SECTION 09 63 40 - STONE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
   1. Uniform General Conditions for Construction Contracts, State of Texas, 2010 (UGC).
   2. The University of Houston’s Supplemental General Conditions and Special Conditions for Construction.

1.2 SUMMARY

A. Section Includes:

   1. Dimension stone exterior flooring.
   2. Dimension stone interior flooring.
   3. Dimension stone stair treads and risers.

B. Related Requirements:

   1. Section 07 14 13 "Hot Fluid-Applied Rubberized Asphalt Waterproofing" for waterproofing, protection board and pedestals under stone flooring.
   2. Section 07 92 00 "Joint Sealants" for sealing control and expansion joints in stonework with elastomeric sealants.
   3. Section 09 30 00 " Tiling."

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: Include plans, sections, details, and attachments to other work.

   1. Show locations and details of joints both within stone flooring and between stone flooring and other finish materials.
   2. Show direction of veining, grain, or other directional patterns.

C. Samples for Initial Selection: For joint materials involving color selection.

D. Samples for Verification:

1. For each stone type indicated, in sets of Samples not less than 12 inches square. Include at least two or more Samples in each set and show the full range of color and other visual characteristics in completed Work.
2. For each color of grout required.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Material Test Reports:

1. Stone Test Reports: For each stone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, according to referenced ASTM standards. Base reports on testing within previous three years.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For stone flooring to include in maintenance manuals. Include product data for stone-care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate stone flooring.

B. Installer Qualifications: A firm or individual experienced in installing stone flooring similar in material, design, and extent to that indicated for this Project, whose work has a record of successful in-service performance.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, and other causes.

1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
2. Store stone on wood A-frames or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.

B. Mark stone units, on surface that is concealed after installation, with designations used on Shop Drawings to identify individual stone units. Orient markings on vertical panels so that they are right side up when units are installed.

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

1.8 FIELD CONDITIONS

A. Maintain air and material temperatures to comply with requirements of installation material manufacturers, but not less than 50 deg Fduring installation and for seven days after completion.

B. Cold-Weather Requirements for Exterior Stone Flooring: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

C. Hot-Weather Requirements for Stone Flooring: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602 and with the following:

1. Maintain temperature of materials below 100 deg F.
2. Do not apply mortar to substrates with temperatures of 100 deg F and above.
3. When the ambient temperature exceeds 90 deg F, fog spray installed stone flooring until damp at least three times a day until flooring is three days old.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Stone: Obtain each variety of stone, regardless of finish, from single quarry with resources to provide materials of consistent quality in appearance and physical properties.

1. For stone types that include same list of varieties and sources, provide same variety from same source for each.
2. Make stone slabs available for examination by Architect.

    a. Architect will select aesthetically acceptable slabs and will indicate aesthetically unacceptable portions of slabs.
    b. Segregate slabs selected for use on Project and mark backs indicating approval.

2.2 GRANITE

A. Material Standard: Comply with ASTM C 615.

B. Description: As indicated on Drawings

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

2.3 LIMESTONE

A. Material Standard: Comply with ASTM C 568.

Usually retain one of three options in "Classification" Subparagraph below. If naming varieties and sources, specifying a classification may be unnecessary but would provide additional quality control and a salient characteristic to use in determining if another variety or source is equivalent. First option generally applies to very porous limestone, such as shell limestone; second, to oolitic limestone; and third, to dolomitic limestone.

1. Classification: II Medium Density.
2. Stone Abrasion Resistance: Minimum value of 10 , based on testing according to ASTM C 241/C 241M or ASTM C 1353.

If retaining "Description" Paragraph below, retain one of three options. Coordinate below with "Classification" Subparagraph above. 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.

B. Description: Oolitic limestone.

C. Varieties and Sources: Indiana oolitic 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.

1. Indiana Oolitic Limestone Grade and Color: As indicated on Drawingsaccording to grade and color classification established by ILI.

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

2.4 QUARTZ-BASED STONE

A. Material Standard: Comply with ASTM C 616, Classification I Sandstone .

1. Stone Abrasion Resistance: Minimum value of 10 , based on testing according to ASTM C 241/C 241M or ASTM C 1353.

B. Finish: As indicated on Drawings .

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

2.5 SLATE

A. Material Standard: Comply with ASTM C 629, Classification II Interior.

1. Stone Abrasion Resistance: Minimum value of 8 , based on testing according to ASTM C 241/C 241M or ASTM C 1353.

B. Description: slate with a fine, even grain and unfading color, from clear, sound stock.

C. Finish: As indicated .

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

2.6 TRAVERTINE

A. Material Standard: Comply with ASTM C 1527, Classification II Interior.

1. Stone Abrasion Resistance: Minimum value of 10 , based on testing according to ASTM C 241/C 241M or ASTM C 1353.

B. Cut: Vein.

C. Filling: Fill pores on faces of stone with cementitious filler of color selected by Architect .

D. Finish: As indicated .

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

2.7 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II. Provide natural color or white cement as required to produce mortar color indicated.

1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.

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

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.

1. Products: Subject to compliance with requirements, provide one of the following :

a. Essroc, Italcementi Group; Saylor's Plus.
b. Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
c. Lafarge North America; Eaglebond.
d. Substitutions: see section 01 25 00 – Substitution Procedures.

D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in stone masonry mortar.

1. Products: Subject to compliance with requirements, provide one of the following :

a. Davis Colors; True Tone Mortar Colors.
b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
c. Solomon Colors; SGS Mortar Colors.
d. Substitutions: see section 01 25 00 – Substitution Procedures.

E. Colored Portland Cement-Lime Mix: Packaged blend of portland cement, hydrated lime, and mortar pigments. Mix shall produce color indicated or, if not indicated, as selected from manufacturer's standard colors. Pigments shall not exceed 10 percent of portland cement by weight.

1. Products: Subject to compliance with requirements, provide one of the following :

a. Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
b. Lafarge North America; Eaglebond.
c. Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.
d. Substitutions: see section 01 25 00 – Substitution Procedures.

F. Aggregate: ASTM C 144; except for joints narrower than 1/4 inch , use aggregate graded with 100 percent passing No. 16 sieve.

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

G. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part of or all 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 products by one of the following :
a. Bostik, Inc.
b. Laticrete International, Inc.
c. MAPEI Corporation.
d. Substitutions: see section 01 25 00 – Substitution Procedures.

H. Thin-Set Mortar:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
   a. Bostik, Inc.
   b. Laticrete International, Inc.
   c. MAPEI Corporation.
   d. Substitutions: see section 01 25 00 – Substitution Procedures.

2. Dry-Set Portland Cement Mortar: ANSI A118.1, packaged.
3. Latex-Portland Cement Mortar: ANSI A118.4, consisting of the following:

   a. Prepackaged Dry-Mortar Mix: Factory-prepared, packaged mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.
   b. Mixture of Dry-Mortar Mix and Latex Additive: Mixture of packaged dry-mortar mix and styrene-butadiene-rubber or acrylic-resin liquid-latex additive.

I. Water: Potable.

2.8 GROUT

A. Grout Colors: As selected by Architect from manufacturer's full range.

B. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate to produce required color.

C. Standard Cement Grout: ANSI A118.6, packaged.

1. Unsanded grout mixture for joints 1/8 inch and narrower.
2. Sanded grout mixture for joints wider than 1/8 inch.

D. Polymer-Modified Cement Grout: ANSI A118.7, packaged.

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

   a. Bostik, Inc.
   b. Laticrete International, Inc.
   c. MAPEI Corporation.
   d. Substitutions: see section 01 25 00 – Substitution Procedures.

