SECTION 321440 - STONE PAVING

PART 1 - GENERAL

0.1 SUMMARY

A. Section Includes:

1. Dimension stone exterior paving set in mortar setting beds.
2. Dimension stone stair treads and risers.
3. Dimension stone site wall caps.

B. Related Requirements:

1. Section 093640 "Stone Flooring" for interior stone flooring.

0.2 ACTION SUBMITTALS

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

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

C. Samples:

1. For each stone type indicated, in sets of Samples not less than 12 inches (300 mm) square. Include at least five 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 pointing mortar required.

0.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For stone paving to include in maintenance manuals.

0.4 QUALITY ASSURANCE

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

1. Build mockup of typical exterior pavement area about 96 inches (2400 mm) square.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

0.5 FIELD CONDITIONS

A. Maintain air and material temperatures not less than 50 deg F (10 deg C) during installation and for seven days after completion.

B. 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 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: 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 (38 deg C).
2. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and above.
3. When the ambient temperature exceeds 90 deg F (32 deg C), fog spray installed stone paving until damp at least three times a day until paving is three days old.

PART 2 - PRODUCTS

0.1 BLUESTONE

A. Material Standard: Comply with ASTM C 616, Classification III Quartzite, except for minimum free silica content.

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

B. Variety and Source: Subject to compliance with requirements, provide Pennsylvania Bluestone.

C. Finish: Flamed finish.

0.2 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.

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

C. 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. 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.

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

E. Water: Potable.

0.3 ACCESSORIES

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

B. Reinforcing Wire: Galvanized, welded, 0.062-inch- (1.57-mm-) diameter wire; 2-by-2-inch (50-by-50-mm) mesh; comply with ASTM A 185/A 185M and ASTM A 82/A 82M except for minimum wire size.

C. Cork Joint Filler: Preformed strips complying with ASTM D 1752, Type II.

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

0.4 MORTAR MIXES

A. Mortar: Comply with referenced standards and with manufacturers' written instructions to produce mortar of uniform quality and with optimum performance characteristics.

1. Do not use admixtures, unless otherwise indicated. Do not use calcium chloride.
2. 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 retains 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.

B. Portland Cement-Lime Setting Mortar: ASTM C 270, Proportion Specification, Type S.

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

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

E. Pointing Mortar: Comply with requirements indicated above for setting mortar, including type and the following:

1. Packaged Portland Cement-Lime Mix Mortar: Use portland cement-lime mix of selected color.

0.5 STONE FABRICATION

A. Select stone for intended use to prevent fabricated units from containing cracks, seams, and starts that could impair structural integrity or function.

B. Cut stone to produce pieces of thickness, size, and shape indicated.

1. Stone Thickness: 1 inch (25 mm) unless otherwise indicated.
2. Pattern: Random, rectangular pattern composed of units not less than 8 inches (203 mm) or more than 32 inches (813 mm) in nominal dimension.
3. Stone Edges: Square cut with top corner slightly eased to prevent snipping.
4. Joint Width: 3/8 inch (10 mm).

C. Fabricate stone stair treads and risers in sizes and profiles indicated.

PART 3 - EXECUTION

0.1 PREPARATION

A. Sweep 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. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials.

0.2 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.

B. Set stone to comply with requirements indicated.

C. Scribe and field cut stone as necessary to fit at obstructions.

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.

0.3 INSTALLATION TOLERANCES

A. Variation in Line: For positions shown in plan for edges of paving, ramps, steps, changes in color or finish, and continuous joint lines, do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (10 mm) maximum.

B. Variation in Joint Width: Do not vary from average joint width more than plus or minus 1/16 inch (1.5 mm) or one-fourth of nominal joint width, whichever is less.

C. Variation in Surface Plane: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (10 mm) maximum from level or slope indicated.

D. Variation in Plane between Adjacent Units (Lipping): Do not exceed 1/32-inch (0.8-mm) difference between planes of adjacent units.

0.4 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 (1.5-mm) thickness. Limit area of mortar-bed 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 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- (1.5-mm-) 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 pointing mortar as units are set.

H. Point joints after setting. Fill full with mortar type and color indicated. Tool joints flat, uniform, and smooth, without visible voids.

0.5 ADJUSTING AND CLEANING

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

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

0.6 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 (20-mm) untreated plywood over nonstaining kraft paper.

END OF SECTION