

GENERAL

1.1 PRICING

- .1 All costs associated with the work required by and associated with this Section shall be included as part of the Contract Price and in the price listed in item #1 of the Bid Form.

1.2 GENERAL INSTRUCTIONS

- .1 Read and conform to:
 - .1 the General Conditions and the Supplementary Conditions of the Contract.
 - .2 Division 01 requirements and documents referred to therein.

1.3 SUMMARY

- .1 Work Included: Provide sheet metal flashing and trim including but not limited to following:
 - .1 site-fabricated flashings concealed from view
 - .2 site-fabricated flashings exposed to view
 - .3 related flashing accessories.
 - .4 Auxiliary materials required for complete installation.
- .2 Related Requirements: Specifications throughout the entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.4 REFERENCES

- .1 Reference Standards: Latest published editions of reference standards listed in this Section in effect as of the closing date and time of the Request for Tenders for the Contract, including any amendments adopted, are applicable unless otherwise indicated.

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Installation Meetings:
 - .1 Prior to starting work of this Section, convene a pre-installation meeting at Project site to review Project requirements and site conditions with pertinent parties. Conform to requirements of Section 01 30 00.
 - .1 review installation procedures and coordination required with related work including roofing requirements for interfacing with roof accessories and roof mounted equipment.
 - .2 review fire hazard assessment of work prior to commencement of torch application.
 - .3 review and finalize construction schedule and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 - .4 review structural loading limitations of roof deck during roofing.
 - .5 review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs and condition of other construction that will affect roofing system.
 - .6 review temporary protection requirements for roofing system during and after installation.

- .7 review flashing repair procedures after installation.
- .2 Coordination:
 - .1 Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.
 - .2 Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

1.6 SUBMITTALS

- .1 Product Data: Submit manufacturer's literature and data sheets for each type of material provided under this Section for Project in accordance with requirements of Section 01 30 00.
 - .1 Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving, and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.
- .2 Safety Data Sheets (SDS): Submit SDS for inclusion in Operation and Maintenance Manual specified in Section 01 70 00, for adhesives, sealants and any other material designated by Consultant.
- .3 Shop Drawings: Submit Shop Drawings for work of this Section in accordance with Section 01 30 00.
 - .1 Submit fully detailed Shop Drawings showing proposed method of shaping, forming, jointing, fastening and application of sheet metal work, in accordance with the Contract Documents. Submit lists of materials to be used to Consultant.
- .4 Samples: Submit samples in accordance with Section 01 30 00. Submit samples for each type of sheet metal flashing, trim, and accessory exposed to view indicated with factory-applied colour finishes. Submit in sizes indicated below.
 - .1 Sheet Metal Flashing: 300 mm (12 inches) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
 - .2 Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 300 mm (12 inches) long and in required profile. Include fasteners and other exposed accessories.
 - .3 Accessories and Miscellaneous Materials: Full-size Sample.
 - .4 Submit a representative sample section of prepainted metal flashing illustrating "S" lock jointing, minimum 600 mm (24 inch) long, method to accommodate thermal movement, cleats and fasteners. Submit sample well in advance of material fabrication.
- .5 Wind Uplift Resistance Calculations: Provide calculations or reports sealed by a Professional Engineer, licensed to practice in Province of Ontario, demonstrating that roof assembly design meets wind uplift requirements specified in this Section. Alternatively, wind uplift calculations prepared by roofer or roof manufacturer determined using NRC's Wind-RCI calculators or equivalent tools demonstrating compliance will be deemed acceptable.

1.7 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Manufacturers: Provide Products for Work of this Section by manufacturer with minimum 10 years' experience in the manufacture of such materials.

- .2 Installers: Provide work of this Section executed by competent installers with minimum 5 years' experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.
- .3 Sealant Compatibility and Adhesion Testing: Use sealant manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
- .4 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.
- .5 Mock-ups: Provide Mock-ups in locations designated by Consultant and as required to demonstrate quality of workmanship. Maintain Mock-ups during construction in an undisturbed condition as a standard for judging the completed work. Coordinate with adjacent building envelope material mock-ups including roofing, cladding, insulation and air barrier work

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- .2 Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.
- .3 Replace damaged work which cannot be satisfactorily repaired, restored or cleaned at no cost to Owner.

