SECTION 07321
CLAY ROOF TILES

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install clay roof tile assembly where shown on the drawings, as specified herein, and as needed for a complete and proper installation.
   1. Work shall be performed in accordance with Title 24, manufacturer’s written instructions and the Contract Documents.
   2. System installation shall provide leak free roofing.

1.2 RELATED REQUIREMENTS

Note to Specifier: Retain and edit Paragraphs below to refer to Sections with information that would be expected in this Section.

A. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.3 DEFINITIONS


1.4 ADMINISTRATIVE REQUIREMENTS

A. Scheduling: Schedule work such that underlayment will not be left exposed to weather for longer than that recommended by the manufacturer but in no case left unprotected for more than 30 days.

B. Preinstallation Meetings: Coordinate preinstallation meeting one week prior to commencement of field installation to establish procedures to maintain required working conditions and to coordinate this Work with related and adjacent Work. Preinstallation meeting attendees shall include representatives for Stanford University and the Architect, inspection firm, Contractor, roofing contractor and other subcontractors involved with the Work of this Section.
1.5  SUBMITTALS

Note to Specifier: Insert submittal procedures Section number and title below.

A.  Comply with pertinent provisions of Section______.

B.  Within 15 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1.  Materials list of items proposed to be provided under this Section;
   2.  Manufacturer’s specifications and other data needed to prove compliance with the specified requirements;
   3.  Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.

C.  Product Data: For each type of product indicated.

D.  Samples for Initial Selection: For each type of clay roof tile and accessory tile indicated.
   1.  Include similar Samples of trim and accessories involving color selection.

E.  Samples for Verification: For the following products, in manufacturer's standard sizes:
   2.  Accessory Tile: Full size, each type.
   3.  Mortar Color Sample: Large enough to compare mortar color to tile color.

F.  Provide shop drawings for Architect approval for all details not included in the Contract Documents which become necessary; for any proposed changes; and for clarifications to the Drawings.

G.  Material Test Reports: For each type of clay roof tile.

H.  Research/Evaluation Reports: For clay roof tiles, fasteners, and fastener systems, from the ICC.

I.  Warranties: Sample of special warranties.

1.6  CLOSEOUT SUBMITTALS

A.  Maintenance Data: For roofing to include in maintenance manuals.

1.7  MAINTENANCE MATERIAL SUBMITTALS

A.  Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1.  Clay Roof Tiles: 100 sq. ft. of each type, in unbroken bundles.
1.8 QUALITY ASSURANCE

A. Installer Qualifications: Installer shall meet or exceed the qualifications listed below and indicated elsewhere in the Contract Documents.
   1. A firm which has at least (10) years of experience in work of the type required by this Section, who can comply with manufacturers’ warranty requirements.
   2. Installer shall adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

B. Source Limitations: Obtain clay roof tiles and accessory tiles from single source from single manufacturer. Obtain tile wire tie system including fasteners and accessories from single source from single manufacturer.

C. Fire-Test-Response Characteristics: Provide clay roof tiles and related roofing materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
   1. Exterior Fire-Test Exposure: Class A; UL 790 or ASTM E 108, for application and roof slopes indicated.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Build mockups for clay roof tiles including related roofing materials.
      a. Size: 10 feet long by 10 feet wide.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. A roofing quality control consultant may be retained to provide full-time quality control. Duties and functions of the quality controller shall include monitoring of the roofing system installation. The Work will be subject to continual audit by the Consultant. The Contractor is to notify Stanford University, Architect and Consultant when work is to begin in sufficient time to arrange roofing observation and is to remain in continual contact throughout the course of the job regarding scheduling of work.

F. If, in the opinion of the contractor, any work is indicated on the Contract Drawings or specified in such a manner as to make it impossible to produce guaranteed and warranted work of highest quality, or should discrepancies appear from one Drawing to another or between Drawings and Specifications, the Contractor shall advise the Architect in writing before proceeding.
1.9 DELIVERY, STORAGE, AND HANDLING

*Note to Specifier: Insert delivery, storage and handling Section number and title below.*

A. Comply with pertinent provisions of Section _______.

B. Deliver the materials to the job site in the manufacturer’s unopened containers with all labels intact and legible at time of use.

