SECTION 07610
SHEET MEMBRANE ROOFING

PART I - GENERAL

1.01 DESCRIPTION

A. Work of this Section shall include all materials and installation necessary to provide Sheet Metal Roofing as shown and detailed on the Drawings and specified herein, including:

(**CONSULTANT TO SELECT APPLICABLE ITEMS**)  
1. Standing-seam metal roofing.  
2. Batten-seam metal roofing.

B. Related Sections include the following:

1. Division 5 (**Consultant to Specify**) for steel roof deck.
2. Division 6, Section 06100 – ROUGH CARPENTRY for wood framing and decking.
3. Division 7 (**Consultant to Specify**) for flashing not part of roofing and other sheet metal work.
4. Division 9, Section 09900 – PAINTING for priming and painting installed metal roofing.

1.02 PERFORMANCE REQUIREMENTS

A. Install sheet metal roofing capable of withstanding normal thermal movement, wind loading, structural movement, thermally induced movement, and exposure to weather without failure or infiltration of water into the building interior.

1.03 SUBMITTALS

A. Product Data: For each product indicated. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.

B. Shop Drawings: Show details for forming, joining, and securing metal roofing, and for pattern of seams. Show expansion-joint details and waterproof connections to adjoining work and at obstructions and penetrations.

C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for metal roofing with color-coated finishes.

D. Samples for Verification: 12” square specimens of metal roofing material with specified finishes applied. Where finishes involve normal color and texture variations, include Sample sets of 2 or more units showing the full range of variations expected.

E. Product Certificates: Signed by manufacturers of the following products certifying that the products furnished comply with requirements:
1. Sheet metal roofing.

2. Special finishes.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed sheet metal roofing similar in material, design, forming method, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Industry Standard: Unless otherwise shown or specified, comply with the Sheet Metal and Air Conditioning Contractors National Association's (SMACNA) Architectural Sheet Metal Manual.” Conform to dimensions and profiles shown.

C. Wind-Uplift Resistance: Provide roof assemblies that meet requirements of UL 580 for Class 90 wind-uplift resistance.

1. Maintain current certification of UL follow-up program for field-rolled panels on field-forming equipment.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver metal coils, panels, and other roofing materials so they will not be damaged or deformed. Package roofing materials for protection against transportation damage.

B. Handling: Exercise care in unloading, storing, and erecting roofing materials to prevent bending, warping, twisting, and surface damage.

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

1.06 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive the University of other rights the University may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Finish Warranty: Submit a written warranty executed by the manufacturer covering failure of the factory-applied exterior finish on metal roofing within the specified warranty period and agreeing to repair finish or replace sheet metal roofing that evidences finish deterioration. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.

C. Warranty Period: 20 years from date of Substantial Completion.

PART II - PRODUCTS

2.01 ROOFING SHEET METALS

A. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755 and the following requirements:
1. Galvanized Steel Sheet: ASTM A 653, G90; structural quality.

2. Aluminum-Zinc-Alloy-Coated Steel Sheet: ASTM A 792, Class AZ-50 coating, Grade 40; structural quality.

3. Aluminum-Coated Steel Sheets: ASTM A 463, T1-40 coating.

4. Thickness: 0.0217", unless otherwise indicated.

5. Thickness: 0.0276", unless otherwise indicated.

6. Batten Caps: 0.0276" thick.
   a. Aluminum-Coated Steel Sheets: ASTM A 463, T1-40 coating.

7. Finish: Apply the following organic coating in a thickness of not less than 0.0336", unless otherwise indicated. Furnish appropriate air-drying spray finish in matching color for touchup.
   a. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70% polyvinylidene fluoride resin by weight with a total minimum dry film thickness of 0.9 mil and 30% reflective gloss when tested according to ASTM D 523.
      1) Durability: Provide coating field tested under normal range of weather conditions for minimum of 20 years without significant peel, blister, flake, chip, crack, or check in finish; without chalking in excess of a chalk rating of 8 according to ASTM D 4214; and without fading in excess of 5 Hunter units.
          a) Color: As indicated by manufacturer's color designations.
          b) Color: Match University's Representative's sample.
          c) Color: As selected by University's Representative from manufacturer's full range of colors.
   b. Factory Prime Coating: Where painting after installation is indicated, provide pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat; with a minimum dry film thickness of 0.2 mil.

B. Aluminum Sheets: ASTM B 209 for Alclad alloy 3003 or 3004 with temper as required to suit forming operations and finish indicated.

1. Surface: Manufacturer's standard stucco embossed finish.

2. Thickness: 0.040", unless otherwise indicated.
3. Batten Caps: 0.051” thick, 6063 alloy aluminum, temper T-5. High-Performance Organic Coating Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.
   a. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70% polyvinylidene fluoride resin by weight; complying with AAMA 1402.
      1) Color and Gloss: As indicated by manufacturer's color and gloss designations.
      2) Color and Gloss: Match University's Representative's sample.
      3) Color and Gloss: As selected by University's Representative from manufacturer's full range of choices for color and gloss.

