realstone SYSTEMS™
Real, Reclaimed & Prefabricated Natural Stone Systems

GENERAL NOTES TO SPECIFIER:

This Specification Section has been prepared to assist design professionals in the preparation of project or office master Specifications. It follows guidelines established by the Construction Specifications Institute (CSI), and therefore may be used with most master Specification systems with minor editing.

Edit carefully to suit project requirements. Modify as necessary and delete items that are not applicable. Verify that referenced Section titles are correct. (Titles referenced are based on CSI MasterFormat, 2004 edition).

This Section assumes the Project Manual will contain complete Division 1 documents. Close coordination with Division 1 Sections is required. If the Project Manual does not contain the following sections, additional information should be included under the appropriate articles.

Product Substitution Procedures (if substitutions are to be allowed)
Submittal Procedures
Product Storage and Handling Requirements
Closeout Procedures
Product Options
Cleaning And Waste Management
Closeout Submittals

This is written as a closed proprietary specification.

Notes to the specifier are in highlighted boxes and should be deleted from final copy.

Optional items requiring selection by the specifier are enclosed within brackets, e.g. [**Exterior**] [**Interior**]. Make appropriate selections and delete others including the brackets themselves.

Items requiring additional information are enclosed within single Guillemots, e.g. <**insert option here**>.

Revise header and footer to suit project/office requirements.

Electronic versions of this specification utilize automatic paragraph numbering based on Microsoft Word style formatting. To adjust levels of paragraphs assign appropriate style and numbering will automatically adjust.

When editing is complete, delete all text on this page, then remove the page break at the top of the next page to remove this page from the document.

SECTION 04 42 51 - PREFABRICATED STONE PANELS

This Section uses the term "Architect." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes the following prefabricated natural stone systems
   1. [**Exterior**] [**Interior**] [**Exterior and interior**] stone veneer wall panels.
   2. [**Exterior**] [**Interior**] [**Exterior and interior**] stone [**paving**] [**flooring**] mats.

B. Related Sections:

Enter Section(s) below that specify substrate for stone panel systems.

Add/delete Sections as appropriate.

Add reference to Division 01 sections containing LEED® requirements.

Delete LEED requirements if project is not registered for LEED Certification.

   1. Division 1 Section [**"LEED Requirements"**] <**Insert Section Reference Here**> for additional LEED requirements.
   2. Division 7 Section [**"Air Barriers"**] <**Insert Section Reference Here**> for weather resistant barrier over framed walls.
   3. Division 7 Section "Sheet Metal Flashing and Trim" for flashing materials.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's product specifications and descriptive literature. Include data for application materials[**, and weather resistant barrier**].

B. Samples for Initial Selection: Submit manufacturer's sample panels showing full range of standard colors and patterns available.

C. Samples for Verification:
   1. For each stone type indicated. Include at least [**two**] [**three**] [**four**] [**five**] <**Insert number**> individual stone samples in each set for each type of stone, exhibiting extremes of the full range of color and other visual characteristics expected in completed Work. [**Samples will establish the standard by which stone provided will be judged.**]
   2. Submit [**1**] [**2**] [**3**] sample panel[**s**], approximately 16 by 12 inches, containing full-size samples of specified stone panel system illustrating [**anticipated variation in**] [**color**] [**and**] [**texture**] [**complete with specified sealants**].
   3. For each color of pointing mortar required.

D. Quality Assurance Submittals:
   1. Mix Designs: For mortar. Include description of type and proportions of ingredients.
   2. Certificates: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.
   3. Qualification Data: Submit data verifying qualifications and years of experience for [**manufacturer**] [**and**] [**installer**]. Include list of completed projects having similar scope of Work identified by name, location, date, reference names, and phone numbers.

4. Manufacturer's Instructions: Submit manufacturer's printed installation instructions. Indicate by transmittal that copies of instructions and recommendations have been distributed to installer.

E. Quality Control Submittals:
1. Stone Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each stone panel system product.

Delete LEED requirements if project is not registered for LEED Certification.

