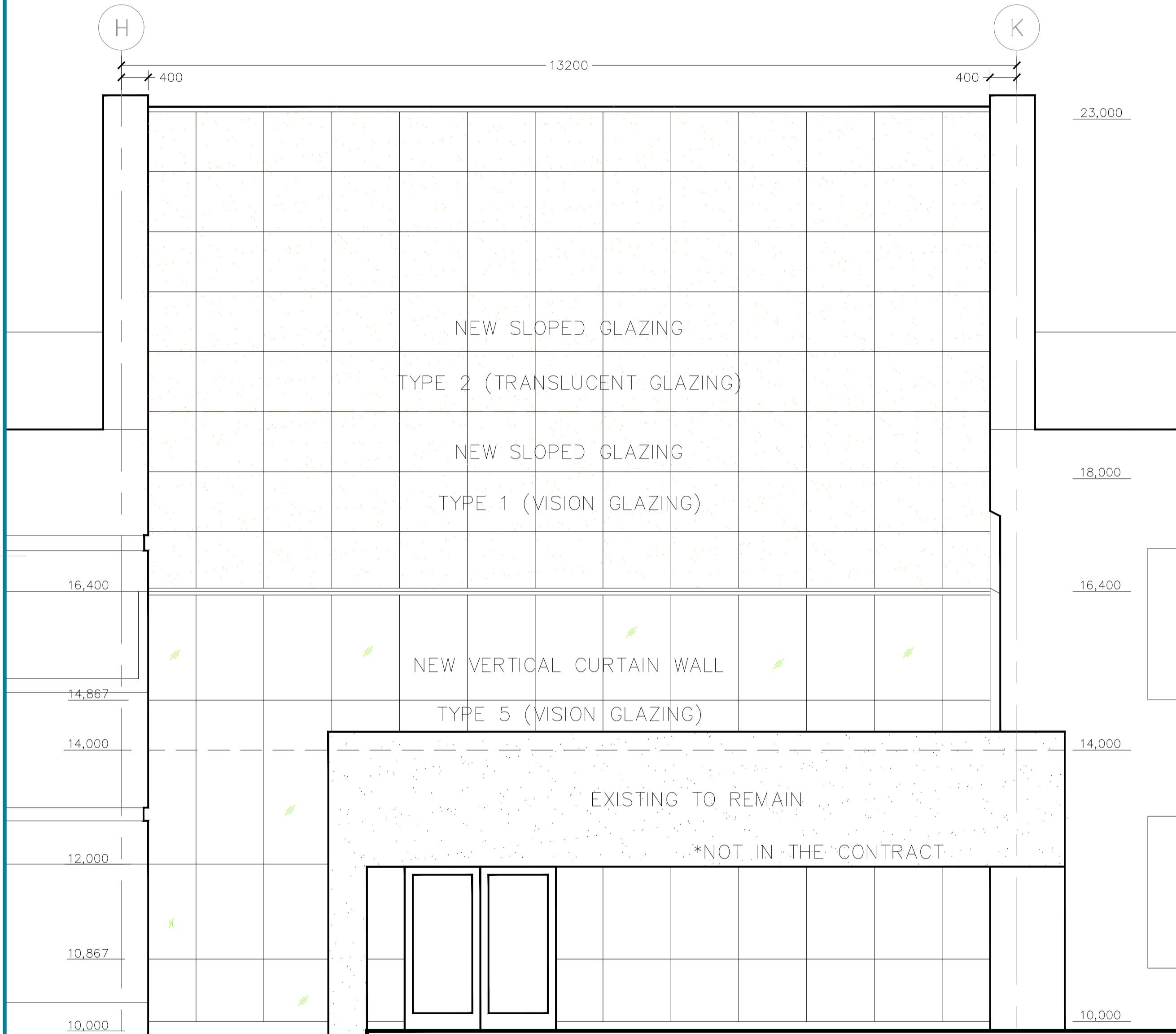
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Plotted by: J.Lopez Mar 11, 2022 - 5:01pm

PWGSC A2 (841x594)

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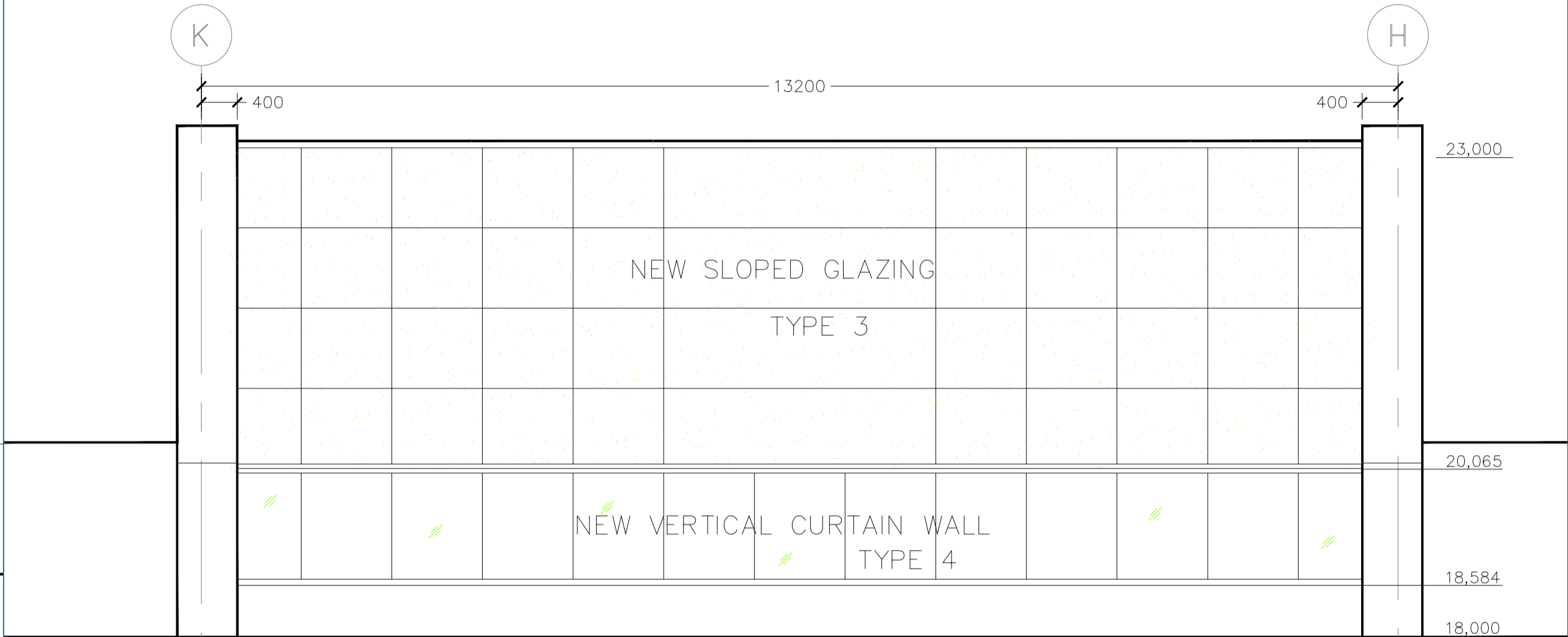
C



SOUTH ELEVATION VIEW
SCALE: 1: 50

NOTE:

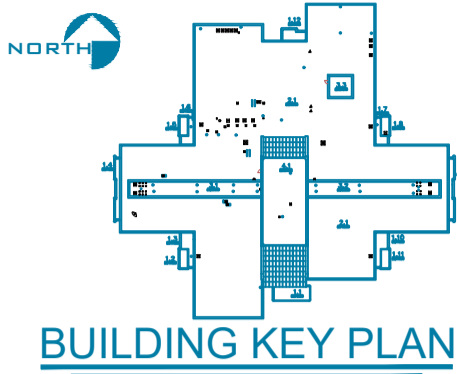
CONTRACTOR TO VERIFY DIMENSIONS ON SITE.



