07 50 00 | Low Slope Roofing

This design guideline is written to the designer of record (DOR). This guideline is written to document UA standards of work and assist the designers in ensuring these standards get incorporated into the contract documents. Project specifications are to be written in specification language. Thus, in some cases, the text must be modified to read as specification language before it is copy-pasted into construction documents. Although this guideline lists many specific requirements that are to be included in the contract documents, the uniqueness of each project dictates this guideline also be used as a resource to facilitate the design process.

A. General & Design

Philosophy: All roofing shall be designed and installed such that the roofing system is decoupled from other façade and building elements. For example, a roof shall NOT be installed such that mechanical, electrical or veneer elements (brick, stucco, metallic copings, steep sloped roofing, etc.) must be removed to properly repair a roof or reroof a building. Similarly, a roof shall not be installed such that removal of the roofing is required to properly repair other building elements. This will simplify maintenance and future roof replacement projects.

Roofing shall be designed and installed to allow for roof replacement without requiring the removal of mechanical elements from curbs. Counter flashing at adjacent vertical elements will allow for roof replacement without removal of mechanical and electrical elements.

B. Materials

The UA standard roofing material for low sloped roofs is a KEE or KEE/PVC blend membrane. All other roofing types require written approval. One-half inch thick recover board (cover board) shall be used immediately below all membranes to enhance hail resistance, reduce insulation compression from foot traffic, and to mitigate effects of insulation shrinkage per NRCA recommendations. The membrane shall be fully adhered to the cover board.

Unless job conditions dictate otherwise, the desired roofing system is a fully adhered membrane over a mechanically anchored or fully adhered cover board, over polyisocyanurate insulation. The cover board and insulation will usually be fully adhered over regular strength concrete substrates and mechanically anchored over decking. Nailed base sheets may be more appropriate over lightweight concrete fill, poured gypsum decks or other substrates that can hold a tested and warranted anchor.

Although warranties are limited to 20 years, the roofing systems shall be designed to last over 30 years.

1. Materials and assemblies shall meet the following standards:
    a. FM Class 1: Fire rating from within (NFPA 276 or FM 4880)
    b. UL Class A: Fire rating from above (ASTM E-108)
    c. Wind Uplift: System have certified UL 1879 and FM uplift resistance approval up to the structural loading up to the design wind speed, but not less than FM I-75 for buildings with average roof heights of 30 feet or less and FM I-90 for buildings with roof heights greater than that.
    d. Hail Rating: FM 4470 Severe Hail (SH) rating
2. Membrane roofing shall one of the following. No substitutions allowed.

a. Fibertite KEE 45 mil smooth backed membrane

b. Johns Manville PVC/KEE blend, 60 mil smooth backed membrane

c. Duralast PVC/KEE blend, 60 mil smooth backed membrane.

d. SiPlast PVC/KEE blend, 60 mil smooth backed membrane.

e. Fleece backed membranes shall be use when installing roofing directly to irregular substrates.

3. Modified bitumen membranes shall only be used with written approval from UA staff. When used, modified bitumen system shall be the following:

   a. Three ply cold adhered system with heat welded end and side laps. Base flashing shall be torch applied. Two ply systems may be used instead of three ply systems depending on the application. Coordinate with UA PM. Torched down systems may be approved where appropriate depending on job specific conditions where solvents could cause significant user concerns.

   b. Nailed Base Sheet (if used): ASTM D4601, Type 2. Use Soprema Sopra G or approved equal from SiPlast or Johns Manville.

   c. Vapor Barrier and Base Plys:

      1) Cold Applications: ASTM D 6164, Type I, Grade S, 120 mil SBS sheet. Use Sopralene 180 sanded by Soprema or approved equal from SiPlast or Johns Manville.
      2) Torched Applications: ASTM D 6164, Type I, Grade S, 120 mil SBS sheet. Use Sopralene Flam180 by Soprema or approved equal from SiPlast or Johns Manville.

   d. Cap Sheet:

      1) Cold Applications: ASTM D 6164, Type I, Grade G, 160 mil SBS sheet. Use Sopralene 180 FR GR sanded by Soprema or approved equal from SiPlast or Johns Manville.
      2) Torched Applications: ASTM D 6164, Type I, Grade G, 160 mil SBS sheet. Use Sopralene Flam180 FR GR by Soprema or approved equal from SiPlast or Johns Manville.

