

SECTION 044315 - STONE MASONRY VENEER

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Stone masonry veneer anchored to cold-formed metal framing and sheathing.
2. Thin stone veneer adhered to concrete and unit masonry backup.
3. Dimension stone units in stone veneer assemblies, including sills.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for furnishing steel lintels for stone masonry.
2. Section 076200 "Sheet Metal Flashing and Trim" for sheet metal flashing and for furnishing manufactured reglets installed in stone masonry joints.
3. Section 321440 "Stone Paving" for dimension stone paving, stair treads and wall caps.

1.2 DEFINITIONS

- A. Design Reference Sample:** Sample of approved stone veneer blend, color, range, coursing, finish and texture, located on existing historic building and preapproved by Architect.

1.3 ACTION SUBMITTALS

- A. Product Data:** For each variety of stone, stone accessory, and manufactured product.

- B. Shop Drawings:** For the following:

1. Thin Stone Veneer: Indicate locations, dimensions, and details of stone units, including corner units and special shapes, and joint treatment.
2. Dimension Stone: Show fabrication and installation details for dimension stone units. Include dimensions and indication of finished faces.

- C. Samples for Verification:** Samples for each type of stone required, showing full range of color and texture expected. Include Sample showing color and texture of joint treatment.

1.4 QUALITY ASSURANCE

- A. Mockups:** Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockup of typical stone veneer wall area as directed by Architect in sizes approximately 60 inches (1500 mm) long by 48 inches (1200 mm) high by full thickness.

1.5 FIELD CONDITIONS

- A. Protection of Stone Masonry:** During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work.

- B. Stain Prevention:** Prevent grout, mortar, and soil from staining stone veneer. Immediately remove mortar and soil that come in contact with stone veneer.

- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace stone masonry damaged by frost or freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until masonry has dried.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 STONE VENEER

- A. Variety and Source: Subject to compliance with requirements, provide custom blend obtained from Delaware Quarries to comply with requirements specified.
- B. Custom Stone Veneer Blend: Composed of different shades of agrillite stone of varying size, proportion and irregularity; including "rat tails" to mimic the thin fill stone used in the historic building and produce less rectilinear shapes; and with finishes to match Architect's sample.
- C. Thin Stone Veneer: Natural quarried stone cut to thin profile for adhesive application as indicated.
 - 1. Match full-thickness stone veneer for blend of shapes, size, color range, and other appearance characteristics.
 - 2. Special Shapes: Provide corner units and other special shapes as necessary to match appearance of typical thin stone veneer and produce appearance of full-depth stones.

2.2 BLUESTONE DIMENSION STONE

- A. Material Standard: Comply with ASTM C 616, Classification III Quartzite, except for minimum free silica content.
 - 1. Stone Abrasion Resistance: Minimum value of 10, based on testing according to ASTM C 241/C 241M or ASTM C 1353.
- B. Variety and Source: Subject to compliance with requirements, provide Pennsylvania Bluestone.
- C. Finish: Flamed finish.

2.3 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type II, except Type III may be used for cold-weather construction; natural color or white cement may be used as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Colored Portland Cement-Lime Mix: Packaged blend of portland cement, hydrated lime, and mortar pigments. Mix shall produce color indicated or, if not indicated, as selected from manufacturer's standard colors. Pigments shall not exceed 10 percent of portland cement by weight.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.

- b. Lafarge North America Inc.; Eaglebond.
- c. Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.
- d. Mutual Materials Co.; DesignMix Colored Mortar Mix.

D. Aggregate: ASTM C 144 and as follows:

- 1. For pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
- 2. White Aggregates: Natural white sand or ground white stone.
- 3. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.
 - a. Match approved sample.

E. Water: Potable.

F. Modified Cement Setting Mortar for Thin Stone Veneer: Polymer-fortified adhesive mortar.

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide Laticrete International, Inc.; MVIS™ Hi-Bond Veneer Mortar.
- 2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
- 3. For wall applications, provide nonsagging mortar.

