SECTION 07410
METAL ROOF PANELS
Soledad USD
District Office

PART 1 GENERAL

1.1 SECTION INCLUDES: Owner supplied material thru the CMAS program. Contractor to provide R-15 insulation above deck and ½" Dens Deck Prime installed as per code.

A. Standing seam metal roofing system.

1.2 RELATED SECTIONS

A. Section 06150 - Wood Decking.

B. Section 07220 - Roof and Deck Insulation.

C. Section 07550 - Modified Bituminous Roofing

D. Section 07714 - Gutters and Downspouts

1.3 REFERENCES

A. ASTM A 240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

B. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. ASTM A 792/A 792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

D. ASTM A 875 - Standard Specification for Steel Sheet, Zinc-5 % Aluminum Alloy-Coated by the Hot-Dip Process

E. ASTM B 101 - Standard Specification for Lead-Coated Copper Sheet and Strip for Building Construction.

F. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

G. ASTM B 370 - Standard Specification for Copper Sheet and Strip for Building Construction.

H. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

I. ASTM D 1056 - Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.

J. ASTM D 2178 - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.

K. ASTM D 3575 - Standard Test Methods for Flexible Cellular Materials made from Olefin Polymers.

L. ASTM E 84 - Standard Test for Surface Burning Characteristics of Building Materials.

M. ASTM E 283 - Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

N. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

O. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

P. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.

Q. ASTM E 1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.

R. ASTM E 2140 - Standard Test Method for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head.

S. AAMA 501.1 - Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure.

T. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

U. FM 4470 Approval Standard for Class 1 Panel Roofs.

V. FM 4471 - Class 1 Panel Roof; Factory Mutual Research Corporation.

W. UL 263 - Fire Tests of Building Constructions and Materials.

X. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies.

Y. UL 790 - Standard Test Methods for Fire Tests of Roof Coverings.

Z. UL 1897 - Uplift Test for Roof Covering Systems.

AA. ICC-ES AC166 - Test Procedure for Wind Driven Rain Resistance of Metal Roof Coverings.

BB. SMACNA - Architectural Sheet Metal Manual.

CC. National Coil Coating Association (NCCA)

DD. NRCA - The NRCA Roofing and Waterproofing Manual.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Standing Seam Roofing System: R-Mer Span
   1. Thermal Expansion and Contraction:
      a. Completed metal roofing and flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.
      b. Design temperature differential shall be not less then 200 degrees F.
      c. Interface between panel and clip shall provide for unlimited thermal movement in each direction along the longitudinal direction.
      d. Location of metal roofing rigid connector shall be at roof ridge unless otherwise approved by the Project Architect. Metal ridge connector may require design as per job conditions by specified manufacturer.
   2. Uniform Wind Load Capacity:

a. Installed roof system shall withstand negative (uplift) design wind loading pressures complying with the following criteria.
    1) Design Code: ASCE 7, Method 2 for Components and Cladding.
    2) Safety Factor: 1.67 after any load reduction or material stress increase.
    3) Category III Building with an Importance Factor of 1.
    4) Wind Speed: 103 mph.
    5) Ultimate Pullout Value: 434 pounds per each of the two fasteners holding the panel anchor to the roof decking or framing system.
    6) Exposure Category: C.
    7) Design Roof Height: 15 feet.
    8) Minimum Building Width: 60 feet.
    9) Roof Pitch: 3 inches per foot.
    10) Roof Area Design Uplift Pressure:
        a) Zone 1 - Field of roof 30 psf.
        b) Zone 2 - Eaves, ridges, hips, and rakes 41.7 psf.
        c) Zone 3 - Corners 48.8 psf.
b. ASTM E 1592: Capacity shall be determined using pleated airbag method in accordance with ASTM E 1592, testing of sheet metal roof panels. Allowable safe working loads shall be determined by dividing the ultimate test load by the safety factor specified above.
c. Underwriters' Laboratories, Inc., (UL), wind uplift resistance classification: Roof assembly shall be classified as Class 1-90, as defined by UL 580
d. FM 4471: Submit test report for negative wind uplift pressures no less than that specified. Roof system must have approval over the substrate specified.