1.9 WARRANTY

- .1 Warrant work of this Section including finish for period of 5 years from Substantial Performance of the Work against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner.

PART 2 - PRODUCTS

2.1 DESIGN AND PERFORMANCE REQUIREMENTS

- .1 Design sheet metal flashing and trim assemblies to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction in accordance with requirements of authorities having jurisdiction.
- .2 As minimum ensure flashing system comply with requirements CRCA's "Roofing Specifications FL Series" details and SMACNA's "Architectural Sheet Metal Manual".
- .3 Ensure completed sheet metal flashing and trim do not rattle, leak, or loosen, and remain watertight.
- .4 Select appropriate type of flashings on basis of compatibility when incorporated into roofing system and in a rigid manner in finished roofing system.
- .5 Design exterior envelope system to minimize thermal bridging using proven installation methods and details consisting of a combination of low conductivity materials, thermal breaks, and insulation to minimize heat loss and enhance assemblies' effective R-values.

- .6 Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
- .1 Temperature Change: 67 deg C (120 deg F), for ambient temperature; 100 deg C (180 deg F), for material surfaces.

2.2 PREFINISHED SHEET METALS

- .1 Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- .2 Galvanized Steel Sheet: Provide zinc-coated (galvanized) steel sheet in accordance with ASTM A653/A653M, Z275 (G90) coating designation; prepainted by coil-coating process to comply with ASTM A755/A755M.
 - .1 Surface: Smooth, flat.
 - .2 Minimum thickness: 0.61 mm (24 ga) thickness.
 - .3 Exposed Finish:
 - .1 Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with dry film thickness of not less than 0.005 mm (0.2 mil) for primer and 0.02 mm (0.8 mil) for topcoat.
 - .2 Colour: As selected by Consultant from manufacturer's full range.
 - .3 Basis-of-Design: "WeatherXL" by Sherwin Williams (previously Valspar) or approved equivalent by PPG.
- .3 Aluminum Sheet: ASTM B209M (ASTM B209), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
 - .1 Surface: Smooth, flat.
 - .2 Minimum thickness: 2 mm (0.08 inch) thickness.
 - .3 Exposed Finish:
 - .1 Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
 - .2 Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both colour coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - .1 Basis-of-Design: "Duranar XL" by PPG or approved equivalent by Sherwin Williams (previously Valspar).
 - .3 Colour: As selected by Consultant from manufacturer's full range.
- .4 Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.013 mm (0.5 mil).

2.3 UNDERLAYMENT MATERIALS (AVB-4)

- .1 Self-Adhering, High-Temperature Sheet Underlayment: Minimum 0.76 mm (30 mils) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to

withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.

- .1 Thermal Stability: ASTM D1970 or equivalent to CAN/CGSB-51.33; stable after testing at 116 deg C (240 deg F) or higher.
- .2 Low-Temperature Flexibility: ASTM D1970 or equivalent to CAN/CGSB-51.33; passes after testing at minus 29 deg C (20 deg F) or lower.
- .3 Basis-of-Design: "Blueskin PE200 HT" by Henry Company or approved equivalent as follows:
 - .1 "Grace Ultra" by GCP Applied Technologies.
 - .2 "Lastobond Shield HT" by Soprema

2.4 FLEXIBLE FLASHING

- .1 Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 1.0 mm (0.039 inch)
 - .1 Acceptable Products:
 - .1 "CCW-705-TWF Thru-Wall Flashing" by Carlisle Coatings & Waterproofing
 - .2 "Perm-A-Barrier Wall Flashing" by GCP Applied Technologies.
 - .3 "Blok Lok Airtight 40 Self Adhered Air and Vapour Barrier" by Hohmann & Barnard, Inc.
 - .4 "Air-Shield Thru-Wall Flashing" by W.R. Meadows Inc., Canada
 - .5 "Blueskin TWF" by Henry Company
 - .6 "AquaBarrier™ TWF" by IKO Industries Ltd.
 - .7 "ExoAir TWF" by Tremco Incorporated, an RPM company
 - .8 "Sopralseal WFM" by Soprema Inc.
 - .2 Primer: as per manufacturer's recommendation.
 - .3 Mechanical fasteners: recommended by flashing manufacturer to suit project requirements.

