

**(Specifier Notes:**

***The purpose of this guide specification is to assist the specifier in correctly specifying limestone masonry veneer and its installation. The specifier needs to edit this guide specification to fit the needs of each specific project.***

***Throughout the guide specification, there are Specifier Notes to assist in the editing of this guide specification. Brackets [ ] have been used to indicate when a selection or a decision is required. References have been made to MasterFormat Division numbers and titles and should be coordinated with other Sections.)***

SECTION 04 42 43

LIMESTONE MASONRY VENEER

PART 1 - GENERAL

1.1 SECTION INCLUDES

**(Specifier Note: RETAIN one of bracketed options in paragraph below.)**

- A. Exterior, non-load bearing, limestone masonry veneer anchored over [concrete masonry][sheathed steel studs].

1.2 SUBMITTALS

- A. Product Data: Manufacturers technical literature for each product indicated, specified or required including, but not limited to, following:
  - 1. Kind, size, and color of limestone unit.
  - 2. Manufactured accessory products.
- B. Samples for Initial Selection: Mortar samples showing full range of colors expected; make samples using same materials to be used on Project; label samples to indicate type and amount of colorant used.
- C. Samples for Verification:
  - 1. Limestone Units: Full-size samples for each different unit showing full range of limestone color, finish, and dimension to be expected.
  - 2. Pigmented and Color Aggregate Mortar: Samples using same sand and mortar ingredients to be used on Project; label Samples to indicate types and amounts of pigments used.
  - 3. Accessories: Samples of manufactured products, including anchors, ties, cavity drainage material, flashing materials, weeps, vents, and other accessories.
  - 4. Flashing: Samples of each shape, profile, intersection and transition required, not less than 12 inches long, including end dam, and splice/lap joint for lintel/shelf angle flashing; demonstrate soldering quality.
- D. Installer Qualifications: Written data for company, principal personnel, experience, and training required by PART 1 "Quality Assurance" Article.
- E. Limestone Availability Certification: After samples are approved, certify availability of each limestone variety in sufficient quantities for work.

April 18, 2011

**LIMESTONE MASONRY VENEER**

04 42 43 - 1

### 1.3 QUALITY ASSURANCE

#### A. Installer Qualifications:

1. Experience: Company with not less than 5 years experience in performing specified work similar to scope of this Project, and with a record of successful in-service performance, and sufficient production capability, facilities and personnel, to produce required work.
2. Supervision: Installer shall maintain a full time supervisor on job site during times specified work is in progress and who has minimum 10 years experience in installing systems similar to type and scope required for this project.

#### B. Sheet Metal Flashing Installer Qualifications: Sheet metal firm experienced with proper fabrication and installation of specified work similar in design, material and extent to scope of this project, and with a record of successful in-service performance and completion of projects for minimum 10 years.

#### C. Quality Standards: In addition to specified requirements, comply with TMS 402/ACI 530/ASCE 5 for veneered masonry classification and prescriptive requirements, unless local building code has jurisdiction, whichever is more stringent.

#### D. Mockups: Before beginning work of this Section, build as many mockups as required to verify selections made under submittals and to demonstrate aesthetic effects (not for work execution). Use materials and installation methods specified.

1. Build 48 inch square for each type of masonry veneer finish.
2. Locate at locations indicated or, if not indicated, as directed by Architect; facing south.
3. Clean exposed faces.
4. Notify Architect 7 days in advance of dates and times when mockups will be constructed.
5. Protect approved mockups from elements with weather-resistant covering.
6. Maintain during construction in an undisturbed condition as a standard for judging completed work.
7. Approval is for following qualities; approval does not constitute approval of deviations from Contract Documents, unless specifically approved by Architect in writing:
  - a. Color, texture, and blending of limestone units.
  - b. Color and blending of mortar.
  - c. Relationship of mortar and sealant colors to masonry unit colors.
  - d. Tooling of joints.
  - e. Effectiveness of masonry.
  - f. Other aesthetic qualities as determined by Architect.
8. When directed, demolish and remove mockups from site, including foundations.

