SECTION 07 41 00

PREFORMED METAL STANDING SEAM ROOFING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. This section covers the pre-finished, pre-fabricated architectural standing seam roof system. All metal trim, accessories, fasteners, and sealants indicated on the drawings and required for a waterproof system as part of this section.

B. Roof underlayment.

C. Gutters and downspouts

D. Sealants are specified in Section 07920 Joint Sealants.

1.2 DEFINITIONS

A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, snow guard rail system and accessories necessary for a complete weathertight roofing system.

B. References:

1. American Society for Testing and Materials (ASTM)
    a. ASTM A 653: Steel Sheet, Zinc Coated by the Hot Dip Process
2. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
    a. SMACNA Architectural Sheet Metal Manual, 7th edition
3. American Iron and Steel Institute (AISI)
    a. AISI Cold Formed Steel Design Manual
4. Metal Construction Association
    a. Preformed metal Wall Guidelines
5. Code References
    a. ASCE, Minimum Loads for Buildings and Other Structures
    b. VUSBC Virginia Uniform Statewide Building Code

1.4 QUALITY ASSURANCE

A. Installer qualifications: Roofing installer shall have received training from metal panel manufacturer for the installation of the specified roof panel system, and use of equipment authorized and inspected by the metal panel manufacturer.

B. Manufacturer and erector shall demonstrate experience of a minimum of five (5) years in this type of project.

C. Panels shall be factory-produced only. No portable, installer-owned or installer-rented machines will be permitted.
D. Material to comply with ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process

1.5 ROOF SYSTEM PERFORMANCE TESTING

A. General Performance: Metal roof panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation or other defects in construction.

B. Roof System shall be designed to meet VUSBC Code Wind Load requirements.

C. Panels to meet:

1. Water Penetration: When tested per ASTM E-283/1680 and ASTM E-331/1646 there shall be no uncontrolled water penetration or air infiltration through the panel joints.
2. UL 2218 - Impact Resistance rated.

1.6 WARRANTIES

A. Finish warranty: Manufacturer's standard form in which manufacturer agrees to repair finish or replace standing seam metal roof panels that show evidence of deterioration of factory-applied finish within specified warranty period.

1. Exposed Panels Finish - deterioration includes the following:
    a. Color fading more than 5 hunter units when tested according to ASTM D 2244
    b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214
    c. Cracking, checking, peeling or failure of a paint to adhere to a bare metal.
2. Warranty Period: 20 (minimum) Years from the date of substantial completion.

B. Contractor shall furnish written warranty for a two (2) year period from date of substantial completion of building covering repairs required to maintain roof and flashings in watertight condition.

1.7 SUBMITTALS

A. Furnish detailed drawings showing profile and gauge of exterior sheets, location and type of fasteners, location, gauges, shape and method of attachment of all trim locations and types of sealants, and any other details as may be required for a weather-tight installation.

B. Provide finish samples of all colors specified.

C. Shop drawings: Show fabrication and installation layouts of metal roof panels, metal wall panels or metal soffit panels, details of edge conditions, side-seam joints, panel profiles, corners, anchorages, trim, flashings, closures and accessories, and special details. Distinguish between factory and field-assembled work.

D. Coordination Drawings: Roof plans, drawn to scale, on which the following are shown and coordinated with each other:

1. Roof panels and attachments
2. Roof-mounted items including snow guards and items mounted on roof curbs.

1.8 DELIVERY, STORAGE AND HANDLING

A. Ordering: Comply with manufacturer's ordering instruction and lead time requirements to avoid construction delays.

B. Deliver components, sheets, metal roof panels and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.

C. Unload, store and erect metal roof panels in a manner to prevent bending, warping, twisting and surface damage.

D. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting or other surface damage.

E. Protect strippable protective coating on any metal coated product from exposure to sunlight and high humidity, except to the extent necessary for material installation.

1.9 PROJECT CONDITIONS

A. Weather Limitations: proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed.

B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

1.10 COORDINATION

A. Coordinate sizes and locations of equipment supports and roof penetrations with actual equipment provided.

B. Coordinate metal roof panels with rain drainage work, flashing, trim, parapet walls and other adjoining work to provide a leakproof, secure and noncorrosive installation.

