



City of Saint John

TENDER

Tender # 2022-082704T

Roof Rehabilitation – Millidgeville Wastewater Treatment Plant

Sealed tenders, hand delivered or couriered, addressed to Chris Roberts, SCMP, CPPB, Supply Chain Management, 1st Floor – 175 Rothesay Avenue, Saint John, NB, E2J 2B4, and marked on the envelope:

“Tender # 2022-082704T – Roof Rehabilitation – Millidgeville Wastewater Treatment Plant”

will be received until 2:30:00 pm, Tuesday, April 26, 2022 for the supply of all materials, labor and equipment necessary for the rehabilitation of the roof at the Millidgeville Wastewater Treatment Plant in accordance with the enclosed specifications, drawings, terms and conditions.

In light of the current Covid-19 pandemic, there will be no public opening. Tenders will be opened by the Tender Opening Committee, in the second-floor boardroom, 175 Rothesay Avenue, Municipal Operations Complex, immediately following the tender closing time. **Registered bidders may attend remotely via Teams invitation.**

The lowest or any tender not necessarily accepted.

**Chris Roberts, SCMP, CPPB
Supply Chain Management**

Issued: Wednesday, April 13, 2022

T E N D E R
Tender # 2022-082704T
Roof Rehabilitation – Millidgeville Wastewater Treatment Plant

SCOPE OF WORK:

The City of Saint John is soliciting tenders from qualified bidders to supply all materials, labor and equipment necessary for the rehabilitation of the roof at the Millidgeville Wastewater Treatment Plant, as per the specifications, drawings, terms and conditions outlined in this document.

A pre-bid site visit will be held on Tuesday, April 19, 2022, at 12:00 pm. All bidders are strongly urged to attend.

SPECIFICATIONS:

See Appendix A.

TERMS AND CONDITIONS

Governing Law, Trade Treaties and Policies

This procurement will be in accordance with the laws of the province of New Brunswick and the federal laws of Canada.

This procurement is also subject to the following Policies, Legislation and Internal Trade Agreement(s) including:

- Agreement on the Opening of Public Procurement for NB and Quebec
- New Brunswick Procurement Act and Regulation 2014-93
- City of Saint John Policy for the Procurement of Goods, Services and Construction

Submission Instructions

Sealed tenders, hand delivered or couriered, addressed to Chris Roberts, SCMP, CPPB, Supply Chain Management, 1st Floor – 175 Rothesay Avenue, Saint John, NB, E2J 2B4, and marked on the envelope:

“Tender # 2022-082704T – Roof Rehabilitation – Millidgeville Wastewater Treatment Plant”

will be received until 2:30:00 pm, Tuesday, April 26, 2022 for the work contemplated in this document and in accordance with the enclosed specifications, drawings, terms and conditions.

Enquiries

Bidders shall promptly examine the bid documents and report any errors, omissions or ambiguities and may direct enquiries or seek additional information in writing by email before the deadline for enquiries to the Authorized Enquiries Contact as set out below. No such communications are to be directed to anyone other than the Authorized Enquiries Contact.

Authorized Enquiries Contact

Chris Roberts, SCMP, CPPB
Supply Chain Management
City of Saint John
Email: supplychainmanagement@saintjohn.ca

It is the Bidder's responsibility to seek clarification from the City on any matter it considers unclear. The City shall not be responsible for any misunderstanding on the part of the Bidder concerning this bid document or its process.

The City intends to confirm receipt of a bidder's communication by way of an email or facsimile in reply. If a bidder has not received a reply, the bidder may wish to resend its communication as the lack of reply may have resulted from a technical problem. The City is under no obligation to respond to enquiries or provide additional information but may do so at its sole discretion.

Responses to inquiries may be distributed to all bidders on the invitation list as having received the bid documents as of the date the response is prepared. The source of the question will not be identified in the response. Verbal information shall not be binding upon the City. Inquiries received after the deadline for enquiries will not receive a response.

Tender to be Submitted on Prescribed Form

Bidders are to submit their tender on the prescribed form contained in this document. Failure to submit on this form may result in the disqualification of the bid.

Taxes

The bid price shall be all taxes extra. The City of Saint John shall be invoiced for and pay all applicable taxes related to this bid.

Schedule for the Bid Process

Issue Date	Wednesday, April 13, 2022
Pre-Bid Site Visit	Tuesday, April 19, 2022, 12:00 pm, ADT
Deadline for Enquiries	Tuesday, April 19, 2022, 4:00 pm, ADT
Deadline for Issuing Addenda	Wednesday, April 20, 2022, 4:00 pm, ADT
Submission Deadline	Tuesday, April 26, 2022, 2:30:00 pm, ADT
Date of Award	Monday, May 2, 2022 (Tentative)

The Schedule for the bid process is tentative only and may be changed by the City in its sole discretion.

Advisory Notice(s)

Periodically, the City of Saint John is required to issue clarification notices to a bid document in the form of Advisory Notices. Normally these notifications will not have a direct bearing on the cost of a project and will not influence bidding.

Bidders are responsible for obtaining all advisory notice(s) issued by the City. Advisory Notice(s) may be obtained from the City’s website (www.saintjohn.ca) under the Menu option, City Hall header, then “Tender and Proposals”.

Bidders are instructed to sign the Advisory Notice and return it either by fax to (506) 658-4742 or email to supplychainmanagement@saintjohn.ca prior to the closing date. Failure to comply with the instructions on an advisory may result in rejection of the bid.

Addenda

Periodically, the City of Saint John is required to issue notification of changes or corrections to a bid document by way of addenda. Normally these notifications will have direct bearing on the cost of a project and will influence bidding. Therefore, it is important that the City have assurances that bidders have in-fact received the notification(s).

Bidders are responsible for obtaining all addenda issued by the City. Addenda may be obtained from the City’s website (www.saintjohn.ca) under the Menu option, City Hall header, then “Tender and Proposals”.

Bidders are required to sign and include all addenda with their bid submission.

Failure to include a copy of all signed addenda with the bid submission may result in rejection of the bid regardless of whether or not the changes noted in the addendum are included in the bid submission.

Mandatory Requirements

Each submission will be evaluated to ensure that it complies with the mandatory requirements and may be rejected if it does not comply. The evaluation of mandatory requirements will confirm that:

- the submission was received prior to the applicable Submission Deadline;
- the bid submission is signed;
- the bid submission is legible;
- the bid submission does not contain a substantive qualification or conditions that are contrary to the terms of the bid document;
- the bid submission does not contain a change in price that was not initialled by the person who signed the submission; and
- the bid submission is in English;

Payment

Payment shall be based on Net 45 Days from date of invoice or receipt of goods/services, whichever is later. Invoices can either be mailed to: City of Saint John, Accounts Payable Department, P.O. Box 1971, Saint John, NB, E2L 4L1, or by email to the Accounts Payable department (accounts payable@saintjohn.ca). Vendors are to ensure invoices are not sent both ways.

Pricing

The tender prices shall include all installation wages, fringe benefits, insurance, transportation, delivery, duty, working tools, equipment costs, and any other charges incurred in order to provide required materials and/or services.

Substitutes

Substitute products will not be considered (where applicable).

Verbal Agreement

No verbal agreement or conversation with any officer, agent or employee of the owner either before or after execution of the contract shall effect or modify any of the terms or obligations contained in any of the documents comprising the said contract.

Fax Tenders

Tenders received by fax WILL NOT be accepted.

Late Bids

Bids received after the time and date as shown in this document shall not be considered.

Cancellation Clause

In the event that the successful bidder does not comply with the specifications and terms and conditions of this tender, at any time throughout the duration of the contract, the City of Saint John reserves the right to cancel the contract in its entirety.

Basis for Award

A The city does not limit itself to accepting the lowest, or any tender submitted, but reserves the right to award the tender in any manner deemed to be in the City's best interest. It is the City of Saint John's intention to award this agreement to one Vendor.

No guarantee

The City makes no guarantee as to the volume of the Deliverables.

Acceptance, Revocation and Rejection Of Tenders

The bidder agrees that his tender is a firm offer to supply the goods and/or services specified herein at the quoted price, and in accordance with the terms and conditions herein contained. The bidder may revoke his tender at any time prior to the time fixed for tender opening by delivering, or causing to be delivered, written notice of revocation to the designated official at the City of Saint John. Revocation will take effect from the time the notice is actually received. A notice of revocation will not be accepted after the time fixed for tender opening.

The bid shall not be restricted by a statement added to the Tender Form, or by a covering letter, or by alterations to the tender form as supplied, unless otherwise provided herein and further, a tender form that has been altered in any way may be deemed to be a non-confirming bid and, therefore, rejected. Bidders shall be allowed to attach descriptive literature; whose sole purpose is to amplify the bid.

Due Diligence

In the event that a health and safety offence is committed, the onus falls on the employer to prove that it exercised due diligence (i.e. did everything it reasonably could) in order to avoid the offence.

When hiring contractors, the City of Saint John is responsible for ensuring compliance with Health and Safety Legislation and must make sure that the appropriate accident prevention systems are implemented in the workplace.

Therefore, if any contractor is found to be working in an unsafe manner, or outside of current legislation, he will be made to stop work immediately. Any losses which may arise as a result of this work stoppage are the responsibility of the contractor.

Failure to comply with current legislation on the part of the contractor, may lead to cancellation of this contract and any bid deposits that may be in place.

Insurance

The successful contractor shall provide evidence of the following insurance coverage:

General Liability with minimum limits of two million dollars, (\$2,000,000.00). The policy shall include:

- *operations of the contractor in connection with this tender;
- *products and completed operations coverage;
- *contractual liability with respect to this tender;
- *the City of Saint John added as an additional insured;
- *a cross liability clause;
- *non-owned automobile;
- *thirty (30) days notice of cancellation of this policy "will" be given to the City of Saint John, by the insurers;

Standard automobile insurance for owned automobiles with at least the minimum limits allowed by law. This coverage is to remain in effect for the entire time frame of the contract.

WorkSafeNB Certificate and Business Corporations Act Certificate

New Brunswick Tenderers shall provide to the City a WorkSafeNB certificate which confirms proper registration and good standing with WorkSafeNB and a Business Corporations Act Certificate which confirms proper registration and good standing with the Province of New Brunswick - Corporate Affairs within five (5) Working Days following the City's notice of selection.

Out-of-province Tenderers shall provide to the City a WorkSafeNB certificate which confirms proper registration and good standing with WorkSafeNB or a letter or certificate issued under the equivalent applicable legislation in the province of origin of the Tenderer confirming extension of coverage from said legislation to the Province of New Brunswick for the term of the Contract. Subject to paragraph c), out-of-province Tenderers shall also provide a Business Corporations Act Certificate which confirms proper registration and good standing with the Province of New Brunswick - Corporate Affairs within five (5) Working Days following the City's notice of selection.

Tenderers from Nova Scotia may submit the appropriate Business Corporations Act Certificate from the Province of Nova Scotia.

Reserved Rights

The City reserves the right to:

- a) Reject an unbalanced bid submission. For the purpose of this section, an unbalanced bid submission is a bid submission containing a unit price which deviates substantially from, or does not fairly represent reasonable and proper compensation for the unit of work bid or one that contains prices which appear to be so unbalanced as to adversely affect the interests of the City. The City reserves the right to use other bids submitted in response to this bid solicitation or for other like or similar work as a guideline in determining if a bid is unbalanced.

- b) Amend or modify the scope of the Work, and/or cancel or suspend the bid award, at any time for any reason;
- c) Require bidders to provide additional information after the submission deadline to support or clarify their bid submission;
- d) Not accept any or all bids;
- e) Not accept a bid submission from a bidder who is itself, or whose principals, owners or directors are also principals, owners or directors of another entity which is, involved in litigation, arbitration or any other similar proceeding against the City;
- f) Reject any or all bid submissions without any obligation, compensation or reimbursement to any bidder or any of its team members;
- g) Withdraw this bid solicitation and cancel or suspend the bid process;
- h) Extend, from time to time, any date, any time period or deadline provided in this bid solicitation (including, without limitation, the submission deadline), upon written notice to all bidders;
- i) Assess and reject a bid submission on the basis of:
 - (i) information provided by references;
 - (ii) the bidder's past performance on previous contracts;
 - (iii) the information provided by a bidder pursuant to the City exercising its clarification rights under this bid process;
 - (iv) the bidder's experience with performing the type and scope of work specified;
 - (v) other relevant information that arises during this procurement process;
- j) Waive formalities and accept bids which substantially comply with the requirements of this bid solicitation;
- k) Verify with any bidder or with a third party any information set out in a bid submission;
- l) Disqualify any bidder whose bid submission contains misrepresentations or any other inaccurate or misleading information;
- m) Disqualify any bidder who has engaged in conduct prohibited by the bid solicitation;
- n) Make changes, including substantial changes, to the bid solicitation provided that those changes are issued by way of addenda in the manner set out in this bid document;
- o) Select any bidder other than the bidder whose bid submission reflects the lowest cost to the City;
- p) Cancel this procurement process at any stage, for any reason;

- q) Cancel this procurement process at any stage and issue a new bid solicitation for the same or similar deliverables;
- r) Accept any bid submission in whole or in part;
- s) Waive minor non-compliance with the mandatory requirements of the bid solicitation and accept the bid submission; or
- t) Accept a bid submission which contains the following errors:
 - (i) error in mathematics – whether this involves the extension of a unit price or an error in addition, the mistake will be corrected and the correct total will be used for evaluation purposes and will be binding on the bidder.
 - (ii) conflict between the written and numerical bid prices. In all cases, the total bid price will be corrected to reflect the written bid price, whether lump sum or unit price (where applicable).
 - (iii) failure to include the contingency allowance in the total bid price (where applicable). If the contingency allowance was not included in the addition, the bid price shall be corrected to reflect its inclusion.

and these reserved rights are in addition to any other express rights or any other rights which may be implied in the circumstances and the City shall not be liable for any expenses, costs, losses or any direct or indirect damages incurred or suffered by any bidder or any third party resulting from the City exercising any of its express or implied rights under this bid solicitation.

By submitting a bid, the bidder authorizes the collection by the City of the information set out at paragraph i) in the manner contemplated in that subparagraph.

Limitation of Liability and Waiver

Each bidder, by submitting a bid, agrees that:

- a) Neither the City nor any of its employees, agents, advisors or representatives will be liable, under any circumstances, for any Claim arising out of this procurement process including but not limited to costs of preparation of the bid submission, loss of profits, loss of opportunity or for any other Claim; and
- b) The bidder waives any Claim for any compensation of any kind whatsoever, including Claims for cost of preparation of the bid submission, loss of profit or loss of opportunity by reason of the City's decision to not accept the bid submitted by the bidder, to award a Contract to any other bidder or to cancel this procurement process, and the bidder shall be deemed to have agreed to waive such right or Claim.

Validity Period

The bid submission constitutes an offer which shall remain open and irrevocable until 90 days after the submission deadline.

Minor Irregularities

The City of Saint John reserves the right to waive minor non-compliances in accordance with Section 120 of the Province of New Brunswick's Regulation 2014-93 under the Procurement Act.

APPENDIX A – SPECIFICATIONS

TENDER No. 2022-082704T

Roof Rehabilitation – Millidgeville Wastewater Treatment Plant

IRC BUILDING SCIENCES GROUP

BIDDING DOCUMENTS

MILLIDGEVILLE WASTEWATER TREATMENT PLANT

IRC No. 25052-NR21-007SP

Roof Rehabilitation Program 2022 At:

MILLIDGEVILLE WASTEWATER TREATMENT
PLANT
700 Woodward Avenue,
Saint John, New Brunswick
E2K 4G7

PREPARED FOR:

CITY OF SAINT JOHN
15 Market Square,
Saint John, New Brunswick, E2L 4L1

Attention:
Paul Basque

Project Meeting:
Friday, TBD, 2022 at 9:00 am ADT

Bid Closing:
Friday, TBD, 2022 by 2:00 pm ADT



A Rimkus Company

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See Appendix B – Form of Tender

PART 1 - GENERAL

1.1 DESCRIPTION

- .1 Roofing Contractor to provide all labour, plant, equipment, and materials necessary to perform to completion Work as described in these Contract Documents for:
 - .1 Roof Rehabilitation Program 2022 on designated roof areas at Millidgeville Wastewater Treatment Plant located at 700 Woodward Avenue, Saint John, New Brunswick, E2K 4G7.
- .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.

1.2 PROJECT SCHEDULE

- .1 Owner requires that work of this contract be completed by October of 2022.
 - .1 Submit with Bid a detailed bar diagram schedule of Work, detailing start and completion dates for various items of work necessary to perform contract to Total Completion.
 - .2 Total Completion of Work to be completed by a specified date; to be announced later in consultation with Contractor.
- .2 A Project Start-Up Meeting will take place at the end of winter in Spring 2022 to determine start date and review scheduling constraints.
- .3 Start of Work: Mobilize forces and trades, setup on site, and begin staging required for performance of Work as soon as possible after Award of Contract, weather permitting.
- .4 Substantial Completion of Work: Must be achieved **by no later than end of September 30th, 2022.**
- .5 Total Completion of Work: To be achieved **by no later than Friday, October 28th, 2022;** including full vacate of project site and demobilization by Contractor and his forces.