3. Uniform Positive Load Capacity.
    a. Installed roof system shall be capable of resisting the following positive uniform roof loads: Roof Live Load of 20 psf;
    b. Dead Load: Loading of the roof structure, due to tear off of existing, and/or installation of new roofing materials shall not exceed the present loading due to weight of the existing roofing system.
    c. Installed roof system shall carry positive uniform design loads with a maximum system deflection of L/180 as measured at the rib (web) of the panel.
4. Underwriters' Laboratories, Inc., (UL):
    a. Underwriters' Laboratories, Inc., (UL) fire resistance P ratings for roof assemblies: If applicable, panel system shall be approved for use in an appropriate Construction Assembly, as defined by UL 263.
    b. Underwriters' Laboratories, Inc., (UL) Class A fire rating per UL 790.
5. ASTM E 283: Static pressure air infiltration (doors, windows, curtain walls):
    a. Pressure Leakage Rate
        1) 1.57 PSF 0.0007 cfm/sq.ft.
        2) 6.24 PSF 0.0002 cfm/sq.ft.
        3) 20.0 PSF 0.0036 cfm/sq.ft.
6. ASTM E 331: Static pressure water infiltration (doors, windows, curtain walls):
    a. Pressure Result:
        1) 5 Gal. /Hr. per S.F. and Static No Leakage
        2) Pressure of 20.0 Psf. for 15 minutes
7. ASTM E 1680: Static pressure air infiltration (roof panels):
    a. Pressure Leakage Rate:
        1) 1.57 PSF 0.0012 cfm/sq.ft.
        2) 6.24 PSF 0.0001 cfm/sq.ft.
        3) 20.0 PSF 0.0011 cfm/sq.ft.
8. ASTM E 1646: Static pressure water infiltration (roof panels):
    a. Pressure Result:
        1) 5 Gal. /Hr. per S.F. and Static No Leakage
        2) Pressure of 20.0 Psf for 15 minutes
9. Capacities for gauge, span or loading other than those tested may be determined by

interpolation of test results within the range of test data. Extrapolations for conditions outside test range are not acceptable.

10. Water penetration (dynamic pressure): No water penetration, other than condensation, when exposed to dynamic rain and 70 mph wind velocities for not less than five minutes duration, when tested in accord with principles of AAMA 501.1.
11. Wind and wind driven rain resistance: No water penetration or panel movement when exposed to 110 mph wind velocities when tested in accordance with TAS 100.
12. Installed roof system assembly shall show that it can resist the calculated roof pressure in accordance with the test results of TAS 125.
13. Water penetration in low slope applications: No water penetration or panel movement when subject to 6 inch head of water for 6 hours when tested in accordance with the ASTM E 2140 and when subject to 6 inch head of water for 7 days when tested in accordance with the TAS 114 appendix G.
14. Submit third party validation of environmental claims, prepared UL Environment, for all metal roof panels containing recycled content and/or bio based content.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Submit product data, test reports, and certifications in accordance with quality assurance and performance requirements specified herein.

C. Design Loads: Submit manufacturer's minimum design load calculations according to ASCE 7, Method 2 for Components and Cladding. In no case shall the design loads be taken to be less than those specified herein.

D. Dead Load Evaluation: Provide documentation from a licensed structural engineer of a structural evaluation of the roof structure and it's suitability for the new imposed roofing loads.

E. Shop Drawings: Prepared specifically for this project; showing dimensions of metal roofing and accessories, fastening details and connections and interface with other products.

F. LEED Submittals: Provide documentation of how the requirements of Credit will be met:
1. List of proposed materials with recycled content. Indicate post-consumer recycled content and pre-consumer recycled content for each product having recycled content.
2. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.

G. Selection Samples: For each finish product specified, two complete sets of samples representing manufacturer's full range of available colors and textures.

H. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and textures.

I. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

J. Closeout Submittals:
1. Provide manufacturer's maintenance instructions that include recommendations for periodic checking and maintenance of installed roof system.
2. Provide executed copy of manufacturer's warranty.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall have in place a documented, standardized quality control program such as ISO-9001 approval.

B. Installer Qualifications: Certified and approved installer of the sheet metal roofing manufacturer.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

1.7 PRE-INSTALLATION CONFERENCE

A. Convene a pre-roofing conference approximately two weeks before scheduled commencement of roofing system installation and associated work.

B. Require attendance of installers of deck or substrate construction to receive roofing, installers of rooftop units and other work in and around roofing which must precede or follow roofing work including mechanical work, Architect, Owner, roofing system manufacturer's representative.