C. Terne-Coated Steel Sheet: ASTM A 308, LT110 coating designation, unless otherwise indicated.
   1. Thickness: 0.018”.
   2. Batten Caps: 0.018”-thick, terne-coated steel, unless otherwise indicated.
   3. Coating Test: Confirm coating weight and composition by the tipple-spot test according to ASTM A 309.
      a. In lieu of spot tests to determine coating weight, manufacturer may submit nondestructive radiographic test results and certification showing that terne-coating weight of sheets furnished for Project complies with requirements.

D. Lead Sheet: ASTM B 749, Type L51121, copper-bearing lead sheet, with a minimum thickness of 0.0625” but not less than 0.0937” thick for applications where burning (welding) is involved.

2.02 UNDERLAYMENT MATERIALS

A. Fabric Underlayment: Manufacturer's standard nonwoven polyester fabric marketed for use in cold-applied, single-ply roofing systems weighing 6.0 oz./sq. yd, white, nonswelling, rot and mildew resistant.
   1. Product: Subject to compliance with requirements, provide "E6N Rufon Fabric" by Amoco Fabric and Fibers Co., or equal, no known equal.

B. Polyethylene Underlayment: Minimum 6-mil polyethylene sheeting complying with ASTM D 4397.

C. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felts.

D. Felts: ASTM D 226, Type I (No. 15), asphalt-saturated organic felts.
2.03 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and accessory items as required for a complete roofing system and as recommended by sheet metal manufacturer and fabricator for metal roofing work, unless otherwise indicated.

B. Expansion-Joint Sealant: For hooked-type expansion joints, which must be free to move, provide nonsetting, nonhardening, nonmigrating, heavy-bodied polyisobutylene sealant.

C. Primer Paint: Rust-inhibitive primer recommended by sheet metal manufacturer for finish coat.

D. Terne Base Coating: Red iron-oxide/linseed oil paint, with iron oxide as 40% minimum of pigment and linseed oil as 50% minimum of vehicle.

E. Metal Accessories: Provide components matching sheet metal roofing in finish and material that are required for a complete roofing system, including the following:

2. Trim, copings, fasciae, gutters, and louvers.

F. Sealing Tape: Pressure-sensitive, 100% solids, polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

G. Elastomeric Joint Sealant: ASTM C 920, of base polymer, type, grade, class, and use classifications required to produce joints in roofing that will remain weathertight and as recommended by the roofing manufacturer for installation indicated.

H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat, unless otherwise indicated. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

1. Wood Battens: Fabricated to size indicated from lumber complying with requirements of Division 6, Section 06100 – ROUGH CARPENTRY and preservative treated by pressure process using a chemical solution that is noncorrosive to type of metal roofing.

2. Aluminum Battens: 0.051” thick, 6063 alloy aluminum, temper T-5.

2.04 FABRICATION

A. General: Fabricate sheet metal roofing to comply with details shown, with metal roofing manufacturer's written instructions, and with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of installation indicated.

B. Fabricate sheet metal to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the Work. Form exposed sheet metal work to fit substrates without excessive oil canning, buckling, and tool marks, true to line and levels indicated, and with exposed edges folded back to form hems.
C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, or would not be sufficiently waterproof and weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant (concealed within joints).

D. Sealant Joints: Where movable, nonexpansion-type joints are indicated or required to produce weathertight seams, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.

E. Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with bituminous coating or other permanent separation as recommended by manufacturer or fabricator.

PART III - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements indicated for conditions affecting performance of sheet metal roofing. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Coordinate metal roofing with rain drainage work, flashing, trim, and construction of decks, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

B. Promptly remove protective film, if any, from exposed surfaces of metal roofing. Strip with care to avoid damage to finish.

3.03 INSTALLATION, GENERAL

A. Install roofing to comply with sheet metal roofing manufacturer’s written instructions, unless otherwise indicated.

B. Separate dissimilar metals by painting each metal surface in area of contact with a bituminous coating, by applying rubberized-asphalt underlayment to each metal surface, or by other permanent separation as recommended by manufacturers of dissimilar metals.

C. Install felt underlayment and building's paper slip sheet on substrate under metal roofing, unless otherwise recommended by sheet metal manufacturer. Use adhesive for temporary anchorage, where possible, to minimize use of mechanical fasteners under metal roofing. Apply from eave to ridge in shingle fashion and lap joints 2” minimum.

D. Install building paper as only underlayment under terne metal.

E. Paint back side of terne roofing with terne base coating, 1.0-mil dry film thickness, where slope of roofing is 3” per foot or less.

F. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of metal roofing to profiles, patterns, and drainage arrangements shown and as required for leakproof construction. Provide for thermal expansion and contraction of the Work. Seal joints as shown and as required for leakproof construction. Shop fabricate materials to greatest extent possible.
G. Sealant-Type Joints: Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1" into sealant. Form joints to completely conceal sealant. When ambient temperature is moderate, between 40º and 70ºF, at time of installation, set joint members for 50% movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40ºF. Comply with requirements of Division 7 (**Consultant to Specify**) for handling and installing sealants.

H. Fabricate and install work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves, and avoidable tool marks, considering temper and reflectivity of metal. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant. Fold back sheet metal to form a hem on concealed side of exposed edges, unless otherwise indicated.

I. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

3.04 CLEANING

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

3.05 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensures metal roofing is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 07610