SECTION 044313.13 - ANCHORED STONE MASONRY VENEER

Revise this Section by deleting and inserting text to meet Project-specific requirements.

1. GENERAL
   * + 1. RELATED DOCUMENTS
          1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
       2. SUMMARY
          1. Section Includes:

Stone masonry anchored to concrete backup.

Stone masonry anchored to unit masonry backup.

Stone masonry anchored to wood framing and sheathing.

Stone masonry anchored to cold-formed metal framing and sheathing.

* + - * 1. Products Installed but Not Furnished under This Section Include:

Steel lintels in unit masonry.

Steel shelf angles for supporting unit masonry.

* + - * 1. Related Requirements:

Retain subparagraph below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

Retain subparagraph below if items in options are specified in Section 042000 "Unit Masonry" for use in Work of both that Section and this Section.

Section 042000 "Unit Masonry" for [**concealed flashing] [horizontal joint reinforcement] [and] [veneer anchors**].

* + - 1. PREINSTALLATION MEETINGS

Retain "Preinstallation Conference" Paragraph below if Work of this Section is extensive or complex enough to justify a conference.

* + - * 1. Preinstallation Conference: Conduct conference at Project site.

If needed, insert list of conference participants.

* + - 1. SUBMITTALS
         1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
         2. Manufacturer’s installation instructions shall be provided along with product data.
         3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
         4. Product Data: For each variety of stone, stone accessory, and manufactured product.
         5. Sustainable Design Submittals:
         6. Samples for Initial Selection: For colored mortar and other items involving color selection.

Generally, retain "Samples for Verification" Paragraph below, especially for more variable stone varieties where Samples may serve to define acceptable range of colors, patterns, and so on.

* + - * 1. Samples for Verification:

For each stone type indicated. Include at least [**two] [three] [four] [five**] Samples in each set and show the full range of color and other visual characteristics in completed Work.

For each color of mortar required.[ **Label Samples to indicate types and amounts of pigments used**.]

Coordinate "Qualification Data" Paragraph below with qualification requirements in "Quality Assurance" Article.

* + - * 1. Qualification Data: For Installer.

Retain "List of Materials Used in Constructing Mockups" Paragraph below for critical work if record of mockup materials is required.

* + - * 1. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, supply sources, and other information as required to identify materials used. Include mix proportions for mortar and source of aggregates.

Neither receipt of list nor approval of mockups constitutes approval of deviations from the Contract Documents contained in mockups unless Director’s Representative approves such deviations in writing.

Retain "Material Test Reports" Paragraph below for material test reports that are Contractor's responsibility.

* + - * 1. Material Test Reports:

Stone Test Reports: For[ **each**] stone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, other than abrasion resistance, according to referenced ASTM standards. Base reports on testing done within previous [**three] [five**] years.

Sealant Compatibility and Adhesion Test Report: From sealant manufacturer indicating that sealants will not stain or damage stone. Include interpretation of test results and recommendations for primers and substrate preparation needed for adhesion.

* + - 1. QUALITY ASSURANCE
         1. Installer Qualifications: A qualified installer who employs experienced stonemasons and stone fitters.
         2. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

Retain first subparagraph below for limited mockups.

Build mockups for [**each type of stone masonry] [typical exterior wall**] in sizes approximately [**48 inches**] [**60 inches**] [**72 inches**] [**96 inches**] long by [**48 inches**] [**60 inches**] [**72 inches**] high by full thickness, including face and backup wythes and accessories.

Delete any of first four subparagraphs below that do not apply or are not required.

Include stone coping at top of mockup.

Include a sealant-filled joint at least 16 inches long in mockup.

Retain first subparagraph below to show materials and methods used for through-wall flashing if required.

Include through-wall flashing installed for a 24-inch length in corner of mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit stone masonry above half of flashing).

Include [**metal] [wood**] studs, sheathing, veneer anchors, flashing, and weep holes in exterior masonry-veneer wall mockup.

Protect accepted mockups from the elements with weather-resistant membrane.

Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Director’s Representative specifically approves such deviations in writing.

Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

* + - 1. PRECONSTRUCTION TESTING

Retain "Preconstruction Sealant Compatibility and Adhesion Testing" Paragraph below if sealants are specified in this Section.

* + - * 1. Preconstruction Sealant Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for compatibility and adhesion testing according to sealant manufacturer's standard testing methods and Section 079200 "Joint Sealants," Samples of materials that will contact or affect joint sealants.
      1. DELIVERY, STORAGE, AND HANDLING
         1. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
         2. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

Always retain first paragraph below if Contractor uses a preblended, dry mortar mix.

* + - * 1. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, in a dry location, or in covered weatherproof dispensing silos.
        2. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.
      1. FIELD CONDITIONS
         1. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed stone masonry when construction is not in progress.

Increase extent of cover in subparagraph below as needed to suit local climatic conditions.

Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

* + - * 1. Stain Prevention: Immediately remove mortar and soil to prevent them from staining stone masonry face.

Protect base of walls from rain-splashed mud and mortar splatter using coverings spread on the ground and over the wall surface.

Protect sills, ledges, and projections from mortar droppings.

Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.

Turn scaffold boards near the wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed stone masonry.

* + - * 1. 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 TMS 602/ACI 530.1/ASCE 6.

Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than seven days after completing cleaning.

* + - * 1. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
      1. COORDINATION
         1. Advise installers of adjacent Work about specific requirements for placement of reinforcement, veneer anchors, flashing, and similar items to be built into stone masonry.
         2. Coordinate locations of dovetail slots installed in concrete that are to receive stone anchors.

1. PRODUCTS

Manufacturers and products listed in SpecAgent and MasterWorks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications.

* + - 1. MANUFACTURERS

Delete third option in "Source Limitations for Stone" Paragraph below if stone for other Sections is specified in a stone schedule in this Section or if not using other stone Sections.

* + - * 1. Source Limitations for Stone: Obtain[ **each variety of**] stone, [**regardless of finish**, ]from single quarry[, **whether specified in this Section or in another Section of the Specifications**,] with resources to provide materials of consistent quality in appearance and physical properties.
        2. Source Limitations for Mortar Materials: Obtain mortar ingredients of uniform quality for each cementitious component from single manufacturer and each aggregate from single source or producer.

Retain "Varieties and Sources" Paragraph below and delete stone type articles below if stone varieties and sources are specified in Section 044200 "Exterior Stone Cladding." Specifying all stone types in one Section helps ensure uniformity of stone supplied under different Sections.

* + - * 1. Varieties and Sources: Subject to compliance with requirements, provide stone of varieties and from sources complying with Section 044200 "Exterior Stone Cladding."

Delete "Varieties and Sources" Paragraph above and retain one or more of first four articles below to describe stone types used if stone types are not specified in Section 044200 "Exterior Stone Cladding." If articles describing stone types are retained here and only one type from each category is required, the generic name can be retained and used on Drawings instead of a stone-type designation; otherwise, copy and re-edit article retained for each type required, inserting a different stone-type designation each time. If different stone types require different thicknesses, patterns, or finishes, copy appropriate paragraphs from "Fabrication" Article to articles specifying stone types below, and delete copied paragraphs from "Fabrication" Article.

* + - 1. GRANITE <**Insert drawing designation**>

Some granite varieties that are suitable for stone masonry do not comply with ASTM C615; verify that granite selected will comply before retaining option in "Material Standard" Paragraph below.

* + - * 1. Material Standard: Comply with ASTM C615.