C. Objectives include:
   1. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
   2. Tour representative areas of roofing substrates, inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work.
   3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
   4. Review roofing system requirements, Drawings, Specifications and other Contract Documents.
   5. Review and finalize schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
   6. Review required inspection, testing, certifying procedures.
   7. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing.
   8. Record conference including decisions and agreements reached. Furnish a copy of records to each party attending.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
   1. Store materials above ground, on skids.
   2. Protect material with waterproof covering and allow sufficient ventilation to prevent condensation buildup or moisture entrapment on the materials.

1.9 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 WARRANTY

A. Warranty:
   1. 30 year, no dollar limit, warranty.
   2. Provide installers 2 year warranty covering roofing system installation and water-tightness.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Garland Company, Inc. (The), which is located at: 3800 E. 91st St.; Cleveland, OH 44105; Toll Free Tel: 800-321-9336; Tel: 831-682-6827; Fax: 216-641-0633; Email:tchapman@garlandind.com Web:http://www.garlandco.com

B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 STANDING SEAM METAL ROOFING

A. R-Mer Span:
   1. Width of Standing T-Seam Panel: 1 inch T-seam.
      a. 18 inches.
   2. Standing Seam: 2-3/8 inch tall mechanically seamed with factory installed hot melt sealant in-seam cap. Panel/Cap is configured with a total of 4 layers of metal surrounding anchor clip.
   3. Panel Profile: Provided with minimum 1-1/2 inches wide elevated mesa's every 2 inches on center continuous throughout panel.
      a. Slope: Open Purlins or Solid Substrate down to 1/4:12.
   4. Panel material:
      a. Galvalume steel, type AZ-55, smooth as per ASTM A 792, 24 gauge.
   5. Flashing and flat stock material: Fabricate in profiles indicated on Drawings of same material, thickness, and finish as roof system, unless indicated otherwise.
   6. Accessory Components:
      a. Anchor Clips:
         1) Concealed Standard Anchor Clips: Clips 16 gauge galvanized steel, 1 piece clip with projecting legs for additional panel alignment and provision for unlimited thermal movement in each direction along the longitudinal dimension.
      b. Fasteners:
         1) Concealed fasteners: Corrosion resistant steel fasteners (zinc plated, stainless steel or equal) designed to meet structural loading requirements.
         2) Exposed fasteners: Series 410 stainless steel fasteners or 1/8 inch diameter stainless steel waterproof rivets. All exposed fasteners shall be factory painted to match the color of the standing seam panels.
      c. Closures: Factory precut closed cell foam meeting ASTM D 1056 or ASTM D 3575, enclosed in metal channel matching panels when used at hip, ridge, rake, and jamb.
      d. Provide all miscellaneous accessories for complete installation.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive metal roofing. Notify the Architect in writing of any defective conditions encountered. Starting of work shall constitute acceptance of such conditions.

B. Structural Deck Substrate:

1. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves, or projections, and properly sloped.
2. Verify deck is dry and joints are solidly supported and fastened.
3. Verify wood nailers are installed and correctly located. Do not use pressure-treated wood containing salt-based preservatives or materials corrosive to steel.

C. Structural Framing Substrate:
1. Verify primary and secondary framing members are installed and fastened, properly aligned and sloped.
2. Verify damaged shop coatings are repaired with touch up paint.

D. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets are in place, and nailing strips located.

E. Correct defective conditions before beginning work.

3.2 INSTALLATION

A. Install in conformance with the NRCA Roofing and Waterproofing Manual and Manufacturers installation requirements.

B. Form panel shape as indicated on Drawings, accurate in size, square, and free from distortion or defects.

C. Install underlayment and eave protection sheet underlayment as recommended by the Manufacturer.

D. Coordinate with installation of rigid board insulation as specified in Section 07200.

E. Install all panels continuous from ridge to eave. Transverse seams are not permitted.

F. Where not otherwise indicated conform to SMACNA details including flashings and trim.

G. Install sealants where indicated to clean dry surfaces only without skips or voids..

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.4 SCHEDULES

A. OWNER SUPPLIED MATERIAL includes all panels, clips, butyl, seam caps, underlayment, etc as per shop drawings.

B. Contractor to provide all screws, fabrication of details from OSM flat stock, insultion and anything else not provided in Owner Supplied materials.

END OF SECTION