*(**Specifier Note**: The purpose of this guide specification is to assist the specifier in correctly specifying Porphyry Stone Pavers. The specifier needs to edit these guide specifications to fit the needs of each specific project. Contact Milestone Imports to assist in appropriate product selections. Throughout the guide specification, there are Specifier Notes to assist in the editing of the file. The term Architect is used throughout these guide specifications and may be revised to read "Design Professional"," Engineer", "Owner" or other appropriate designation as required for specific projects.*

References have been made within the text of the specification to MasterFormat 2004 Section numbers and titles, the specifier needs to coordinate these numbers and titles with sections included for the specific project. Brackets [ ]; "AND/OR"; and "OR" have been used to indicate when a selection is required.

This guide is for Porphyry Stone Pavers installed on an aggregate setting bed with sand grout joints.

SECTION 32 14 40

STONE PAVING

Milestone Imports – Porphyry Pavers

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Stone pavers set in aggregate setting beds.

B. [Steel] [Concrete] [Stone] edge restraints.

C. Joint Sand for Stone Pavers

1.2 REFERENCES

A. ASTM International (ASTM):

1. ASTM C 33 – Standard Specification for Concrete Aggregates.
2. ASTM C 97 – Standard Test Method for Absorption and Bulk Specific Gravity of Dimension Stone.

3. ASTM C 99 – Standard Test Method for Modulus of Rupture of Dimension Stone.
4. ASTM C 170 – Standard Test Method for Compressive Strength of Dimension Stone.
5. ASTM C 241 – Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic.
6. ASTM C 615 – Standard Specification for Granite Dimension Stone.
7. ASTM C 880 – Standard Test Method for Flexural Strength of Dimension Stone.
8. ASTM D 698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
9. ASTM D 1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil using Modified Effort.
10. ASTM D 4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
11. ASTM D 4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile.

B. American Association of State Highway and Transportation Officials (AASHTO) M 288 – Standard Specification for Geotextile Specification for Highway Applications.

C. Masonry Standards Joint Committee (MSJC):

1. ACI 530.1/ASCE 6/TMS 602 – Specification for Masonry Structures; Cold and hot weather requirements for mortar and grout.

1.3 SUBMITTALS

A. Refer to Section [01 33 00 Submittal Procedures] [insert section number and title].

B. Product Data: For materials other than water and aggregates.

C. Samples for [stone pavers] [joint materials] [and] [edge restraints].

D. Closeout Submittals:

1. Refer to Section [01 78 00 Closeout Submittals] [insert Section number and title].

1.4 QUALITY ASSURANCE

A. Installer shall have a minimum 5 years experience with similar materials and shall have a record of successful projects of comparable size.

B. Mock-up:

1. Install mock-up using approved stone pavers including related accessories.

a. Mock-up size: [10 feet by 10 feet] [insert size].
b. Mock-up may [not] remain as part of the work.

C. Pre-installation Meeting:

1. Refer to Section [01 31 19 Project Meetings] [insert section number and title].
2. Hold a pre-installation conference, prior to start of stone paving installation. Attendees shall include Contractor, Architect, installer, Owner's Representative, and manufacturer's designated representative.
3. Review all related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of stone pavers and components, installer's qualifications, equipment, and coordinate methods, procedures and sequencing requirements for full and proper installation, integration and protection.

1.5 PROJECT CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or build on frozen subgrade or setting beds.

B. Weather Limitations for Joint Sand:

1. Joint Sand JS-1: Apply when ambient temperature is above 32 degrees F (15 degrees C), under dry conditions with no rain forcast for 24 hours and when surface of pavement is completely dry.
2. Joint Sand JS-2: Apply when ambient temperature is above 40 degrees F (5 degrees C), under dry conditions with no rain forcast for 24 hours and when surface of pavement is completely dry.