"Description" Paragraph below is an example of a generic description that can be retained and revised for a nonproprietary specification.

* + - * 1. Description: Uniform, [**fine] [medium**]-grained, [**white] [pink] [gray] [black**] stone[ **without veining].**

For a more explicit specification, retain "Varieties and Sources" Paragraph below and name specific products.

* + - * 1. Varieties and Sources: Subject to compliance with requirements, [**provide the following] [provide one of the following] [available stone varieties that may be incorporated into the Work include, but are not limited to, the following**]:

<**Insert, in separate subparagraphs, names of varieties and producers, distributors, or importers**>.

Retain paragraph below for added quality control if required.

* + - * 1. Match Director’s Representative's samples for color, finish, and other stone characteristics relating to aesthetic effects.
      1. LIMESTONE <**Insert drawing designation**>
         1. Material Standard: Comply with ASTM C568.

Retain one of four options in "Classification" Subparagraph below. First option generally applies to very porous limestone that may only be used on building exteriors in mild climates; second, to oolitic limestone; third and fourth, to dolomitic limestone.

Classification: [**I Low Density] [II Medium Density] [II Medium Density, except as follows: absorption, 5 percent by weight maximum; density, 150 lb/cu. ft. minimum; compressive strength, 8000 psi minimum; and modulus of rupture 800 psi minimum] [III High Density**].

If retaining "Description" Paragraph below, retain one of three options. Coordinate with option retained in "Classification" Subparagraph. Description can serve as a salient characteristic if varieties other than those named are allowed and can be deleted if only specific named varieties are allowed.

* + - * 1. Description: [**Dolomitic] [Oolitic] [Shell**] limestone.
        2. Varieties and Sources: Subject to compliance with requirements, [**provide the following] [provide one of the following] [available stone varieties that may be incorporated into the Work include, but are not limited to, the following**]:

<**Insert, in separate subparagraphs, names of varieties and producers, distributors, or importers**>.

Retain "Varieties and Sources" Paragraph below if Indiana limestone is required. If retaining below, retain "II Medium Density" option in "Classification" Subparagraph and "Oolitic" option in "Description" Paragraph. Revise below if stone from a particular quarry is required.

* + - * 1. Varieties and Sources: Indiana limestone quarried in Lawrence, Monroe, or Owen Counties, Indiana.

Select and Standard grades are hard to get in large sizes; gray is more plentiful than buff. Verify availability with producers.

Indiana Limestone Grade and Color: [**Select, buff] [Select, gray] [Standard, buff**] [**Standard, gray] [Rustic, buff] [Rustic, gray] [Variegated**], according to grade and color classification established by ILI.

Retain paragraph below for added quality control if required.

* + - * 1. Match Director’s Representative's samples for color, finish, and other stone characteristics relating to aesthetic effects.
      1. QUARTZ-BASED STONE <**Insert drawing designation**>

Retain one of three options in "Material Standard" Paragraph below.

* + - * 1. Material Standard: Comply with ASTM C616[, **Classification I Sandstone] [, Classification II Quartzitic Sandstone] [, Classification III Quartzite**].
        2. Varieties and Sources: Subject to compliance with requirements, [**provide the following] [provide one of the following] [available stone varieties that may be incorporated into the Work include, but are not limited to, the following**]:

<**Insert, in separate subparagraphs, names of varieties and producers, distributors, or importers**>.

Retain paragraph below for added quality control if required.

* + - * 1. Match Director’s Representative's samples for color, finish, and other stone characteristics relating to aesthetic effects.
      1. OTHER STONE <**Insert drawing designation**>

Usually, replace "Other Stone" in title of this article with common name or varietal name of stone, as is used on Drawings.

* + - * 1. Material Standards:

Maximum Absorption per ASTM C97: [**7.5] [3**] percent.

Minimum Compressive Strength per ASTM C170: [**4000 psi] [7500 psi**].

* + - * 1. Varieties and Sources: Subject to compliance with requirements, [**provide the following] [provide one of the following] [available stone varieties that may be incorporated into the Work include, but are not limited to, the following**]:

<**Insert, in separate subparagraphs, names of varieties and producers, distributors, or importers**>.

Retain paragraph below for added quality control if required.

* + - * 1. Match Director’s Representative's samples for color, finish, and other stone characteristics relating to aesthetic effects.
      1. MORTAR MATERIALS

Coordinate requirements in this article with those in "Mortar Mixes" Article.

Retain "Portland Cement" and "Hydrated Lime" paragraphs below for portland cement-lime mix or for job-mixed, portland cement-lime mortar.

* + - * 1. Portland Cement: ASTM C150, 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.

Retain "Low-Alkali Cement" Subparagraph below if recommended by stone source to limit staining.

Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C114.

* + - * 1. Hydrated Lime: ASTM C207, Type S.

Mix in "Portland Cement-Lime Mix" Paragraph below allows better control of color than job-mixed, portland cement-lime mortar. If retaining, also retain "Portland Cement" and "Hydrated Lime" paragraphs above.

* + - * 1. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Essroc.

Holcim US.

Lehigh Hanson; HeidelbergCement Group.

Approved equivalent.

* + - * 1. Mortar Cement: ASTM C1329.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Cemex, Inc

Holcim US.

Approved equivalent.

Before retaining "Mortar Cement" Paragraph above or "Masonry Cement" Paragraph below, verify that mortar or masonry cements have a successful history of use with stone variety selected. Delete both if requirements in "Mortar Mixes" Article limit cementitious materials to portland cement and lime. See the Evaluations in Section 042000 "Unit Masonry" for discussion of mortar and masonry cements.

* + - * 1. Masonry Cement: ASTM C91.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Cemex, Inc.

Holcim US.

Lehigh Hanson; Heidelberg Cement Group.

Approved equivalent.

Retain "Mortar Pigments" Paragraph below for colored cement or for pigments added at Project site.

* + - * 1. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979. Use only pigments with a record of satisfactory performance in stone masonry mortar.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Davis Colors.

Lanxess Corporation.

Solomon Colors, Inc.

Approved equivalent.

Mix in "Colored Portland Cement-Lime Mix" Paragraph below allows better control of color than job-mixed, portland cement-lime mortar with pigment added.

* + - * 1. 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.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Holcim (US) Inc.

Lehigh Hanson; Heidelberg Cement Group.

Approved equivalent.

* + - * 1. Colored Masonry Cement Mix: Packaged blend of masonry cement and mortar pigments. Mix shall produce color indicated or, if not indicated, as selected from manufacturer's standard colors. Pigments shall not exceed 5 percent of masonry cement by weight.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Cemex, Inc.

Holcim (US) Inc.

Lehigh Hanson; Heidelberg Cement Group.

Approved equivalent.

* + - * 1. Aggregate: ASTM C144 and as follows:

For pointing mortar, use aggregate graded with 100 percent passing No. 16 sieve.

Retain "White Aggregates" Subparagraph below for white mortar.

White Aggregates: Natural white sand or ground white stone.

Delete "White Aggregates" Subparagraph above or "Colored Aggregates" Subparagraph below unless both white and colored mortars are required.

Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.

Retain subparagraph below if required.

Match Director’s Representative's sample.

Usually, delete "Cold-Weather Admixture" Paragraph below, which is an example requirement for a concrete admixture often used in cold weather as antifreeze. The appendix to ASTM C270 recommends against using admixtures. If retaining below, verify suitability for use with stone selected.

