Division 03  | Concrete

Section includes various guidelines for general concrete use, curing, forming, reinforcing, finishing and concrete accessories.

This design guideline is written to the designer of record (DOR). This guideline is written to document UA standards of work, assist the designers in ensuring UA standards are incorporated into the contract documents and provide a resource to facilitate the design process. It is the designer of record’s responsibility to coordinate the criteria set forth in these design guidelines and in conjunction with the manufacturer requirements and use the most stringent standard.

Section 03 00 00 – Concrete

A. General

Philosophy and Approach

All concrete shall be designed, transported, placed, finished, and cured in accordance with American Concrete Institute (ACI) requirements. Components of the concrete mix shall meet applicable ANSI/ASTM requirements. Mix requirements and strength shall be specified by the Design Team for each item of construction. Structural drawings to be sealed by a registered structural engineer in the State of Alabama and contain the following:

1. Specify all loads used for design with complete strength calculations

2. Shop drawings required for fabrication, grade, and placement of reinforcement, including joint locations and sealing compounds. Provide certification from (an independent testing laboratory) that mechanical connectors for steel reinforcing comply with applicable codes and engineering calculations.

B. Materials

Form Materials

1. Forms for Exposed Finished Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.

2. Form for Unexposed Finish Concrete: Form concrete surfaces which will be exposed in finished structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

3. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.
Reinforcing Materials

1. Reinforcing Bars: ASTM A615. Grade 60, deformed.
2. Steel Wire: ASTM A82, plain, cold-drawn, steel.
5. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI Specifications, unless otherwise approved by UA in advance.

Concrete Materials

1. Portland Cement: ASTM C150, Type I or II low alkali, unless otherwise acceptable to UA.
2. Use one brand of cement throughout project, unless otherwise acceptable to UA.
3. Fly Ash: ASTM C618, Type C or Type F. Limit use fly ash to not exceed 25% of cement content by weight.
   a. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing or deleterious substances.
   b. Local aggregates not complying with ASTM C33 but which have shown by special test of actual service to produce concrete of adequate strength and durability may be used when acceptable to UA.
5. Water: Potable
   a. Products: Subject to compliance with requirements, provide one of the following:
      i. “Sika Aer”; Sika Corp.
      ii. “MB-VR” or “MB-AE”; Master Builders
      iii. “Dorex AEA”; W.R. Grace
      iv. “Edoco 2001 or 2002”; Edoco Technical Products
Underlayment & Flashings

1. Underlayment shall be permeable material that is mechanically fastened to the deck to ease shingle removal for future roof replacement projects (GAF Tiger Paw or equivalent). Underlayment must be approved (if applicable) by the roofing manufacturer.

2. SBS underlayment shall be 40 mil cross laminated, high-density polyethylene film and self-adhesive SBS asphalt sheet (SBS underlayment) embossed with or without a slip resistant or sanded surface and with removable contact/release paper or approved equal capable of withstanding 250 degree temperatures and self-healing at fastener penetrations. Use WR Grace Ice and Water Shield or equal.

3. Metal flashings shall be 0.032” aluminum, 16 oz. copper, 26 gauge stainless steel, or brushed stainless. Thicker material may be required depending on the installation. Galvanized painted metal shall not be used without prior UA approval.

Concrete Accessories

1. Nails: Hot-dip galvanized or stainless steel 11 or 12-gauge, sharp-pointed, conventional roofing nails with barbed or ringed shanks, minimum 3/8” diameter head, and of sufficient length to penetrate 3/4” into solid decking or to penetrate through plywood sheathing. Nails shall be approved by the roofing manufacturer. Zinc plated fasteners are not allowed. All shingles to be hand nailed, coiled nails not permitted.

2. Fasteners other than those required for attaching roof cladding, to be stainless steel or contain a corrosion resistant coating to resist 1000 hours of 5% salt spray testing per ASTM B117 without showing red rust, and meet FM 4470 corrosion resistance requirements. Fasteners for pressure treated wood shall be stainless.

3. Drive pin expansion anchors typically used to anchor metallic elements to concrete and masonry are not allowed. SS hammer screws shall be used instead.

4. All exposed sealants shall be silicone.

5. Provide plastic expansion joint cap similar to “Snap-Cap”, as manufactured by W.R. Meadows, where concrete walks or paving abuts the exterior wall of buildings.

6. Install expansion joint cap over top of expansion joint and pull out once concrete is cured prior to applying sealant.

C. Warranties

Designer of Record to ensure specifications require the following:

1. The following shall be specified in the manufacturer’s warranty for shingles:
   a. 50 year material warranty for slate and 40 year material warranty for shingles, prorated no sooner than 20 years. 20 year material color warranty for metal roofing.
   b. 15 year wind warranty. DOR to verify at least two manufacturers can offer this warranty.
   c. Warranty shall be adjudicated in Tuscaloosa, Alabama.
d. Be warranted for wind speeds up to 90 mph as defined by the three second gust listed in ASCE-7.

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

f. Require not less than 30 day notice to manufacturer after observance of a potential warranty defect.

2. The installer shall provide a 5 year water tight workmanship warranty.

3. Longer duration warranties may be desired based on the elevated risks of damage to building and contents on a case by case basis. In such cases, the DOR to make a recommendation to Owner for manufacturer held workmanship warranty requirements.

D. Design & Documentation Requirements

Scoping and Detailing

1. Contract drawings shall include details for the following conditions. The contractor may use these details as the basis for shop drawings. DOR to specifically require shop drawings for these conditions.

   a. Eave. Show dimensions on eave flashing with dimensioned shingle/slate/metal lap over back leg of gutter. Roof covering (shingles, slate, and metal) shall extend a minimum of 1/2 inch past the face of eave drip metal. Show SBS underlayment lapping over top of eave metal.

   b. Rake flashing at face of gables. Dimension metallic flashing. Use 2 inch minimum vertical leg with hemmed drip. Show SBS underlayment below rake drip metal.

   c. Step flashing complete with counter flashing shall be installed below adjacent wall elements at rake conditions that decouples roofing from wall systems. Show counter flashing (CF) covering step flashing such that it that can be reroofed without removing siding. One piece of siding removal is acceptable. Reference SMACNA or NRCA standards.

   d. Saddle flashing (crickets on uphill side of penetrations). Use saddles when width of the roof penetration exceeds 24”.

   e. Apron flashing (downhill side of penetrations). Use cleat to anchor head wall flashing. Head wall flashings shall be design to allow reroofing with minimal removal of head wall vertical elements.

   f. Corners of saddle and apron flashing shall turn and extend 3” at the sides and be fabricated water tight beneath or above adjacent step flashing.

   g. Any unusual condition that may not be covered by SMACNA or NRCA standard details. For reroofing projects, these areas are typically those with three or four layers of sealant installed to stop previous leaks.

   h. Metal flashings at the intersection of roofs, adjoining walls, or projections through the deck such as vent stacks.
Roof Covering

1. Use a minimum of six nails per shingle or slate or the manufacturer’s standard nail pattern, whichever is greater. Using less than six nails will require a statement from the manufacturer that using less than six nails will be detrimental to the system. Inform Owner if manufacturer prohibits using 6 nails per shingle.

2. Shingles are to be hand nailed only. **Nail guns are not permitted.**

3. Use starter shingles at eaves.

Flashings

1. Install SBS underlayment up 30 inches around the perimeter of all deck discontinuities (ridges, eaves, rakes, valleys, changes in slope).

2. Lap underlayment over SBS underlayment at roof deck perimeter elements.

3. SBS underlayment is not allowed as underlayment immediately below the roof covering elements unless required by the manufacturer.

4. Use only open valleys. Line valleys with a single 36 inch wide strip of SBS underlayment centered on the valley in addition to that required at the deck element perimeter. Show underlayment lapping a minimum of 3 inches over valley metal. Lap roof covering a minimum of 5” over valley metal. Valley metal shall be copper, brushed stainless, zinc or prefinished aluminum for polymeric slate. DOR to review with Owner for the appropriate metallic flashing material and color for each building. Written approval is required to use prefinished aluminum with shingles because granules can wear off the finish.

5. No penetrations are allowed in valley flashings.

6. SBS underlayment shall be installed below metal flashings and contractor fabricated metallic roofing elements.

7. Step flashing is required at side wall rake conditions. Runner flashing not allowed except for use with barreled clay or concrete tile roofs.

8. Last piece of step flashing at eave to be formed into a kickout flashing to divert water away from the end wall and into the gutter.

9. Flashing anchorage shall meet SPRI ES-1 Standards.

10. DOR to specify or detail minimum anchorage of wood blocking to be No. 12 screws installed at 12 inches on center staggered. Anchor lengths to be sized to provide adequate strength to resist induced loads.

11. No fasteners through exposed sloping legs of vents or boots. Strip in upper half of vent and boot flanges with SBS underlayment.

Penetrations

1. Penetrations of numerous conduit or pipe shall be grouped and routed through metallic goosenecks pointing down the slope. Goosenecks to contain 6” flanges all around fabricated on the slope of the deck. No exposed fasteners are allowed on the lower flanges.
2. Individual pipe and conduit penetrations shall be flashed with membrane flashings set in cut off mastic against the face of the penetrating element, held tight with a stainless steel clamp band. As metallic rain collar is required above the flashing termination to protect the sealant from UV exposure.

3. Hot pipe flashings shall extend a minimum of 6” above the roof deck.

4. 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.

5. Posts, newels and other penetrations shall be detailed such that reroofing and repairs can be made without removal of the penetrating element.

6. Use lead vent flashing boots.

Gutters

1. Eave flashing should lap 2” down over back leg of gutters. Lap 3” minimum if gutter slopes to allow for slopes. Show detail on drawings with dimensions. Include provisions for tight trimming of eave flashing at gutter hangers.

2. Back leg of gutters to always be at least 2” higher than front of gutters. This must be shown on drawings because some premanufactured gutters are not constructed with an extended back leg.

3. Unless specifically permitted by UA, exterior gutters shall be hung and shall not rest on top of other building elements. This creates a condition conducive to trapping water behind or beneath the gutter.

4. Gutter straps and hangers shall allow for adjustment of the gutter height to allow some variance between the plan of the roof deck and the plane the gutter.

5. Gutter splices shall be per SMACNA standards and shall be cold soldered.

6. Show gutter expansion joints on roof plan. Expansion joints are required every 50 feet. This spacing may be slightly exceeded if conditions dictate. Reference the specific gutter EJ desired from SMACNA or NRCA.

7. Show downspouts on roofing plans and building elevations.

8. Specify that gutters shall not pond more than ½ inch of water.

9. Only use solid flanges on gutter outlets. Snipped and tabbed flanges are not allowed.

10. All outlets shall have stainless steel debris screens. Cold solder screens to the outlets.

11. DOR to provide downspout dimension off the face of veneer and coordinate this with changes in the vertical plan of the veneer.

12. Downspouts shall terminate in the standard UA boot at grade level. DOR to coordinate elevation of top of boot with varying grade elevations and below grade piping around the building.
E. **Submittals**

Designer of Record to ensure specifications require the following:

1. **Product Data:** Submit technical product data, installation instructions and requirements from shingle manufacturer.

2. **Samples:** Submit full range of sample panels for color and texture selection. Panels shall be approximately 24” square. After selection, submit 2 full-size shingles for verification of each type/color/texture shingle used in work.

3. **Submit job specific shop drawings showing the details required in the “Design” section below. The DOR shall specifically enumerate which details are required to be submitted for approval.**

4. **Manufacturer shall issue intent to warrant letter from the roofing manufacturer listing all products to be used in the roofing system 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.**

F. **Re-Roofing Projects**

1. **DOR to assess condition of existing deck, wood blocking and framing and estimate the quantity of deteriorated material that needs to be replaced. Include unit allowances per square foot, board foot or other appropriate units for replacing deteriorated materials. Include a unit rate 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 is acceptable for new roof covering—including condition, type and thickness. If destructive observations are required, this can be facilitated by UA staff. Coordinate with UA PM.**

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

4. **It is preferred that existing shingles and roofing system be removed down to the roof deck prior to reroofing. Install new roofing over existing only with UA approval.**

5. **Replace metallic flashing as needed at adjacent walls. Use face mounted counter flashing (CF) on all masonry exhibiting deteriorated mortar joints. Otherwise remove existing reglet mounted CF and reinstall new reglet mounted CF in existing reglet. Seal with silicone sealant.**

6. **Inform Owner if new roofing membrane is being installed above existing through wall flashing (TWF) that drains a veneer drainage cavity. In these cases, the scope may entail installing new TWF.**

G. **Lightning Protection**

1. **Lightning protection routing shall be coordinated by Designer. Routing shall be shown on line diagram plan, unless the system is to be removed and reinstalled.**
2. Waterproofing of lightning protection penetrations shall be shown by roofing designer or record.

3. A lightning protection pre-installation meeting is required. Lightning protection sub, lightning protection manufacturer, roofing sub, GC, and owner are required to attend.

4. The DOR shall make all effort to avoid penetrating the sloped roof deck with terminals. Terminals penetrating the roof deck shall be detailed by the roofing DOR. Route cables and mount terminals through ridge vents and other water tight elements.

5. Re-Roofing
   a. DOR to request a UA in-house review of the existing lightning protection system.
   b. After the inspection, UA will advise if existing lightning protection can be removed, must be removed and reinstalled, must be replaced, and/or needs to be recertified.

H. Construction & Quality Control

Quality Control Expectations

1. A pre-installation meeting is required with contractor, installer, owner, and roofing manufacturer.

Inspections and Manufacturer Field Requirements

1. Manufacturer’s technical representative shall be on site during the first day of roofing 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 warranted per project requirements.

5. For reroofing projects, the DOR is expected to conduct two site visits per week for the first and last week of the installation. One site visit per week is required otherwise. Additional site visits may be required based on the specifics of the project.

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