2.4 VENEER ANCHORS

A. Materials:

- 1. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304.
- 2. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

B. Adjustable, Screw-Attached Veneer Anchors: Units consisting of wire tie sections that fit in horizontal masonry joints, metal anchor sections that are anchored to masonry backup, and vertical dowels to which the ties and anchors are attached, that allows vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to metal studs, and as follows:

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide Wire-Bond (wirebond.com); Stone Anchor System.
- 2. Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N) load in both tension and compression without deforming or developing play in excess of 0.05 inch (1.3 mm).
- 3. Fabricate sheet metal anchor sections and other sheet metal parts from 0.097-inch- (2.5-mm-) thick, 12 gauge stainless-steel sheet.
- 4. Wire Ties: Dovetail-shaped wire ties fabricated from 0.188-inch- (4.8-mm-) diameter, stainless-steel wire.
- 5. Vertical Dowels: 3/8-inch diameter stainless-steel.

2.5 MISCELLANEOUS MASONRY ACCESSORIES

A. Cavity Drainage Panels: Made from rigid polystyrene in corrugated profile to produce vertical drainage channels, with perforations to allow cross-ventilation, and spunbonded polypropylene fabric facing.

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide Masonry Technology Incorporated (MTIDRY.com); Sure Cavity™ SCMM 2532.
- 2. Panel Depth (Thickness): 10 mm.

3. System Auxiliary Components: Provide weeps and wall vent products by manufacturer of cavity drainage panels and made from similar materials, as recommended for Project conditions including the following:
 - a. Weeps at Grade: Stone Cavity Weep™ SCV 5012.
 - b. Weeps at Wall Opening Head and Sill Conditions: Wall Opening Weeps™ WOW 9095.
 - c. Top of Wall Vent: MTI; Floor Edging™ FE 8555.

2.6 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar and grout stains, efflorescence, and other new construction stains from stone masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cleaner manufacturer and stone producer.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Diedrich Technologies, Inc.
 - b. Dominion Restoration Products.
 - c. EaCo Chem, Inc.
 - d. Hydrochemical Techniques, Inc.
 - e. Prosoco, Inc.

2.7 FABRICATION

- A. Split or select stone veneer to produce pieces of thickness, size, and shape indicated, including details on Drawings and pattern specified in "Setting Stone Masonry" Article.
 1. Shape stone specified to be laid in broken-course, random range ashlar pattern with split beds.
- B. Thickness of Stone Veneer: Provide thickness indicated, but not less than the following:
 1. Thickness for Full-Depth Veneer: 4 to 6 inches.
 2. Thickness for Thin Stone Veneer: 2 inches (50 mm) plus or minus 1/4 inch (6 mm).
- C. Dimension Stone: Cut stone to produce pieces of thickness, size, and shape indicated.
 1. Stone Edges: Square cut with top corner slightly eased to prevent snipping unless otherwise indicated.
- D. Finish exposed stone faces and edges to comply with requirements indicated and to match approved samples and mockups.

2.8 MORTAR MIXES

- A. General: Do not use admixtures unless otherwise indicated.
 1. Do not use calcium chloride.
 2. Use portland cement-lime unless otherwise indicated. Do not use masonry cement or mortar cement mortar.
 3. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches required

consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

- B. Mortar for Stone Masonry: Comply with ASTM C 270, Proportion Specification.
 - 1. Mortar for Setting Stone: Type N.
 - 2. Mortar for Pointing Stone: Type N.
- C. Latex-Modified Portland Cement Setting Mortar for Thin Stone Veneer: Proportion and mix portland cement, aggregate, and latex additive to comply with latex-additive manufacturer's written instructions.
 - 1. Cement-Paste Bond Coat: Mix either neat cement and water or cement, sand, and water to a consistency similar to that of thick cream.
 - a. For latex-modified, portland cement, setting-bed mortar, substitute latex admixture for part or all of water, according to latex-additive manufacturer's written instructions.
 - 2. Mortar for Scratch Coat over Unit Masonry: 1 part portland cement, 1 part lime, 7 parts loose damp sand, and enough water to produce a workable consistency.
- D. Pigmented Mortar: Use colored cement product.
 - 1. Pigments shall not exceed 10 percent of portland cement by weight.
 - 2. Mix to match approved sample.

PART 3 - EXECUTION

3.1 SETTING STONE MASONRY

- A. Perform necessary field cutting and trimming as stone is set.
 - 1. Use hammer and chisel to split stone that is fabricated with split surfaces. Make edges straight and true, matching similar surfaces that were shop or quarry fabricated.
- B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.
- C. Arrange stones in range ashlar pattern with course heights as indicated, random lengths, and uniform joint widths, with offset between vertical joints as indicated.
- D. Arrange stones with color and size variations uniformly dispersed for an evenly blended appearance.
- E. Maintain uniform joint widths except for variations due to different stone sizes and where minor variations are required to maintain bond alignment if any. Lay walls with joints not less than 1/4 inch (6 mm) at narrowest points or more than 1 inch (25 mm) at widest points.
- F. Provide sealant joints of widths and at locations indicated.
 - 1. Keep sealant joints free of mortar and other rigid materials.
 - 2. Sealing joints is specified in Section 079200 "Joint Sealants."
- G. Install embedded flashing and weeps at lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

1. At stud-framed walls, extend flashing through stone masonry, up sheathing face at least 12 inches (300 mm), and behind weather barrier.
2. At lintels and shelf angles, extend flashing full length of angles but not less than 6 inches (150 mm) into masonry at each end.
3. At sills, extend flashing not less than 4 inches (100 mm) at ends.
4. At ends of head and sill flashing, turn up not less than 2 inches (50 mm) to form end dams.
5. Extend sheet metal flashing 1/2 inch (13 mm) beyond masonry face at exterior, and turn flashing down to form a drip.

H. Cavity Drainage, Weeps and Vents:

I. Place weeps in joints where moisture may accumulate, including at base of walls, at wall openings, at flashing, and at top of walls.

1. Use specified weep products to form weeps.
2. Place cavity drainage panels in cavities to comply with manufacturer's written instructions.

J. Install vents in head joints at top of walls at spacing indicated. Use top-of-wall vent product.

3.2 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (10 mm in 6 m), or 1/2 inch in 40 feet (13 mm in 12 m) or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m) or 1/2 inch in 40 feet (13 mm in 12 m) or more.
- B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m) or 1/2 inch in 40 feet (13 mm in 12 m) or more.
- C. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet (13 mm in 6 m) or 3/4 inch in 40 feet (19 mm in 12 m) or more.

3.3 INSTALLATION OF ANCHORED STONE MASONRY

- A. Anchor stone masonry to stud framing with specified veneer anchor system. Fasten rigid anchors through sheathing to framing with two screws. Connect wire ties to vertical rods inserted through ties and through eyes of rigid anchors.
- B. Embed veneer anchors in mortar joints of stone masonry at least halfway, but not less than 1-1/2 inches (38 mm), through stone masonry and with at least a 5/8-inch (16-mm) cover on exterior face.
- C. Space anchors not more than 18 inches (450 mm) o.c. vertically and 32 inches (800 mm) o.c. horizontally, with not less than one anchor per 2.67 sq. ft. (0.25 sq. m) of wall area. Install additional anchors within 12 inches (300 mm) of openings, sealant joints, and perimeter at intervals not exceeding 12 inches (300 mm).
- D. Set stone in full bed of mortar with full head joints unless otherwise indicated. Build anchors into mortar joints as stone is set.
- E. Provide 1-inch (25-mm) cavity between stone masonry and backup construction unless otherwise indicated. Keep cavity free of mortar droppings and debris.
 1. Slope beds toward cavity to minimize mortar protrusions into cavity.
 2. Do not attempt to trowel or remove mortar fins protruding into cavity.

- F. Rake out joints for pointing with mortar to depth of not less than 3/4 inch (19 mm) before setting mortar has hardened. Rake joints to uniform depths with square bottoms and clean sides.

3.4 INSTALLATION OF ADHERED THIN STONE MASONRY VENEER

- A. Coat backs of stone units and face of backup with cement-paste bond coat, then butter both surfaces with setting mortar. Use sufficient setting mortar so a slight excess will be forced out the edges of stone units as they are set. Tap units into place, completely filling space between units and masonry backup.
- B. Rake out joints for pointing with mortar before setting mortar has hardened. Rake joints to uniform depths with square bottoms and clean sides.

3.5 POINTING

- A. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than 3/8 inch (10 mm) deep until a uniform depth is formed.
- B. Point stone joints by placing and compacting pointing mortar in layers of not more than 3/8 inch (10 mm) deep. Compact each layer thoroughly and allow to it become thumbprint hard before applying next layer.
- C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:
 - 1. Joint Profile: Match design reference sample.

3.6 ADJUSTING AND CLEANING

- A. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before cleaning stone masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaner; remove cleaner promptly by rinsing thoroughly with clear water.
 - 5. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20, Revised II, using job-mixed detergent solution.
 - a. If necessary to further clean stone veneer, and if approved by stone and mortar sources, clean stone masonry with proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION