SECTION 07050

BASIC THERMAL AND MOISTURE PROTECTION MATERIALS AND METHODS

PART 1 GENERAL

1.1 ROOFING

A. General:

1. Work shall comply with all local, state, and federal fire and safety regulations. Equipment and materials shall be situated in such a manner as to preclude any danger, disturbance, fire hazard, or interference to public safety and traffic.

2. All requests for changes, substitutions, "equals", etc. shall include complete specification sheets describing materials and methods of application.

3. A sufficient work force shall be provided to meet requirements specified herein. The foreman shall be skilled in the trade and qualified to lay out and supervise the work, and shall be in attendance at all times during roofing work installation.

4. Work shall be scheduled to prevent unnecessary traffic over the new roofing. Where such traffic is unavoidable, roofs shall be protected with plywood runways. Existing and newly completed roofs shall not be used to stockpile materials or debris.

5. Kettles shall be equipped with smoke afterburners in good operating condition and conforming to state air pollution control standards. (For odor sensitive environments, see FDG section 07515 for Cold Applied Built-Up Roofing.)

6. Test-cut sections twelve inches by twelve inches (12" x 12") may be removed from the rooms, one (1) for each 5,000 square feet, to determine compliance with specifications. Areas failing to meet specifications shall be removed and replaced at Contractor's expense.

7. When possible, utilize infra-red / capacitance or alternate testing for verification of acceptable moisture level of existing insulation to be reused.

B. Delivery and Storage

1. Materials shall be delivered in quantities sufficient to allow continuity of work.

2. All materials stored on the roof shall be on raised pallets and completely protected from the weather. Materials that become damp or wet, whether stored on the roof or elsewhere, shall not be allowed for incorporation into the roofing system, and shall be removed from the job site. All rolls shall be stored on end.
1.2 INSULATION

A. General:
1. State of California requirements for the insulation of buildings shall serve as minimum standards.
2. Certain cellular plastics used in building construction, though tested in conformance under ASTM A and NFPA criteria, have been considered by the Federal Trade Commission as performing differently under actual fire conditions than under test conditions. Such products, if allowed to remain exposed unprotected, may produce rapid flame spread, quick flashover, toxic or flammable gases, dense smoke and intense and immediate heat and may present a serious fire hazard. Architects are cautioned to thoroughly investigate these materials and their installation prior to specifying insulation products.
3. No visible emissions are allowed from the spray-on application of materials containing more than one percent (1%) asbestos when used to insulate or fireproof equipment.
4. Materials used to insulate and fireproof buildings shall contain no asbestos.
5. Provide proper attachment of existing and new insulation: mechanical, adhesive, hot tar. Must meet Factory Mutual wind requirements.

1.3 PEST CONTROL

A. Bats: Stanford has had several experiences with bats, some of which have been shown to be rabid. Tile eaves, unless properly designed, provide ideal resting and nesting places for these nocturnal mammals. The University's Department of Health and Safety will provide advice to minimize this problem, which includes the following:
1. Eight inch (8") wide gutters tight to building wall and flush with bottom of roof tile.
2. A twelve inch (12") strip of fiberglass near roof edge and under tile.
3. Parapets or curbs in lieu of eaves.
4. Alternate method: provide bird stop using mortar at fascia.

PART 2 PRODUCTS

2.1 A. Roof Tile:
1. All mission type roof tile shall be Mariposa Mission two-piece straight barrel clay roofing tile, manufactured by Gladding McBean or approved equivalent. Tile shall vary in color, shade and tone as specified below for "Stanford Blend." All tiles shall be 7-5/8 inches wide, laid in parallel rows 10-3/4 inches on centers and lap four inches (4").
a. Colors shall be same as or matching those manufactured by Gladding McBean "Stanford Blend."

b. Round of "Stanford Blend" shall be composed of 50% Blended Red, 45% #8 Mix, and 5% Monterey Blend

2. Pan tile shall be double eave and hip tile six inches (6") long. First row of cover tile shall be fourteen inches (14") long with ten inches (10") exposure. All other field, hip, and ridge cover tile shall be eighteen inches (18") long with fourteen inches (14") exposure.