C. Store and handle materials in accordance with the manufacturer’s published requirements, Contract Documents and in accordance with Stanford University’s requirements. The more stringent requirements shall apply.

D. Maintain the products in a dry condition during delivery, storage, handling, installation, and concealment.

E. Protect from damage from sunlight, weather, excessive temperatures and construction operations.

F. Remove damaged material from the site and dispose of in accordance with applicable regulations.

G. Sequence deliveries to avoid delays, but minimize on-site storage.

H. Store underlayment rolls on end, on pallets or other raised surfaces. Do not double stack rolls. Cover rolled goods with breathable type covering such as tarpaulin. Visqueen or other non-breathable plastic wraps are not acceptable.

I. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.

1.10 PROJECT CONDITIONS

A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials and products used.

B. Proceed with installation only when substrate construction and preparation work is complete and in condition to receive waterproofing.

C. Construction may not be as shown on the Drawings and some modification of details may be required to accomplish the intent of the documents. Contractor shall receive approval in writing from Architect for all modifications or adjustments before commencing with the work.
1.11 WARRANTY

A. Manufacturer’s Warranty: Standard form in which manufacturer agrees to repair or replace clay roof tiles that fail in materials within specified warranty period.

*Note to Specifier: Verify available warranty periods for clay roof tiles with manufacturers and revise number in subparagraph below as required.*

1. Materials-Only Warranty Period: 75 years from date of Substantial Completion.

B. Underlayment Manufacturer’s Warranty: Underlayment manufacturer’s standard warranty for manufacturer’s membrane and accessory products covering defects in materials.

*Note to Specifier: Verify available warranty periods for underlayment with manufacturers and revise number in subparagraph below as required.*

1. Materials-Only Warranty Period: 10 years from date of Substantial Completion.

C. Installer's Warranty: Roofing Installer's Warranty signed by roofing Installer, covering Work of this Section, in which roofing Installer agrees to repair or replace components of roofing that fail in materials or workmanship within the following warranty period:

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CLAY ROOF TILES

A. Clay Roof Tiles: ASTM C 1167, molded- or extruded-clay roof tile units of shape and configuration indicated, with integral color, and free of surface imperfections. Provide with fastening holes pre-punched at factory.

1. Basis-of-Design Product: Subject to compliance with requirements, provide 2 piece Cordova clay roof tile by Gladding McBean or approved equal.

2. Weight: Normal.

3. Size: 18”x8”.

4. Blend: Blended to avoid streaks or hot spots. Bright yellow tiles shall be installed as pans only.

   a. 50 percent Blended Red
   b. 45 percent #8 Mix
   c. 5 percent Monterey Blend

5. Patterns: As indicated on Contract Drawings.

6. Profile-Shape Accessory Tiles: Ridge, ridge end, hip and hip starter header course roll rake edge and other units indicated, in color matching clay roof tiles.

2.2 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
B. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied.

*Note to Specifier: Revise first paragraph below if elastomeric sealant of another type, grade, class, and a specific use related to substrate is required.*

C. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane-based joint sealant; Type S, Grade NS, Class 25, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O.

D. Foam Adhesive: Two-component, polyurethane expanding adhesive recommended for application by clay roof tile manufacturer.

E. Mortar: ASTM C 270, Type M, with ASTM C 979, pigmented mortar matching the color of clay roof tiles for exposed-to-view mortar, and natural color for concealed-from-view mortar as weather block at hips ridges and transitions.

F. Eave Closure: Manufacturer's standard bird stop eave closure formed to shape of clay roof tiles. Match material of clay roof tile.

*Note to Specifier: Retain first paragraph below if above-deck wood components are required. Insert material requirements if preferred.*

G. Wood Nailers, Shims: Construction heart redwood.

H. Wormgear Clamp: Type 316 stainless steel wormgear clamp.

I. Accessory Products: Provide accessory products indicated in the Contract Documents and as required by the manufacturer for a complete roofing installation.