PART 2 - PRODUCTS

2.1 STONE PAVERS

A. Rough-Stone Pavers: Square or Rectangular paving stones, made from stone complying with ASTM C 615.

B. Performance Requirements

1.	Modulus of Rupture:	1,900 psi	per ASTM C 99.
2.	Compressive Strength:	17,622 psi	per ASTM C 170.
3.	Flexural Strength:	3,141 in.lb.	per ASTM C 880.
4.	Absorption:	0.647%	per ASTM C 97.
5.	Density:	160 lbs/cu.ft.	per ASTM C 97.
6.	Static Coefficient of Friction:	0.62 in.lb.	per ASTM C 1028.
7.	Abrasion Resistance:	70.92 in.lb.	per ASTM C 241.

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

1. Porphyry Stone Pavers as distributed by Milestone Imports; www.milestoneimports.com. 866-641-1999.
2. Color: [Storm Grey] [Copper Mountain] [Sierra] [insert color].
3. Thickness: [1/2 to 1¼ inch] [1¼ to 2¼ inch] [2¼ to 3¼ inch] [3¼ to 4¼ inch] [As indicated].
4. Cubes: [1¼ to 2¼ inch cubes] [2¼ to 3¼ inch cubes] [3¼ to 4¼ inch cubes] [As indicated].

(Specifier Note: Random lengths vary from 6 to 15 ¾ inches.)

5. Face Size: [4 by 4 inches] [6 by 6 inches] [8 by 8 inches] [12 x 12 inches] [4 by random length] [6 by random length] [8 by random length] [10 by random length] [12 by random length]
6. Edges: [Snap Cut] [Sawn].

2.2 EDGE RESTRAINTS

(Specifier Note: Select appropriate edge restraint below based on project requirements.)

A. Steel Edge Restraints: Manufacturer's standard painted steel edging [3/16 inch thick by 4 inches high] [1/4 inch thick by 5 inches high] with loops pressed from or welded to face to receive stakes at 36 inches o.c., and steel stakes 15 inches long for each loop.

B. Concrete Edge Restraints: Refer to Section [03 30 00 Cast-in-Place Concrete] [32 13 13 Concrete Paving] [insert Section number and title] and the Drawings for concrete edge restraints.

C. Stone Curbing – [3" wide by 10" deep with a minimum length of 12" +]

2.3 AGGREGATE SETTING-BED MATERIALS

A. Graded Aggregate for Base: Sound, crushed stone or gravel complying with requirements in Section [31 20 00 Earth Moving] [insert Section number and title] for base course.

(Specifier Note: If base material will be specified under Division 31, delete paragraph B. If Base material to be supplied under this Section, delete paragraph A.)

B. Base Course: Sound, crushed stone with a maximum size aggregate of 100 percent passing the 2" sieve and having a range of 0 to 10 percent passing the 200 sieve. Conform to AASHTO M147-65, grading A:

Sieve Size	Percent Passing
2 inch	100
3/8 in.(9.5 mm)	30 to 65
No. 4 (4.75 mm)	25 to 55
No. 10 (2.36 mm)	15 to 40
No. 40	8 to 20
No. 200 (0.075 mm)	2 to 10

C. Sand for Leveling Course: Sound, sharp, washed, natural sand complying with gradation requirements in ASTM C 33 for fine aggregate. Do not use stone dust or mason sand for Leveling Course. Provide gradations as follows:

Sieve Size	Percent Passing
3/8 in.(9.5 mm)	100
No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (0.600 mm)	25 to 60
No. 50 (0.300 mm)	10 to 30
No. 100 (0.150 mm)	2 to 10
No. 200 (0.075 mm)	0 to 1

D. Joint Sand:

1. Description: Dry mix, containing polymeric binding agent, activated with water.
2. Manufacturer: Techniseal; www.techniseal.com
3. Product:

(Specifier Note: Select Joint Sand JS-1 when joints will be exposed to normal traffic, such as driveways, terraces, garden paths, or access roads. Select Joint Sand JS-2 for highly exposed surfaces such as public ways, sloped driveways and pool decks.)

a. JS-1: Techniseal "RG+" Polymeric Jointing Sand.
b. JS-2: Techniseal "HP" Polymeric Jointing Sand

4. Joint Sand Colors: [As selected by Architect from manufacturer's full range]

E. Drainage Geotextile: Nonwoven needle-punched geotextile fabric, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
2. Permittivity: 0.5 per second, minimum; ASTM D 4491.

