

SPECIFICATIONS FOR

ROOF REPLACEMENT AND
LIFT SHAFT CONSTRUCTION

LINKLATER PUBLIC SCHOOL

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END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 04 05 13 – Masonry Mortar and Grouting.

1.2 REFERENCE STANDARDS

- .1 CSA Group
 - .1 CAN/CSA-A165 Series-14, CSA Standards on Concrete Masonry Units (Consists of A165.1, A165.2 and A165.3).
 - .2 CAN/CSA-A179-14, Mortar and Grout for Unit Masonry.
 - .3 CAN/CSA-A371-14, Masonry Construction for Buildings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for masonry, mortar, grout and accessories, including product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS 2015 SDS.
- .3 Samples:
 - .1 Provide samples as follows:
 - .1 Six (6) of each type of each masonry unit specified to be exposed in final assembly.
 - .2 Two (2) cured samples of mortar and grout illustrating mortar colour and colour range, supplemented with specific requirements in Section 04 05 12.
 - .3 Two (2) of each type of masonry accessory and flashing specified, supplemented by specific requirements in Section 04 05 23.
 - .4 Two (2) of each type of masonry anchorage, reinforcement and connector proposed for use, supplemented by specific requirements in Section 04 05 19.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit manufacturer's instructions for care, cleaning and maintenance of prefaced masonry units for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and 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 in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect packages from nicks, scratches, and blemishes
 - .3 Keep materials dry until use.
 - .4 Replace defective or damaged materials with new.

1.6 SITE CONDITIONS

- .1 Ambient Conditions: assemble and erect components when temperatures are above 4°C.
- .2 Cold weather requirements to CAN/CSA-A371 with following requirements:
 - .1 Maintain temperature of mortar between 5 degrees C and 50 degrees C until batch is used or becomes stable.
 - .2 Maintain ambient temperature of masonry work and its constituent materials between 5 degrees C and 50 degrees C and protect site from windchill.
 - .3 Maintain temperature of masonry above 0 degrees C for minimum of seven (7) days, after mortar is installed.
 - .4 Preheat unheated wall sections in enclosure for minimum 72 hours above 10 degrees C, before applying mortar.
- .3 Hot weather requirements to CAN/CSA-A371 with the following requirements:
 - .1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.
 - .2 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashings or other permanent construction.

1.7 WARRANTY

- .1 For Work in this Section 04 05 00 - Common Work Results for Masonry, 12 months warranty period is extended to 24 months.

Part 2 Products

2.1 MATERIALS

- .1 Masonry materials are specified elsewhere in related Sections:
 - .1 Section 04 05 13 - Masonry Mortar and Grouting.

Part 3 Execution

3.1 INSTALLERS

- .1 Experienced and qualified masons to carry out erection, assembly, installation and repair of masonry work.

3.2 EXAMINATION

- .1 Examine conditions, substrates and work to receive work of this Section.
 - .1 Co-ordinate with Section 01 71 00 - Examination and Preparation.
- .2 Examine openings to receive masonry units. Verify opening size, location, and that opening is square and plumb, and ready to receive work of this Section.
 - .1 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .2 Proceed with installation after unacceptable conditions have been remedied and after receipt of written approval from Consultant.
- .3 Verification of Conditions:
 - .1 Verify that:
 - .1 Substrate conditions which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions prior to installation of concrete block.
 - .2 Site conditions are acceptable and are ready to receive work.
 - .3 Built-in items are in proper location, and ready for roughing into masonry work.
 - .2 Commencing installation means acceptance of existing substrates.

3.3 PREPARATION

- .1 Prepare surface in accordance with manufacturer's written recommendations and co-ordinate with Section 01 71 00 - Examination and Preparation.
- .2 Establish and protect lines, levels, and coursing.
- .3 Protect adjacent materials from damage and disfiguration.

3.4 INSTALLATION

- .1 Do masonry work in accordance with CAN/CSA-A371 except where specified otherwise.
- .2 Build masonry plumb, level, and true to line, with vertical joints in alignment, respecting construction tolerances permitted by CAN/CSA-A371.
- .3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

3.5 CONSTRUCTION

- .1 Exposed masonry:
 - .1 Remove chipped, cracked, and otherwise damaged units, in accordance with CAN/CSA-A165, in exposed masonry and replace with undamaged units.
- .2 Jointing:
 - .1 Allow joints to set just enough to remove excess water, then tool with round jointer to provide smooth, joints true to line, compressed, uniformly concave joints where exposed and flush joints where concealed.
 - .2 All joints shall be fully mortared, head and bed joints having thickness of 10mm.
- .3 Cutting:
 - .1 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects.
 - .2 Make cuts straight, clean, and free from uneven edges.
- .4 Building-In:
 - .1 Build in items required built into masonry.
 - .2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
 - .3 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.
- .5 Support of loads:
 - .1 Use grout to CAN/CSA-A179 where grout is used instead of solid units.
 - .2 Install building paper or fill voids in existing concrete masonry units below voids to be filled with grout; keep paper 25 mm back from faces of units.
 - .3 Support top of all masonry walls as indicated.
- .6 Loose steel lintels:
 - .1 Install loose steel lintels. Center over opening width.
- .7 Control joints:
 - .1 Construct continuous control joints as indicated.
- .8 Movement joints:
 - .1 Unless noted otherwise, provide vertical movement joints at maximum spacing of 15.0 m and 7.5 m from corners. Locations of movements joints shall be approved by the engineer.
 - .2 Where vertical movements joints are noted on drawings, carry the horizontal reinforcement in the bond beams through the movement joints. Joint reinforcement shall be terminated.
- .9 Interface with other work:
 - .1 Cut openings in existing work as indicated.

- .2 Make good existing work. Use materials to match existing.
- .3 Unless noted otherwise, provide minimum 25mm deflection gap at top of all non-loadbearing masonry walls.

3.6 SITE TOLERANCES

- .1 Tolerances in notes to CAN/CSA-A371 apply.

3.7 SITE QUALITY CONTROL

- .1 Site Tests, Inspection:
 - .1 Perform site inspection and testing in accordance with Section 01 45 00 - Quality Control.

3.8 CLEANING

- .1 Progress Cleaning: Clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.

3.9 PROTECTION

- .1 Protect masonry during construction in accordance with CAN/CSA-A371.
- .2 Temporary Bracing:
 - .1 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.
 - .2 Bracing approved by Consultant.
 - .3 Brace masonry walls as necessary to resist wind pressure and lateral forces during construction.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 04 21 13 - Brick Masonry.

1.2 REFERENCE STANDARDS

- .1 CSA Group
 - .1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CAN/CSA-A179-14, Mortar and Grout for Unit Masonry.
 - .3 CAN/CSA-A371-14, Masonry Construction for Buildings.
 - .4 CAN/CSA-A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .2 International Masonry Industry All-Weather Council (IMIAC)
 - .1 Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for masonry mortar and grout and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements. Indicate VOC's mortar, grout, parging, additives and admixtures. Expressed as grams per litre (g/L).
- .3 Samples:
 - .1 Samples: submit unit samples in accordance with Section 04 05 00 - Common Work Results for Masonry, supplemented as follows:
 - .1 Submit two mortar.
 - .2 Submit confirmation of source or product data sheet samples, prior to mixing or preparation of mortars, to Consultant of:
 - .1 Aggregate: sand.
 - .2 Cement.
 - .3 Lime.
- .4 Manufacturers' Instructions: submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties.

- .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.

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 in dry location off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect masonry mortar and grout packages from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.6 SITE CONDITIONS

- .1 Ambient Conditions: maintain materials and surrounding air temperature to:
 - .1 Minimum 5°C prior to, during, and 48 hours after completion of masonry work.
 - .2 Maximum 32°C prior to, during, and 48 hours after completion of masonry work.
- .2 Weather Requirements: CAN/CSA-A371.

Part 2 Products

2.1 MATERIALS

- .1 Use same brands of materials and source of aggregate for entire project.
- .2 Cement:
 - .1 Portland Cement: to CAN/CSA-A3000, white Type GU - General use hydraulic cement (Type 10).
 - .2 Mortar Cement: to CAN/CSA-A3002 and CAN/CSA-A179, Type N.
 - .3 Packaged Dry Combined Materials for mortar: to CAN/CSA-A179, Type N, using cement.
- .3 Aggregate: supplied by one supplier.
 - .1 Fine Aggregate: to CAN/CSA-A179, natural sand. Pea gravel concrete.

- .4 Water: clean and potable.
- .5 Polymer Latex: organic polymer latex admixture of butadiene-styrene type non-emulsifiable bonding admixture.

2.2 MORTAR MIXES

- .1 Mortar for exterior masonry above grade:
 - .1 Non-Load Bearing: N based on proportion specifications.
- .2 Mortar for Parapet walls, chimneys, unprotected walls: type N based on proportion specifications to CAN/CSA-A179.
- .3 Mortar for structural masonry elements: type S based on proportion specifications to CAN/CSA-A179.
- .4 Parging Mortar: type N, to match masonry mortar.
- .5 Calcium Chloride in any form is not permitted in mortar or grout.

2.3 MORTAR MIXING

- .1 Use pre-blended, mortar prepackaged under controlled factory conditions. Ingredients batching limitations to within 1% accuracy.
- .2 Mix mortar ingredients in accordance with CAN/CSA-A179 in quantities needed for immediate use.
- .3 Maintain sand uniformly damp immediately before mixing process.
- .4 Using anti-freeze compounds including calcium chloride or chloride based compounds is prohibited.
- .5 Use a batch type mixer in accordance with CAN/CSA-A179.
- .6 Pointing mortar: prehydrate pointing mortar by mixing ingredients dry, then mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into ball. Allow to stand for not less than 1 hour no more than 2 hours then remix with sufficient water to produce mortar of proper consistency for pointing.
- .7 Re-temper mortar only within two hours of mixing, when water is lost by evaporation.
- .8 Use mortar within 2 hours after mixing at temperatures of 32°C, or 2-1/2 hours at temperatures under 5°C.

2.1 GROUT MIXES

- .1 Bond Beams: grout mix 10 to 12.5 MPa strength at 28 days; 200-250 mm slump; premixed type in accordance with CSA A23.1/A23.2 conforming to CAN/CSA-A179, pea gravel concrete.

- .2 Grout: Minimum compressive strength of 12.5 MPa at 28 days. Maximum aggregate size and grout slump: CAN/CSA-A179.

2.2 GROUT MIXING

- .1 Mix batched and delivered grout in accordance with CSA A23.1/A23.2 transit mixed.
- .2 Mix grout ingredients in quantities needed for immediate use in accordance with CAN/CSA-A179 fine coarse grout.
- .3 Add admixtures in accordance with manufacturer's instructions; mix uniformly.
- .4 Using calcium chloride or chloride based admixtures is prohibited.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for masonry 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.

3.2 PREPARATION

- .1 Apply bonding agent to existing concrete surfaces.

3.3 CONSTRUCTION

- .1 Do masonry mortar and grout work in accordance with CAN/CSA-A179 except where specified otherwise.
- .2 Apply parging in uniform coating not less than 10 mm thick.

3.4 MIXING

- .1 Pointing mortar can be mixed using a regular paddle mixer. Only electric motor mixers are permissible. Mixers run on hydrocarbons are not permitted, due to fumes. Mixing by hand pre-approved by Consultant.
- .2 Clean mixing boards and mechanical mixing machine between batches.
- .3 Mortar: weaker than units it is binding.

- .4 Contractor to appoint one individual to mix mortar, for duration of project. In event that this individual is changed, mortar mixing must cease until new individual is trained, and mortar mix is tested.

3.5 MORTAR PLACEMENT

- .1 Install mortar to manufacturer's instructions.
- .2 Install mortar to requirements of CAN/CSA-A179.

3.6 FIELD QUALITY CONTROL

- .1 Site Tests, Inspection: as follows:
 - .1 Test and evaluate mortar during construction in accordance with CAN/CSA-A179.

3.7 GROUT PLACEMENT

- .1 Notify Consultant minimum 24 hours prior to grout placement.
- .2 Install grout in accordance with manufacturer's instructions.
- .3 Install grout in accordance with CAN/CSA-A179.
- .4 Work grout into masonry cores and cavities to eliminate voids. Cores indicated to be fully grouted are to be kept clear of mortar and other materials.
- .5 Place grout in lifts not exceeding 1.5 m in height. If clean-outs are provided, maximum pour height shall be 3.0 m.
- .6 Displacing reinforcement while placing grout is prohibited.
- .7 Consolidate grout by puddling or vibration.
- .8 Grout all cores containing vertical and horizontal reinforcing, anchor bolts, dowels and other masonry connectors.
- .9 Fully grout bond beams. Grout solid all parapets.

3.8 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Remove droppings and splashings using clean sponge and water.
- .3 Clean masonry with low pressure clean water and soft natural bristle brush.
- .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.9 PROTECTION

- .1 Cover completed and partially completed work not enclosed or sheltered with waterproof covering at end of each work day. Anchor securely in position.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 Canadian Standards Association (CSA)
 - .1 CSA A23.1/A23.2-14 (R2015), Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CAN/CSA-A179-14, Mortar and Grout for Unit Masonry.
 - .3 CAN/CSA-A370-14, Connectors for Masonry.
 - .4 CAN/CSA-A371-14, Masonry Construction for Buildings.
 - .5 CSA G30.18-09 (R2014), Carbon Steel Bars for Concrete Reinforcement.
 - .6 CSA S304-14(R2015), Design of Masonry Structures.
 - .7 CSA W186-M1990(R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .2 Reinforcing Steel Institute of Canada (RSIC)
 - .1 Reinforcing Steel Manual of Standard Practice, 2004.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for anchorage and reinforcing materials and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Samples:
 - .1 Submit two (2) samples of masonry ties.
- .4 Manufacturers' Instructions: submit manufacturer's installation instructions.

1.3 QUALITY ASSURANCE

- .1 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.

1.4 SITE MEASUREMENTS

- .1 Make site measurements necessary for proper fit of members.

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 in dry location off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect anchorage and reinforcing materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

- .1 Connectors: to CAN/CSA-A370 and CSA S304.1.
- .2 Corrosion protection: to galvanized to CSA S304.1 and CAN/CSA-A370.
- .3 Fasteners: installed post-construction:
 - .1 Bolts and Screws: size and type to suit application, locate where indicated.
 - .2 Adhesives: epoxies, mastics and contact cements for fastening applications, use in accordance with manufacturers' recommendations.
- .4 Masonry reinforcement shall conform to the following:
 - .1 Steel reinforcing to CSA G30.18, Grade 400W MPa.
 - .2 Joint reinforcement to ASTM A951, steel wire for masonry joint reinforcement.
- .5 Joint reinforcement: ladder type steel wire, hot dip galvanized after fabrication, 3.8mm diameter spaced at 400 mm.
- .6 Anchors: to CAN/CSA-A370:
 - .1 Wedge Anchors: expansion anchors type wedge and bolt, sized to suit application.
- .7 Adhesive Anchors: proprietary systems, pre-mixed, self-contained system with double glass vial system to contain epoxy, consisting of resin, hardener and aggregate measure and mix system where epoxy materials are hand-measured and mixed in accordance with manufacturers' written instructions.

2.2 FABRICATION

- .1 Fabricate connectors in accordance with CAN/CSA-A370.
- .2 Ship connectors, clearly identified in accordance with drawings.

2.3 SOURCE QUALITY CONTROL

- .1 Upon request inform Consultant of proposed source of supplied material.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for anchorage and reinforcing materials 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 remedied and after receipt of written approval to proceed from Consultant.

3.2 PREPARATION

- .1 Direct and coordinate placement of metal anchors for masonry supplied to other Sections.

3.3 INSTALLATION

- .1 Supply and install masonry connectors and reinforcement in accordance with CAN/CSA-A370, CAN/CSA-A371, CSA A23.1/A23.2 and CSA S304.1 unless indicated otherwise.
- .2 Prior to placing mortar, obtain Consultant's approval of placement of reinforcement and connectors.

3.4 BONDING AND TYING

- .1 Tie masonry veneer to backing in accordance with National Building Code of Canada (NBC), CSA S304.1, CAN/CSA-A371 and as indicated.

3.5 ANCHORS

- .1 Supply and install metal anchors in accordance with CAN/CSA-A370 and CAN/CSA-A371 as indicated.

3.6 LATERAL SUPPORT AND ANCHORAGE

- .1 Supply and install lateral support and anchorage in accordance with CSA S304.1 and as indicated.

3.7 MOVEMENT JOINTS

- .1 Reinforcement not continuous across movement joints unless otherwise indicated.

3.8 FIELD BENDING

- .1 Do not field bend reinforcement and connectors except where indicated or authorized by Consultant.
- .2 When field bending authorized, bend without heat, applying slow and steady pressure.
- .3 Replace bars and connectors with cracks or splits.

3.9 FIELD QUALITY CONTROL

- .1 Obtain Consultant approval of placement of reinforcement and connectors, prior to placing mortar.

3.10 FIELD TOUCH-UP

- .1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcement steel and connectors with compatible finish to provide continuous coating.

3.11 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management:
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 04 05 00 – Common Work Results for Masonry.
- .2 Section 04 05 13 – Masonry Mortar and Grouting.
- .3 Section 04 05 23 – Masonry Accessories.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A165 Series-04 (R2014), CSA Standards on Concrete Masonry Units.
 - .2 CAN/CSA A371-04 (R2014), Masonry Construction for Buildings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00.
- .2 Product Data:
 - .1 Product Data: provide product data, including manufacturer's printed data sheets and catalog pages illustrating products to be incorporated into project for specified products.
- .3 Manufacturer's Written Instructions: provide in accordance with Section 04 05 00.

1.4 QUALITY ASSURANCE SUBMITTALS

- .1 Certificates: provide in accordance with Section 04 05 00.
- .2 Test and Evaluation Reports: provide certified test reports in accordance with Section 04 05 00.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle concrete unit masonry in accordance with Section 01 61 00 and 04 05 00.

Part 2 PRODUCTS

2.1 MATERIALS

- .1 Standard concrete block units: Type A, normal weight: to CAN/CSA-A165 Series.
 - .1 Classification: H/15/A/M.
 - .2 Dimensions – Nominal width as indicated, 7 5/8" high x 15 5/8" long.

- .3 Special shapes: Provide special shapes as required to suit project conditions..

2.2 MORTAR MIXES

- .1 Mortar and mortar mixes in accordance with Section 04 05 13.

2.3 GROUT MIXES

- .1 Grout and grout mixes in accordance with Section 04 05 13.

2.4 CLEANING COMPOUNDS

- .1 Compatible with substrate and acceptable to masonry manufacturer for use on products.
- .2 Cleaning compounds compatible with concrete unit masonry and in accordance with manufacturer's written recommendations and instructions.

2.5 TOLERANCES

- .1 Tolerances for standard concrete unit masonry tolerances in accordance with CAN/CSA A165.1, supplemented as follows:
 - .1 Maximum variation between units within specific job lot, not to exceed 2 mm.
 - .2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.
 - .3 Out of square tolerance not to exceed 2 mm.

Part 3 EXECUTION

3.1 EXAMINATION

- .1 Verify surfaces and conditions are ready to accept work of this Section.
- .2 Commencing installation means acceptance of conditions.

3.2 PREPARATION

- .1 Protect adjacent finished materials from damage due to masonry work.

3.3 INSTALLATION

- .1 Do masonry work in accordance with CAN/CSA A371.
- .2 Concrete block units:
 - .1 Bond: running.
 - .2 Coursing height: 200 mm for one block and one joint.

- .3 Jointing:concave where exposed or where paint or other finish coating is specified. Flush where concealed.
- .4 Key new concrete block into existing to ensure continuity of bond.
- .5 Clean block faces using soft cloths before mortar hardens.

3.4 MORTAR PLACEMENT

- .1 Place mortar in accordance with Section 04 05 13.

3.5 GROUT PLACEMENT

- .1 Place grout in accordance with Section 04 05 13.

3.6 CONSTRUCTION

- .1 Cull out masonry units, in accordance with CAN/CSA A165 and reviewed range of colour samples, with chips, cracks, broken corners, excessive colour and texture variation.
- .2 Build in miscellaneous items such as bearing plates, steel angles, bolts, anchors, inserts, sleeves and conduits.
- .3 Masonry shall be laid in running bond pattern, to CSA A371 tolerances for line, plumb, level and joints.
- .4 Hollow Units: spread mortar setting bed from outside edge of face shells. Gauge amount of mortar on top and end of unit to create full joints, equivalent to shell thickness. Avoid excess mortar.
- .5 Ensure compacted head joints. Use full or face-shell joint as indicated.
- .6 Tamp units firmly into place.
- .7 Do not adjust masonry units after mortar has set. Where resetting of masonry is required, remove, clean and reset units in new mortar.
- .8 After mortar has achieved initial set up, tool joints.
- .9 Do not interrupt bond below or above openings.

3.7 CLEANING

- .1 Clean in accordance with Section 01 74 11 supplemented as follows.
 - .1 Progress Cleaning:
 - .1 Standard Concrete Unit Masonry:
 - .1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block. Clean wall surface with suitable brush or burlap.

3.8 PROTECTION

- .1 Brace and protect concrete unit masonry in accordance with Section 04 05 00.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 ASTM International Inc.
 - .1 ASTM A53/A53M-20, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - .2 ASTM A307-21, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
 - .3 ASTM A325-09ae1, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - .4
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-85.10-99, Protective Coatings for Metals.
- .3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA).
 - .1 Handbook of the Canadian Institute of Steel Construction.
 - .2 CISC/CPMA Standard 2-75, Quick-Drying Primer for use on Structural Steel.
- .4 Canadian Standards Association (CSA International)
 - .1 CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA-S16-14 (R2019), Limit States Design of Steel Structures.
 - .3 CAN/CSA-S136, North American Specifications for the Design of Cold Formed Steel Structural Members.
 - .4 CSA W47.1, Certification of Companies for Fusion Welding of Steel.
 - .5 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding.
 - .6 CSA W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - .7 CSA W59, Welded Steel Construction (Metal Arc Welding).
- .5 Master Painters Institute
 - .1 MPI-INT 5.1, Structural Steel and Metal Fabrications.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Shop Drawings:
 - .1 Submit shop drawings to the engineer for review and approval prior fabrication.

- .2 Shop drawings shall show all details and material specification and shall be sealed and signed for connection design, by a Professional Engineer Registered in the Province of Ontario.
- .2 Erection drawings:
 - .1 Submit erection drawings indicating details and information necessary for assembly and erection purposes including:
 - .1 Description of methods.
 - .2 Sequence of erection.
 - .3 Type of equipment used in erection.
 - .4 Temporary bracings.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Manufacturers Requirements.

Part 2 Products

2.1 MATERIALS

- .1 Structural steel: to CSA-G40.20/G40.21 with the following grades:
 - .1 W and S shapes: Grade 350W.
 - .2 HSS Shapes: Grade 350W.
 - .3 Plates: Grade 300W.
- .2 Steel pipes: ASTM A53, Type S, Grade B, minimum yield strength 240 mPa.
- .3 Structural bolts, nuts and washers: to ASTM A325, Type 1.
- .4 Anchor bolts: to ASTM A307, Grade A.
- .5 Post-installed anchors: HILTI.
 - .1 Follow manufacturer's recommendations for drilling and installing procedures. Hole diameter shall not exceed those required by the manufacturer.
 - .2 Embedment lengths shown on the drawing are effective embedment lengths; for the required hole depths, follow the manufacturer recommendations.
- .6 Concrete Fasteners: Tapcon screws, as indicated.
- .7 Welding materials: to CSA W48 Series, E49XX, CSA W59 and certified by Canadian Welding Bureau.
- .8 Shop paint primer: to CISC/CPMA2-75 solvent reducible alkyd, red oxide.

- .9 Grout: single component, non-shrink, non-ferrous grout to ASTM C1107.
- .1 Acceptable product: MasterFlow 713, by Master Builders Solutions, or Consultant approved alternative.

2.2 DESIGN AND FABRICATION

- .1 Fabricate and erect structural steel in accordance with CSA-S16 and in accordance with reviewed erection drawings.
- .2 Steel is to be supplied in full lengths, without shop splices between field connections, unless specifically accepted in writing by the engineer. The fabricator shall pay for any costs to inspect and test all splices.
- .3 Continuously seal members by continuous welds. Grind smooth.
- .4 Design, detailing and fabrication of connections shall conform to CSA S16 and CISC handbook.
- .5 Forces and moments shown on structural drawings where applicable are factored values (per limit states design). Connections design forces are reversible and act concurrently.
- .6 All bolted connection shall be 'bearing type' unless noted otherwise.
- .7 Design of bolted connections shall assume that bolts have threads included in the shear plane.
- .8 Beam shear connections shall be designed to resist half of total beam load capacity for a laterally supported beam as listed in CISC handbook beam load tables for the given span of the beam.
- .9 Welded procedures, materials and quality standards shall conform to CSA W59.
- .10 All welding shall be performed by a fabricator certified to CSA 47.1.
- .11 All welders are to be CWB certified.
- .12 Minimum fillet weld size shall be 6 mm and all joints are assumed fully welded unless noted otherwise.
- .13 Any welding defects shall be corrected by the contractor at the contractor's expense.

2.3 FINISHES

- .1 Galvanized items shall be hot dipped galvanizing with zinc coating 600 g/m² to CAN/CSA-G164.
- .2 Galvanized bolts, nuts and washers shall be used for all painted structures.
- .3 Shop coat primer: to Section 09 91 99.

- .4 Zinc primer: to Section 09 91 99.

2.4 SHOP PAINTING

- .1 Prepare steel surfaces for priming where applicable. Paint all structural steel with one coat of primer in accordance with CISC/CPMA standard 2-75.
- .2 Clean members, remove loose mill scale, rust, oil, dirt and foreign matter. Prepare surface according to NACE No.3/SSPC-SP-6.
- .3 Apply one coat of primer in shop to steel, except:
 - .1 Surfaces to be encased in concrete.
 - .2 Surfaces to receive field installed stud shear connections.
 - .3 Surfaces and edges to be field welded.
 - .4 Faying surfaces of slip-critical connections.
 - .5 Below grade surfaces in contact with soil.
- .4 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5°C.
- .5 Maintain dry condition and 5°C minimum temperature until paint is thoroughly dry.
- .6 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.

Part 3 Execution

3.1 APPLICATION

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

3.2 GENERAL

- .1 Structural steel work: in accordance with CSA-S16 and CAN/CSA-S136.
- .2 Welding: in accordance with CSA W59.
- .3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.
- .4 Place grout under full baseplate area in accordance with grout manufacture's instructions after thorough cleanout.

3.3 CONNECTION TO EXISTING WORK

- .1 Verify dimensions and condition of existing work, report discrepancies and potential problem areas to Consultant for direction before commencing fabrication.

3.4 MARKING

- .1 Mark materials in accordance with CSA G40.20/G40.21. Do not use die stamping. When steel is to be left in unpainted condition, place marking at locations not visible from exterior after erection.
- .2 Match marking: shop mark for fit and match.

3.5 ERECTION

- .1 Erect structural steel, as indicated and in accordance with CSA-S16 and CAN/CSA-S136 and in accordance with reviewed erection drawings.
- .2 Field cutting or altering structural members: to approval of Consultant.
- .3 Clean with mechanical brush and touch up shop primer to bolts, rivets, welds and burned or scratched surfaces at completion of erection.
- .4 Continuously seal members by continuous welds where indicated. Grind smooth.

3.6 FIELD QUALITY CONTROL

- .1 Inspection will be carried out by the Consultant.
- .2 Fabricator and erector are required to cooperate with the inspectors and testing agencies retained by the Owner.

3.7 FIELD PAINTING

- .1 Touch up damaged surfaces and surfaces without shop coat with primer to NACE No.3/SSPC-SP-6 except as specified otherwise. Apply in accordance with MPI Architectural Painting Specification Manual.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 ASTM International
 - .1 ASTM A307-21, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.40, Anti-corrosive Structural Steel Alkyd Primer.
- .3 CSA International
 - .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W47.1-09(R2014), Certification of companies for fusion welding of steel.
 - .3 CSA W59-13, Welded Steel Construction (Metal Arc Welding).
- .4 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS).
- .5 The Society for Protective Coatings (SSPC)
 - .1 Systems and Specifications Manual, Volume 2, 2008 Edition.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .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 Product data:
 - .1 Submit primer and paint manufacturer's printed product literature, specifications and datasheet for review by Consultant.
 - .2 Submit WHMIS SDS - Safety Data Sheets for review by Consultant.

1.3 QUALITY ASSURANCE

- .1 Structural steel work: In accordance with CAN/CSA S16.
- .2 Welding to be performed to CSA W59.
- .3 Companies to be certified under CSA W47.1 for fusion welding of steel structures.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and 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 indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect ladders from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 SYSTEM DESCRIPTION

- .1 Design ladder to comply with Ontario Ministry of Labour Engineering Data Sheet 2-04 and the Ontario Building Code (2012).
- .2 As part of the shop drawing, Contractor to provide a valid method of preventing unauthorized personnel from accessing the ladder. The drawing details are shown for illustration purposes only.

2.2 MATERIALS

- .1 Ladder components: Steel to CSA G40.20/G40.21 Grade 300W.
- .2 Welding materials: To CSA W59.
- .3 Bolts: To ASTM A307.
- .4 Concrete connectors: Galvanized, expansion anchors. See drawings for size and location.
- .5 Masonry connections: Galvanized, threaded rods, epoxy adhered with insert sleeves. See drawings for size and location.
- .6 Paint materials listed in latest edition of MPI Approved Products List (APL) are acceptable for use on this project.
- .7 Paint materials for paint systems: To be products of single manufacturer.

2.3 FABRICATION

- .1 Weld connections where possible, otherwise bolt connections. Countersink exposed fasteners, cut off bolts leaving two threads exposed. Make exposed connections of same material, colour and finish as base material on which they occur.

- .2 Accurately form connections with exposed faces flush:
 - .1 Make mitres and joints tight.
 - .2 Make rungs equal spaced through the height.
- .3 Grind or file exposed welds and steel sections smooth.
- .4 Shop fabricate stairs in sections as large and complete as practicable.

2.4 SHOP PRIMER

- .1 Clean surfaces in accordance with Steel Structures Painting Council Manual Volume 2.
- .2 Apply one shop coat of primer to metal items or two coats of primer of different colours to parts inaccessible after final assembly; with exception of galvanized or concrete encased items. Shop primer to be in accordance with CAN/CGSB-1.40.
- .3 Use primer as prepared by manufacturer without thinning or adding admixtures. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is below 7°C.
- .4 Clean surfaces to be field welded; do not paint.

2.5 FINISHES

- .1 Shop Painted: to MPI-EXT 5.1F – Epoxy Finish, colour to be approved by Consultant. Selection of colour will be from manufacturer's standard range of colours.

Part 3 Execution

3.1 EXAMINATION

- .1 Verify that field conditions are acceptable and are ready to receive work.
- .2 Ladder location to be confirmed by Consultant in writing prior to installation.

3.2 PREPARATION

- .1 Clean and strip primed steel items to bare metal, where site welding is required.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.
 - .1 Work paint into cracks, crevices and corners.
 - .2 Apply coats of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied. Remove runs, sags and brush marks from finished work and repaint.

.3 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.4 Sand and dust between coats to remove visible defects.

3.3 INSTALLATION

.1 Ladder: Refer to Drawing Details.

.2 Install components plumb and level, accurately fitted, free from distortion or defects.

.3 Field weld as indicated on approved shop drawings. Grind welds smooth and touch-up welds with primer and paint.

3.4 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 00 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.3 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal ladders 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.
- .4 Section 22 05 11 – Plumbing and Drainage.

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 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 blocking and nailers.
 - .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 Fire-retardant-treated wood and plywood: to CAN/CSA-80 Series, impregnated with fire-retardant chemicals in solution under high pressure.
- .2 Canadian softwood plywood (CSP): to CSA O151, standard construction.
 - .1 Urea-formaldehyde free.
 - .2 CAN/CSA-Z809 or FSC or SFI certified.

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 Plywood to concrete, brick or hollow masonry fasteners: 6 mm diameter screws. Length to provide minimum 32 mm and maximum 40 mm embedment into substrate as required. Type to be approved subject to results of pull tests.
 - .1 Standard of acceptance:
 - .1 Tapcon.
 - .2 Or accepted alternate.
- .3 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.
- .4 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 Rawl.
 - .3 Or accepted alternate.
- .5 Nails, spikes and staples: To CSA B111.

2.4 ACCESSORIES

- .1 Interior gypsum board: To ASTM C1396/1396M-13, thickness 12.7 mm unless otherwise noted.

2.5 FINISHES

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

Part 3 Execution

3.1 GENERAL INSTALLATION

- .1 Extend air/vapour barrier seals up vertical surfaces and curbs and onto the deck as shown on the Drawings, to provide continuity.
- .2 Slope the top of all wood blocking at the roof perimeter in towards the roof at a minimum of 5%, unless otherwise shown on the Drawings.
- .3 Comply with requirements of NBC, supplemented by the following paragraphs.
- .4 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.

- .5 Align and plumb faces of furring and blocking to tolerance of 1:600.
- .6 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
- .7 Install wood, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.
- .8 Install wood backing, dressed, tapered and recessed slightly below top surface of roof insulation for roof hopper.

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 Secure wood to concrete in a staggered pattern with each row spaced at minimum 600 mm c/c with specified fasteners. Drill holes 13 mm deeper than depth of fastener penetration.
- .4 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.
- .5 Unless specified otherwise, the number of fasteners shall be doubled at all outside parapet corners, for a distance of 3 m from the corner.
- .6 For any exposed fastening, provide touch-up paint as required to coat all exposed surfaces of screws damaged during the driving process.

3.3 SHEATHING INSTALLATION

- .1 Gypsum board:
 - .1 Install sheathing to curb interiors, as indicated on the drawings and details. Secure with specified fasteners at 200 mm c/c around perimeter of each board and at maximum 300 mm c/c spacing in the field of the board.
- .2 Plywood:
 - .1 Not less than 2 mm gaps shall be provided between sheets, to allow for material expansion.
 - .2 Unless otherwise indicated, fasten plywood 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 REFERENCES

- .1 ASTM International
 - .1 ASTM C1320-10, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
- .2 CSA Group
 - .1 CSA B149 PACKAGE-10, Consists of B149.1, Natural Gas and Propane Installation Code and B149.2, Propane Storage and Handling Code.
- .3 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S604-2012, Standard for Factory-Built Type A Chimneys.
 - .2 CAN/ULC-S702-2012, Standard for Mineral Fibre Insulation for Buildings.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for blanket insulation and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and 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, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

Part 2 Products

2.1 INSULATION

- .1 Batt and blanket mineral fibre: Type 1 to CAN/ULC-S702, thickness as indicated.
 - .1 Acceptable product: COMFORTBATT as manufactured by Rockwool.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for blanket insulation application 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.

3.2 INSULATION INSTALLATION

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces and to ASTM C1320.
- .2 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- .3 Do not compress insulation to fit into spaces.
- .4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN/ULC-S604 Type A chimneys CSA B149.1 and CSA B149.2 Type B L vents.
- .5 Do not enclose insulation until it has been inspected and approved by Consultant.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for recycling.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Urethane Foam Contractors Association Inc. (CUFCA)
- .2 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S101-07, Standard Methods of Fire Tests of Building Construction and Materials.
 - .2 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 - .3 CAN/ULC-S705.1-01, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Material Specification. Includes Amendment 1.2.
 - .4 CAN/ULC-S705.2-05, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Application.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for polyurethane foam sprayed insulation and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS 2015 SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and Section 01 35 43 - Environmental Procedures.

1.3 QUALITY ASSURANCE

- .1 Applicators to conform to CUFCA Quality Assurance Program.
- .2 Qualifications:
 - .1 Installer: person specializing in sprayed insulation installations with documented experience.
 - .2 Manufacturer: company with experience in producing of material used for work required for this project, with sufficient production capacity to produce and deliver required units without causing delay in work.
- .3 Health and Safety Requirements: worker protection:
 - .1 Protect workers as recommended by CAN/ULC-S705.2 and manufacturer's recommendations:
 - .2 Workers must wear eye protection, gloves, dust masks, long sleeved clothing and respirators when applying foam insulation.
 - .3 Workers must not eat, drink or smoke while applying foam insulation.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.
- .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 in dry location, off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect specified materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.5 SITE CONDITIONS

- .1 Ventilate area to receive insulation by introducing fresh air and exhausting air continuously during and 24 hour after application to maintain non-toxic, unpolluted, safe working conditions.
- .2 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.
- .3 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.
- .4 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

Part 2 Products

2.1 MATERIALS

- .1 Insulation: spray polyurethane to CAN/ULC-S705.1.
- .2 Primers: in accordance with manufacturer's recommendations for surface conditions.
 - .1 Maximum VOC limit 100 g/L to GS-11 Standard.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sprayed insulation application 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.

3.2 APPLICATION

- .1 Apply insulation to clean surfaces in accordance with manufacturer's printed instructions and CAN/ULC-S705.2.
- .2 Use primer where recommended by manufacturer.
- .3 Apply sprayed foam insulation in thickness as indicated.

3.3 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
 - .1 Remove insulation material spilled during installation and leave work area ready for application of wall board.

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 C1177/C1177M-13, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 - .3 ASTM C1396/C1396M-13, Standard Specification for Gypsum Board.
 - .4 ASTM D4637/D4637M-14e1, Standard Specification for EPDM Sheet Used In Single-Ply Roof Membrane.
- .2 Canadian Standards Association (CSA International)
 - .1 CAN/CGA-8.1-M86 (R2011), Elastomeric Composite Hose and Couplings for Conducting Propane and Natural Gas.
 - .2 CSA A123.3-05, Asphalt Saturated Organic Roofing Felt. (updated)
 - .3 CAN/CSA-A123.4-04 (R2013) - Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.
 - .4 CSA A123.22-08(r2013), Self-Adhering Polymer Modified Bituminous Membrane Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 - .5 CSA A123.23-15 - Product specification for polymer-modified bitumen sheet, prefabricated and reinforced.
 - .6 CSA A231.1-14/A231.2-14, Precast Concrete Paving Slabs / Precast Concrete Pavers.
 - .7 CSA B149.1-10 (R2015), Natural Gas and Propane Installation Code
 - .8 CSA B272-93 (R2000), Prefabricated Self-Sealing Roof Vent Flashings.
 - .9 CSA O151-09, Canadian Softwood Plywood.
- .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.
- .3 CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.
- .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-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
 - .6 CAN/ULC-S705.1-01, Standard for Thermal Insulation – Spray-Applied Rigid Polyurethane Foam, Medium Density.
 - .7 CAN/ULC-S705.2-05, Standard for Thermal Insulation - Spray-Applied Rigid Polyurethane Foam, Medium Density – Application.
 - .8 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 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 System summary:
 - .1 Provide a one page synopsis of each roof type that lists the assembly components in order from top to bottom.

- .3 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.
- .4 Provide shop drawings:
 - .1 Indicate sloped insulation layout and details.
 - .2 Provide shop drawing or submittal indicating adhesive pattern specified by adhesive manufacturer for the required wind uplift pressures indicated on the Drawings.
- .5 Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

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.
- .2 Only certified applicators are permitted to use torch welding equipment.
- .3 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.
- .4 Roof membrane manufacturer shall delegate a representative to visit the work site at the start of roofing installation. Contractor shall engage membrane manufacturer's technical representative as required to provide technical guidance for and inspection of membrane application. The Contractor shall at all times enable and facilitate access to the worksite by this representative.

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 or of any interior service.
- .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 Take spot levels to verify that pools of water in excess of 13 mm depth will not form.
- .4 Tabulate levels and submit to Consultant.
- .5 Ensure plumbing is accessible and work can be completed as specified.
- .6 Inspect roof drains to ensure they are open and working properly.
- .7 Where specified or shown for areas with only one drain, provide overflow scuppers or drains to detail and specified requirements.

1.18 EXAMINE UNDERSIDE OF DECK

- .1 Inspect the underside of deck to ensure fasteners will not damage the structure, affect interior surfaces or electrical and mechanical services.
- .2 For drain alterations and pipe hangers, coordinate with plumbing subtrade as per Section 22 05 11 – Plumbing and Drainage, prior to commencement of roofing operations.

1.19 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.

1.20 EQUIPMENT

- .1 Inspect equipment affected by the work, including but not limited to rooftop equipment, curbs, existing drains and plumbing, mechanical, electrical and lightening 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 Notify Owner and/or Consultant of any equipment which is not operational or damaged prior to the commencement of work.

1.21 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.

1.22 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 Protect all openings, vents and stacks from weather and contamination from debris.
- .3 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 days work.

1.23 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.

1.24 WARRANTY

- .1 Contractor's Warranty for Labour and Material:
 - .1 For Work of this Section 07 52 00 - Modified Bituminous Membrane Roofing, 12 months warranty period is extended to 60 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 15-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.

2.2 ROOF DECK SHEATHING MATERIALS

- .1 Glass mat gypsum sheathing: Glass mat faced treated core gypsum roof board, for installation over steel deck to ASTM C1177/C1177M. Boards to be 1.2 m x 2.4 m, thickness as indicated, with pre-primed surface where indicated.
 - .1 Standard of acceptance:
 - .1 DensDeck Roof Board by GP Gypsum.
 - .2 Securock by USG.
 - .3 Or accepted alternate.

2.3 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.

2.4 AIR/VAPOUR BARRIER MEMBRANE

- .1 For torchable gypsum board surfaces:
 - .1 Torch grade modified bituminous air/vapour barrier, to CSA A123.23, with polyester or glass fleece reinforcement, minimum thickness 3 mm, top side sanded.
 - .1 Type A, B or C.
 - .2 Grade 3.
 - .3 Top and bottom surfaces: sanded/polyethylene.

2.5 SELF-ADHERED MEMBRANE

- .1 To CSA A123.22, self-adhering membrane consisting of SBS rubberized asphalt compound laminated to a polyethelene 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.

2.6 MEMBRANE AND MEMBRANE FLASHINGS

- .1 Acceptable membrane manufacturers:
 - .1 Soprema.
 - .2 IKO Industries Ltd.
 - .3 Henry Bakor.
 - .4 Johns Manville.
- .2 Base sheet membrane (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.
- .5 Fireguard tape:
 - .1 Modified bituminous membrane supplied in strips, 150 mm wide, 1.6 mm thick, glass fleece reinforced with self-adhesive underside.
 - .2 Provided by membrane manufacturer.

2.7 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.

2.8 ADHESIVES

- .1 Adhesive for securing overlay board and insulation: To be fully compatible with all materials in the roofing assembly. Applicability of use to adhere the different materials in the roofing assembly to be included in the manufacturer's literature.
 - .1 Standard of acceptance:
 - .1 Duotack by Soprema.
 - .2 Millenium by IKO.
 - .3 Fas-n-free by Tremco.
 - .4 Insta-Stick by Instafoam Inc.
 - .5 Roof Assembly Adhesive by Chemlink.
 - .6 Olybond 500 by OMG.
 - .7 2-Part UIA by Johns Manville.
 - .8 Or accepted alternate.

2.9 POLYSTYRENE INSULATION

- .1 Extruded polystyrene (XPS) insulation to CAN/ULC-S701, Type 4, thickness as indicated. Where indicated, provide drainage grooves on underside of board. Edges to be shiplapped unless otherwise indicated.

2.10 POLYISOCYANURATE INSULATION (INORGANIC)

- .1 Conforming to CAN/ULC S704, rigid foam board, Class 2 or 3, Type 3. Manufactured with HC blowing agent meeting requirements of CAN/ULC S126, CAN/ULC S107 and CAN/ULC S770 for LTTR values. Approved and listed by Factory Mutual Global for 1-60 and 1-90 wind classification and FM 4450 requirements for Class 1 fire. Thickness as specified or shown with maximum board size 1200 mm x 1200 mm. Fibre-reinforced **inorganic facers** on both major surfaces of the core foam.

2.11 SLOPED INSULATION (INORGANIC)

- .1 Conforming to CAN/ULC S704, rigid foam board, Class 2 or 3, Type 3. Manufactured with HC blowing agent meeting requirements of CAN/ULC S-126, CAN/ULC S107 and CAN/ULC S770 for LTTR values. Approved and listed by Factory Mutual Global for 1-60 and 1-90 wind classification and FM 4450

requirements for Class 1 fire. Thickness as specified or shown with maximum board size 1200 mm x 1200 mm. Fibre-reinforced **inorganic facers** on both major surfaces of the core foam.

- .2 Insulation slopes shall be as indicated on the detailed drawings and roof plans. Modules shall be factory cut to correct slopes.
- .3 Sloped insulation must terminate at 0 thickness. Supply an additional nosing piece if required, factory fabricated of compatible, flame-resistant sloped rigid insulation material, to smoothly terminate sloped insulation at 0 thickness.

2.12 OVERLAY BOARD

- .1 Overlay board: 6 mm thick asphalt based overlay board with non-woven glass facers, as recommended by the membrane manufacturer.

2.13 SEMI-RIGID MINERAL WOOL INSULATION

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

2.14 SPRAYED POLYURETHANE INSULATION

- .1 To Section 07 21 29.03 Sprayed Insulation - Polyurethane Foam

2.15 DUCT WATERPROOFING

- .1 Duct waterproofing: Self-adhered modified bituminous sheet, reflective surface, minimum thickness 1.0 mm.
 - .1 Standard of acceptance:
 - .1 InsulSeal 50 by Protecto Wrap Company.
 - .2 Or accepted alternate.

2.16 DUCT INSULATION

- .1 Duct Insulation: Polyisocyanurate insulation, to CAN/ULC S704, faced with inorganic coated polymer-bonded glass fibre mat facers on both major surfaces of the foam core. Thickness and size as shown and detailed.

2.17 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.

2.18 WALKWAY MATERIALS

- .1 One additional ply of cap sheet membrane. Colour to be different from field membrane as selected by Consultant.

2.19 SUSPENDED DUCTWORK SUPPORT

- .1 All ductwork systems routed across the roof shall be supported off the roof by an engineered prefabricated suspension 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.
- .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 Or accepted alternate.

2.20 PROTECTION MATERIALS

- .1 Rubber protection pad: Heavy duty grade, 550 mm x 550 mm or for size as indicated, 8 mm thick, masticated recycled rubber with reinforcement and UV resistant, dimpled surface.

2.21 MEMBRANE FASTENING BAR

- .1 Galvanized sheet steel or extruded aluminum, thickness 1 mm (20 ga.), 38 mm width, supplied in minimum 2.4 m lengths, with pre-drilled 2 mm holes, secured with #14 stainless steel screws @ 150 mm c/c.

2.22 FASTENERS

- .1 Fasteners for gypsum board to steel deck: No. 12 flat head, self-tapping, Type A or AB, cadmium plated screws. Use fastener plates (see below).
- .2 Fastener plates: FM Global approved 75 mm hexagonal metal plates, 75 mm hexagonal plastic lock plates.
 - .1 Standard of acceptance:
 - .1 Dekfast.
 - .2 Or accepted alternate.
- .3 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.

- .4 Fasteners for sheet metal into steel: Self-drilling, self-tapping screws, galvanized, #8 or larger size, Teks or equivalent, head to suit application.
- .5 Fasteners for sheet metal and wood to wood: Corrosion resistant #10 wood screws or nails to suit application.
- .6 Structural fasteners into wood: Lag screws, 12.7 mm diameter hot dipped galvanized steel, length 125 mm.
- .7 Duct Insulation fasteners:
 - .1 Standard of acceptance:
 - .1 "Stic-Klip" fasteners with 230-35 adhesive by Henry Bakor Inc.
 - .2 Or accepted alternate.

2.23 PLUMBING VENTS

- .1 Spun aluminum flashing consisting of metal flashing sleeve with integral flange, matching aluminum hood, perforated collar premoulded urethane insulation liner and EPDM base seal. Diameter to suit existing pipe size.
 - .1 Standard of acceptance:
 - .1 SJ-31 Vandal Proof Stack Jack Flashings as manufactured by Thaler.

2.24 SCUPPERS AND OVERFLOWS

- .1 See Section 07 62 00 – Sheet Metal Flashing and Trim.
- .2 Size and materials as specified or shown, fabricated from 22 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.

2.25 SPLIT FLASHING FOR PIPE PENETRATION

- .1 Fabricated from 0.48 mm (26 ga.) Type 304, stainless steel, compliant with CSA B272, 2-piece, with EPDM triple pressure grommet seal around cap and continuous EPDM seals at split junctures of sleeve and deck flange, with stainless steel bolted closure design, size to suit structure, 450 mm in height.
 - .1 Standard of acceptance:
 - .1 SPJ-1 by Thaler.
 - .2 Or accepted alternate.

2.26 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.

2.27 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.

2.28 GAS LINE / CONDUIT SUPPORTS

- .1 High density polypropylene plastic base with roller having hot dipped galvanized supports and hot dipped galvanized pipe retention clamp to suit application with 13 mm maximum oversize allowable. Provide isolation coating at pipe contact interface, as required.
 - .1 Standard of acceptance:
 - .1 PP10-R by Portable Pipe Hanger.
 - .2 Or accepted alternate.

2.29 CONCRETE PAVERS

- .1 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.

2.30 PREFABRICATED INSULATED ROOF CURB

- .1 Prefabricated roof curb to be manufactured of prime galvanized steel construction, 1.2 mm (18 ga.) steel thickness, meeting ASTM A653/653M, with welded corners and with seams joined by continuous water and airtight welds. Roof curb shall be internally reinforced with angles 600 mm on center and factory installed wood nailer. Internally insulated with 38 mm thick 0.53 kN/m³ (3 pcf). density rigid insulation. Heights to be as detailed to suit installed roof thickness. Top of all roof curbs shall be level, with pitch built into curb when deck slopes.

2.31 STATIC ROOF VENTS

- .1 All existing static vents indicated to be removed and replaced are to be replaced with heavy gauge aluminum vents with integrated 600mm high curb and bird screen. Size and operation to be confirmed on site prior to submission of shop drawings. Secure to top of insulated roof curb sized to suit opening.
 - .1 Acceptable material: Fabra Hood – FGI/FGR by Greenheck or Consultant approval alternative.

2.32 ROOF ACCESSORIES

- .1 Miscellaneous clamps: For extending gas piping services to CAN/CGA-8.1-M86.
- .2 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.
- .3 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 a 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 deck 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 INSTALLATION OF GYPSUM BOARD SHEATHING

- .1 Attach boards as per the OBC Wind Uplift Attachment detail illustrated on the drawings.
- .2 Install boards as detailed and specified with primed or top side up.
- .3 Over steel deck, place with long axis of each sheet transverse to steel deck ribs with end joints staggered and fully supported on ribs.
- .4 Cut sheets as required to suit site conditions.
- .5 Butt joints tightly. Use maximum size pieces where possible to reduce joints.

3.8 MECHANICAL FASTENERS FOR SHEATHING (STEEL DECK)

- .1 Attach boards as per the OBC Wind Uplift Attachment detail illustrated on the drawings.
- .2 In compliance with specified requirements, use mechanical fasteners to secure boards in place.
- .3 Inspect the underside of the deck to ensure fasteners will not be visible, damage the structure or interior surfaces, affect electrical and mechanical services. Fasteners to penetrate top flute of the deck maximum 20 mm.
- .4 Advise Consultant of any unusual circumstances affecting the work. Be responsible and correct all damage caused by work to match existing materials and finish.
- .5 Secure to top flute of steel deck with screws spaced in pattern specified. Use screw-type anti-backout corrosion resistant fasteners with 75 mm metal plates as generally approved or required by the fastener manufacturer.
- .6 Prime metal plates that will be covered with bitumen roofing. Ensure primer is tack-free before proceeding.

3.9 AIR SEALS

- .1 Install 0.56 mm (26 ga.) galvanized or 0.51 mm (26 ga.) pre-finished metal air seal where indicated. Mechanically secure metal to deck and extend as required to allow a minimum 100 mm tie-in with air/vapour barrier membrane. Lap and seal air/vapour barrier membrane onto air-seal.

3.10 TORCH-APPLIED AIR/VAPOUR BARRIER ON SHEATHING

- .1 Ensure all surfaces to be covered with self-adhering membrane are complete and free of moisture and contaminants and surfaces are above 5°C (40°F). At temperatures below 5°C (40°F) heat materials to be covered with hot air gun.

Store all materials in heated storage when temperatures fall below 5°C (40°F) and remove only as much material that can be used before cooling.

- .2 Prime all vertical surfaces to be covered with torch-applied membrane, and horizontal surfaces as required. Use roller application – no spray application permitted. Let primer tack dry and complete thumb test to test set-up.
- .3 Use fireguard tape or overlay board to protect all open joints in substrate and all combustible surfaces.
- .4 Working up slope from drain, install air/vapour barrier membrane using torch methods, true to line to completely cover the area intended to be protected to points shown on the drawing.
- .5 Membrane is to be installed without air blisters and wrinkles. Rework, repair or replace all poorly installed membrane. Do not stretch material that would result in pullback and deformity of the membrane at intersections.
- .6 Lap all side laps 75 mm and end laps 150 mm. Torch all seams to achieve bleedout. At nailable surfaces, secure all membrane on vertical surface at points of termination at 150 mm c/c, using large head roofing nails.
- .7 Turn up membrane 150 mm at edge where horizontal surface meets vertical planes. Lap onto existing surfaces as required to provide continuity of air/vapour barrier at terminations. Use fireguard tape or overlay board to protect all open joints in deck and all combustible surfaces
- .8 Seal all points of termination at horizontal planes and vertical surfaces with modified sealant. Tool sealant to consistent smooth and even surface.
- .9 Seal all perimeters and penetrations, and ensure drains are operational and prevent backflow, if air/vapour barrier is to be left exposed as an overnight temporary waterproofing.

