SECTION 07320

TILE ROOF GUIDELINES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The drawings and general provisions of the contract, including General and Specific Conditions, and Division 1 (General Requirements) apply to the work specified in this section.

1.2 DEFINITIONS

A. "Top" tile: Clay tile covering pan (sometimes referred to as the "cover" tile), concave in shape.

B. "Pan" Tile: Clay tile on the underlayment, convex in shape.

C. Underlayment: Waterproof membrane (sometimes referred to as felt) vapor barrier or tar paper.

D. Substrate: Wooded platform the tile is fastened to, (sometimes referred to as the deck) sheathing.

1.3 QUALITY ASSURANCE

A. Qualification of Installer: Company with minimum five years successful experience in work of comparable scope.

B. Qualification of Subcontractor: Company with minimum five years successful experience in work of comparable scope.

C. Inspection: Prior to bidding, contractor shall thoroughly inspect roof to become familiar with extent of tiles, flashings, substrate and other items in the specification to be replaced and or repaired.

1.4 SUBMITTALS

A. The contractor will supply shop drawings of any changes or deviation from the bid document for written approval prior to installation of all treatment of ridge, hip, piping, ducts, valleys, skylights, clerestory windows and other penetrations installations.

B. Product Data:
   1. Provide product data sheet for each type of roofing material.
C. Certification:
1. The contractor will certify that manufacturer's materials have been tested and comply with Contract Documents.

D. MSDS
1. Manufacturer's Material Safety Data Sheets (MSDS) on all product

E. Samples:
1. Full size standard tile
2. Underlayment
3. Mortar or roof cement
4. Fasteners and fastening system
5. Urethane caulking

F. Mock-up:
1. A six foot by six foot (6'x6') mock-up section of new tile will be set up on the roof for review and approval by the Project Manager. The mock-up area will be adjacent to an existing area of tile roofing tiles for comparison.

1.5 DELIVERY, STORAGE AND HANDLING

A. Delivery:
1. Transport and deliver tiles on manufacturer's original pallets and in a manner to avoid physical damage.
2. Clearly identify manufacturer, trade name, style and color of palletized material

1.6 TILE STORAGE:

A. Stack palletized tiles not more than two pallets high; stack loose tile on butt end on blocking and straight as possible in level rows not more than two tiles high.

B. Do not store tiles in flat position

C. Do not store tiles under trees or shrubs to avoid soil compaction near landscaped areas.

1.7 UNDERLAYMENT STORAGE

A. Store rolls of underlayment on ends and protect from weather.

1.8 FASTENERS:

A. Store fasteners in original, unopened containers until used.
1.9 HANDLING:

A. Do not stack tiles on roof in quantities exceeding six tiles high on 12: centers at every third course on slope.

1.10 BUILDING PROTECTION DURING PROJECT

A. The building will be protected from damage due to rain, wind or other adverse weather conditions during the entire project. All temporary protection will be done in such a manner that no rain, wind or other adverse weather conditions will enter or damage the building or its contents. Failure to protect the building and/or its contents and damage occurs, the contractor will replace or repair this damage with no additional cost to Stanford University. The repair or replacement will be immediate upon notification by Stanford. Replacement shall be in kind.

1.11 ENVIRONMENTAL CONDITIONS

A. Do not set tiles in mortar when the ambient temperature is less then 40 degrees F., or when such temperature is expected within 24 hours.

1.12 PRE-INSTALLATION CONFERENCE

A. Convene pre-construction conference one week prior to roofing work to coordinate roofing with other trades.

B. Require attendance of parties directly affecting roofing work.

C. Review installation and coordination required with related work.

1.13 WARRANTY

A. Provide warranty for correcting failure of clay tile roofing system to resist penetration of water.

B. Warranty Period: Five years.

PART 2 MATERIALS

2.1 CLAY ROOFING TILES

A. Historic Buildings:

1. The roof tile on the historic building shall be made by Gadding McBean Tile Company in Lincoln California. The mixture of the
tiles varies from building to building slightly. The following mixture guidelines are to be confirmed in the field depending on the building.

2. 95% of the tile will be the Number 8 blend. This consists of approximately 18-20% burnt klinker and an even distribution of three other colors. Mixed in with these tile shall be 5% of the Monterey blend. Even with in the Monterey blend there are variations with in the pallets and between pallets runs. The Stanford tile are the darker pallet and pieces of the Monterey blend. If a blond or yellow tile is shipped in the order those tile will be used as pan only.