PART 2 - PRODUCTS

2.1 ROOFING SYSTEM DESCRIPTION

A. Roofing System: Standing seam metal roof panels and other components, together forming a watertight assembly having the following characteristics:
   1. Warranty: 20 years (minimum).
   2. Panel Seam Type: Mechanically double-locked in the field with a mechanical seamer.
   3. Panel Material: Steel, 24 gauge, with fluoropolymer finish, over G90 hot-dipped galvanized coating.
   4. Color: To be selected from manufacturer's standard colors.
   5. Design Loads: In accordance with ASCE 7, current edition.
      a. Design Snow Load: Not less than specified on the drawings.
      b. Maximum Deflection Under Snow Load: Not more than L/180 or as recommended by ASCE 7, whichever is less.
      c. Wind Uplift Resistance: Class 90 rating, minimum, when tested in accordance with UL 580.
      d. Wind Pull-Off Resistance: No failure of roof panel or fasteners when tested in accordance with ASTM E1592 for negative loading equal to negative design wind load; for assemblies not tested, capacity for gauge, span, or loading may be determined by interpolating between test values only.
   6. Air Infiltration: Maximum of 0.007 cfm/sq ft at pressure differential of 6.24 psf, when tested in accordance with ASTM E1680.
   7. Water Leakage: No uncontrollable water leakage at pressure differential of 2.86 psf, when tested in accordance with ASTM E1646.
   8. Impact Resistance: Minimum of Class 4, when tested in accordance with UL 2218.
   9. Thermal Effects: Design roof panels and their attachment to allow free movement in response to expansion and contraction forces resulting from temperature variation, as specified in the MBMA Metal Roofing Systems Design Manual.
   10. External Fire Resistance: Class A, when tested in accordance with ASTM E108 or UL 790.
   11. Provide all necessary members and connections, whether indicated in the manufacturer's standard detail drawings or not.
   12. Accessories and Their Fasteners: Capable of resisting the specified design wind uplift forces and allowing for thermal movement of the roof panel system, not restricting free movement of the roof panel system resulting from thermal forces except at designed points of roof panel fixity.

2.2 ACCEPTABLE MANUFACTURERS

A. Acceptable Manufacturers - Metal Roof Panels and Associated Sheet Metal Components: Firestone Building Products LLC, Carmel, IN: www.firestonebpco.com ; ATAS International, Inc., Allen Town PA. www.ATAS.com ; Fabral, Lancaster PA www.fabral.com, Metl-Span, Division of NCI Group Inc, Lewisville TX www.metlspan.com or McElroy Metal, 1500 Hamilton Road, Bossier City, LA. www.mcelroymetal.com
   1. Provide all components of system supplied or specified by same manufacturer.

B. Manufacturer of Insulation: Same manufacturer as metal roof panels.

C. Substitutions: - Product Requirements.
   1. Substitutions will be considered in the shop drawing submittal phase, contractor shall submit evidence in the shop drawing submittal outlining how the proposed substitution complies with the specified requirements and meets or exceeds the original specified product.

2.3 ROOF PANELS AND SHEET METAL FABRICATIONS

A. Roof Panels “Basis of Design”: Firestone UNA-CLAD UC-6 Roofing Panel; factory formed double-lock standing seam, mechanically seamed in the field.
   1. Seam Height: 1 ½ inch - 2 inch profiles are acceptable.
   2. Seam Spacing (Panel Width): 18 inches.
   3. Profile: Flat, with no secondary ribs or secondary profiles.
   4. Texture: Smooth. (Striations are acceptable)
   5. Form roofing panels in longest practical lengths, true to shape, accurate in size, square, and free from distribution or manufacturing defects.

B. Steel Sheet: ASTM A653/A653M, lock-forming quality, extra smooth, tension-leveled, galvanized/galvannealed steel, minimum spangle.

C. Fluoropolymer Coating: 70 percent full strength Kynar 500/Hylar 5000.
   1. Exposed Surface: 1.0 mil plus/minus 0.1 mil total dry film thickness.
   2. Concealed Surface: 0.2 to 0.3 mils total dry film thickness

2.4 ACCESSORY MATERIALS

A. Trim: Trim shall be fabricated of the same material and finish to match the profile, and will be press broken in lengths of 10 to 12 feet. Trim shall be formed only by the manufacturer of their approved dealer. Trim to be erected in overlapped condition. Use lap strips only as indicated on drawings. Miter conditions shall be factory welded material to match the sheeting.