* + - * 1. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Euclid Chemical Company (The); an RPM company.

GCP Applied Technologies Inc.

Sonneborn.

Approved equivalent.

* + - * 1. Water: Potable.
      1. VENEER ANCHORS

If retaining this article, delete references to veneer anchors in "Related Requirements" Paragraph in "Summary" Article.

* + - * 1. Materials:

Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A1064; with ASTM A153, Class B-2.

Retain "Type 304" option in "Stainless Steel Wire" Subparagraph below unless higher corrosion resistance of Type 316 is required.

Stainless Steel Wire: ASTM A580, [**Type 304] [Type 316**].

Hot-Dip Galvanized-Steel Sheet: ASTM A1008, cold-rolled, carbon-steel sheet, hot-dip galvanized after fabrication to comply with ASTM A153, Class B-2.

Retain "Type 304" option in "Stainless Steel Sheet" Subparagraph below unless higher corrosion resistance of Type 316 is required.

Stainless Steel Sheet: ASTM A240 or ASTM A666, [**Type 304] [Type 316**].

* + - * 1. Size: Sufficient to extend at least halfway, but not less than 1-1/2 inches, through stone masonry and with at least a 5/8-inch cover on exterior face.

Retain "Wire Veneer Anchors" Paragraph below for loose wire ties and for wire ties used with masonry wall reinforcement.

* + - * 1. Wire Veneer Anchors: Wire ties formed from W1.7 or 0.148-inch- diameter, [**hot-dip galvanized] [stainless**] steel wire.

Retain one of three subparagraphs below. First subparagraph is based on prescriptive requirements for stone veneers in the IBC. Second is based on typical eye-and-pintle, adjustable (two-piece), masonry joint reinforcement for cavity walls. Third is based on Dayton Superior Corporation's "Adjustable Joint Reinforcement for Random Stone" and Hohmann & Barnard's "Tie-HVR."

Ties are bent in the form of loops with legs not less than 15 inches in length and with last 2 inches bent at 90 degrees.

Ties are bent in the form of rectangular loops with ends bent downward for inserting into eyes projecting from masonry joint reinforcement specified in Section 042000 "Unit Masonry."

Ties are bent in the form of triangular loops designed to be attached to masonry joint reinforcement specified in Section 042000 "Unit Masonry" with vertical wires passing through ties and through eyes projecting from masonry joint reinforcement.

Corrugated-metal veneer anchors in "Corrugated-Metal Veneer Anchors" Paragraph below are often used instead of adjustable veneer anchors for stone facings on concrete and for low-rise construction. Masonry Standards Joint Committee Code requires that corrugated-metal veneer ties be at least 0.030 inch thick and requires closer spacing for veneer ties less than 0.060 inch thick.

* + - * 1. Corrugated-Metal Veneer Anchors: Not less than [**0.030-inch-] [0.060-inch-**] thick by 7/8-inch- wide [**hot-dip galvanized] [stainless**] steel sheet with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch.
        2. Adjustable Masonry-Veneer Anchors:

General: Provide anchors that allow vertical adjustment but resist a 100-lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch.

Fabricate sheet metal anchor sections and other sheet metal parts from [**0.075-inch- thick steel sheet, galvanized after fabrication] [0.105-inch- thick steel sheet, galvanized after fabrication] [0.078-inch- thick, stainless steel sheet] [0.109-inch- thick, stainless steel sheet**].

Fabricate wire ties from [**0.187-inch-] [0.25-inch-**] diameter, [hot-dip galvanized-steel] [stainless steel] wire unless otherwise indicated.

Fabricate wire connector sections from **[0.187-inch-] [0.25-inch**-] diameter, [**hot-dip galvanized-steel] [stainless steel**] wire.

Usually, retain "Contractor's Option" Subparagraph below along with the acceptable types of anchors.

Contractor's Option: Unless otherwise indicated, provide any of the adjustable masonry-veneer anchors specified.

First "Adjustable, Screw-Attached Veneer Anchors" Paragraph below describes a type of veneer anchor that offers very little vertical adjustment, so it can only be used with predetermined stone coursing heights unless it is installed as stone is laid. Flat plate can crush foam-plastic sheathing.

* + - * 1. Adjustable, Screw-Attached Veneer Anchors: Units consisting of a wire tie section and a metal anchor section for attachment over sheathing to wood or metal studs, and as follows:

Anchor Section: Rib-stiffened, sheet metal plate with screw holes in top and bottom, 2-3/4 inches wide by 3 inches high; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit veneer anchor section.

First "Adjustable, Screw-Attached Veneer Anchors" Paragraph below describes a type of veneer anchor with flat plate that can crush foam-plastic sheathing.

* + - * 1. Adjustable, Screw-Attached Veneer Anchors: Units consisting of a wire tie section and a metal anchor section for attachment over sheathing to wood or metal studs, and as follows:

Anchor Section: Sheet metal plate, 1-1/4 inches wide by 9 inches long, with screw holes in top and bottom and with raised rib-stiffened strap, 5/8 inch wide by 5-1/2 inches long, stamped into center to provide a slot between strap and plate for inserting wire tie.

First "Adjustable, Screw-Attached Veneer Anchors" Paragraph below describes a type of veneer anchor with flat plate that can crush foam-plastic sheathing.

* + - * 1. Adjustable, Screw-Attached Veneer Anchors: Units consisting of a wire tie section and a metal anchor section for attachment over sheathing to wood or metal studs, and as follows:

Anchor Section: Sheet metal plate, 1-1/4 inches wide by 6 inches long, with screw holes in top and bottom and with raised rib-stiffened strap, 5/8 inch wide by 3-5/8 inches long, stamped into center to provide a slot between strap and plate for inserting wire tie.

First "Adjustable, Screw-Attached Veneer Anchors" Paragraph below describes a type of veneer anchor with prongs that prevent plate from crushing foam-plastic sheathing.

* + - * 1. Adjustable, Screw-Attached Veneer Anchors: Units consisting of a wire tie section and a metal anchor section for attachment over sheathing to wood or metal studs, and as follows:

Anchor Section: Gasketed sheet metal plate, 1-1/4 inches wide by 6 inches long, with screw holes in top and bottom; top and bottom ends bent to form pronged legs of length to match thickness of insulation or sheathing; and raised rib-stiffened strap, 5/8 inch wide by 6 inches long, stamped into center to provide a slot between strap and plate for inserting wire tie. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and extend beyond pronged legs.

* + - * 1. Adjustable, Screw-Attached Veneer Anchors: Units consisting of a wire tie section and a metal anchor section for attachment over sheathing to wood or metal studs, and as follows:

Anchor Section: Zinc-alloy barrel section with flanged head with eye and corrosion-resistant, self-drilling screw. Eye designed to receive wire tie and to serve as head for drilling fastener into framing. Barrel length to suit sheathing thickness, allowing screw to seat directly against framing with flanged head covering hole in sheathing.

Anchors in "Adjustable, Seismic Veneer Anchors" paragraphs below may be used for other than seismic conditions but can only be used with stone laid in horizontal coursing; seismic veneer anchors require a continuous joint in which to place continuous wire reinforcement.

First "Adjustable, Seismic Veneer Anchors" Paragraph below describes a type of veneer anchor that offers very little vertical adjustment, so it can only be used with predetermined stone coursing heights unless it is installed as stone is laid. Flat plate can crush foam-plastic sheathing.