2.3 FASTENERS

A. Roofing Nails: ASTM F 1667, hot-dip galvanized-steel, 0.1055-inch- diameter shank, sharp-pointed, conventional roofing nails with ring shanks; minimum 3/8-inch- diameter head; of sufficient length to penetrate 3/4 inch into wood.
   1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

B. Wire Ties: Stainless steel, 0.083-inch minimum diameter.

C. Twisted-Wire-Tie System: Continuously twisted, two-wire unit with loops formed 6 inches apart, minimum 0.083-inch- diameter stainless-steel wire and 0.037-inch- diameter stainless-steel tie wires, with matching-metal folding clip deck anchors.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to Newport Tool & Fastener Company, Inc.
Note to Specifier: Use hook nails, also called "wind locks," in high-wind areas and on roofs steeper than 7:12.

D. Wind Lock Nose Hook: Hot-dip galvanized-steel, 0.09-inch diameter wire device designed to secure butt edges of overlaid clay roof tiles. For hip and ridge trim tiles.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to Newport Tool & Fastener Company, Inc.

2.4 UNDERLAYMENT MATERIALS

A. Self-Adhering Underlayment: ASTM D 1970, min. of 30 mils thick; slip-resisting, high temperature-rated, polyethylene-film-reinforced top surface laminated to butyl rubber adhesive or rubberized asphalt, with release-paper backing; cold applied.
   1. Products: Subject to compliance with requirements, provide products by one of the following:
      a. Grace Ultra; Grace Construction Products
      b. WIP 300HT; Carlisle Coatings & Waterproofing, Inc.
      c. Approved equal.
   2. Criteria: Self-adhering underlayment shall meet the following criteria:
      a. Must be able to resist temperatures up to 250 degrees F without degradation of the adhesive.
      b. Tensile Strength: 250 psi minimum; ASTM D412.
      c. Elongation: 250 percent minimum; ASTM D412.

B. Self-Adhering Flashing: Same product as self-adhering underlayment.

C. Primer: Manufacturer’s standard primer for each substrate.

2.5 METAL FLASHING AND TRIM

A. General: Comply with requirements in Section 07650 "Flashing and Sheet Metal."

B. Fabricate sheet metal flashing and trim to comply with recommendations that apply to design, dimensions, metal, and other characteristics of the item in SMACNA's "Architectural Sheet Metal Manual" and TRI/WSRCA's "Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions." Install self-adhering sheet underlayment integrating deck to penetration prior to installing sheet metal.

Note to Specifier: Retain detailed fabrication requirements for flashings in subparagraphs below. Delete subparagraphs if Drawings fully detail these flashing conditions.
   1. Apron Flashings: Fabricate with lower flange extending a minimum of 6 inches over and 4 inches beyond each side of downslope tile roofing and 6 inches up the vertical surface.
Note to Specifier: Retain first subparagraph below for interleaving metal step flashings between succeeding courses of flat roof tile that abut vertical surfaces such as chimneys, sidewalls, and skylights.

2. Step Flashings: Fabricate with a head lap of 3 inches and a minimum extension of 4 inches both horizontally and vertically.

Note to Specifier: Retain first subparagraph below for metal pan or channel flashings acting as an internal gutter under sloping high-profile roof tile abutting vertical surfaces such as chimneys, sidewalls, and skylights. Revise dimensions to suit Project.

3. Channel Flashings: Fabricate with vertical surface extending a minimum of 4 inches above the clay roof tile and 6 inches beneath the tile roofing, with a 1-inch-high vertical return to form a runoff channel.

Note to Specifier: Retain first subparagraph below for metal pan or channel flashings acting as an internal gutter at rake edge fasciae. Revise dimensions to suit Project.

4. Rake Pan Flashings: Fabricate with vertical surface extending over fasciae and 6 inches beneath the tile roofing, with a 1-inch-high vertical return to form a runoff channel.

Note to Specifier: Retain first subparagraph below if cricket or backer flashings are required. Revise dimensions to suit Project.

5. Cricket Flashings: Fabricate with concealed flange extending a minimum of 24 inches beneath upslope tile roofing, 6 inches beyond each side of penetration, and 6 inches above the roof plane.