2.5 LIQUID FLASHING MATERIALS

- .1 Liquid-Applied Flashing: Low-VOC resin-based, seamless, reinforced waterproofing system flashing that is compatible with adjacent materials.
 - .1 Provide waterproofing of atypical flashing details including, but not limited to, mechanical equipment, roof/wall penetrations and similar locations.
 - .2 Acceptable Products:
 - .1 "Alsan Flashing" by Soprema Inc.
 - .2 "MS Detail" by IKO Industries.
 - .3 "PermaFlash" by Johns Manville.

2.6 ACCESSORIES

- .1 Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal unless otherwise indicated.
- .2 Isolation coating: conforming to ASTM D1187, alkali resistant bituminous paint or epoxy resin solution to provide dielectric separation which will dry to be tack-free and withstand high temperatures.
- .3 Roof Drainage Sheet Metal Fabrications: Fabricate hanging gutters, downspouts, parapet scuppers, splash pans and similar fabrications in conformity to CRCA, Roofing Practices Manual, designed and sized to withstand design loads in accordance with applicable building code and referenced standards.
- .4 Sealants: conforming to ASTM C920 or CAN/CGSB-19.13-M, in accordance with requirements of Section 07 92 00. Confirm compatibility with adjacent materials.
- .5 Bedding Compound: Rubber-asphalt type.
- .6 Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- .7 Starter Strips: Of same material as flashing used, 1.2 mm (18 ga), minimum 50 mm (2 inch) wide, interlocked with metal flashing.
- .8 Flashing Cleats, Starter Strips, Skirts, Clips and Backup Plates: Same as specified sheet metal, unless indicated otherwise, make cleats 50 mm (2 inch) wide and interlocked with metal flashing.
- .9 Fasteners: Use fasteners designed and sized to withstand design loads in accordance with applicable building code and referenced standards.
 - .1 Exposed Fasteners: Heads matching colour of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - .2 Blind Fasteners: High-strength stainless-steel rivets suitable for metal being fastened.
 - .3 Use fasteners manufactured from Series 300 stainless steel with and finish as flashing metal or material compatible with material being fastened with respect to galvanic reaction. Size and type to suit applicable conditions. Use stainless steel where connecting directly to concrete.
 - .4 Nails, screws, bolts and other fastening devices: CSA B111, Table 12, finished to match metal being fastened where exposed to view by means of plastic caps or factory-applied coating.
 - .5 Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

2.7 FABRICATION

- .1 Fabricate copings, parapet vertical flashings, flashings, curb counter flashing starter clips, strips, downspouts, parapet scuppers, and miscellaneous flashings in accordance with CRCA recommendations and to detail indicated.
- .2 Form sections true to shape, accurate in size, square, and free from distortion or defects. Equally space joints in any one run of flashing to suit building module or window spacing and locate in consultation with Consultant before installation commences.
- .3 Fabricate flashings meeting the Project requirements for roof mounted equipment. Provide seismic bracing as required.