2. Polymer Type: Acrylic resin or ethylene vinyl acetate, in dry, redispersible form, packaged with other dry ingredients.
3. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to packaged dry-grout mix.
4. Unsanded grout mix for joints 1/8 inch and narrower.
5. Sanded grout mix for joints wider than 1/8 inch.

E. Water-Cleanable Epoxy Grout: ANSI A118.3 packaged, chemical-resistant, water-cleanable, tile-setting and -grouting epoxy.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
   a. Bostik, Inc.
   b. Laticrete International, Inc.
   c. MAPEI Corporation.
   d. Substitutions: see section 01 25 00 – Substitution Procedures.

2.9 WATERPROOF MEMBRANES

A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Chlorinated Polyethylene Sheet: Nonplasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; 0.030-inch nominal thickness.

1. Products: Subject to compliance with requirements, provide the following :

   a. Noble Company (The); Nobleseal TS.
   b. Substitutions: see section 01 25 00 – Substitution Procedures.

C. PVC Sheet: Two layers of PVC sheet heat-fused together and to facings of nonwoven polyester; 0.040-inch nominal thickness.

1. Products: Subject to compliance with requirements, provide the following :

   a. Compotite Corporation; Composeal Gold.
   b. Substitutions: see section 01 25 00 – Substitution Procedures.

D. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; 0.008-inch nominal thickness.

1. Products: Subject to compliance with requirements, provide the following :

   a. Schluter Systems L.P.; KERDI.
   b. Substitutions: see section 01 25 00 – Substitution Procedures.

E. Fabric-Reinforced, Modified-Bituminous Sheet: Self-adhering, SBS-modified-bituminous sheet with woven reinforcement facing; 0.040-inch nominal thickness.

1. Products: Subject to compliance with requirements, provide the following :

   a. National Applied Construction Products, Inc.; Strataflex.
   b. Substitutions: see section 01 25 00 – Substitution Procedures.

F. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.

1. Products: Subject to compliance with requirements, provide one of the following :
   a. Bostik, Inc.; Hydroment Blacktop 90210.
   b. Laticrete International, Inc.; Laticrete 9235 Waterproof Membrane.
   c. MAPEI Corporation.; Mapelastic AquaDefensewith MAPEI Reinforcing Fabric.
   d. Substitutions: see section 01 25 00 – Substitution Procedures.

G. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.

1. Products: Subject to compliance with requirements, provide one of the following :
   a. Bostik, Inc.; Durabond D-222 Duraguard Membrane Hydroment Gold.
   b. Laticrete International, Inc.; Latapoxy 24hr HydroProofing .
   c. MAPEI Corporation; Mapelastic AquaDefense.
   d. Substitutions: see section 01 25 00 – Substitution Procedures.

H. Latex-Portland Cement: Flexible mortar consisting of cement-based mix and latex additive.

1. Products: Subject to compliance with requirements, provide one of the following :

   a. Boiardi Products, a QEP company; Elastiment 323 Cement Based Waterproofing, Anti-Fracture/Crack Suppression Membrane.
   b. C-Cure; UltraCure 971.
   c. MAPEI Corporation; Mapelastic 315.
   d. Substitutions: see section 01 25 00 – Substitution Procedures.

2.10 ACCESSORIES

A. Paver Pedestals: Manufacturer's standard paver support assembly, including fixed-height pedestals, shims, and spacer tabs for joint spacing of 1/8 inch or .

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
   a. Hanover Architectural Products.
   b. Tremco Incorporated.
   c. Wausau Tile, Inc.; Terra-Paving Div.
   d. Substitutions: see section 01 25 00 – Substitution Procedures.

B. Temporary Spacers: Resilient plastic, nonstaining to stone, sized to suit joint thickness.

C. Cleavage Membrane: Polyethylene sheeting, ASTM D 4397, 4.0 mils thick.

D. Reinforcing Wire: Galvanized, welded, 0.062-inch- diameter wire; 2-by-2-inch mesh; comply with ASTM A 185/A 185M and ASTM A 82/A 82M except for minimum wire size.

