

SPECIFICATIONS FOR

ROOF REPLACEMENT

RADIATION PROTECTION BUREAU (RPB)
775 BROOKFIELD ROAD
OTTAWA, ONTARIO

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Part 1 General

1.1 GENERAL DESCRIPTION OF THE WORK

- .1 Work to be carried out under this Contract, Roof Replacement at 775 Brookfield Road, Ottawa, Ontario.
- .2 Provide the necessary labour and materials to complete the removal of the existing roofing system, existing curbs, sheet metal flashings and membrane down to the existing structural deck and install new roofing system as specified herein.
- .3 The new roof system shall be as follows and as specified in the areas indicated on the drawings:
 - .1 Typical Roof System R1:
 - .1 Existing concrete deck.
 - .2 2-ply modified bituminous membrane.
 - .3 75 mm XPS insulation.
 - .4 Filter fabric/geotextile membrane.
 - .5 Gravel/ballast.
 - .2 Typical Roof System R2:
 - .1 Existing concrete deck.
 - .2 2-ply modified bituminous membrane.
 - .3 Geotextile membrane.
 - .4 75 mm XPS insulation.
 - .5 Geotextile membrane.
 - .6 Stone dust (50 mm minimum and sloped to drains).
 - .7 Pavers.
- .4 Supply and installation of related rough carpentry at parapets and curbs.
- .5 Supply and install all sheet metal caps, counter flashings, scuppers, torch stops, fascia and all other roof related metal flashings required to complete roof installation.
- .6 Supply and installation of all sealants required to seal the transition of membrane and related metal detailing and the termination of sheet metal and non-membrane surfaces.
- .7 Supply and installation of roof drains as detailed and indicated on the drawings.
- .8 Supply and installation of ballasted guardrail system.
- .9 Supply and installation new skylight on Roof Area 107.
- .10 Supply efforts to remove and reinstall existing lightning protection on areas noted throughout.
- .11 Contractor to provide an aluminum scaffold staircase to access roof areas to be replaced.
- .12 Contractor to provide 21 Test Cuts for DSR Consultant and provide temporary seals. Core testing to be completed prior upon mobilization but prior to any major roofing operations.

1.2 DEFINITIONS

- .1 "CONSULTANT" and "Fishburn Sheridan & Associates Ltd.", and "FSA" are synonymous.
- .2 "OWNER" and "Health Canada" are synonymous.
- .3 "CONSTRUCTOR" and "CONTRACTOR" are synonymous.

1.3 OTHER CONTRACTORS

- .1 Other Contractors, Sub-Contractors and the Owner's own forces, may be performing work on the site at the same time as the Work is being done under this Contract. The successful bidder shall provide all reasonable co-operation and collaboration with these other forces to ensure a timely completion of the work, taking into consideration and without undermining its own role as the "Constructor".

1.4 USE OF THE SITE

- .1 Carry out the Work so as to have the least possible interference and disturbance to the normal use of the premises. The successful bidder is expected to include in the bid an allowance for the performance of off-hours work should it be required to conform with the above.
- .2 Maintain services to existing building and provide for personnel and vehicle access.
- .3 Restrict construction access to and from site to approved location. Do not allow construction traffic to block entrances or exits for any reason.
- .4 Co-ordinate any interference with Owner's operation in this area and abide by Owner's direction in this regard. In cases of conflicting requirements, Owner's operation takes precedence but all reasonable effort to accommodate Contractor's needs will be made.

1.5 EXISTING SERVICES

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Consultant of findings.
- .2 Remove abandoned service lines within 2.4 m of structures. Cap or otherwise seal lines at cut-off points as directed by Consultant.
- .3 Services are to be left operational unless otherwise authorized by Owner.
- .4 Unless otherwise specified, the Contractor will be responsible for disconnection, relocation, re-installation and extending all services required to facilitate work under this Contract. Co-ordinate work with the Owner and provide minimum 48 hours notification if services are to be interrupted.

1.6 CUTTING AND PATCHING

- .1 Generally patch and "make good" any and all surfaces cut, damaged, exposed, or disturbed to comply with any appropriate statutory requirements and to the Owner's acceptance.

1.7 PROTECTION OF PROPERTY

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

1.8 PRECONSTRUCTION CONDITIONS

- .1 Prior to commencing mobilization, the Contractor shall record preconstruction conditions by photographing all items that could potentially be claimed by the Owner or Consultant as damaged during the course of the work.
- .2 These items should include adjacent wall areas, landscaping, pavement, windows, paint finishes and any roof top equipment on or adjacent to the subject roof.
- .3 In the event that the Contractor is permitted to store materials or equipment on adjacent roofs or use adjacent roofs to access the subject roofs, these areas shall also be reviewed for preconstruction damage and photographed.
- .4 Provide Consultant and Owner with photographic record of preconstruction photographs a minimum of 24 hours prior to commencing mobilization.
- .5 All such damages observed during final or post construction review that cannot be verified as pre-existing, are potentially considered the Contractor's responsibility to rectify.

1.9 FIRE PROTECTION

- .1 Provide and maintain temporary fire protection equipment during the performance of the Work as required by insurance companies and governing codes, regulations and by-laws having jurisdiction.
- .2 Work requiring the generation of open flames (welding, soldering, etc...) cannot be performed until an Owner's Permit has been issued. It is the responsibility of the successful bidder to apply for here said permit on a daily basis through Health Canada.
- .3 Open fires and burning of rubbish are not permitted on site.

1.10 OCCUPATIONAL HEALTH AND SAFETY

- .1 Follow the Ontario Provincial Occupational Health and Safety Act and Regulations for Construction Projects. For the purposes of the act, the person or company contracted to carry out the work shall be deemed the "**Constructor**".
- .2 Hazardous materials, not identified by the Owner, may be encountered at the worksite. Use all necessary precautions when handling such material. It is possible that asbestos may exist in some form and if encountered the Contractor is responsible to notify the Owner and to follow Ontario Ministry of Labour regulations governing the handling of asbestos in the workplace.
- .3 The Owner may cause those who do not comply with the O.H.S.A. and Regulations to be escorted from the site.
- .4 Temporary overhead protection will be required at ground street level sidewalks, where pedestrians are walking. All entrances shall have overhead protection. Additional protection will also be required to prevent material from falling to the street from overhead scaffold platforms.

1.11 PROTECTION OF BUILDING FINISHES AND EQUIPMENT

- .1 Prevent movement, settlement, or other damage to other adjacent structures, utilities, and parts of building to remain in place. Provide bracing and shoring if required.
- .2 Keep noise, dust, and inconvenience to occupants to a minimum.
- .3 Protect building systems, services and equipment. Protect all furnishings within work area with (6 mil) polyethylene film during construction. Remove film during non-construction hours and leave premises in clean, unencumbered and safe manner for normal daytime function.
- .4 Provide temporary dust tight screens, partitions, covers, railings, barricades, supports and/or other protection as required. Protect workers, finished areas of work and public.

1.12 PARKING

- .1 Parking is not available on site.
- .2 Contractor's vehicles on site shall be limited to reasonable loading and unloading of equipment and/or materials to a local entrance. Failure to observe these requirements may result the vehicle being ticketed and/or towed.

1.13 SIGNS AND ADVERTISEMENTS

- .1 No signs or advertisements of any description other than notices regarding safety shall be displayed at the Work Site without permission of the Owner.
- .2 Upon completion of the Work, all signs shall be removed except those specifically directed by the Owner to remain.

1.14 CLEAN-UP

- .1 Maintain the work area in tidy condition, free from the accumulation of waste products and debris.
- .2 Remove waste and materials regularly so as to maintain a tidy work site. Do not dispose of any waste in the Owner's facilities unless specifically directed to do so by authorised personnel.
- .3 Store materials in areas specially designated by the Owner. Dispose of this debris in a legal manner so as to avoid causing a hazard to occupants and visitors on site.

1.15 MATCHING

- .1 Where new work occurs in or adjacent to existing work, it is the intent that colours and textures of visible finishes within these areas shall be matched to the satisfaction of the Owner.

1.16 PERMITS, FEES, CERTIFICATES

- .1 Obtain and pay for all required permits with the exception of the Building Permit, which shall be obtained and paid for by the Owner. A Building Permit will not be required for this project.

- .2 Arrange and pay for all inspection certificates required by Authorities having jurisdiction, (i.e., Electrical Safety Authority Certificate). Provide the Owner with copies of these certificates upon completion.

1.17 DISRUPTION OF SERVICES

- .1 The Contractor is responsible to provide adequate written notice to the Owner of any interruption of services (i.e., mechanical, electrical etc.) for the connection of new services or the alteration of existing.
- .2 The Contractor is expected to co-operate reasonably with the Owner in the scheduling of service interruptions.

1.18 SANITARY FACILITIES

- .1 Temporary sanitary facilities will be provided by the Constructor in compliance with the Occupational Health and Safety Act and Regulations for Construction Projects.

1.19 POWER

- .1 Maximum power of 110V will be available at no cost. Any connection to this power source will be done at the Contractor's expense and liability, and in accordance with the Canadian Electrical Code.

1.20 WATER SUPPLY

- .1 Water supply is available at no cost. Connection and disconnection will be at Contractor's expense and liability.

1.21 TEMPORARY FACILITIES

- .1 Any temporary facilities provided at the site by the Contractor must be removed upon completion of the work and the area used must be returned to the original condition.

1.22 DOCUMENTS REQUIRED

- .1 Maintain at the job site, one copy each of the following:
 - .1 Original Plans and Specifications and completed Form of Tender.
 - .2 Building Department stamped drawings if required.
 - .3 Any changes to Drawings or Details.
 - .4 Shop Drawings and any changes.
 - .5 Addenda.
 - .6 Change Orders.
 - .7 Site Instructions.
 - .8 Contractor's Safety Policy.
 - .9 Safety Data Sheets.

1.23 MAINTAIN WARRANTIES

- .1 Ensure that work of this Contract does not invalidate warranties on adjacent work. Provide written confirmation and arrange and pay for all services and costs to ensure that warranties on adjacent work are maintained.
- .2 The Contractor accepts full and complete responsibility of maintaining existing warranties.

1.24 CHANGES IN WORK

- .1 All changes to the Contract Documents which result in an extra or credit to the Contract amount or time are not to be executed until written instructions have been received and the extra or credit agreed to in writing by all parties.
- .2 Execute variations, alterations and substitutions that do not affect the intent, function, duration, or Contract amount, as instructed by the Consultant.
- .3 Changes to the work that are considered urgent by the Owner shall be acted upon by the Contractor on the basis of a written field instruction to be confirmed by a Change Order. Costs are to be kept and presented along with all appropriate timesheet vouchers and bills of materials, or fixed sum if, work is done by a Sub-Contractor on a lump sum basis.

1.25 ADJUSTMENT OF CONTRACT PRICE BASED ON UNIT COST

- .1 Provide a separate unit price as requested on the Form of Tender to adjust the cost for the quantity of work completed in comparison to that specified.
- .2 The unit price shall be applied as an extra or credit to adjust the Contract price.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 NOT USED

- .1 Not used.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 ASTM International
 - .1 A27/A27M-13 Standard Specification for Steel Castings, Carbon, for General Application
 - .2 ASTM A 47-99 (2014), Standard Specification for Ferritic Malleable Iron Castings.
 - .3 ASTM A53/A53M 02, Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated Welded and Seamless.
 - .4 ASTM A 123/A 123M-16, Standard Specification for Zinc (Hot-Dip) Coatings on Iron and Steel Hardware.
 - .5 ASTM A500-13 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - .6 ASTM E935-13e1, Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
- .2 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards.
 - .1 SCAQMD Rule 1113-A2011, Architectural Coatings.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for handrails and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit manufacturer's installation instructions with project specific annotations to suit project conditions.
- .2 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .2 Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
 - .3 Indicate installation of handrails and guardrails including but not limited to plans, elevations, sections, details of components, anchor details, toe boards, swing gates and clearances to adjacent assemblies. Indicate critical field dimensions and conflicts.
 - .4 Indicate installation conditions at obstructions or at junction with adjacent construction as necessary to provide continuity of protection.
- .3 Certifications:
 - .1 Submit certification that modular guardrail system has been tested in accordance with ASTM E935, that it conforms to requirements of ANSI/ASSE A1264.1 and to workplace safety requirements of authority having jurisdiction.

1.3 QUALITY ASSURANCE

- .1 Modular guardrail system shall be the standard product of a manufacturer regularly engaged in the engineering design and manufacture of such products. System shall consist of components that have been in satisfactory use for at least 5 years prior to date of tender issue.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:
 - .1 Deliver products to site in original factory packaging, labelled with manufacturer's name and address, and list of contents of each package.
 - .2 Inspect products for any damage or deformation. Remove damaged products from site and replace with matching undamaged products.
 - .3 Check package contents list to ensure all components necessary for a complete installation have been delivered.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors in a dry location off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect guardrail components from all damage. Protect finish from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 DESIGN CRITERIA

- .1 Installed guardrail assembly and anchorage shall conform to ANSI/ASSE A1264.1, structural requirements of OBC 2012 and workplace safety requirements of authority having jurisdiction.
 - .1 In case of conflicting requirements, the more stringent requirement shall apply.

2.2 MODULAR STEEL GUARDRAIL SYSTEM

- .1 Rails: 42 mm diameter galvanized structural steel tubing to ASTM A500.
- .2 Posts: 42 mm diameter structural steel tubing to ASTM A500, vertical or curved profile as indicated.
- .3 Fittings: elbows, T-shapes, wall flanges, couplings, malleable iron castings to A47 with locking stainless steel set screws.
- .4 Non-Penetrating Anchorage for Rooftop or Freestanding Installation: weighted base mounting plate with non-abrasive non-slip resilient pad, with integral

receivers to secure and fasten posts and 19 mm thick rubber protection mat on underside of the component.

- .5 Rubber protection pad: HD grade 625 mm x 625 mm x 19 mm thick, masticated recycled rubber with reinforcement and UV-resistant, dimpled surface.
- .6 Exposed Fasteners: flush countersunk screws or bolts; consistent with design of railing. All fasteners shall be 304 or 305 stainless steel.
- .7 Splice Connectors: malleable iron castings to A47 collars with locking stainless steel set screws.
- .8 Galvanizing: to ASTM A153, provide minimum 600 g/sq m galvanized coating.
 - .1 Touch-Up Primer for Galvanized Surfaces: SPCC 20 Type I Inorganic zinc rich.
- .9 Factory Pre-finishing: epoxy powder coated.
 - .1 Colour: as selected by Consultant.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for handrail installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Consultant.
 - .2 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 INSTALLATION

- .1 Assemble and install modular guardrail system in accordance with manufacturer's instructions, reviewed shop drawings and as necessary to provide continuity of protection.
- .2 Install components plumb and level, in proper alignment with adjacent assemblies.
- .3 At non-penetrating or freestanding guardrail set posts into weighted base plates and secure.
- .4 Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- .5 Assemble with fittings, spigots, sleeves and set-screws to produce secure, vibration-resistant installation.

3.3 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by hand rail installation.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 07 52 00 – Modified Bituminous Membrane Roofing.
- .2 Section 07 62 00 – Sheet Metal Flashing and Trim.
- .3 Section 07 92 00 – Joint Sealants.

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM A653/A653M-11, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 CSA International
 - .1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
 - .2 CSA O141-05 (R2009), Softwood Lumber.
 - .3 CSA O151-09, Canadian Softwood Plywood.
- .3 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber 2010.
- .4 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S702-14, Standard for Mineral Fibre Thermal Insulation for Buildings.
 - .2 CAN/ULC-S702.2-10, Standard for Mineral Fibre Thermal Insulation for Buildings, Part 2: Application.

1.3 QUALITY ASSURANCE

- .1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Plywood identification: by grade mark in accordance with applicable CSA Standards.

1.4 PRECAUTIONS

- .1 Provide temporary protection, to the satisfaction of the Consultant, to render all wood blocking and plywood watertight, if for any reason permanent membrane protection cannot be provided within the same day. Ensure the base of any curbs are temporarily sealed to prevent water from entering below the curb assembly, or behind sheathing, should the roof assembly not be completed on the same day as the carpentry work.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.
- .2 Delivery and acceptance requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and handling requirements:
 - .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store materials off ground with moisture barrier at both ground level and as a cover forming a well-ventilated enclosure, with drainage to prevent standing water.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 LUMBER MATERIAL

- .1 Lumber: Unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:
 - .1 CSA O141.
 - .2 NLGA Standard Grading Rules for Canadian Lumber.
- .2 Furring, blocking, nailing strips, grounds, rough bucks, curbs, fascia backing and sleepers:
 - .1 S2S is acceptable for all surfaces.
 - .2 Board sizes: "Standard" or better grade.
 - .3 Dimension sizes: "Standard" light framing or better grade.
 - .4 Post and timbers sizes: "Standard" or better grade.

2.2 PANEL MATERIALS

- .1 Canadian softwood plywood (CSP): to CSA O151.
 - .1 Urea-formaldehyde free.

2.3 FASTENERS

- .1 Wood to wood fasteners: Wood screw #12 or as indicated, galvanized flat head, of sufficient length to completely penetrate through base minimum 25 mm.
- .2 Exposed fasteners for metal to wood or masonry: Use #10 cadmium plated hex screws with neoprene and steel washers. Minimum length 38 mm. Use lead shields, as required for anchoring. Colour of screw head to meet approval of Consultant.
 - .1 Standard of acceptance:
 - .1 Atlas Bolt.

.2 Or accepted alternate.

.3 Nails, spikes and staples: To CSA B111.

2.4 ACCESSORIES

.1 Semi-rigid insulation: semi-rigid mineral wool, rockwool, or slagwool boards, to CAN/ULC 702.2.

2.5 FINISHES

.1 Galvanizing: To ASTM A653/A653M, use galvanized fasteners for all work.

Part 3 Execution

.1 Extend air/vapour barrier seals up vertical surfaces and curbs and onto the deck as shown on the Drawings, to provide continuity.

.2 Comply with requirements of NBC, supplemented by the following paragraphs.

.3 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, 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, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.

3.2 SECUREMENT OF WOOD BLOCKING

.1 Comply with more stringent requirements as required by drawings or Ontario Building Code requirements. Increase number and spacing of all fasteners by 50% for 2400 mm from all outside roof corners.

.2 Install fasteners to the design intent to hold all wood blocking permanently in place to prevent warping, deflection and to resist all wind and weather conditions.

.3 Install fasteners in two rows in the direction of the grain, offset one to another in a staggered fashion by approximately 50%. All fasteners shall be placed minimum 10 mm from any edge of framing.

.4 For any exposed fastening, provide touch-up paint as required to coat all exposed surfaces of screws damaged during the driving process.

.5 Where new rigid insulation cannot fully fill cavities in the new assembly, contractor shall fill voids with spray applied foam or flexible mineral wool insulation.

3.3 SHEATHING INSTALLATION

- .1 Plywood:
 - .1 Not less than 2 mm gaps shall be provided between sheets, to allow for material expansion.
 - .2 Unless otherwise indicated, fasten plywood to Z-bars with a minimum of thirty-six fasteners per 1200 mm x 2400 mm sheet.

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.
- .3 Bevel leading edge of wood panel products on vertical applications to facilitate membrane installation and as detailed on drawings.

END OF SECTION

Part 1 General

1.1 GENERAL

- .1 Contractor to provide an original, complete insurance policy identifying specific coverage for torch applied systems.

1.2 RELATED SECTIONS

- .1 Section 06 10 53 – Miscellaneous Rough Carpentry.
- .2 Section 07 62 00 – Sheet Metal Flashing and Trim.
- .3 Section 07 92 00 – Joint Sealants.
- .4 Section 22 05 11 – Plumbing and Drainage.

1.3 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A653/A653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM C578-16, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 - .3 ASTM D1621-16, Standard Test Method for Compressive Properties of Rigid Cellular Plastics
 - .4 ASTM D448-12, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
- .2 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A123.4-04 (R2013) - Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.
 - .2 CSA A123.22-08(r2013), Self-Adhering Polymer Modified Bituminous Membrane Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 - .3 CSA A123.23-15 - Product specification for polymer-modified bitumen sheet, prefabricated and reinforced.
 - .4 CSA A231.1-14/A231.2-14, Precast Concrete Paving Slabs / Precast Concrete Pavers.
 - .5 CAN/CSA B72-M87 (R2013) Installation Code for Lightning Protection Systems.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.108-M89, Bituminous Solvent Type Paint.
 - .2 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
- .4 Factory Mutual (FM Global)
 - .1 Hot Work Permit Form F2630.

- .2 FM 4450, Approval Standard for Class 1 Insulated Steel Roof Decks.
- .5 Underwriters Laboratories' of Canada (ULC)
 - .1 CAN/ULC-S107-10, Standard Methods of Fire Tests of Roof Coverings.
 - .2 CAN/ULC-S126-06, Standard Method for Test for Fire Spread Under Roof Deck Assemblies.
 - .3 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 - .4 CAN/ULC-S702.2-03, Standard for Mineral Fibre Thermal Insulation for Buildings.
 - .5 CAN/ULC-S770-09, Standard Test Method for Determination of Long-Term Thermal Resistance of Closed-Cell Thermal Insulating Foams.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Convene pre-installation meeting one week prior to beginning roofing Work, with roofing contractor's representative and Consultant to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.

1.5 COORDINATION

- .1 Coordinate work of this Section with related work specified in other Sections to ensure construction schedule is maintained and water tightness and protection of the building and finished work is maintained at all times.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 System summary:
 - .1 Provide a one page synopsis of each roof type that lists the assembly components in order from top to bottom.
- .2 Product Data:
 - .1 Provide two copies or an electronic copy of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations for all products to be incorporated in the new system.
 - .2 Provide two copies or an electronic copy of WHMIS 2015 Safety Data Sheets to Consultant for:
 - .1 Primers.
 - .2 Sealers.
 - .3 Liquid membrane.
 - .4 Adhesives.
- .3 Provide shop drawings:

- .1 Indicate sloped insulation layout and details.

1.7 QUALITY ASSURANCE

- .1 Installer qualifications: Company or person specializing in application of modified bituminous roofing systems with 5 years documented experience, approved by manufacturer. Installer to be members of Ontario Industrial Roofing Contractors Association (OIRCA) and/or Canadian Roofing Contractors' Association (CRCA) in good standing. Only certified applicators are permitted to use torch welding equipment.
- .2 Hold a pre-installation meeting prior to the start of roofing works, with the roofing contractor's representative and the Consultant, to review installation conditions particular to this project.

1.8 FIELD QUALITY CONTROL

- .1 Water Testing:
 - .1 In the event the Consultant deems any of the Work to be deficient, provide water test of all flashing, projections, equipment on roof and roofing system. Co-ordinate test with the Owner's operations personnel.
 - .2 Contractor is to assume all costs of testing and correction.
- .2 Adhesion Testing:
 - .1 If requested by the Consultant, at each roof drainage area, following installation of membrane base sheet, carry out adhesion tests to confirm adhesion of membrane to substrate and substrate layers to each other, down to first mechanically attached layer.
 - .2 Locations and timing of tests will be directed by Consultant. Provide labour and materials as required to assist Consultant in conducting tests.
 - .3 If inadequate adhesion is found, conduct further testing to determine the extent of the inadequate adhesion. Replace all defective areas to the satisfaction of the Consultant. Replace substrate materials as necessary with new materials, and patch cut tests with membrane patches extending at least 150 mm beyond the cut.
 - .4 Contractor is to assume all costs of testing and correction.
- .3 Sample Testing:
 - .1 If requested by the Consultant, at each roof drainage area, following installation of membrane base sheet, carry out sample tests to confirm materials and installation of roof assembly components. Sample size to be 300 mm x 300 mm.
 - .2 Locations and timing of tests will be directed by Consultant.
 - .3 If inadequate construction is found, conduct further testing to determine the extent of the inadequate adhesion. Replace all defective areas to the satisfaction of the Consultant. Replace substrate materials as necessary with new materials, and patch cut tests with membrane patches extending at least 150 mm beyond the cut.
 - .4 Contractor is to assume all costs of testing and correction.

1.9 FIRE PROTECTION

- .1 Fire Extinguishers:
 - .1 Pressure rechargeable type with hose and shut-off nozzle,
 - .2 ULC labeled for ABC class protection.
 - .3 ULC labeled for A class protection, for wood, paper and fibreboard.
 - .4 Size 14 kg.
 - .5 Have one fully charged ABC extinguisher and one fully charged Type A extinguisher on roof per torch applicator, within 3 m of the propane source.
- .2 Maintain fire watch for 2 hours after each day's torching operations cease.

1.10 GENERAL REQUIREMENTS

- .1 Comply with the General Requirements, General Instructions and Supplementary Conditions.
- .2 Execute work in accordance with this Section and other related Sections, Drawings and Details.
- .3 Attach roofing to structure to meet requirements of insurance underwriter and authorities having jurisdiction.
- .4 Regard manufacturer's printed recommendations as minimum requirement for materials, methods and workmanship not otherwise specified.
- .5 Contact the Consultant if the specifications conflict with the manufacturer's recommendations. Otherwise it will be assumed that the Contractor and manufacturer are in agreement with procedures outlined.
- .6 Advise the Consultant of adjustments to specified roofing procedures caused by weather and site conditions. Make adjustment to specified procedures only after review with the Consultant.
- .7 Maintain equipment in good working order to ensure control of roofing operations and protection of work. Types of roofing equipment and laying techniques to be employed are to meet the approval of the Consultant.
- .8 Do not penetrate roof deck with any fastening devices that would do damage or impair the function of the assembly.
- .9 All temporary drains shall be connected with a mechanical connection (MJ coupling) or a U-flow connection, until new drains are installed.

1.11 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

- .2 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS 2015) regarding use, handling, storage, and disposal of, sealing compounds, primers and caulking materials.
- .3 Manufacturer's recommendations for handling and storing products are to be considered a minimum requirement.
- .4 Materials shall be delivered to the site, undamaged and in their original packages, with manufacturer's labels visible, attesting to their conformity to specific standards.
- .5 Ensure that shelf life of materials has not expired.
- .6 Remove damaged material from site and replace all rejected materials with new product.
- .7 Elevate on raised platform and store as to prevent deformation of materials.
- .8 Provide and maintain dry, off-ground weatherproof storage.
- .9 Store rolls of membrane in upright position. Store membrane rolls with selvage edge up.
- .10 Remove only in quantities required for same day use.
- .11 Place plywood runways over completed Work and over areas not in Contract, as required, to enable movement of material and other traffic.
- .12 Store sealants at +5°C minimum.
- .13 Protect insulation by slitting manufacturer's packaging and installing a waterproof UV-resistant tarp.
- .14 Handle roofing materials in accordance with manufacturer's written directives, to prevent damage or loss of performance.
- .15 Avoid stockpiling of materials or use of equipment on decks in a way which could cause overloading.

1.12 ENVIRONMENTAL REQUIREMENTS

- .1 Ensure protection of products that are sensitive to damage by moisture. Do not work during rain, snow or fog. Stop work and make watertight before the onset of inclement weather or when weather appears imminent.
- .2 Ensure protection of the building from weather at all times. If inclement weather is forecast or appears imminent, postpone work that would risk the building from moisture damage.
- .3 If it becomes apparent that work would threaten the building watertightness, the Owner has the right to stop work. Any additional expenses due to work stoppage or postponement of work will be at the Contractor's expense.

- .4 Ambient Conditions
 - .1 Do not install roofing when ambient temperature remains below -18°C for torch application.
 - .2 Minimum ambient temperature for solvent-based adhesive is -5°C.
- .5 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

1.13 COMPATIBILITY

- .1 Compatibility between materials is essential. Use only materials that are known to be compatible when incorporated in a complete assembly. Provide written declaration to Consultant stating that materials and components, as assembled in system, meet this requirement.
- .2 Defective work resulting from work with incompatible materials will be considered the responsibility of the Contractor.
- .3 Repair all work that could result in damage or interfere with performance.

1.14 EXISTING SUBSTRATES

- .1 Following removal of existing material to the substrate, inspect the deck for soundness and notify the Consultant of any deck found unsound and not suitable for roofing. Do not commence work until conditions are documented and the Consultant rules on the acceptability of surfaces and/or corrective measures required. The cost of any delays due to postponement of work that results from investigating the site problem or obtaining a ruling will be at the Owner's expense.
- .2 The commencement of work is proof that the Contractor has accepted surfaces as satisfactory and accepts responsibility for appearance and performance of completed work.
- .3 Defective work resulting from application of material on unsatisfactory surfaces will be considered the responsibility of the Contractor.
- .4 The Contractor will be responsible for all repairs, costs and pay all cost and fees required to rectify damage or defective work. Use materials and finish to match the original preconstruction conditions.

1.15 DAILY OPERATIONS

- .1 Unless otherwise specified, complete the entire roofing operation up to line of termination of each day's work, as required by design intent, in order to safeguard and protect the work and building from damage and weather.

1.16 EXAMINATION

- .1 Before proceeding with roofing application, ensure that:

- .1 All surfaces are clean and free of debris, snow, frost and moisture.
 - .2 The deck is clean and sufficiently dry to ensure specified adhesion will be obtained.
 - .3 Adjacent construction and installation of related work (i.e. curbs, drains, penetrations, wood nailers, etc.) incorporated with the roof are complete.
 - .4 Roof deck is sound, existing fasteners are tight and irregularities are corrected to provide a suitable surface for new roofing.
- .2 Ensure substrate is smooth. Remove sharp edges or protrusions that could impair the function of the roof assembly.
 - .3 Inform Owner/Consultant in writing of any defects.

1.17 DRAINS AND DRAINAGE PLANE

- .1 Inspect surfaces and ensure that roof deck is level or sloped to drains in conforming to design intent.
- .2 Inspect surfaces and ensure that roof drains are set at a level to drain and are connected or capped.
- .3 Ensure plumbing is accessible and work can be completed as specified.
- .4 Inspect roof drains to ensure they are open and working properly.
- .5 Where specified or shown for areas with only one drain, provide overflow scuppers or drains to detail and specified requirements.

1.18 HIDDEN SERVICES

- .1 Investigate the location of all known hidden services by reviewing interior conditions, plans, specifications and drawings for the original building, any subsequent alterations, completion of cut tests and interviewing those involved in the construction and maintenance of building services. These services include but are not limited to mechanical, electrical, cable, communication, computer, security or roof assembly. Ensure all services are located and will be protected from damage under the Contract. In some cases, services may be located over the roof deck and within the roof assembly. Notify Owner/Consultant in such occurrence and proceed with installation as directed.

1.19 EQUIPMENT

- .1 Inspect equipment affected by the work, including but not limited to rooftop equipment, curbs, existing drains and plumbing, mechanical, electrical and lightning protection services, to ensure they are in good repair and working order. Record any damage and advise the Consultant.
- .2 During re-roofing, ensure that all mechanical equipment, ducts, pipes, etc. are properly supported.

- .3 Temporarily remove the existing lightening protection system and stored for re-installation. Provide certification from licensed contractor after reinstallation.
- .4 Notify Owner and/or Consultant of any equipment which is not operational or damaged prior to the commencement of work.

1.20 ADVISE CONSULTANT

- .1 Advise the Consultant of any unusual circumstances affecting the work. Notify the Consultant of any defective or malfunctioning equipment or drainage deficiencies. Do not commence work until defects and incorrect levels have been verified and rectified.

1.21 PROTECTION OF ROOFTOP EQUIPMENT

- .1 Remove any equipment and flashing intended for re-use and save from harm. Store in approved location and reset at project conclusion unless specified or shown to be removed.
- .2 Temporarily remove the existing lightening protection system and stored for re-installation. Provide certification from licensed contractor after reinstallation.
- .3 Protect all openings, vents and stacks from weather and contamination from debris.
- .4 Provide temporary plumbers plugs to protect drains during roofing operations. Ensure that temporary protection is removed at completion of work period and/or at the end of each day's work.

1.22 SERVICES

- .1 Services are to be left operational unless otherwise authorized by the Owner.
- .2 Unless otherwise specified, the Contractor will be responsible for disconnection, relocation, re-installation and extending all services required to facilitate work under this Contract. Co-ordinate work with the Owner and provide minimum of 48 hours notification if services are to be interrupted.
- .3 Contractor to verify location of services prior to commencement of work. Notify Owner/Consultant of any unusual conditions.
- .4 The Contractor and their employees must hold valid certificates for the work undertaken.
- .5 Complete work of this Section as required by local authorities having jurisdiction. Have work inspected and pay all fees relative to such inspection to ensure work meets with published standards and codes.
- .6 Submit Certificate or Letter of Approval by authority responsible for the work to the Owner and Consultant with final documentation.

- .7 All fans, air handling units, and any electrical equipment affected by the replacement of the roof sections under this Section, whether disconnected or extended must be inspected by an ESA representative to verify the integrity of the existing wiring and/or the new installation.
- .8 The roofing Contractor must obtain a "Certificate of Inspection" from the ESA (Electrical Safety Authority 1-887-ESA-7233) and fill in the attached ESA log sheet and provide the certificate to Fishburn Sheridan & Associates Ltd. Failure to do so will result in an amount deducted from the Contractor's final invoice equal to the cost of doing this work.
- .9 Temporarily remove the existing lightning protection system and stored for re-installation. Provide certification from licensed contractor after reinstallation.

1.23 WARRANTY

- .1 Contractor's Warranty for Labour and Material:
 - .1 For Work of this Section 07 52 00 – Modified Bituminous Membrane Roofing, 12-month warranty period is extended to 24 months.
 - .2 Make all necessary repairs and replacements within 48 hours of receipt of written notification.
 - .3 Nothing contained in this Article shall be construed as in any way restricting or limiting the liability in common law and statutory liability of the Contractor.
 - .4 Provide these written warranties, confirming above, issued on the corporate letterhead, signed and sealed by an authorized signing officer. The warranties will specifically reference the name of the Building, location and Owner.
- .2 Manufacturer's Warranty:
 - .1 Provide a 10-year membrane warranty.

Part 2 Products

2.1 GENERAL

- .1 All standards, regulations and specifications listed herein are considered to be the latest available edition.
- .2 For sealants, mastic, adhesives or caulk, refer to Section 07 92 00 – Joint Sealants.

2.2 PRIMERS

- .1 Asphalt Primer: To manufacturer's recommendations.

- .2 Self-adhesive membrane primer. As recommended by membrane manufacturer. Use low VOC, polymer emulsion-based primer, unless directed otherwise by Consultant on site.

2.3 SELF-ADHERED MEMBRANE

- .1 To CSA A123.22, self-adhering membrane consisting of SBS rubberized asphalt compound laminated to a polyethylene film. Minimum thickness 1 mm.
 - .1 Standard of acceptance:
 - .1 Blueskin SA by Henry Bakor.
 - .2 GoldShield by IKO.
 - .3 Soprastick 1100 by Soprema.
 - .4 Vapour Barrier SA by Johns Manville.
 - .5 Or accepted alternate.

2.4 MEMBRANE AND MEMBRANE FLASHINGS

- .1 Acceptable membrane manufacturers:
 - .1 Soprema.
 - .2 IKO Industries Ltd.
 - .3 Henry Bakor.
 - .4 Johns Manville.
- .2 Base sheet membrane and base sheet membrane flashing (non-combustible substrates): To CSA A123.23.
 - .1 Styrene-butadiene-styrene (SBS) elastomeric polymer polyester or composite polyester/fibreglass reinforcement.
 - .2 Type B or Type C.
 - .3 Grade 2.
 - .4 Top and bottom surfaces:
 - .1 polyethylene/polyethylene.
- .3 Self-adhesive base sheet membrane flashing (combustible substrates): To CSA A123.23.
 - .1 Styrene-butadiene-styrene (SBS) elastomeric polymer prefabricated sheet, polyester or composite polyester and glass reinforcement.
 - .2 Type B or Type C.
 - .3 Grade 2.
 - .4 Top and bottom surfaces:
 - .1 Polyethylene/release paper.
- .4 Cap sheet membrane and membrane flashing: To CSA A123.23.
 - .1 Styrene-butadiene-styrene (SBS) elastomeric polymer, prefabricated sheet, polyester or composite polyester/fibreglass reinforcement.
 - .2 Type B or Type C.

- .3 Grade 1, granule surfaced.
 - .1 Colour for granular surface: Gray.
- .4 Grade 1-standard service.
- .5 Bottom surface polyethylene.

2.5 LIQUID MEMBRANE

- .1 Two-component methacrylate or one component polyurethane/bitumen resin, solid content 80% or greater, compatible with roof membrane.
 - .1 Standard of acceptance:
 - .1 Alsan Flashing by Soprema.
 - .2 MS Detail by IKO.
 - .3 PermaFlash by Johns Manville.
 - .4 Or accepted alternate.
 - .2 Reinforcement mesh: As recommended by liquid membrane manufacturer.

2.6 POLYSTYRENE INSULATION

- .1 Extruded polystyrene (XPS) insulation to CAN/ULC-S701, Type 4, thickness as indicated on drawings. Where indicated, provide drainage grooves on underside of board.
- .2 Extruded polystyrene (XPS) insulation compliant with CAN/ULC S701.1. Rigid thermal insulation board made of high-density extruded polystyrene with squared edges on its four sides. It is composed of closed cell foam and is designed for applications requiring high-density insulation on which heavy loads will be applied. It is mainly used for foundation systems under slabs, protected-membrane roofing systems (inverted), parking decks, and plaza decks.

2.7 SEMI-RIGID MINERAL WOOL INSULATION

- .1 Semi-rigid mineral wool, rockwool, or slagwool boards, to CAN/ULC 702.2.

2.8 SEALERS

- .1 Plastic cement: Asphalt, to CAN/CGSB-37.5.
- .2 For sealants, mastic, adhesives or caulk, refer to Section 07 92 00 – Joint Sealants.

2.9 DRAINAGE LAYER

- .1 High-compressive strength, for horizontal applications, geocomposite sheet drain with a high-strength woven geotextile fabric.
 - .1 Compressive strength: 18,000 psf.
 - .2 Core thickness: 0.40 in.
 - .3 Maximum flow rate: 21 gpm/ft.
 - .4 Geotextile fabric: woven.

- .5 Performance index: 27,198.

2.10 BALLAST, INTERLOCK & PAVING STONES, STONE DUST

- .1 Ballast shall comply with ASTM D448 #4, free of splinters and fines, with typical size of stone being between 38 mm diameter and 50 mm diameter.
- .2 Ballast requirement:
 - .1 Perimeter zone (defined as the roof section parallel to the exterior roof edge a minimum width of 2400 mm), 0.75 kPa (75 kg/m²).
 - .2 Corner zone (defined as a 2400 mm x 2400 mm at the exterior corner of the roof), 1.0 kPa (100 kg/m²).
 - .3 Field and penetration zone (defined as the main portion of the roof section that is not part of the perimeter and corner zone), 0.75 kPa (75 kg/m²).
 - .4 Supply interlocking bricks to match existing design intent, to replace existing interlocking bricks.
 - .5 Supply and install concrete pavers in accordance with the Drawings.
 - .6 Pre-cast concrete pavers to CSA A231.1, 450 mm x 450 mm, size 50 mm thick. Colour and finish to be accepted by the Owner. To be installed at locations indicated on Drawings.
 - .7 Stone dust, Roof Area 104, to be fine crushed granules, sized 6mm-12mm grade for patios.

2.11 BALLAST FILTER FABRIC

- .1 Woven polyolefin fabric.

2.12 SUSPENDED METAL WALKWAY

- .1 Elevated walkway systems routed across the roof shall be supported off the roof by an engineered prefabricated walkway system specifically designed to be installed directly on the roof without roof penetration, flashing or damage to the roofing material.
- .2 The system shall be designed to support all weight and equipment as required.
- .3 The system shall consist of the following:
 - .1 Bases are to be made of high density polypropylene plastics and other additives for UV protection. Material with inserts for strut or threaded rods as required.
 - .2 The substructure is to be made of a 2.78 mm (12 ga) back to back strut G-1012A, or approved equivalent and to be supported directly from the bases.
 - .3 The grating material is to be made from mill-galvanized carbon steel, 1.98 mm (14 ga), finished to ASTM A525, section width to be 304 mm, grating height to be 63 mm.
 - .4 The handrail is to be assembled from a 2.78 mm (12 ga), 41 mm strut G-5812, or approved equivalent.

- .4 All substructures and handrails shall be galvanized steel. Nuts, threaded rods and washers shall be electro-plated.
 - .1 Standard of acceptance:
 - .1 PPH Walkway System by Portable Pipe Hanger.
 - .2 Unistrut by Unistrut Canada Ltd.
 - .3 Or accepted alternate.

2.13 FASTENERS

- .1 Fasteners for exposed metal flashing and cladding to wood or steel: Minimum 38 mm #10 cadmium plated hex head screws, colour matched, with neoprene and steel washers.
- .2 Fasteners for plywood or sheet metal to concrete deck: Corrosion resistant purpose-made pre-drill, self-tapping concrete screws, minimum 4.78 mm diameter, minimum 25 mm penetration into concrete.
 - .1 Standard of acceptance:
 - .1 Tapcon.
 - .2 Or accepted alternate.
- .3 Fasteners for sheet metal into steel: Self-drilling, self-tapping screws, galvanized, #8 or larger size, Teks or equivalent, head to suit application.
- .4 Fasteners for sheet metal and wood to wood: Corrosion resistant #10 wood screws or nails to suit application.
- .5 Structural fasteners into wood: Lag screws, 12.7 mm diameter hot dipped galvanized steel, length 125 mm.
- .6 Expansion fasteners for wood plates and steel to concrete deck: AISI Type 304 stainless steel, with stainless nuts and washers.
 - .1 Standard of acceptance:
 - .1 Hilti Kwik Bolt TZ.
 - .2 Or accepted alternate.

2.14 PLUMBING VENTS

- .1 2-piece spun aluminum with integral flange, diameter to suit existing pipe size.
 - .1 Standard of acceptance:
 - .1 Flash-tite by Lexcor, EVF-1 by Thaler.
 - .2 Or accepted alternate.

2.15 ROOF DRAINS

- .1 See Section 22 05 11 – Plumbing and Drainage.

2.16 SCUPPERS AND OVERFLOWS

- .1 See Section 07 62 00 – Sheet Metal Flashing and Trim.
- .2 Size and materials as specified or shown, fabricated from 454 g. (16 oz.) copper or 0.65 mm (24 ga.) prefinished steel, with minimum 125 mm roof flange and gravel guard to Consultant's approval. Make all seams continuous and watertight by soldering or heat welding. Scupper to have a minimum width of 200 mm to allow proper drainage.

2.17 CONDUIT PENETRATION FLASHING

- .1 Consists of metal flashing sleeve with bent integral flange, pre-molded urethane insulation liner, EPDM triple pressure grommet seal & EPDM base seal.
 - .1 Material: Aluminum
 - .2 Standard of acceptance:
 - .1 MEF-2A by Thaler.
 - .2 Or accepted alternate.

2.18 B-VENT BASE FLASHING AND STORM COLLAR

- .1 Rain collar to be shop fabricated from 0.61 mm (24 ga.) galvanized sheet, to be same material as base flashing, 100 mm girth, with integral tightening clamp.

2.19 CONDUIT AND PIPE SUPPORT

- .1 Fabricated from 100% recycled rubber with reflective tape on both sides, UV resistant, with a 1.9 mm thick galvanized steel channel attachment 25 mm high to secure conduit.
 - .1 Standard of acceptance:
 - .1 Dura-Block Rooftop Support, DB series by Eaton.
 - .2 Or accepted alternate.

2.20 LIGHTNING PROTECTION CONDUCTOR ATTACHMENT

- .1 Components to reinstate lightning protection system shall comply with CAN/CSA B72-M87 Installation Code for Lightning Protection Systems.
- .2 Report system deficiencies in writing prior to commencing roofing demolition phase. Commencement of demolition in the absence of any reported deficiencies will be considered such that the pre-construction conditions met current code requirements.
- .3 Include for all copper/brass base plates, anchorage, straps, rods and connectors to reinstate the lightning protection system to comply with CAN/CSA B72-M87 and provide copy of certification prior to contract close-out.
- .4 Standard of acceptance:
 - .1 C711 Cast Adhesive Conductor Holder by KLP Inc.

- .2 Or accepted alternate.

2.21 SKYLIGHT

- .1 Continuous plastic double-domed skylights with 100 mm curb mount with clear outer dome and clear inner dome. Thermally broken frame shall consist of 6063-T5 mill finished extruded aluminium alloy, sized to fit over the exterior of the existing curb.
 - .1 Standard of acceptance:
 - .1 Arc-o-Lite by Architectural Plastics Limited.
 - .2 Or accepted alternate.

2.22 MODULAR CURBS

- .1 Modular curb consisting of polyester forms bonded to the roof surface around the penetration, creating a cavity that is filled with a one-part, non-shrinking sealant creating a unified bond integrated to the penetration.
 - .1 Standard of acceptance:
 - .1 "ChemCurb System" by Chem Link Products, LLC., with M-1 structural adhesive and 1-Part Pourable Sealer.
 - .2 Or accepted alternate.

2.23 ROOF ACCESSORIES

- .1 Deck closure, for openings up to 300 mm maximum: 0.79 mm (22 ga.) galvanized steel. Size to suit opening.
- .2 Deck closure, for openings up to 600 mm maximum: 3.2 mm steel plate. Size to suit opening.
- .3 Deck closure, for openings up to 800 mm maximum: 6.4 mm steel. Size to suit plate opening.
- .4 Miscellaneous clamps: For extending gas piping services to CAN/CGA-8.1-M86.
- .5 Bituminous metal paint: To isolate metal from concrete and masonry surfaces, to CAN/CGSB-1.108-M89 Type II.
 - .1 Standard of acceptance:
 - .1 810-07 by Henry Inc.
 - .2 Or accepted alternate.
- .6 Door sill: Extruded aluminum, width to suit opening.
 - .1 Standard of acceptance:
 - .1 CT Series by KN Crowder.
 - .2 Or accepted alternate.
- .7 Pile weatherstripping: Vinyl and pile, external attachment to door sill, adjustable.

Part 3 Execution

3.1 QUALITY OF WORK

- .1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and CRCA Roofing Specification Manual.
- .2 Do priming in accordance with manufacturer's written recommendations.
- .3 Fit the interface of all walls and roof assemblies with durable rigid material sheet metal or plywood providing connection point for continuity of air barrier.
- .4 Make assembly, component and material connections in consideration of appropriate design loads, with reversible mechanical attachments.
- .5 In the event that any product contains a manufacturing defect or anomaly, the Contractor shall notify the Consultant and manufacturer immediately and request direction.

3.2 REMOVAL OF EXISTING ROOFING

- .1 Remove all roofing, flashing and insulation materials down to deck. Leave existing blocking and parapet construction in place where indicated. Where an adhered membrane or built-up air/vapour barrier is present, remove this from the deck unless agreement is otherwise obtained from the Consultant to leave in place.
- .2 Remove existing rooftop equipment where indicated.

3.3 EXAMINATION OF ROOF DECKS

- .1 Verification of Conditions:
 - .1 Inspect with Consultant substrate conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.
- .2 Evaluation and Assessment:
 - .1 Prior to beginning of work ensure:
 - .1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.
 - .2 Curbs have been built.
 - .3 Roof drains have been installed at proper elevations relative to finished roof surface.
 - .4 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.
- .3 Do not install roofing materials during rain or snowfall or when such weather is imminent.

3.4 MECHANICAL EQUIPMENT DISCONNECTION / MODIFICATION / RECONNECTION

- .1 Perform disconnection, extension, modification, and reconnection of mechanical equipment in accordance with drawings provided. Work shall be performed by a licensed trade sub-contractor. Obtain approval from Consultant prior to making adjustments not scheduled.
- .2 In general, Contractor is responsible for disconnection extension, modification, and reconnection of all operating HVAC equipment in work area. Owner is responsible for disconnection (at interior) of those mechanical items indicated for removal by Contractor.
- .3 All mechanical equipment must be properly tagged out of service (especially where gas is present). ESA certificates are required for all mechanical and electrical reconnections.

3.5 PROTECTION OF IN-PLACE CONDITIONS

- .1 Cover walls, walks and adjacent work where materials hoisted or used.
- .2 Use warning signs and barriers. Maintain in good order until completion of Work.
- .3 Protect roof from traffic and damage. Comply with precautions deemed necessary by Consultant.
- .4 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.
- .5 Metal connectors and decking will be treated with rust proofing or galvanization.
- .6 Fit the interface of the walls and roof assemblies with durable rigid material sheet metal or plywood providing connection point for continuity of air barrier.

3.6 PRIMING

- .1 Unless otherwise indicated or directed by Consultant, prime all surfaces which will be in direct contact with bituminous materials at the rate of 0.15 L/m² to manufacturer's recommendations. For self-adhering membrane, install primer at a rate recommended by manufacturer. Ensure that surfaces are tack-free before proceeding.
- .2 Limit quantity of primer at deck openings and points of termination and provide supplemental protection to prevent bleedthrough to the building interior.
- .3 Roll primer into surface.
- .4 Re-prime all surfaces, including pre-primed surfaces, that become contaminated with dust or become marred due to their exposure to roof traffic or weather.

3.7 MODIFIED BITUMINOUS MEMBRANE - GENERAL APPLICATION

- .1 Inspect and seal all substrates to eliminate fire hazard. Use fireguard tape as required or recommended by manufacturer.
- .2 Mechanical spreaders are not permitted to install modified membranes.
- .3 Use only bitumen, sealants, adhesive or mastics as specified by membrane manufacturer. Provide written approval from manufacturer when proposing any alternatives or substitutions.
- .4 Lay out all sheets as to allow them to relax a minimum of 30 minutes. When temperatures are below 4.4°C keep and lay out rolls in heated storage. Install rolls before temperature fallback of the sheet occurs.
- .5 Roof membrane to be installed in one sheet if possible.
- .6 Lay all membrane starting at low point to ensure that seams do not face water flow. Roll all membrane into place, true to line, free of buckles, air pockets, fishmouths and tears.
- .7 Overlap all end laps minimum 150 mm and side laps 75 mm.
- .8 Offset all side laps between plies by 50%.
- .9 Offset all end laps between plies minimum 1200 mm.
- .10 At valley locations, run membrane continuously with the slope of the main roof. Lay out all sheets to ensure minimum side laps are maintained through valley area and short section of roof beyond. At these locations the side laps for the main roof will increase. Install membrane to details and Consultant's direction onsite.
- .11 Ensure that a watertight seal is achieved at all overlaps and points of termination.
- .12 Carry base sheet flashing over face of building as shown on the drawings.
- .13 Carry membrane up all vertical surfaces to point shown. Cut off corners at 45° at end laps to be covered by the next roll prior to installation of following sheet.
- .14 Verify procedure with Consultant on site. Seal fasteners through membrane immediately with Type 'A' sealant.
- .15 Do not walk on membrane during applications and until sufficient cooling has taken place as to allow for traffic without doing damage or marking surface.

3.8 BASE SHEET FLASHINGS (SELF-ADHERED APPLICATION)

- .1 All flashings to be cut across the roll in 1 m sections. Cut off corners at end laps to be covered by next flashing piece.

- .2 Provide chalk lines and install all membrane true to line. Install gusset reinforcement pieces at all corner locations.
- .3 Ensure wall or eave surfaces are clean and dry, free of contaminants or other irregularities. Re-prime as necessary.
- .4 Commence flashings from the drain or low points and overlap all side laps minimum 75 mm. Base sheet flashings to extend 100 mm onto roof surface and terminate as shown in drawings.
- .5 Place sheet into primer or adhesive and press into place using hand roller to ensure uniform adhesion. Use hot air welder on all seams and joints to ensure a waterproof seal on all points of termination. Apply flashings free of air pockets, voids, wrinkles or fishmouths.

3.9 BASE SHEET (TORCH APPLICATION)

- .1 Install 1-ply base sheet membrane running with the roof slope, starting at the low point. Layout roll in place to verify alignment and proper overlap and re-roll prior to torching.
- .2 Fully torch in place base sheet membrane using proper application techniques as specified by membrane manufacturer.
- .3 Install membrane true to line and free of wrinkles, air pockets, voids, excessive bitumen flow or other irregularities. Ensure the membrane is not overheated at any location. Should any of these conditions occur, immediately stop membrane application and correct the deficiency before proceeding. Notify Consultant and obtain his approval for proposed repair methods. Questionable areas will require to be cut out and replaced.
- .4 Ensure that a watertight seal of all membrane joints and points of termination is achieved with a torch and trowel.
- .5 Review base membrane for low areas (ponding) and correct with additional base sheet membrane.

3.10 BASE SHEET FLASHINGS (TORCH APPLICATION)

- .1 All flashings to be cut across the roll in 1 m sections. Cut off corners at end laps to be covered by next flashing piece.
- .2 Provide chalk lines and install all membrane true to line. Install gusset reinforcement pieces at all corner locations.
- .3 Commence flashings from the drain or low points and overlap all side laps minimum 75 mm. Base sheet flashings to extend 100 mm onto roof surface and terminate as shown in drawings.
- .4 Install membrane by softening both contact surfaces simultaneously with recommended torching equipment. During application, unroll membrane slowly into fluid bitumen ensuring consistent 6 mm flow protrudes each side of the roll.

- .5 Unroll and work sheet into place using torch, trowel and wet sponge to ensure proper placement and adhesion.
- .6 Install membrane true to line and free of wrinkles, air pockets, voids, excessive bitumen flow or other irregularities. Ensure the membrane is not overheated at any location. Should any of these conditions occur, immediately stop membrane application and correct the deficiency before proceeding. Notify Consultant and obtain his approval for proposed repair methods. Questionable areas will require to be cut out and replaced.

3.11 BASE SHEET (SELF-ADHERED APPLICATION)

- .1 Prime all surfaces to receive membrane to manufacturer's recommendations. Ensure all surfaces are free of dust, debris, voids or other contaminants prior to commencement of the membrane installation.
- .2 Lay out roll commencing from the low point, align and re-roll approximately half of the roll.
- .3 Carefully cut the protective film on backside and peel away slowly, carefully unrolling membrane into place. Immediately use steel roller as recommended by manufacturer to ensure complete adhesion of membrane to substrate free of voids, air pockets, etc.
- .4 Repeat process for remainder of roll. Ensure corners are cut off end laps that are to be covered with the next roll.
- .5 Use hot air welder to seal all joints and points of termination. Install Type 'A' sealant where specified or as shown on drawings.
- .6 At terminations, on nailable vertical surfaces, extend membrane 50 mm up vertical surface and adhere to wall. Secure membrane at 225 mm c/c with nails or screws having 25 mm diameter caps.
- .7 Review base membrane for low areas (ponding) and correct with additional base sheet membrane.

3.12 BASE SHEET FLASHINGS (SELF-ADHERED APPLICATION)

- .1 All flashings to be cut across the roll in 1 m sections. Cut off corners at end laps to be covered by next flashing piece.
- .2 Provide chalk lines and install all membrane true to line. Install gusset reinforcement pieces at all corner locations.
- .3 Ensure wall or eave surfaces are clean and dry, free of contaminants or other irregularities. Re-prime as necessary.
- .4 Commence flashings from the drain or low points and overlap all side laps minimum 75 mm. Base sheet flashings to extend 100 mm onto roof surface and terminate as shown in drawings.

- .5 Place sheet into primer or adhesive and press into place using hand roller to ensure uniform adhesion. Use hot air welder on all seams and joints to ensure a waterproof seal on all points of termination. Apply flashings free of air pockets, voids, wrinkles or fishmouths.

3.13 CAP SHEET (TORCH APPLICATION)

- .1 Prior to installation, unroll the cap sheet and check for granular embedment width and alignment.
- .2 Layout membrane to ensure side lap of cap sheet does not occur within 150 mm of roof drain.
- .3 Install specified cap sheet membrane running with the roof slope, starting at the low point. Layout roll in place to verify alignment and proper overlap and re-roll prior to torching. Offset cap sheet side laps 50% to base sheet side laps, ensure lap does not lie within 150 mm of a roof drain.
- .4 Install 1-ply cap sheet membrane full torched in place using proper application techniques as specified by the membrane manufacturer.
- .5 Install membrane by softening both contact surfaces simultaneously with recommended torching equipment. During application, unroll membranes slowly into fluid bitumen ensuring consistent 3 mm to 6 mm flow protrudes each side of the roll.
- .6 Install membrane true to line and free of wrinkles, air pockets, voids, excessive bitumen flow or other irregularities. Ensure the membrane is not overheated at any location. Should any of these conditions occur, immediately stop membrane application and correct the deficiency before proceeding. Notify Consultant and obtain his approval for proposed repair methods. Questionable areas will require to be cut out and replaced
- .7 Using a torch and trowel, embed granules at end laps and where required on surface of cap sheet to ensure proper bonding of membrane overlaps.

3.14 CAP SHEET FLASHINGS (TORCH APPLICATION)

- .1 All flashings to be cut across the roll in 1 m sections. Cut off corners at end laps to be covered by next flashing piece.
- .2 Provide chalk lines and install all membrane true to line. Install base sheet gusset reinforcement at all corner locations.
- .3 Commence flashings from the drain or low points and overlap all side laps minimum 75 mm. Cap sheet flashings to extend 150 mm onto roof surface and terminate as shown in drawings. At wall locations, unless otherwise specified, cap sheet flashings to extend up 50 mm higher than base sheet flashings.
- .4 Where required by Summary of Work and details, install 50 mm wide continuous strip of Type 'A' sealant to the tops of parapets or eaves to prevent bitumen spillage on the building exterior.

- .5 Install membrane by softening both contact surfaces simultaneously with recommended torching equipment. During application, unroll membrane slowly into fluid bitumen ensuring consistent 6 mm flow protrudes each side of the roll.
- .6 Unroll and work sheet into place using torch, trowel and wet sponge to ensure proper placement and adhesion.
- .7 Install membrane true to line and free of wrinkles, air pockets, voids, excessive bitumen flow or other irregularities. Ensure the membrane is not overheated at any location. Should any of these conditions occur, immediately stop membrane application and correct the deficiency before proceeding. Notify Consultant and obtain his approval for proposed repair methods. *Questionable* areas will require to be cut out and replaced.
- .8 Touch up bare spots, corners, scuffs and bleedout runs on cap sheet with granules matching membrane colour, immediately following installation. Use hot air welder, torch or Type 'A' sealant to adhere granules to sheet.

3.15 DRAINAGE LAYER

- .1 Install new drainage layer over the entire completed cap sheet membrane. Fold perimeter locations and extend a minimum of 100 mm up verticals.
- .2 Lay drainage layer loose laid in parallel courses and cut or fold to fit cants and projections. At adjacent sheets, remove fabric and overlap 100 mm ensuring that dimples are inserted into adjacent sheet dimples to prevent sheets pulling apart.
- .3 Once application is complete and uniformly even/level, proceed with insulating.

3.16 ROOF DRAINS

- .1 See Section 22 05 11 – Plumbing and Drainage for plumbing work.
- .2 Install self-adhered membrane air seal around drain and extend onto air/vapour barrier minimum 150 mm.
- .3 Complete roof membrane, installing additional 1 m x 1 m base sheet flashing centred over drain opening.
- .4 Fully coat drain flange to receive roofing with modified sealant and continue modified bitumen over flange. Neatly trim and work membrane to interior face and seal with Type 'A' sealant.
- .5 Set clamping ring in solid bed of Type 'A' sealant. Secure clamp ring and integral screen as dictated by drain design immediately after membrane is installed. Tighten bolts to ensure a permanent watertight compression seal.
- .6 Install and bolt strainers with heavy iron mechanical bracket to ensure the drain screen remains permanently in place to the Consultant's approval.

- .7 Install test plug, water test roof and repair leaks. Remove test plug once complete.
- .8 Restore interior finishes affected by work of this Contract to match original materials and finishes to Consultant's approval. Insulate rainwater leader pipes as required by Summary of Work in accordance with Section 22 05 11 – Plumbing and Drainage.

3.17 SCUPPERS AND OVERFLOWS

- .1 As required by the Summary of Work and drawings, install new overflow scuppers as indicated. Height of scupper is to be less than 150 mm above membrane level at roof drain.
- .2 Install new scuppers, downspouts and concrete pavers protection to requirements of the Summary of Work, drawings and details.
- .3 Verify that location will allow for positive drainage and will not conflict with existing facilities or entrance ways.
- .4 Verify that drainage to lower levels can be adequately accommodated without problems.
- .5 Reduce insulation thickness minimum 25 mm, 1200 mm from scupper to provide positive roof drainage and ensure water flow will not be impeded.
- .6 Install 1-ply 95 g/m² base sheet mopped or adhered as an underlay to membrane at scupper locations.
- .7 Cut neat notch through membrane roofing 19 mm larger than specified scupper size. Set scupper on top of completed membrane prior to membrane flashing installation.
- .8 Install scupper, plumb, level and true to line. Secure flanges to the substrate at outer edges at a minimum of four locations.
- .9 Set and cover scupper flanges with Type 'A' sealant prior to roofing.
- .10 Flash scuppers with 1-ply modified bitumen base sheet adhered in place. Extend base sheet 125 mm beyond scupper flange.
- .11 Provide new downspouts in conformity with Summary of Work, drawings and details. See Section 07 62 00 - Sheet Metal Flashing and Trim for specification of eavestroughs and downspouts.

3.18 PLUMBING VENTS, B-VENTS, STACKS AND SLEEVES

- .1 Inspect and clean soil pipes of debris to ensure they are operational.
- .2 Protect exposed surface during roofing operation and clean surfaces free of bitumen before leaving site.

- .3 Make all penetrations air and watertight at air/vapour barrier by installing self-adhesive membrane flashings 150 mm onto air/vapour barrier and carry up and around projection. Clamp in place and caulk.
- .4 Trim base sheet at roof projections.
- .5 Adjust existing pipes to new flashing heights by either cutting down or extending pipes with matching materials attached with mechanical couplers. Ensure pipes are 38 mm higher than flashing to allow for sealing to prevent condensation.
- .6 Clear all projections free of contaminants and seal junction of base sheet and roof projections with trowel applications of sealant as shown on drawings.
- .7 Install all metal flanges to be built into the membrane before the installation of cap sheet. Insulate sleeves in accordance with drawings as specified. Where required, install telescoping caps to detail.
- .8 Prime topside and underside of all flanges to be incorporated with roofing prior to application. Use primer supplied by the membrane manufacturer. All primer to be dry before installation of membrane roofing or flashing.
- .9 Before installing flashings, install 1-ply base sheet extending to opening. Set flanges in bed of Type 'A' sealant prior to membrane installation, as per manufacturer's recommendations.
- .10 Install 1-ply of base sheet flashings thermofused to the flange to within 25 mm from upturn and continuing a minimum of 225 mm beyond flange. Continue cap sheet to metal upturn. Seal around upturn junction with sealant and touch up with matching granules, as per manufacturer's recommendations.
- .11 Install rain collars over sleeves and stacks as indicated to match adjoining materials and seal with sealant as indicated on drawings.

3.19 SKYLIGHT

- .1 Install skylights/hatch plumb and level, centred over curb or opening. Anchor to substrate through flange at anchorage points provided, with fasteners as specified in Section 06 10 53 – Miscellaneous Rough Carpentry or as recommended by manufacturer.
- .2 Ensure all integral internal skylight drainage is operating satisfactorily and that the domes are not warped, twisted or under other stresses after completion.
- .3 Install hatch to ensure handle and latch are located on the same side as the existing access ladder.
- .4 Install skylight / hatch in strict accordance with manufacturers printed instructions.

3.20 MODULAR CURBS

- .1 Remove all dirt, dust and other contaminants such as, but not limited to, water, ice, oil, grease, animal fat and industrial solvents, away from the application area. Do not use splice wash or gasoline.
- .2 Apply a very thin bead of structural sealant to the outside base of the curb and tool it smooth, making sure to seal all voids and gaps. Apply a bead of pourable sealer over top of the bead of structural sealant.
- .3 With a wire brush and scraper, thoroughly clean and remove all loose roof cement, mastics, coatings, scaled rust and caulking that may be adhered to the penetrations inside the curb. If any fresh roof cement is present, it must be removed completely. Apply structural sealant around the penetration starting at the base of the penetration. Tool smooth around the entire circumference of the penetrations, extending a minimum of 75 mm above the roof surface or beyond the point where any mastics or sealants may have been previously applied. Tool the structural sealant smooth to an approximate thickness of 3 mm.
- .4 Do not use any asphalt primer inside the curb area.
- .5 Apply a bead of structural sealant around the base of all penetrations that are inside the curb. Apply additional structural sealant to the penetrations, starting at the base and extending a minimum of 75 mm above the roof or 13 mm above the point where previous sealants may have been installed. Tool smooth, covering the entire circumference of the penetrations.
- .6 Hold the curved section of the curb “flat side up” and apply a 6 mm bead of structural sealant to the entire bottom perimeter and an additional bead down the center of the curb section. Structural sealant shall also be applied to the scarf joints. Place the freshly treated section into place on the prepared surface and press down firmly.
- .7 Apply structural sealant to the second section (or succeeding sections for large curbs) as described above. Press the sections together and down firmly. Apply additional structural sealant to any voids. Neatly tool any excess that extrudes from the scarf joints.
- .8 When the entire curb is assembled, and pressed into place, apply a 6 mm round continuous bead of structural sealant around the outside base of the curb. All joints and seals shall be tooled to a smooth finish. Apply a thin bead of structural sealant to the outside of the curb and tool smooth. An additional bead of pourable sealer should be applied over the structural sealant to ensure proper granule adhesion.
- .9 Maintain 50 mm depth of the sealer inside the entire curb. On pipes extending through a vertical wall, apply the external bead of structural sealant around the outside base perimeter and tool it quickly.
- .10 Fill the entire curb with sealant specified by curb manufacturer. Hand tool the sealant to a metal smooth finish flush with the top of the curb.

3.21 INSULATION AND BALLAST

- .1 Install insulation to thickness as required within the specification and shown on the drawings.
- .2 Lay insulation loose laid in parallel courses with long joints running with the drainage plane. Stagger end joints. Lay board with moderate contact without forcing joints. Bevel as required and cut to fit cants and projections.
- .3 Cover entire insulation area with filter fabric, cut to fit projections and lapped a minimum of 300 mm at all lap joints. Lay fully flat without wrinkles and extend up all flashing locations a minimum of 100 mm.
- .4 Apply ballast over the installed insulation.
- .5 Rake surfaces to remove all uneven areas and to remove any debris or other deleterious materials.

3.22 CONCRETE PAVERS

- .1 Install concrete pavers where shown to requirements of Summary of Work, drawings and details, matching existing patterns, compaction, and levelling including at drain grates and adjacent concrete curbs.
- .2 Concrete pavers: To CSA A231.1, 600 x 600 x 50 mm thick of sizes indicated natural, air entrained precast concrete paving slabs having non-slip finish with 51 mm plain margin around perimeter.

3.23 LIQUID MEMBRANE FLASHING

- .1 Using a slow-speed mechanical agitator, thoroughly mix the entire container of resin for two minutes before the addition of catalyst. Pour the resin into a second container if you make a batch mix. Add pre-measured catalyst to the resin component according to the amounts indicated in manufacturer's Catalyst Mixing Chart. Add catalyst only to the amount of material that can be used within 10 to 15 minutes. Stir again for two minutes before applying.
- .2 Apply the first resin layer to the substrate using rollers, brushes or notched squeegees provided for this purpose. The thickness of the first layer must be 1.3 mm to 1.5 mm when wet.
- .3 Lay out the polyester reinforcement on the resin to prevent the formation of wrinkles, swellings or fishmouths.
- .4 Use rollers, brushes or notched squeegees in order to fully saturate resin reinforcement and remove wrinkles and air bubbles under the reinforcement. The appearance of the reinforcement should be slightly opaque without any white trace. It is important to correct these defaults before the resin cures.
- .5 Apply the second resin layer on top of the reinforcement using rollers, brushes or notched squeegees provided for this purpose. The second layer thickness must be 0.6 mm to 0.7 mm when wet.

- .6 Excess resin which is not absorbed should be used to saturate adjacent reinforcement.
- .7 The final resin coating should be smooth and even.
- .8 Each reinforcement shall overlap the previous one by 50 mm laterally and by 100 mm at the ends.

3.24 LIGHTNING PROTECTION

- .1 Reinstall lightning protection system in strict accordance with CAN/CSA B72-M87 Installation Code for Lightning Protection Systems.
- .2 Install conductor fasteners to fasten down conductor at intervals not to exceed 915 mm on centre. Adhere conductor fastener onto the membrane surface of the roof. Use liquid membrane as recommended by membrane manufacturer.
- .3 Remove and discard all components damaged during roofing operations and replace with new copper/brass base plates, anchorage, straps, rods and connectors as required.
- .4 Provide copy of certification of compliance by a licensed Lightning Protection applicator prior to contract close-out.

3.25 CLEAN UP

- .1 At all times, keep the premises free from accumulation of waste materials or rubbish. Stock piling of debris on the roof will not be permitted.
- .2 Repair defects in surface and bitumen runs with granules to match existing to leave the roof in an even consistent finish.
- .3 Leave roof clear of debris and bitumen left by spills and machine tracking.
- .4 Leave grounds and building free of debris and bitumen spread by pedestrian traffic where applicable.
- .5 Clean surfaces and penetrations of all contaminants and touch up to the satisfaction of the Owner. Include rooftop equipment, curbs, soil stacks, sleeves, gas lines, vents, drains and ladders.
- .6 Check drains to ensure they are functional and where required remove all debris by vacuum.
- .7 At the completion of the work remove all rubbish, tools, equipment and surplus materials.
- .8 Be responsible to repair and pay all costs and fees required to rectify damage caused by work of the Contract with materials and finish to match original.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 06 10 53 – Miscellaneous Rough Carpentry.
- .2 Section 07 52 00 – Modified Bituminous Membrane Roofing.
- .3 Section 07 92 00 – Joint Sealants.

1.2 REFERENCE STANDARDS

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A240/A240M-16, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - .2 ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .3 ASTM D523-14, Standard Test Method for Specular Gloss.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA A123.22-08(2013), Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 - .2 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.108-M89, Bituminous Solvent Type Paint.
- .4 Canadian Roofing Contractors Association (CRCA)
 - .1 Roofing Specifications Manual 2012.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS 2015)
 - .1 Safety Data Sheets (SDS).
- .6 Sheet Metal and Air Conditioning Contractors Association of North America (SMACNA)
 - .1 Architectural Sheet Metal Manual – 2012.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit to the Consultant a list of materials intended for use before they are ordered.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature including product specifications and technical data sheets for sheet metal flashing fasteners

and accessory materials. Include product characteristics, performance criteria, physical size, finish and limitation.

- .2 Submit copies of WHMIS 2015 SDS - Safety Data Sheets
- .3 Samples:
 - .1 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, finishes and colours.

1.4 COORDINATION

- .1 Coordinate work of this Section with Related Work specified in other Sections to ensure construction schedule is maintained and watertightness and protection of the building and finished work is maintained at all times.

1.5 EXAMINATION

- .1 Do not commence work until surface to be covered has been inspected.
- .2 Inspect work and advise the Consultant of conditions that would adversely affect the work of this trade.
- .3 Commencement of work is proof that the Contractor has accepted surfaces as satisfactory for intended operations and accepts responsibility for appearances and performance of completed work.
- .4 Repair damaged and inferior work caused by work of this Contract with materials and finish to match original to the Consultant's approval.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS 2015) regarding use, handling, storage, and disposal of materials.
- .3 Manufacturer's recommendations for handling and storing products are to be considered a minimum requirement.
- .4 Materials shall be delivered to the site, undamaged and in their original packages, with manufacturer's labels visible, attesting to their conformity to specific standards.

Part 2 Products

2.1 GENERAL

- .1 All standards, regulations and specifications listed herein are considered to be the latest available edition.

- .2 Compatibility between materials is essential. Use only materials that are known to be compatible when incorporated in a completed assembly.

2.2 PREFINISHED SHEET METAL FLASHING

- .1 Pre-finished metal flashings: As shown on drawings, fabricate from 0.65 mm (24 ga.) steel to ASTM A653 Grade 230 with G90 zinc coating. Surface with Perspectra Series baked enamel finish. Colour to match existing from manufacturer's standard colour range.

2.3 ACCESSORIES

- .1 Metal cleat: Same material as metal flashings, 50 mm wide @ 600 mm c/c.
- .2 Continuous metal starter strip: 0.71 mm (24 ga.) galvanized steel, secured at 400 mm c/c.
- .3 Use galvanized, copper, aluminum or stainless steel nails or screws as most compatible with materials and preservatives being utilized.
- .4 Nails: Annular threaded nails of length to penetrate into bases minimum 25 mm. No. 8 screws to penetrate wood 19 mm at 600 mm c/c.
- .5 Masonry fasteners: Tapcon, Permagrip or Tapgrip or Rawl. Spike sized to penetrate concrete 38 mm minimum as specified or shown.
- .6 Exposed fasteners: Where exposed fasteners are specified or as shown, use #10 screws with metal and neoprene washers pre-finished to match colour of flashing. Alternatively, use screws with colour match nylon caps where shown or approved by the Consultant.
- .7 Screws for starter strips and fascia: #8 @ 400 mm c/c.
- .8 Sealant: Refer to Drawings and Section 07 92 00 – Joint Sealants.
- .9 Self-adhered membrane: To CSA A123.22, self-adhering membrane consisting of SBS rubberized asphalt compound laminated to a polyethylene film. Minimum thickness 1 mm.
- .10 Touch-up paint: As recommended by prefinished material manufacturer.

2.4 FABRICATION

- .1 Fabricate metal flashings and other sheet metal work in accordance with applicable details, as indicated. Where not indicated, follow applicable CRCA 'FL' series details and SMACNA architectural details.
- .2 Metal shall be formed on a bending brake, shaping trimmed and hard seaming shall be done on bench, as far as practicable, with proper sheet metal working tools. Angles of bends and folds for interlocking metal shall be made with full regard to expansion and contraction to avoid buckling and to avoid damaging metal surfaces.

- .3 Fabricate all possible work in shop in maximum 2400 mm lengths by brake forming, bench cutting, drilling and shaping. Match existing profiles where metal flashing is to be repaired.
- .4 Hem exposed edges on underside 13 mm. Mitre and seal corners with sealant.
- .5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .6 Dry joints are to be tight but not dented so as to permit slight adjustments of sheets and yet remain watertight.
- .7 Lock seams at all corners.
- .8 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.
- .9 Supply all accessories required for installation of sheet metal work of this Section. Fabricate accessories of same material to which they will be used.

2.5 REGLETS AND SCUPPERS

- .1 Form reglet and scupper flashings from same material as other metal flashings, unless otherwise indicated.
- .2 Scupper to have minimum 125 mm roof flange and gravel guard to Consultant's approval. Make all seams continuous and watertight by soldering or heat welding.
- .3 Scupper to have a minimum width of 200 mm to allow proper drainage.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: Comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 SHEET METAL FLASHING INSTALLATION

- .1 Install sheet metal flashings at copings, walls, expansion joints, roof openings and other components required to protect the membrane flashings as shown on the drawings or otherwise required. Where not indicated, follow applicable CRCA 'FL' series details.
- .2 Install continuous concealed starter strips at all exterior faces. Install cleats between lock joints and as indicated to permanently hold flashing in place. Install hook strip fasteners with 2 fasteners per cleat.

- .3 Sheet metal work shall be installed to cover the entire area it protects and shall be watertight under all service and weather conditions. Install in a uniform manner, true to line, free of dents, warping and distortion.
- .4 Back-paint sheet metal that comes into contact with another kind of metal, masonry or concrete with bituminous paint at the rate of 0.15 L/m².
- .5 Install sheet metal with concealed fasteners at lock joints. Exposed fastening will only be permitted with the approval of the Consultant. When exposed fasteners are shown, space all fasteners evenly in an approved manner. Use lead plugs and screws with neoprene washers where fasteners are exposed, otherwise use concrete drive fasteners where metal flashings are installed over concrete masonry.
- .6 Install weather barrier membrane under sheet metal where indicated.
- .7 Self-Adhered Membrane:
 - .1 Install 1-ply of self-adhered membrane to detail under sheet metal on horizontal or vertical surfaces that are not otherwise covered by membrane flashings.
 - .2 Ensure all surfaces to be covered with self-adhered membrane are complete and free of moisture and contaminants. At temperatures below 5°C (40°F) heat materials to be covered with hot air gun. Store all materials in heated storage above 5°C (40°F) and remove only as much material as can be used before cooling.
 - .3 Prime all surfaces to be covered with self-adhered membrane. Let primer tack dry and complete thumb test to ensure.
 - .4 Remove paper backing and install membrane true to line to completely cover the area intended to be protected to points shown on the drawing.
 - .5 Roll or work material into place by hand to ensure a positive bond.
 - .6 Membrane to be installed without air blisters and wrinkles. Rework, repair or replace all poorly installed membrane. Do not stretch material that would result in pull back and deformity of the membrane at intersections.
 - .7 Lap all side laps 75 mm and end laps 150 mm. Secure all membrane on vertical surface at points of termination at 150 mm c/c.
 - .8 Turn up membrane 150 mm at edge where horizontal surface meets vertical planes.
 - .9 Seal all points of termination at horizontal planes and vertical surfaces with modified sealant. Tool sealant to consistent smooth and even surface.
 - .10 It is recommended that all self-adhering membrane be installed by a team of two workmen. Avoid working in windy conditions or weather that would result in inferior product.
- .8 Join sheet metal by “S” lock seams, to permit thermal movement. Seal all fasteners and completely fill all joints with Type ‘B’ sealant as flashing is being installed. Clean off all excessive visible material subsequent to installation.

- .9 When flashing is being installed in more than one piece, offset joints in adjacent flashings by approximately 50%.
- .10 Form inside and outside corners by means of locked seams. Do not use pop rivets unless accepted by Consultant.
- .11 Slope all metal to interior of roof area to maintain slope, unless otherwise indicated. Do not form open joints or pockets that fail to drain water.
- .12 Where existing reglets are to be re-used, remove existing sealant and re-cut to conform to the size requirements specified herein.

3.3 SCUPPERS

- .1 Install scuppers as indicated with a minimum width of 200 mm.
- .2 Fasten to substrate on three sides and prime surfaces.

3.4 CLEANING

- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment. Remove and replace all sheet metal sections that received surface damage or scratches during fabrication, delivery or installation.
- .2 For scratches and scuffs to be retained in the new installation, use touch up paint recommended by the metal material supplier.
- .3 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 06 10 53 – Miscellaneous Rough Carpentry.
- .2 Section 07 52 00 - Modified Bituminous Membrane Roofing.
- .3 Section 07 62 00 – Sheet Metal Flashing and Trim.
- .4 Section 22 05 11 – Plumbing and Drainage.

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM C920-18, Standard Specification for Elastomeric Joint Sealants.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS 2015)
 - .1 Safety Data Sheets (SDS).

1.3 COORDINATION

- .1 Coordinate work of this Section with Related Work specified in other Sections to ensure construction schedule is maintained and watertightness and protection of the building and finished work is maintained at all times.

1.4 EXAMINATION

- .1 Do not commence work until surface to be covered has been inspected.
- .2 Inspect work and advise the Consultant of conditions that would adversely affect the work of this trade.
- .3 Commencement of work is proof that the Contractor has accepted surfaces as satisfactory for intended operations and accepts responsibility for appearances and performance of completed work.

1.5 DELIVERY, STORAGE AND HANDLING

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

1.6 ENVIRONMENTAL AND SAFETY REQUIREMENTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS 2015) regarding use, handling, storage and disposal of hazardous materials; and regarding labeling and provision of safety data sheets acceptable to Labour Canada.

- .2 Conform to manufacturer's recommended temperatures, relative humidity and substrate moisture content for application and curing of sealants including special conditions governing use.
- .3 In confined spaces provide portable supply of outside air and exhaust fans to ensure fumes will not impact workmen or building occupants.
- .4 Compatibility is essential in use of any materials that will be compatible when incorporated in finished assembly.

Part 2 Products

2.1 MATERIALS

- .1 Sealants acceptable for use on this project must be listed on CGSB Qualified Products List issued by CGSB Qualification Board for Joint Sealants. Where sealants are qualified with primers use only these primers.
- .2 Modified bitumen sealant (Sealant Type 'A'):
 - .1 For penetration and terminations of bituminous and modified bituminous membrane: To CAN/CGSB-37.5. As recommended by membrane manufacturer.
 - .2 Standard of acceptance:
 - .1 Sopramastic 200 by Soprema.
 - .2 MBR Flashing Cement by Johns Manville.
 - .3 Polybitume 570-05 by Henry Bakor.
 - .4 Or accepted alternate.
- .3 Urethanes one part (Sealant Type 'B'):
 - .1 Non-sag: To ASTM C920, Type S, Class 25 or higher, use NT.
 - .2 Standard of acceptance:
 - .1 Tremco Dymonic.
 - .2 BASF NPI.
 - .3 Sika IA.
 - .4 Mulco Flextra.
 - .5 Sherwin-Williams Loxon SI.
 - .6 Or accepted alternate.

Type		Use	Movement Capability Class		
S	Single Component	T	Traffic	Class 100/50	100% expansion
M	Multi-Component	NT	Non-traffic		50% compression
Grade		I	Immersed	Class 50	50%
P	Pourable	M	Mortar	Class 35	35%
NS	Non-sag	G	Glass	Class 25	25%
		O	Other	Class 12.5	12.5%

2.2 JOINT CLEANER

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

2.3 PRIMER

- .1 As recommended by sealant manufacturer for specific substrate adhesion.

Part 3 Execution

3.1 PROTECTION

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

3.2 PREPARATION OF JOINT SURFACES

- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
- .2 Clean bonding joint surfaces of harmful substances including dust, rust, oil, grease and other matter, which may impair work.
- .3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.
- .4 Ensure joint surfaces are dry and frost free.
- .5 Prepare surfaces in accordance with manufacturer's directions.

3.3 APPLICATION

- .1 Sealant - General:
 - .1 Apply sealant when air and substrate temperatures are not forecast to be less than minimum recommended by manufacturer. Do not work during inclement weather. Perform all work in accordance with manufacturer's written instructions.
 - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
 - .3 Apply sealant in continuous beads.
 - .4 Apply sealant using gun with proper size nozzle.
 - .5 Use sufficient pressure to fill voids and joints solid.
 - .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets and embedded impurities.
 - .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
 - .8 Remove excess compound promptly as work progresses and upon completion.

- .9 The use of liquid tooling aids, such as soapy water or alcohols, are prohibited as they may impact effective sealant cure, adhesion and potentially cause aesthetic issues.
- .2 Sealant Type 'A':
 - .1 Install sealant Type 'A' to the top of membrane flashings where required or as shown on drawings. Modified sealant to be installed around finished flashings at all protrusions including soil stacks, sleeves, pitch boxes and fasteners securing membrane to walls.
 - .2 Apply sealant Type 'A' with hand trowel to achieve a 25 mm width and minimum 3 mm thickness.
 - .3 Apply sealant Type 'A' immediately after flashings have been installed and are still warm. No membrane flashings shall be left uncovered at the end of any work period. *(Non-compliance with this mandate may result in rejection, removal and replacement of the membrane flashings to the affected area).*
 - .4 Trowel sealant Type 'A' in two directions to ensure proper adhesion to substrate and that all surface irregularities are filled. Tool surface of modified sealant to smooth finish.
 - .5 Install sealant Type 'A' at the underside of drains, metal sleeves and other location where specified on drawings.
- .3 Curing:
 - .1 Cure sealants in accordance with sealant manufacturer's instructions.
 - .2 Do not cover up sealants until proper curing has taken place.
- .4 Install sealant Type 'B' at sheet metal terminations.
- .5 Install sealant Type 'C' at all B-vent collars and at all high temperature locations.

3.4 CLEANING

- .1 Clean adjacent surfaces immediately and leave work neat and clean.
- .2 Remove excess droppings using recommended cleaners as work progresses.
- .3 Remove masking tape after initial set of sealant.
- .4 Clean all contaminated surfaces to Owner's acceptance.
- .5 Remove all rubbish and surplus materials from the job site on a daily basis.

3.5 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by joint sealants installation.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 06 10 53 – Miscellaneous Rough Carpentry.
- .2 Section 07 52 00 - Modified Bituminous Membrane Roofing.
- .3 Section 07 92 00 – Joint Sealants.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM B42-10, Standard Specification for Seamless Copper Pipe, Standard Sizes.
 - .2 ASTM C547-12. Standard Specification for Mineral Fiber Pipe Insulation.
- .2 American Water Works Association (AWWA).
 - .1 ANSI/AWWA C110/A21.10-08, American National Standard for Ductile-Iron and Gray-Iron Fittings for Water.
 - .2 ANSI/AWWA C111/A21.11-12, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .3 Cast Iron Soil Pipe Institute (CISPI)
 - .1 CISPI 310-12, Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
- .4 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-B70-12, Cast Iron Soil Pipe, Fittings, and Means of Joining.
 - .2 CSA B79-08 (R2013), Commercial and residential drains and cleanouts.
 - .3 CAN/CSA B1800-11, Thermoplastic Nonpressure Piping Compendium.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS 2015)
 - .1 Safety Data Sheets (SDS).

1.3 SUBMITTAL / APPROVAL

- .1 Do not commence work until satisfactory installation of related work has been completed and approved.
- .2 Inspect work and advise Consultant of conditions that would adversely affect the work of this trade.
- .3 Commencement of work is proof that the Contractor has accepted surfaces as satisfactory for intended operations and accepted responsibility for appearance and performance of completed work.

- .4 Defective work resulting from work on unsatisfactory surfaces will be considered the responsibility of those performing the work of this Section.
- .5 Repair damage and inferior work caused by the work of this Contract with materials and finish to match the original to Consultant's approval.
- .6 Submit to the Consultant a list of materials intended for use before they are ordered.
- .7 Provide samples of material without additional cost, to the Consultant for review as requested.

1.4 QUALITY ASSURANCE

- .1 All drain installations, including insert type drains, shall be completed by plumbing subtrades licensed to undertake plumbing work in Ontario.
- .2 Equipment and materials must be new and free of imperfections.

Part 2 Products

2.1 MATERIALS

- .1 All standards, regulations and specifications listed herein are considered to be the latest available edition.
- .2 Compatibility between materials is essential. Use only materials that are known to be compatible when incorporated in a completed assembly.
- .3 Copper roof drains: Soldered copper body with flat hub. Provide appropriate bearing pans, under deck clamping and hardware, as required. For inverted roof drains, use a straight exit and include a stainless steel ballast guard, complete with welded connectors to ensure guard perimeter is suitable for clamping ring diameter and 200 mm in height.
 - .1 At existing drain locations: Insert type drain with soldered copper leader and large flange, internal clamping ring, depressed receiving area, and copper or aluminum basket. Diameter to suit existing drain leader.
 - .1 Standard of acceptance:
 - .1 OMG Copper Hercules.
 - .2 Model RD-4C-RR by Thaler Metal Industries Inc.
 - .3 Ultra Mek Dome by Les Produits Murphco Ltée.
 - .4 Or accepted alternate.
 - .2 Drain connector:
 - .1 Connection to be a mechanically tightened expanding rubber anti-backflow connector.
 - .2 Standard of acceptance:
 - .1 U-Flow Connector by U-Flow Inc.

- .2 Or accepted alternate.
- .1 **Cast Iron Roof Drains:** IRMA roof drain with promenade top. Cast iron roof drain with flashing clamp, 102 mm (4") stainless steel perforated extension, square epoxy coated ductile iron heel proof promenade top, and no hub (standard) outlet.
 - .1 Acceptable product: Watts Drain RD-100-CP-85.
- .2 Provide control flow weir at all drains unless otherwise indicated. Weir to be supplied by drain manufacturer.
- .3 Mechanical joints for drain pipe: Neoprene or butyl rubber gasket with stainless steel clamp type joint to CISPI 310-12.
- .4 Fittings: Iron fittings for cast iron or ductile-iron water pipes shall conform to ANSI/AWWA C110/A21.10, 75 mm through 1200 mm, for water and other liquids.
- .5 Rubber gasket joints: For cast iron and ductile-iron pressure pipe for water piping shall conform to ANSI/AWWA C111/A21.11. For connection of copper drain pipe to cast iron drain pipe use 975 mm x 100 mm rubber gasket.
- .6 Downpipe clamp: 1.21 mm (18 ga.) galvanized 2-hole clamp. Profile to suit pipe and size.
- .7 Insulation for pipes: 25 mm thick performed type mineral fibre insulation to ASTM C547.
 - .1 Standard of acceptance:
 - .1 Roxul Tecton 1200 or SSL II Fiberglas by Owens Corning.
 - .2 Or accepted alternate.
- .8 Insulation for underside of drain: 2-component, 1 kg density polyurethane foam as detailed.

Part 3 Execution

3.1 PREPARATION

- .1 Inspect surfaces and ensure that:
 - .1 Roof deck is level or sloped to provide proper and complete drainage from the roofing system in conformity to design intent.
 - .2 Existing pipe hangers are in adequate condition to independently support distribution pipes, prior to disconnection of any drains at roof level.
 - .3 Roof drains are set at a level to allow for positive drainage and are connected or capped.
 - .4 Plumbing is accessible and work can be completed as specified. Notify Consultant of any adverse conditions.
 - .5 Existing roof drains are open and functioning properly.

- .2 Contractor shall advise Consultant in the event that the existing system or materials do not meet current code requirements.
- .3 Unless indicated otherwise, the plumbing sub-trade shall be responsible for the removal and reinstatement of furniture, plants and interior equipment, excluding computers, monitors, copiers and the like.
- .4 Contractor to provide interior protection to all areas where plumbing work is being completed. Provide sufficient dust and debris protection for the temporary removal of ceiling tiles, and include for any supplemental clean up to return interiors to pre-construction conditions.
- .5 Remove all ceiling panels and plaster finish to provide access to the work. Re-install and make good all existing finishes to match original materials and conditions. Repainting of surfaces shall include all ceiling all wall areas up to a break in plane, unless otherwise indicated on drawings.
- .6 Remove and discard all existing drains and plumbing not designated for re-use. Notify Owner of any hazardous materials encountered.

3.2 ROOF DRAINS AT EXISTING DRAIN LOCATIONS

- .1 Install new drains at existing drain locations to requirements of Summary of Work, drawings and details. Drains to be connected as shown. Size drains to properly fit existing rainwater leader.
- .2 Where shown, leave existing drain bowls in place, ensuring existing drainage pipe, interior insulation and surfaces are not disturbed or damaged during installation.
- .3 Remove bitumen or other debris from surfaces that could interfere with installation and advise Consultant of any abnormalities.
- .4 Repair any damaged or disturbed surfaces as required to match existing materials and finishes.
- .5 Subsequent to installation, tighten mechanical coupling to manufacturer's requirements to provide a permanent gas and watertight seal.

3.3 CONNECTING TO EXISTING DRAINS

- .1 Remove existing drains to below deck level. Ensure existing drainage pipe and insulation is left undamaged during removal. Repair existing materials to original condition.
- .2 Connect new drainage pipe to existing drain pipe by means of mechanical couplings as specified.

3.4 PLUMBING VENT MODIFICATIONS

- .1 Cut down or extend existing soil stacks to a minimum height of 300 mm above finished roof surface. Extensions to match existing material and connections to be made with mechanical joint couplings.

3.5 PIPING TEST

- .1 Perform water tests before restoring interior ceilings and finishes.
- .2 Install plumbing line plugs below the level of connection and water test new plumbing installation. Correct all leaks.
- .3 Make leaks watertight while systems are still under test. If this is impossible, remove and refit defective parts. Caulking of threaded joints will not be permitted.
- .4 After leaks have been repaired, repeat tests as often as necessary to obtain approval and to ensure watertightness of each system.
- .5 Correct level of drains or pipes, if roof or pipes hold water.

3.6 FINISH

- .1 Reset existing ceiling finishes removed to execute work of this Contract.
- .2 Restore and repair all existing surfaces affected by the work to match existing materials and finish.
- .3 Re-paint entire ceiling or walls where it is required to make patching work un-disguisable with existing surfaces.

END OF SECTION