3. Mortar shall be three (3) parts sand, one (1) part white Portland cement. Lime shall not exceed fifteen percent (15%) of cement and shall be tinted to match tile.

B. Composition Shingles: Composition shingles shall carry a UL rating approval with a Type "Class A". (Minimum rating on material – 50 Year)

C. Gutters, Downspouts, and Flashing:

1. Gutters and downspouts for major buildings shall be sixteen ounce (16 oz) copper only, no substitutions.

2. Parapet wall caps shall be fully galvanized 22 gage sheet metal with one inch (1") standing locked seams.

3. Continuous gravel stop and nosing shall comply with SMACNA Architectural Sheet Metal Manual #7. Strips shall be canted as needed in angles of roof deck intersection with walls, curbs, etc.

4. Dome strainers for roof drains shall be metal; plastic dome strainers are not acceptable.

PART 3 EXECUTION

3.1 ROOFING INSTALLATION

A. General:

1. Before starting the work, all surfaces shall be smooth, firm, dry, and swept broom clean. Application of the roofing system shall not proceed until unsatisfactory conditions have been corrected and approved by the Project Manager's representative.

2. Drainage fittings, connections, metal aprons, metal edgings, flashings and counter flashings, collars and sleeves for pipes passing through the roof, and metal overflows shall be properly set, or shall be on the job if they are to be built into the roofing assembly. As a minimum follow SMACNA sheet metal details in conjunction with the manufacturer...
required details providing the roof warranty. “All” penetrations must be a minimum of 12” apart from each other and 18” out of valleys.

3. Roofing applicator shall be approved by the manufacturer of the specified roofing and flashing system.

4. All penetrations must be a minimum of 12” apart from each other and 18” out of valleys, measured from the center-line.

5. Material handling equipment shall be selected and operated so as not to damage existing construction or applied roofing. Soft rubber and inflatable tires only are permissible. Drum type felt machines shall not be used.

6. All fish mouths, wrinkles, buckles, tears, or other damage in any ply or felt shall be cut out and repaired by installation of an additional layer of felt set into hot asphalt over the top. Surface shall be mopped the full width under each felt layer; no dry laps will be allowed.

7. All debris resulting from or incidental to this work shall be gathered up and deposited in containers daily and removed from the job site. All bitumen spills or stains shall be cleaned or repaired to the satisfaction of the Project Manager's representative.

8. All plies of roofing shall be laid "shingle" fashion, starting at low points or drains and working up the slopes to high points of roof.

9. All plies of roofing shall be broomed thoroughly into the hot asphalt full felt width. A clean broom shall be used; no rollers or squeegees are permissible.

10. Roofing shall be applied in dry weather only, and when there is no threat of immediate inclement weather. Roofing shall not be applied when ambient temperature is below 40 Degree F.

11. Roofing shall be properly sealed around drains as specified by the manufacturer. Ring shall be installed and tightened immediately after roofing is applied.

12. All sheet metal work shall be done in accordance with SMACNA Architectural Sheet Metal Manual #7: Thermal and Moisture Protection, Metal Roofing, Accessories, and Specialties.

B. Tile Roofing Installation:

1. The Contractor shall install approximately one-hundred (100) square feet of tile roofing at location designated by the Architect and the Project Manager. The finished tile roof shall match the approved sample.

2. The tile roofing shall be installed according to manufacturer's instructions and laid regularly in parallel rows maximum 10-3/4 inches on centers perpendicular to the eaves. Double-eave cover tile shall be installed in field with the lower six inches (6") long, the upper fourteen inches (14") long, and with ten inches (10") exposure. All field pan and cover tile, hip, and ridge cover tile shall be eighteen inches (18") long with fourteen inches (14") exposure. All tile shall be eight inches (8") wide. The upper
edge of each cover tile shall butt against the lower edge of a pan tile so that all rows of tile are uniform and parallel with eaves. Lead flashing and counter flashing shall be installed on all pipes passing through tile roof.

3. Copper tie wire not less than #14 gauge shall be used for securing tiles. Copper nails shall be used to secure tie wires.

4. Tiles that verge or miter along the valleys, hips, and ridges shall be cut neatly on the job using a masonry saw for making clean, straight, smooth cuts. Tiles shall be cut so as to give separation of four inches (4") between both cover and pan tiles at valleys to allow free flow of water.

5. The space under the pan tile and cover tile next to ridge tile shall be completely filled with cement mortar. Mortar shall be neatly splayed from the lower edge of ridge tiles, over field cover and pan tiles, so that the upper four inches (4") thereof is imbedded in mortar in approved manner. Mortar shall be tinted with mineral color to match existing tile roof.

6. All surplus mortar shall be removed from surfaces of tile roofing and washed, if necessary, so that all surfaces are left clean to the satisfaction of Architect and the Project Manager.

7. Tile with projecting anchor lugs at the bottom of the tiles shall be held in position by means of 1 x 2 x 4’ wood stripping nailed to the roof sheathing over the underlay.

8. Tile roofs shall have an underlayment of modified bitumen or equal. Mil thickness shall be specified for providing a 100 year roof warranty.

9. Roof valley flashings shall be provided of not less than sixteen ounce (16 oz.) copper sheet metal and shall extend at least eleven inches (11") from the centerline each way, and shall have a splash diverter rib not less than one inch (1") high at the flow line formed as part of the flashing. Sections of flashings shall have an end lap of not less than four inches (4”).

10. Hip and ridge weather exposures shall not exceed those permitted for the field of the roof.

11. Grout for hip and ridges on new projects shall be colored to match the tile. At existing projects adjoining continuous roofs, grout color shall match existing.

C. Composition Shingles:

1. Composition shingles shall be applied only to solidly sheathed roofs, except when applied over existing wood shingle roofs as approved by the Project Manager's representative.

2. Composition shingles shall be fastened according to manufacturer's printed instructions, but not less than four nails (staples are not allowed) per each strip for shingles not more than thirty-six inches (36") wide and two (2) nails per each individual shingle less than twenty inches (20") wide.

3. Composition shingles shall not be installed on a roof having a slope of less than 4/12 pitch unless approved by the Project Manager's representative.
4. Composition shingle roofs shall have an underlay of not less than thirty pound (30#) felt over entire roof, and two (2) layers of fifteen pound (15#) felt at change of pitch less than 4/12.

5. Roof valley flashings shall be the same as required for wood shingles. Valley flashing shall be not less than 22 gauge galvanized sheet metal, shall extend at least eight inches (8") from the centerline each way, and shall have a splash diverter rib not less than 3/4 inch high at the flow line formed as part of the flashing. Sections of flashing shall have an end lap of not less than four inches (4").

D. Mineral Surface:
1. Metal nosing 3inch x 3inch shall be installed around complete perimeter for drip edge.
2. Thirty pound (30#) base felt shall be applied over entire roof on two inch (2") overlap with underlay of two-ply fifteen pound (15#) felt on pitch less than 4/12.
3. Two (2) layers of thirty pound (30#) felt shall be applied by lapping each layer of felt nineteen inches (19") over the preceding one. The full width of each felt shall be mopped with 425 degree to 475degree F high-melt asphalt, twenty-five pounds (25#) per square.
4. Starting at the low edge, one (1) layer of cap sheet (90# or fiberglass 72#) shall be applied by lapping each layer two inches (2") over the preceding one. The end shall be lapped six inches (6") over the preceding felt and hot mopped full width under each layer with 190oF high-melt asphalt at twenty-five pounds (25#) per square.
5. Hips and ridges of the same material, color, and exposure shall be installed.
6. All pipes and vent flashings shall be sealed with lead jacks with the top of the flashing rolled approx. 1” into the pipe and painted with enamel paint. Color shall be red to match roof. (See typical plumbing vent detail, attached)
7. The roof and yard shall be cleaned of all roofing debris when roof is completed.
8. All gutters shall be cleaned of debris.
9. The above work shall be guaranteed against defective workmanship for a period of three (3) years. Material must carry warranty by manufacturer for twenty-five (25) years vs. 20. Pitch pockets are not to be used. Follow standard detail of “penetration pocket” utilizing non-shrink grout, specified mastic, sheet metal rain collar with correct overlap, draw band and sealant around the “V-ed” caulking channel. (See typical detail of penetration pocket attached). Install “approved” roof traffic pads at high traffic areas to preserve / minimize any damage to the overall roofing system.

E. Wood Shakes:
1. Wood shakes shall be applied to roofs with solid or spaced sheathing. The spaced sheathing shall be spaced no more than four inches (4") clear, nor more than the width of the sheathing board. Spaced sheathing shall be at least 1 x 4 nominal size.
2. Wood shakes shall be laid in straight or staggered courses. Shakes shall be laid with a side lap of at least 1-1/2 inches between joints on adjacent courses. Edges shall be parallel within one inch. Spacing between shakes shall be no more than 1/2 inch.

3. Each wood shake shall be fastened to the sheathing with two nails or staples only. The starter course at the eaves shall be doubled and the bottom or first layer shall be either fifteen inch (15") or eighteen inch (18") wood shingles. Fifteen inch (15") shakes may be used for the final course at the ridge.

4. Shakes shall be laid with not less than eighteen inch (18") wide strips of not less than thirty pound (30#) felt shingled between each course in such a manner that no felt is exposed to the weather below the shake butts.

5. Shakes shall not be installed over on a roof having a slope less than 4/12 pitch, unless they are installed over an underlay of not less than thirty pound (30#) felt, applied as required for a base sheet, and unless approved by Project Manager after consultation with the University's Department of Operations and Maintenance.

6. Roof valley flashing shall be provided of not less than 22 gauge galvanized sheet metal and shall extend at least eleven inches (11") from the centerline each way and shall have a splash diverter rib not less than one inch (1") high at the flow line formed as part of the flashing. Sections of flashing shall have an end lap of not less than four inches (4").

7. Weather exposures shall not exceed ten inches (10"). Hip and ridge weather exposures shall not exceed those permitted for field of the roof.

F. Wood Shingles:

1. Wood shingles shall be applied to roofs with solid or spaced sheathing. The spaced sheathing shall be spaced no more than four inches (4") clear, nor more than the width of the sheathing board. Spaced sheathing shall be at least 1 x 4 nominal dimensions.

2. Wood shingles shall be laid with a side lap of not less than 1-1/2 inches between joints in adjacent courses, and 1/2 inch on alternate courses. Spacing between shingles shall be not more than 1/4 inch. Each wood shingle shall be fastened to the sheathing with two nails or staples only.

3. Wood shingles shall not be installed on a roof having a slope less than 4/14 pitch unless they are installed over an underlay of not less than thirty pound (30#) felt, applied as required for a base sheet, and unless approved by the Project Manager's representative.

4. Roof valley flashing shall be provided of not less than 22 gauge galvanized sheet metal, shall extend at least eight inches (11") from the centerline each way, and shall have splash diverter rib not less than 3/4 inch high at the flow line formed as part of the flashing. Sections of flashing shall have an end lap of not less than four inches (4").

5. Weather exposures shall not exceed four inches (4").

6. Hip and ridge weather exposures shall not exceed those permitted for the field of the roof.
G. Metal Roofing:
1. Flat sheets or shingles shall be applied only to solidly sheathed roofs.
2. Metal roofing shall be applied in an approved manner.
3. Metal shingles shall not be installed on a roof having a slope of less than 3/12 pitch.
4. Metal shingles shall be applied over an underlay of not less than thirty pound (30#) felt applied as required for a base sheet.

PART 4 ROOF MODIFICATIONS:

4.1 Building renovations involving roof modifications:
   B. General:

   1. Modifications to an existing roof system, i.e. adding of new roof mounted equipment, pipe penetrations, etc. must follow the manufacturer requirements to maintain the Roof System Warranty(s). Coordinate and receive necessary approvals from the specified Manufacturer. Utilize qualified and experienced (min. 5 years) roofing subcontractors to perform roof modifications, sealing of roof penetrations, etc. Ensure temporary provisions have been made to protect the roofing system including the insulation, building structure; occupants, equipment and possessions of the occupants while modifications are being made.
   4. Any wet insulation will need to be replaced by the contractor at no cost to Stanford University.
   5. Do not use roofing products containing asbestos.

END OF SECTION