NORTH ELEVATION VIEW
SCALE: 1: 50

GLAZING TYPES

1. TYPE 1: SLOPED VISION GLAZING BIRD DETERRENT AT THE LOWER PORTION OF THE SOUTH SKYLIGHT. SEE DRAWINGS FOR THE LOCATION. ACCEPTABLE PRODUCTS: WILL BE LOW-E COATED ACID-ETCHED BIRD SAFE GLASS. TRIPLE PANE SOLARBAN 70XL BY VITRO GLASS, WITH AVIPROTEK E. GLASS SEPARATED BY ½" (13MM) ARGON-FILLED AIRSPACE.
2. TYPE 2 SLOPED TRANSLUCENT GLAZING UNITS AT THE UPPER PORTION OF THE SOUTH SKYLIGHT, AND WHERE INDICATED ON THE DRAWINGS. ACCEPTABLE PRODUCT IS SOLERA TR9 MANUFACTURED BY ADVANCE GLAZING LIMITED.
3. TYPE 3 SLOPED TRANSLUCENT GLAZING UNITS AT THE ENTIRE NORTH SKYLIGHT, AND WHERE INDICATED ON THE DRAWINGS. ACCEPTABLE PRODUCT IS SOLERA TR18 MANUFACTURED BY ADVANCE GLAZING LIMITED.
4. TYPE 4 VERTICAL TRANSLUCENT GLAZING UNITS AT NORTH WALL TRANSITION AND WHERE INDICATED ON THE DRAWINGS. ACCEPTABLE PRODUCT IS SOLERA TR18 MANUFACTURED BY ADVANCE GLAZING LIMITED.
5. TYPE 5 VERTICAL VISION GLAZING UNITS AT SOUTH WALL. SEE DRAWINGS FOR THE LOCATION. ACCEPTABLE PRODUCTS: WILL BE LOW-E COATED ACID-ETCHED BIRD SAFE GLASS. TRIPLE PANE SOLARBAN 70XL BY VITRO GLASS, WITH AVIPROTEK E. GLASS SEPARATED BY ½" (13MM) ARGON-FILLED AIRSPACE.



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REV	Description	Date

A	A
C	B C

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2022 SLOPED GLAZING (SKYLIGHTS) & RELATED REMEDIAL REPAIRS AT

NATIONAL HYDROLOGY RESEARCH CENTRE

11 INNOVATION BLVD SASKATOON, SK S7N 3H5

ENVIRONMENT CANADA
335 River Rd
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drawing dessin

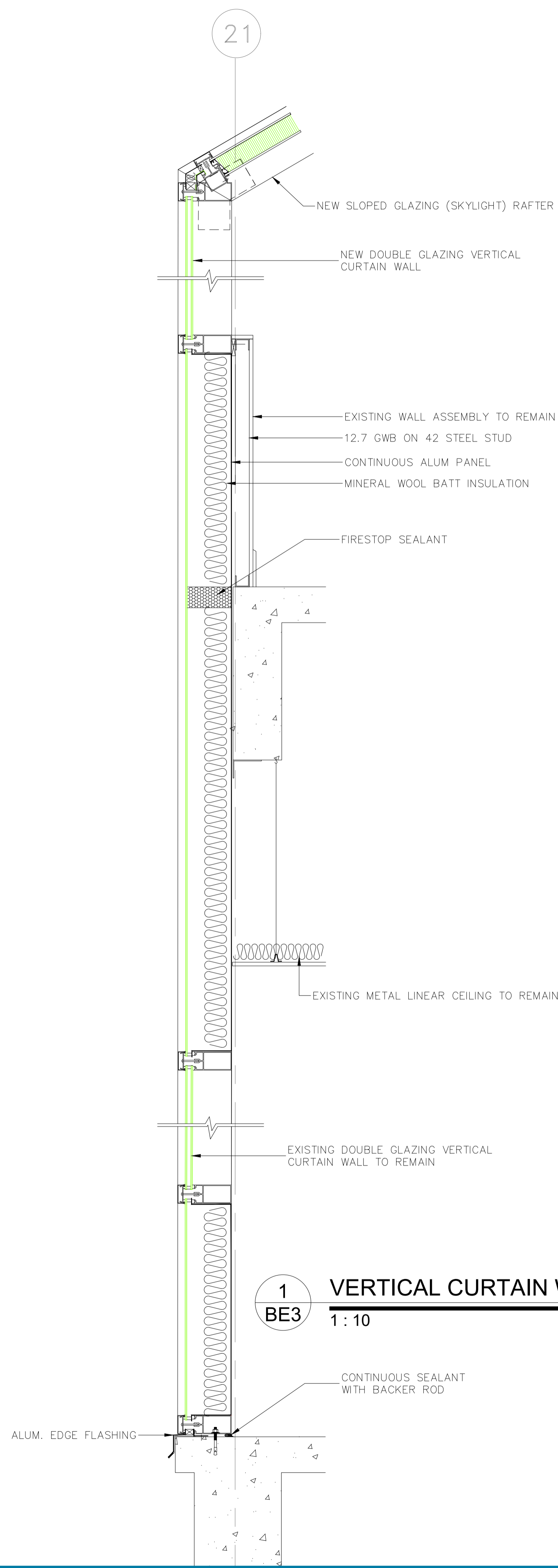
SLOPED GLAZING ELEVATIONS

Designed By	RIMKUS / IRC GROUP	Conçu par
Date	2022/02/08	(yyyy/mm/dd)
Drawn By	IRC GROUP B.W.	Dessiné par
Date	2021/10/25	(yyyy/mm/dd)
Reviewed By	IRC GROUP A.G.	Examiné par
Date	2022/02/08	(yyyy/mm/dd)
Approved By		Approuvé par
Date		(yyyy/mm/dd)
Tender		Soumission
Project Manager	Administrateur de projets	
EC PMDI Proj no.	Consultant Proj no.	
Drawing no.	No. du dessin	

