

1 General

1.1 **SECTION INCLUDES**

- .1 Design, labour, Products, equipment and services necessary for metal roofing work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ANSI B18.6.4, Screws, Tapping and Metallic Drive, Inch Series, Thread Forming and Cutting.
- .2 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
- .3 ASTM A792-M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .4 ASTM C612, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
- .5 ASTM C1177M, Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- .6 ASTM E84, Test Method for Surface Burning Characteristics of Building Materials.
- .7 CAN/CGSB-19.13-M, Sealing Compound, One Component, Elastomeric, Chemical Curing.
- .8 CAN/CSA S136-M, Cold Formed Steel Structural Members.
- .9 CAN/CSA S136.1-M, Commentary on CAN/CSA S136-M, Cold Formed Steel Structural Members.

1.3 **DESIGN REQUIREMENTS**

- .1 Design metal roofing elements in accordance with CAN/CSA S136-M, S136.1-M and to withstand live, dead, lateral, wind, seismic, handling, transportation and erection loads.
- .2 Design metal roofing elements in accordance with following Climatic Design Data for Barrie contained in Ontario Building Code:
 - .1 Design temperature: January 1%, July 2 1/2%.
 - .2 Wind (Hourly wind pressures): one (1) in 50 year occurrence.
 - .3 Earthquake: Seismic Data as listed.
- .3 Design metal roofing system to limit deflection under design loads to L/240.

- .4 Design metal roofing system to prevent restriction of thermal induced movement which would induce deformation such as warping, buckling, and failure of joint seals and fasteners.
- .5 Design metal roofing system to prevent the infiltration of water into the roof system and to prevent roofing system components from vibrating due to design wind loads.
- .6 Incorporate design of snow fencing into roof design to meet design criteria specified herein. Snow fencing to be of same material and colour as roof system

1.4 **SUBMITTALS**

- .1 Product data:
 - .1 Submit copies of manufacturer's Product data in accordance with Section 01 30 00 indicating:
 - .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations.
 - .2 Product transportation, storage, handling and installation requirements.
- .2 Shop drawings:
 - .1 Submit shop drawings in accordance with Section 01 30 00 indicating:
 - .1 Arrangements of sheets and joints, materials, thicknesses, dimensions, layouts, types and locations of supports and fasteners and special shapes.
 - .2 Relationship of panels to structural frame.
 - .3 Details of waterproofing membrane, insulation, connections, snow fencing and all other components in the system.
- .3 Samples:
 - .1 Submit following samples in accordance with Section 01 30 00.
 - .1 Submit 300 x 300 mm samples of each sheet metal material and finish.
 - .2 Waterproofing membrane.
 - .3 Insulation.
- .4 Reports: Submit written field inspection and test report results within three (3) days after each inspection.
- .5 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.

1.5 QUALITY ASSURANCE

- .1 Installers qualifications: Perform work of this Section by a company that has a minimum of five (5) years proven experience in the installation of metal roofing of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.
- .2 Retain a Professional Engineer, licensed in Province of Ontario, with experience in metal roofing work of comparable complexity and scope to perform following services as part of work of this Section:
 - .1 Design of metal roofing and snow fencing and framing for snow fencing and attachment.
 - .2 Review, stamp, and sign shop drawings.
 - .3 Conduct shop and on-Site inspections and prepare and submit inspection reports.
- .3 Mock-up:
 - .1 Construct one full scale 1200 mm wide x 1800 mm long mock-up panel of metal roofing construction, in location acceptable to Consultant.
 - .2 Demonstrate installation of underlay board, insulation, metal roofing, finish, and quality of workmanship.
 - .3 Mock-up may form part of final Work, if acceptable to Consultant. Remove and dispose of mock-ups which do not form part of Work.
- .4 Pre-installation meeting: Arrange with manufacturer's representative, Contractor, and Consultant to inspect substrates, and to review installation procedures 48 hours in advance of installation.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Stockpile panels tilted to provide water run-off, free from ground contact on firm, level, non-staining supports extending full width of sheet and spaced not more than 450 mm apart. Cover components with opaque polyethylene sheet. Vent to allow air movement.

1.7 EXTENDED WARRANTY

- .1 Submit an extended warranty for metal roofing work In accordance with the General Conditions, except that the warranty is extended to 2 years from date of Substantial Performance.
 - .1 Warrant against panel warping, twisting, failure, jointing, finish failure, water penetration below waterproofing membrane and failure to drain water from rainscreen cavity.
 - .2 Coverage: Complete replacement including affected adjacent parts.