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 to 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 BID PRICING

- .1 Provide a Stipulated Lump Sum Price on Bid Form to perform all Work described in this Summary of Work, its related technical specification sections, and as shown on drawings.
- .2 Base Bid Pricing: Provide a breakdown of Stipulated Lump Sum Price as itemized and indicated on Bid Form under Appendix “C” - Stipulated Price Breakdown.
 - .1 Low Slope Roof Replacement: Price to perform specified new roof replacement work over existing prepared roof deck on Roof Areas 1.1, 1.2, 1.3, 1.4 & 1.5 with a two (2) ply modified bitumen membrane system and a fifteen (15) year System Warranty, to Section 07 52 16.
 - .1 Existing Vapour Barrier (Roof Areas 1.1, 1.2, 1.3, 1.4 & 1.5): Allow for repair and localized replacement of damaged existing deck overlay board and vapour retarder in Bid Price on ten percent (10%) of each roof area. Cut out wet, damaged, or deteriorated sections of existing deck overlay board and vapour retarder, and replace with new compatible materials as specified.
 - .2 Bonded Uplift Testing (Roof Areas 1.1, 1.2, 1.3, 1.4 & 1.5): Carry \$10,000.00 in Bid Price to perform Bonded uplift testing as required on existing vapour barrier. Pull testing to be performed in accordance with CSA A123.21 of new fully adhered roof system on Roof Areas 1.1 and 1.2. Contractor to provide roof assembly mock-up after demolition and before installation. Testing to be conducted by Consultant.
 - .1 In addition to the lump sum above provide/install fifteen (15) full system mock-ups, 24” x 24” in size, including a 0.5” plywood covering adhered to top of assembly for bonded uplift testing. Mock-ups to be located as directed by Consultant, at a rate of 3 mock-ups installed at each roof area. Samples to be attached following specific wind uplift fastening/spacing pattern for this building and to be installed 24-hours before testing and temporarily sealed/waterproofed overnight.
 - .2 All designated replacement work to be awarded and performed together, at one time, as one contract.
 - .3 Unit Pricing: Items to be performed as required and reviewed by Consultant where exposed during performance of Work or where directed on site by Consultant, and added to Contract Price.
 - .1 Low Slope Roof Replacement: Price to perform specified new roof replacement work over existing prepared roof deck on Roof Areas 1.1, 1.2, 1.3, 1.4 & 1.5 with a two (2) ply

modified bitumen membrane system and a fifteen (15) year System Warranty, to Section 07 52 16.

- .1 Remove existing vapour barrier down to concrete deck in-lieu of leaving in place per base bid.
- .2 Existing Plywood Sheathing Replacement: Price to add to Contract to supply and install new matching plywood sheathing along vertical transitions at perimeters, walls, and curbs as required to replace damaged, wet, or deteriorated existing plywood sheathing, per square foot. Replacement of plywood sheathing to be reviewed by Observer.
- .3 Existing Wood Block Replacement: Price to add to Contract to supply and install new matching wood blocking at perimeters, walls, and curbs as required to replace damaged, wet, or deteriorated existing wood blocking, per board foot. Replacement of wood blocking to be reviewed by Observer.
- .4 Vapour Barrier Repair: Price to add to Contract or delete from contractor for localized repairs of existing vapour barrier membrane, per square foot. Replacement of vapour barrier to be reviewed by Observer.

1.5 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.

1.6 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.

1.7 GENERAL SITE REQUIREMENTS

- .1 Temporary Barriers, enclosures and signage will be highly enforced given use of property.
- .2 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.
- .3 Obtain Construction/Building Permit and sidewalk/roadway occupation permits as required by local municipality.
- .4 Determine nature and extent of all site services above and below grade prior to commencement of Work.
- .5 Coordination of trades will be responsibility of Contractor to ensure work is completed as soon as possible. Provide winter protection and heating as required to perform Work if required and as specified.
- .6 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.

- .7 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.
- .8 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.
- .9 Provide temporary support to existing structural and cladding components during performance of work if required.
- .10 Install temporary protection for all materials and building components, which have been exposed during demolition/removals as specified.
- .11 Dispose of all materials at landfill site authorized by authorities having jurisdiction.

1.8 SITE SPECIFIC REQUIREMENTS

- .1 Hours of Work: Specified work may be performed on weekend days to meet work schedule. Include all associated costs in submitted Bid Pricing. No additional cost to Owner allowed after
- .2 No Smoking Policy: Smoking and vaping are strictly prohibited at project worksite; on rooftop and at related staging and storage areas. Comply with Owner's additional smoking restrictions for site and premises.
 - .1 Smoking and vaping are defined as including cigarettes, cigars, pipes, e-cigarettes, and other equipment used to smoke or burn tobacco, cannabis, and other plant material.

1.9 PROTECTION OF ROOFS

- .1 Protect existing roof systems from possible damage during performance of work required by this contract, including transportation across existing roof areas.
- .2 Provide protection within area of work where materials, equipment, or heavy tools are placed on or transported across roof surface.
- .3 Protection to consist of:
 - .1 Supply and loose lay a continuous layer of clean 6 mil polyethylene slip sheet over existing roof system. Slip sheet to be a minimum 2.44m (8'-0") wide with minimum 457mm (1'-6") overlaps at end joints.
 - .2 Supply and loose lay a continuous layer of minimum 25mm (1.0") thick, clean extruded polystyrene insulation centered over polyethylene slip sheet.
 - .3 Supply and loose lay a continuous layer of minimum 13mm (0.5") thick, clean plywood sheathing.
- .4 Provide additional protection over newly installed roof sections where required for temporary storage or transportation of materials, equipment, or heavy tools.

1.10 SCOPE OF WORK: LOW SLOPE ROOF REPLACEMENT

- .1 On Roof 1.1, 1.2, 1.3 & 1.4: Remove existing roof system components, projection and perimeter flashings, and old appurtenances down to existing mopped vapour retarder in preparation for installation of a new roof system. Replacement Work to be in accordance with Section 07 52 16.:

- .1 Remove existing roof components down to existing vapour retarder. Remove and dispose of damaged, loose, or de-bonded sections of existing vapour retarder membrane.
 - .1 Where existing concrete deck is exposed, review surface of deck for damage and deterioration that may impact new roof system installation. Repair concrete decking with quick dry mortar mix as required.
 - .2 Restore continuity of existing vapour retarder with installation of new modified bitumen base sheet membrane over damaged and removed sections.
- .2 Install new wood blocking and plywood at perimeters and curbs as required.
 - .1 Prime all exposed wood, concrete, gypsum board, and metal surfaces where required to receive new membrane and flashings.
- .3 Install torch applied modified bitumen vapour retarder field membrane and self-adhered tie-in flashings over vapour retarder membrane along perimeters, curbs, projections, and where indicated on detail drawings.
- .4 Adhere base layer of flat 51mm (2.0") polyisocyanurate insulation in ribbons of polyurethane roofing adhesive to CSA A123.21-14 requirements.
- .5 Adhere overlay layer of flat 51mm (2.0") polyisocyanurate insulation in ribbons of polyurethane roofing adhesive to CSA A123.21-14 requirements.
- .6 At overlay insulation layer at all roof drains install new tapered 8' x8' drain sump, centered over the drain, tapered at 2% slope.
- .7 Install a continuous flat layer of torchable deck board panels with a modified bitumen base sheet membrane in ribbons of polyurethane roofing adhesive.
 - .1 Soprema Option: Install 7mm (9/32") 2-1 Soprasmart Board with factory laminated modified bitumen base sheet membrane. Adhere in ribbons of polyurethane roofing adhesive and hot air seal all side laps and install modified bitumen base sheet cover strips cover board panel end joints. (For Field and Perimeters of roof sections)
 - .2 OR 0.25" Asphaltic Cover Board with 1 ply modified bitumen base sheet field membranes,
 - .3 OR 0.5" Gypsum Cover Board with 1 ply modified bitumen base sheet field membranes,
- .8 Install one ply self adhered modified bitumen base sheet flashings along perimeters, curbs, projections and where indicated on detail drawings.
- .9 Install one ply granular modified bitumen cap sheet field membrane, torch applied.
- .10 Install one ply granular modified bitumen cap sheet flashings, torch applied.
- .11 Install new prefinished sheet metal flashings and trim with required hook strips.

1.11 SCOPE OF WORK: LOW SLOPE ROOF REPLACEMENT

- .1 On Roof Areas 1.5 (FLAMELESS): Remove existing roof gravel, projection and perimeter flashings, and old appurtenances down to expose existing mopped vapour barrier in preparation for installation of a retrofit roof system in accordance with Section 07 52 16.

- .1 Remove existing roof components down to existing vapour retarder. Remove and dispose of damaged, loose, or de-bonded sections of existing vapour retarder membrane.
 - .1 Where existing concrete deck is exposed, review surface of deck for damage and deterioration that may impact new roof system installation. Repair concrete decking with quick dry mortar mix as required.
 - .2 Restore continuity of existing vapour retarder with installation of new modified bitumen base sheet membrane over damaged and removed sections.
 - .2 Install new wood blocking and plywood at perimeters and curbs as required.
 - .1 Prime all exposed wood, concrete, gypsum board, and metal surfaces where required to receive new membrane and flashings.
 - .3 Install self adhered modified bitumen vapour retarder field membrane and tie-in flashings over vapour retarder membrane along perimeters, curbs, projections, and where indicated on detail drawings.
 - .4 Adhere base layer of flat 51mm (2.0") polyisocyanurate insulation in ribbons of polyurethane roofing adhesive to CSA A123.21-14 requirements.
 - .5 Adhere overlay layer of flat 51mm (2.0") polyisocyanurate insulation in ribbons of polyurethane roofing adhesive to CSA A123.21-14 requirements.
 - .6 At overlay insulation layer at all roof drains install new tapered 8' x8' drain sump, centered over the drain, tapered at 2% slope.
 - .7 Install a continuous flat layer of sanded surface deck board panels with a modified bitumen base sheet membrane in ribbons of polyurethane roofing adhesive.
 - .1 Soprema Option: Install 7mm (9/32") 2-1 Soprasmart Board Sanded with factory laminated modified bitumen base sheet membrane (**Sanded Surface**). Adhere in ribbons of polyurethane roofing adhesive and hot air seal all side laps and install self-adhered modified bitumen base sheet cover strips cover board panel end joints. (For Field and Perimeters of roof sections)
 - .2 OR 0.25" Asphaltic Cover Board with 1 ply modified bitumen base sheet field membranes, self-adhered
 - .3 OR 0.5" Gypsum Cover Board with 1 ply modified bitumen base sheet field membranes, self-adhered
 - .8 Install one ply self adhered modified bitumen base sheet flashings along perimeters, curbs, projections and where indicated on detail drawings.
 - .9 Install one ply granular modified bitumen cap sheet field membrane, self adhered.
 - .10 Install one ply granular modified bitumen cap sheet flashings, self adhered.
 - .11 Install four (4) concrete pavers on top of new 25mm (1.0") extruded polystyrene insulation support pads at each corner (16 total per roof).
- .2 Install new prefinished sheet metal flashings and trim with required hook strips

1.12 CLEANING

- .1 Perform daily and final clean-up of work area and areas surrounding site.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION - 01 11 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 16 – SBS Modified Bituminous Membrane Roofing

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 Demolition of spray or trowel applied asbestos can be hazardous to health. Notify Consultant if material resembling spray or trowel applied asbestos is encountered on site. Stop work and do not proceed with further removal until written instructions have been received from Consultant.
 - .1 Abatement procedures for Asbestos Containing Materials (ACM) pertinent to successful performance of Work to be paid for by Owner, preapproved by Consultant, as an extra cost to Contract.
 - .2 All ACM work to be in compliance with current provincial asbestos abatement regulations for Place of Work.

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.
- .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.

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 152x152mm (6"x6"):
 - .1 Metal Decking: Install 610x610mm (24"x24") galvanized steel plate, min. 18ga. secured with 4 screws per side to existing decking.
 - .2 Openings greater than 152mm (6") in diameter or 152x152mm (6"x6"):
 - .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, turrs, 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 915x915mm (3'x3'):
 - .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 01 56 00 – Temporary Barriers and Enclosures
- .2 Section 02 41 19 – Selective Demolition and Removal
- .3 Section 07 52 16 – SBS Modified Bituminous Membrane Roofing
- .4 Section 07 62 00 – Prefinished Sheet Metal Flashing and Trim

1.2 REFERENCES

Latest edition of listed references apply; most stringent requirement to govern in case of conflict.

- .1 American Lumber Standards Committee (ALSC):
 - .1 Softwood Lumber Standards.
- .2 American Society for Testing and Materials (ASTM) International:
 - .1 A153M-16a: Standard Specification for Zinc Coating (Hot-Dip) on Iron & Steel Hardware.
 - .2 A653M-15e1: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.
 - .3 D1760-01: Standard Specification for Pressure Treatment of Timber Products.
- .3 American Wood-Protection Association (AWPA):
 - .1 AWPA E12: Standard Method of Determining Corrosion of Metal in Contact with Wood.
 - .2 AWPA M4: Standard for the Care of Preservative Treated Wood Products.
 - .3 AWPA P5: Standard for Waterborne Preservatives.
 - .4 AWPA P26: Standard for Alkaline Copper Quat Type A (ACQ-A).
 - .5 AWPA P27: Standard for Alkaline Copper Quat Type B (ACQ-B).
 - .6 AWPA P28: Standard for Alkaline Copper Quat Type C (ACQ-C).
 - .7 AWPA P29: Standard for Alkaline Copper Quat Type D (ACQ-D).
 - .8 AWPA U1: Use Category System: User Specification for Treated Wood.
- .4 Canadian Standards Association (CAN/CSA):
 - .1 B111-1974 (R2003): Wire Nails, Spikes and Staples.
 - .2 G164-M92 (R2003): Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 O121-17: Douglas Fir Plywood.
 - .4 O141-05 (R2014): Softwood Lumber.
 - .5 O151-17: Canadian Softwood Plywood.
 - .6 O325-16: Construction Sheathing.
- .5 Engineered Wood Association (EWA); formerly American Plywood Association (APA):
 - .1 Product Guide: Grades and Specifications.
- .6 National Forest Products Association (NFPA):
 - .1 Grading Rules.
- .7 National Lumber Grades Authority (NLGA):
 - .1 Standard Grading Rules for Canadian Lumber (2014).

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.

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 well ventilated sheds having firmly constructed over hanging roof with sufficient end wall 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 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 elements.
- .6 Moisture Content:
 - .1 At time of delivery and maintained at site.
 - .2 Boards and lumber 51mm (2") and less in thickness: 19% or less.
 - .3 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).

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.

- .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.

3.3 INSTALLATION

- .1 Comply with requirements of Provincial Building Code at Place of Work, supplemented by following paragraphs:
 - .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 SUMMARY

- .1 This Section to compliment General Conditions of the Contract and Supplementary Conditions. Read and interpret this section in conjunction with contract requirements and Division 01 documents. In case of conflict between documents, more stringent condition or requirement shall govern.
- .2 Section Includes:
 - .1 Definition of common terms.
 - .2 Requirements for coordination of construction review.
 - .3 Requirements for confirming performance and compliance of installed work.
 - .4 Requirements for warranty application and milestone review.
 - .5 Control of the Work.

1.2 DEFINITIONS

- .1 "Quality Assurance Observation (QAO)" to be consensus definition commonly used in Canadian roofing industry to mean Site Visit and review of observable construction in progress and completed to date, without implying guarantees to performance of completed construction.
- .2 "Observer" to mean authorized individual employed by IRC Building Sciences Group, the entity engaged by Owner to provide Quality Assurance Observation services for Contract, to perform QAO testing of materials and review of construction in progress and completed to date.
- .3 "Site Visit" to mean physical attendance at Place of the Work for purpose of reviewing construction in progress and completed to date.

1.3 REFERENCES

- .1 Latest edition of listed references intended; most stringent requirements to govern in conflicts:
 - .1 Canadian Standards Association (CAN/CSA):
 - .1 A123.21-20: Standard Test Method for Dynamic Wind Uplift Resistance of Membrane Roofing Systems.

1.4 REQUIREMENTS OF ROOFING CONTRACTOR

- .1 Staging and setup on-site in preparation for installation shall signify Contractor's acceptance of contract requirements and responsibility for quality control during performance of Work.
 - .1 Pay for Testing and Inspection services required by regulations and by Contractor's own requirements for quality control.
- .2 Work in good faith and be proactive towards successful completion of Work required to attain warranty from roof membrane manufacturer.
 - .1 Correct defects and irregularities of installed work at no additional cost to Owner.
- .3 Be responsible for associated costs to confirm performance of roof installation work and compliance with intent of Contract Documents, including but not limited to:
 - .1 Documentation:

- .1 Maintain at job site at least one complete hardcopy set of Contract Documents during construction activities for reference and record keeping.
 - .2 Contract Documents provided in electronic format for Contractor to make as many copies as deemed necessary for performance of work. Drawing files provided in colour to be printed originals in colour and at intended scale for hardcopy sets to maintain visual clarity intended and eliminate photocopy degradation.
 - .3 Hardcopy production of Contract Documents to assist with As-built drawing mark up and red-lining available as an additional service from Consultant.
- .2 Shop Drawings for Wind Uplift Resistance:
- .1 On conventional low slope or flat roofing areas (slope less than 3:12) using mechanical or adhesive fastening:
 - .1 Determine mechanical and adhesive fastening patterns required by specifications for compliance from chosen manufacturer's roof system testing to meet CSA A123.21 and installation requirements to achieve specified warranty. Design wind uplift forces noted in technical sections.
- .3 Coordination with Consultant:
- .1 Owner has retained IRC Building Sciences Group (IRC) to provide independent, third-party, Quality Assurance Observations for on-site construction review and testing of roofing installation work. Observation fees are based on installation work anticipated and performed in a timely fashion.
 - .1 Employment of QAO agency by Owner does not relieve Contractor of responsibility to perform work in accordance Contract Documents.
 - .2 Cooperate with Consultant to facilitate observation and documentation of existing substrate and construction details throughout demolition work.
 - .2 Coordination of Work with Consultant is imperative for successful completion of project and confirmation of compliance with Contract Documents. Coordinate frequency of construction review with Observer to suit finalized project schedule at Pre-construction meeting. Poor performance of Work will result in additional service fees being invoiced directly to Contractor to cover extra costs incurred by Consultant.
 - .3 Missed Site Reviews: Failure to notify Consultant of daily work being performed will result in Contractor being invoiced directly by Consultant for services missed, per occurrence.
 - .1 Portions of Work installed without Consultant's knowledge or coordination, inhibiting ability to schedule and perform QAO services, will result in Contractor being invoiced for additional Site Visits required to perform exploratory work and verify installation, including administration time.
 - .4 Additional Site Reviews: When a Site Visit by Consultant is required during construction or after project completion that is outside of intended project scope of work for any reason, such as reported leaks, potential safety violations, deficiencies, incomplete work, or rejected work, Contractor will be invoiced directly by Consultant for additional services required per occurrence, including:

- .1 Failure of a mock-up installation requiring additional Site Visit dedicated to second mock-up review.
 - .2 Insufficient work force allocated to project completion resulting in work duration exceeding intended project schedule.
 - .3 Leaks reported during installation work requiring additional Site Visit by Consultant.
 - .1 Coordinate leak review with Consultant and document leak locations and damages found to building or other roof areas. Produce incident report for reported leaks and provide to Consultant for review.
 - .4 Roof assemblies not maintained in watertight condition that become contaminated with moisture during construction, resulting in additional Site Visits required to help map out areas of contamination to be remediated.
 - .1 Consultant may perform interim thermographic (infrared) roof scan, electronic impedance scanning (EIS), and/or Electric Field Vector Mapping (EFVM) of installed work to help determine extent of moisture infiltration and compliance with Contract Documents, with costs borne by Contractor.
 - .5 Deficiencies identified after Final Review requiring additional Site Visit.
- .4 Roofing Samples & Testing:
- .1 On low slope or flat roofing areas (slope less than 3:12), be responsible for arrangements required for removal and testing of samples, including delivery and pick-up costs.
 - .2 Provide samples of material to testing laboratory and pay for services required to allow verification of installed work.
 - .3 Carry costs associated with roofing sample testing work. Cut-out and remove samples, roughly 300mm x 300mm (12" x 12") in size as follows:
 - .1 Remove samples of completed roof assembly as work progresses and from location determined on-site with Consultant.
 - .2 Provide one sample per 465m² (5,000 ft²) of roof with a minimum of two samples per roof area, or as directed otherwise on-site by Consultant.
 - .3 Unless otherwise requested by Consultant, samples to be whole roof system carefully cut through all layers down to structural roof deck.
 - .4 Repair sample cut-out areas with new roofing product to restore and make good roof system. Ensure continuity of vapour retarder, thermal insulation layers, and watertightness of roof membrane.
 - .4 In event that test results are unsatisfactory, obtain and pay for additional roofing samples for testing from locations determined on-site with Consultant, at no additional cost to Owner.
- .5 Wind Uplift Resistance Testing:

- .1 On conventional low slope or flat roofing areas (slope less than 3:12) using mechanical or adhesive fastening, carry costs associated with mechanical fastener and adhesion testing for wind uplift resistance required for CSA A123.21 compliance.
- .2 Coordinate with Consultant in advance to perform wind uplift tests per roof area.
 - .1 Mechanical fastener testing to be performed at mechanically fastened deck overlay board, insulation board, or cover board layer.
 - .1 Perform one test per 465m² (5,000 ft²) of roof with a minimum of two tests per roof area, or as directed on-site by Consultant.
 - .2 Bond uplift testing or negative pressure uplift testing to be performed over completed roof membrane and system installation.
 - .1 Perform one test per 465m² (5,000 ft²) of roof with a minimum of two tests per roof area larger than 46.5m² (500 ft²), or as directed on-site by Consultant.
 - .3 Repair and restore roof system components damaged by uplift resistance testing.
 - .1 With adhesion testing, mark entire square footprint of testing apparatus to define boundary of roofing materials to be cut out and restored with new products.
 - .4 At areas under construction where uplift resistance testing failed to meet required resistance threshold, adjust amount of mechanical or adhesive fastening and installation pattern to meet wind uplift resistance as directed by Consultant.
- .6 Assist in Warranty Applications.
 - .1 Be proactive with required documentation and application process to ensure Owner's prompt receipt of specified warranties at project close.
 - .2 Start warranty application process prior to start of project and provide evidence of application to Consultant at Pre-construction meeting.
 - .3 Follow manufacturer's protocols and requirements for warranty application.
 - .4 Promptly provide executed warranties to Consultant for distribution after release of holdback.
 - .5 Contractor will be invoiced directly by Consultant for extra services required for warranty process.
- .7 Thermographic Scan of Completed Work.
 - .1 On conventional low slope or flat roofing areas (slope less than 3:12), carry costs associated with thermographic (infrared) roof scan, electronic impedance scanning (EIS), and/or Electric Field Vector Mapping (EFVM) by Consultant of completed roof installation work to confirmation absence of moisture infiltration and compliance with Contract Documents.
 - .1 Thermographic scan to occur as soon as reasonably possible after Substantial Completion or Final Review, weather and environmental conditions permitting.
- .8 As-Built Drawings:

- .1 Note changes or sketch deviations from Drawings made on-site to original construction intent by red-lining or other mark up for project record.
- .2 Copy of red-lined or otherwise marked up Drawings to be submitted to Consultant with Application for Substantial Completion in accordance with Section 01 77 00 - Closeout Procedures and Submittals.
 - .1 If no As-Built mark ups were noted or required, Contractor to provide a signed letter as a Closeout submittal stating that installation work was in accordance with Drawings without significant modification.
- .9 Roof Database Records:
 - .1 On designated projects where access is granted to Contractor, provide complete data entry of necessary project specifics and details into designated roof management database.
- .10 Milestone Warranty Review:
 - .1 Contractor Workmanship Warranty: Carry costs associated with Consultant providing milestone warranty review of roof installation work jointly with Contractor at month 22 from date of Substantial Completion and prior to expiry of 2-year warranty.
 - .1 Notify Consultant in advance and coordinate Site Visit date for milestone warranty review by Consultant jointly with Contractor.
 - .1 Provide written summary report of deficiencies found and submit to both Consultant and Owner.
 - .2 Promptly repair deficiencies found and noted in milestone warranty review, at no additional cost to Owner.
 - .1 Expiration of workmanship warranty does not relieve Contractor of responsibility for repair work needed to rectify deficiencies noted on milestone warranty review.

1.5 CONTROL OF THE WORK

- .1 Sole control of construction means, methods, techniques, procedures, safety precautions, and programs required for Work in accordance with applicable construction legislation, regulations, and general construction practice remains with Contractor.
- .2 Consultant not responsible for acts of omissions of Contractor, his Subcontractors, employees, or other persons performing Work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION - 07 05 40

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1.1 SECTION INCLUDES

- .1 Installation of a new roof system over prepared substrate.
- .2 Existing roofing components and related appurtenances to be removed as specified in preparation for installation of a new low slope, conventional roofing system, including but not limited to:
 - .1 On Roof Areas 1.1, 1.2, 1.3 and 1.4:
 - .1 Existing concrete roof deck,
 - .2 Existing vapour barrier
 - .3 1 ply modified bitumen vapour barrier, torch applied
 - .4 1 ply modified bitumen flashings, self-adhered
 - .5 51mm (2.0") polyisocyanurate insulation, in adhesive
 - .6 51mm (2.0") polyisocyanurate insulation, in adhesive
 - .7 7mm (9/32" 2-1 Soprasmart Board with factory laminated base sheet in adhesive
 - .1 OR 0.25" Asphaltic Cover Board and 1 ply base sheet field membrane self-adhered
 - .2 OR 0.5" Gypsum Cover Board and 1 ply base sheet field membrane self-adhered,
 - .8 1 ply modified bitumen base sheet flashings, self-adhered,
 - .9 1 ply granular modified bitumen cap sheet field membrane, torch applied,
 - .10 1 ply granular modified bitumen cap sheet flashings, torch applied,
 - .11 Prefinished metal flashings and trim.
 - .2 On Roof Areas 1.5 (Flameless):
 - .1 Existing concrete roof deck,
 - .2 Existing vapour barrier
 - .3 1 ply SBS & Woven polyethylene vapour retarder, self-adhered
 - .4 1 ply modified bitumen vapour retarder flashings, self-adhered
 - .5 51mm (2.0") polyisocyanurate insulation, in adhesive
 - .6 51mm (2.0") polyisocyanurate insulation, in adhesive
 - .7 7mm (9/32" 2-1 Soprasmart Board Sanded with factory laminated base sheet in adhesive
 - .1 OR 0.25" Asphaltic Cover Board and 1 ply base sheet field membrane self-adhered
 - .2 OR 0.5" Gypsum Cover Board and 1 ply base sheet field membrane self-adhered,
 - .8 1 ply modified bitumen base sheet flashings, self-adhered with sanded top surface,
 - .9 1 ply granular modified bitumen cap sheet field membrane, Self-Adhered,
 - .10 1 ply granular modified bitumen cap sheet flashings, Self-Adhered,
 - .11 Prefinished metal flashings and trim.

1.2 RELATED SECTIONS

- .1 Section 01 11 00 – Summary of Work
- .2 Section 02 41 19 – Selective Demolition & Removal
- .3 Section 07 62 00 – Sheet Metal Flashing & Trim

- .4 Section 07 92 00 – Joint Sealants

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 C208: Cellulosic Fibre, Insulating Board.
 - .2 C578: Rigid, Cellular Polystyrene Thermal Insulation.
 - .3 C1289: Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - .4 D41: Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
 - .5 D312: Asphalt Used in Roofing.
 - .6 D2822: Asphalt Roof Cement.
 - .7 D4601: Standard for Asphalt Coated Glass Fibre Base Sheet Used in Roofing.
 - .8 D6162: SBS Mod. Bit. Sheets Using Polyester & Glass Fibre Reinforcements.
 - .9 D6163: SBS Mod. Bit. Sheets Using Glass Fibre Reinforcements.
 - .10 D6164: SBS Mod. Bit. Sheets Using Polyester Reinforcements
 - .2 Canadian Standards Association (CAN/CSA):
 - .1 A123.2: Asphalt Coated Roofing Sheets.
 - .2 A123.16: Asphalt Coated Glass Base Sheets.
 - .3 A123.21: Dynamic Wind Uplift Resistance of Roof Assemblies.
 - .4 A231.1: Precast Concrete Paving Slabs.
 - .5 O121M: Douglas Fir Plywood.
 - .6 O151M: 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.
 - .4 Underwriters Laboratories of Canada (CAN/ULC):
 - .1 S701: Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 - .2 S704: Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Fixed.
 - .5 New Brunswick Roofing Contractors Association (NBRCA): Roofing Manual.
 - .6 Canadian Roofing Contractors Association (CRCA): Roofing and Waterproofing Manual.

1.4 DESIGN REQUIREMENTS

- .1 Design Wind Load: Install new roof systems to manufacturer's tested and approved roof system assemblies and meet or exceed design wind uplift resistance criteria of CSA A123.21. Wind uplift analysis performed for building using NRCC's wind load calculator for roof coverings with resulting parameters listed below.
- .1 Wind Uplift Pressure to Meet:
 - .1 Roof Areas 1.1 (Screen Building)
 - .1 Corner & Edge Zone Width (z): 1.2m (3'-9").
 - .2 Corner of Roof (c): -4.40 kPa (-91 psf).

- .3 Edge of Roof (s): -2.20 kPa (-46 psf)
- .4 Field of Roof (r): -1.73 kPa (-36 psf).
- .2 Roof Areas 1.2 (Biocell Building)
 - .1 Corner & Edge Zone Width (z): 1.0m (3'-3").
 - .2 Corner of Roof (c): -4.40 kPa (-91 psf).
 - .3 Edge of Roof (s): -2.20 kPa (-46 psf)
 - .4 Field of Roof (r): -1.73 kPa (-36 psf).
- .3 Roof Areas 1.3 (Secondary Clarifier 1)
 - .1 Corner & Edge Zone Width (z): 1.5m (5'-0").
 - .2 Corner of Roof (c): -4.40 kPa (-91 psf).
 - .3 Edge of Roof (s): -2.20 kPa (-46 psf)
 - .4 Field of Roof (r): -1.73 kPa (-36 psf).
- .4 Roof Areas 1.4 (Secondary Clarifier 2)
 - .1 Corner & Edge Zone Width (z): 1.5m (5'-0").
 - .2 Corner of Roof (c): -4.40 kPa (-91 psf).
 - .3 Edge of Roof (s): -2.20 kPa (-46 psf)
 - .4 Field of Roof (r): -1.73 kPa (-36 psf).
- .5 Roof Areas 1.5 (Sludge Building – Flameless)
 - .1 Corner & Edge Zone Width (z): 1.34m (4'-4").
 - .2 Corner of Roof (c): -4.60 kPa (-96 psf).
 - .3 Edge of Roof (s): -3.11 kPa (-65 psf)
 - .4 Field of Roof (r): -2.20 kPa (-46 psf).
- .2 Shop Drawings: Provide mechanical and adhesive fastening patterns where required by specifications for compliance from chosen manufacturer's roof system testing for wind uplift and installation requirements to achieve specified warranty.

1.5 SUBMITTALS BY ROOFING CONTRACTOR

- .1 Provide with Bid Submission for Roof Work:
 - .1 Certificate of Insurance for ten million (\$10,000,000⁰⁰) in Liability,
 - .2 WCB Experience Rating & Clearance Letter,
 - .3 Sample copy of Manufacturer's Labour, Material, and Workmanship Warranty,
 - .4 Sample copy of Contractor's Warranty.
- .2 Provide to Quality 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.
 - .3 Current WCB Experience Rating & Clearance Letter for Place of Work.
 - .4 Specified Bonding and Insurance in Owner's name.
- .3 Provide to Quality Observer, at Prestart Meeting:

- .1 Finalized project work schedule listing start date, anticipated number of working days working, and manpower assignments for project.
 - .2 Sample of specified warranties from Manufacturer and Contractor for proposed materials and products to be installed.
 - .3 Letter and completed Manufacturer's project warranty application form sent to "Warranty Provider" advising them of project start and particulars.
 - .4 Complete Materials List; including installation instructions and product datasheets providing characteristics of all proposed materials to be installed.
 - .5 Safety Data Sheets (SDS) pertaining to all proposed materials to be used on site to perform Work.
 - .6 Certifications by manufacturers of roofing and insulating materials that all products supplied comply with all requirements of current identified ASTM and other industry standards or practices.
 - .7 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.
 - .8 Applicable shop drawings for tapered insulation layout and other specified items to be reviewed by Consultant prior to prefabrication and delivery.
 - .9 Attachment pattern diagrams to meet wind uplift requirements for mechanical fastening and adhesive securement of deck boards, insulation boards, and cover boards where applicable to project.
 - .10 List of "Trained and Carded Membrane Approved Applicators" to work and be present during performance of Work.
 - .11 Health & Safety Plan for Specific Work Site including contact list and phone numbers for project, and twenty-four (24) hour emergency contact numbers.
- .4 Provide to Owner, at project completion:
- .1 Completed and executed Roof System Warranty for project areas,
 - .2 Completed and executed Contractor's Warranty for project areas.
 - .3 for suitability to perform specified Work to be made within three (3) working days.

1.6 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 Arrange for a Technical Representative of Manufacturer to review installed roof system wherever a System Warranty requirement has been specified.

- .5 Upon completion of new installation, provide certification that all work has been done in accordance with Contract Documents and to Manufacturer's requirements.

1.7 QUALITY OBSERVATION

- .1 IRC Building Sciences Group, hereafter known as "Observer", is an independent Rooftop Quality 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.
- .2 Cooperate with Observer and afford all facilities necessary to permit full Rooftop Quality Observations during performance of Work. Act immediately on instructions given by Observer.
- .3 When required, provide roof cut-outs and samples in field where directed by Observer and make good without additional cost to Owner.
- .4 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.
- .5 Copies of Observation Reports issued to Owner and Prime Contractor.

1.8 DELIVERY, STORAGE, AND HANDLING

- .1 Site storage is limited. Where applicable, location of storage and related facilities to be coordinated with Prime Contractor and Owner.
- .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.
- .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.

1.9 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 Follow all safety regulations as required by OHS (Occupational Health and Safety) and any other applicable authority having jurisdiction.
- .10 All roofing, insulation, flashings and metal work removed during construction to be immediately taken off site to a legal dumping 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.
- .11 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.
- .12 Take precautions that storage and/or application of materials and/or equipment does not overload roof deck or building structure.
- .13 Flammable adhesives and deck primers to not be stored and not be used in vicinity of open flames, sparks and excessive heat.
- .14 All rooftop contamination that is anticipated or that is occurring to be reported to manufacturer to determine corrective steps to be taken.
- .15 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.
- .16 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.

- .17 Site cleanup, including both interior and exterior building areas that have been affected by construction, to be completed to satisfaction of Consultant.
- .18 All landscaped areas damaged by construction activities to be repaired at no cost to Owner.
- .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.

1.10 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 or dirt and remove all debris prior to any installation work.

1.11 SAFETY AND PROTECTION

- .1 Solvents, Adhesives and Membranes:
 - .1 Store only enough solvents and adhesives on roof for same day use. Do not leave adhesives on roof over night. Manufacturer supplied adhesives should be stored in their over night containers. Minimum temperature for solvent based adhesives and primers is -5°C (23°F). Refer to Manufacturer's written instructions.
 - .2 Do not install roof membrane when temperature remains below 5°C (41°F) for self-adhered installations. Apply materials in accordance with manufacturer's recommendations and in accordance with Canadian Modified Bitumen Manufacturer's Association.
 - .3 Protect walls from damage where hoisting is required.
 - .4 Protect roofs from damage due to traffic and materials handling until completion.
- .2 Fire Safety:
 - .1 Keep charged and ready to use fire extinguishers on site at all times, including at access to building interior, at rooftop work areas, and wherever solvent based products are stored and accessed.
 - .2 Provide a minimum two (2) hour fire watch at completion of each day's activities on all projects implementing use of propane torches and/or burners.
 - .1 A handheld, infrared thermal scanner suitable for roofing applications and fire alert must be kept on site at all times during torching procedures. Fire scanner by Raytek or approved IRC Group equal. Check seams and flashings at hourly intervals for flare ups.

ROOF 1.5 (Flameless application)

- .3 Torch application of membranes is prohibited on this project area. Employ use of hot air guns instead at membrane seaming where heat welding is required.
- .3 Health and Safety:

- .1 Contractor to comply with all safety requirements as per current printed edition of Provincial Occupational Health and Safety Act and with New Brunswick Roofing Contractors Association (NBRCA) standards.

1.12 WARRANTY

- .1 Contractor Workmanship Warranty:
 - .1 On Roof Replacement Areas 1.1, 1.2, 1.3, 1.4, & 1.5: Provide Owner with Contractor's Warranty for Workmanship on a New Brunswick Roofing Contractors Association (NBRCA) approved form, signed, authorized, and executed. Warranty period to be for minimum two (2) years from date of Substantial Completion.
 - .1 During Contractor's warranty term, any work related to roofing, flashing, or metal found to be defective or otherwise not in accordance with Contract Documents, to be promptly repaired by Contractor at no additional cost to Owner and in accordance with drawings and specifications. Applicator's warranty obligation to run directly to Owner with a copy sent to Manufacturer.
- .2 Roof System Warranty:
 - .1 On Roof Replacement Areas 1.1, 1.2, 1.3, 1.4, & 1.5: Provide Owner with Manufacturer's Labour, Material and Workmanship OIC (Original Installation Cost) System Warranty for a period of fifteen (15) years on roof replacement areas.
 - .1 Owner to notify both membrane Manufacturer and Contractor of any leak that occurs during time period while warranties remain in effect.
- .3 Cost of all warranties to be included in Contract Amount.

PART 2 - PRODUCTS

2.1 GENERAL

- .1 All membrane materials are to be supplied by Johns Manville, Siplast, or Soprema, meeting manufacturer's respective material compatibility requirements to achieve required System Warranty.
- .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.
- .3 Membrane Manufacturer's acceptance of any other product is only for a determination of compatibility with products and not for inclusion in manufacturer's warranty.
- .4 Specifications, installation instructions, limitations, and/or restrictions of respective manufacturers must be reviewed by Consultant for acceptability for intended use with membrane manufacturer's products.

2.2 MEMBRANE PRIMER

- .1 General Purpose: Asphalt Primer to ASTM D41 Type II.
 - .1 Solvent Based Primer: Composed of volatile solvents, synthetic polymers, and/or adhesive enhancing resins to prepare surfaces for membrane application.
 - .1 JM Asphalt Primer (Black) by Johns Manville,
 - .2 PA-917 Asphalt Primer by Siplast,
 - .3 Elastocol 500 Primer (Black) by Soprema.

- .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 JM SA Primer (Red) by Johns Manville,
 - .2 TA-325 Primer (Orange) by Siplast,
 - .3 Elastocol Stick Primer (Red) by Soprema.
 - .3 For Torch Applied Membranes:
 - .1 Solvent Based Primer: Composed of SBS modified bitumen, volatile solvents, synthetic polymers, and/or adhesive enhancing resins to prepare surfaces for torch applied membranes.
 - .1 JM Asphalt Primer (Black) by Johns Manville,
 - .2 PA-917 Asphalt Primer by Siplast,
 - .3 Elastocol 500 Primer (Black) by Soprema.

2.3 ROOFING BOARD ADHESIVE

- .1 Polyurethane Adhesive for Deck, Insulation, and Cover Boards:
 - .1 Ribbons of one or two component polyurethane foamable adhesive.
 - .1 INSTA-STIK Adhesive by Flexible Products Company-Roofing Group (DOW),
 - .2 JM Two-Part Urethane Insulation Adhesive by Johns Manville,
 - .3 OlyBond500 Adhesive by OMG Roofing Products,
 - .4 Para-Stik Adhesive by Siplast,
 - .5 Duotack by Soprema.

2.4 VAPOUR RETARDER: 1 PLY TORCH MODIFIED BITUMEN (ROOF 1.1, 1.2, 1.3 & 1.4)

- .1 Vapour Retarder Field Membrane:
 - .1 Torch grade modified bitumen, minimum 2.5mm thick, with minimum 180 g/m² non-woven polyester scrim, random glass fibre mat, or composite reinforcement, impregnated and coated with SBS modified bitumen, and conforming to CSA A123.23-15. Top surface lightly sanded and torch grade bitumen bottom surface covered with thermofusible polyolefin film or lightly sanded.
 - .1 DynaBase HW by Johns Manville,
 - .2 Paradiene 20 TG by Siplast,
 - .3 Sopralene 180 SP 3.5 by Soprema.

2.5 VAPOUR RETARDER: 1 PLY SBS COATED POLYETHYLENE (ROOF 1.5)

- .1 SBS & Polyethylene Field Membrane:
 - .1 Self-adhered SBS modified bitumen membrane for steel decks 0.8mm (32 mil) thick with a tri-laminated woven polyethylene top surface and silicone release film bottom surface. Roll width to be 1.14m (45").
 - .1 SA Vapour Retarder by Siplast,
 - .2 JM Vapour Barrier SA by Johns Manville,
 - .3 Soprapav'r by Soprema.

.2 Vapour Retarder and Tie-in Flashings:

.1 Self-adhered grade modified bitumen, minimum 1.5mm (60 mil) thick, with minimum 95g/m² non-woven polyester scrim, random glass fibre mat, or composite reinforcement, impregnated and coated with SBS modified bitumen, and conforming to CSA A123.23-15. Top surface lightly sanded and self-adhesive bitumen bottom surface covered with polyolefin or silicone release film.

- .1 DynaGrip SD/SA by Johns Manville,
- .2 Paradiene 20 SA by Siplast,
- .3 Sopraflash Stick Duo by Soprema (Application ≥ 0°C)

2.6 VAPOUR RETARDER TIE-IN FLASHINGS: SELF-ADHERED MODIFIED BITUMEN

.1 Vapour Retarder Tie-in Flashings: At sleepers, curbs, penetrations, and around perimeters:

.1 Self-adhered grade modified bitumen, minimum 1.5mm (60 mil) thick, with minimum 85g/m² non-woven polyester scrim, random glass fibre mat, or composite reinforcement, impregnated and coated with SBS modified bitumen, and conforming to CSA A123.23-15. Top surface lightly sanded and self-adhesive bitumen bottom surface covered with polyolefin or silicone release film.

- .1 DynaGrip SD/SA by Johns Manville,
- .2 Paradiene 20 SA by Siplast,
- .3 Sopraflash Stick Duo by Soprema (Application ≥ 0°C),

2.7 BASE INSULATION: CGF POLYISOCYANURATE

.1 Base Insulation Type: 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 to inorganic coated glass facers on top and bottom surfaces during manufacturing process:

.1 Approved and listed for use with Noncombustible and FM Class 1 rated insulated roof assemblies to FM Standard 4450 on Insulated Steel Deck Roofs and FM Standard 4470 on Roof Covers for durability, wind uplift, and fire resistance.

.2 Meet physical property requirements of ASTM C1289 and CAN/ULC S704.

.3 Compressive strength: Min. 138 kPa (20 psi) to ASTM C1621, Grade 2.

.4 Dimensional stability change of less than 2% conforming to ASTM D2126.

.5 Conformity to CAN/ULC S704 and Can/ULC S770 for Long Term Thermal Resistance (LTTR) in polyisocyanurate insulation.

.6 Acceptable Products:

- .1 ACFoam III polyisocyanurate by Atlas Roofing Corp.,
- .2 Engry 3 CGF polyisocyanurate by Johns Manville,
- .3 Paratherm CG polyisocyanurate by Siplast,
- .4 Sopra-ISO Plus polyisocyanurate by Soprema.

.1 Base Insulation Thickness:

.1 On Roof Area 1.1, 1.2, 1.3, 1.4 & 1.5: Continuous flat layer of polyisocyanurate insulation boards 51mm (2.0") in thickness, with butt lapped joints.

- .2 Base Insulation Panel Size: Maximum 1.22m x 1.22m (4' x 4') regardless of attachment method.
- .1 Overlay Insulation Thickness:
 - .1 On Roof Area 1.1, 1.2, 1.3, 1.4 & 1.5: Continuous flat layer of polyisocyanurate insulation boards 51mm (2.0") in thickness, with butt lapped joints.
 - .2 Base Insulation Panel Size: Maximum 1.22m x 1.22m (4' x 4') regardless of attachment method.
- .2 Tapered Drainage Sumps: Tapered closed-cell polyisocyanurate foam rigid insulation boards with inorganic coated glass facers.
 - .1 At Roof Drains: Delete section of base insulation to accommodate tapered sump:
 - .1 On All Roof Replacement Areas: 2.44m x 2.44m (8' x 8') and tapered from 51mm (2.0") at outer edge down 2% to 25mm (1.0") in thickness at center.

2.8 COVER BOARD:

- .1 Base Sheet Laminated Asphaltic Board:
 - .1 4.8mm (3/16") thick multi-ply, semi-rigid asphaltic roofing recovery board composed of a mineral fortified asphaltic core formed between two asphaltic saturated fibreglass liners with 2.2mm (3/32") factory laminated non-woven polyester reinforced SBS modified bitumen base sheet membrane conforming to CSA A123.23-15. Panel boards to have a membrane duo selvedge edge width of 89mm (3.5") for overlapping onto next board.
 - .1 7.0mm (9/32") 2-1 Soprasmart Board by Soprema.
 - .2 7.0mm (9/32") 2-1 Soprasmart Board Sanded by Soprema. (Roof 1.5)
 - .2 Laminated Asphaltic Board Size: Flat panels, max. size 0.91m x 2.44m (3' x 8').
 - .3 Laminated Asphaltic Board Surface: Thermofusible polyolefin film top surface. (Roof 1.1, 1.2, 1.3 & 1.4)
 - .4 Laminated Asphaltic Board Surface: Sanded top surface. (Roof 1.5)
 - .5 Cover Strips For Base Sheet Laminated Panels: At insulation panel end joints, 330mm (13.0") wide strips of 2.5mm (3/32") thick base sheet membrane with composite reinforcement, impregnated and coated with SBS modified bitumen, and conforming to CSA A123.23-15.
 - .1 Heat Welded Application: Top and bottom surface covered with thermofusible polyfilm; SopraLap SP by Soprema.
 - .2 Self-adhered Application (Roof 1.5): Top surface to be lightly sanded with bottom surface covered with silicone release film; SopraLap Stick by Soprema.
- .2 OR Asphaltic Cover Board: Dimensionally stable, laminated board, max size 1.2m x 2.4m (4'x8'):
 - .1 Multi-ply, semi-rigid asphaltic roofing recovery board composed of a mineral fortified asphaltic core formed between two asphaltic saturated fibreglass liners.
 - .1 Thickness: 0.25"

- .3 OR Gypsum Cover Board: Dimensionally stable, fire resistant, gypsum based roof board with treated core for moisture and mould resistance; size no larger than 1.22m x 2.44m (4' x 8'):
 - .1 Glass-Mat Faced: Siliconized gypsum roof board with factory laminated glass-mat facer meeting ASTM C 1177. Boards with factory applied primer preferred.
 - .1 13mm (1/2") DensDeck Prime with EONIC technology by Georgia-Pacific,
 - .2 13mm (1/2") DEXcell FA Glass Mat Roof Board by National Gypsum (JM)

2.9 MODIFIED BITUMEN MEMBRANE: SELF-ADHERED BASE & TORCH AND SELF-ADHERED CAP

- .1 Two (2) ply modified bitumen membrane system for specified System Warranty.
- .2 Base Sheet Field Membrane:
 - .1 Soprema Option: Factory laminated to cover board.
 - .2 JM & Siplast Option: Self-adhered grade modified bitumen; minimum 2.5mm thick, with minimum 180 g/m² non-woven polyester scrim, random glass fibre mat or composite reinforcement, impregnated and coated with SBS modified bitumen, and conforming to CSA A123.23-15. Top surface light sanded or covered with thermofusible polyolefin film and self-adhesive bitumen bottom surface covered with polyolefin or silicone release film.
 - .1 Fifteen (15) Year System Warranty (BASE BID):
 - .1 DynaGrip P/SA by Johns Manville,
 - .2 Paradiene 20 SA by Siplast,
- .3 Base Sheet Flashing:
 - .1 (Roof 1.1, 1.2, 1.3 & 1.4) Self-adhered grade modified bitumen; minimum 2.5mm with minimum 180 g/m² non-woven polyester scrim, random glass fibre mat, or composite reinforcement, impregnated and coated with SBS modified bitumen, and conforming to CSA A123.23-15. Top surface lightly sanded or covered with thermofusible polyolefin film and self-adhesive bitumen bottom surface covered with polyolefin or silicone release film.
 - .1 For Fifteen (15) Year System Warranty (BASE BID):
 - .1 DynaGrip P/SA by Johns Manville,
 - .2 Paradiene 20 SA by Siplast,
 - .3 Sopraflash Flam Stick by Soprema (Use Winter Grade at -10 to 10°C).
 - .2 (Roof 1.5) Self-adhered grade modified bitumen; minimum 2.5mm with minimum 180 g/m² non-woven polyester scrim, random glass fibre mat, or composite reinforcement, impregnated and coated with SBS modified bitumen, and conforming to CSA A123.23-15. Top surface sanded and self-adhesive bitumen bottom surface covered with polyolefin or silicone release film.
 - .1 For Fifteen (15) Year System Warranty (BASE BID):
 - .1 DynaGrip SA by Johns Manville,
 - .2 Paradiene 20 SA by Siplast,
 - .3 Sopraflash Stick by Soprema (Use Winter Grade at -10 to 10°C).
- .4 Cap Sheet Field Membrane:

- .1 (Roof 1.1, 1.2, 1.3 & 1.4) Torch grade modified bitumen; minimum thickness 3.3mm, with minimum 250 g/m² non-woven polyester scrim, random glass fibre mat, or composite reinforcement, impregnated and coated with SBS modified bitumen, and conforming to CSA A123.23-15. Top surface to have No. 11 ceramic granules and torch grade bitumen bottom surface covered with thermofusible polyolefin film or lightly sanded. Colour of granules to be chosen by Owner from Contractor supplied samples of standard colours.
 - .1 For Fifteen (15) Year System Warranty (BASE BID):
 - .1 DynaWeld 250 Cap by Johns Manville,
 - .2 Paradiene 30 TG by Siplast,
 - .3 Sopralene Flam 250 GR by Soprema.
 - .2 (Roof 1.5) Self-adhered modified bitumen; minimum thickness 3.3mm, with minimum 250 g/m² non-woven polyester scrim, random glass fibre mat, or composite reinforcement, impregnated and coated with SBS modified bitumen, and conforming to CSA A123.23-15. Top surface to have No. 11 ceramic granules and torch grade bitumen bottom surface to be a self-adhesive underface with split-back release film. Colour of granules to be chosen by Owner from Contractor supplied samples of standard colours.
 - .1 For Fifteen (15) Year System Warranty (BASE BID):
 - .1 Sopraply Stick Traffic Cap by Soprema
 - .2 DynaGrip Cap by Johns Manville,
- .5 Cap Sheet Flashing:
 - .1 (Roof 1.1, 1.2, 1.3, 1.4) Torch grade modified bitumen; minimum thickness 3.3mm, with minimum 250 g/m² non-woven polyester scrim, random glass fibre mat, or composite reinforcement, impregnated and coated with SBS modified bitumen, and conforming to CSA A123.23-15. Top surface to have No. 11 ceramic granules and torch grade bitumen bottom surface covered with thermofusible polyolefin film or lightly sanded. Colour of granules to be chosen by Owner from Contractor supplied samples of standard colours.
 - .1 Fifteen (15) Year System Warranty (BASE BID):
 - .1 DynaWeld 250 Cap by Johns Manville,
 - .2 Parafor 30 TG by Siplast,
 - .3 Sopralene Flam 250 GR by Soprema.
 - .2 (Roof 1.5) Self-adhered modified bitumen; minimum thickness 3.3mm, with minimum 250 g/m² non-woven polyester scrim, random glass fibre mat, or composite reinforcement, impregnated and coated with SBS modified bitumen, and conforming to CSA A123.23-15. Top surface to have No. 11 ceramic granules and torch grade bitumen bottom surface to be a self-adhesive underface with split-back release film. Colour of granules to be chosen by Owner from Contractor supplied samples of standard colours..
 - .1 Fifteen (15) Year System Warranty (BASE BID):
 - .1 DynaGrip Cap by Johns Manville,
 - .2 Sopraply Stick Traffic Cap by Soprema.

2.10 MISCELLANEOUS INSULATION

- .1 Batt Insulation: Non-combustible, water resistant, vapour permeable, semi rigid mineral wool batt insulation made from slag and basalt rock, conforming to CAN/ULC S702-09 with a density of 45 kg/m³ (2.8 lb/ft³).
 - .1 Rockwool AFB (Acoustical Fire Batt) by Rockwool Inc.
- .2 Extruded Polystyrene Insulation: Closed cell, Type IV (4) extruded expanded polystyrene foam insulation boards with continuous skin surface on top face and back meeting requirements of CAN/ULC S701. Minimum thickness 25mm (1.0").
 - .1 Foamular 350 or 400 series XPS by Owens Corning (Light Pink),
 - .2 Styrofoam Brand Roofmate XPS insulation by Dow (Light Cyan),
 - .3 Sopra-XPS 35 insulation by Soprema (Light Orange).

2.11 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.
- .2 Wood to steel, wood to wood or steel to steel:
 - .1 Tru-Fast Ultra Solid Stainless Steel fastener or equal approved by membrane Manufacturer, to penetrate substrate by minimum 19mm (3/4").
- .3 Wood/steel to concrete or concrete block:
 - .1 Perma-Grip Tap Grip HD Truss Head fastener with Perma-Coat Z3 corrosion protection or equal approved by membrane Manufacturer, to penetrate substrate by 32mm (1 1/4").
 - .2 Tru-Fast Tap Grip HD Truss Head fastener with Perma-Coat Z3 corrosion protection to penetrate substrate by 32mm (1 1/4").
- .4 Steel/aluminum to aluminum:
 - .1 Tru-Fast DP with Trucote PC-3 corrosion protection fastener c/w EPDM galvanized steel sealing washers or equal approved by membrane Manufacturer, to penetrate substrate by 19mm (3/4").
- .5 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 (1/4" x 3/8") slotted holes on 203mm (8") o/c. Acceptable material: TB-120 aluminum termination bar by Tru-Fast or equal approved by membrane Manufacturer.
- .6 Termination bar fastener for wood, steel or aluminum:
 - .1 Tru-Fast Ultra Solid Stainless Steel fastener to penetrate substrate by 19mm (3/4") 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,
- .7 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 1/4") c/w EPDM galvanized steel sealing washers.

- .8 Pre-painted metal flashing to steel or wood:
 - .1 #14 Colormate fasteners by Leland Industries, Construction Fasteners Inc. Woodgrip #14 screw complete with Senti coating on threads and Chromagard colour match heads with EPDM washer, or equal approved by membrane Manufacturer, to penetrate substrate by minimum 19mm (3/4").
- .9 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 1/4").

2.12 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 Consultant, pitch pockets are strictly prohibited. All units are to have foamed in place closed cell urethane foam insulation sprayed into unit at plant under controlled conditions. Flanges to be primed with rubberized asphalt compatible primer. Supply roof drains with control flow weirs and install weirs only at existing roof drains currently using control flow.
 - .1 Retrofit Roof Drain Insert: RD-4C-RR-FLAT by Thaler with T-7 Control Flow Weirs,
 - .2 Plumbing Stack Flashing: SJ-26A insulated stack by Thaler Metal Industries Inc.,
 - .3 Tallcone/B-Vent Flashing: MEF-4A by Thaler Metal Industries Inc.,
 - .4 Hot Pipe Flashing: MEF-3A by Thaler Metal Industries Inc.,
 - .5 Walkway Pavers: Pedslab by Brooklin Concrete and to IRC Detail
- .2 Picket Pockets: Pre-molded curbs size adjusted to suit site conditions, bonded with adhesive sealant to roof membrane, and filled level with non-slumping, one component, moisture-curing pourable sealer. Acceptable products:
 - .1 Chem Curb system by ChemLink,
 - .2 Inter Clip System by Soprema,
 - .3 Or IRC Group 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 Retro Roof Drains: Copper retrofit drain inserts using U-Flow connectors. Retrofit roof drains shall be RD-4C-RR-FLAT by Thaler Metal Industries, complete with cast aluminum domes and U-Flow seal connectors.
- .5 Pourable Sealer: Elastomeric pourable sealer as recommended by manufacturer.
- .6 Sealing Compound: Rubberized Sealing Compound to CAN/CGSB-37.29, rubber asphalt type Sopramastic by Soprema, MBR Utility Cement by Johns Manville, or PS-209 Elastomeric Sealant by Siplast.
- .7 Spray Urethane foam: One or two component polyurethane spray foam insulation. Use low pressure expanding spray foam insulation at force sensitive areas.
- .8 Fire Rated Spray Foam: Two component, fire rated (2 Hour) polyurethane spray foam insulation; Fire Barrier FIP-1Step by 3M.
- .9 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 IRC Group approved equal.

- .10 Cold Applied Mastic: Trowel grade, asbestos-free plastic cement composed of bitumen, solvents, and mineral fillers for use with bituminous waterproofing membranes:
 - .1 MBR Utility Cement by Johns Manville,
 - .2 PA-828 Flashing Cement by Siplast,
 - .3 Sopralastic 110 by Soprema.
- .11 Sheet Metal Flashings and Trim: As per Section 07 62 00 and fabricated from 24 gauge prepainted steel. Hook strips to be 2 gauges heavier than flashings. Colour to match existing.
- .12 Sealants: As per Section 07 92 00. Colour of sealants to match component applied against.
- .13 Sacrificial Protection Membrane: Self adhered or cold applied squares of matching cap sheet membrane under all bases and footings of rooftop supports and equipment set on roof membrane. Custom cut to suit base or footing size with min. 51mm (2.0") extension on all sides.

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 Factory Mutual Global design criteria FM 1-28 and 1.49,
 - .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 Do not use spray installation methods on days with significant wind.
 - .7 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") extruded 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 otherwise alter roof deck.

- .2 DO NOT STRUCTURALLY OVERLOAD ROOF DECK WITH STORAGE PILES OF STONE BALLAST AND CONCRETE PAVERS ON ROOFTOP.
- .3 Ensure weight of paver and stone ballast is adequately distributed across roof at all times, or temporarily remove ballast from roof and store at ground level staging area.
- .4 Immediately separate and reorganize pallets of stacked concrete pavers hoisted or carried to roof. Spread Dead Load out across roof and concentrate loading over structural members. Expect roofs to have less reserve load capacity in winter.
- .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.
 - .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 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 Rooftop equipment requiring disconnection and reconnection to be responsibility of Contractor unless otherwise specified elsewhere in contract documents or in consultation with Owner.
 - .2 Include for modifications required to existing rooftop curbs and supports and related cabling, conduits, cable trays, ductwork, etc. as required to suit height of new finished roof system.

.2 Existing Roof Removal:

On All Roof Replacement Areas: Remove existing roof components down to expose existing vapour retarder membrane in preparation for installation of new roof system.

Remove and dispose loose or debonded sections of existing vapour retarder membrane from roof deck.

Include in Bid Price for localized repair and replacement of existing vapour retarder membrane and gypsum board on 10% of each roof area.

At areas designated for roof removal and replacement, remove existing projection and perimeter metal flashings, ballast, gravel, roof membrane and flashings, insulation, vapour retarder and flashings, and old appurtenances. Dispose removed items to an appropriate site for building material waste.

All unused and abandoned pitch pockets, vents, curbs, sleepers, projections, etc. are to be removed from designated areas and disposed of.

Obtain verification and authorization from Client before removing and disposing of any suspected unused or abandoned projections.

.1 Install new roof decking as required to close off any deck openings prior before proceeding with new roof system installation. For holes in the concrete deck greater than 6" x 6" but less than 18" x 18" mechanically fasten a ¼" steel plate to cover hole, ensuring the metal plate extends a minimum of 6" onto the existing deck on all sides. For holes less than 6" x 6" no deck infill is required.

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 of Manufacturer of 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, 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 Consultant 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 LOCALIZED REPAIR OF EXISTING VAPOUR RETARDER & DECK OVERLAY

.1 On All Roof Replacement Areas: Examine and review surface of exposed existing vapour retarder membrane for damage and deterioration in consultation with Observer. All damaged sections are to be cut out and repaired with new material in logical rectangular sections.

Allow for existing mopped vapour retarder repair on 10% of each roof area in Bid Price. Provide a Unit Price on Bid Form to add to or delete from Contract Price for localized repair of existing mopped vapour retarder, per square foot.

- .2 At repair sections, neatly cut out sections of discovered wet and/or damaged mopped membrane in logical rectangular shapes as required.
- .3 Prime repair area as required and allow to flash off.
- .4 Restore existing vapour retarder with plies of self-adhered or torch applied modified bitumen base sheet membrane to build up flush with existing BUR membrane.
- .5 Carry on to and over existing mopped membrane around perimeter of cut-out area by a minimum of 102mm (4"). Ensure good bond to existing membrane.

3.6 CARPENTRY

- .1 On Designated Roof Areas: Refer to drawings for carpentry requirements. Install wood blocking, plywood, and cant strips to accommodate required slopes, insulation, membranes, and finish 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 and at least 51mm (2.0") higher than adjacent roof perimeters, up to a maximum 460mm (1'-6") 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, or prefab curb adapter or reducer to raise curb as required to suit new height.
- .2 At Existing Parapets: Minimum height to be 102mm (4") above finished roof membrane, unless otherwise indicated on detail drawings.
- .3 Replace any damaged or deteriorated wood at perimeters and projections with new construction grade spruce wood blocking or exterior grade plywood, good one side, to match existing. Determination of suitability to reuse or replace existing wood to be by Observer.
 - .1 Ensure existing wood blocking remaining at perimeters and curbs is securely fastened to existing substrate before installing new wood 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 staggered.
 - .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 to be considered part of roof, and to be made watertight by end of each work day to eliminate moisture infiltration into roof system.

3.7 VAPOUR RETARDER (ROOF 1.1, 1.2, 1.3 & 1.4)

- .1 On All Roof Areas 1.1, 1.2, 1.3 & 1.4: Install a one (1) ply modified bitumen vapour retarder with membrane flashings as per manufacturer's written instructions. Installation to be free of blisters, wrinkles and fish-mouths.
 - .1 Install modified bitumen base sheet flashings at perimeters, curbs, sleepers, and penetrations prior to installation of field membrane across roof. Self-adhered modified bitumen flashings may be used at perimeters or projections where torching may be an issue.
 - .2 Vapour retarder must be installed on same day as primer application.
 - .3 Do not install when it is raining or snowing, on wet/humid surfaces, or when inclement weather is expected shortly.
 - .4 Deck substrate must be clean, dry, and free of dirt, dust, grease, or other contaminants.
- .2 Primer Installation:
 - .1 Prime surface of vapour barrier, perimeters, curbs, sleepers, and penetrations to receive membrane and flashings where required by manufacturer.
 - .2 Apply primer to clean and dry surfaces with a paint brush, roller or sprayer at temperatures 0°C (31°F) and above.
 - .3 Apply primer at a coverage rate between of 0.1 to 0.5 L/m² (0.25 to 1.22 gallon/100 ft²) as recommended by membrane manufacturer for surface type.
 - .4 Ensure all substrates are fully covered with primer with no areas bare and avoid pooling.
 - .5 Allow primer to dry and flash-off prior to installation of new membrane and flashings.

- .3 Membrane Flashing Installation:
 - .1 Install membrane flashing onto substrate in strips one membrane roll wide (40" or 1m) and extend over perimeters as shown on detail drawings
 - .2 Field measure and cut flashing membrane to length required for flashing at each detail and roll up for installation.
 - .3 For self-adhered flashings: Once aligned in position, peel back a portion of release sheet and press membrane onto substrate for initial adherence. Hold membrane flashing tight and peel back release sheet by pulling diagonally.
 - .4 For torch applied flashings: Align and unroll flashing membrane while torching roll from side to side. Limit direct contact of flame with prepared vertical substrates. Ensure that majority of flame remains on roll of membrane.
 - .5 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").
 - .6 For self-adhered flashings: Use a weighted roller to press membrane down onto substrate including laps. Finish by aligning edge of roller with lower end of side laps and rolling up membrane.
 - .1 Do not cut membrane to remove trapped air bubbles. Squeeze out air bubbles by pushing roller to edge of laps.
- .4 Field Membrane Installation:
 - .1 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and re-roll from both ends.
 - .2 Unroll and install base sheet carefully in straight and parallel rows.
 - .3 When torching, limit direct contact of flame with prepared substrates. Ensure that majority of flame remains on roll of membrane. Avoid over torching membrane.
 - .4 Overlap each preceding row of membrane sheet by min. 76mm (3") on side laps and by a min. 152mm (6") at end laps. Stagger end laps of adjacent rows by at least 305mm (12").
 - .5 Carry vapour retarder up all vertical surfaces at parapets and projections a minimum of 152mm (6") to allow for encapsulating of new insulation with roof membrane as indicated on detail drawings.
 - .6 **INSTALL MEMBRANE GUSSET REINFORCEMENT AT ALL INSIDE AND OUTSIDE CORNERS ON TOP OF BASE SHEET MEMBRANE. CONSULTANT TO REVIEW GUSSET INSTALLATION BEFORE PROCEEDING.**
- .5 All side and end laps of base sheet and base sheet flashing to be hot air welded to satisfaction of Observer.

3.8 VAPOUR RETARDER (ROOF 1.5)

- .1 Roof 1.5: Install one (1) ply self-adhered vapour retarder membrane and flashing as per manufacturer's written instructions, free of blisters, wrinkles and fish-mouths. Installation to be free of blisters, wrinkles and fish-mouths.
 - .1 Vapour retarder must be installed on same day as primer application.

- .2 Do not install when it is raining or snowing, on wet/humid surfaces, or when inclement weather is expected shortly.
- .3 Deck substrate must be clean, dry, and free of dirt, dust, grease, or other contaminants.
- .2 Primer Installation:
 - .1 Prime exposed surfaces to receive vapour retarder membrane and flashings. Apply primer to clean and dry surfaces with a paint brush, roller or sprayer at temperatures 0°C (31°F) and above.
 - .2 Apply primer at a coverage rate between of 0.1 to 0.5 L/m² (0.25 to 1.22 gallon/100 ft²) as recommended by membrane manufacturer for surface type.
 - .3 Ensure all substrates are fully covered with primer with no areas bare and avoid pooling.
 - .4 Allow primer to dry completely prior to installation of new vapour retarder membrane.
- .3 Field Membrane Installation:
 - .1 Begin application at bottom of roof slope. Unroll self-adhered membrane onto substrate without adhered for alignment. Do not immediately remove release film.
 - .2 Overlap each preceding sheet by a minimum of 76mm (3") lengthwise following reference chalk line and by a minimum of 152mm (6") at each end. Stagger end laps by at least 305mm (12").
 - .3 Once aligned, peel back a portion of release film and press membrane onto substrate for initial adherence. Hold membrane tight and peel back release film by pulling diagonally.
 - .4 Use a manufacturer recommended weighted roller to press membrane down into substrate including laps. Finish by aligning edge of roller with lower end of side laps and rolling up membrane.
 - .5 Do not cut membrane to remove air bubbles trapped under laps. Squeeze out air bubbles by pushing roller to edge of laps.
 - .6 Carry vapour retarder up all vertical surfaces at parapets and projections where indicated on detail drawings.
- .4 Membrane Flashing Installation:
 - .1 Prime substrate to receive self-adhered base sheet flashing with primer and rate of application as recommended by manufacturer. Avoid pools and heavy areas and allow primer to dry a minimum 30 minutes or until staining does not occur to touch and surface becomes tacky.
 - .2 Ensure complete coverage of primer to both prepared substrates and to field sheet membrane prior to placement of membrane flashing.
 - .3 Install membrane flashing onto substrate in strips one membrane roll wide (40" or 1m) and extend over perimeters as shown on detail drawings
 - .4 Field measure and cut flashing membrane to length required for flashing at each detail and roll up for installation. Allow for encapsulating of new insulation with roof membrane.
 - .5 Unroll and install membrane flashing onto substrate by removing release paper and discarding.

- .6 Using weighted roller as recommended by manufacturer, roll all surfaces of roof membrane to ensure continuous adhesion with membrane to substrate. Firmly press membrane into substrate to ensure proper bond.
- .7 Lap membrane flashing onto field membrane a minimum 152mm (6"). Side laps between adjacent sheets to be a minimum of 127mm (5") wide.
- .8 **INSTALL MEMBRANE GUSSET REINFORCEMENT AT ALL INSIDE AND OUTSIDE CORNERS ON TOP OF BASE SHEET MEMBRANE.**
- .9 Install vapour retarder tie-in flashings between new vapour retarder and roof membrane at projections and curbs and where indicated in detail drawings.

3.9 BASE INSULATION

- .1 On Designated Roof Replacement Areas: Install a layer of base insulation boards over prepared vapour retarder in accordance with insulation manufacturer's instructions.
- .2 Where applicable, install tapered base insulation according to layout on reviewed shop drawings and roof plan drawing(s). Report any discrepancies to Consultant before proceeding.
- .3 Do not install more insulation board than can be covered with membrane by end of work day or before onset of inclement weather.
- .4 Do not install warped, curled, damaged, or wet insulation boards.
- .5 Install base insulation 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.
- .6 On Designated Roof Replacement Areas: Adhere base insulation 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 152mm (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 insulation 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 insulation is firmly attached.
- .7 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.

- .8 For uneven surfaces, trimming or slitting of boards may be necessary. Fill all gaps larger than 3mm (1/8”) with insulation slivers or continuous spray polyurethane foam insulation to ensure thermal barrier continuity.

3.10 OVERLAY INSULATION

- .1 On Designated Roof Replacement Areas: Install a continuous layer of overlay insulation boards over base insulation in accordance with insulation manufacturer's instructions.
- .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 Install overlay insulation 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 On Designated Roof Replacement Areas: Adhere overlay insulation 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 152mm (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 insulation 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 insulation is firmly attached.
- .6 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.
- .7 For uneven surfaces, trimming or slitting of boards may be necessary. Fill all gaps larger than 3mm (1/8”) with insulation slivers or continuous spray polyurethane foam insulation to ensure thermal barrier continuity.
- .8 On Designated Roof Replacement Areas: At all existing roof drain locations, delete a section of base insulation in a 2.4m x 2.4m (8' x 8') area centered around each drain and 1.2m x 2.4m (4' x 8') at each scupper.
 - .1 At each drain location, install a new 2.4m x 2.4m (8' x 8') prefabricated, tapered insulation drain sump over prepared substrate.

3.11 COVER BOARD

- .1 On Designated Roof Replacement Areas: Install a continuous layer of cover board panels over existing substrate insulation in accordance with insulation manufacturer's instructions.
- .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 panel boards.
- .4 Install panels 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.
 - .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.
- .5 For Base Sheet Laminated Cover Board: 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 to 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 152mm (6") apart.
 - .4 Rows of adhesive to be no more than 102mm (4") apart in corner zones.
 - .5 Do not allow rising foam adhesive to skin over. Place roof board panels immediately into wet adhesive.
 - .6 Walk-in board panels to ensure positive adhesion to substrate across full panel. Repeat walk-in every five (5) minutes until insulation is firmly attached.
- .6 Custom cut boards as required at perimeters and projections to suit. Field cuts to be neat and provide tight fit around penetrations, projections, and at perimeters. For uneven surfaces, trimming or slitting of boards may be necessary.
- .7 Ensure all panels are fit tightly together. Fill all gaps larger than 3mm (1/8") with insulation slivers or continuous spray polyurethane foam insulation to ensure thermal barrier continuity of same materials.
- .8 With Base Sheet Laminated Panels:
 - .1 Side Laps: Adhere and heat weld with hot air gun or torch to satisfaction of Observer all side laps of modified bitumen base sheet membrane.
 - .2 End Joints: Install 330mm (13") wide self-adhered, modified bitumen base sheet cover strips centered over panel end joints. Cover strips to extend a min. of 152mm (6") past each side of end joint.

- .3 Ensure all laps and seams in base sheet membrane are well bonded to form a single continuous waterproof membrane barrier

3.12 MODIFIED BITUMEN MEMBRANE APPLICATION

- .1 On Roof Area 1.1, 1.2, 1.3 & 1.4: Install a two (2) ply SBS modified bitumen membrane system over top of prepared substrate. Base sheet field membrane to be torch applied with self-adhered base sheet flashings. Cap sheet field membrane and cap sheet flashings to be torch applied.
 - .1 Soprema Option: Base sheet field membrane factory laminated to Cover Board.
 - .2 JM & Siplast Option: Install self-adhered base sheet flashings with primer around perimeters, curb, and projections before torch application of base sheet field membrane.
- .2 On Roof Area 1.5 (FLAMELESS): Install a two (2) ply, SBS modified bitumen membrane system otop of prepared substrate. Base sheet layer to be self-adhered with self-adhered flashings. Cap sheet layer and flashings to be self-adhered.
 - .1 Soprema Option: Sanded Base sheet field membrane factory laminated to Cover Board.
- .3 Provide materials from same manufacturer to meet material compatibility and warranty requirements necessary to attain specified roofing manufacturer warranty.
- .4 Install membranes in accordance with manufacturer's written instructions and applicable project specific report notes.
- .5 Membrane applications to be free of sags, blisters, wrinkles, and fish-mouths.
- .6 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 zig-zag pattern with torch as recommended by manufacturer over membranes that are covered with thermal-fusible film.
 - .6 Alignment of Rolls: Completely unroll first roll and align with edge of roof. Reroll membrane from both ends to centre and apply as per specifications.
 - .7 Staggering of Sheets: End laps between base and cap sheets to be offset a min. of 610mm (24"). 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. 305mm (12") wide for end laps. When salvage side laps of

- base and cap sheets are unequal, adjust cap roll width occasionally to maintain alignment.
- .8 Procedure to Seal Voids: Where voids are created by overlapping rolls of membrane, cut off corner of salvage edge where covered by next roll of material.
 - .9 Salvage Edge Protection: Granules along edge of membrane to be primed prior to application of adhesive to provide good adhesion of laps.
 - .10 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.
 - .11 Bleed-Out at Seams: When torch applying membrane, provide consistent, continuous bleed-out along all seams, no less 3mm (1/8") and no greater than 6mm (1/4") in width.
 - .12 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.
 - .13 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.
 - .14 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 straight chalk lines to mark outline of areas requiring degranulation. Achieve a uniform black surface of bitumen across 100% of embedment areas to be overlapped.
 - .15 Reinforcement: Required at all corners, vents, drains, HVAC units, and gravel stops.
 - .16 Primer Application: Sanded membrane left exposed overnight or longer to be primed before continuing membrane installation to ensure good adhesion.
- .7 Correction Requirements for Defects and Deficiencies:
- .1 Delamination: Membrane may not be fully bonded to substrate due to:
 - .1 Moisture present on substrate,
 - .2 Dirt, dust, or other contaminate on substrate acting as a parting agent,
 - .3 Inadequate application of primer or adhesive.
 - .2 Misalignment: Alignment of row to starting line is lost due to swerving during application or to roll not being unrolled, aligned, and rerolled straight prior to application.
 - .1 Misaligned roll to be cut at point where swerve begins and restarted.
 - .2 Ensure membrane rolls are allowed to relax. Use heat in a zig-zag pattern to relax thermo-fusible films and membrane reinforcement.
 - .3 Ensure pressure is applied evenly across roll during application to avoid drifting.
 - .3 Wrinkles: Undulations located on surface of membrane after it has been applied:
 - .1 Cross-Sheet Undulations: Waves in membrane due to installation in a stop and go fashion.

- .2 Continuous Ridging of Membrane: Formed by movement of substrate underneath membrane. Ensure substrate is secure before continuing.
- .4 Blisters: Pocket of air trapped under membrane where full adhesion was not achieved or trapped moisture released from substrate:
 - .1 Remove and repair significant blisters.
 - .2 Cut blister and adhere any loose membrane.
 - .3 Apply patch membrane over repair area, extend a min. 152mm (6") on all sides.
- .5 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").
- .8 Primer Installation:
 - .1 Apply primer to clean and dry surfaces with a paint brush, roller or sprayer at temperatures 0°C (31°F) and above.
 - .2 Apply primer at a coverage rate between of 0.1 to 0.5 L/m² (0.25 to 1.22 gallon/100 ft²) as recommended by membrane manufacturer for surface type.
 - .3 Ensure all substrates are fully covered with primer with no areas bare and avoid pooling.
 - .4 Allow primer to dry and flash-off prior to installation of new membrane and flashings.
- .9 Base Sheet Field Membrane: Factory Laminated to Cover Board (Soprema Option):
 - .1 Self-adhere first part of dual edge membrane side laps and heat weld with hot air gun or torch remaining part of side laps to satisfaction of Observer.
 - .2 Use a membrane manufacturer recommended weighted roller to press membrane down onto substrate over side laps.
 - .3 Install 330mm (13") wide modified bitumen base sheet cover strips along and centered over all panel end joints.
 - .4 Heat weld side laps and end laps of base sheet field membrane to achieve continuous bond and seal between overlapping sheets.:
- .10 Base Sheet Field Membrane, Self-adhered Installation: (JM & Siplast Option)
 - .1 Prime substrate and around perimeters to receive new self-adhered base sheet membrane and flashings.
 - .1 Install specified primer at application rate and temperature recommended by manufacturer to avoid pooling and heavy areas.
 - .2 Allow primer to dry a minimum of 30 minutes or until staining does not occur upon touch and surface becomes tacky.
 - .2 Field measure and cut membrane to length of run required and roll up for installation.
 - .3 Starting at low point of roof, perpendicular to slope, unroll base sheet membrane and position.
 - .4 Once aligned in desired position, peel back a portion of release under film and press membrane onto substrate for initial adherence.

- .5 Hold membrane tight and peel back release under film by pulling diagonally to remove fully and discard. Broom sheet into place to ensure full contact with substrate
- .6 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").
- .7 Use a membrane manufacturer recommended weighted roller to press membrane down onto substrate including laps. Finish by aligning edge of roller with lower end of side laps and rolling up membrane.
 - .1 Do not cut membrane to remove trapped air bubbles. Squeeze out air bubbles by pushing roller to edge of laps.
- .8 Heat weld side laps and end laps of base sheet field membrane to achieve continuous bond and seal between overlapping sheets.
- .11 Base Sheet Flashing, Self-adhered Installation:
 - .1 Where required, prime concrete and wood surfaces at roof projections and around perimeter to receive new base sheet membrane flashings.
 - .2 Install membrane flashing onto substrate in strips one membrane roll wide (40" or 1m) and extend over 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 Install base sheet flashing starting at outside face of perimeter, running across perimeter detail, and down onto flat of roof.
 - .5 Once aligned in position, peel back a portion of release sheet and press membrane onto substrate for initial adherence. Hold membrane flashing tight and peel back release sheet by pulling diagonally.
 - .6 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").
 - .7 Use a membrane manufacturer recommended weighted roller to press membrane down onto substrate including laps. Finish by aligning edge of roller with lower end of side laps and rolling up membrane.
 - .1 Do not cut membrane to remove trapped air bubbles. Squeeze out air bubbles by pushing roller to edge of laps.
 - .8 Provide preliminary securement of membrane on outside edge or perimeters before installation of finish metal flashings and trim. Fasten top edge of membrane flashings on outside face of perimeter details with round top nails spaced every 229mm (9") o/c.
 - .9 (Roof 1.1, 1.2, 1.3, 1.4) Heat weld side laps and end laps of base sheet flashing to achieve continuous bond and seal between overlapping sheets.
 - .10 (Roof 1.5) All side and end laps of base sheet to be heat welded with hot air gun to satisfaction of Consultant.
- .12 Gusset Reinforcement:

- .1 Install membrane gussets at inside and outside corner locations around perimeters, roof curbs, and sleepers to reinforce base sheet membrane layer.
 - .1 Gusset size to be approx. 76x152mm (3"x6") with bottom cut to form "V" shape. Where installing over cant strip, provide additional "V" shape at top of gusset.
 - .2 OBSERVER TO REVIEW MEMBRANE GUSSET INSTALLATION WORK BEFORE COMMENCEMENT OF CAP SHEET MEMBRANE INSTALLATION.
- .13 Cap Sheet Field Membrane, Self-adhered Installation (Roof 1.5):
 - .1 Complete installation of base sheet flashing prior to installing membrane cap sheet and cap sheet flashings.
 - .2 Prime base sheet with specified primer at rate recommended by manufacturer. Avoid pools and heavy areas and allow primer to dry a minimum 30 minutes or until staining does not occur to touch and surface becomes tacky.
 - .3 Field measure and cut membrane to length of run required and roll up for installation.
 - .4 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and re-roll from both ends.
 - .5 Unroll and install cap sheet onto base sheet by removing release paper and discarding. Broom sheet into place to ensure full contact with substrate.
 - .6 Lap sheets 76mm (3") for side laps and a minimum 152mm (6") for end laps. Turn sheet up at perimeters a minimum of 76mm (3").
 - .7 Use metal roller, apply pressure on whole cap sheet to enhance adhesion to base sheet.
 - .8 All side and end laps of cap sheet to be heat welded with hot air gun to satisfaction of Consultant.
- .14 Cap Sheet Field Membrane, Torch Installation (Roof 1.1, 1.2, 1.3 & 1.4):
 - .1 Complete installation of base sheet flashing prior to installing membrane cap sheet and cap sheet flashings.
 - .2 Field measure and cut membrane to length of run required and roll up for installation.
 - .3 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and re-roll from both ends.
 - .4 Unroll and install cap sheet carefully in straight and parallel rows keeping majority of flame on membrane roll.
 - .5 Cap sheet to be torched across flat of roof, overtop of base sheet, and terminated at perimeters and vertical surfaces ensuring a good bond.
 - .6 Lap sheets 76mm (3") for side laps and a minimum 152mm (6") for end laps. Offset joints in cap sheet 305mm (12") minimum from those of base sheet.
 - .7 Heat weld side laps and end laps of cap sheet field membrane to achieve continuous bond and seal between overlapping sheets.
- .15 Cap Sheet Flashing, Self-adhered Installation (Roof 1.5):

- .1 Prime base sheet flashing with specified primer at rate recommended by manufacturer. Avoid pools and heavy areas and allow primer to dry a minimum 30 minutes or until staining does not occur to touch and surface becomes tacky.
 - .1 Ensure complete coverage of primer to both prepared base sheet flashing and to field cap sheet membrane prior to placement of cap sheet flashing.
 - .2 Install cap sheet flashing onto substrate in 1m (40") wide strips extending over perimeters as shown on detail drawings.
 - .3 Set cap sheet to offset base sheet flashing joints by 50% and extend a minimum of 152mm (6") onto roof. All side lap joints to be a minimum 76mm (3").
 - .4 Unroll and install cap sheet flashing onto substrate by removing release paper and discarding.
 - .5 Using weighted roller as recommended by manufacturer, roll all surfaces of roof membrane to ensure continuous adhesion with membrane to substrate. Firmly press membrane into substrate to ensure proper bond.
 - .6 Lap cap sheet flashing onto cap sheet membrane a minimum 152mm (6"). Side laps between adjacent sheets to be a minimum of 127mm (5") wide.
 - .7 Properly secure flashings to their support, without sags, blisters, fish-mouths or wrinkles with terminations as indicated on drawings and details.
 - .8 All side and end laps of cap sheet flashing to be heat welded with hot air gun to satisfaction of Observer.
- .16 Cap Sheet Flashing, Torch Installation (Roof 1.1, 1.2, 1.3 & 1.4):
- .1 Cap sheet membrane flashing to be torched up and over perimeter details.
 - .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 to offset base sheet flashing joints by 50% and extend a minimum of 152mm (6") onto roof. All side lap joints to be a minimum 76mm (3").
 - .5 Align bottom edge to a chalk reference line along cap sheet membrane.
 - .6 Install cap sheet flashing onto field membrane a minimum 102mm (4") at base of perimeter detail. Run flashing up vertical and across perimeter detail to outside edge.
 - .7 Overlap each preceding cap sheet flashing sheet by min. 76mm (3") on side laps. Offset joints in cap sheet flashing 305mm (12") minimum from those of base sheet flashing.
 - .8 Properly secure flashings to their support, without sags, blisters, fish-mouths or wrinkles with terminations as indicated on drawings and details.
 - .9 Heat weld side laps and end laps of cap sheet flashing to achieve continuous bond and seal between overlapping sheets.

3.13 LIQUID APPLIED PMMA RESIN FLASHINGS

- .1 On Designated Roof Replacement Areas: 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 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 of Concrete Block and/or Masonry Substrates:
 - .1 Existing concrete substrates to have a minimum hardness of 24 N/mm² (3,500 psi).
 - .2 Scarify or shot-blast concrete or masonry surfaces to provide a sound substrate free from laitance and residue from bitumen, coal tar, primer, coatings, adhesives, sealer or any material that may inhibit adhesion.
 - .3 Prepare concrete surface to generate a concrete surface profile of CSP-2 to CSP-4 as defined by ICRI.
 - .4 Repair spalls and voids on vertical or horizontal surfaces using specified primer and preparation paste.
- .6 Preparation of Poured or Precast Concrete Substrates:
 - .1 Repair and Leveling: Before application of roofing membrane, and after priming, fill all joints, cracks, voids, fractures, depressions, small indentations, and low areas in substrate using specified paste or repair mortar.
 - .2 Prime cracks and joints with specified PMMA primer and fill cracks and joints using specified preparation paste prior to flashing application. Commence flashing application immediately following catalyzation of preparation paste.
 - .3 Prime areas of concrete substrate intended for repair using specified PMMA primer. Fill areas using specified paste or repair mortar and allow to catalyze. Follow paste or repair mortar manufacturer's published minimum and maximum product thickness limitations per lift.
- .7 Preparation of Steel and/or Aluminum Substrates:
 - .1 Grind to generate a "white-metal" surface and remove loose particles. Extend preparation area a minimum of 13mm (½") beyond termination of roofing/flashing system.

Do not use cleaner/solvent after grinding. Notch steel surfaces to provide a rust-stop where detailed.

- .8 Preparation of Wood and/or Plywood Flashing Substrates:
 - .1 Tape joints between plywood or wood panels using specified tape and prime wood/plywood surfaces to receive specified flashing system with specified PMMA-based primer and allow primer to set prior to application of flashing system.
- .9 Preparation of Gypsum Board, DensDeck, and/or DensDeck Prime Substrates:
 - .1 Ensure insulation panels have been properly secured. Review surface of panel insulation system to ensure that edges are level and even between adjoining panels. Tape panel joints and panel terminations at nailers, walls, perimeter and penetrations using specified tape, centering tape strips over joints or panel edges.
- .10 Preparation of Plastic (PVC, ABS) Substrates:
 - .1 Tape joint around bottom of pipe penetrations using specified tape. Lightly sand and prime wood/plywood surfaces to receive specified flashing system with specified PMMA-based primer and allow primer to set prior to application of flashing system.
 - .2 Fill joints, voids, and cracks around base of pipe penetrations using specified preparation paste or repair mortar prior to flashing application. Use tape joints around base for larger gaps.
 - .3 Follow paste or repair mortar manufacturer's published minimum and maximum product thickness limitations per lift. Commence flashing application immediately following catalyzation of preparation paste.
- .11 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.
- .12 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, 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.
- .13 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.
- .14 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.
- .15 Skid Resistant Surfacing:
 - .1 Over horizontal area of new resin flashing, apply an additional top coat of catalyzed roof resin at minimum rate specified by manufacturer; and broadcast granules into resin at a rate recommended by manufacturer before resin sets.
 - .2 Apply a clear coat of resin over granular surface if required by system manufacturer.

3.14 ROOF PENETRATIONS & ACCESSORIES

- .1 On All Roof Replacement Areas: 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.

- .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.
- .2 Reinstall and modify existing lightning protection system to suit new roof system installation.
 - .3 Sacrificial Protection Membrane: Protect surface of finished roof membrane from damage underneath all rooftop supports and equipment laid on top of roof membrane.
 - .1 Provide self adhered or cold applied sacrificial squares of matching cap sheet membrane under each base or footing of rooftop support and equipment.
 - .2 Custom cut cap sheet squares to suit width and length of each occurrence and include additional minimum 51mm (2.0") extension of membrane on all sides.

3.15 ROOF DRAINS

- .1 General Practice:
 - .1 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.
 - .2 Where required for new roof drains and interior plumbing, Contractor to provide interior plumbing and hook-up to existing storm water drainage system and coordinate installation of same with Owner.
 - .2 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.
 - .3 Once work has begun, no roof area to be left overnight without adequate provision for drainage.
 - .4 Install drains in accordance with detail drawings and as per manufacturer's written instructions and guidelines.
- .2 Roof Drain Installation:
 - .1 On Roof Areas 1.1, 1.2, 1.3, 1.4 & 1.5: At all existing roof drain locations, install new spun copper retrofit drain inserts into existing drain piping with attached new U-Flow connectors. Drain body insert to be secured to substrate with min. four (4) fasteners per drain as required to properly secure drain body.

- .1 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.
- .2 Affix U-Flow connector seal to bottom of drain stem before insert retrofit drain body down 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.
- .4 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.
- .5 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 endlaps and picture-frame into remainder of roof.
- .6 Place Clamping Ring over raised bolt studs. Install stainless steel self locking nuts to tighten Clamping Ring against membrane flashings until secure.
- .7 Install ballast guard strainer dome and secure with cotterless pin or wing nut screw.

3.16 MISCELLANEOUS MECHANICAL & ELECTRICAL

- .1 Unless stated in writing elsewhere, Contractor responsible for all Mechanical and Electrical Work required to perform complete installation of new roofing. Any and all costs associated with HVAC disconnection, removal, and reconnection, including modification of gas and conduit lines, to be included in Bid Pricing, unless specified otherwise on Bid Form.
 - .1 Co-ordinate roofing work, if applicable, with Prime Contractor and other Sub-Contractor trades that may be present on roof.
 - .2 Coordinate any planned disruptions in advance with Owner to minimize inconvenience.
- .2 HVAC and Rooftop Equipment: Disconnect, lift (if necessary), modify, and reconnect all Heating, Ventilation, Air Conditioning, and Mechanical units as required to for new roof system.
 - .1 Modify existing sleepers, curbs, and supports as required to suit new roof system installation and configuration as detailed. Ensure modified sleepers, curbs, and supports are made watertight with new membrane and flashings as required.
 - .2 Remove and dispose of identified and designated abandoned, redundant, and unused HVAC equipment from roof and worksite.
- .3 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 IRC Group approved equivalent.
- .4 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.
 - .5 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.

3.17 TEMPORARY WATER CUT-OFFS

- .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 New roofing membrane to be carried into water-stop. Water-stop to be sealed to roof deck and/or substrate to prevent water travel and infiltration under new or existing roofing.
- .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.

3.18 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 drawings.

3.19 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.

3.20 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 16

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PART 1 - GENERAL

1.1 SUMMARY

- .1 Section Includes: Supply and installation of new prefinished sheet metal flashings and counter flashings to complete roof system installation.
- .1 Unless specifically indicated otherwise, all references to sheet metal flashings in specifications and on drawings to refer to new prepainted steel.
- .2 Coordinate all work of this section with other sections and trades as required to ensure proper installation of specified components.

1.2 RELATED SECTIONS

- .1 Section 07 92 00 – Joint Sealants.

1.3 REFERENCES

- .1 Reference Standards: Most stringent requirement to govern conflicts between standards.
 - .1 American Society for Testing and Materials (ASTM):
 - .1 A606M-18: Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
 - .2 A653M-19a: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.
 - .3 A792M-10(2015): Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - .4 A924M-19: Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
 - .2 Canadian General Standards Board (CAN/CGSB):
 - .1 51.32M: Sheathing, Membrane, Breather Type.
 - .2 93.1M: Sheet, Aluminum Alloy, Prefinished.
 - .3 Canadian Standards Association (CAN/CSA):
 - .1 S136-16: Specification for Design of Cold Formed Steel Structural Members.
 - .2 S269.2-16: Access Scaffolding for Construction Purposes.
 - .4 Canadian Sheet Steel Building Institute (CSSBI):
 - .1 20M-2015: Standard for Sheet Steel Cladding for Architectural, Industrial, and Commercial Building Applications.
 - .5 Canadian Roofing Contractors Association (CRCA):
 - .1 Roofing Specifications Manual.
 - .6 Canadian Standards Association (CAN/CSA):
 - .1 B-111: Wire Nails, Spikes and Staples.
 - .7 Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

- .1 Architectural Sheet Metal Manual, Seventh Edition, 2012.

1.4 SUBMITTALS

- .1 Procedures: Provide listed submittals to Section 01 33 00.
- .2 Samples: Submit min. 51mm x 51mm (2" x 2") sheet metal flashing sample for each type of material, finish, and colour specified or chosen by Owner from standard manufacturer colour range.
 - .1 Samples to fully represent physical and chemical properties of materials to be supplied and installed.
 - .2 Samples to be reviewed by Owner before order and delivery of materials. Return and restocking fees for incorrect or rejected materials to be at no additional cost to Owner.

1.5 CLOSEOUT SUBMITTALS

- .1 Procedures: Provide project closeout submittals to Section 01 77 00.
- .2 Warranty Documentation: Signed Contractor Warranty for Workmanship covering metal work.

1.6 QUALITY ASSURANCE

- .1 Installer Qualifications: Bondable contractor using skilled tradespeople with equipment adequate for project to perform work in an expeditious manner. Use only manufacturer approved installers to meet warranty requirements.
 - .1 Contractor preapproved by Owner and Consultant.
 - .2 Member of New Brunswick Roofing Contractors Association (NBRCA) in good standing.
 - .3 Minimum 10 years of relevant experience with similar materials.
 - .4 And licensed for Place of the Work.
- .2 Perform Work in accordance with Contracts Documents and manufacturer's written instructions.
- .3 Make no deviation from Specifications or approved Shop Drawings without prior written approval by Consultant and, if applicable, manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store, and handle materials to manufacturer's instructions and CSSBI guidelines.
 - .1 Review condition of materials at delivery. Remove and replace damaged products at own expense, including those identified by Observer.
- .2 Do not store metals in direct contact with earth, road surface, roof deck, or other metals.
 - .1 Do not store materials on roof.
- .3 Store materials under cover, on elevated platforms, and protect from elements in a dry, well ventilated location.
 - .1 Place suitable supports or pallets under metal stock upon delivery.
 - .2 Protect metal from scratches, dents, punctures, and moisture.
 - .3 Store caulking and sealants at +5°C minimum.
- .4 Handle and store products in a manner to prevent damage, oxidization, and deterioration.

- .1 Do not allow metal panels to bend or sag during handling and transport.
- .2 Bring to roof and work area only those materials to be installed on same day.

1.8 SAFETY AND PROTECTION

- .1 Scaffolding:
 - .1 Where required for access, scaffolding for construction purposes to CSA S269.2.
- .2 Safety:
 - .1 Comply with safety requirements as per current printed edition of OHSA.
 - .2 Wear protective gear during installation as required by job conditions or manufacturer.
- .3 Solvents, Adhesives, and Membranes
 - .1 Bring to roof only enough solvents, adhesives, and sealants required for same day use. Do not leave adhesives on roof over night.
 - .2 Adhesives to be stored in their overnight containers. Keep product from freezing.
- .4 Hoisting & Protection:
 - .1 Protect walls and roof perimeters from damage where hoisting is required.
 - .2 Protect roofs from damage due to traffic and material handling during project.
- .5 Fire Safety:
 - .1 Keep charged and ready fire extinguishers on site at all times, including on roof, at access points to building interior, and wherever solvent based products are stored.

1.9 WARRANTY

- .1 Contractor Warranty: Workmanship.
 - .1 Provide Contractor Warranty for Workmanship covering metal work on a certificate or form preapproved by New Brunswick Roofing Contractors Association (NBRCA) or specified on Contractor's Letterhead, signed, authorized, and executed for project.
 - .1 Warranty Period: Not less than 2 years from date of Substantial Completion.
 - .2 Metal work installation to be warranted free from defects related to workmanship or material deficiencies, including but not limited to water penetration, material deformation, and fading of finish.
 - .1 During warranty period provide all labour and materials required to promptly repair and rectify noted defects, in accordance with project Contract Documents, at no additional cost to Owner.
- .2 Cost of warranties to be included in Contract.

1.10 CONSTRUCTION REVIEW AND OBSERVATION

- .1 IRC Building Sciences Group, hereafter known as "Observer", is an independent Observation agency appointed by Owner to observe performance of Work required by this section and to review construction progress.

- .1 Arrange a Prestart meeting on-site with Observer no more than 3 weeks prior to commencement at project site. Obtain Observer's instructions and reference procedures to be followed on project.
- .2 Provide Observer with anticipated beginning date for each phase of Work, at least 48 hours prior to commencement of each phase.
- .3 Where required for warranty, arrange for Final Observation and review of installed work with both Observer and manufacturer's technical representative.
- .2 When testing or observations reveal work by Contractor failing to meet contract requirements, pay for additional testing and observation work required by Observer or third-party testing agency for correction of deficient installed work, at no additional cost to Owner.
- .3 Copies of Observation reports issued to Owner and Prime Contractor.

PART 2 - PRODUCTS

2.1 METAL FLASHINGS

- .1 Prefinished Steel Flashings: Prefinished cap flashings, counter flashings, drip flashings, jamb flashings, and closure strips to be fabricated from steel with hot-dip galvanization to ASTM A653M, Grade 230 with Z275 zinc coating.
 - .1 Base Steel: Minimum 0.61 mm (24-gauge, 0.024") nominal core thickness.
 - .2 Finish: Silicone Modified Polyester (SMP) applied over pretreated substrate:
 - .1 WeatherXL SMP topcoat by Valspar Corp.,
 - .2 Perspectra Plus Series SMP topcoat by ArcelorMittal.
 - .3 Colour: Colour to be chosen by Owner from manufacturer standard colour range.
- .2 Flashing Securement: Metal flashing hook strips, cleats, and clips to be fabricated from steel with hot-dip galvanization to ASTM A653M, Grade 230 with Z275 zinc coating. Securement flashings to be two gauges thicker than that of metal flashing being secured.
 - .1 Base Steel: Minimum 0.76 mm (22-gauge, 0.030") nominal core thickness.
 - .2 Colour and finish of securement strips to match prefinished metal flashings.
 - .3 Provide hook strips in continuous lengths, not short segments, to match metal flashings.

2.2 ACCESSORIES

- .1 Dissimilar Materials: Protect material from electrolytic action when dissimilar metals are in direct contact with one another.
 - .1 Underlay Sheet: Smooth unsaturated quality rosin sized paper weighing not less than 0.3 Kg/m² (6 lb. per 100 ft²), unless otherwise shown, to CSA A123.3M.
 - .2 Painting: Paint mating surfaces of aluminum and galvanized steel with bituminous or zinc chromate primers.
 - .3 Taping: Apply self-adhering tape or gasket with non-absorptive materials or sealants.
- .2 Bituminous Paint: Gilsonite asphalt 910-02 by Bakelite to CGSB 1-GP-108 Type II.
- .3 Joint Filler: Polyethylene, urethane, or neoprene extruded, closed cell foam to Section 07 92 00.

- .4 Sealants: Joint and finish sealants to Section 07 92 00.
- .5 Touch-up Paint: High grade enamel paint as recommended by metal manufacturer and matching colour of prefinished metal being used.

2.3 FASTENERS

- .1 General: Use galvanized, copper, aluminum, stainless steel, or coated screws most compatible with materials being installed to avoid corrosion caused by galvanic reaction.
- .2 Fasteners to Wood: Space fasteners at max. 610mm (24") on center and stagger.
 - .1 Galvanized nails, with annular thread, length to penetrate into base min. 25mm (1"),
 - .2 Min. No.8 coated steel screws to penetrate wood surface by min. 19mm (0.75").
- .3 Exposed Fasteners:
 - .1 Nylon headed No.14 Colormate fasteners by Leland Industries with hex head and self tapping or drill point tips. Length to suit installation. Colour head to match prepainted metal being secured.
 - .2 Hex head, cadmium plated metal screws with neoprene washers as manufactured by Fabco Fastening Systems, Atlas, Perma-Grip, or IRC Group approved equal. Provide with screw head caps to match colour of materials being secured.
- .4 Masonry Anchors: Rawl lead lags for screws as recommended by manufacturer.
- .5 Masonry Fasteners: Tapcon, Gripcon or Rawl spike sized to penetrate concrete 38mm (1.5") minimum unless otherwise shown.
- .6 Masonry Fasteners: Tapcon screws, Gripcon screws, or Rawl spikes with factory applied corrosion resistant coating.
 - .1 Minimum 6mm (0.25") diameter and of sufficient length to provide a minimum of 38mm (1.5") of penetration into substrate. Pre-drill holes into masonry to suit application.
- .7 Wedges: Rolled plumber sheet lead. Secure metal flashings on inside and should be secured with No.10 galvanized screws through neoprene washers at 760 mm (30") on center.
- .8 Pop Rivets: All stainless steel, blind pop rivets meeting ASME/ANSI B18.1.1.
 - .1 Minimum 6mm (0.25") head diameter with 3mm (0.125") shank diameter and a grip range of 4.7mm to 6.4mm (0.1875 to 0.25").
 - .2 Body and mandrel to be constructed from high-shear, 300 series stainless steel.

2.4 FABRICATION

- .1 Form bends with straight sharp lines, angles and corners into true planes, free from twists, buckles, dents and other visual distortions.
 - .1 Verify all dimensions on site affecting work of this section prior to fabrication.
- .2 Fabricate all possible work in shop in default lengths of 2.4m (8'-0") by brake forming, bench cutting, drilling, and shaping, ready for field installation.
 - .1 Horizontal Flashings Wider Than 16": Cap flashings and flashings with horizontal sections having a dimension greater than 406mm (16") to be fabricated in maximum lengths of 1.2m (4'-0").

- .2 Horizontal Flashings Wider Than 20": Cap flashings and flashings with horizontal sections having a dimension greater than 508mm (20") to be fabricated with 25mm (1") high lock-folded standing seams.
- .3 Curved Perimeter Flashings: Cap flashings and flashings over curved perimeters and curbs to be fabricated in lengths of 0.61m (2'-0") or less to suit radius of arc.
- .4 Corner Flashings: Cap flashings and flashings to be fabricated with 25mm (1") high lock-folded standing seam joints at corner miters.
- .3 Fabricate sheet metal components to dimensions, profiles, shapes, and gauges shown on Shop Drawings and verified by site measurements.
 - .1 Profiled metal components to be cold rolled.
 - .2 Fabricate drip and sill flashings with minimum 2% downward slope outward to encourage drainage.
 - .3 End joints of adjacent lengths of metal flashing to be made using S-lock jointing to allow for thermal movement.
 - .4 Exposed metal flashings edges to be double-backed or hemmed min. 13mm (0.5") for appearance and stiffness. Raw edges not accepted.

PART 3 - EXECUTION

3.1 EXAMINATION & PREPARATION

- .1 Examine work of other Sections upon which work of this Section depends.
 - .1 Prior to application of flashings, review roof perimeters, parapets, curbs, and projections.
- .2 Examine installed membrane flashings for any defect of level or construction that may impact installation work before proceeding.
 - .1 Do not cut-off or remove installed membrane flashings turned down over exterior face of roof perimeters. Installed membrane to remain as part of complete roof installation.
- .3 Report discrepancies to Observer that may affect performance of roof system and deviations from specified tolerances.
 - .1 Defective or improper work must be corrected before proceeding with installation of sheet metal flashings.
- .4 Protect roof surfaces from damage and metal debris generated by work of this section.

3.2 MOCK-UP SAMPLE

- .1 Construct full size mock-up sample of typical sheet metal cap flashing installation including typical components, flashings, hook strips, cleats, and securement to substrate.
 - .1 Minimum size to be 3.66m to 4.88m (12'-0" to 16'-0') in length, at location chosen with Observer. Installation must include at least one S-lock joint.
 - .2 All materials to be supplied and installed in accordance with Contract Documents.
 - .3 Mock-up to demonstrate methods of attachment, typical components, and connections.
- .2 Reviewed and accepted Mock-up to represent minimum base standard for remaining work.

- .1 Accepted mock-up may remain in place and form part of completed Work.
- .3 Provide any additional mock-up samples as reasonably requested by Observer.

3.3 SHEET METAL INSTALLATION

- .1 Sheet metal work to be installed in a uniform manner, true to line, and free of dents, oil canning, warping, and distortions.
 - .1 Provide metal work to cover perimeters of entire roof area and make watertight under all service and weather conditions.
- .2 Install sheet metal flashings at copings, perimeters, walls, joints, curbs, roof openings, and other locations where required to protect membrane flashings, and as shown on drawings.
 - .1 Provide perimeter metal flashings with slope toward roof interior at minimum 4% slope.
 - .2 Do not form open metal joints or create pockets that fail to drain water.
 - .3 Provide concealed metal hook strips, locking strips, and clips where shown on drawings and as required to permanently hold flashing in place.
 - .1 Install concealed hook strips along all exterior perimeter faces and as detailed.
 - .2 Secure continuous hook strips, spaced at 152mm (6") on center and in staggered V-pattern. Keep lower fasteners within 32mm (1.25") of bottom of drip edge.
 - .4 Install lengths of sheet metal flashings with fasteners concealed inside S-lock joints; minimum two fasteners per joint.
 - .1 Space joints evenly where exposed to view.
 - .5 Provide inside and outside corner flashings by means of 25mm (1") high lock-folded standing seam joints at corner miters. Do not use pop rivets.
 - .1 Include intermediate securement clips in folded joint. Apply sealant before locking raised seams in place.
 - .6 On perimeter cap sheet flashings, exposed fastening not permitted on exterior face visible to public, without approval of Observer.
 - .1 Exposed fastening on interior face of perimeter cap flashing permitted.
 - .7 Space fasteners evenly and in consistent pattern. Use lead plugs and screws with rubber washers where metal flashings are installed to concrete or masonry.
- .3 Provide protection for metal work from potential galvanic action.
 - .1 Where sheet metal flashings directly contact masonry, concrete, or a different type of metal, back-paint surfaces with bituminous paint at rate of 0.12L/m² (0.25 Gal/100 ft²).
 - .2 Where sheet metal flashings directly contact uncovered wood or masonry surfaces, provide underlay separator sheet and overlap joints min. 51mm (2"). Turn up 76mm (3") at edges where horizontal surfaces intersect vertical planes.
- .4 Clean reglets in masonry walls and make free of dust and contaminates.
 - .1 Where existing reglets can not be reused, saw cut new continuous reglets 10mm (0.4") wide, 25mm (1.0") deep, or suit existing site conditions.

- .2 Secure top of metal flashings into reglet joints using lead wedges spaced at 229mm (9") on center, and set min. 6mm (0.25") out from face of masonry.
- .3 At reglets wider than 10mm (0.4") and deeper than 19mm (0.75") provide polyethylene backer rod, 25% wider than joint width, and insert into back of reglet before sealant application.

3.4 FINISH

- .1 After installation, touch-up and repair minor surface damage and scratches to finish surfaces of metal components with colour matched paint in accordance with manufacturer's instructions.
 - .1 Remove dirt, debris, and other foreign deposits from visible surfaces of metal work in accordance with metal manufacturer's cleaning instructions.
 - .2 Remove stains, caulking, and adhesives from contaminated surfaces.
 - .3 Post paint all exposed metal and metal edges exposed due to cutting or grinding.
- .2 Finished surfaces of formed metal work to be colour matched, free of damage and dents, and free of visual impairments caused by oil canning, bending, twisting, or other distortions.
 - .1 Finished product with visual appearance impaired or diminished by changes in colour between sheets, dents, distortions, or oil canned surfaces will be rejected.
 - .2 Remove and replace damaged, defaced, contorted, or otherwise defective work.

3.5 SEALANTS

- .1 Apply sealant to provide a continuous waterproof seal at all open sheet metal joints, reglets, gum joints, and where shown on drawings to Section 07 92 00.

3.6 FIELD QUALITY CONTROL

- .1 Field Observation and Testing: Cooperate with Observer and afford all necessary facilities required to permit construction review and observation during performance of Work.
 - .1 Act immediately on instructions given by Observer.
 - .2 When required or reasonably directed by Observer, make assembly cut-outs and component samples at Observer identified locations. Restore assembly and make good at no additional cost to Owner.
 - .3 Promptly share and provide Observer with a copy of written reports and instructions given to Contractor from manufacturer and warranty holder pertaining to installation and observation work on this project.
 - .1 Manufacturer may copy project related communication regarding installation work directly to Observer.

3.7 CLEANING

- .1 Remove daily surplus materials and debris resulting from work of this section and at completion.
- .2 Lightly drag a magnetic bar, without damage to surfaces, across work area and grounds to find and remove discarded fasteners and sharp metal debris.

END OF SECTION - 07 62 00

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 02 41 19 – Selective Demolition & Removal
- .2 Section 07 52 16 – SBS Modified Bitumen Membrane Roofing
- .3 Section 07 62 00 – Prefinished Sheet Metal Flashing & Trim

1.2 REFERENCES

Latest edition of all listed references to apply:

- .1 ASTM C920 – Elastomeric Joint Sealants
- .2 CAN/CGSB-19.13 – Sealing Compound, One-component, Elastomeric, Chemical Curing
- .3 Sealants: Professionals' Guide, Sealant, Waterproofing and Restoration Institute
- .4 SWRI (Sealant, Waterproofing and Restoration Institute) – Sealant and Caulking Guide Specification

1.3 QUALITY OBSERVATION

- .1 Observation of work will be carried out by designated Rooftop Quality 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 manufacturers 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.

1.4 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.

1.5 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.

1.6 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.

PART 2 - PRODUCTS

2.1 SEALANT MATERIALS

- .1 Sealants and caulking compounds must:
 - .1 meet or exceed all applicable governmental and 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 including.
- .2 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.
- .3 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 CWS by Dow Corning; or
 - .2 795 by Dow Corning
- .2 Acceptable single component, moisture curing, polyurethane sealants for reglets and other roofing related flashing termination work include:

- .1 Dymonic by Tremco; or
- .2 CWS by Dow Corning
- .3 Butyl (for concealed skylight related sealant joints): Tremco Curtainwall Sealant or approved alternate.
- .4 Primers:
 - .1 Primers to be as recommended by sealant manufacturer.
- .5 Cleaners:
 - .1 Acceptable cleaners:
 - .1 Xylol
 - .2 Methylethylketone (MEK)
 - .3 Isopropyl Alcohol
 - .2 Surfaces to receive silicone sealants to not be cleaned with Xylol.
 - .3 All substrate materials to be cleaned with compatible cleaners.
- .6 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.
- .7 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.

2.3 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

APPENDIX B – FORM OF TENDER

TENDER No. 2022-082704T
Roof Rehabilitation – Millidgeville Wastewater Treatment Plant

BID FORM

Project Title:	Roof Rehabilitation Program 2022
Worksite:	Millidgeville Wastewater Treatment Plant
Address:	700 Woodward Avenue, Saint John, New Brunswick, E2K 4G7
Owner:	City of Saint John
Address:	15 Market Square, Saint John, New Brunswick, E2L 4L1
Submitted To:	City of Saint John

We, _____
(Company Name)

Of _____
(Company Address)

having carefully examined all the requirements of the Bidding Documents, as listed in Appendix A of the Bid Form, having examined issued Addendum No. _____ to No. _____ inclusive, having visited the Worksite to familiarize ourselves with the existing conditions, and having examined the conditions affecting performance of the Work, hereby offer to enter into contract to perform the specified Work for the total Stipulated Price of

_____ Canadian Dollars (\$ _____);

which includes all specified Cash and Contingency Allowances, Itemized Prices, duties in force at this date, and all applicable taxes, including Harmonized Sales Tax (HST).

- Appendices to Bid Form:
- LIST OF BIDDING DOCUMENTS
 - LIST OF SUBCONTRACTORS
 - STIPULATED PRICE BREAKDOWN
 - UNIT PRICING

DECLARATIONS

We hereby declare that:

- (a) we agree to perform the Work in accordance with the agreed schedule, to be prepared after the award of Contract.
- (b) we agree to commence the Work in accordance with the Bid Documents within _____ working days of the award of the Contract (weather permitting).
- (c) we agree to complete the Work within _____ working days of mobilization, weather permitting.
- (d) we agree that this offer is open to acceptance for a period of sixty (60) days from the date of Bid Closing.

Signatures:

Signed, sealed, and submitted for and on behalf of:

Company: _____
(Company Name)

_____ *(Street Address or Postal Box Number)*

_____ *(City, Province & Postal Code)*

Signature: _____

Name and Title: _____
(Print or Type)

Witness: _____

Name and Title: _____
(Print or Type)

Dated at _____ this _____ day of _____, 20____.

LIST OF BIDDING DOCUMENTS

Project Title:	Roof Rehabilitation Program 2022
Worksite:	Millidgeville Wastewater Treatment Plant
Address:	700 Woodward Avenue, Saint John, New Brunswick, E2K 4G7

Submitted By:

The items and sections listed below form an integral part of the Contract Documents for the Project.

Specifications:

- 00 21 13 - Instructions to Bidders
- 00 41 00 - Bid Form (Replaced with Appendix B)
- 01 11 00 - Summary of Work
- 02 41 19 - Selective Demolition and Removal
- 06 10 00 - Rough Carpentry
- 07 05 40 - Quality Requirements for Roofing
- 07 52 16 - SBS Modified Bituminous Membrane Roofing
- 07 62 00 - Sheet Metal Flashing and Trim
- 07 92 00 - Joint Sealants

Drawings:

R1, R2, R3, R4, CMM050, DMM013, PMM023, SMM098

Addenda:

Issued before date and time of Bid Closing

STIPULATED PRICE BREAKDOWN

Project Title:	Roof Rehabilitation Program 2022
Worksite:	Millidgeville Wastewater Treatment Plant
Address:	700 Woodward Avenue, Saint John, New Brunswick, E2K 4G7
Submitted By:	

The following itemized list is a breakdown of our Stipulated Price to perform the Work. The itemized prices quoted include the specified cost, overhead, profit, and any applicable taxes in force at the date of Bid with the exception of the Harmonized Sales Tax (HST). The HST is shown as a separate line item.

Item No.	Description of Work	Estimated Quantity	Unit Rate	Contractor's Total Bid
1.0	Roof Replacement – Low Slope:			
1.1	Roof Replacement Work specified for Roof Area 1.1 (Screen Building):	Lump Sum	N/A	\$ _____
1.2	Roof Replacement Work specified for Roof Area 2.1 (Biocell Building):	Lump Sum	N/A	\$ _____
1.3	Roof Replacement Work specified for Roof Area 3.1 (Secondary Clarifier 1):	Lump Sum	N/A	\$ _____
1.4	Roof Replacement Work specified for Roof Area 4.1 (Secondary Clarifier 2):	Lump Sum	N/A	\$ _____
1.5	Roof Replacement Work specified for Roof Area 5.1 (Sludge Building – Flame Free):	Lump Sum	N/A	\$ _____
1.6	Bonded Uplift Testing:	Lump Sum	N/A	\$ 10,000.00
2.0	Stipulated Price:			
2.1	Subtotal (Total of Itemized Bid Prices Above):			\$ _____
2.2	Harmonized Sales Tax (HST):			\$ _____
2.3	Total Stipulated Price:			\$ _____

Notes:

- At Owner's discretion, the Scope of Work may be altered to suit Owner's requirements.
- If required by Owner, successful Bidder should be prepared to submit a further price breakdown of identified items.
- ALL quantities and measurements to be confirmed by Contractor to own satisfaction from on-site take-offs.
- Costs above include provision and co-ordination of all locates to determine location of all services necessary to perform work.

UNIT PRICING

Project Title:	Roof Rehabilitation Program 2022
Worksite:	Millidgeville Wastewater Treatment Plant
Address:	700 Woodward Avenue, Saint John, New Brunswick, E2K 4G7
Submitted By:	

The following itemized list contains our Unit Prices to perform select parts of the Work as specified and are to be added to the Contract Price. The itemized prices quoted include the specified cost, overhead, profit, and any applicable taxes in force at the date of Bid with the exception of the Harmonized Sales Tax (HST). The HST is shown as a separate item.

3.0	Description of Work	Subtotal	HST	Contractor's Total Bid
3.1	Lump Sum Price to fully remove existing vapour barrier down to concrete deck in-lieu of leaving in place per base bid on Roof Area 1.1:	\$ _____	\$ _____	\$ _____
3.2	Lump Sum Price to fully remove existing vapour barrier down to concrete deck in-lieu of leaving in place per base bid on Roof Area 1.2:	\$ _____	\$ _____	\$ _____
3.3	Lump Sum Price to fully remove existing vapour barrier down to concrete deck in-lieu of leaving in place per base bid on Roof Area 1.3:	\$ _____	\$ _____	\$ _____
3.4	Lump Sum Price to fully remove existing vapour barrier down to concrete deck in-lieu of leaving in place per base bid on Roof Area 1.4:	\$ _____	\$ _____	\$ _____
3.5	Lump Sum Price to fully remove existing vapour barrier down to concrete deck in-lieu of leaving in place per base bid on Roof Area 1.5:	\$ _____	\$ _____	\$ _____
3.6	Price to add to Contract to supply and install new plywood sheathing to replace and match identified damaged existing plywood sheathing:	\$ _____ /ft ²	\$ _____ /ft ²	\$ _____ /ft ²
3.7	Price to add to Contract to supply and install new wood blocking to replace and match identified damaged existing wood blocking:	\$ _____ /bd ft	\$ _____ /bd ft	\$ _____ /bd ft
3.8	Price to add to Contract or delete from contractor for localized repairs of existing vapour barrier membrane, per square foot. Replacement of vapour barrier to be	\$ _____ /ft ²	\$ _____ /ft ²	\$ _____ /ft ²

Notes:

1. At Owner's discretion, the Scope of Work may be altered to suit Owner's requirements.
2. Payment on Unit Price Items to be based on actual quantity of Work performed as measured on site jointly with the Consultant and Contractor.

APPENDIX C – FORM OF AGREEMENT

TENDER No. 2022-082704T
Roof Rehabilitation – Millidgeville Wastewater Treatment Plant

AGREEMENT BETWEEN OWNER AND CONTRACTOR

THIS AGREEMENT made in triplicate between **THE CITY OF SAINT JOHN** herein (and in the Specifications) called the "Owner" or the "City"

AND

_____ herein (and in the Specifications) called the "Contractor".

WITNESSETH: That the Owner and the Contractor agree as follows:

- (a) The Contractor shall provide all the materials and perform all the work shown on the drawings and described in the Contract Specifications titled:

Contract No: _____

Title: _____

- (b) The Contractor shall do and fulfill everything indicated by this Agreement; and
- (c) The Contractor shall Substantially Complete the Work no later than _____.

CONTRACT DOCUMENTS

General Specifications

General Specifications, City of Saint John, New Brunswick, with all applicable divisions, as updated and as listed in the Table of Contents of the Contract Specifications.

Contract Specifications

Contract specifications for

Contract No: _____

Title: _____

City of Saint John, New Brunswick,

Drawings

ADDENDA

The Contractor agrees that he has received addenda ___ to ___ inclusive, and that the tender price includes the provisions set out in the addenda.

CONTRACT PRICE

The Owner shall pay to the Contractor, in lawful money of Canada for the performance of the Contract, the amounts determined for each of the items of work completed at the unit prices as listed in the Schedule of Quantities and Unit Prices, plus applicable taxes, submitted with the tender, which is to be attached with this Agreement, for the total tender price of:

If the Engineer orders in writing the performance of any work not covered by the drawings or included in the specifications that cannot be classified as coming under any of the contract units and for which a unit price can be agreed upon, then such additional work shall be paid for as described under the General Administration of Contract, Division 6.

PAYMENT

The Owner shall pay on account of thereof upon the Engineer's Certificate, as invoiced by the Contractor and approved by the Engineer, in the manner described in the Specifications.

AGREEMENT DOCUMENTS

The General Administration of Contract, Division 6 and the aforesaid Specifications and Drawings are all to be read into and form part of this Agreement and the whole shall constitute the Contract between the parties and it shall inure to the benefit of and be binding upon them and their successors, executors, administrators, and subject to the General Administration of Contract, their assigns.

AFFIDAVIT OF CORPORATE EXECUTION

CANADA

PROVINCE OF NEW BRUNSWICK

CITY OF SAINT JOHN

I, _____, of the _____
in the County of _____, and Province of New Brunswick

MAKE OATH AND SAY:

- (1) THAT I am the _____ of _____, and _____ is the _____ of the said Company, as such I am/we are duly authorized officer(s) of the said Company to execute the foregoing instrument.
- (2) THAT the signature _____ subscribed to the within instrument is my signature and in my own proper handwriting and that the signature _____ so subscribed is his signature made thereto by him in my presence.
- (3) THAT the Seal affixed to the said instrument purporting to be the Corporate Seal of the said _____ is the Corporate Seal of the said Company and was affixed to the said instrument by me and by order of the Board of Directors of the Company.

SWORN TO BEFORE ME at the _____)
)
of _____)
)
in the Province of _____)
)
this ____ day of _____ A.D., _____.)
)
_____) _____)
COMMISSIONER OF OATHS) CONTRACTOR
)

Note: The blank spaces are to be filled in with the name or names of the signing officer(s).