F. Herbicide: Commercial chemical for weed control, registered with the EPA. Provide in granular, liquid, or wettable powder form.

2.4 SOURCE QUALITY CONTROL

A. Fabrication Tolerances:

1. Maximum variations in stated thickness: plus or minus 1/2 inch.
2. Split edge pavers width tolerance: plus or minus 1/8 inch.
3. Sawn edge pavers width tolerance: plus or minus 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is properly compacted and ready for the work of this Section.

(Specifier Note: Verify that waterproofing membrane is specified in Division 07 in a separate Section 07 10 00 – Dampproofing and Waterproofing. Verify if waterproofing membrane is a project requirement and location of Section)

B. Verify that waterproofing membrane work is complete and ready for the work of this Section.

3.2 AGGREGATE SETTING-BED APPLICATIONS

A. Applications over Waterproofing Membrane: Exercise care in placing setting beds, leveling course and pavers over waterproofing so protection materials are not displaced and waterproofing is not punctured or otherwise damaged.

(Specifier Note: Select appropriate percentage for compaction and test method based on project soils report. ASTM D 1557 test is more costly and strict in its requirement, verify with Soils Engineer which test is appropriate.)

B. Compact soil subgrade uniformly to at least [95] [Insert number] percent of [ASTM D 698] [ASTM D 1557] laboratory density.

C. Place aggregate base, compact by tamping with plate vibrator, and screed to depth indicated in 2 inch lifts.

(Specifier Note: Verify that geotextile fabric is shown on Drawings.)

D. Place drainage geotextile over compacted base course, above soils, overlapping ends and edges at least 12 inches.

E. Provide edge restraints as indicated. Install edge restraints before placing stone pavers.Set pavers with a joint width not to exceed ½ inch, being careful not to disturb leveling base. Use string lines to keep straight lines.

3.3 INSTALLATION, GENERAL

A. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.

(Specifier Note: Tile Installation. When installing for tile installation tiles shall be cut with motor driven masonry saw.)

B. Stone Cutting:

1. Cut stone tiles with motor-driven masonry saw equipment to provide pattern indicated and to fit adjoining work neatly. Use full stones without cutting where possible.

(Specifier Note: Paver Insallation. When installing for a paver installation pavers shall be cut with a stone guillotine or snap cut machine.)

2. Cut stone pavers with stone guillotine or snap cut machine to provide pattern indicated and to fit adjoining work neatly. Use full stones without cutting where possible.

C. Place leveling course and screed to a thickness of 1 to 1-1/2 inches, taking care that moisture content remains constant and density is loose and uniform until pavers are set and compacted.

D. Treat leveling course with herbicide to inhibit growth of grass and weeds.

E. Place Pavers in the following Joint Pattern: [Wave Pattern] [Fan Pattern] [Overlapping Arcs] [Running bond] [Grid] [As indicated] [Match and continue existing stone paver joint pattern].

F. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf compaction force at 80 to 90 Hz.

G. Joint Sand:

1. Verify that pavers are completely dry.
2. Spread Polymeric sand and fill joints completely.
3. Sweep surface clean of sand prior to compaction to avoid staining.
4. Compact pavers and add more sand if necessary until joints are completely filled to a minimum depth of 1.25 inches.
5. Remove excess dust with leaf blower.
6. Polymeric Sand Wetting:

    a. Perform wetting in three or more applications of water.
    b. Do not flood pavement or generate runoff.
    c. First application of water shall be in a fine mist; Do not displace sand. Wait 5 to 10 minutes.
    d. Subsequent applications of water: Dampen surface in 5 to 10 minute intervals to gradually soak joints to a complete depth. Spot check joints by emptying sand to the bottom of a joint.
    e. Allow joints to dry at least 24 hours before allowing traffic on pavers.
    f. If there is a risk of rain within 24 hours, protect pavement with waterproof cover.

END OF SECTION