- .2 Manufacturer's Warranty: Provide metal roof manufacturer's written warranty naming Owner as beneficiary and covering all materials with all supports and accessories for a complete system and failure of factory-applied exterior finish on metal roof panels within the warranty period; warrant finish per ASTM D4214 for chalk not in excess of eight (8) NBS units and fade not in excess of five (5) NBS units. Warranty period for material and finish: ~~Ten~~ **Twenty-Five** (25) years from date Work is certified as substantially performed.

2 Products

2.1 MATERIALS

- .1 All materials under work of this Section, including but not limited to, sealants and coatings are to have low VOC content limits.
- .2 Standing seam metal: ASTM A653M; 0.61 mm (24 Ga.) minimum base metal, Z275, galvanized steel. 'CRS-38' by CR Systems or 'Tradition 150' by VicWest Steel, or by Agway Metals Inc., Roll From Group or approved equivalent.
- .3 Metal roofing finish: Perspectra Series coating system by ArcelorMittal Dofasco, or WeatherX by Vicwest Steel or 'SMP Prepainted Steel' by Cascadia Metals Ltd. or approved equivalent. Colour as selected by Consultant.
- .4 Galvalume: ASTM A792M, AZM165 coating designation, 0.61 mm thick minimum base metal.
- .5 Steel deck: Refer to Structural Drawings and Specification for steel deck.
- .6 Deck closures: ASTM A653/A653M, Z275 hot-dip galvanized steel, 0.61 mm thick base steel thickness.
- .7 Deck reinforcements: ASTM A653/A653M, Z275 hot-dip galvanized steel, 2.0 mm thick base steel thickness.
- .8 Underlay board: ASTM C1177; six (6) mm thick, 'Dens-Deck Roof Board' by Georgia-Pacific Corp. or approved equivalent; tested to ASTM E84, 0 flame spread, 0 smoke developed, glass fibre faced both sides, silicone treated gypsum core. 1200 mm wide sheets x maximum practical lengths to minimize end joints.
- .9 Waterproof membrane: 1.0 mm thick composite sheet comprised of SBS modified bitumen with woven polyethylene reinforcement; 'CCW 300 HT' by Carlisle Coatings and Waterproofing, 'Lastobond Shield HT' by Soprema, 'Platinum HT SA' by FT Synthetics, or by Henry Company Canada or approved equivalent. Primer recommended by membrane manufacturer.
- .10 Drainage mat: 7.6 mm thick, 'Viper CDR Vent' by Keene or approved equivalent.

- .11 Z girts and C channels: CAN/CSA S136-M; Minimum 1.2 mm, Z275 galvanized Z girts and C channels. Depth: As indicated on Contract Drawings.
- .12 Seam clips: ASTM A653M; Z275 galvanized steel, thermal clip system.
- .13 Insulation: ASTM C612, 96 kg/m³, Semi-rigid mineral fibre. Thickness as indicated on Contract Drawings. Temporary adhesive: As recommended by insulation manufacturer.
 - .1 'Rockboard 60' by Rockwool Inc.
 - .2 Owens Corning Canada Inc.
 - .3 Or approved equivalent
- .14 Fascia, trim, closure, and flashings: Material, finish, colour, hidden fastener and thickness to match metal roofing material.
- .15 Snow fencing: Fabricated from galvanized steel and prefinished to match metal roof; 'Snow Fence' by TRA Snow Fences Inc., 'Snow Guard' by Vicwest, or approved equivalent.
- .16 Screw fasteners: Hot dipped galvanized steel fasteners. All fasteners to be concealed and hidden. Fasteners to be complete with coloured heads to match metal roofing.
- .17 Sealant: CAN/CGSB-19.13-M. Primer as recommended by sealant manufacturer.

2.2 **FABRICATION**

- .1 Fabricate roof components in accordance with reviewed shop drawings factory-ready for field installation.
- .2 Fabricate individual metal roofing panels in maximum lengths.
- .3 Fabricate metal roofing panels square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .4 Notch Z girts and C channels as required to allow for drainage of rainscreen cavity.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **STEEL DECK**

- .1 Install steel deck in accordance with CSA S136 and manufacturers written instructions ensuring it is securely fastened with minimum bearing on structural support equal to depth of steel roof deck profile.
- .2 Fasten steel roof deck to structural supports with a maximum fastener spacing along bearing supports of 400 mm or two flute spacings, whichever is less.
- .3 Provide arc spot welds with a nominal 20 mm top diameter.
- .4 Mechanically fasten side laps of adjacent units at maximum 900 mm. Provide closer spacing where required by design.
- .5 Provide deck closures and reinforcing as required for design loads.