3.11 INSULATION – ALL LAYERS – ADHESIVE ADHERED

- .1 Attach insulation as per the OBC Wind Uplift Attachment detail illustrated on the drawings.
- .2 Install base insulation layer over air/vapour barrier to specified design intent and thickness. Secure insulation laid with adhesive, in pattern as per adhesive manufacturer's directions and as indicated. Apply boards before adhesive cures, skims over or loses adhesive qualities.
- .3 For subsequent layers of insulation, secure insulation laid with adhesive, in pattern as per adhesive manufacturer's recommendations and as indicated.
- .4 Stagger all joints of insulation a minimum 300 mm.
- .5 Stagger both end and side joints between insulation layers.

- .6 Butt sheets of insulation with moderate contact. Do not force insulation into place. Cut neatly at projections and points of termination. Replace all broken, damaged or misfit boards as work progresses.
- .7 Where necessary, back-cut insulation to allow it to conform and stay bonded to irregular surfaces without bridging. Subsequent to placement, walk insulation into place to ensure positive bonding is achieved.

3.12 SLOPED INSULATION

- .1 Attach boards as per the OBC Wind Uplift Attachment detail illustrated on the drawings.
- .2 At all locations of sloped insulation provide shop drawings from sloped insulation manufacturer for Consultant's review prior to installation.
- .3 At all new and existing drain locations, provide sloped polyisocyanurate insulation sump around drain to promote positive drainage. Total sump size to be as shown on drawings, with maximum depression of 25 mm, unless otherwise indicated.
- .4 Installation methods for sloped insulation to be same as for upper layers of base insulation, using adhesive as specified.
- .5 At the low termination of sloped insulation, when applying overlay board, Contractor shall increase adhesive application by adding 4 additional ribbons at 100 mm spacing at the 13 mm elevation change from tapered to flat insulation, to compensate for the 13 mm elevation change of tapered insulation.

3.13 OVERLAY BOARD

- .1 Attach boards as per the OBC Wind Uplift Attachment detail illustrated on the drawings.
- .2 Adhere overlay board to insulation with adhesive at the rate and pattern specified, as for insulation.
- .3 Place boards in parallel rows with end joints staggered. Tape joints in overlay board with fireguard membrane where combustible surfaces are directly below.
- .4 Where overlay board is specified on nailable vertical surfaces, secure overlay board using large-head roofing nails at 200 mm centres each direction and tape all joints with fireguard tape.

3.14 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.

3.15 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 Terminate base sheet up all verticals 50 mm, secure on vertical with membrane fastening bar and fasteners @ 150 mm c/c.
- .6 Review base membrane for low areas (ponding) and correct with additional base sheet membrane.

3.16 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.
- .6 Prior to the application of cap sheet membranes, secure vertical surfaces of base sheet membrane flashings using fasteners and stress plates secured at minimum 300mm centres. Fasteners are to be covered with 150mm x 150mm membrane reinforcement patch centred on fastener.

3.17 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.

3.18 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.

3.19 DRIP FLASHINGS

- .1 Follow manufacturer's recommendations as to whether pre-finished flashings built into the roof are to be primed. When primer is required, prime top and underside of all drip flashings to be incorporated with roofing prior to application. Primer must be compatible with both membrane and finishes on pre-finished flashing material. Use primer supplied by the membrane manufacturer. All primer to be dry before proceeding.
- .2 Fabricate and install metal drip flashings built into the roof at locations noted on the drawings as per detail and Section 07 62 00 - Sheet Metal Flashing and Trim. Join flashing with S-lock on face and overlap horizontal joints 50 mm. Mitre and seal inside and outside corners of roof flanges. Seal all overlaps, apply sealant Type 'B' as metal flashing is being installed and clean off any material exposed to view. Avoid contact between caulking and bitumen products.
- .3 Install drip flashing true to line set on top of completed base sheet membrane roofing in continuous strip of Type 'A' sealant. Secure flashings with roofing nails installed in a double staggered row at 100 mm centres. Locate nails no closer than 75 mm from face.
- .4 Install an additional piece of base sheet (minimum 150 mm X 150 mm) centered over joints and corners of drip flashing and carried to within 25 mm of edge. Review procedures with the Consultant before proceeding.
- .5 Install 1-ply of base to 25 mm from drip edge and continuing a minimum of 150 mm beyond flashing flange. Ensure positive bond to all metal as to provide a continuous permanent watertight seal.
- .6 Install cap sheet as specified and trim flush with outside face with hot roofing knife. Work underlying surfaces with broom, roller or wet sponge as required to obtain a positive continuous permanent watertight seal.

3.20 DUCT WATERPROOFING

- .1 Remove existing waterproofing and insulation materials down to metal duct surface and dispose.
- .2 Notify Consultant immediately of any defects found in ductwork.
- .3 Install duct insulation fasteners as recommended by manufacturer.
- .4 Install duct insulation in continuous fashion without voids or gaps.
- .5 Install duct insulation fastener plates to secure insulation.
- .6 Apply primer to insulation surfaces as recommended by membrane manufacturer.
- .7 Install duct waterproofing membrane in shingle fashion, rolling as required to provide full adhesion to insulation substrate.

- .8 Use liquid sealant recommended by membrane manufacturer to seal penetrations and terminations.

3.21 ROOF DRAINS

- .1 Install self-adhered membrane air seal around drain and extend onto air/vapour barrier minimum 150 mm.
- .2 Unless otherwise specified or shown, provide prefabricated sump of sloped polyisocyanurate insulation 1200 mm each side of the centre of the drain. Reduce polyisocyanurate insulation thickness to minimum 19 mm at drain to provide positive roof drainage (make allowance for thickness of all flanges and clamps) and ensure water flow will not be impeded.
- .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.

3.22 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 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.

3.23 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.

3.24 CONCRETE PAVERS

- .1 Install concrete pavers at the top and bottom of all roof access ladders accessing roof areas to be replaced in this contract.
- .2 Install concrete pavers at the exit of all roof access doors within the area of work.
- .3 Set pavers on rubber protection pad, in turn on walkway membrane cap sheet.

3.25 GAS LINE / CONDUIT SUPPORTS

- .1 Provide alterations in pipe to raise existing pipe minimum 300 mm above finished roof level as required by Summary of Work, drawings and details.
- .2 Elevate pipe on supports to maximum 300 mm above finished roof surface or to clear all expansion and control joints by 25 mm unless otherwise specified or shown. Provide an additional membrane ply and rubber pad under pipe supports as specified elsewhere in the Section.
- .3 Tighten roller assembly into bracket at desired height and secure in place with lock nuts. Ensure roller assembly is allowed 3 mm minimum spacing and will accommodate movement of pipes due to expansion and contraction.
- .4 Install supports at spacing required to support the pipe without deflection and to safeguard the roof from damage due to excessive spot loading, as per CSA B149.1 Table 6.2 (see below).

Table 6.2
Spacing of supports for piping
(See [Clauses 6.8.3](#) and [6.25.1.](#))

NPS	Maximum spacing of supports ft (m)
1/2 or less — horizontal	6 (2)
3/4–1 — horizontal	8 (2.5)
1-1/4–2-1/2 — horizontal	10 (3)
3–4 — horizontal	15 (5)
5–8 — horizontal	20 (6)
10 or larger — horizontal	25 (8)
All sizes — vertical	Every floor but not more than 125% of horizontal spacings
Tubing — all sizes — vertical and horizontal	6 (2)

- .5 Locate supports over joists, beams or other structural members wherever possible.
- .6 Double pads will be required where pipes change direction, roof elevation changes and at roof control or expansion joints.
- .7 Paint gas lines with gas line paint, following modifications.
- .8 Complete work of this Section as required by local authorities having jurisdiction. Make any adjustments to natural gas system only with fitters certified by the Ministry of Consumer And Commercial Relations. Conform to CAN/CSA B149.1-05 and all supplementary regulations. Have work inspected and pay all fees related to such inspection to ensure work meets with published standards and codes. Submit certificate or letter of approval with final documentation to Owner's Project Coordinator and Consultant.

3.26 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.

3.27 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 B32-08(2014), Standard Specification for Solder Metal.
 - .4 ASTM D523-14, Standard Test Method for Specular Gloss.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA A123.3-05(2015), Asphalt Saturated Organic Roofing Felt.
 - .2 CSA A123.22-08(2013), Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 - .3 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
- .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. Submit samples in accordance with Section 01 33 00 – Submittal Procedures.