* + - * 1. Adjustable, Seismic Veneer Anchors: Units consisting of a metal anchor section and a connector section designed to engage a continuous wire embedded in stone masonry mortar joint, complying with the following requirements:

Anchor Section: Rib-stiffened, sheet metal plate with screw holes in top and bottom, 2-3/4 inches wide by 3 inches high; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit anchor section. Size wire tie to extend at least 1-1/2 inches into stone masonry but with at least a 5/8-inch cover on exterior face.

Connector Section: Sheet metal clip welded to wire tie with integral tabs designed to engage continuous wire.

Continuous Wire: 0.188-inch- diameter, [**hot-dip galvanized] [stainless**] steel wire.

"Adjustable, Seismic Veneer Anchors" Paragraph below describes a type of veneer anchor with prongs that prevent plate from crushing foam-plastic sheathing.

* + - * 1. Adjustable, Seismic Veneer Anchors: Units consisting of a metal anchor section and a connector section designed to engage a continuous wire embedded in stone masonry mortar joint, complying with the following requirements:

Anchor Section: Gasketed sheet metal plate, 1-1/4 inches wide by 6 inches long, with screw holes in top and bottom; top and bottom ends bent to form pronged legs to bridge insulation or sheathing and contact studs; and raised rib-stiffened strap, 5/8 inch wide by 6 inches long, stamped into center to provide a slot between strap and plate for inserting wire tie. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and extend beyond pronged legs.

Connector Section: Triangular wire tie and rigid PVC extrusion with snap-in grooves for inserting continuous wire.

Continuous Wire: 0.188-inch- diameter, [**hot-dip galvanized] [stainless**] steel wire.

Fasteners in "Polymer-Coated, Steel Drill Screws for Steel Studs" Paragraph below are for steel studs from 0.033 to 0.112 inch thick. "Climaseal" and "Stalgard" finishes by ITW Buildex and Textron comply with coating description.

* + - * 1. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C954 except manufactured with hex washer head and neoprene washer, No. 10 by length required to penetrate steel-stud flange with not less than three exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B117.

See BIA Technical Note No. 28B if using stainless steel screws.

* + - * 1. Stainless Steel Drill Screws for Steel Studs: Proprietary fastener consisting of carbon-steel drill point and 300 Series stainless steel shank, complying with ASTM C954, except manufactured with hex washer head and neoprene washer, No. 10 by length required to penetrate steel-stud flange with not less than three exposed threads.
        2. Polymer-Coated, Steel Drill Screws for Wood Studs: Self-drilling, wood screws recommended by veneer anchor manufacturers for fastening to wood studs; not less than No. 10, 1-1/2 inches long, and with organic polymer coating with more than 500-hour, salt-spray resistance to red rust per ASTM B117.
        3. Polymer-Coated, Steel Tapping Screws for Concrete Masonry: Self-tapping screws with specially designed threads for tapping and wedging into masonry, with hex washer head and neoprene washer, 3/16-inch diameter by 1-1/2-inch length, and with organic polymer coating with more than 800-hour, salt-spray resistance to red rust per ASTM B117.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

ITW Buildex; Illinois Tool Works, Inc.

Powers Fasteners.

Approved equivalent.

* + - 1. STONE TRIM ANCHORS

Retain this article if stone trim is anchored with anchors or dowels inserted into holes or kerfs in stone units. If retaining, indicate anchors on Drawings.

* + - * 1. Stone Trim Anchors: Units fabricated with tabs or dowels designed to engage kerfs or holes in stone trim units and holes for fasteners or postinstalled anchor bolts for fastening to substrates or framing as indicated.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Heckmann Building Products, Inc.

Hohmann & Barnard, Inc.

Meadow Burke.

Approved equivalent.

Usually, retain Type 304 stainless steel in "Materials" Paragraph below. Retain Type 316 for increased corrosion resistance in a coastal environment.

* + - * 1. Materials: Fabricate anchors from stainless steel, ASTM A240 or ASTM A666, [**Type 304] [Type 316**]. Fabricate dowels from stainless steel, ASTM A276, [**Type 304] [Type 316**].
        2. Fasteners for Stone Trim Anchors: Annealed stainless steel bolts, nuts, and washers; ASTM F593 for bolts and ASTM F594 for nuts, Alloy Group 1.
        3. Postinstalled Anchor Bolts for Fastening Stone Trim Anchors: [**Chemical anchors] [torque-controlled expansion anchors] [or] [undercut anchors**] made from stainless steel components complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2 for bolts and nuts; ASTM A666 or ASTM A276, Type 304 or Type 316, for anchors.
      1. EMBEDDED FLASHING MATERIALS

If retaining this article, delete references to flashing in "Related Requirements" Paragraph in "Summary" Article.

See the Evaluations in Section 042000 "Unit Masonry" for discussion of flashing materials. If required, verify that flashing materials selected can be easily formed to fit irregular stone surfaces.

* + - * 1. Metal Flashing: Provide metal flashing[, **where flashing is exposed or partly exposed and where indicated,**] complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

Insert zinc-tin-alloy-coated stainless steel or lead-coated copper if required.

Stainless Steel: ASTM A240, Type 304, 0.016 inch thick.

Copper: ASTM B370, Temper H00 or H01, cold-rolled copper sheet, 10-oz./sq. ft. weight or 0.0135 inch thick for fully concealed flashing; 16-oz./sq. ft. weight or 0.0216 inch thick elsewhere.

Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.

Delete first subparagraph below if referencing Section 076200 "Sheet Metal Flashing and Trim" or if plain (flat) sheet metal flashing is acceptable. Revise if dovetail pattern is required for interlocking bond. Before retaining below, verify that total thickness of ribbed flashing will fit in joint space. Note that ribs will not nest with each other at overlaps at corners.

Fabricate through-wall metal flashing embedded in masonry from [**stainless steel] [copper**], with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Cheney Flashing Company.

Hohmann & Barnard, Inc.

Keystone Flashing Company, Inc.

Approved equivalent.

Delete first subparagraph below if not required.

Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.

Usually, retain one of first two subparagraphs below, or both, if using metal through-wall flashing. See the Evaluations in Section 042000 "Unit Masonry."

Fabricate through-wall flashing with drip edge [**where] [unless otherwise**] indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees[ **and hemmed**].

Fabricate through-wall flashing with sealant stop [**where] [unless otherwise**] indicated. Fabricate by bending metal back on itself 3/4 inch at exterior wall face and down into joint 3/8 inch to form a stop for retaining sealant backer rod.

Retain first subparagraph below if using one of first two subparagraphs above with ribbed metal flashing.

Fabricate metal [**drip edges] [and] [sealant stops**] for ribbed metal flashing from plain metal flashing of same metal as ribbed flashing and extending at least 3 inches into wall with hemmed inner edge to receive ribbed flashing and form a hooked seam. Form hem on upper surface of metal so that completed seam will shed water.

Retain "Metal Drip Edges" or "Metal Sealant Stops" Subparagraph below, or both, for use with flexible flashing if required. See the Evaluations in Section 042000 "Unit Masonry."

Metal Drip Edges: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees[ and hemmed].

Metal Sealant Stops: Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior wall face. At exterior wall face, bend metal back on itself for 3/4 inch and down into joint 3/8 inch to form a stop for retaining sealant backer rod.

Retain "Metal Expansion-Joint Strips" Subparagraph below if using metal strips at expansion joints.

Metal Expansion-Joint Strips: Fabricate from [**stainless steel] [copper**] to shapes indicated.

Delete "Flexible Flashing" Paragraph below if only allowing metal flashing. If concealed metal flashing is required at certain locations, indicate those locations on Drawings or revise below.

* + - * 1. Flexible Flashing: For flashing unexposed to the exterior, use[ one of] the following unless otherwise indicated:

"Copper-Laminated Flashing" Subparagraph below is an example only; revise if other laminated products are required.

Copper-Laminated Flashing: [**5-oz./sq. ft.] [7-oz./sq. ft.**] copper sheet bonded with asphalt between two layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Advanced Building Products Inc.

Hohmann & Barnard, Inc.

Wire-Bond.

York Manufacturing, Inc.

Approved equivalent.

Asphalt-Coated Copper Flashing: [**5-oz./sq. ft.] [7-oz./sq. ft.**] copper sheet coated with flexible asphalt. Use only where flashing is fully concealed in masonry.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Hohmann & Barnard, Inc.

Phoenix Building Products.

Wire-Bond.

Approved equivalent.

Certain rubberized-asphalt flashing products are 0.040 inch thick; some are 0.030 inch thick; others are 0.025 inch thick. BIA recommends a 0.030-inch minimum thickness.

Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive, rubberized-asphalt compound, bonded to a high-density, cross-laminated, polyethylene film to produce an overall thickness of not less than [**0.030 inch] [0.040 inch**].

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Advanced Building Products Inc.

Carlisle Coatings & Waterproofing Inc.

Heckmann Building Products, Inc.

Hohmann & Barnard, Inc.

Polyguard Products, Inc.

Wire-Bond.

Approved equivalent.

Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy as follows:

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

DuPont.

Hohmann & Barnard, Inc.

Mortar Net Solutions.

Wire-Bond.

Approved equivalent.

Retain one or more of "Monolithic Sheet," "Self-Adhesive Sheet," and "Self-Adhesive Sheet with a Drip Edge" subparagraphs below or indicate on Drawings where each is required.

Monolithic Sheet: Elastomeric thermoplastic flashing, 0.040 inch thick.

Self-Adhesive Sheet: Elastomeric thermoplastic flashing, 0.025 inch thick, with a 0.015-inch- thick coating of rubberized-asphalt adhesive.

"Self-Adhesive Sheet with Drip Edge" Subparagraph below is for applications where flashing extends to masonry face. This material may be unsuitable for use at sealant joints because removing the sealant for replacement without damaging the flashing is difficult.

Self-Adhesive Sheet with Drip Edge: Elastomeric thermoplastic flashing, 0.025 inch thick, with a 0.015-inch- thick coating of rubberized-asphalt adhesive. Where flashing extends to masonry face, rubberized-asphalt coating is held back approximately 1-1/2 inches from edge.

Color: [**Gray] [White] [Tan/buff] [Black**].

Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D4637, 0.040 inch thick.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Carlisle Coatings & Waterproofing Inc.

Firestone Specialty Products.

Heckmann Building Products, Inc.

Hohmann & Barnard, Inc.

Wire-Bond.

Approved equivalent.

* + - * 1. Application: Unless otherwise indicated, use the following:

Where flashing is indicated to receive counterflashing, use metal flashing.

Where flashing is indicated to be turned down at or beyond wall face, use metal flashing.

Where flashing is partly exposed and is indicated to terminate at wall face, use metal flashing [**with a drip edge] [with a sealant stop] [or flexible flashing with a metal drip edge] [or elastomeric thermoplastic flashing with drip edge] [or flexible flashing with a metal sealant stop**].

Where flashing is fully concealed, use [**metal flashing**] [**or**] [**flexible flashing**].

* + - * 1. Solder and Sealants for Sheet Metal Flashings:[ **As specified in Section 076200 "Sheet Metal Flashing and Trim."**]

Retain option in "Solder and Sealants for Sheet Metal Flashings" Paragraph above or retain one or more of "Solder for Stainless Steel," "Solder for Copper," and "Elastomeric Sealant" subparagraphs below.

Solder for Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.

Solder for Copper: ASTM B32, Grade Sn50.

Revise "Elastomeric Sealant" Subparagraph below if sealant of specific type, grade, class, and use is required.

Elastomeric Sealant: ASTM C920, chemically curing [**urethane**] [**polysulfide**] [**silicone**] sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

Retain "Elastomeric Sealant" Subparagraph above if using sheet metal flashing. Delete "Adhesives, Primers, and Seam Tapes for Flexible Flashings" Paragraph below if using only sheet metal flashing.

* + - * 1. Adhesives, Primers, and Seam Tapes for Flexible Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.
      1. MISCELLANEOUS MASONRY ACCESSORIES
         1. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from [**neoprene] [urethane] [or] [PVC].**
         2. Cementitious Dampproofing[ **for Limestone**]: Cementitious formulation recommended by ILI and nonstaining to stone, compatible with joint sealants, and noncorrosive to veneer anchors and attachments.

Dampproofing in "Asphalt Dampproofing" Paragraph below prevents salts in concrete or masonry backup from migrating into stone and causing efflorescence. Cut-back asphalt is solvent based, but asphalt emulsion is water based; see the Evaluations in Section 071113 "Bituminous Dampproofing" for additional information.

* + - * 1. Asphalt Dampproofing: [**Cut-back asphalt complying with ASTM D4479, Type I] [or] [asphalt emulsion complying with ASTM D1227, Type III or Type IV**].
        2. Weep/Vent Products: Use[ **one of**] the following unless otherwise indicated:

Retain one or more of six subparagraphs below, or delete all if not using weep holes and vents.

Wicking Material: Absorbent rope, made from [cotton] [or] [**UV-resistant synthetic fiber]**, 1/4 to 3/8 inch in diameter, in length required to produce 2-inch exposure on exterior and 18 inches in cavity behind stone masonry. Use only for weeps.

Round Plastic Tubing: Medium-density polyethylene, 3/8-inch OD by thickness of stone masonry.

Rectangular Plastic Tubing: Clear butyrate, 3/8 by 1-1/2 inches by thickness of stone masonry.

Mesh Weep Holes/Vents: Free-draining mesh; made from polyethylene strands, full width of head joint and 2 inches high by thickness of stone masonry; in color selected from manufacturer's standard.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

CavClear/Archovations, Inc.

Mortar Net Solutions.

Approved equivalent.

Products in "Aluminum Weep Holes/Vents" and "Vinyl Weep Holes/Vents" subparagraphs below are designed for brick masonry and can only be used in vertical head joints of coursed masonry. Mortar will corrode aluminum weep holes/vents unless protected with paint.

Aluminum Weep Holes/Vents: One-piece, L-shaped units made from painted sheet aluminum, designed to fit into head joint and consisting of vertical channel with louvers stamped in web and with top flap to keep mortar out of head joint.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Hohmann & Barnard, Inc.

Approved equivalent.

Vinyl Weep Holes/Vents: One-piece, offset, T-shaped units made from flexible, injection-molded PVC, designed to fit into head joint and consisting of louvered vertical leg, flexible wings to seal against ends of stone units, and top flap to keep mortar out of head joint; in color approved by Director’s Representative to match that of mortar.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Hohmann & Barnard, Inc.

Williams Products, Inc.

Wire-Bond.

Approved equivalent.

Products described in "Cavity Drainage Material" Paragraph below can be used to keep weep holes clear and to keep cavity free draining. See the Evaluations in Section 042000 "Unit Masonry."

* + - * 1. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Advanced Building Products Inc.

CavClear/Archovations, Inc.

Mortar Net Solutions.

Approved equivalent.

Usually, retain subparagraph below.

Provide one of the following configurations:

Usually, retain two or more of four subparagraphs below to ensure competition in bidding. If using only one configuration, revise subparagraph above and combine with subparagraph(s) retained below.

First subparagraph below describes Mortar Net Solutions' "MortarNet."

Strips, full depth of cavity and 10 inches wide, with dovetail-shaped notches 7 inches deep that prevent mesh from being clogged with mortar droppings.

First subparagraph below describes Advanced Building Products' "Mortar Break" and "Mortar Break II," respectively. Usually, retain second option if cavity is 1-1/2 inches or larger.

Strips, not less than [**3/4 inch] [1-1/2 inches**] thick and 10 inches wide, with dimpled surface designed to catch mortar droppings and prevent weep holes from being clogged with mortar.

Sheets or strips full depth of cavity and installed to full height of cavity.

Sheets or strips not less than [**3/4 inch] [1 inch] <Insert dimension**> thick and installed to full height of cavity with additional strips 4 inches high at weep holes and thick enough to fill entire depth of cavity and prevent weep holes from being clogged with mortar.

Insert other accessories to suit Project.

* + - 1. MASONRY CLEANERS

Verify acceptability of cleaner for cleaning masonry with pigmented mortar joints and for stone variety specified. Do not use acidic cleaners on limestone. See the Evaluations.

* + - * 1. 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.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Diedrich Technologies, Inc.; a Hohmann & Barnard company.

EaCo Chem, Inc.

Hydroclean; Hydrochemical Techniques, Inc.

PROSOCO, Inc.

Approved equivalent.

* + - 1. FABRICATION
         1. General: Fabricate stone units in sizes and shapes required to comply with requirements indicated.

Retain applicable references in two subparagraphs below. No specific reference for quartz-based stone currently exists.

For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."

For limestone, comply with recommendations in ILI's "Indiana Limestone Handbook."

* + - * 1. [**Cut] [Split] [Select**] stone to produce pieces of thickness, size, and shape indicated, including details on Drawings and pattern specified in "Setting Stone Masonry" Article.

Shape stone specified to be laid in three-course, random range ashlar pattern with [sawed] [**split**] beds.

* + - * 1. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated. Shape beds to fit supports.

Retain first paragraph below only if anchors and supports require stone to be fabricated to receive them.

* + - * 1. Cut and drill sinkages and holes in stone for anchors and supports.
        2. Carefully inspect stone at quarry or fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units before shipment.

Clean sawed backs of stone to remove rust stains and iron particles.

If more than one stone type is required and different stone types require different thicknesses or finishes, copy applicable text from two paragraphs below to stone-type articles and delete below.

* + - * 1. Thickness of Stone: Provide thickness indicated, but not less than the following:

Revise thickness and tolerance in "Thickness" Subparagraph below to suit stone source; delete last option if no pitched faces.

Thickness: 4 inches plus or minus [**1/4 inch] [1/2 inch].[ Thickness does not include projection of pitched faces.]**

* + - * 1. Finish exposed stone faces and edges to comply with requirements indicated for finish and to match approved samples[ **and mockups**].

Retain one of eight options in "Finish" Subparagraph below or revise to suit Project. Verify finish availability with sources. See the Evaluations, including "References" Article, for explanations of terms for various finishes.

Finish: [**Split face] [Rock face (pitched face)] [Natural cleft] [Mixed split face and seam face] [Mixed split face, seam face, and rock face (pitched face)] [Smooth] [Sand rubbed] [As indicated**].

Retain one of five options in "Finish for Sills" Subparagraph below or revise to suit Project. Delete all if sills have same finish as other stone.

Finish for Sills: [**Smooth] [Sand rubbed] [Split face with sand-rubbed washes] [Rock face (pitched face) with sand-rubbed washes] [Rock face (pitched face) with tooled (boasted) washes]**.

Retain one of four options in "Finish for Lintels" Subparagraph below or revise to suit Project. Delete all if lintels have same finish as other stone.

Finish for Lintels: [**Smooth] [Sand rubbed] [Split face] [Rock face (pitched face**)].

Retain one of five options in "Finish for Copings" Subparagraph below or revise to suit Project. Delete all if no copings or if copings have same finish as other stone.

Finish for Copings: [**Smooth] [Sand rubbed] [Split face] [Rock face (pitched face), front and back; sand-rubbed top] [Rock face (pitched face), front and back; tooled (boasted) top**].

Usually, retain subparagraph below with "Finish for Copings" Subparagraph above.

Finish exposed ends of copings same as front and back faces.

* + - 1. MORTAR MIXES
         1. General: 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.

Retain one or more of three subparagraphs below to indicate acceptable mortar types.

Use portland cement-lime, masonry cement, or mortar cement mortar unless otherwise indicated.

Retain first subparagraph below if retaining cold-weather admixture.

Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

Retain "Mixing Pointing Mortar" Subparagraph below for prehydrating pointing mortar if required. Prehydrating mortar allows most of initial shrinkage to occur before mortar is placed in joint.

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.

Retain "Preblended, Dry Mortar Mix" Paragraph below if preblended mix is required.

* + - * 1. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
        2. Mortar for Stone Masonry: Comply with ASTM C270, [**Proportion] [Property**] Specification.

Retain mortar types in "Mortar for Setting Stone" and "Mortar for Pointing Stone" subparagraphs below for setting and pointing applicable to stone variety selected. Ensure that mortar is softer than stone. See the Evaluations.

Mortar for Setting Stone: [**Type S] [Type N**].

Mortar for Pointing Stone: [**Type N] [Type O**].

Retain "Pigmented Mortar" Paragraph below if pigmented mortar is required.

* + - * 1. Pigmented Mortar: Use colored cement product[ **or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products**].

Retain three subparagraphs below if retaining option in "Pigmented Mortar" Paragraph above. Percentages in first two subparagraphs are for pigments containing only metallic oxides. If using pigments containing carbon black, limit pigments to 2 percent of portland cement or 1 percent of masonry cement or mortar cement.

Pigments shall not exceed 10 percent of portland cement by weight.

Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.

Insert materials and proportions used for sample if known.

Mix to match Director’s Representative's sample.

* + - * 1. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary.

Insert materials and proportions used for sample if known.

Mix to match Director’s Representative's sample.

1. EXECUTION
   * + 1. EXAMINATION
          1. Examine surfaces indicated to receive stone masonry, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone masonry.
          2. Examine substrate to verify that dovetail slots, inserts, reinforcement, veneer anchors, flashing, and other items installed in substrates and required for or extending into stone masonry are correctly installed.

Retain paragraph above or first paragraph below, or both depending on substrates.

* + - * 1. Examine wall framing, sheathing, and weather-resistant sheathing paper to verify that stud locations are suitable for spacing of veneer anchors and that installation will result in a weatherproof covering.
        2. Proceed with installation only after unsatisfactory conditions have been corrected.
      1. PREPARATION

Retain first paragraph below for anchored veneer over frame construction.

* + - * 1. Accurately mark stud centerlines on face of weather-resistant sheathing paper before beginning stone installation.

Process in first paragraph below prevents salts in concrete and unit masonry from migrating into stone and causing efflorescence.

* + - * 1. Coat concrete and unit masonry backup with asphalt dampproofing.
        2. Clean dirty or stained stone surfaces 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.
      1. INSTALLATION OF STONE MASONRY
         1. Perform necessary field cutting and trimming as stone is set.

Retain one of first two subparagraphs below, or both depending on whether stone is fabricated with sawed edges or split edges.

Use power saws to cut stone that is fabricated with saw-cut surfaces. Cut lines straight and true, with edges eased slightly to prevent snipping.

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.

Retain subparagraph below if using pitched-face stone.

Pitch face at field-split edges as needed to match stones that are not field split.

Retain first paragraph below if stone sources produce variable material that may contain some unsuitable stone.

* + - * 1. 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.

Retain one of first four paragraphs below or revise to suit Project. Indicate detail of typical jointing pattern on Drawings, because terminology may be unclear.

* + - * 1. Arrange stones in range ashlar pattern with course heights as indicated, [**uniform] [random**] lengths, and uniform joint widths, with offset between vertical joints as indicated.
        2. Arrange stones in broken-range ashlar pattern with uniform course heights, random lengths, and uniform joint widths.
        3. Arrange stones in three-course, random-range ashlar pattern with random course heights, random lengths (interrupted coursed), and uniform joint widths.
        4. Arrange stones in [**coursed] [uncoursed] rubble pattern with joint widths within tolerances indicated.[ Insert small stones into spaces between larger stones as needed to produce joints as uniform in width as practical.]**

Retain first paragraph below for stones that vary in color and size.

* + - * 1. Arrange stones with color and size variations uniformly dispersed for an evenly blended appearance.
        2. Install supports, fasteners, and other attachments indicated or necessary to secure stone masonry in place.
        3. Set stone accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
        4. Install steel lintels where indicated. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.
        5. 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] [3/8 inch] at narrowest points or more than [3/8 inch] [1/2 inch] [5/8 inch] [1 inch] [1-1/2 inches**] at widest points.
        6. Provide sealant joints of widths and at locations indicated.

Keep sealant joints free of mortar and other rigid materials.

Sealant joints are specified in Section 079200 "Joint Sealants."

Retain first paragraph below if using metal expansion strips.

* + - * 1. Install metal expansion strips in sealant joints at locations indicated. Build flanges of expansion strips into masonry by embedding in mortar between stone masonry and backup wythe. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.

Always retain first paragraph below, even if flashing is specified in Section 042000 "Unit Masonry."

* + - * 1. Install embedded flashing[ **and weep holes**] at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

Retain any of 12 subparagraphs below and revise to suit wall configurations used. Arrangement of flashing can be communicated better by detailing on Drawings rather than by relying on any subparagraphs below.

At stud-framed walls, extend flashing through stone masonry, up sheathing face at least [**8 inches] [12 inches] [16 inches**], and behind weather barrier.

At multiwythe masonry walls, including cavity walls, extend flashing through stone masonry, turned up a minimum of [**4 inches] [8 inches] [12 inches] [16 inches**], and extend into or through inner wythe to comply with requirements in Section 042000 "Unit Masonry."

At concrete backing, extend flashing through stone masonry, turned up a minimum of [**4 inches] [6 inches] [8 inches] [12 inches**], and insert in reglet**.[ Reglets are specified in Section 076200 "Sheet Metal Flashing and Trim."**]

At lintels and shelf angles, extend flashing full length of angles but not less than 6 inches into masonry at each end.

At sills, extend flashing not less than 4 inches at ends.

At ends of head and sill flashing, turn up not less than 2 inches to form end dams.

Retain first two subparagraphs below if using ribbed sheet metal flashing.

Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.

Install metal [**drip edges] [and] [sealant stops**] with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.

Extend sheet metal flashing 1/2 inch beyond masonry face at exterior, and turn flashing down to form a drip.

Last subparagraph above can be accomplished only with sheet metal flashing. Retain one of three subparagraphs below if using flexible flashing materials. See the Evaluations in Section 042000 "Unit Masonry."

Install metal drip edges beneath flexible flashing at exterior wall face. Stop flexible flashing 1/2 inch back from exterior wall face and adhere flexible flashing to top of metal drip edge.

Install metal flashing termination beneath flexible flashing at exterior wall face. Stop flexible flashing 1/2 inch back from exterior wall face and adhere flexible flashing to top of metal flashing termination.

Cut flexible flashing flush with wall face after completing masonry wall construction.

Retain first paragraph below for cavity walls and possibly for noncavity walls made of porous stone.

* + - * 1. Place weep holes and vents in joints where moisture may accumulate, including at base of cavity walls, above shelf angles, and at flashing.

Use [**wicking material] [round plastic tubing] [rectangular plastic tubing] [mesh weep holes/vents] [aluminum weep holes/vents] [vinyl weep holes/vents] [or] [open head joints**] to form weep holes.

Use wicking material to form weep holes above flashing in stone sills. Turn wicking down at lip of sill to be as inconspicuous as possible.

Space weep holes [**16 inches] [24 inches**] o.c.

Retain first subparagraph below if retaining plastic tubing or wicking material for weep holes in Part 2.

Space weep holes formed from [**plastic tubing] [or] [wicking material**] 16 inches o.c.

Retain first subparagraph below if using wicking.

Trim wicking material used in weep holes flush with exterior wall face after mortar has set.

Place pea gravel in cavities as soon as practical to a height of not less than 2 inches above top of flashing, to maintain drainage.

Delete last subparagraph above and subparagraph below if not using cavity walls. Retain applicable products in Part 2 if retaining below.

Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

Retain first paragraph below if wall is designed on rain-screen principle with vents acting to equalize air-pressure differential between cavity and exterior. Indicate spacing of vents and blocking on Drawings. See the Evaluations in Section 042000 "Unit Masonry."

* + - * 1. Install vents in head joints at top of each continuous cavity at spacing indicated. Use [**round plastic tubing] [rectangular plastic tubing] [mesh weep holes/vents] [aluminum weep holes/vents] [vinyl weep holes/vents] [or] [open head joints**] to form vents.

Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

* + - * 1. Coat limestone with cementitious dampproofing as follows:

Stone at Grade: Beds, joints, and back surfaces to at least 12 inches above finish-grade elevations.

Stone Extending below Grade: Beds, joints, back surfaces, and face surfaces below grade.

Allow cementitious dampproofing formulations to cure before setting dampproofed stone. Do not damage or remove dampproofing in the course of handling and setting stone.

* + - 1. CONSTRUCTION TOLERANCES

Tolerances in this article are based on those published by BIA for unit masonry and are generally appropriate for natural-cleft or smooth finished stone. Revise to suit Project or delete for fieldstone or for rustic finished stone.

* + - * 1. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.
        2. 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 or 1/2 inch in 40 feet or more.
        3. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet or 3/4 inch in 40 feet or more.

Retain first paragraph below for rough stone.

* + - * 1. Measure variation from level, plumb, and position shown in plan as a variation of the average plane of each stone face from level, plumb, or dimensioned plane.
        2. Variation in Mortar-Joint Thickness: Do not vary from joint size range indicated.

Consider retaining paragraph below for rough stone.

* + - * 1. Variation in Plane between Adjacent Stones: Do not exceed one-half of tolerance specified for thickness of stone.
      1. INSTALLATION OF ANCHORED STONE MASONRY

Retain one or more of first 10 paragraphs below depending on backup construction and types of veneer anchors used.

* + - * 1. Anchor stone masonry to concrete with corrugated-metal veneer anchors unless otherwise indicated. Secure anchors by inserting dovetailed ends into dovetail slots in concrete.
        2. Anchor stone masonry to unit masonry with [**corrugated-metal] [or] [individual wire**] veneer anchors unless otherwise indicated. Embed anchors in unit masonry mortar joints or grouted cells at a distance of at least one-half of unit masonry thickness.

First paragraph below is for adjustable cavity-wall reinforcement used for brick veneer and can only be used with stone that has closely or regularly spaced horizontal mortar joints.

* + - * 1. Anchor stone masonry to unit masonry with wire anchors unless otherwise indicated. Connect anchors to masonry joint reinforcement by inserting pintles into eyes of masonry joint reinforcement projecting from unit masonry.

First paragraph below describes Dayton's "Adjustable Joint Reinforcement for Random Stone" and Hohmann & Barnard's "Tie-HVR."

* + - * 1. Anchor stone masonry to unit masonry with wire anchors unless otherwise indicated. Connect anchors to masonry joint reinforcement with vertical rods inserted through anchors and through eyes of masonry joint reinforcement projecting from unit masonry.
        2. Anchor stone masonry to unit masonry with [**adjustable, screw-attached] [seismic**] veneer anchors unless otherwise indicated. Fasten anchors to unit masonry with two screws.
        3. Anchor stone masonry to stud framing with [**adjustable, screw-attached] [seismic**] veneer anchors unless otherwise indicated. Fasten anchors through sheathing to framing with two screws.

Retain last paragraph above for veneer anchors that are attached with two screws. Retain first paragraph below for veneer anchors, such as Heckmann's "Pos-I-Tie," that have a single integral screw.

* + - * 1. Anchor stone masonry to stud framing with screw-attached veneer anchors unless otherwise indicated.
        2. Anchor stone masonry to wood-stud framing with corrugated-metal veneer anchors unless otherwise indicated. Fasten anchors through sheathing to studs with corrosion-resistant roofing nails.
        3. Anchor stone masonry to wood-stud framing with wire anchors unless otherwise indicated. Fasten anchors through sheathing to wood studs with corrosion-resistant roofing nails.
        4. Anchor stone masonry to metal-stud framing with wire anchors unless otherwise indicated. Tie anchors to studs.

Retain first paragraph below with any of 10 paragraphs above.

* + - * 1. Embed veneer anchors in mortar joints of stone masonry at least halfway, but not less than 1-1/2 inches, through stone masonry and with at least a 5/8-inch cover on exterior face.

Installation in subparagraph below is required by the Uniform Building Code in Seismic Zones 3 and 4; delete if not required.

Install continuous wire reinforcement in horizontal joints and attach to seismic veneer anchors as stone is set.

Retain one of first three paragraphs below. First paragraph is based on prescriptive requirements for stone veneers in the IBC. Second and third paragraphs are based on anchor spacing requirements for veneers in TMS 402/ACI 530/ASCE 5. Spacing in third paragraph allows more flexibility in locating anchors than spacing in second and may be easier to accomplish with some stone patterns.

* + - * 1. Space anchors to provide not less than one anchor per 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings, sealant joints, and perimeter at intervals not exceeding 12 inches.
        2. Space anchors not more than 16 inches o.c. vertically and 24 inches o.c. horizontally. Install additional anchors within 12 inches of openings, sealant joints, and perimeter at intervals not exceeding 12 inches.
        3. Space anchors not more than 18 inches o.c. vertically and 32 inches o.c. horizontally, with not less than one anchor per 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of openings, sealant joints, and perimeter at intervals not exceeding 12 inches.

Retain first paragraph below if stone trim is anchored with anchors or dowels inserted into holes or kerfs in stone units. If retaining, indicate anchors on Drawings.

* + - * 1. Anchor stone trim with stone trim anchors where indicated. Install anchors by fastening to substrate and inserting tabs and dowels into kerfs and holes in stone units. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with mortar.
        2. Set stone in full bed of mortar with full head joints unless otherwise indicated. Build anchors into mortar joints as stone is set.

Retain one of first two paragraphs below depending on backup construction and building code requirements. See the Evaluations. The IBC refers to 1-inch airspace; 2-inch airspace is often recommended because it is easier to keep free of mortar.

* + - * 1. Fill [**collar joint] [space between back of stone masonry and weather-resistant sheathing paper**] with mortar as stone is set.
        2. Provide [**1-inch] [2-inch**] cavity between stone masonry and backup construction unless otherwise indicated. Keep cavity free of mortar droppings and debris.

Slope beds toward cavity to minimize mortar protrusions into cavity.

Attempting to remove mortar fins from cavity or to trowel them flat against stone usually results in increased mortar droppings at base of cavity.

Do not attempt to trowel or remove mortar fins protruding into cavity.

Raking out joints to depth of 3/4 inch allows for two layers of pointing mortar approximately 3/8 inch deep.

* + - * 1. Rake out joints for pointing with mortar to depth of not less than [**1/2 inch] [3/4 inch**] before setting mortar has hardened. Rake joints to uniform depths with square bottoms and clean sides.
      1. POINTING
         1. 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 deep until a uniform depth is formed.
         2. Point stone joints by placing and compacting pointing mortar in layers of not more than 3/8 inch deep. Compact each layer thoroughly and allow to it become thumbprint hard before applying next layer.
         3. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:

Retain one of five options in "Joint Profile" Subparagraph below or revise to suit Project.

Joint Profile: [**Concave] [Smooth, flat face slightly below edges of stone] [Smooth, flat face recessed 1/4 inch below edges of stone (raked joint)] [Flush, with a 3/8-inch half-round raised bead in middle of joint] [As indicated**].

* + - 1. ADJUSTING AND CLEANING
         1. Remove and replace stone masonry of the following description:

Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Director’s Representative.

Defective joints.

Stone masonry not matching approved samples and mockups.

Stone masonry not complying with other requirements indicated.

* + - * 1. Replace in a manner that results in stone masonry matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.
        2. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.
        3. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:

Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes. Obtain Director’s Representative's approval of sample cleaning before cleaning stone masonry.

Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.

Delete last subparagraph above and first subparagraph below if cleaner is not specified in Part 2 or is not allowed.

Wet wall surfaces with water before applying cleaner; remove cleaner promptly by rinsing thoroughly with clear water.

Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20, Revised II, using job-mixed detergent solution.

Retain last subparagraph above or first subparagraph below. Coordinate with products retained in Part 2. If high-pressure water cleaning or other cleaning methods are acceptable, delete above and below and insert applicable requirements.

Clean stone masonry with proprietary acidic cleaner applied according to manufacturer's written instructions.

Delete subparagraph below if no limestone.

Clean limestone masonry to comply with recommendations in ILI's "Indiana Limestone Handbook."

* + - 1. EXCESS MATERIALS AND WASTE
         1. Excess Stone: Stack excess stone where directed by Director’s Representative for Director’s Representative's use.

Retain "Disposal as Fill Material" Paragraph below if clean masonry waste can be used as fill; this diverts some material from waste stream and conserves landfill space.

* + - * 1. Disposal as Fill Material: Dispose of clean masonry waste, including mortar and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.

Crush masonry waste to less than 4 inches in greatest dimension.

Mix masonry waste with at least 2 parts of specified fill material for each part of masonry waste.

Generally, retain subparagraph below. If required, increase limit if using acid-soil plants for foundation plantings.

Do not dispose of masonry waste as fill within 18 inches of finished grade.

* + - * 1. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other waste, and legally dispose of off State property.

END OF SECTION 044313.13