4. Minimum cover board (recover board, or insulation protection board) shall be ½" thick, fiberglass faced, 500 psi minimum, gypsum-based material equal to or better than DensDeck Prime or equal. Use 4x4 sheets with adhered cover boards. 4x8 sheets may be used for mechanically anchored cover boards.

5. Insulation shall be polyisocyanurate meeting ASTM C1289, Type II, Class1, Grade 2, 20 psi compression strength unless a higher strength board is required. Shall meet FM Class 1 approval. The ASTM C518, 5 year aged R value shall be a minimum of 5.7 per inch.

6. Where possible, use prefabricated boots and prefabricated inner and outer corners.

7. Coated metal: 0.020" membrane material laminated to 25 gage galvanized sheet metal.

8. Membrane adhesive: Water or solvent based approved my membrane manufacturer.

9. Interlayer Adhesives: Two component, low rise polyurethane foam will typically be used, if approved by roofing manufacturer, for adhering other materials.

10. Termination and pressure bars: Stainless steel or aluminum, 1/8" thick by 1" minimum wide, pre-punched at 8" on center maximum. Termination bars shall have an integral caulk tray.

11. Fasteners:

    a. Drive pins are not allowed. SS hammer screws shall be used instead of drive pins.

    b. Fasteners to be stainless steel or contain a corrosion resistant coating to resist 1,000 hours of 5% salt spray testing per ASTM B117 without showing read rust, and meet FM 4470 corrosion resistance requirements. Fasteners for pressure treated wood shall be stainless.

    c. Deck screws shall be fully threaded, heavy duty, coated steel capable of penetrating two layers of 18 gage steel deck without damage to the tip, threads or shank.

    d. Plates shall be minimum 18 gage galvanized steel.

12. Metal flashings that are not required to be membrane coated metal shall be 0.040" aluminum, 16 oz copper, 26 gauge stainless steel, terne coating stainless or brushed stainless. Thicker material may be required depending on the installation. Galvanized painted metal shall not be used without prior UA approval. This is typically limited to pre-engineered, prefabricated metal building systems.

13. All exposed sealant shall be silicone.

14. Drains shall be cast iron drains with an integral clamp ring.

15. Overflow drains shall either contain a clamp ring and an overflow collar, or be a pipe with the membrane folded a minimum of 2" into the pipe with an internal clamp band. Pipes shall be large enough to meet plumbing code with membrane folded into pipe.

C. Warranty

1. The following shall be specified in the manufacturer's warranty.

    a. 20 year no dollar limit material and workmanship warranty again leakage.

    b. Warranty shall include labor and material to repair leaks resulting from manufacturer and workmanship defects.

    c. Be warranted for wind speeds up to 90 mph as defined by the three second gust listed in ASCE-7.

    d. Warranty shall repair wind damaged roofing prior to owner insurance coverage engaging owner's insurance.

    e. Warranty shall be governed by Alabama law and adjudicated in Alabama.

    f. Require not less than 30 days to notify manufacturer of potential warranty claim from observance of potential defect.

    g. Consequential damages may be excluded except for failure of essential purpose (if the warranty is not honored).

h. Time for filing a legal claim shall be not less than 5 years, or governed by state law, whichever is greater.

i. Manufacturer may make subsequent inspections of the roof not more than once a year at no cost to the owner.

j. The warranty shall commence on the date of substantial completion of the project.

k. Arbitration is not allowed.

2. The installer shall provide a 5-year watertight workmanship warranty per standard ABC form C-9.

3. Longer or shorter warranties may be justified based on the type of construction and risks associated with leaks. In such cases, the DOR to make a recommendation to Owner for manufacturer held workmanship warranty requirements.

4. Warranty shall be fiduciary and primary for damaged roofing systems up to the warranted wind speed.

D. Submittals & Mockup

1. Product Data: Submit technical product data, installation instructions and recommendations from manufacturer, including data showing materials comply with contract requirements, including UL and FM approvals.

2. Samples: Submit sample of membrane, insulation, prefabricated flashings, and coated metal. If colored membranes are used, submit color samples.

3. At a minimum submit job specific shop drawings showing the details listed in the design section below. The DOR shall specifically enumerate which details are required to be submitted for approval. Shop drawings shall show nailers and blocking, including specific anchor and anchor spacing of these elements. An insulation and fastener layout plan shall be submitted.

4. Manufacturer shall issue intent to warrant letter from the roofing manufacturer listing all products to be used and a statement of compatibility of those products, and a sample of the warranty. The preinstallation meeting shall not be held until the sample warranty has been approved.

5. A letter from the manufacturer stating the installer is approved by the manufacturer to install the product.

6. Free standing mockups will be required for large projects. Mockups shall be selected to show transition from roofing system to wall systems, gutters, expansion joints, precast, etc. Medium and smaller projects shall require in-place mockups.

E. Design-Execution

Contract documents shall be assembled to follow the standards and conditions listed below.

1. Provide a minimum 1/4" per foot slope on roofing membranes. Where possible, slope the structure to provide this slope. Tapered insulation is more than twice the cost of flat insulation. Slopes less than ¼" per foot require written approval by UA design staff.

2. The contractor may use construction document details as shop drawings.

3. Roofing shall be detailed and installed such that the water tightness of any joint is not sealant dependent.

4. Show layout of roof slopes with crickets and valleys. Use crickets when width of curb exceeds 23". Cricket shall not exceed a 3 to 1 side to side ratio unless approved otherwise by UA.

5. All roofs shall include drain sumps at roof drains and sumps at roof drain scuppers. Sumps shall be 4-foot square and have a minimum slope of ½" per foot. Half sumps are acceptable at scuppers.

6. Drain and OF drain scuppers. Through wall scuppers shall be four sided where possible. Scuppers shall be sealed watertight on the roofing AND veneer side of walls. If lambs tongues Use a prefinished aluminum collar on the exterior of through wall scuppers to match the construction. Collar shall be anchored to the wall at 6" centers, terminate in a caulk tray and seal with silicone sealant around the top and sides of the collar.

7. Roof Drains: Roof drains shall be installed in such a manner as to be below the level of the sump area. Apply a generous bead of approved sealant between the flashing sheet and drain bowl flange, the flashing sheet and clamping ring. Tighten clamping ring uniformly until sealant disperses out from under and above clamping ring and assembly is sealed. Lap roof membrane onto flashing a minimum of 6" and heat-weld.

8. No exposed sealants allowed at roof membrane terminations. Cover all sealant and membrane terminations with storm collar or counterflashing.

9. Mechanical curbs. Curbs shall extend 12 inches above the field of the roof. Curb flashing shall Include a stainless steel skirt set in butyl tape on top of the curb. The SS skirt shall extend below the mechanical equipment skirt and include a receiver to receive CF to cover a future roof termination. This will allow a reroof project to be executed without removal of the mechanical equipment.

10. Mechanical curb rails: Curb rail caps shall be fabricated in one piece, be watertight, constructed with non-corroding metal and include a minimum 2" skirt shingle lapped over the membrane termination. ALL penetrations through the skirt shall be sealed with EPDM washers or silicone sealant.

11. Pipe penetration with storm collar: All pipe penetrations shall have stainless steel or copper storm collars installed with a caulk tray and clamp band above the membrane termination. This protects the roofing sealant from UV degradation. Silicone sealant shall be used in the rain collar caulk tray.

12. Expansion joints: Expansion joints fabricated from the roofing membrane shall be used. If metallic expansion joints are needed, they shall be fabricated by the roofing contractor. Prefabricated metallic roofing expansion joints shall not be used unless the DOR can justify their use to UA staff.

13. Expansion joint to roofing transition: DOR to show or call out how the expansion joint is to transition to veneer systems.

14. Parapet coping: Coping shall be designed and installed to never be removed.

    a. Copper, prefinished aluminum or brushed stainless copings shall be used. Use of galvanized coating steel copings will only be allowed in special conditions with written UA design staff approval.

    b. Copings shall slope approximately 1" per foot toward the roof.

c. Standing seam copings shall be used on copings over 15 feet high. Flat seamed copings with 8" backer splices are preferred on copings less than 15 feet high.

d. Flat seamed copings shall have solid backing the full width of the coping to prevent sagging from personnel stepping on the coping.

e. All metal copings must be underlaid with ice and water shield or roofing membrane.

f. All metal copings and coping cleats shall be anchored a minimum of 12 inches on center.

g. Continuous cleats shall be used on the outside of copings. Copings may be surface anchored on the roofing side if EPDM washers are used under the screw heads.

h. A 360 degree receiver shall be folded into the roofing side drip of the coping to receive counterflashing that will cover future reroofing membrane terminations.

i. Metal shall extend at least 1" below all blocking prior to reaching the drip.

j. Copings shall be terminated at higher walls with a coping end cap anchored to the veneer of the higher wall, with through wall flashing draining above the coping termination flange. The coping termination shall fold 3" up and on the sides of the veneer, be anchored and have an integral caulk tray with silicone caulk.

15. Wall system to roofing transition: Through wall flashing (TWF) is required to drain above the roofing termination. At coping terminations to a higher wall, TWF shall extend at least 3 inches past the sides of the coping and exit above the coping end cap.

16. Roof penetrations by numerous conduits or pipe shall be grouped and run through non-corroding, metallic goosenecks with the outlet pointing down a minimum of 10 degrees. Pitch pockets shall not be used.

    a. Goosenecks may be fabricated from coated metal, copper, ss or prefinished aluminum.

    b. If goosenecks are not fabricated with coating metal, coated metal base flashing must turn up 8 inches and the gooseneck must slide over and shingle lap 6" over the coating metal. Screws anchoring the gooseneck to the coating metal must have EPDM washers.

    c. The top of goosenecks shall be sloped a minimum of 10 degrees away from the penetration and extend over the gooseneck opening at least 12 inches.

    d. Goosenecks shall be shown adjacent to all mechanical units. Discuss mechanical layout with mechanical engineer and owner to limit penetrations and allow one gooseneck to serve numerous units.

    e. The inside of gooseneck shall be insulated to meet energy code and not allow air flow.

    f. Goosenecks shall be insect resistant.

    g. Elements running through goosenecks shall be sloped downward as they exit the roofing side gooseneck to prevent water from running the element and entering the gooseneck.

17. Grouped wall penetration through roof membrane: Grouped wall penetrations shall be covered by a sloping (10 degrees minimum) rain cover just like goosenecks. Elements penetrating walls shall be sloped just like that for goosenecks.

18. Hot pipe penetrations. Hot pipe flashings shall extend a minimum of 8" above the field of roof.

19. Electrical outlets shall not be mounted to the sides of curbs. This is a non-warrantable roof penetration. All electrical, water, and data penetrations shall be made through a warrantable roof termination list a single conduit flashing, gooseneck, or covered by a sloping water shield extending at least 12" over the penetration.

20. Membrane transition to other roofing systems: Transitions from steep sloped to low sloped or low sloped roofing system to different low sloped roofing systems shall be shown and dimensioned on the drawings.

21. Eave transition to gutters or fascia. DOR to determine if colored fascia is required or if the roofing membrane can be exposed at the fascia. Show dimensions on eave flashing with a minimum 2 inch shingle lap over beck leg of gutter or wall elements. If possible separate roofing system from wall elements with sealant joints between the two. Colored fascia shall be prefinished aluminum snapped over the coated metal fascia.

22. Show base flashing and counter flashing below adjacent wall elements that decouples roofing from wall systems. Detail shall allow removal and reinstallation of ONLY the CF to execute a reroofing project.

23. Any unusual condition that may not be covered by SMACNA or NRCA standard details shall be detailed or noted on the drawings. These conditions cannot be left to the roofers discretion. For reroofing projects, these areas are typically those with three or four layers of sealant installed to stop previous leaks.

24. All membrane and base flashing terminations shall be with a termination bar and caulk tray, anchored a maximum of 8 inches on center unless folded over curbs or parapets. All membrane terminations shall be shielded from UV exposure by using counterflashing or storm collars. SS or copper Rain shields and counter flashings shall be installed to shingle lap at least 3 inches over these sealants. Rain shields and counter flashings shall be sealed at the top with silicone sealant. Counter flashing must have caulk trays. Rain shields must be anchored with a SS clamp band.

25. Reroofing: All details shall be provided such that reroofing can be executed without disturbing adjacent building elements. All copings, TWF or other hard mounted metals shall have receivers to hold CF to cover roof terminations for future reroof projects.

26. Handrails, balustrades and other horizontal elements above the roof shall extend at least 6 inches above the plane of the roof to allow access for installation and repairs. If the element is more than 12 inches wide, it shall be at least 12 inches above the roof.

27. Posts, newels and other penetrations shall be detailed such that reroofing and repairs can be made without removal of the penetrating element. The design shall also allow for reroofing without the removal of these finishes, or the finishes shall be designed to be easily removed and reinstalled to allow for reroofing.

28. All membranes shall be rolled in place with heavy rollers to ensure good adhesive contact and limit sheet wrinkles.

29. The roofing membrane may be carried over parapet walls, but either metallic copings or parapet cap flashings shall terminate with a receiver on the roofing side to receive a counter flashing to cover a future roof termination when the building is reroofed.

30. Flashing anchorage shall meet SPRI ES-1 Standards. DOR to specify or detail minimum anchorage of wood blocking and flashing to be No. 12 screws installed at 12 inches on center

staggered. Sheet metal flashing terminations intended to be water tight shall be anchored a maximum of 8 inches on center.

31. All exposed sheet metal finishes are to have ice and water shield (high temperature peel and stick) or the roof membrane installed below them with a slip sheet between the two to ensure long term water tightness.

32. Insulation shall meet energy code requirements.

33. Use two layers of insulation with staggered joints when more than 1 1/2" of insulation is needed.

34. All structural penetrations through roof shall be circular or pipe members. No wide flanges, bars are channels shall be allowed to penetrate the membrane.

F. Re-Roofing

All the standards listed in Section D above shall also apply to existing roofing. The following additional standards shall apply for reroofing projects:

1. DOR to assess condition of existing deck, insulation, and wood blocking and estimate the quantity that needs to be replaced. Include unit allowances per square foot, board foot or other appropriate units for replacing deteriorated materials. Include a unit price for contract adjustments after the work is complete. In some cases, wholesale deck overlays may be more cost effective than numerous isolated repairs.

2. DOR to ensure existing deck and/or roofing system is acceptable for new roofing. If destructive observations are required, this can be facilitated by UA staff. Coordinate with UA PM.

3. DOR is responsible for conducting elevation surveys as required to confirm adequate base flashing height given the restraints of existing parapet heights, window and door heights, transition elements, and through wall flashings.

    a. Add tapered insulation as required to achieve the minimum required slope.

    b. UA may be able to shoot elevations to determine existing slopes. In some cases, insulation thickness and top of deck elevations both vary.

    c. Coordinate with UA PM. Inform Owner if ¼" per foot slope requires a roofing membrane tie-in above existing through wall flashing (TWF) that drains the drainage cavity. In these cases, the project may entail installing new TWF in the walls, moving drains, or as a last resort, a reduced roof slope.

4. DOR to ensure existing deck and enclosed space ventilation meets building code and roofing manufacturer warranty requirements.

5. Existing natural stone and precast copings are typically covered with prefinished metal copings with only a ¾" cleat and drip on the outside top corner of the stone. The entire stone may be covered if there is evidence of severe leakage through the copings. On lower floors, it may be desired to install a double sealant in the coping head joints and not install a metallic coping over the stone. DOR shall discuss covering natural stone or precast copings with the owner.

6. Replace metallic flashing as needed at adjacent walls. Use of face mounted counter flashing (CF) over roof membrane terminations is only allowed if there is no through wall flashing in the existing wall system. Reuse existing reglets when possible. Use silicone sealant in caulk trays and at flashings in reglets.

7. DOR to assess the size and condition of existing roof drains and roof overflow drains. DOR shall determine if existing drains can be reused, if new drains are needed, or if retrofit drains can be used. Allowances and unit prices may be required to track costs for replacing vs reusing the drains.

    a. The Roofing Contractor shall replace missing or non-functional drain components at each existing roof drain location. Replacement components shall be as supplied by the existing drain Manufacturer where possible. Submit alternative drain components for approval where necessary. Unless noted otherwise in the Allowances and Unit Prices Section, costs for replacement of non-functioning roof drain components shall be included in the base bid.

8. Add insulation where required to meet code. Discuss with UA staff.

9. Pull out testing: If mechanical anchorage is in question, DOR shall conduct pull out anchor testing during design. When anchor strength is questionable, anchor pull testing shall be required. One test shall be conducted for every 6,000 square feet of contiguous roof area, but not less than 4 tests for each roof area.

G. Lightning Protection

1. Lightning protection routing shall be coordinated by Designer.

2. Routing shall be shown on line diagram plan, unless the system is to be removed and reinstalled in like kind.

3. Waterproofing of lightning protection penetrations shall be shown by roofing designer.

4. ReRoofing

    a. DOR to request a UA in-house review of the existing lightning protection system.

    b. UA to advise if existing lightning protection can be removed, must be removed and reinstalled, must be replaced, and/or needs to be recertified.

5. Lightning terminals shall not penetrate the roof. Run cables through vents and other watertight elements where possible. Where terminals must penetrate the roof run through conduit running perpendicular to membrane, flash conduit watertight and include a storm collar, and proper conduit seal from lightning protection vendor.

6. Do not penetrate ANY gutters or valleys for any reason.

H. Quality Control and Inspections

1. Manufacturer's technical representative shall be on site during the first day of the installation to ensure all installers have been properly trained to install the roofing.

2. Manufacturer's technical representative shall visit the jobsite once during each week the roofing system is being installed.

3. Manufacturer's technical representative shall issue a written report digitally to all parties within 3 days of the jobsite visit.

4. Manufacturer shall conduct all visits required to ensure the roofing is installed properly and can be warranty per project requirements.

5. Installer shall calibrate heat welding equipment upon every startup of the equipment.

6. Three 6 inch long heat welded samples shall be provided for every day heat welding occurs. Samples shall be labeled with the date, building and locations and turned over to Owner at completion of the work.

7. Two 1 inch wide heat welded seams shall be cut from production heat welds and saved for tests. Samples shall be labeled with the date, building and locations and pull tested.

8. All seams shall be checked after cooling and repaired, if required, by the Contractor within 24 hours after hot air welding.

    a. Seams with blisters, fish mouths, wrinkles or other defects are unacceptable and shall be repaired.

    b. Patching and repair of defective seams shall be as directed by Membrane Manufacturer, Construction project manager or owner. Minimum patch shall extend beyond defect a minimum of 3" in all directions and be fully hot air welded.

- End –

Change Log – 07 50 00

Description of Change	Sheet or Drawing	Date
Division 07 50 00 reformatted to align with CA standards.		**03/31/23**