Note to Specifier: Retain first subparagraph below for metal valley flashings. Revise dimensions to suit Project.

6. Open-Valley Flashings: Fabricate in lengths not exceeding 10 feet, with 1-inch-high, inverted-V profile at center of valley and with equal flange widths of 12 inches.

Note to Specifier: Retain subparagraph below if eaves or rake drip edges are required.

7. Drip Edges: Fabricate in lengths not exceeding 10 feet, with 2-inch roof-deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge.

Note to Specifier: Retain paragraph below for plumbing vents that penetrate roof. Revise to another flashing material if required or delete paragraph and include requirements in Section 07620 "Sheet Metal Flashing and Trim" or Section 15150 "Sanitary Waste and Vent Piping."

C. Vent-Pipe Flashings: Two stage at underlayment level and at tile level; ASTM B 749, Type L51121, at least 1/16 inch thick. Provide 4 lb. lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof and extending at least 4 inches from pipe onto roof.
2.6 VENT COVER

A. Manufacturer: Subject to compliance with requirements, provide vent covers by O’Hagin’s, Inc. or approved equal.

B. Primary Vent Cover: Clay tile subflashing.
   1. Material: As indicated in Drawings.

C. Secondary Vent Cover: Clay 50 sq. in. vent cover.
   1. Material: As indicated in Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored and that provision has been made for flashings and penetrations through roofing.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with Contract Documents and manufacturer's written instructions and recommendations.

B. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this section.

C. Install clay tile roofing system where shown on the Drawings, and in strict accordance with the manufacturer’s recommendations as approved by the Architect and Stanford University.

3.3 UNDERLAYMENT INSTALLATION

A. General: Comply with manufacturer's written instructions and recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual" and TRI/WSRCA's "Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions."
   1. Cover wood nailers with underlayment strips.
1. Install two layers, laps staggered all directions between layers.
2. Seal penetrations with manufacturer’s recommended liquid membrane.
3. Prime decks prior to installation of underlayment.

C. Self-Adhering Flashing: Install wrinkle free; comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated on Drawings, lapped in direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches, staggered 24 inches between succeeding courses. Roll laps with roller. Cover underlayment within seven days.
1. Seal penetrations with manufacturer’s recommended liquid membrane.
2. Prime surfaces to receive self-adhering flashing as recommended by self-adhering flashing manufacturer.

D. Metal-Flashed, Open-Valley Underlayment: Install two layers of 36-inch- wide self-adhering sheet underlayment centered in valley. Stagger end laps between layers at least 24 inches Lap ends of each layer at least 12 inches, in direction to shed water.
1. Lap roof-deck felt underlayment over first layer of valley felt underlayment at least 6 inches.

3.4 METAL FLASHING INSTALLATION

A. General: Install metal flashings and other sheet metal to comply with requirements in Section 07650 "Flashing and Sheet Metal."
2. Flashing exposed to view shall be primed and painted with a minimum of two finish coats to match Architects color sample.

Note to Specifier: Retain first paragraph below for apron flashings. Apron flashings provide a weatherproofing transition material where a roof area intersects a head wall. Common locations for apron flashings include the front downslope side of a dormer or chimney, curbed roof penetrations, and clerestory transitions.

B. Apron Flashings: Extend lower flange over and beyond each side of downslope tile roofing and up the vertical surface.
C. Step Flashings: Install with a head lap of 3 inches and extend both horizontally and vertically. Install with lower edge of flashing just upslope of, and concealed by, butt of overlying tile. Fasten to roof deck only.

D. Cricket Flashings: Install against roof-penetrating elements, extending concealed flange beneath upslope tile roofing and beyond each side.

E. Open-Valley Flashings: Install centrally in valleys, lapping ends at least 8 inches in direction to shed water. Fasten upper end of each length to roof deck beneath overlap.