B. Mixing old tile and new:
1. When mixing old tile and new the contractor will mix tile in a random pattern. Do not create patterns with the tiles, including but not limited to, appearances of rows by color of texture or grouping of similar colors or texture. The term texture is use to describe aging of tile such as moss growth. New tile will be placed as pan to allow the historical tile to be seen.

2.2 FITTINGS:

A. Furnish fittings as needed for complete installation in accordance with manufacturer's recommended and approved samples.

2.3 Tie System:

A. Use Copper Tile Tie System concrete sub roofs or where directed by Stanford's project manager. Provide sample to the Stanford Project Manager as part of the submittals.

B. Tile Nail will be used on wood sub roofs. Provide sample to the Stanford Project Manager as part of the submittals.

2.4 UNDERLAYMENT: Modified bitumen membrane.

2.5 ROOF CEMENT: ASTM D2822, Group 1, non-sag.

2.6 MORTAR: ASTM C 270, Type O; cement-lime-sand type.

2.7 EXPOSED HIP AND RIDGE TILE:

A. Colored to match original historic mortar color with pure, non-fading mineral oxide color conforming with ASTM C979; designed and mixed to provide uniform finish color. Provide sample to the Stanford University Project Manager as part of the submittals.
2.8 POLYURETHANE SEALANT:
   A. Use only polyurethane sealant on penetrations.

2.9 ELASTOMERIC ASPHALT MASTIC:

2.10 ELASTOMERIC MASTIC FOR METAL GUTTERS: Trowel grade only.

2.11 REINFORCING MESH: Polyester fabric

2.12 ACRYLIC COATING FOR METAL:

**PART 3 EXECUTION**

3.1 COORDINATION
   A. Do not start setting tiles until other trades have completed work requiring traffic on or across roof surfaces.

3.2 INSPECTIONS
   A. Once the tile and necessary substrates are removed, a complete inspection by the project manager and roofing contractor will take place to determine additional structural damage that will need to be repaired, changed or replaced before the new plywood sub-roof is installed. This will not include repair work already identified in the scope of work.
   B. The contractor will notify the project manager when the roof is ready to receive tile. The project manager will inspect the modified bitumen membrane, flashing and other details prior to the installation of the tile.
   C. All county building inspections are the contractor's responsibility. Final payment will not be released until the building permit is finalized by the county of Santa Clara and a copy of the final permit is received by the project manager.

3.3 PREPARATION
   A. All areas inside the building will be protected by the roofing contractor from damage dust, debris or other foreign material associated with this project.
   B. Remove existing tile, mortar, building felt, and other material or objects identified in the scope of work.
   C. Remove mortar from surfaces of existing tiles, wash, if necessary, and leave all surfaces clean
D. Stack roof tile in safe, protected area, taking special precautions not to damage tile.

E. Sweep dust, dirt and debris, leaving surface clean to receive new roofing material.

F. Remove any sharp projections that would injure roofing membrane.

G. Remove existing substrate as needed. This will include wood, metal decking and flashing.\textsuperscript{1}

H. As the roofing material is removed, the contractor will clean inside any area where debris and dust is accumulating. This will include tops of suspended ceilings, lights fixture, rooms, floors or any other area or surface that require cleaning due to this project. Once the sub-roof is removed, the contractor will clean the area that now is exposed before new underlayment is installed.

3.4 INSTALLATION

A. Additional Framing: If the County building department requires details, the contractor will provide all necessary design and drawings.

B. Existing known damaged Structure: Only areas not known at the bid walk will be considered for additional cost. All areas requiring repair to the sub-structure will be completed by the contractor. Only qualified journeyman level craft persons in that trade will complete this work. All work will be inspected by the building inspector and Stanford's project manager before covering.

C. Sub-roof: The new sub roof will be three quarter (3/4") inch exterior structural grade plywood. Installation will be done to manufacturer specification for spacing. Nailing or screwing will be in compliance with the building code. Due to noise, nailing will be done by pneumatic nailers or deck screws only. Edge of plywood against clerestory window is to be sealed with a polyurethane sealant. Any visible areas of the roof, under eaves, will have clear construction heart redwood 1X8 instead of plywood.\textsuperscript{2} In addition, the contractor will install a 2X2 redwood cant strip under the first row of tile on each level. This will cover the ply word edge as well as act as the cant strip.

3.5 UNDERLAYMENT:

A. Lay two (2) layers modified bitumen membrane over deck and parallel to eaves with triple thickness at hips and ridges.
B. Overlap horizontal joints minimum 3" and vertical joints a minimum 12" with vertical joints staggered.
   1. Extend modified bitumen membrane up 6" at abutting vertical walls and parapets.
   2. Place modified bitumen membrane not less than 4" under edges at built-in metal flashings.
   3. Attach second ply of modified bitumen membrane with edges of the second ply staggered no less than 6" with first ply.

3.6 FLASHINGS AND GUTTERS

A. General note:
   1. All flashing over tile will extend a minimum of one full "top" tile way from the item being flashed. The flashing will wrap over the gap between the two "pan" tiles. See details.

B. Pipe Jacks: All pipe jacks will be lead double booted. See detail.

C. Flashings:
   1. All valley flashings will be 20 gage copper and extend a minimum of 18 inches under tile.
   2. If other sheet flashing is required, it will be made of 20 gage copper only.
   3. Flashing on clerestory windows: Flashing on clerestory windows will be two piece interlocked. See detail drawing. The flashing will be set in wet urethane caulking on the clear story sill. All caulking lines will be clean and straight. The second interlocking piece of flashing will be set in we mortar. Flashing will be 10' or less in length and over lap a minimum of six inches. Flashing will be secured by 1-1/2 inch number 10 pan head wood screws with rubber grommet.

E. Existing gutters: The existing gutters will be leveled and repaired. All seams in the gutters will be re-sealed and re-soldered as needed. Once the roof is finished, the gutters will be flooded and inspected for leaks and proper drainage.

F. Existing Sky-Light Windows: The existing sky-light windows will be re-flashed, as required, to ensure proper drainage and water tightness. Shop drawing will be required for approval to the project manager prior to installation.

3.7 ROOF TILES

A. Field tiles will be installed parallel to eaves, spaced to provide uniform courses. Tile lines will be true and even at all times.
B. Ridge and hip tiles will be installed straight and uniform in distance.

C. Install tile roofing according to manufacturer's instructions and as required to match existing.
   1. Attach tile fastening systems in accordance with manufacturer's requirements; apply a urethane caulk over anchors penetrating building paper underlayment.

D. Bedding tiles in mortar:
   1. Wet or soak tiles with water and allow free water to drain from surface before setting.
   2. Set each tile in bed of mortar and press into place.
   4. Clean mortar from exposed surfaces of tiles immediately using sponge and clean water.
   5. Mortar: Mortar line on ridge and hip tiles will be no greater than one inch with a uniform mortar angle throughout the project that matches the existing.

E. Mortar clean-up: All mortar drips, spills or other discoloration on tiles caused by the installation process will be completely removed, or the contractor will replace the damaged tile at no additional cost to the University.

F. Nailing: All nails will be 1-1/4 inch copper. Each nail will be placed in a daub of polyurethane caulking to seal penetration through roofing paper.

G. Tie Wires: Each "top" tile will be wired by a # 16 for proper wrapping of the wire and minimal pull on the nail.

H. Wire Nail: Wire nails will be allowed with 1-1/2 wire penetrating the roof underlayment with a daub of urethane caulking at each penetration. The wire will be 10 gauge brass nail

I. Wind clips some time referred to as "Hurricane Straps" will be required on all buildings with starting heights of 40 feet or higher. Clips will be on the first four rows of tile.

J. Fabricating fittings and special tile shapes:
   1. Cut tiles accurately to produce needed shapes where required.
   2. Tiles are to be cut using a saw. No chipping or score cutting will be allowed.
3. Removal and storage of tile: All tiles that are to be removed will be stacked on a pallet, bound, shrink-wrapped. Do not stack more than two pallets high.

3.8 CLEANING

A. Remove mortar, asphalt splatter or any other foreign material caused by the project from adjacent surfaces and or equipment.

B. Upon completion of work, remove excess materials and broken tiles from premises.

C. The entire site around the building will be cleaned. This will include but not limited to raking landscaped area, sweeping walks and driveways, and pressure washing, as required. Any damage to landscape areas, including soil compaction shall be repaired by the contractor.

END OF SECTION

1 On historic buildings is it preferable to leave original wood substrate intact if it is in an undamaged condition.

2 On historic buildings, if the original is tongue and groove board, new wood must match.