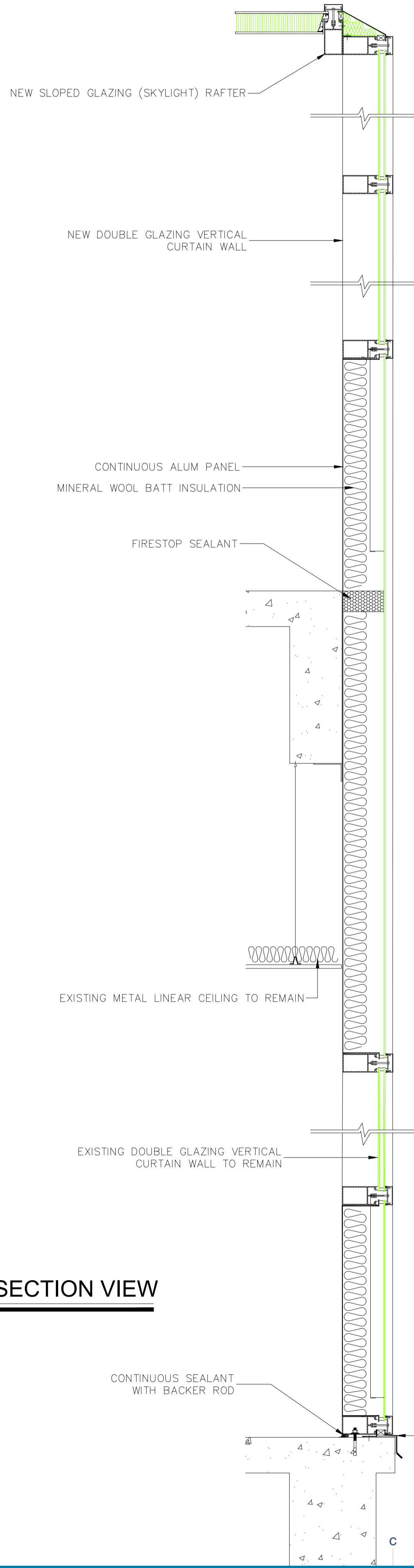
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Plotted by: JLopez Mar 11, 2022 4:57pm

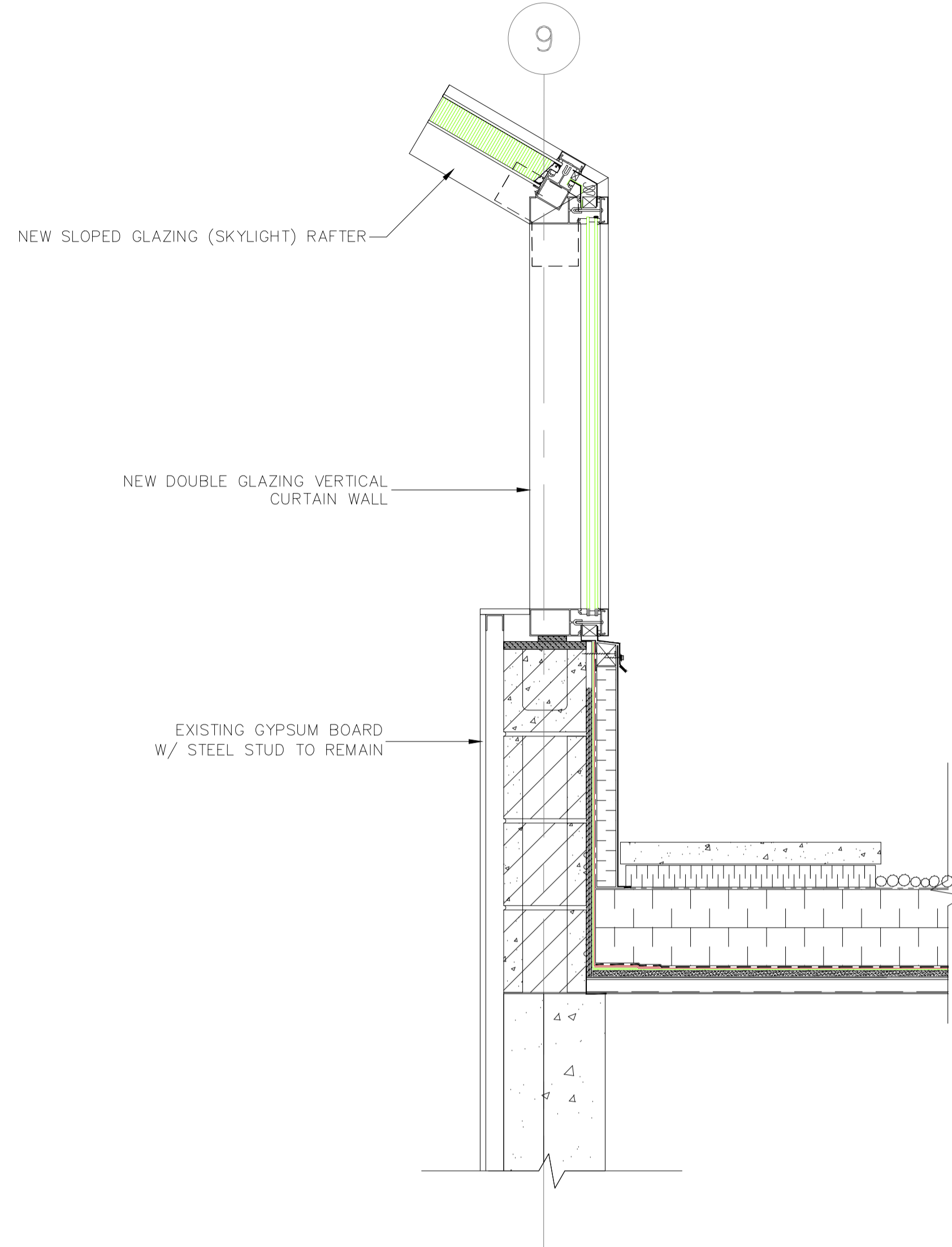
PWGSC A2 (841x594)



1
BE3
VERTICAL CURTAIN WALL 1 SECTION VIEW
1 : 10

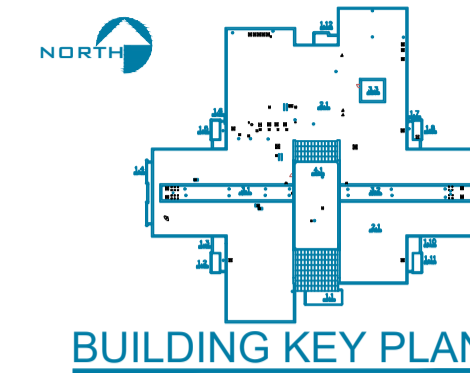


2
BE3
VERTICAL CURTAIN WALL 1 SECTION VIEW
1 : 10



3
BE3
VERTICAL CURTAIN WALL 2 SECTION VIEW
1 : 10

0 10 20mm 40 60 80 100 120 140 160 180 200mm



BUILDING KEY PLAN

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REV	Description	Date
A	detail no. no. du detail	A
B	location drawing no. sur dessin no.	B
C	drawing no. dessin no.	C

project
2022 SLOPED GLAZING (SKYLIGHTS) & RELATED REMEDIAL REPAIRS AT
NATIONAL HYDROLOGY RESEARCH CENTRE
11 INNOVATION BLVD SASKATOON, SK S7N 3H5
ENVIRONMENT CANADA
335 River Rd
Ottawa ON. K1V 1C7

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**SLOPED GLAZING
SECTION VIEW**

Designed By	RIMKUS / IRC GROUP	Conçu par
Date	2022/02/08	(yyyy/mm/dd)
Drawn By	IRC GROUP B.W.	Dessiné par
Date	2021/10/25	(yyyy/mm/dd)
Reviewed By	IRC GROUP A.G.	Examiné par
Date	2022/02/08	(yyyy/mm/dd)
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Date		(yyyy/mm/dd)
Tender		Soumission

Project Manager
EC PMDI Proj no.

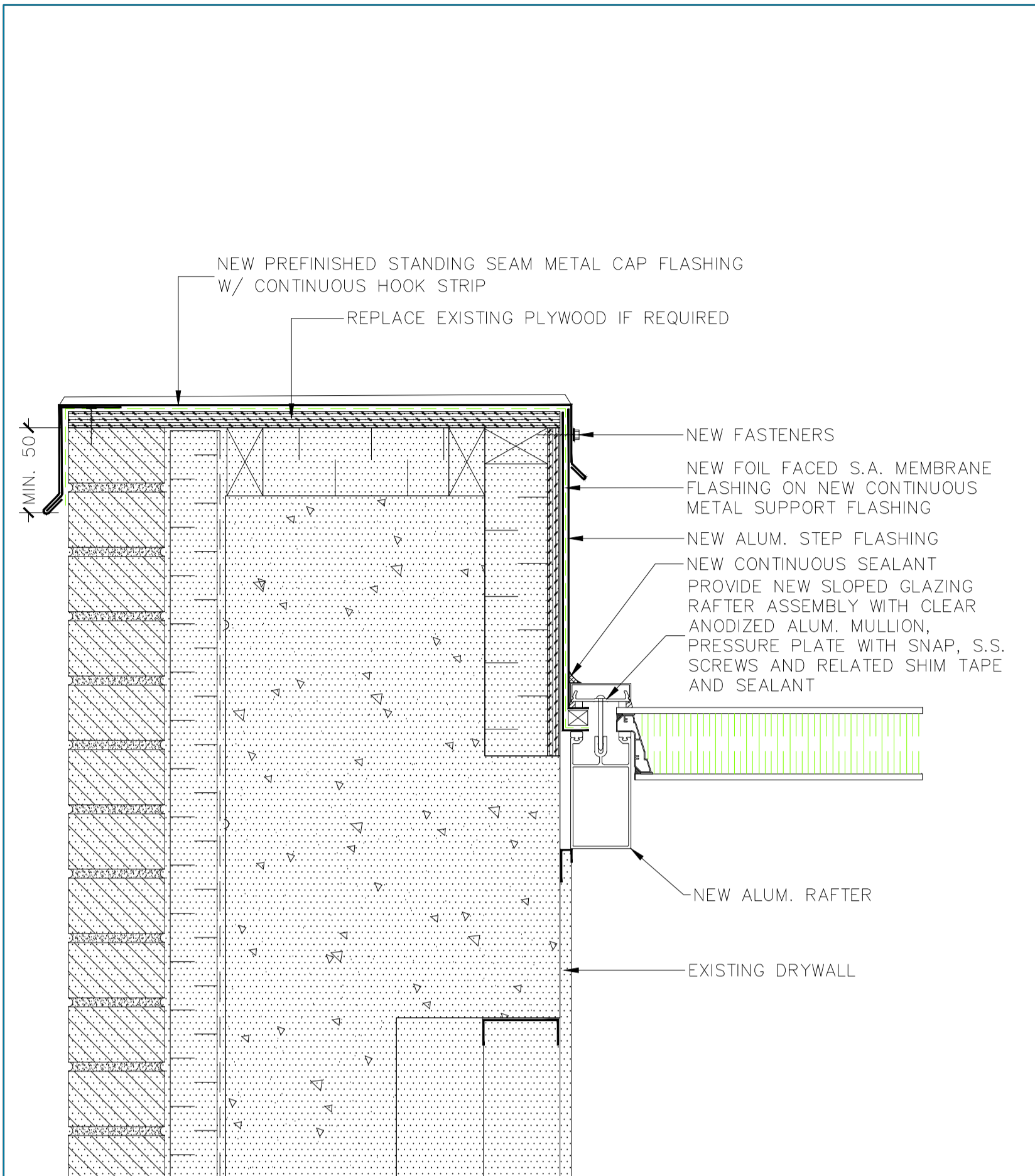
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Consultant Proj no.

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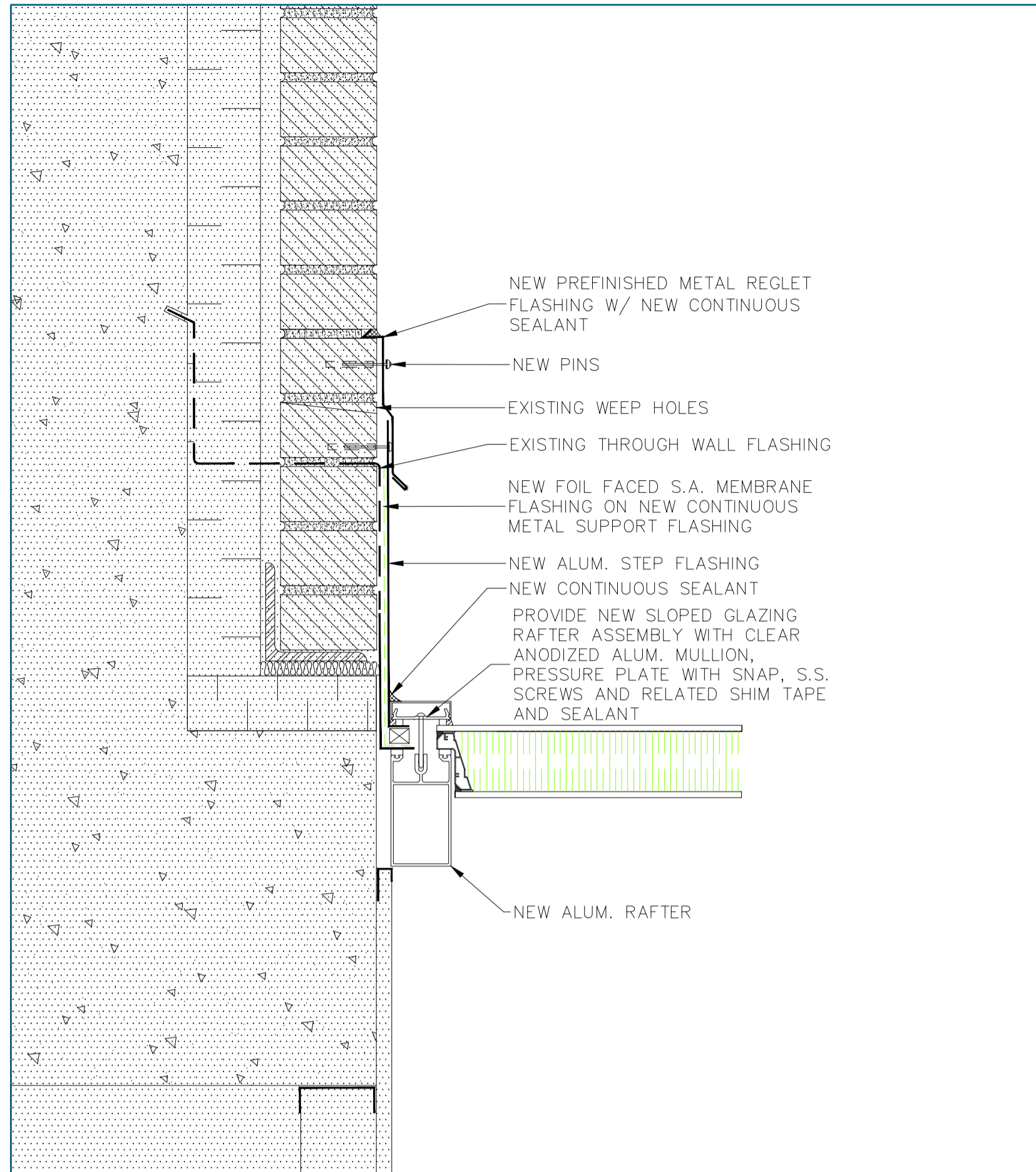
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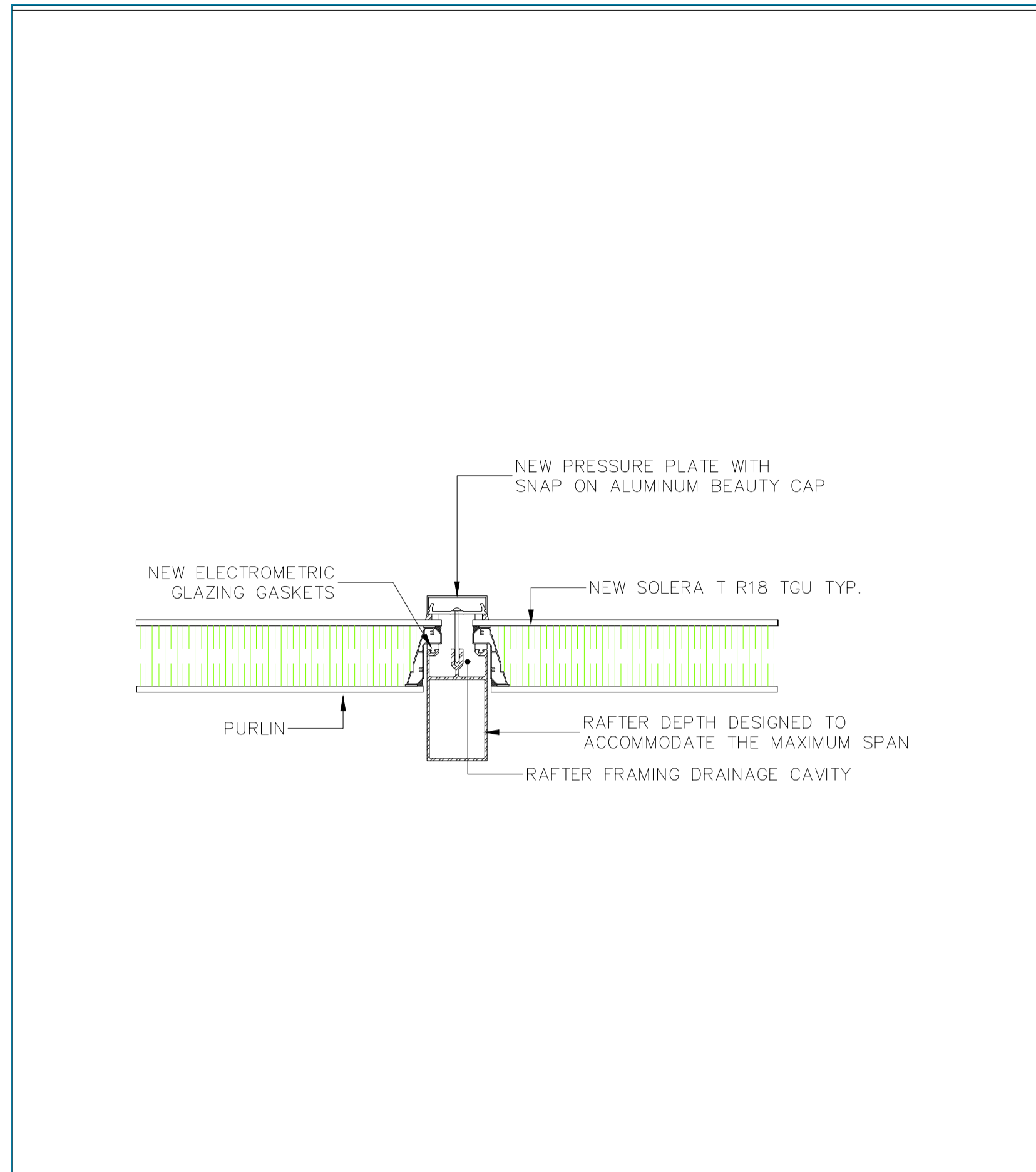
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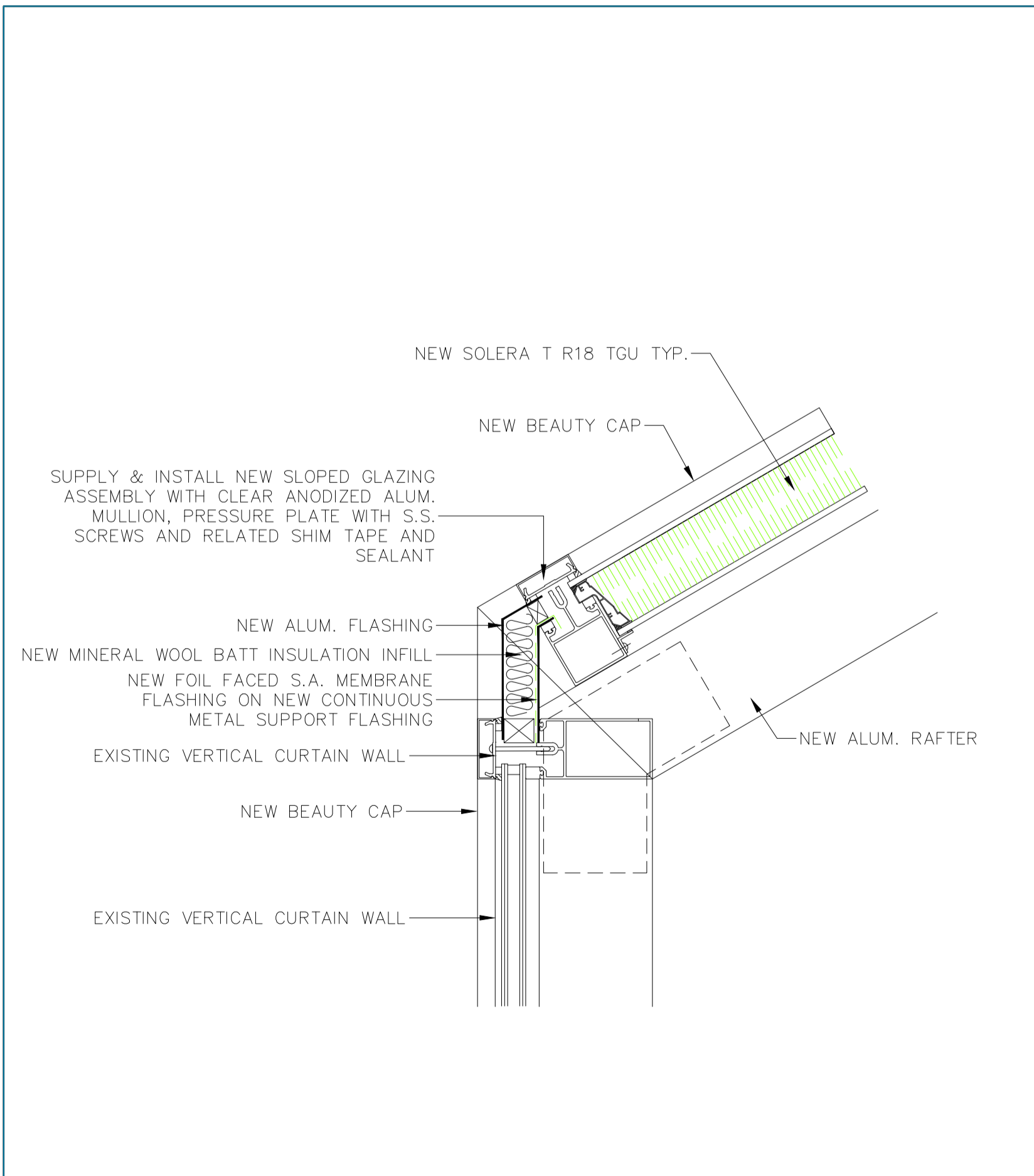
1
BE4
1:5
PARAPET DETAIL



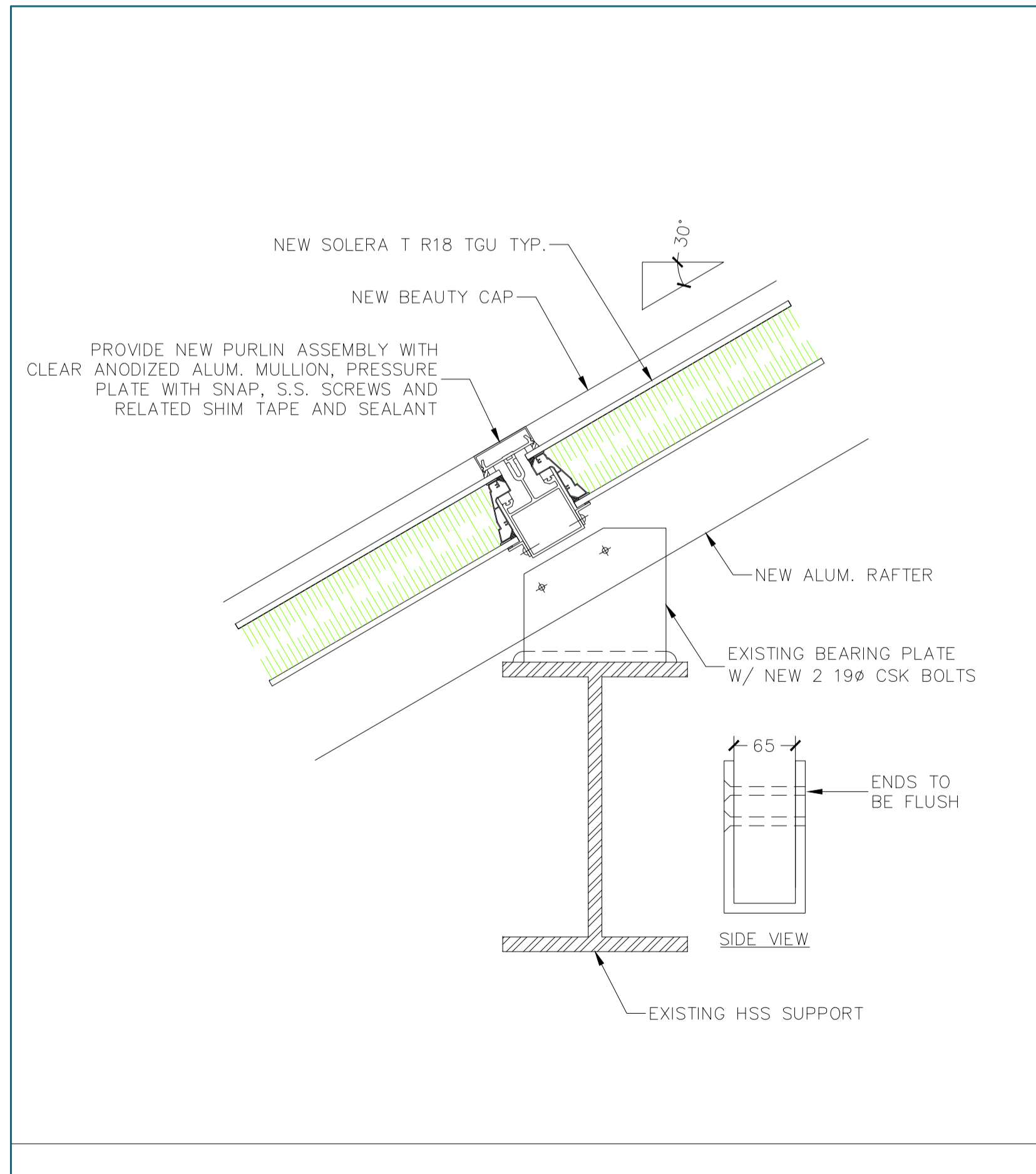
2
BE4
1:5
SLOPED GLAZING STEP FLASHING DETAIL