#### E. Pre-Installation Conference:

1. Conduct at Project site.

***(Specifier Note: EDIT attendees in brackets that are appropriate to project conditions.)***

2. Attendees include Owner, Contractor, Architect, limestone masonry veneer installer, [cold-formed steel stud framing installer], [sheathing installer], [weather barrier installer], [concrete masonry installer], [cast-in-place concrete installer], Technical Representative of Manufacturer, and Owner's testing agency.
3. Review Contract Document requirements.
4. Review approved submittals.
5. Review installation procedures, including, but not limited to:

- a. Handling, storing and protecting products and materials.
  - b. Evaluation of substrates on which masonry will be installed.
  - c. Fabrication and placement of flashings.
  - d. Preparation and mixing of mortar, including testing.
  - e. Laying masonry units.
  - f. Anchoring and attaching masonry.
  - g. Keeping masonry cavity clean.
  - h. Protecting installed masonry, including stain prevention.
  - i. Cleaning installed masonry.
- 6. Tour representative areas of required work, discuss and evaluate for compliance with Contract Documents, including substrate conditions, surface preparations, sequence of installation and other preparatory work performed by other installers.
  - 7. Review required inspection and testing procedures.
  - 8. Review forecasted weather conditions and procedures for coping with unfavorable conditions.
  - 9. Record discussions, including decisions and agreements reached, and furnish copy of record to each party attending.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

##### A. Limestone and Accessories: Store and handle according to following:

- 1. To prevent deterioration or damage due to contaminants, breaking, chipping, or other causes.
- 2. ILI's The Contractors Handbook on Indiana Limestone.

#### 1.5 FIELD CONDITIONS

##### A. Stain Prevention: Prevent mortar and soil from staining exposed limestone.

- 1. Protect base of walls from rain-splashed mud and mortar splatter.
- 2. Protect sills, ledges, projections, and adjacent construction from mortar droppings.
- 3. Prevent rain from splashing mortar droppings or dirt from scaffolding onto face of exposed limestone.

##### B. Cold Weather Requirements:

- 1. Do no cementitious work when ambient temperature is less than 32 degrees F or when 40 degrees F or less and falling.
- 2. Provide heat and protection to protect work from freezing for not less than 48 hours after installation.
- 3. Distribute heat uniformly to prevent concentration of heat near sources; provide deflection or protective screens.

##### C. Warm Weather Requirements:

- 1. Protect work against uneven and excessive evaporation and from strong flows of dry air, both natural and artificial.
- 2. Apply and cure work as required by climatic and job conditions to prevent dryout during cure period.
- 3. Provide suitable coverings, moist curing, barriers to deflect sunlight and wind from work during cure period.

## PART 2 - PRODUCTS

### 2.1 LIMESTONE

- A. Material Quality Standard: ASTM C 568, Classification II or III.

### 2.2 LIMESTONE MASONRY VENEER

- A. Basis of Design: Contract Documents are based on thin limestone units fabricated by Earthworks, Inc. to establish a standard of quality.

***(Specifier Note: RETAIN one of bracketed options in subparagraph below.)***

1. Selection: [Aux Vases][Cottonwood][Country Villa][Dove Gray][EW Gold][Fox Tail Blend][Harvest Mix][Ozora Tumbled Rubble][Rustic Cleft][Weathered Fieldstone][Woods Blend].
2. Dimensions: [ - insert for width, length, height, and depth as required - ].