F. [**LEED Submittals**]: Refer to Division 1 Section " LEED Requirements" for additional submittals required of this Section to verify compliance with indicated LEED requirements.
1. LEED submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated LEED requirements.

100 percent of the stone used by RealStone is a post-industrial waste by-product (pre-consumer) of the stone quarry sources. None of the stone used in the finished panels is newly quarried for that purpose. All stone is recut from waste stone that was quarried and cut for other uses and would otherwise be wasted.

2. Credit MR 4.1[**and Credit MR 4.2**]: Indicate materials with recycled content. Include certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

Stone panel system may also contribute to credits ea 1.1-1.5 for optimizing energy performance, however, no specific submittals are required in this section.

G. Closeout Submittals:
1. Maintenance Data: For stone panel systems to include in maintenance manuals.
2. Warranty: Submit properly executed special warranties specified in this Section.

1.03 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum [**five**] <**Insert Option Here**> years [**documented**] experience.
2. Installer Qualifications: A qualified installer who employs experienced stonemasons and stone fitters.

B. Source Limitations:
1. Obtain primary products through one source from a single manufacturer for entire Project, unless otherwise acceptable to Architect.
2. Furnish secondary products only of type and from source recommended by manufacturer of primary materials.

C. Mockups: Build mockups to [**verify selections made under sample Submittals and to**] demonstrate aesthetic effects and qualities of materials[**and to set quality standard for installation**].
1. Build mockup of typical wall area as shown on Drawings.

Retain first subparagraph above for large-scale mockup. Indicate portion of wall represented by mockup on Drawings or draw mockup as separate element.

Retain first subparagraph below for limited mockups.

2. Build mockups for [**each type of stone**] [**typical exterior wall**] [**typical interior wall**] [**typical exterior and interior walls**] in sizes approximately [**48 inches (1200 mm)**] [**60**

inches (1500 mm)] [72 inches (1800 mm)] [96 inches (2400 mm)] <**Insert dimension**> long by [**48 inches (1200 mm)] [60 inches (1500 mm)] [72 inches (1800 mm)]** <**Insert dimension**> 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.

a. Include stone coping at top of mockup.
b. Include a sealant-filled joint at least 16 inches (400 mm) long in mockup.

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

c. Include through-wall flashing installed for a 24-inch (600-mm) length in corner of mockup approximately 16 inches (400 mm) down from top of mockup, with a 12-inch (300-mm) length of flashing left exposed to view (omit stone above half of flashing).
d. Include [**metal**] [**wood**] studs, sheathing, weather resistant barrier, and flashing in exterior wall mockup.
e. Include penetration and termination details, corner detail, tooling, and perimeter sealants.

3. Locate on site where [**indicated**] [**directed by Architect**].
4. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work. Protect accepted mockups from the elements with weather-resistant membrane.
5. Approval of mockups is for color, texture, and blending of stone; relationship of sealant colors to stone colors; tooling of joints; and aesthetic qualities of workmanship.

Delete subparagraphs below if mockup is only for establishing appearance factors.

a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.

6. [**Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.**]

Retain subparagraph above if mockups are erected as part of building rather than separately.

Retain subparagraph below for demolishing and removing temporary mockups.

7. [**Remove mockups prior to Substantial Completion or earlier if directed by the Architect.**]

D. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

1.05 PROJECT/SITE CONDITIONS

A. Protection of Stone: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed stone when construction is not in progress.

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

1. Extend cover a minimum of 24 inches (600 mm) down both sides and hold cover securely in place.

B. Stain Prevention: Immediately remove mortar and soil to prevent them from staining the face of stone.
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 end of each day to prevent rain from splashing mortar and dirt on completed stone.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace stone damaged by frost or freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until mortar has dried, but not less than 7 days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1.06 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Provide manufacturer's standard limited warranty against defects in manufacturing for a period of 50 years following date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Basis-of-Design Products: As manufactured by RealStoneSystems; 248-614-6613, www.realstonesystems.com.

2.02 STONE

Reclaimed stone is the standard material used for panel manufacture, but may also meet LEED requirements for recycled content.

A. Utilize reclaimed stone, recut and uniformly sized.

B. Sandstone: Comply with ASTM C 616, Classification I Sandstone.

C. Quartzite: Comply with ASTM C 616, Classification III Quartzite.

D. Slate: Comply with ASTM C 629, Classification [**I Exterior**] [**II Interior**], with a fine, even grain [**and unfading color,**] from clear, sound stock.

E. Finish: Natural cleft.

F. Stone Physical Properties:
1. Density: ASTM C 97, five specimen average, 2.72 bulk specific gravity.
2. Absorption: ASTM C 97, five specimen average, 1.1 percent.
3. Compressive Strength: ASTM C 39, three specimen average.
   a. Parallel to Rift: 9,230 psi.
   b. Perpendicular to Rift: 16,500 psi.
4. Flexural Strength: ASTM C 880, three specimen average.
   a. Parallel to Rift: 970 psi.
   b. Perpendicular to Rift: 740 psi.
5. Freeze/Thaw: ASTM C 67, no disintegration and less than 0.4 percent weight loss.
6. Coefficient of Friction: ASTM C 1028, three specimen average.
   a. Dry: 0.91.
   b. Wet: 0.67.

2.03 WALL PANELS

Select desired panel stone color from list below. Check manufacturer's website for current product availability.

Ledgestone Colors Available	Blue Stone Charcoal Gray Desert Rose Mountain Rust Terracotta Verde
Shadowstone Colors Available	Arctic White Blue Stone Charcoal Gray Chiseled Sand Copper Quartzite Desert Rose Sierra Sandstone Terracotta Verde

A. Wall Panel Stone Color: [**Arctic White**] [**Blue Stone**] [**Charcoal Gray**] [**Chiseled Sand**] [**Copper Quartzite**] [**Desert Rose**] [**Mountain Rust**] [**Sierra Sandstone**] [**Terracotta Verde**].

Retain paragraph below for added quality control if required.

1. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.

Panel Type	Avg. Depth	Length	Height	Avg Weight/Piece
Designer Flat Panels:	1/2-1 inch	24 inches	6 inches	8 lbs
Shadowstone Flat Panels:	1/2-1-1/2 inch	24 inches	6 inches	9 - 9.99 lbs
Shadowstone Corner Panels:	1/2-1-1/2 inch	8 / 16 inches*	6 inches	9 - 9.99 lbs
Ledgestone Flat Panels:	1/2-2-1/2 inch	24 inches	6 inches	14 - 14.99 lbs
Ledgestone Corner Panels:	1/2-2-1/2 inch	8 / 16 inches*	6 inches	14 - 14.99 lbs

* Corner pieces are available for all stone types. Corners have fingered, interlocking ends with one end 8 inches long and the other 16 inches long.

B. Individual Panel Size: 24 inches (610 mm) long by 6 inches (152 mm) high.
1. Provide matching factory fabricated corner units with 16 inches (406 mm) and 8 inches (203 mm) long returns by 6 inches (152 mm) high.

C. Panel Thickness: Varies randomly from [**1/2 inch (13 mm)**] to [**1 inches (25 mm)**] [**1-1/2 inches (38 mm)**] [**2-1/2 inches (64 mm)**].

D. Fabricate panels using multiple pieces of stone to same overall rectangular size. Utilize individual stone pieces of heights and lengths and thickness to achieve desired aesthetic effect.
1. Adhere individual stones together.
2. Adhere to plastic backing mat of 0.06 to 0.08 inch (1.5 to 2 mm) thickness.

2.04 FLOORING MATS

A. Algoma Flagstone Mat Stone Color: [**Terracotta Verde**] [**Blue Stone**] [**Sierra Sandstone**] [**Charcoal Gray**] [**Ocean Green**] [**Black Slate**].

Retain paragraph below for added quality control if required.

1. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.

B. Individual Panel Size: [**Average 30 by 21 inches (762 by 533 mm); 3 square feet per mat (279 sq mm)**] [**Average 40 by 29 inches (1016 by 737 mm); 5.4 square feet (502 sq mm) per mat**].

C. Panel Thickness: Varies from 0.4 to 0.56 inches (10 to 14 mm).

D. Fabricate mats using 6 to 9 pieces of stone to same overall size and shape to permit interlocking.
1. Space individual stones 0.35 to 0.60 inches (9 to 15 mm) apart.
2. Adhere to plastic mat of 0.06 to 0.08 inch (1.5 to 2 mm) thickness.

2.05 MORTAR MATERIALS

Coordinate requirements in this article with those in "Mortar Mixes" Article. Retain option in paragraph below for colored pointing mortar.

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. [**Provide natural color or white cement as required to produce mortar color indicated.**]

B. Hydrated Lime: ASTM C 207, Type S.

C. Aggregate: ASTM C 144; except for [**joints narrower than 1/4 inch (6 mm)**] [**and**] [**pointing mortar**], use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.

Retain first subparagraph below for white mortar.

1. White Aggregates: Natural white sand or ground white stone.

Retain subparagraph below for colored-aggregate mortar.

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

Retain first paragraph below for pigments added at Project site. Verify that pigments have a successful history of use with stone variety selected.

D. Mortar Pigments: Natural and synthetic iron oxides, compounded for use in mortar mixes. Use pigments with a record of satisfactory performance in mortar and containing no carbon black.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:
   a. Bayer, Industrial Chemicals Div.; Bayferrox Iron Oxide Pigments.
   b. Davis Colors; True Tone Mortar Colors.
   c. Solomon Colors; SGS Mortar Colors.
   d. <**Insert manufacturer's name; product name or designation**>.

Usually retain first paragraph below for adhered veneer. Model codes do not require latex for either tile-setting or mortar-setting method, but latex improves adhesion and weather resistance. Additive is available prediluted or in concentrated form to be diluted with water.

E. Latex Additive: [**Manufacturer's standard**] [**acrylic-resin**] [**or**] [**styrene-butadiene-rubber**] water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement mortar bed, and not containing a retarder.
   1. Manufacturers: Subject to compliance with requirements, [**provide the following**] [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
      a. Boiardi Products Corporation.
      b. Bonsal.
      c. Bostik Findley Inc.
      d. C-Cure.
      e. Custom Building Products.
      f. DAP Inc.
      g. Laticrete International, Inc.
      h. MAPEI Corp.
      i. Summitville Tiles, Inc.
      j. TEC Specialty Construction Brands; H. B. Fuller Company.
      k. <**Insert manufacturer's name**>.

F. Cold-Weather Admixture: Not allowed.

Usually retain paragraph above and delete paragraph below, which is an example requirement for a concrete admixture often used in cold weather as antifreeze. The appendix to ASTM C 270 recommends against using admixtures. If retaining below, verify suitability for use with stone selected.

G. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
   1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:
      a. Euclid Chemical Company (The); Accelguard 80.
      b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Morset.
      c. Sonneborn, Div. of Degussa Building Systems; Trimix-NCA.
      d. <**Insert manufacturer's name; product name or designation**>.

H. Water: Potable.

2.06 RELATED MATERIALS

Edit following materials based on local usage and building code requirements. Delete materials specified in separate Sections and include references to related Section as required.

All exterior surfaces require a water/weather resistant barrier before installing stone panels. Barrier must meet local building codes, IBC Section 1404.2, UBC Standard Code 14-1 regarding waterproof building paper, or asphalt saturated building felt.

A. Weather Resistant Barrier: [**No. 15, Type I, asphalt saturated felt, ASTM D 226**].

B. Expanded-Metal Lath: ASTM C 847 with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
   1. Diamond-Mesh Lath: Self-furring.
      a. Weight: [**2.5 lb/sq. yd. (1.4 kg/sq. m)**] [**3.4 lb/sq. yd. (1.8 kg/sq. m)**].

C. Metal Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with [**SMACNA's "Architectural Sheet Metal Manual**] [**Division 7 Section "Sheet Metal Flashing and Trim**]" and as follows:

Delete first three subparagraphs below if referencing Division 7 Section "Sheet Metal Flashing and Trim." Insert other types of metal if required.

   1. Stainless Steel: ASTM A 240/A 240M, Type 304, 0.016 inch (0.4 mm) thick.
   2. Copper: ASTM B 370, Temper H00 or H01, cold-rolled copper sheet, 16-oz./sq. ft. (5-kg/sq. m) weight or 0.0216 inch (0.55 mm) thick.
   3. Fabricate continuous flashings in sections 96 inches (2400 mm) long minimum, but not exceeding 12 feet (3.6 m). Provide splice plates at joints of formed, smooth metal flashing.

D. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of not fewer than three exposed threads.

E. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.

F. Fasteners:
   1. Into Wood Studs: Minimum 0.120 inch shank diameter galvanized nails or staples of sufficient length to penetrate 1-3/8 inches minimum into the stud.
   2. Into Metal Studs: Minimum 7/16 inch head diameter, corrosion-resistant, self-drilling, self tapping, pancake head screws of sufficient length to penetrate 3/8 inch minimum into the stud.

G. Solder and Sealants for Sheet Metal Flashings:[**As specified in Division 7 Section "Sheet Metal Flashing and Trim."**]

Retain option in paragraph above or retain one or more of three subparagraphs below.

   1. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
   2. Solder for Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.

Revise subparagraph below if sealant of specific type, grade, class, and use is required.

   3. Elastomeric Sealant: ASTM C 920, 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.

2.07 MORTAR MIXES

Refer to the appendix in ASTM C 270 for an in-depth discussion of the considerations for selecting and using mortar and to BIA Technical Note Nos. 8, 8A, and 8B.

Adhered stone veneers are held in place by the adhesive action of a solidly filled collar joint or of similar mortar over metal lath. Adhered veneers are limited by model building codes to a thickness of no more than 1-5/8 inches (41 mm) and are more typically a nominal 1 inch (25 mm) thick. Units are limited to no more than 36 inches (914 mm) in any dimension, no more than 720 sq. in. (0.46 sq. m) in area, and no more than 15 lb/sq. ft. (73 kg/sq. m) in weight. They can be set with a tile-setting method where they are no more than 1 inch (25 mm) thick and less than 81 sq. in. (522 sq. cm) in area, and where they are gaged to true up the backs as RealStone does. Units can also be set by applying a neat cement bond coat to both the stone and the backup, applying Type S mortar to both, and tapping the units into place. Setting beds must be 3/8 to 3/4 inch (10 to 19 mm) thick for the tile-setting method and 1/2 to 1-1/4 inches (13 to 32 mm) thick for the mortar-setting method. The Section Text specifies the mortar-setting method but can easily be modified for the tile-setting method.

BIA Technical Notes 8B contains a basic rule for mortar selection: "Never use a mortar that is stronger (in compression) than is required by the structural requirements of the project. Always select the weakest (in compression) mortar that is consistent with the performance requirements of the project." This rule is followed by the advice that good judgment must be exercised in following the rule. The concept embodied in the rule is reinforced in ASTM C 270, which includes the requirement under the proportion specifications that "mortar of known higher strength shall not be indiscriminately substituted where a mortar type of anticipated lower strength is specified." One reason behind this principle is that mortars with a lower compressive strength usually have higher lime contents, which improves other mortar qualities.

A. Mortar: 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. Limit cementitious materials in mortar to portland cement and lime.
   3. Combine mortar materials and thoroughly mix in a mechanical batch mixer unless otherwise indicated. Discard mortar when it has reached initial set.

Retain subparagraph below for prehydrating pointing mortar if required. Prehydrating mortar allows most of initial shrinkage to occur before mortar is placed in joint. Delete if grout is used rather than pointing mortar.

   4. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding any water. Add 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 desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

Retain first paragraph below for adhered veneer on metal lath.

B. Mortar for Scratch Coat over Metal Lath: 1 part portland cement, 1/2 part lime, 5 parts loose damp sand, and enough water to produce a workable consistency.

Retain first paragraph below for adhered veneer on concrete masonry units.

C. Mortar for Scratch Coat over Unit Masonry: 1 part portland cement, 1 part lime, 7 parts loose damp sand, and enough water to produce a workable consistency.

Retain one of the following three paragraphs for adhered veneer. Verify selection of type for application indicated. Mortar should have lower compressive strength than stone.

UBC 1997 and ACI 530.1/ASCE 6/TMS 602 require Type S setting mortar. ACI 530-02/ASCE 5-02/TMS 402-02 requires that adhesion developed between adhered veneer units and backing have a shear strength of at least 50 psi based on gross unit surface area when tested in accordance with ASTM C 482, or shall be adhered in compliance with Article 3.3 C of ACI 530.1/ASCE 6/TMS 602.

D. Portland Cement-Lime Setting Mortar: Comply with ASTM C 270, Type [**S**] [**N**] [**M**], Proportion Specification.

Latex additives are often used in setting mortars for adhered veneers. They increase the bond strength and flexibility of hardened mortar and retard evaporation of water from mortar during setting. Because latex additives increase bond strength, extra care must be used to prevent latex mortar from getting on the face of the stone because it will be more difficult to remove.

E. Latex-Modified Portland Cement Setting Mortar: Proportion and mix portland cement, aggregate, and latex additive to comply with latex-additive manufacturer's written instructions.

Retain paragraph below for adhered veneer.

F. Cement-Paste Bond Coat: Mix either neat cement and water or cement, sand, and water to a consistency similar to that of thick cream.

Retain subparagraph below if latex-modified portland cement setting-bed mortar is specified.

1. For latex-modified portland cement setting-bed mortar, substitute latex admixture for part or all of water, according to latex-additive manufacturer's written instructions.

G. Pointing Mortar: Comply with ASTM C 270, Type [**S**] [**N**] [**O**], Proportion Specification and the following:

Select one of three subparagraphs below. Ratio in first subparagraph applies only to pigment types listed under materials. Other pigments, if inserted, may require different limitations.

1. Pigmented Pointing Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1:10, by weight.
2. Colored-Aggregate Pointing Mortar: Produce color required by combining colored aggregates with portland cement of selected color.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine surfaces indicated to receive stone, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

Concrete surfaces must be clean and provide sufficient "tooth" to permit proper bonding. Surfaces may require detergent washing and etching with acid or sand-blasting to provide a sound, proper surface for stone installation. If proper cleaning is not feasible, metal lath may be applied instead with a 1/2 inch (13 mm) scratch coat..

B. Ensure concrete surfaces are free of dirt, form release agents and oils, grease, [**paint,**] [**applied coatings,**] and other substances detrimental to obtaining adequate bond with stone mortar.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean stone dust from backs of panels with damp cloth. 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.

B. Surface Preparation: Follow manufacturer's instructions for type of stone panel system and substrate.

Retain paragraph below for application over masonry without metal lath. Concrete block needs to be clean and in its original, untreated condition. If the surface has been treated, light sandblasting or waterblasting can be used to restore the wall to a smooth, clean surface. Remove all form-release agents, dust, etc., that may inhibit the mortar bond.

1. Clean concrete block masonry to remove form-release agents, dust, coatings, and other substances that might inhibit mortar bond by light sandblasting or waterblasting.

C. Flashings: Install embedded flashing at [**shelf angles,**] lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

Retain any of first 3 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.

1. At stud-framed walls, extend flashing through stone panel system, up the face of sheathing at least [**8 inches**] [**12 inches**] [**16 inches**], and behind weather-resistant barrier, fastening through sheathing into framing.
2. At masonry backing walls extend flashing through stone panel system, 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 Division 4 Section "Unit Masonry Assemblies."
3. At concrete backing, extend flashing through stone panel system, turned up a minimum of [**4 inches**] [**6 inches**] [**8 inches**] [**12 inches**], and insert in reglet.[**Reglets are specified Division 7 Section "Sheet Metal Flashing and Trim."**]
4. At lintels and shelf angles, extend flashing full length of angles but not less than 6 inches beyond each side of openings.
5. At sills, extend flashing not less than 4 inches at ends.
6. At ends of head and sill flashing, turn flashing up not less than 2 inches to form end dams.
7. Extend sheet metal flashing 1/2 inch beyond face of stone at exterior and turn flashing down to form a drip.

Retain paragraph and subparagraphs below for installation over stud framing with sheathing panels. Studs should be installed not over 16 inches o.c..

D. Cover sheathing with weather resistant barrier, lapping vertical joints 6 inches and horizontal joints 2 inches in shingle fashion to shed water.
   1. Accurately mark stud centerlines on face of weather-resistant barrier before beginning stone panel system installation.
   2. Install lath over weather-resistant barrier by fastening through sheathing into framing to comply with ASTM C 1063. Space fasteners not more than 6 inches o.c. vertically in each stud.
   3. Extend weather-resistant barrier and metal lath a minimum of 16 inches around outside and inside corners terminating over a framing member.

Retain paragraph and subparagraphs below for installation over solid masonry or concrete.

E. Install lath over unit masonry and concrete to comply with ASTM C 1063.
   1. Space fasteners not more than 6 inches o.c. vertically and 16 inches o.c. horizontally.
   2. Extend metal lath a minimum of 4 inches (100 mm) around outside and inside corners terminating over a framing member.

3.03 SETTING OF STONE PANEL SYSTEM, GENERAL

Manufacturer's installation instructions cover normal installation conditions. Unusual conditions may require additional information in this article.

A. Install products in accordance with manufacturer's installation instructions.

B. Perform necessary field cutting and trimming as stone panels are set.
   1. Use power saws with diamond blades to cut stone panels. Cut lines straight and true, with edges eased slightly to prevent snipping.

C. Lay out panels prior to setting with mortar to ensure proper fit and alignment.

D. Scribe and field-cut stone as necessary to fit at obstructions. Produce neat joints of size specified or indicated.

E. Install corner units first.

F. Install remaining field panels with vertical end joints staggered randomly.

You can start laying stone panels at the top or the bottom of the wall. Working from the top down helps keep mortar droppings from staining stones below, but care must be taken to ensure the mortar is strong enough to hold the suspended stone panels in place.

G. Install stone panels working from the [**bottom up**] [**top down**] using mortarless joints.

H. Remove mortar droppings as work progresses.

I. Rake out perimeter and expansion joints for sealant to full depth of system before setting mortar has hardened. Rake joints with square bottoms and clean sides.

J. Expansion- and Control-Joint Installation: Locate and install according to Drawings and Shop Drawings.

K. Provide sealant joints of widths and at locations indicated.
   1. Keep sealant joints free of mortar and other rigid materials.
   2. Sealing joints is specified in Division 7 Section "Joint Sealants."

3.04 INSTALLATION OVER METAL LATH

A. Using a plasterer's or mason's trowel, apply scratch coat over metal lath 1/2 to 3/4 inch (13 to 19 mm) thick to prepared surface area to comply with ASTM C 926. Use a toothed scraper, notched trowel or small piece of lath to lightly rake horizontal grooves in the scratch coat. Allow scratch coat to dry for 24 hours.

B. Coat backs of stone panel system units and face of scratch coat with cement-paste bond coat, then butter both surfaces with setting mortar at least 1/2 inch (13 mm) thick. Tap units into place, completely filling space between units and scratch coat.

3.05 INSTALLATION OVER SOLID [**MASONRY**] [**AND**] [**CEMENT BOARD**]

Adhered veneer can be installed directly over masonry or cement board backup without lath; retain appropriate option in first paragraph below.

A. Using a plasterer's or mason's trowel, apply scratch coat directly over [**masonry**] [**and**] [**cement board**] backup without lath 1/4 to 1/2 inch (6 to 13 mm) thick to prepared surface area to comply with ASTM C 926. Use a toothed scraper, notched trowel or small piece of lath to lightly rake horizontal grooves in the scratch coat. Allow scratch coat to dry for 24 hours.

B. Coat backs of stone panel system units and face of [**masonry**] [**and**] [**cement board**] backup with cement-paste bond coat, then butter both surfaces with setting mortar at least 1/2 inch (13 mm) thick. Tap units into place, completely filling space between units and backup.

3.06 INSTALLATION ON FLOORS

Stone mats may be installed directly over clean, properly prepared concrete substrates. Cover wood panel substrates with a layer of cement board or install a cementitious topping.

A. Saturate concrete with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.

B. Apply cement-paste bond coat to damp concrete and broom to provide an even coating that completely covers the concrete. Do not exceed 1/16-inch (1.5-mm) thickness. Limit area of cement-paste bond coat to avoid its drying out before placing setting bed.

C. Apply mortar bed immediately after applying mortar-bed bond coat. Spread, tamp, and screed to approximately 3/8 inch (9 mm) thickness.
   1. Mix and place only that amount of mortar bed that can be covered with stone before initial set. Cut back, bevel edge, and discard material that has reached initial set before stone can be placed.

D. Place stone before initial set of mortar occurs. Immediately before placing stone on setting bed, apply uniform 1/16-inch- (1.5-mm-) thick cement-paste bond coat to back of each stone unit.

E. Set stone mats in position and firmly press into mortar bed ensuring mesh backing is embedded and there is bond between the stone and mortar.

F. Tamp stone with a rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each unit in a single operation before initial set of mortar; do not return to areas already set and disturb stone for purposes of realigning finished surfaces or adjusting joints.

G. Rake out joints to depth required to receive grout as units are set.

Some mortar and weather conditions will require more time for the mortar to cure.

H. Allow setting mortar to dry for at least 24 hours before installing grout.

I. Prepare grout mixture according to manufacturer's directions. Work grout into spaces between stones. Remove excess grout with a wet sponge, ensuring no grout is left behind on stone surfaces. Tool joints flat, uniform, and smooth, without visible voids and level with surface of stone.

3.07 POINTING

Pointing wall stones should only be required where stones do not touch. Flat runs of stone panels properly set will not need pointing mortar between panels or between individual pieces of stone nor will factory corner units properly installed on 90 degree corners. If odd angle corners or other unusual conditions preclude using factory made units, some pointing may be required to fill open joints if stones do not come into close contact with each other.

A. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles.

B. Point open stone joints at corners where stones do not touch by placing and compacting pointing mortar in layers not more than 3/8 inch (10 mm) deep. 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:

Retain one of five options in subparagraph below or revise to suit Project.

1. Joint Profile: [**Concave**] [**Smooth, flat face slightly below edges of stone**] [**Smooth, flat face recessed 1/4 inch (6 mm) below edges of stone (raked joint)**] [**As indicated**].

3.08 JOINT-SEALANT INSTALLATION

Delete this Article if sealing joints is not specified in this Section.

A. Prepare joints and apply sealants of type and at locations indicated to comply with applicable requirements in Division 7 Section "Joint Sealants."

3.09 ADJUSTING AND CLEANING

A. Remove and replace stone panel system of the following description:
   1. Broken, chipped, stained, or otherwise damaged stone panel system units. Stone panel system units may be repaired if methods and results are approved by Architect.
   2. Defective joints.
   3. Stone panel system not matching approved samples and mockups.
   4. Stone panel system not complying with other requirements indicated.

B. Replace in a manner that results in stone panel system matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean stone panel system as work progresses. Remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean stone panel system as follows:
   1. Comply with manufacturer's recommendations. Do not use materials or methods which may damage finish surface or surrounding construction.
   2. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   3. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before cleaning stone panel system.
   4. Protect adjacent surfaces.

3.10 PROTECTION

A. Protection: Prohibit work from occurring on the opposite of walls to which stone panel system is applied during and for 48 hours following installation of the stone panel system.

B. Prohibit traffic from installed floor stone for a minimum of 72 hours.

C. Protect finished work from rain during and for 48 hours following installation.

D. Protect finished work from damage during remainder of construction period.

3.11 EXCESS MATERIALS AND WASTE

A. Stack excess stone panel system units where directed by Owner for Owner's use.

END OF SECTION 04 42 51

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