- .4 Fabricate cleats and starter strips of same material as sheet, minimum 50 mm (2 inch) wide, interlockable with sheet.
- .5 Form pieces in longest practical lengths. Make joints to permit thermal movement. Make flashing surfaces free from building, warp, wave, dents, oil canning or other defects.
- .6 Hem exposed edges on underside 13 mm (1/2 inch); mitre and seam corners.
- .7 Form material with standing seam where applicable.
- .8 Fabricate corners from one piece with minimum 450 mm (18 inch) long legs; seam for rigidity, seal with sealant. Make corners square and surfaces straight and in true planes.
- .9 Fabricate vertical faces with bottom edge formed outward 6 mm (1/4 inch) and hemmed to form drip.
- .10 Fabricate flashings to allow toe to extend 50 mm (2 inch) over roofing as applicable. Return and brake edges.
- .11 Form sheet metal pans 150 mm (6 inch) nominal size, with 75 mm (3 inch) upstand, and 100 mm (4 inch) flanges. Fill pans watertight with liquid flashing as specified in this Section.

2.8 FINISHES

- .1 Shop prepare and prime exposed ferrous metal surfaces.
- .2 Concealed metal surfaces to receive one coat of bituminous paint, minimum 0.4 mm (1/64 inch) thickness.
- .3 Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Site Verification of Conditions:
 - .1 Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.
- .2 Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place and nailing strips located.
- .3 Verify membrane termination and base flashings are in place, sealed and secure.
- .4 Notify Consultant of any unsatisfactory conditions. Do not proceed with this work until conditions have been corrected.
- .5 Commencement of work shall imply acceptance of conditions and substrates.

3.2 PREPARATION

- .1 Field measure site conditions prior to fabricating work.
- .2 Install starter, edge strips and cleats before starting installation.
- .3 Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
- .4 Insert flashings into reglets to form tight fit. Secure in place with plastic wedges. Seal flashings into reglets with sealant.

- .5 Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations accepted by Consultant.
- .6 Apply plastic cement compound between metal flashings and felt flashings.
- .7 Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- .8 Provide and maintain continuity of air/vapour barrier to adjacent dissimilar materials. Seal to form weathertight seal between flashing and adjoining surfaces and between flashing and other work.

3.3 INSTALLATION

- .1 Conform to drawing details included in CRCA manuals (FL series details) as applicable. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
- .2 Install copings, curb coverings, starter strips, (back-up plates), pipe collars and other flashings to details shown on Drawings.
- .3 Exposed fastenings will not be permitted in the Work.
- .4 Install starter strips where indicated or required to present a true, non-waving, leading edge. Anchor to back-up to provide rigid, secure installation.
- .5 Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
- .6 Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

3.4 UNDERLAYMENT INSTALLATION

- .1 Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 150 mm (6 inches) staggered 600 mm (24 inches) between courses. Overlap side edges not less than 90 mm (3-1/2 inches). Roll laps and edges with roller. Cover underlayment within 14 days.

3.5 SHEET STEEL FLASHINGS

- .1 End joints where adjacent lengths of metal flashing meet shall be made using an "S-lock" joint as detailed on Drawings. Execute by inserting the end of 1 coping length in a 25 mm (1 inch) deep "S" lock formed in the end of the adjacent length. Extend concealed portion of the "S" lock 25 mm (1 inch) outwards and nail to substrate. Face nailing of joints will not be permitted.

3.6 ALUMINUM FLASHINGS

- .1 Make end joints where adjacent lengths of metal flashing meet, using a 300 mm (12 inch) long back-up flashing secured in place before installing flashing. Apply beads of caulking compound on face of back-up plate to seal ends of metal flashing. Leave 13 mm (1/2 inch) wide space between ends of adjacent lengths of metal flashing. Fabricate back-up plates of same material and finish as metal flashing with which it is being used. Make back-up plate profile of flashing allowing for metal thickness.
- .2 Separate dissimilar metals with a bituminous coating or polymer-modified, bituminous sheet underlayment.

3.7 SEALING

- .1 Use sealant-filled joints unless otherwise indicated. Seal as required to form weathertight seal between flashing and adjoining surfaces and between flashing and other work of this Section.
- .2 Provide bedding between members where possible and with neatly formed caulking bead where exposed.
- .3 Provide non expansion, but movable, joints in metal to accommodate elastomeric sealant. Form joints to completely conceal sealant.

3.8 CLEANING AND PROTECTION

- .1 Clean off excess sealants.
- .2 Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- .3 Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION