

# ADMINISTRATIVE PROCEDURES APPENDIX 3

## BUILDING ENVELOPE DESIGN GUIDELINE

### PART 1 - GENERAL

#### 1.01 INTRODUCTION

- A.** This is a guideline on the Owner's minimum standards for:
1. masonry ..... normally specified in Division 04
  2. copings ..... normally specified in Division 04 or 07
  3. cavity wall flashings & sealants ..... normally specified in Division 07
  4. shingle roofs ..... normally specified in Division 07
  5. metal roof panels ..... normally specified in Division 07
  6. modified bituminous membrane roofing ... normally specified in Division 07
  7. elastomeric membrane roofing ..... normally specified in Division 07
- B.** This is not a specification, and should not be inserted as-is into specifications. It is provided in a specification format in order to facilitate its use by the Designer. Designers should translate requirements consistent with this guideline into their specifications.

#### 1.02 QUALITY CONTROL IN ROOFING

- A.** Products alone do not make a good roof. A good roof requires: appropriate design; suitable materials (vapor retarders, insulation, fasteners, membranes, flashings, accessories, perimeter metal); an adequate budget; a qualified, well-financed, trained applicator knowledgeable and experienced with the system specified; field quality assurance; and, a solid relationship between manufacturer and applicator.
- B.** Minimum degree of experience for a qualified roofing installer should be specified.
- C.** The roofing installer, whether the contractor or a subcontractor, and the manufacturer shall work together and be considered as one and the same certifying and providing:
1. Roofing products for the purpose of designing, developing and marketing a complete roofing system.
  2. Recommendations, specifications, and details for the roofing system materials and installation.
  3. Training for and approval of applicators of the roof system.
  4. Technical assistance to applicators during the application of the roof.
  5. Approval and preparation of shop drawings for the roof system.
  6. A qualified technical representative employed by the Manufacturer for the final inspection, and all inspections required by the Roofing System Warranty.
  7. All materials used with the roof system shall be approved by or purchased from the roof manufacturer.
- D.** Require submission of the following information for Designer to evaluate in judging whether a product will be an approved equal:
1. A list of approved applicators indicating name, address, phone number, and year first licensed as an applicator.
  2. Application form, required by the Manufacturer, establishing the past experience, reputation, and financial stability of the roofing installer.
  3. Training session(s) taught by the manufacturer and certification that the installers have attended and passed the training program.
  4. Indication that the roofing installer has displayed adequate experience and knowledge to be licensed by the manufacturer to install the roofing system. The license shall be renewed annually. The on-the-job superintendent shall be licensed as a qualified installer.
  5. A comprehensive list of references indicating name, location, address, phone number approximate number of square feet and name of architect and or owner of the project.
  6. Certification that the company has been manufacturing the product for 5 years or more.

## PART 2 - PRODUCTS

### 2.01 COPINGS

- A. Pre-cast concrete and cast stone copings shall not be used.
- B. Manufactured metal systems are preferred.
  - 1. System shall allow for thermal expansion and have replaceable components.
  - 2. Materials may be coated steel or aluminum, stainless steel, or copper.
  - 3. Coating system shall have a 20 year warranty and be field repairable.
  - 4. Aluminum may be anodized.
  - 5. Stainless steel and copper may be mill finish.
  - 6. Use under plates and cover plates.

### 2.02 MASONRY

#### A. BRICK

- 1. Avoid exposed CMU walls. Single-wythe split-face block walls usually allow water into the building and coatings are a temporary solution.
- 2. Pick a brick with a good track record in Tennessee.
- 3. Brick shall be made from fire clay, shale or a mixture of the two. Brick shall be fired to comply with the Building Code and ASTM C216, Grade SW, Type FBS. Brick shall be cored unless otherwise specified.
- 4. Brick shall have been in service for a minimum of 5 years on more than one building in Tennessee without deterioration, efflorescence, delamination, or spalling.
- 5. Exercise care when selecting white, gray, yellow, tan or other light-colored bricks. These have performed poorly in Tennessee when exposed to moisture absorption and freeze/thaw action.
- 6. Provide vendors with size, color, shade blend and texture desired.
- 7. Masonry walls above roofs are problematic. Consider using impervious materials.

#### B. MORTAR

- 1. Mortar for stonework and bearing walls shall be ASTM C270, Type S, cement-lime mortar.
- 2. Mortar for brick and concrete block in non-load bearing exterior walls shall be ASTM C270, Type N, cement-lime mortar.

#### C. SEALANTS

Polyurethane sealants shall be used with porous materials and joints between porous and non-porous materials.

#### D. CAVITY WALL FLASHINGS

- 1. Stainless steel is the preferred flashing material.
- 2. Other materials such as copper, peel and stick bitumen, and EPDM may be utilized.
- 3. Exposed materials may be prefinished steel, prefinished aluminum, stainless steel, or copper. Coating system shall have a 20 year warranty and be field repairable. Typically, the through wall material does not have a prefinished coating. Aluminum may be anodized. Stainless steel and copper may be mill finish.
- 4. If a stainless steel drip edge is not used:
  - a. an asphalt-based material is not acceptable because of UV sensitivity and the normal configuration of asphalt-based materials being held back a half inch from the brick face to prevent drooling;
  - b. asphalt coated copper fabric is not acceptable because of the inability to properly seal longitudinal joints and make water-tight end dams; and,
  - c. EPDM or reinforced 40 mil non-asphalt based peel-and-stick through-wall flashing material with pre-molded end dams and inside/outside corners should be used.

## 2.03 ROOFING

- A. The following roofing products are preferred, though other types can be submitted for evaluation with information and recommendations:
1. Shingles or metal on adequately sloped roof befitting the overall building design;
  2. Fully adhered 60 mil non-reinforced EPDM single membrane roof system;
  3. Mechanically fastened 60 mil reinforced EPDM single membrane roof system; or,
  4. Modified Bitumen Roof System (base sheet and granular cap sheet).

## PART 3 - EXECUTION

### 3.01 COPINGS

- A. Copings shall slope towards the roof and comply with ES-1 requirements.
- B. Stone copings:
1. Stone copings shall be set on sloped stainless steel flashings and mortar beds.
  2. The Stone copings shall overhang the parapet wall and have drips.
  3. Stone coping end joints shall be sealed with sealant in lieu of mortar.

### 3.02 PARAPETS

Parapets taller than 24" shall not have the inside face covered entirely by roofing flashings. The flashing material is not intended for this use. An exterior, low-maintenance, impervious material is preferred.

### 3.03 MASONRY

#### A. JOINTS

1. Proper horizontal and vertical movement joints shall be provided at critical locations. Vertical joints shall be 1/4" to 1/2" wide and be within 4' of the corner on one side and within 8' to 12' of the corner on the other side.
2. Typically, vertical joints shall be spaced on 20' to 25' centers.

#### B. PENETRATIONS

1. Through-wall flashings and weeps shall be installed above and below windows and other openings.
2. Windows and other openings shall have sealed head flashing with sealed end-dams and full head joint weeps. Windows shall have subsills with back dams and end-dams.
3. Sill flashings should extend from the inside face of the window or storefront section and direct all water beyond the outside face. Turn back edge and sides to form dams, at least 1 inch in height. Sill flashings shall be bedded in sealant. Fasteners penetrating sill flashing shall have fastener heads sealed completely. Sill weeps on the window or storefront shall remain open.
4. Steel lintels over openings greater than 42" wide shall be free to move laterally on one side.

#### C. BRICK

No chemical or harsh physical cleaning will be permitted as this can open pores of material.

#### D. MORTAR

Joints shall be tooled. Struck and Raked joints are not recommended.

#### E. CAVITY SPACE

1. All cavities shall be kept clean and free of mortar. Use 2" cavities when possible.
2. As the exterior veneer is laid, provide temporary wood or foam strips resting on the veneer ties to catch mortar droppings. As the wall is laid up, carefully remove the temporary strips and mortar in the cavity.
3. Dove tail mortar nets may be used and left within the cavity space.

## **F. WEEPS**

1. Use mortar free open full head joint weeps at maximum 24" centers.
2. Do NOT use tube weeps.
3. Do NOT allow weep holes to be drilled after the fact.
4. Do NOT seal joint where through wall flashing terminates at exterior face of the wall, obstructing weep drainage.
5. Locate weep holes/joints at, (on top of), the through wall flashing level.

## **3.04 FLASHINGS**

- A.** Wall flashings are extremely important and shall be properly detailed and installed. Ensure all details depict positive fall for drainage/weeping. Flashings and counter-flashings shall slope away from the wall.
- B.** For metals:
1. Lap joints 2 inches and fully solder lap.
  2. For long runs of metal flashing over 20 to 30 feet, provide 6 inches lap expansion/contraction joints at 30 foot centers maximum with 3 strips of double-sided sealant tape for the full width of the flashing.
  3. Aluminum should be lapped and sealed with three rows of sealant.
  4. For metal through wall flashings, miter, lap & seal or solder inside & outside corners.
- C.** Through-wall flashing
1. Peel and stick must be terminated at the top of the through-wall flashing, and must have a stainless steel drip through-wall flashing, since it must be held back one-half inch (1/2") minimum from the face of the brick. Peel and stick through-wall flashings should have a termination bar where attached to the back-up wall, sheathing, etc. This can be left sticking out past the face of the brick until the designer sees it in place, and then trimmed flush with the brick.
  2. No through-wall flashing shall be cut off to fall within a brick core hole.
  3. The exposed edge of through-wall flashings shall extend a minimum of 3/4" past face of wall and turn down forming a drip to prevent water from re-entering the building. If the through wall is above roofing, form a receiver for the counter flashings.
  4. Through-wall flashing in cavity walls shall be the full width of the brick and turn up in the back. Flashings shall be turned behind the sheathing on framed walls. Flashings shall be turned back at a mortar joint on CMU walls. Termination bars may be used. Flashings shall turn up a minimum of 8" within the cavity.
  5. Through-wall flashings shall be run continuous through control joints. Provide for expansion by lapping sections a minimum of 6 inches and seal with 3 rows of the appropriate sealant, one at each side and one in the middle of the lap. Provide for expansion at wall joints and at every 20 feet.
  6. Through-wall flashing shall be a minimum of 8 inches above finished roof surfaces.
- D.** Joints must be sealed water-tight.
- E.** Flashings shall terminate with end dams. End dams shall be indicated on drawings and be detailed.
- F.** Two piece flashing is desirable to allow for tolerances in construction and to facilitate reroofing.
- G.** Counter flashings in masonry shall be inserted into a rattle/reglet joint, secured with appropriate wedges, and sealed with polyurethane sealant. (Reference SMACNA Architectural Sheet Metal Manual Figure 4-3B (1995)).
- H.** Protect ledges with sloped metal flashings.
- I.** At steel lintel, if sealant is to be used to conceal the lintel lower leg termination, seal below the through wall flashing. Do not seal mortar joint where through wall flashings are located.

### 3.05 CAVITY WALL FIELD VERIFICATION

- A. All concealed flashings shall be inspected while visible before work may continue. Alternatively, photographic evidence may be provided by the contractor showing proper installation.
- B. The designer may want to consider directing the contractor to temporarily leave out every 3<sup>rd</sup> or 4<sup>th</sup> brick, horizontally, above flashings to ensure proper installation of flashings and to verify that any cavity spaces are free of excessive mortar. Then bricks that were left out can be installed after the rest of the wall is completed.

#### C. CHECKLIST FOR CAVITY WALL CONSTRUCTION

1. Ensure cavity will be inspected and kept cleaned.
2. Ensure open head joints and flashings are installed at all masonry supports.
3. Ensure flashings are extended out and exposed to create a drip.
4. Ensure wall reinforcing and lintels do not extend through control joints.
5. Ensure masonry control joints in facing and backup are appropriately staggered.
6. Ensure cavity is closed off at all masonry openings.
7. Ensure cavity is sealed at corners and at roof line.
8. Ensure finished masonry is to be cleaned and protected.
9. Ensure flashings are installed undamaged with proper joints and terminations.
10. Ensure protection of adjacent construction, such as roofing, from puncture or damage.
11. Ensure criteria for mock-ups and critical stages of Work.

### 3.06 ROOFING

#### A. SLOPE:

1. Provide one-eighth inch per foot or greater slope for drainage. One-quarter inch per foot or greater is preferred.
2. Wherever possible slope the structural elements rather than using tapered insulation.

#### B. ADJACENT VERTICALS:

1. Whenever a roof plane intersects a vertical wall or other vertical surface, or an expansion joint is required, provide a minimum eight inch rise in height (twelve inch rise is preferred).
2. Ensure that parapet walls are water tight and roof scuppers are provided for emergency relief in accordance with current adopted codes (See Bidding Documents Section 01 41 15).

C. **ROOF DRAINS** are to be located at low points in the roof and not adjacent to columns, particularly for steel deck construction.

D. **EDGE DETAILS** should comply with ES-1 requirements.

E. **"DRYING IN"** is required whenever the Contractor is going to be absent from the jobsite.

#### F. SIGNAGE:

When specifying a roof that will be warranted using the State's standard warranty, a sign should be specified identifying the roof as being under a special warranty.

**END of Appendix 3**