***(Specifier Note: RETAIN one of bracketed options in subparagraph below.)***

3. Finish: [Snapped][Tumbled][Rockfaced].

### 2.3 MORTAR MATERIALS

***(Specifier Note: RETAIN one of first three paragraphs below; portland cement-lime mortar is the traditional field mixed type; both masonry cement and mortar cement are pre-mixed portland cement and lime, however they may contain more entrained air than desired as well as other proprietary ingredients.)***

- A. Portland Cement-Lime Mortar:

***(Specifier Note: RETAIN one of bracketed options in paragraph below.)***

1. Portland Cement: ASTM C 150, Type I; except Type III may be used for cold-weather construction; [gray][colored].
  2. Hydrated Lime: ASTM C 207, Type S.
- B. Masonry Cement: ASTM C 91.
  - C. Mortar Cement: ASTM C 1329.
  - D. Color Pigments:
    1. Description: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes; with record of satisfactory performance.
    2. Quantity Limitations: Pigments shall not exceed 10 percent of portland cement by weight for mineral oxides nor 2 percent for carbon black.
  - E. Colored Portland Cement-Lime Mix:
    1. Description: Packaged blend made from portland cement and lime and color pigments complying with specified requirements, and containing no other ingredients. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
    2. Quantity Limitations: Pigments shall not exceed 10 percent of portland cement by weight nor 2 percent for carbon black.

April 18, 2011

**LIMESTONE MASONRY VENEER**

04 42 43 - 4

- F. Aggregate for Standard Gray Mortar:
  - 1. Product Quality Standard: ASTM C 144.
  - 2. Mortar Exposed to View: Washed aggregate consisting of natural sand or crushed stone.
  - 3. Joints Less Than 1/4 in (6 mm) Thick: 100 percent passing No. 16 sieve.
- G. Aggregate for Colored Mortar: Natural sand or ground marble, granite, or other sound stone, as required to match approved sample.
- H. Water: Potable.

## 2.4 REINFORCEMENT, VENEER ANCHORS AND TIES

- A. General Type: Two-piece assemblies that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall; suitable for attachment conditions indicated. Corrugated ties are not acceptable.
- B. Structural Performance Characteristics: Capable of withstanding a 100 pound load in both tension or compression without deforming, or developing play in excess of, 0.05 inch.
- C. Structural Anchors: Two-piece adjustable veneer anchoring system.
  - 1. Anchors: Zinc alloy barrel, flanged head, screw and eye, with drilling threads suitable for structural substrate.
  - 2. Ties: Hot-dip galvanized, carbon-steel wire, 3/16 inch pre-coated diameter, triangular shaped ties, size as required to provide maximum bond, not less than 2 inches.
- D. Materials for Veneer Wall Ties:
  - 1. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 82 with ASTM A 153 Class B-2 coating.
  - 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008 commercial sheet, hot-dip galvanized after fabrication to comply with ASTM A 153, Class B coating.
- E. Individual Veneer Wall Ties for Sheathed Steel Studs Walls:
  - 1. Anchor Plate: Minimum 0.0713 inch (14 gage) uncoated base metal thickness, with raised strap stamped vertically into center to provide a slot between strap and plate for interlocking wire tie, with one screw hole at top and one at bottom; with rubberized asphalt flexible flashing material either adhered to back of plate, or loose for separate mounting.
  - 2. Wire Tie: Minimum 3/16 inch diameter, bent into triangle shaped tie; length as required to extend at least halfway through limestone masonry veneer but with minimum 5/8 inch cover on outside face of masonry.
- F. Veneer Wall Ties for Concrete Masonry: As specified in Division 04 Section "Concrete Masonry Units".
- G. Drill Screws:
  - 1. Description: SAE J429, Grade 5 and ASTM A 449, self-drilling and self-tapping drill screws, and washers, with following minimum physical properties according to ASTM E 18:
    - a. Load Bearing Threads: Not less than HRC 28, nor more than HRC 34.
    - b. Drill Point and Lead Threads: Not less than HRC 52.
  - 2. Finish: Corrosion resistant coating with not less than 800 hours of salt-spray resistance according to ASTM B 117.

## 2.5 EMBEDDED FLASHING MATERIALS

***(Specifier Note: There are several flashing materials and methods that are commonly used, therefore editing of this Article is required to compliment the flashing details indicated on the Drawings. This guide specification offers several types of embedded flashing.)***

***(Specifier Note – Flashing Type 1 – Field Assembled Metal-Membrane: This method utilizing a sheet metal, rubberized asphalt membranes, and termination bars. If this method is selected, RETAIN one of the first two paragraphs below for the sheet metal, the solder paragraph, and the rubberized asphalt membrane paragraph.)***

- A. Copper: One of following mill non-patinated:
  - 1. ASTM B 370, Temper H00, cold-rolled copper sheet, 16 ounces per square foot weight or 0.0216 inch thick, unless noted otherwise.
  - 2. ASTM B 370, Temper H01, high-yield copper sheet, 12 ounces per square foot weight or 0.0162 inch thick, unless noted otherwise.
- B. Stainless Steel: ASTM A 240 or ASTM A 666, Type 304, 2D annealed finish, not less than 0.0250 inch (24 gage) thick, unless noted otherwise.

***(Specifier Note: RETAIN one of bracketed options in paragraph below; Sn50 is for copper and Sn60 is for stainless steel.)***

- C. Solder: ASTM B 32, [Grade Sn50, 50 percent tin and 50 percent lead.][Grade Sn60, acid flux recommended by sheet manufacturer.].
- D. Rubberized Asphalt Membranes: Not less than 40 mils thick, cold applied, self-adhering sheet consisting of cross-laminated polyethylene film laminated to rubberized asphalt adhesive, with release-paper backing.

***(Specifier Note – Flashing Type 2 – Pre-Manufactured Metal-Membrane: This method is similar to Type 1, however, the various materials are pre-manufactured and ready to set in place without the need to assemble the various components. If this method is selected, RETAIN paragraphs below.)***

- E. Pre-Manufactured Metal-Membrane System:
  - 1. Description: Pre-assembled and pre-cut flashing unit composed of following components in single unit:
    - a. Stainless Steel Drip Edge:
      - 1) Material Quality Standard: ASTM A 240 or A 666, Type 304, 2D annealed finish.
      - 2) Description: 3 inch wide by length of unit of not less than 0.0140 inches (28 gage) thick metal with hemmed drip edge bent down to 30 degree angle.
    - b. Flexible Flashing Material: Minimum 40 mils thick polymeric membrane, reinforced with synthetic fibers, ultraviolet degradation resistant, incorporating DuPont's Elvaloy® KEE, ketone ethylene ester, polymer.
    - c. Weep Material: 3/16 inch thick woven mesh composed of recycled polyester adhered to flexible flashing molded and shaped in open weave configuration to maintain drainage at weeps without being clogged by mortar droppings, size as required to extend across entire width of cavity.
    - d. Termination Bar: High strength plastic strip with holes for attaching to substrate at 6 inches on center, pre-attached to flexible flashing membrane.

April 18, 2011

**LIMESTONE MASONRY VENEER**

04 42 43 - 6

2. Dimensions:
  - a. Width: 5-1/2 inches.

***(Specifier Note: RETAIN one of bracketed options in subparagraph below.)***

- b. Height: [12] [15] [18] [24] inches.
3. Joinery Shapes: Pre-formed of same material as flexible flashing membrane of configuration indicated, specified, or required for application.
4. Basis of Design: Contract Documents are based on products specified to establish a standard of quality.
  - a. Manufacturer: MortarNet USA Ltd.
  - b. Product: TotalFlash™.

***(Specifier Note – Flashing Type 3 – Single Flexible Sheets: This method utilizing a single sheet of flexible material. If this method is selected, RETAIN any one of the paragraphs below. None of these materials can be exposed to the exterior and should only be specified for details that will fully enclose the flashing.)***

- F. Copper Laminated Sheets: Not less than 5 ounces per square foot copper sheet bonded between 2 layers of glass-fiber cloth.
- G. Asphalt Coated Copper Sheets: Not less than 5 ounces per square foot copper sheet coated with flexible asphalt.
- H. EPDM Sheets: ASTM D 4637, ethylene-propylene-diene terpolymer sheet, not less than 0.040 inch thick.

## 2.6 ACCESSORIES

***(Specifier Note: RETAIN one of bracketed options in subparagraph below; may need to coordinate with structural engineer.)***

- A. Steel [Shelf Angles][Loose Lintels]: Steel angles and shapes as specified in Division 05 Section "Metal Fabrications".

***(Specifier Note: If Flashing Type 1 is selected, DELETE weeps, cavity drainage material, and termination bars in three paragraphs below.)***

- B. Weeps: One of following in color selected from manufacturer's standard colors available:
  1. Plastic: One-piece, flexible extrusion made from ultraviolet light resistant polypropylene copolymer, consisting of honeycomb matrix of multiple cells, designed to fill head joint with outside face held back 1/8 inch from exterior face of masonry.
  2. Mesh: Compressed, 200 denier polyester with 90 percent open mesh and bonded with flame retardant adhesive.

- C. Cavity Drainage Material: Composed of either reticulated, nonabsorbent mesh made from polyethylene strands, or, polymer core geomatrix composed of woven nylon strands, molded and shaped in open weave configuration to maintain drainage at weeps without being clogged by mortar droppings, size as required to extend across entire width of cavity.
- D. Termination Bars: ASTM A 666, Type 304, continuous stainless steel bar, 1/8 inch thick by 1 inch wide with 1/4 inch diameter holes spaced at 16 inches on centers; stainless steel fasteners.
- E. Sealant for Sheet Metal Flashing: ASTM C 920, chemically curing silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Bond Breaker Strips: ASTM D 226, Type I, asphalt-saturated organic roofing felt (No. 15 asphalt felt).

## 2.7 METAL FLASHING FABRICATION

- A. Field Measurements: Where metal flashing is to fit, cope, or be tailored to other construction, check actual dimensions of other construction by accurate field measurements before fabrication of metal flashing.
- B. Fabrication Procedures: Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
  1. Shop form flashing on a bending brake in lengths practical for application.
  2. Shape, trim and hand seam on bench as far as practical with proper tools.
  3. Form exposed metal work without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated.
  4. Make angle bends and folds for interlocking metal with full regard for expansion and contraction to avoid buckling or fullness in metal after installation.
  5. Form materials to shape indicated with straight lines, sharp angles and smooth curves.
  6. Fold and hem exposed edges of flashings.
- C. Flashing Joinery: Fabricate interior and exterior corners, intersections, and complex flashing conditions in shop, rather than in field, with properly folded, constructed and continuous soldered joints. Field fabricated units are not permitted and will not be allowed.

## 2.8 MORTAR MIXES

- A. General: Mix cementitious materials in a mechanical batch mixer with a sufficient amount of water to produce a workable consistency for minimum 3 minutes to 5 minutes; do not hand mix.
  1. Admixture Limitation: Do not use admixtures including air-entraining agents, accelerators, retarders, water repellent agents, antifreeze compounds, calcium chloride or other admixtures.
  2. Cementitious Limitation: Limit cementitious materials in mortar to portland cement and lime.
  3. Ingredient Measurement: Measure in a one cubic foot batching box before mixing for component materials not preblended, prepackaged or containerized.
  4. Aggregate Moisture Content: Monitor moisture content of aggregates and exercise caution when mixing to avoid over or underestimation of mortar.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project.
- C. Mortar Mix:



1. Mix Quality Standard: ASTM C 270, Proportion Specification for portland cement-lime mortars, Type N.
2. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required; limit mineral oxide pigments to maximum 10 percent of cement content by weight, and maximum 2 percent for carbon black pigment.
3. Colored Aggregate Mortar: Produce mortar of color required by use of colored aggregates in combination with selected cementitious materials.
4. Mortar Colors: As selected from manufacturer's standard colors available.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

#### A. Acceptance of Surfaces and Conditions:

1. Examine substrates for compliance with requirements, installation tolerances and other conditions affecting performance.
2. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents.
3. Starting work within a particular area will be construed as acceptance.

### 3.2 PREPARATION

- A. Substrate Cleaning: Remove defects or deficiencies that would result in poor or potentially defective installation of limestone masonry, or, that would cause latent defects in work.
- B. Limestone Cleaning: Clean dirty or stained limestone surfaces by removing soil, stains, and foreign materials before setting.

### 3.3 SETTING LIMESTONE

#### A. Installation Quality Standards: In addition to standards specified elsewhere, perform work according to following, unless otherwise specified:

1. ILI – Indiana Limestone Handbook.
2. Delegated engineering.
3. Approved submittals.

#### B. Lay Out and Bond Patterns:

1. Lay out walls in advance for accurate patterns, mortar joints, locations of openings, movement-type joints, returns, and offsets.
2. Avoid using limestone units of less than half-size units at corners, jambs, and where possible at other locations.
3. Bond and interlock corners of each course.

***(Specifier Note: RETAIN one of subparagraph below, RETAIN appropriate bracketed options, or EDIT one to fit project; show details of pattern and mortar joints on Drawings because terminology may not be clear.)***

4. Arrange limestone in range ashlar pattern with course heights as indicated, [uniform] [random] lengths, and uniform joint widths, with offset between vertical joints as indicated.
5. Arrange limestone in broken-range ashlar pattern with uniform course heights, random lengths, and uniform joint widths.
6. Arrange limestone in three-course, random-range ashlar pattern with random course heights, random lengths (interrupted coursed), and uniform joint widths.

April 18, 2011

**LIMESTONE MASONRY VENEER**

04 42 43 - 9

7. Arrange limestone in [coursed] [uncoursed] rubble pattern with joint widths within tolerances indicated. [Insert small limestone pieces into spaces between larger limestone units as needed to produce joints as uniform in width as practical.]
  8. Arrange limestone in polygonal (mosaic) pattern with uniform joint widths.
  9. Arrange limestone with color and size variations uniformly dispersed for an evenly blended appearance.
- C. Openings: Leave for equipment to be installed before completion of masonry; after installation of equipment, complete masonry to match adjacent construction.
- D. Cutting and Trimming:
1. Saw-Cut Surfaces: Use power saws to cut limestone that is fabricated with saw-cut surfaces. Cut lines straight and true, with edges eased slightly to prevent snipping.
  2. Rough Surfaces: Use hammer and chisel to shape limestone.
- E. Sorting and Blending:
1. Sort and remove limestone that does not comply with requirements relating to aesthetic effects, physical properties, fabrication, or that is otherwise unsuitable for intended use.
  2. Mix units to produce uniform blend of colors and textures; if color blending is a critical aspect of work, manufacturer shall provide instructions for blending.
- F. Mortar Workability:
1. Maintain by remixing or retempering,
  2. Do not retemper mortar with added color pigments.
  3. Discard mortar that has begun to stiffen or is not used within 2.5 hours after initial mixing.
- G. Steel Loose Lintels: Set where indicated or required with not less than 8 inches of bearing at each jamb, unless otherwise indicated.
- H. Masonry Lintels: Construct in place using formwork and shoring of sufficient strength to support work, until strength has been achieved and assembly is cured.
- I. Stopping and Resuming Work:
1. In each course, rack back as required to fit coursing; do not tooth.
  2. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar.
- J. Setting:
1. Set limestone in full bed of mortar with full head joints unless otherwise indicated.
  2. Install supports, fasteners, and other attachments indicated or necessary to secure limestone masonry veneer in place.
  3. Set limestone accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
- K. Joint Tooling:
1. Finish joints that will remain exposed with a tool.
  2. Tool joints after mortar has taken its initial set and in such a manner as to squeeze mortar back into joint.
  3. Tool vertical joint first.
- L. Cavity:

**(Specifier Note: RETAIN one of bracketed options in paragraph below.)**

1. Provide cavity [not less than 1 inch wide][not less than 2 inches wide][of dimension shown] between back of limestone masonry veneer and backup construction.
2. Install cavity drainage material at base of cavity to protect bottom of cavity from mortar droppings that would prevent weeps from draining infiltrated water.
3. Keep cavity clean of mortar droppings and other materials.

M. Weeps: Install weeps at not less than 24 inches on centers in head joints of first course of limestone masonry veneer immediately above embedded flashings.

### 3.4 ANCHORING

A. Structural Anchors to Building Structure: Anchor masonry to structural members where masonry abuts or faces structural members to comply with following, with anchors embedded in masonry joints and attached to structure:

1. Unless otherwise indicated, provide an open space not less than 1 inch in width between back of limestone masonry veneer and structural member. Keep open space free of mortar or other rigid materials.
2. Locate anchors vertically and horizontally as required for coursing with one anchor for every 2 square feet of masonry; stagger alternating anchors in each row.

B. Anchoring to Sheathed Steel Studs:

1. Anchor with veneer wall ties.
2. Locate anchor plate portion of tie to allow maximum vertical differential movement of tie up and down.
3. Space anchors at 16 inches on center vertically and 16 inches on center horizontally as required for coursing.
4. Install additional anchors within 12 inches of openings and at maximum 8 inches on center around perimeter.
5. Attach each anchor through sheathing to steel studs with 2 metal fasteners each.
6. Embed wall tie, in proper orientation, at least halfway through limestone masonry veneer but with not less than 5/8 inch cover on outside face of masonry.

C. Anchoring to Concrete Masonry:

1. Connect veneer wall ties to masonry joint reinforcement projecting from concrete masonry.
2. Embed wall tie, in proper orientation, at least halfway through limestone masonry veneer but with not less than 5/8 inch cover on outside face of masonry.

### 3.5 EMBEDDED FLASHINGS

A. General: Drawings may not necessarily indicate or describe full extent of work required for embedded flashing.

B. Scheduled Locations: In addition to conditions shown on Drawings, install embedded flashings within masonry cavity at following locations to direct downward flow of infiltrated water within cavity to exterior:

1. Shelf angles with end dams at through-wall openings; and with lap joints.
2. Lintels without end dams or laps.
3. Jambs at through-wall openings, full height from sill to head.
4. Other obstructions.

April 18, 2011

**LIMESTONE MASONRY VENEER**

04 42 43 - 11

- C. Preparation: Substrate surfaces shall be smooth and free from projections that could puncture flashing.

***(Specifier Note: As indicated above, there are several flashing materials and methods that are commonly used, therefore editing of this Article is required to compliment the flashing details indicated on the Drawings. This guide specification offers several types of embedded flashing.)***

***(Specifier Note – Flashing Type 1 – Field Assembled Metal-Membrane: If this method is selected, RETAIN paragraph below.)***

D. Flashing Installation:

1. Install 4 inch wide sheet metal with outside hemmed drip edge true to line and levels indicated; minimize quantity of lap joints by using longest units possible. At lap joints, form neat and aligned joints by interlocking splice plate within hemmed edge of sheet metal flashing profile; apply sealant and rubberized asphalt flashing as indicated to create water-resistant joint.
2. Apply rubberized asphalt membrane beginning 1 inch from outside edge of sheet metal and extend up wall of backup construction not less than 12 inches.
3. Attach termination bar with screws and seal top with continuous sealant.
4. At continuous shelf angles, terminate horizontal flashings at through-wall openings with properly folded and constructed sheet metal end dams with a depth of not less than 1 brick course, with continuous soldered joints.
5. At lintels, terminate horizontal flashings at end of lintel with properly folded and constructed sheet metal end dams with a depth of not less than 1 brick course, with continuous soldered joints.

***(Specifier Note – Flashing Type 2 – Pre-Manufactured Metal-Membrane: If this method is selected, RETAIN paragraph below.)***

E. Flashing Installation:

1. Set pre-manufactured units in proper alignment with outside hemmed sheet metal drip edge true to line and levels indicated.
2. Lap pre-manufactured units and seal with sealant.
3. Apply adhesives as indicated by manufacturer's instructions.
4. Form inside and outside corners according to conditions and lap with pre-manufactured units.

***(Specifier Note – Flashing Type 3 – Single Flexible Sheets: If this method is selected, RETAIN paragraph below.)***

- F. Flashing Installation: Set sheets in proper alignment with formed end dams, laps, and attachments to back construction indicated by manufacturer's instructions

### 3.6 MASONRY EXPANSION JOINTS

- A. General: Install masonry expansion joints materials as work progresses. Do not allow materials to span masonry expansion joints without provision to allow for in-plane wall or partition movement. Maintain joints free and clear of mortar.

B. Vertical Joints:

1. Locate where indicated but not to exceed 26 feet on center, and within 10 feet, 4 feet preferred, of each side of outside corner. Keep vertical joints straight, true and continuous from top to bottom of masonry.
2. Form open joint of width indicated for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants".

April 18, 2011

**LIMESTONE MASONRY VENEER**

04 42 43 - 12

C. Horizontal Joints:

1. Build in horizontal pressure-relieving joints where indicated; construct of width required for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants".
2. Locate not less than 1/2 inch wide horizontal pressure-relieving joints beneath shelf angles supporting limestone masonry veneer and attached to structure behind limestone masonry.

3.7 FIELD QUALITY CONTROL

A. Testing and Inspection of In-Progress Work: Owner will employ and pay a qualified independent testing agency to perform following testing of in-progress work. Retesting of materials failing to meet specified requirements shall be at Contractor's expense.

1. Testing: Testing agency will test and evaluate work during construction.
2. Mortar Tests: Verify mortar composition with specified requirements according to ASTM C 780, Annex A4; made at following times during work:
  - a. First day.
  - b. 5 percent.
  - c. 15 percent.
  - d. 30 percent.
  - e. 60 percent.
3. Inspections: Testing agency will visit project site periodically at random, but not less than once during each week of masonry work, to inspect progress and to ascertain if work complies with Contract Documents. Allow inspectors access to scaffolding and work areas, as needed to perform inspections. Inspections will include verification that:
  - a. Materials are properly stored.
  - b. Installation is within specified construction tolerances.
  - c. Proper mortar ingredients and mixing techniques are being used.
  - d. Mortar time on board is within specified limits.
  - e. Bed and head joints are being properly made.
  - f. Masonry cavity is being kept clean.
  - g. Ties and anchorages are as specified.
  - h. Joints are being properly tooled.
  - i. Flashing assembly is being properly fabricated and installed.
  - j. Weeps and vents are being installed and are functional.
  - k. Masonry expansion joints are being installed as indicated, or, as specified.
4. Evaluation of Quality Control Tests: Replace work in areas where test results fail to comply with requirements indicated.

3.8 ADJUSTING

A. Damage Repair:

1. If acceptable to Architect, repair damage according to ILI's Repairing Damage to Indiana Limestone.
2. If damaged cannot be repaired, remove and replace limestone units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units and install fresh mortar, pointed to eliminate evidence of replacement.

3.9 CLEANING

A. Final Cleaning: Clean installed work according to following:

1. ILL's Indiana Limestone Handbook.
2. ILL's How to Avoid Small Area Stains and Blemishes.

END OF SECTION