- .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 in accordance with Section 01 35 29.06 - Health and Safety Requirements and Section 01 35 43 - Environmental Procedures.
- .3 Shop Drawings:
 - .1 Submit shop drawings for all sheet metal fabrications.
 - .2 Indicate sheet thickness, flashing dimensions and fastenings. Include anchorage, expansion joints and other provisions for thermal movement.
 - .3 Submit manufacturer's catalogue cut sheets for manufactured items.
- .4 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 MOCK-UPS

- .1 Submit shop drawings and provide mock-up in accordance with Section 01 33 00 – Submittal Procedures. Before installing materials, provide a 1200 mm mock-up for each profile before fabrication. Cost of mock-up to be included in the Contractor's base bid.
- .2 Mock-up samples to indicate type, colour, size, method of joints, seam, expansion provisions, stiffeners, cleat fasteners and method of sealing joints. Fit mock-up to each applicable roof profile or edge.

- .3 Review mock-up with drawings to ensure design intent can be achieved. Verify all elevations including those with matching materials and sections. Verify that continuity of air seals can be achieved. Verify attachments, methods for securing and strengths to ensure that work can support the anticipated loads and will remain in place against all wind, weather and service condition without warping or deforming.
- .4 Make adjustments to the work that results from a review of the mock-up without additional cost.
- .5 Acceptable mock-ups may be left in place as part of the final product.

1.7 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 0.51 mm (26 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 PREFINISHED SHEET METAL CLADDING

- .1 Pre-finished steel cladding: Same material as metal flashings, profile to match existing.

- .2 Pre-finished steel cladding: As shown on drawings, fabricate from 0.51 mm (26 ga.) steel to ASTM A653 Grade 230 with G90 zinc coating. Surface with Perspectra Series baked enamel finish. Colour to match existing adjacent construction from manufacturer's standard colour range.
 - .1 Cladding profile shall be a 38 mm deep, 305mm wide.
 - .1 Acceptable material: Urban Accent 1200 by Ideal Roofing.
- .3 Cladding sections shall be provided in the maximum length to minimize the number of field laps.

2.4 ACCESSORIES

- .1 Z-girts: Preformed or break-formed profiles, commercial quality galvanized steel, 1.01 mm thick (20 ga.).
- .2 Metal cleat: same material as metal flashings, 50 mm wide @ 600 mm c/c.
- .3 Continuous metal starter strip: 0.71 mm (24 ga.) galvanized steel, secured at 400 mm c/c.
- .4 Use galvanized, copper, aluminum or stainless steel nails or screws as most compatible with materials and preservatives being utilized.
- .5 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.
- .6 Masonry fasteners: Tapcon, Permagrip or Tapgrip or Rawl. Spike sized to penetrate concrete 38 mm minimum as specified or shown.
- .7 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.
- .8 Screws for starter strips and fascia: #8 @ 400 mm c/c.
- .9 Wedges: Rolled plumber sheet lead.
- .10 Sealant: Refer to Drawings and Section 07 92 00 – Joint Sealants.
- .11 Weather barrier membrane: Dry sheathing to CAN/CGSB-51.32, No. 15 perforated asphalt felt to CSA A123.3.
- .12 Self-adhered membrane: To CSA A123.22, self-adhering membrane consisting of SBS rubberized asphalt compound laminated to a polyethelene film. Minimum thickness 1 mm.
- .13 Touch-up paint: As recommended by prefinished material manufacturer.

2.5 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.

2.6 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.

2.7 EAVESTROUGHS AND DOWNSPOUTS

- .1 Form eavestroughs and downspouts from 22 ga. prefinished steel.
- .2 Eavestroughs to be 125 mm wide at top, square box profile.
- .3 Downspout to be 125 mm open face box profile downspout with hemmed returns.
- .4 Provide goosenecks, outlets and fastening straps from matching material, secured to downspouts with colour matching rivets.

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 SHEET METAL CLADDING INSTALLATION

- .1 Provide all required accessories to complete the installation at all corners, terminations and projections. Ribs shall be installed horizontally and metal sections shall overlap by a minimum of 150 mm. Use the longest lengths possible to minimize the number of joints.
- .2 Secure Z-girts to existing substrate vertically. Install one Z-girt at the wall head and one at the wall base and at a maximum spacing of 900 mm between bars to provide suitable substrate for cladding and flashing anchorage. Anchor Z-girt to substrate at 300 mm maximum c/c.
- .3 Siding to be secured to Z-girts with self-taping screws complete with neoprene washers. Colour to match siding. Fasteners shall be installed between each rib and at a consistent elevation.
- .4 Install siding in accordance with design intent and as indicated on shop drawings.
- .5 All perimeters shall be covered with specified sheet metal flashing and caulked at termination. Include for all J-trim, U-trim and closures at penetrations and drip edges at base.

3.4 REGLETS

- .1 Cut reglets in existing mortar joint or other materials as indicated. Unless otherwise indicated, cut continuous rectangular slot 25 mm deep height of mortar joint where metal flashings are to terminate. Clean free of dust and contaminants.
- .2 Install membrane flashing materials as indicated. Form metal flashing to fit into reglet slot with return.
- .3 Install lead wedges at maximum 300 mm c/c, keep back 6 mm from face of joint.
- .4 Install backer rod and sealant Type 'B' to fill reglet slot and shed water out onto metal flashing face. Tool uniformly.
- .5 Fasten metal flashing to vertical walls as indicated below reglet level, maximum 900 mm on centre.

3.5 SCUPPERS

- .1 Install scuppers as indicated with a minimum width of 200 mm, as detailed.

3.6 EAVESTROUGHS AND DOWNSPOUTS

- .1 Install eavestroughs and secure to building at 750 mm on centre with eavestrough spikes through spacer ferrules.
 - .1 Slope eavestrough continuously to downspout to promote positive drainage.
 - .2 Seal joints watertight.
- .2 Install downspouts and provide goosenecks back to wall.
 - .1 Secure downspouts to wall with straps at 1800 mm on centre, minimum 2 straps per downspout.

3.7 CLEANING

- .1 Proceed in accordance with Section 01 74 00 - Cleaning.
- .2 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.
- .3 For scratches and scuffs to be retained in the new installation, use touch up paint recommended by the metal material supplier.
- .4 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

PART 1 General

1.1 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
 - .2 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement
- .2 General Services Administration (GSA) - Federal Specifications (FS)
 - .1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Manufacturer's product to describe:
 - .1 Caulking compound.
 - .2 Primers.
 - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
 - .3 Submit 2 copies of WHMIS 2015 SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and Section 01 35 43 - Environmental Procedures.
- .3 Manufacturer's Instructions: Submit instructions to include installation instructions for each product used.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and 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 in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect joint sealants from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.4 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Proceed with installation of joint sealants only when:
 - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4°C.
 - .2 Joint substrates are dry.
 - .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .2 Joint-Width Conditions:
 - .1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.
- .3 Joint-Substrate Conditions:
 - .1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

PART 2 Products

2.1 SEALANT MATERIALS

- .1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.
- .2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.
- .3 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

- .1 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 Aquabarrier Mastic by IKO.
 - .3 Polybitume 570-05 by Henry.
 - .4 Or accepted alternate.

- .2 Silicones one part (Sealant Type 'B'):
 - .1 To CAN/CGSB-19.13 and ASTM C920, Type S, Grade NS, Class 35, colour to match surfaces.
 - .2 Standard of acceptance:
 - .1 Tremsil 400 by Tremco.
 - .2 Dowsil CWS by Dow.
 - .3 Or accepted alternate.
- .3 High temperature sealant (Sealant Type 'C'):
 - .1 One component, low modulus, gun grade, non-sag, moisture-cure polyurethane sealant with UV resistance, designed to cure into a fire rated, elastic weatherproof seal. Sealant shall comply with AS1530 Part 4-1997 (Fire Resistance Test of Elements of Building Construction) and AS4072 Part 1-1992 (Service penetrations and control joints). Tested by BRANZ.
 - .2 Standard of acceptance:
 - .1 Dow Corning 736 Silicone.
 - .2 Or accepted alternate.

2.3 JOINT CLEANER

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

2.4 PRIMER

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

PART 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for joint sealants 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.

3.2 SURFACE PREPARATION

- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
- .2 Clean bonding joint surfaces of harmful matter substances including 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 BACKUP MATERIAL

- .1 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.4 APPLICATION

- .1 Sealant:
 - .1 Apply sealant in accordance with manufacturer's written instructions.
 - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
 - .3 Apply sealant in continuous beads.
 - .4 Apply sealant using gun with proper size nozzle.
 - .5 Use sufficient pressure to fill voids and joints solid.
 - .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
 - .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
 - .8 Remove excess compound promptly as work progresses and upon completion.
- .2 Curing:
 - .1 Cure sealants in accordance with sealant manufacturer's instructions.
 - .2 Do not cover up sealants until proper curing has taken place.
- .3 Install sealant Type 'B' at exterior perimeter or window and door frames.
- .4 Install sealant Type 'C' at all B-vent collars and at all high temperature locations.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day. Clean adjacent surfaces immediately.
 - .2 Remove excess and droppings, using recommended cleaners as work progresses.
 - .3 Remove masking tape after initial set of sealant.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

- .3 Waste Management: separate waste materials for recycling.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 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