1. Secure hemmed flange edges into metal cleats spaced 12 inches apart and fastened to roof deck.


F. Channel Flashings: Install over underlayment and fasten to roof deck.

G. Rake Pan Flashings: Install over underlayment and fasten to roof deck.

H. Rake Drip Edges: Install over underlayment and fasten to roof deck.

I. Eave Drip Edges: Install beneath underlayment and fasten to roof deck.

J. Pipe Flashings: Form flashing around pipe penetrations and tile roofing. Fasten and seal to tile roofing.

K. Sheet Metal Ridge Vents: Install centrally, and mechanically fasten to wood ridge. Adhere each side to clay roof tile with elastomeric sealant.

1. Install fabric mesh over roof-deck air ventilation gaps to prevent insect entry.
3.5 WOOD NAILERS

A. Install wood nailers over completed underlayment system at ridges hips rakes and securely fasten to roof deck at 24 inches on center with minimum two 10d galvanized nails or #8 screws.
1. Fasteners securing nailers shall not penetrate sheet metal flashing.
2. Hips and ridge boards shall be held back from eaves, rake edges and walls approximately 6 to 8 inches. Boards shall run together at hip-to-ridge transitions.
3. Nailers shall run continuous along hip and ridge without gaps.

3.6 CLAY ROOF TILE INSTALLATION

A. General: Install clay roof tiles according to manufacturer's written instructions, to recommendations in TRI/WSRCA's "Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions," and to NRCA's "The NRCA Roofing and Waterproofing Manual."
1. Maintain uniform exposure and coursing of clay roof tiles throughout roof.
2. Wire-Tie Fastening: Install wire-tie systems and fasten clay roof tiles according to manufacturer's written instructions and ICC-ES ESR report.
   a. Place twisted wire tie vertically up the roof deck from eave to ridge. Attach the deck anchor to the deck. Seal fastener head in membrane-compatible roofer’s mastic complying with manufacturer’s requirements.
   b. Slip loops in the twisted wire tie system over stems of the anchor and bend stems apart to engage the wire. Secure tiles to wire tie system with separate wire ties. Twist wire-ties three full revolutions at each tie point.
3. Extend tiles 2 inches over eave fascia.
4. Setting: Install clay roof tiles according to TRI/FRSA's "Concrete and Clay Roof Tile Installation Manual."
5. Cut and fit clay roof tiles neatly around roof vents, pipes, ventilators, and other projections through roof. Fill voids with mortar.
6. Cut tiles back approximately 2 inches from center diverter of valley metal for an open valley finish.
7. All rake tiles are to be fastened with no less than two, nails with a minimum 3/8 inch head, and shall have a dab of roof cement or tile adhesive at overlap.
8. All hip and ridge tiles shall be installed with a nail and a galvanized wind lock type nose hook. Also install a continuous bead of tile adhesive between overlapping area.

B. Cracked or broken tiles shall not be installed or allowed to remain on the roof.
1. Chipped corners which compromise the required 3" head lap are to be considered broken and shall be replaced. Adhered-together broken tile are not acceptable.
C. Mortar: Install mortar neatly forming a smooth, aesthetically pleasing ball which slopes to shed water. Mortar installation shall be aesthetically consistent throughout the project.
   1. Mortar shall be installed at all trim tile terminations.
   2. All tiles in contact with cement mortar shall be immersed in water for at least 2 minutes before laying to avoid drying out the mortar before setting and curing.

D. Clay Roof Tile Installation:
   1. Install tile eave closure.
   2. Provide minimum 3-inch lap between succeeding courses of clay roof tiles.
   3. Install roll rake tiles.
   4. Install ridge tiles with laps facing away from prevailing wind. Seal laps with butyl sealant.

E. Open Valleys: Cut clay roof tiles at open valleys to form straight lines. Maintain uniform width of exposed open valley from highest to lowest point.
   1. Drill or notch cut valley tiles and wire-tie to fastener placed clear of valley metal flashings.
   2. Do not nail tiles to metal flashings.

F. Vent Covers: Install vent covers as indicated in the Contract Documents and in accordance with manufacturer’s written instructions.

3.7 PROTECTION AND CLEANING

A. Protect completed underlayment and roofing and accessory products from subsequent construction activities and as recommended by manufacturer.

B. Remove and replace damaged or broken clay roof tiles.

C. Remove excess clay roof tiles, mortar and other debris from Project site.

END OF SECTION