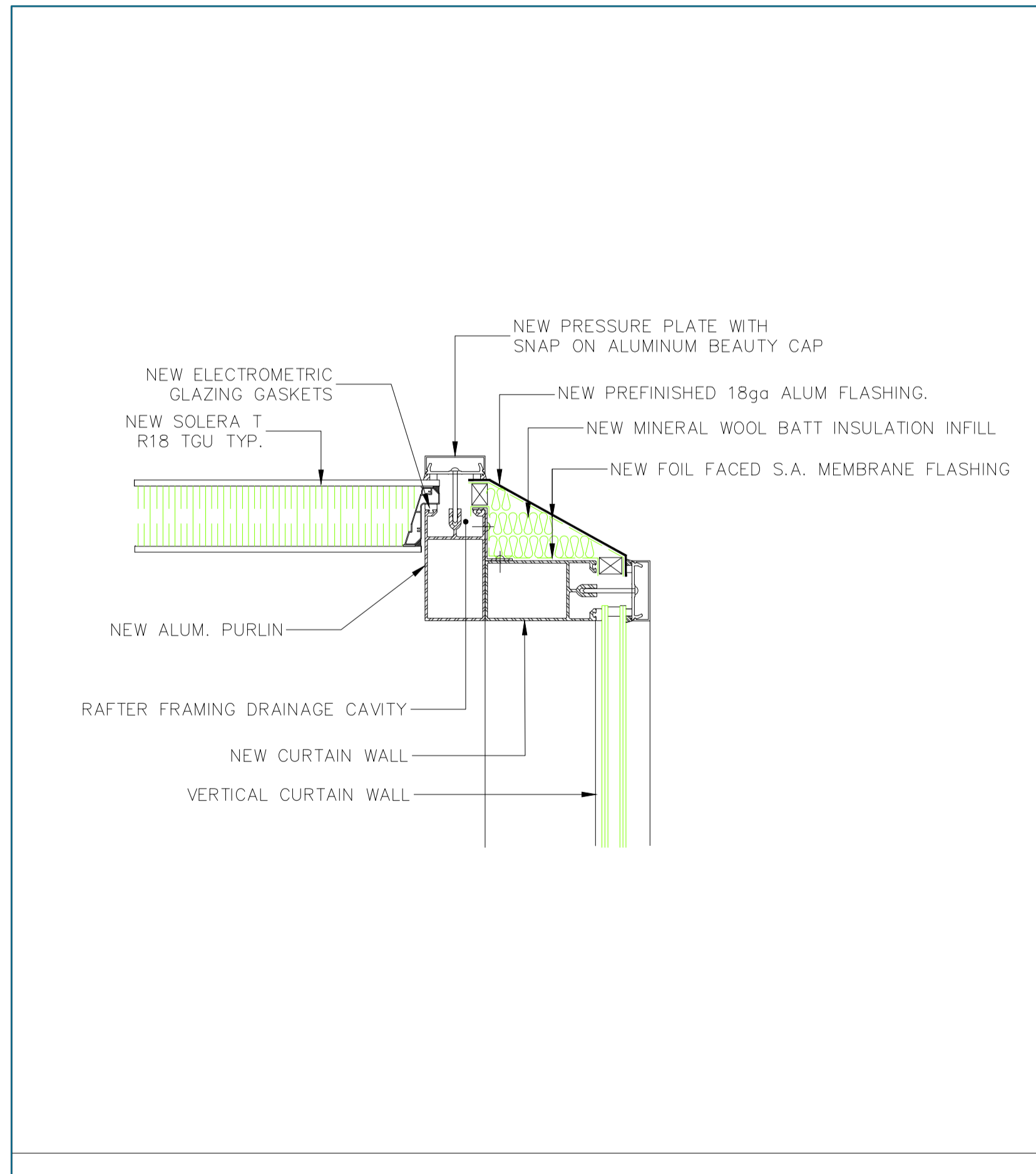
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BE4
1:5
SLOPED GLAZING RAFTER DETAIL



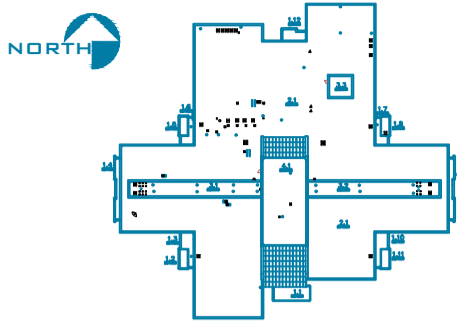
4
BE4
1:5
SLOPED CURTAIN WALL DETAIL



5
BE4
1:5
SLOPED GLAZING PURLIN DETAIL



6
BE4
1:5
SLOPED GLAZING PURLIN AT INTERSECTION



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	C drawing no. dessin no.	

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2022 SLOPED GLAZING (SKYLIGHTS) & RELATED REMEDIAL REPAIRS AT

NATIONAL HYDROLOGY RESEARCH CENTRE

11 INNOVATION BLVD SASKATOON, SK S7N 3H5

ENVIRONMENT CANADA
335 River Rd
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DETAILS

Designed By	RIMKUS / IRC GROUP	Conçu par
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Tender		Soumission

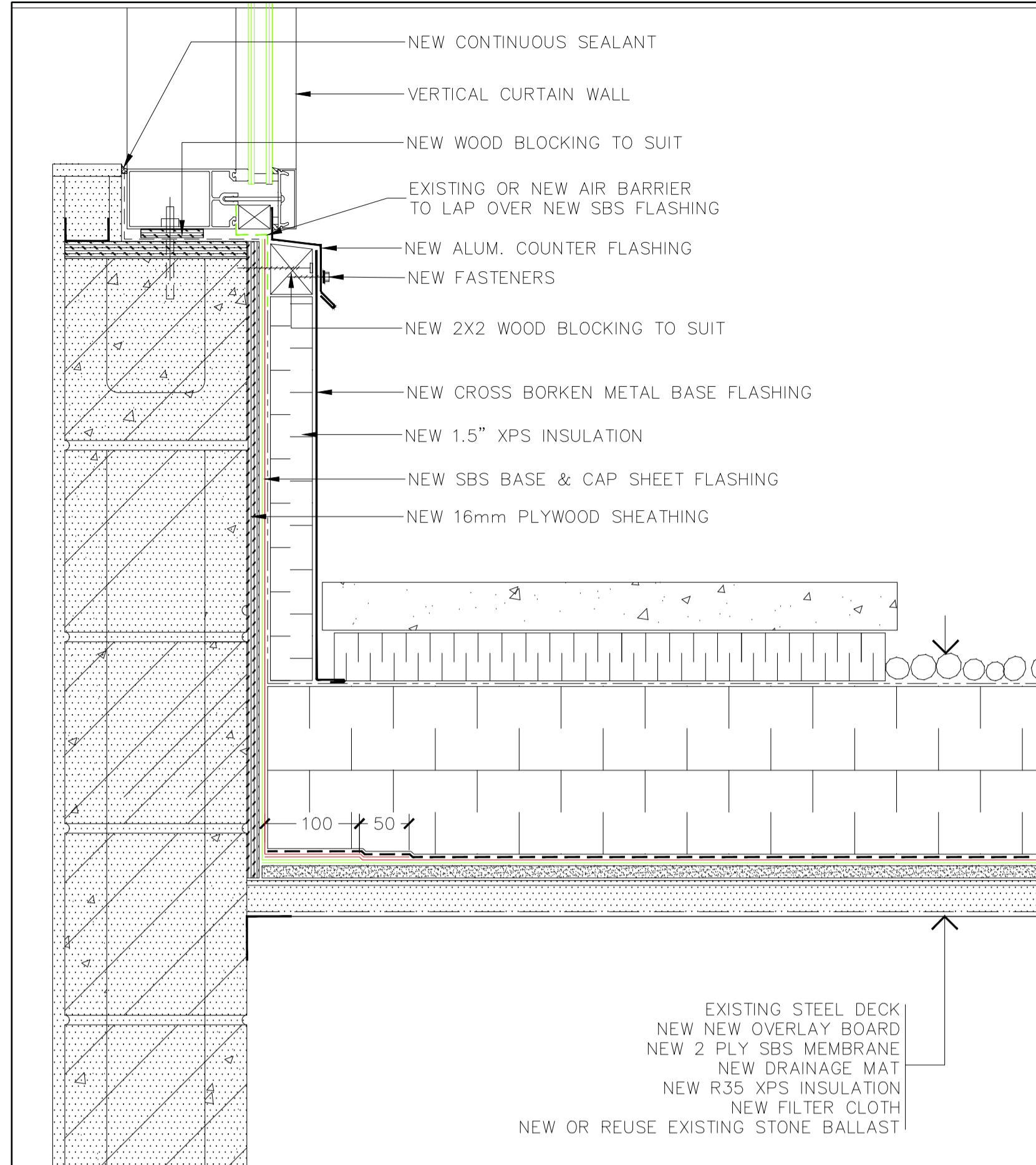
Project Manager Administrateur de projets
EC PMDI Proj no. Consultant Proj no.

Drawing no. No. du dessin

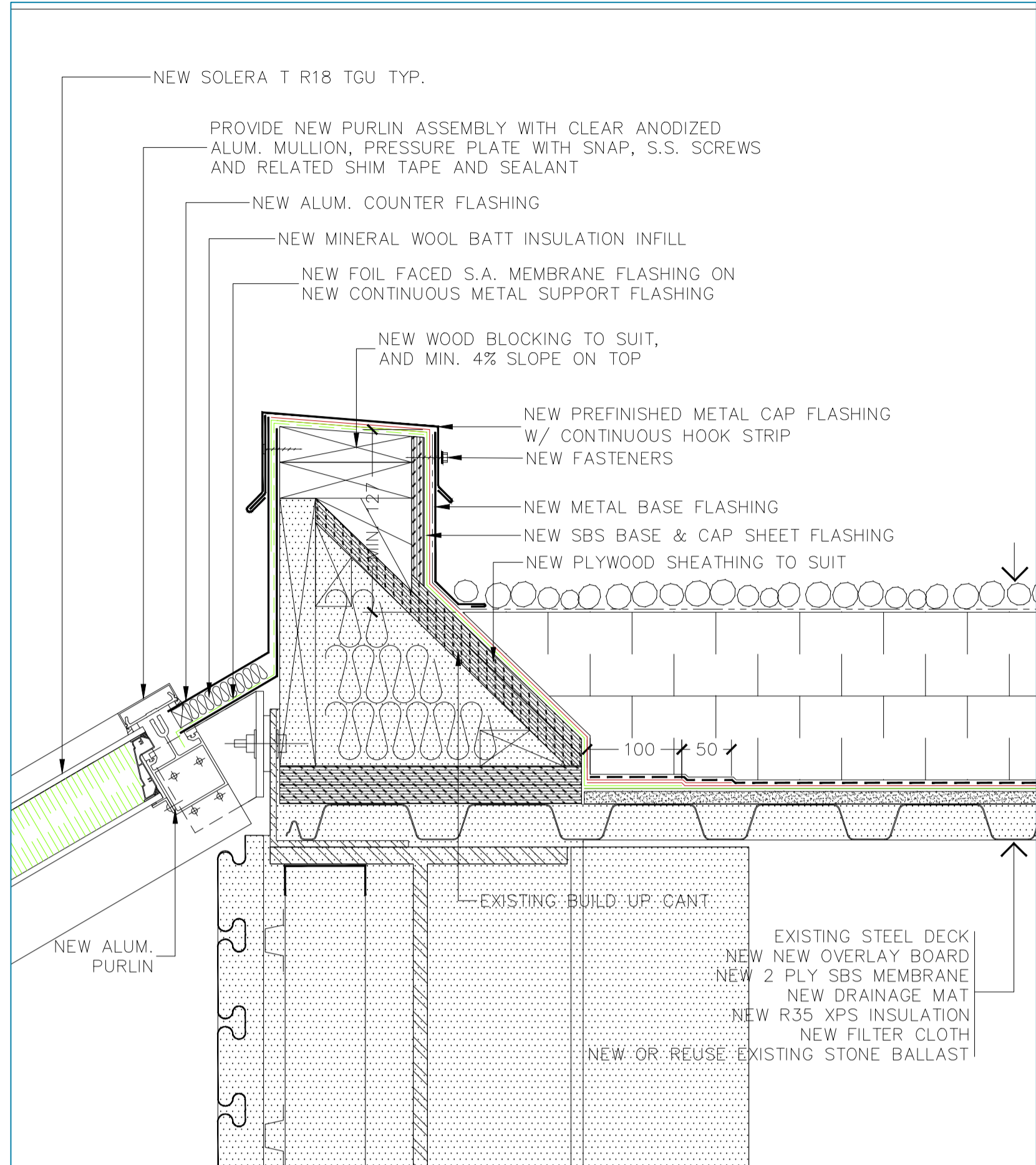
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Plotted by: J. Lopez, Mar 11, 2022 - 4:59pm

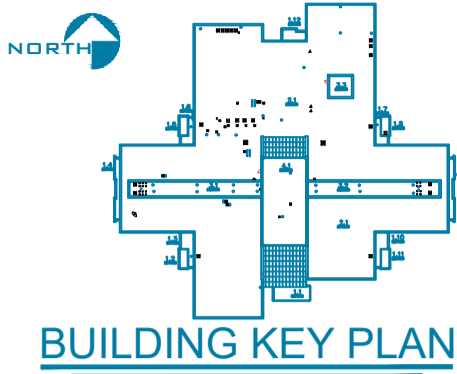
PWGSC A2 (841x594)



1 CURTAIN WALL SILL FLASHING DETAIL
BE5 1:5



2 PARAPET DETAIL
BE5 1:5



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project projet

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335 River Rd
Ottawa ON, K1V 1C7

drawing dessin

DETAILS

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Project Manager	Administrateur de projets
EC PMDI Proj no.	Consultant Proj no.

Drawing no. No. du dessin

BE5

C

0 10 20mm 40 60 80 100 120 140 160 180 200mm