

SECTION 04410

STONE MASONRY VENEER

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Stone masonry veneer anchored to concrete back-up.

1.2 SUBMITTALS

- A. Product Data: For each variety of stone, stone accessory, and other manufactured product specified.
 - 1. For stone varieties proposed for use on Project, include data on physical properties required by referenced ASTM standards.
- B. Stone Samples for Verification: Sets for each color, grade, finish, and variety of stone required. Include 2 or more Samples in each set showing the full range of variations expected in these characteristics.
- C. LEED Submittals:
 - 1. Credit MR 2.1 and 2.2: Waste management plan complying with Division 1 Section "Construction Waste Management."
 - 2. Credit MR 5.1 and 5.2: Product Data indicating location of material manufacturer for regionally manufactured materials.
 - a. Include statement indicating cost and distance from manufacturer to Project for each regionally manufactured material.
 - b. Include statement indicating cost and distance from point of extraction, harvest, or recovery to Project for each raw material used in regionally manufactured materials.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed stone masonry veneer similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Source Limitations for Stone: Obtain each variety of stone from a single quarry with resources to provide materials of consistent quality in appearance and physical properties without delaying the work.
 - 1. Obtain each variety of stone from a single quarry, whether specified in this Section or in another Section of the Specifications.
- C. Source Limitations for Mortar and Grout Materials: Obtain mortar ingredients of uniform quality for each cementitious component from a single manufacturer and each aggregate from one source or producer.

1.4 PROJECT CONDITIONS

- A. Protection of Stone Masonry Veneer: During erection, cover tops of walls, projections, and sills with waterproof sheeting at the end of each day's work. Cover partially completed stone masonry veneer when construction is not in progress.
- B. Stain Prevention: Immediately remove grout, mortar, and soil to prevent them from staining the face of stone masonry veneer.
1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on the ground and over the wall surface.
 2. Protect sills, ledges, and projections from mortar droppings.
 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt on completed stone masonry veneer.
- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace stone masonry veneer damaged by frost or freezing conditions. Comply with the following requirements:
1. Cold-Weather Construction: When ambient temperature is within limits indicated, use the following procedures:
 - a. 40 to 32 deg F (4 to 0 deg C): Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C).
 - b. 32 to 25 deg F (0 to minus 4 deg C): Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar above freezing until used in masonry.
 - c. 25 to 20 deg F (minus 4 to minus 7 deg C): Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar above freezing until used in masonry. Use heat on both sides of walls under construction.
 - d. 20 deg F (minus 7 deg C) and below: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar above freezing until used in masonry. Heat stone to 40 deg F (4 deg C). Provide enclosures and use heat on both sides of walls under construction to maintain temperatures above 32 deg F (0 deg C) within enclosures.
 2. Cold-Weather Protection: When mean daily temperature is within limits indicated, provide the following protection:
 - a. 40 to 25 deg F (4 to minus 4 deg C): Cover masonry with weather-resistant membrane for 48 hours after construction.
 - b. 25 to 20 deg F (minus 4 to minus 7 deg C): Cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. Use windbreaks when wind velocity exceeds 15 mi./h (25 km/h).
 - c. 20 deg F (minus 7 deg C) and below: Provide enclosure and heat to maintain temperatures above 32 deg F (0 deg C) within enclosure for 48 hours after construction.
 3. 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 stone masonry veneer has dried out, but not less than 7 days after completing cleaning.
- D. Hot-Weather Requirements: Protect stone masonry-veneer work when temperature and humidity conditions produce excessive evaporation of water from mortar. Provide artificial

shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and above.

PART 2 - PRODUCTS

2.1 STONE SOURCES

- A. Varieties and Sources: Subject to compliance with requirements, provide stone of the following variety and from the following source:
 - 1. At Exterior Granite Veneer Walls provide Fresh Water Pearl from Fresh Water Stone, Inc. Orland, Maine.

2.2 STONE

- A. Match Architect's samples for variety, color, finish, and other stone characteristics relating to aesthetic effects.
- B. Granite Building Stone Standard: ASTM C 615.

2.3 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color, white, or a blend to produce mortar color indicated.
 - 1. Low-Alkali Cement: Portland cement for use with limestone shall contain not more than 0.60 percent total alkali when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.
 - 1. Blue Circle Cement, Inc.: Eaglebond High Strength Type "S".
 - 2. Ciment Quebec, Inc.: Portland and Lime / Type S.
 - 3. Dragon Cement and Concrete: Type S Masonry Cement.
- D. Aggregate: ASTM C 144.
- E. Water: Potable.

2.4 ADJUSTABLE STONE MASONRY-VENEER ANCHORS

- A. Materials: Provide masonry-veneer anchors of the following materials and thicknesses, unless otherwise indicated:
 - 1. Galvanized Steel Sheet: ASTM A 366 (ASTM A 366M), cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153, Class B-2 or B-3, as applicable.
- B. Adjustable Anchors for Connecting to Structure: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Connector Section for Concrete: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.053-inch- (1.3-mm-) thick, steel sheet, galvanized after fabrication.
2. Product: Provide No. 307 by Hohmann & Barnard or No. 117 by Heckman.

2.5 EMBEDDED FLASHING MATERIALS

- A. Masonry Flashing: For base flashing in veneer masonry, and for head flashing at doors and windows, use the following, unless otherwise indicated:
1. Copper-Laminated Flashing: Manufacturer's standard laminated flashing consisting of 5-oz./sq. ft. (1.5-kg/sq. m) sheet copper bonded with asphalt between 2 layers of glass-fiber cloth.
 - a. Asphalt-Free copper-laminated flashing products will also be acceptable. Similar to Multi-Flash 500 Series by York.
 2. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Copper Fabric Flashing; Advanced Building Products, Inc.
 - b. Copper Fabric; AFCO Products, Inc.
 - c. H & B C-Fab Flashing; Hohmann & Barnard, Inc.
 - d. Copper Fabric Flashing; Polytite Manufacturing Corp.
 - e. Copper Fabric Flashing; Sandell Manufacturing Co., Inc.
 - f. York Copper Fabric Flashing; York Manufacturing, Inc.
- B. Adhesive for Flashings: Of type recommended by manufacturer of flashing material for use indicated.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Type 2, Class A, Grade 1; compressible up to 35 percent; of width and thickness indicated; formulated from the following material:
1. Neoprene.
 2. Urethane.
 3. PVC.
- B. Weep Hole/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, designed to fill head joint with outside face held back 1/8 inch (3 mm) from exterior face of masonry, in color selected from manufacturer's standard.
1. Available Products: Subject to compliance with requirements, cavity drainage materials that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cell Vent; Dur-O-Wal, Inc.
 - b. #QV-Quadro-Vent; Hohmann & Barnard.
- C. Cavity Drainage Material: 2-inch- (50-mm-) thick, free-draining mesh; made from polyethylene strands and shaped to avoid being clogged by mortar droppings.
1. Available Products: Subject to compliance with requirements, cavity drainage materials that may be incorporated into the Work include, but are not limited to, the following:
 - a. Mortar Net by Mortar Net USA, LTD.; Model MN10-2.
 - b. Mortar Break by Advanced Building Products; Mortar Break II.

2.7 MASONRY CLEANERS

- A. Acidic Cleaner: Manufacturer's standard-strength masonry cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from stone masonry surfaces of type indicated without discoloring or damaging masonry surfaces; expressly approved for intended use by stone producer.
 - 1. Available Products: Subject to compliance with requirements, products that may be used to clean unit masonry surfaces include, but are not limited to, the following:
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. 202 New Masonry Detergent; Diedrich Technologies, Inc.
 - b. 101G Granite, Terra Cotta, and Brick Cleaner; Diedrich Technologies, Inc.
 - c. Sure Klean No. 600 Detergent; ProSoCo, Inc.
 - d. Sure Klean Restoration Cleaner; ProSoCo, Inc.

2.8 STONE FABRICATION

- A. General: Fabricate stone in sizes and shapes required to comply with requirements indicated, including details on Drawings.
 - 1. For granite, comply with recommendations of NBGQA's "Specifications for Architectural Granite."
- B. Cut stone to produce pieces of thickness, size, and shape indicated and to comply with fabrication and construction tolerances recommended by applicable stone association or, if none, by stone source, for faces, edges, beds, and backs. Clean sawn backs of stone to remove rust stains and iron particles.
- C. Thickness of Stone Masonry Veneer: Provide thickness indicated, but not less than the following:
 - 1. Thickness: 3 inches (75 mm) plus or minus 1/4 inch (6 mm).
- D. Dress joints (bed and vertical) straight and at right angle to face, unless otherwise indicated.
- E. Shape stone for type of masonry (pattern) indicated:
 - 1. Type of Masonry (Pattern): As indicated on Drawings.
- F. Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match approved samples and mockups.
 - 1. Finish: Split face.
- G. Carefully inspect stone units at quarry or fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units before shipment.

2.9 MORTAR MIXES

- A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortar of uniform quality and with optimum performance characteristics.
 - 1. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated. Do not use calcium chloride.

2. Mixing: Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer, unless otherwise indicated. Discard mortar when it has reached initial set.
- B. Mortar for Stone Masonry Veneer: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated below:
1. Limit cementitious materials in mortar to portland cement and lime.
 2. Set stone with Type S mortar.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Advise installers of other work about specific requirements for placement of reinforcement, anchors, ties, flashing, and similar items to be built into stone masonry veneer.
- B. Accurately mark stud centerlines on face of asphalt-saturated felt before beginning stone installation.
- C. Protect stone masonry veneer during erection as follows:
1. Cover tops of walls with nonstaining, waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress. Extend cover a minimum of 24 inches (600 mm) down both sides and hold securely in place.
 2. Prevent staining of stone from mortar, grout, sealants, and other sources. Immediately remove such materials without damaging stone.
 3. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on the ground and over the wall surface.
 4. Protect sills, ledges, and projections from mortar droppings.
- D. Clean stone surfaces that have become dirty or stained by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

3.2 SETTING STONE MASONRY VENEER, GENERAL

- A. Execute stone masonry veneer by skilled masons experienced with the kind and form of stone and installation method indicated.
1. Employ skilled stone fitters at the Project site to do necessary field cutting as stone is set. Use power saws to cut stone. Produce lines cut straight and true, with edges eased slightly to prevent snipping.
 2. Arrange stones for good fit, in pattern indicated, with joint widths within tolerances indicated.
 3. Arrange stones for uniformity of appearance, with color and size variations uniformly dispersed for an evenly blended appearance.
- B. Set stone to comply with requirements indicated on Drawings. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure stone masonry veneer in place. Set stone accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

- C. Maintain uniform joint widths, except for variations due to stone size variations and minor variations required to maintain bond alignment, if any. Lay walls with joints of the following width.
 - 1. Joint Width: 1/4 to 1/2 inch (6 to 13 mm).
- D. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
 - 1. Sealing expansion and other joints is specified in Division 7 Section "Joint Sealants."
 - 2. Keep expansion joints free of mortar and other rigid materials.
- E. Install concealed flashing at lintels, ledges, and similar obstructions to downward flow of water to divert water to exterior.
 - 1. At wood and metal frame walls, extend flashing from exterior face of veneer, through the veneer, up face of sheathing at least 8 inches (200 mm), and behind asphalt-saturated felt.
 - 2. At lintels and shelf angles, extend flashing a minimum of 4 inches (100 mm) into masonry at each end. At heads and sills, extend flashing 4 inches (100 mm) at ends and turn up not less than 2 inches (50 mm) to form a pan.
 - 3. Extend flashing 1/2 inch (13 mm) beyond face of stone masonry veneer at exterior and turn down to form a drip.
- F. Place weep holes and vents in joints where moisture may accumulate including base of cavity walls, above shelf angles, and flashing. Locate weep holes and vents at intervals not exceeding 24 inches (600 mm).
 - 1. Form weep holes with product specified in Part 2 of this Section.
 - 2. In cavities, place cavity drainage stone to a height equal to height of first course, but not less than 2 inches (50 mm), immediately above top of flashing embedded in wall, as masonry construction progresses, to splatter mortar droppings and to maintain drainage.
 - 3. Place cavity drainage material immediately above flashing in cavities.

3.3 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 (12 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 (12 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 (12 mm in 12 m) or more.
- C. Variation of Linear Building Line: For position shown in plan and related portion of walls, and partitions, do not exceed 1/2 inch in 20 feet (12 mm in 6 m) or 3/4 inch in 40 feet (19 mm in 12 m) or more.
- D. Measure variation from plumb, level, and position shown in plan as the variation of the average plane of the face of each stone from a plumb, level, or dimensioned plane.
- E. Variation in Mortar-Joint Thickness: Do not vary from joint size range indicated.
- F. Variation in Plane between Adjacent Stones: Do not exceed one-half of tolerance specified for thickness of stone.

- G. Variation in Plane on Face of Individual Stone: Do not exceed one-half of tolerance specified for thickness of stone.

3.4 INSTALLING ANCHORED STONE MASONRY VENEER

- A. Anchor masonry veneer to concrete with masonry-veneer anchors to comply with the following requirements:
 - 1. Fasten each anchor section to dovetail slots.
 - 2. Embed tie section in mortar joints to within 1-1/2 inches (38 mm) of face.
 - 3. Space anchors as indicated, but not more than 18 inches (457 mm) o.c. vertically and 24 inches (600 mm) o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. (0.2 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals around perimeter not exceeding 12 inches (305 mm).
- B. Set stone in full bed of mortar with full head joints, unless otherwise indicated. Build anchors and ties into mortar joints as stone is set.
 - 1. Install continuous wire reinforcement in horizontal joints indicated and attached to seismic veneer anchors as stone is set.
- C. Fill collar joint solid as stone is set.
- D. Provide 1-inch (25-mm) air space between stone masonry veneer and back-up construction, unless otherwise indicated. Keep air space free of mortar droppings and debris.
 - 1. Place mortar spots in cavity at anchors and ties to maintain 1-inch (25-mm) spacing.
 - 2. Slope beds toward air space to minimize mortar protrusions into air space. As work progresses, trowel mortar fins protruding into air space flat against back of veneer.
- E. Rake out joints for pointing with mortar to depths of not less than 1/2 inch (13 mm). 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 first in layers not greater than 3/8 inch (10 mm) until a uniform depth is formed.
- B. Point stone joints by placing and compacting pointing mortar in layers not greater than 3/8 inch (10 mm). Compact each layer thoroughly and allow to 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: Concave.

3.6 ADJUSTING AND CLEANING

- A. Remove and replace stone masonry veneer of the following description:
 - 1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if the methods and results are approved by Architect.
 - 2. Defective joints.

3. Stone masonry veneer and joints not matching approved samples and mockups.
 4. Stone masonry veneer not complying with other requirements indicated.
- B. Replace in a manner that results in stone masonry veneer's matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean stone masonry veneer as work progresses. Remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry veneer 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 proceeding with cleaning of 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 cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
 5. Clean stone by bucket and brush hand-cleaning method described in BIA Technical Note No. 20 Revised II, using the following masonry cleaner:
 - a. Acidic cleaner, applied in compliance with written directions of acidic cleaner manufacturer.
- E. Protection: Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure stone masonry veneer is without damage and deterioration at the time of Substantial Completion.

3.7 EXCESS MATERIALS AND WASTE

- A. Excess Stone: Stack excess stone where directed by Owner for Owner's use.
- B. Masonry Waste: Remove clean masonry and legally dispose of off Owner's property.

END OF SECTION