B. Closures: use composition or metal profiled closures at the top of each elevation to close ends of the panels. Metal closures to be made in the same material and finish as face sheet.

C. Fasteners: Fasteners shall be of type, material, size, corrosion resistance, holding power and other properties required to fasten miscellaneous framing members to substrates in strict accordance with metal roof panel manufacturers requirements.

D. Tape Sealant: Pressure sensitive, 100 percent solid, sealing tape with release paper backing; permanently elastic, non-sagging, non-staining; approved by roof panel manufacturer.

E. Bulk Sealant: Approved by roof panel manufacturer.

F. Substrate shall be Nailbase.

G. Roofing Underlayment

1. On all surfaces to be covered with roofing material, furnish and install a 40 mil "Peel & Stick membrane", required as outlined by metal panel manufacturer. Membrane to be a minimum of 40 mil thickness, smooth, non-granular, by one of the following manufacturers:
   a. W.R Grace "Ice & water Shield"
   b. Cetco Strongseal
   c. Carlisle CCW WIP 300HT
   d. Interwrap Titanium PSU
   e. MFM Corp "Wind & Water Shield"
   f. Polyguard Deck Guard HT of Polyglas HT
   g. Tamko TW Tile and Metal Underlayment
2. Underlayment shall be laid in horizontal layers with joints lapped toward the eaves a minimum of 6 inches, and well secured along laps and at ends as necessary to properly hold the underlayment in place. All underlayment shall be preserved unbroken and whole.
3. Ice and Water Shield shall lap all hips and ridges at least 12 inches to form double thickness and shall be lapped 6 inches over the metal of any valley or built-in gutters and shall be installed as required by the Standing Seam Panel Manufacturer to attain the desired 20 Year Weathertightness Warranty.

2.5 FABRICATION

A. Comply with dimensions, profile limitations, gauges and fabrication details shown and if not shown, provide manufacturer's standard product fabrication.

B. Fabricate components of the system in factory, ready for field assembly.

C. Apply specified finishes in conformance with manufacturer's standard, and according to manufacturer's instructions.

2.6 SNOW GUARDS

A. Provide a continuous snow guard (fence/rail) retention system: Basis of Design, Color Snap by PMC Industries Inc (www.aceclamp.com) - Components, extruded aluminum rail with color strip insert, ice flags, clamps, top block hex head bolt and connector link. Extruded materials (Rails and Ice Flag) 6000 series tempered aluminum alloy complying with ASTM B221, Stainless steel materials (connector link and hex head bolts) 300 stainless steel complying with ASTM A582/12, Roof clamp style A2, A2N or ML as applicable with non-penetrating fasteners, color shall match metal roofing. Install snow retention system in strict accordance with the manufacturer's guidelines and instructions and approved shop drawing submittals. Coordinate with submitted / approved metal roof system.

2.7 GUTTERS AND DOWNSPOUTS

A. Gutter: Formed 24 gage steel, nominal 6 inch, shaped as indicated. Color to match roof. Provide 1/4 inch by 1 1/2 inch gutter hangers at 3 foot centers.

B. Downspout: Formed 24 gage steel, finished to match gutter, 4 inch nominal rectangular typ. Anchor with u-shaped hemmed straps 1/16 inch by 1 inch of same material and finish as downspout. Provide minimum of 3 per downspout.

PART 3 - INSTALLATION

3.01 GENERAL

A. Install roofing, insulation, flashings, and accessories in accordance with roofing manufacturer's published instructions and recommendations for the specified roofing system. Where manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards. Comply with federal, state, and local regulations.

B. Obtain all relevant instructions and maintain copies at project site for duration of installation period.

C. Verify that shop drawings prepared by metal roof panel manufacturer have been approved and are available to installers; do not use drawings prepared by others for installation drawings.

D. Verify that the specifications and drawing details are workable and not in conflict with the roofing manufacturer's recommendations and instructions; start of work constitutes acceptable of project conditions and requirements.

E. Do not start work until Pre-Installation Notice has been submitted to manufacturer as notification that this project requires a manufacturer's warranty.

F. Perform work using competent and properly equipped & trained personnel.

G. Temporary closures, which ensure that moisture does not damage any completed section of the new roofing system, are the responsibility of the applicator. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition.

H. Install roofing only when surfaces are clean, dry, smooth and free of snow or ice; do not apply roofing during inclement weather or when ambient conditions will not allow proper application;

consult manufacturer for recommended procedures during cold weather. Do not work with sealants and adhesives when material temperature is outside the range of 60 to 80 degrees F.

I. Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.
   1. Protect from spills and overspray from bitumen, adhesives, sealants and coatings.
   2. Particularly protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within the range of wind-borne overspray.
   3. Protect finished areas of the roofing system from roofing related work traffic and traffic by other trades.

J. Until ready for use, keep materials in their original containers as labeled by the manufacturer.

K. Consult membrane manufacturer's instructions, container labels, and Material Safety Data Sheets (MSDS) for specific safety instructions. Keep all adhesives, sealants, primers and cleaning materials away from all sources of ignition.

3.02 EXAMINATION

A. Examine roof deck to determine that it is sufficiently rigid to support installers and their mechanical equipment and that deflection will not strain or rupture roof components or deform deck.

B. Verify that surfaces and site conditions are ready to receive work. Correct defects in the substrate before commencing with roofing work.

C. Verify that the substructure installation is in accordance with the approved shop drawings and roof panel manufacturer’s requirements, that the fasteners are correct for the substrate, and the substrate is installed to accommodate and support the appropriate clip spacing and attachment.

D. Verify that installed work of other trades that such work is complete to a point where the roofing system installation may commence.

E. Verify that roof openings, curbs, pipes, sleeves, ducts, vents, and other penetrations through roof substrate are complete and properly located.

F. In event of discrepancy, notify Architect in writing; do not proceed with installation until discrepancies have been resolved.

3.03 ROOF PANEL INSTALLATION

A. Install the metal roof panel system in accordance with the manufacturer's instructions, installation drawings, and approved shop drawings, so that it is weathertight and allows for thermal movement.

B. Locate and space all fasteners in accordance with roof panel manufacturer's recommendations. For required exposed fasteners, use proper torque settings to obtain controlled uniform compression for a positive seal without rupturing the sealing washers.

C. Do not place utility penetrations through the panel seams.

D. Do not allow panels or trim to come into contact with dissimilar materials (i.e. copper, lead, graphite, treated lumber, mortar, etc). Protect from water run-off from these materials.

E. Perform field cutting of panels and related sheet metal components by means of hand or electric shears. At no time shall a hot/friction saw be used.

F. Remove protective film immediately after installation.

3.04 FLASHING AND ACCESSORIES INSTALLATION

A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by roof panel manufacturer's recommendations and details.

B. Flashing at Penetrations: Flash all penetrations passing through the membrane; make flashing seals directly to the penetration.

1. Pipes, Round Supports, and Similar Items: Flash with specified pre-molded pipe flashings wherever practical.
2. Where pre-molded pipe flashings are not practical, provide flashing detail as recommended by metal panel manufacturer.

3.05 FIELD QUALITY CONTROL

A. Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes (i.e. not a sales person).

B. Perform all corrections necessary for issuance of warranty.

3.06 ADJUSTING AND CLEANING

A. Repair panels having minor damage.

B. Remove panels damaged beyond repair and replace with new panels to match adjacent undamaged panels.

C. Clean exposed panel surfaces promptly after installation in accordance with recommendations of panel and coating manufacturers.

D. Clean all contaminants generated by roofing work from building and surrounding areas, including adhesives, sealants, and coatings.

E. Repair or replace building components and finished surfaces damaged or defaced due to the work of this section; comply with recommendations of manufacturers of components and surfaces.

F. Remove leftover materials, trash, debris, equipment from project site and surrounding areas.

3.07 PROTECTION

A. Where construction traffic must continue over finished roof panels, provide durable protection and replace or repair damaged roofing to original condition.

END OF SECTION