3.3 **UNDERLAY BOARD**

- .1 Stagger underlay board joints at least 25% of full board length. Orient long side of boards perpendicular to metal deck flutes. Locate end joints over supporting ribs of metal deck.
- .2 Do not install imperfect, damaged or damp boards. Butt boards together with no spaces between boards.
- .3 Screw fasten underlay board to metal deck substrate at 600 mm o.c. and continuously around perimeter of each board at 300 mm o.c.. Maintain 15 mm minimum from edge of board to centre of screw.

3.4 **WATERPROOF/AIRSEAL MEMBRANE**

- .1 Install primer and waterproof membrane continuously over underlay board, in accordance with manufacturer's instructions.
- .2 Overlap waterproof membrane 50 mm along sidelaps and 75 mm on end laps and lap in direction of waterflow.
- .3 Coordinate airseal transition to adjacent parts of work.

3.5 **GIRTS AND CHANNELS**

- .1 Install Z girts, fastened through waterproof membrane and into structural framing beneath. Orient Z girts to drain water from rainscreen cavity.
- .2 Frame roofing system edges, with C channels and orient channel webs to face outwards.

3.6 METAL ROOF INSULATION

- .1 Prior to installation of insulation, examine waterproofing membrane and make good damage.
- .2 Install metal roof insulation in continuous contact with waterproof membrane and fitted between Z girts and C channels. Butt boards together with no spaces between boards. Areas of insulation system having voids will be rejected.
- .3 When cutting insulation board, cut completely through board thickness and trim to provide plain butt joints. Do not break or tear insulation board to fit detail.

3.7 FASCIA, TRIM, CLOSURES, AND FLASHINGS

- .1 Form and profile fascia and trim including inside and outside corners, flashing, edgings, cap strips, drips, fillers, closure strips, and starter strips in accordance with the drawings.
- .2 Flashings to utilize a "S" locking joint for concealed fastening.
- .3 Cut neat holes in metal roofing to accommodate roof penetrations and install flashing for a watertight installation.

3.8 METAL ROOFING (STANDING SEAM)

- .1 Install metal roofing in accordance with reviewed shop drawings and manufacturer's written instructions. Used concealed fasteners unless otherwise approved by the Consultant.
- .2 Install seam clips spaced as indicated on reviewed shop drawings to comply with design criteria. Secure cleats with two fasteners each minimum, into Z girts or metal deck.
- .3 Apply sheet metal roofing beginning at eaves. Loose lock pans to valley flashing and edge strips at eaves and gable rakes.
- .4 Fold lower ends of seams at eaves over at 45° angle. Terminate standing seams at ridge and hips by turning down in tapered fold.
- .5 Install metal roofing panels in one piece, for entire slope, except as indicated otherwise. In locations that roof panels cannot be installed in one piece, provide 100 mm starter strip to join the panels together. Provide a continuous sealant bead under starter strip.
- .6 Metal roof panels terminating at eaves or valleys shall not have a raw metal edge or exposed fasteners. Fold panel ends and install in accordance with reviewed shop drawings.

- .7 Insert metal roof panels terminating at hips or ridges into concealed metal closures. Metal closures shall allow for expansion of the metal roof panel and also act as a starter strip for hip or ridge flashings.
- .8 Install valley sheets not exceeding three (3) m in length. Shingle lap joints 150 mm in direction of flow. Extend valley sheet minimum 150 mm under roofing sheets. Double fold valley and roofing sheets and secure at 450 mm oc.
- .9 Install snow fencing in accordance with manufacturer's instructions and reviewed shop drawings.
- .10 Tapered roof panels to be one piece.
- .11 Apply isolation coating to metal surfaces in contact with concrete or mortar.
- .12 Remove and replace damaged metal roofing. Do not touch-up damaged panels.

3.9 **SEALANT**

- .1 Seal where necessary to form weathertight seal between flashing and adjoining surfaces and between flashing and other work. Sealing work consists of bedding between members where possible. Dry tool sealant to concave profile where exposed.

3.10 **CLEANING AND TOUCH-UP**

- .1 Clean exposed finished surfaces of complete installation free of dirt, grease and smudges.
- .2 Touch-up scratches with air dry formulation of coating system to match original factory finish.

END OF SECTION