E. Divider Strips and Edging: Metal or combination of metal and PVC or neoprene base, designed specifically for flooring applications, in longest lengths available, and as follows:

1. Exposed-Edge Material: Stainless steel; ASTM A 666, Type 302.
2. Cross-Section Profile: Angle or L-shape .
3. Height: Match stone thickness .
4. Exposed-Edge Width: 1/8 inch .
5. Control-Joint Filler: Neoprene.

F. Abrasive Inserts for Stair Treads: Abrasive strips consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder, fabricated for installing in routed grooves of stair treads to provide slip resistance. Provide epoxy-resin installation adhesive compatible with inserts.

1. Width: 1/4 inch .
2. Depth: 1/2 inch .
3. Length: 4 inches less than stair width .

G. Cleaner: Stone cleaner specifically formulated for stone types, finishes, and applications indicated, as recommended by stone producer and by sealer manufacturer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

H. Floor Sealer: Colorless, slip- and stain-resistant sealer that does not affect color or physical properties of stone surfaces, as recommended by stone producer for application indicated.

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

a. Bostik, Inc.
b. Custom Building Products.
c. Summitville Tiles, Inc.
d. Substitutions: see section 01 25 00 – Substitution Procedures.

2.11 MORTAR AND GROUT MIXES

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. Combine mortar materials and thoroughly mix in a mechanical batch mixer unless otherwise indicated. Discard mortar when it has reached initial set.

B. Portland Cement-Lime Setting Mortar: ASTM C 270, Proportion Specification, Type N for interior applications and Type S for exterior applications. Use amount of water to produce a stiff mixture with a moist surface when bed is ready to receive stone.

C. Latex-Modified Portland Cement Setting Mortar: Proportion and mix portland cement, aggregate, and latex additive to comply with latex-additive manufacturer's written instructions and to produce a stiff mixture with a moist surface when bed is ready to receive stone.

D. Mortar-Bed Bond Coat: Mix neat cement and water to a creamy consistency.

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

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

G. Joint Grout: Comply with mixing requirements in referenced ANSI standards and with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive stone flooring and conditions under which stone flooring will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone flooring.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of stone flooring.

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

3.2 PREPARATION

A. Vacuum concrete substrates to remove dirt, dust, debris, and loose particles.

B. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.

C. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

D. Before setting stone, clean dirty or stained stone surfaces by removing soil, stains, and foreign materials. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

3.3 INSTALLATION, GENERAL

A. Do necessary field cutting as stone is set. Cut lines straight and true and finish field-cut edges to match shop-cut edges.

1. Use power saws with diamond blades to cut stone except for stone that is specified to have rough-split edges.

B. Set stone to comply with requirements indicated.

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

D. Provide control and expansion joints of widths and at locations indicated. Keep control and expansion joints free of mortar, grout, and other rigid materials.

3.4 INSTALLATION TOLERANCES

A. Variation in Line: For positions shown in plan for edges of flooring, ramps, steps, changes in color or finish, and continuous joint lines, do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.

B. Variation in Joint Width: Do not vary from average joint width more than plus or minus 1/16 inch or one-fourth of nominal joint width, whichever is less.

C. Variation in Surface Plane: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum from level or slope indicated.

D. Variation in Plane between Adjacent Units (Lipping): Do not exceed 1/32-inch difference between planes of adjacent units.

3.5 INSTALLATION OF STONE BONDED TO CONCRETE

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

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

1. Place reinforcing wire mesh over concrete, lapped at joints by at least one full mesh and supported so mesh becomes embedded in middle of mortar bed. Hold edges back from vertical surfaces about 1/2 inch.

C. Apply mortar bed immediately after applying mortar-bed bond coat. Spread, tamp, and screed to uniform thickness at elevations required for setting stone to finished elevations indicated.

D. 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.

E. Place stone before initial set of mortar occurs. Immediately before placing stone on setting bed, apply uniform 1/16-inch- thick bond coat to mortar bed or to back of each stone unit.

F. Tamp and beat stone with a wooden block or rubber mallet to obtain full contact with mortar 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.

3.6 INSTALLATION OF STONE OVER WATERPROOFING

A. See waterproofing Section for installation of waterproofing and protection board.

1. Carefully place stone and setting materials over waterproofing so protection materials are not displaced and waterproofing is not punctured or otherwise damaged. Replace protection materials that become displaced and arrange for repair of damaged waterproofing before covering with stone flooring.

B. Install waterproof membrane to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.

1. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

C. Place reinforcing wire fabric over waterproofing , lapped at least one full mesh at joints and supported so mesh becomes embedded in middle of mortar bed. Hold edges back from vertical surfaces and control and expansion joints about 1/2 inch.

D. Place mortar bed over waterproofing with reinforcing wire fabric fully embedded in middle of mortar bed. Spread, tamp, and screed to uniform thickness at elevations required for setting stone to finished elevations indicated.

E. 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.

F. Place stone before initial set of mortar occurs. Immediately before placing stone on setting bed, apply uniform 1/16-inch- thick bond coat to mortar bed or to back of each stone unit.

G. Tamp and beat stone with a wooden block or rubber mallet to obtain full contact with mortar 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.

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

3.7 INSTALLATION OF STONE FLOORING ON PEDESTALS OVER WATERPROOFING

A. See waterproofing Section for installation of waterproofing and protection board.

B. Accurately install pedestals and other accessories to elevations required. Adjust for final level and slope with shims.

C. Loosely lay stone flooring units on pedestals, maintaining a uniform, open joint width. Tightly seat stone units against spacers to eliminate lateral movement or drift of flooring assembly. Align joint patterns parallel in each direction.

1. Lay out stone units to avoid less than half-width units at perimeter or other terminations.

D. Install stone flooring units to not vary more than 1/16 inch in elevation between adjacent units.

3.8 STONE THRESHOLD INSTALLATION

A. At locations adjacent to stone flooring, install stone thresholds in same type of setting bed as abutting stone flooring unless otherwise indicated.

1. Set thresholds in thin-set, latex-portland cement mortar to comply with ANSI A108.5 at locations where mortar bed would otherwise be exposed above other adjacent flooring.

B. At locations not adjacent to stone flooring, install stone thresholds in thin-set, latex-portland cement mortar to comply with ANSI A108.5 .

3.9 STONE STAIR TREAD AND RISER INSTALLATION

A. Install stone stair treads and risers to comply with "Installation of Stone Bonded to Concrete" Article.

3.10 GROUTING

A. Grout stone joints to comply with ANSI A108.10 and with manufacturer's written instructions.

1. Do not use sanded grout for polished stone.

2. Grout joints as soon as possible after initial set of setting bed. Force grout into joints, taking care not to smear grout on adjoining stone and other surfaces. After initial set of grout, finish joints by tooling to produce a slightly concave polished joint, free of drying cracks.

B. Grout stone joints with water-cleanable epoxy grout to comply with ANSI A108.6 and with manufacturer's written instructions.

3.11 ADJUSTING AND CLEANING

A. Remove and replace stonework of the following description:

1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
2. Defective joints.
3. Stone flooring and joints not matching approved Samples and mockups.
4. Stonework not complying with other requirements indicated.

B. Replace in a manner that results in stonework matching approved Samples and mockups, complying with other requirements, and showing no evidence of replacement.

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

D. Clean stonework after setting and grouting are complete. Use procedures recommended by stone fabricator for application types.

E. Apply sealer to cleaned stonework according to sealer manufacturer's written instructions.

3.12 PROTECTION

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

B. Protect installed stonework during construction with nonstaining kraft paper. Where adjoining areas require construction work access, cover stonework with a minimum of 3/4-inch untreated plywood over nonstaining kraft paper.

END OF SECTION 09 63 40