

## Eco Permeable Paver Installation Guidelines For Residential Driveways, Patios, and Walkways

### MATERIALS NEEDED

**Open Graded Base:** Should be a clean stone (i.e. # 2 stone and AASHTO #57), which weighs approximately 120 pounds per cubic foot. Calculate the depth of stone using the average depth of the stone from the highest point to the lowest point (6-inch minimum depth for patios and walkways, 10-inch minimum depth for driveways). The maximum recommended depth of AASHTO #57 in the base is 4". The remaining depth of the base material should be # 2 stone. Calculate the project area and including an additional 5% for losses.

(\*Use of a compacted dense graded aggregate shoulder in the base where the base excavation terminates against soil will allow for the use of standard plastic edge restraints that can be spiked in place. Calculate 2 feet of perimeter DGA where those applications are done)

**Bedding Layer:** AASHTO #8 crushed stone is recommended. Calculate the volume for a 2-inch bedding layer over the project area. Add an additional 20 percent for filling joints and losses.

**Pavers:** Eco Pavers are sold by the square foot. Calculate the square footage needed for your project and add 5% - 10% for cuts, waste, etc.

**Edge Restraint:** All exposed edges must be restrained. A 6" wide by 12" deep concrete curb is one recommended edge restraint system for a clean stone base construction. But edge restraints including pre-cast, DGA shoulders wrapped in non-woven geotextile, plastic edge restraint systems connected with poly mesh, and mortared options may also work based on the application. Calculate the linear feet of edge restraint required. The curb should be flush with the top of the pavers. EP Henry's Curbstone can also be wet set in concrete as an alternative.

If a dense graded stone base or shoulder is used a good quality plastic edge restraint that is 3-1/2" high may be used and held in place with 12" spikes placed at intervals of 12" on curved edges and as far apart as 24" on straight edges. The spikes should be inserted through the holes in the horizontal foot of the edge restraint and driven into the dense graded aggregate base pinning the edge restraint into place.

**Separation Fabric:** A non-woven fabric such as Mirafi 160N or Mirafi 140 N is recommended to be installed as a drainage and separation fabric between the # 2 stone open graded base and the natural subgrade soil. In addition, a layer of Mirafi 160N/140 N can be placed between the bedding Layer and the open grade base if needed.

### TOOLS

Hammer, hard tooth garden rake, rubber hammer, level, tape measure, flat shovel, wheelbarrow, diamond blade wet saw, chalk line, plate compactor, stiff bristle street broom, wire cutters (or cutting bands on pavers), and 2-inch screed guide bars, and excavating equipment.

## **LAYOUT & PREPARATION**

Layout the limits of the driveway and edge restraint system. Mark the limits of the excavation on the ground. Before digging, always call your local utility companies to locate any underground utilities.

## **PREPARE SUBGRADE SOILS**

For best results, the finished subgrade should be level. Excavate the soil providing the minimum recommended thickness at the lowest point of the driveway. For instance, a 50-foot long driveway with a 1/4" per foot slope will require a depth of 10 inches of stone at the lowest point and a depth of 22 inches of stone at the highest point. Extend the excavation beyond the edges of the driveway to allow for the installation of the concrete edge restraints or a compacted dense graded aggregate (2-A Modified Stone) shoulder wrapped in Mirafi 160 N/140 N geotextile. The subgrade should be clean and free of any organic materials such as topsoil and have adequate bearing capacity. The subsurface should be firm and not easily rutted. If the subgrade appears weak or damp, contact a professional engineer for further assistance. Do not compact the sub-grade soils, but dig the excavation in such a manner as to cause the least disturbance to the surface of the sub-grade soil surface.

Mirafi 160N/140 N geotextile fabric is recommended as a separation and drainage layer between the open-graded stone base and natural subgrade soil. Place the geotextile material over the subgrade soil and up the sides of the excavation taking care to remove any wrinkles. Where seams cannot be avoided, overlap the edges of the fabric by a minimum of two feet.

## **PREPARATION OF OPEN GRADED BASE**

Open graded base materials must be free of fine materials allowing them to provide maximum storage capacity of runoff and ensuring a free flowing path to the soil. Take care not to track soil onto the fabric or allow sediment to wash into the excavation during construction, potentially clogging the system. The No. 2 stone sub-base (open-graded) needs to be installed before placing the # 57 stone.

AASHTO # 2 and # 57 stone are recommended for this installation. Place the # 2 stone in 6-inch lifts and compact. The material should be moist during installation. A 10-ton steel drum static roller should be used for compaction. A vibratory plate compactor can be used for smaller projects. There should be a minimum of four passes with the compactor or roller with no visible movement of the material. Continue installing the 3 2

stone in 6-inch lifts until the elevation is reached where 4 inches of AASHTO # 57 is required to bring the base to its finished elevation . The base should be smooth and level when completed and there should not be more than a 1/4" gap at any point along a straight edge.

### **BEDDING LAYER**

Using screed boards, place a two-inch layer of moistened AASHTO No. 8 coarse bedding stone onto the open graded base. The coarse sand should be firmly set in the underlying stone. In order to ensure that the finer materials do not migrate into the open graded base and cause settling, a separation fabric such as the one used under the open graded base can be used.

### **INSTALL PAVERS**

Place the pavers in a running bond pattern, ensuring that the lugs interlock. Pavers can be cut with a wet saw as needed. To protect the pavers during compaction, place a medium such as a piece of separation fabric between the plate compactor and the pavers. Using a 3-5 HP (4,000 pound force) vibrating plate compactor, begin at the outside perimeter and work inward. Make at least 2 passes over the pavers with the plate compactor.

Fill paver voids with No. 8 stone level with the paver surface. Voids may be topped with colored decorative stone (1/2") if desired.

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#### **Engineering Notes:**

- 1.) For best results subgrade soil infiltration rates should be confirmed. Soils should have better than 0.5"/hour infiltration rates.
- 2.) The bottom of the open-graded stone should be a minimum of two feet above the seasonally high water table.
- 3.) Avoid over compacting or contaminating the natural subgrade soils.
- 4.) Under-drain piping and storage systems may be used if designed by a qualified professional engineer.
- 5.) For moist or clayey subgrade soils consult a geotechnical engineer.
- 6.) A sieve analysis of the bedding material and open-graded stone material should be reviewed to confirm it meets the following filter criteria:

#### Filter Criteria:

$$D_{15} \text{ open graded base} / D_{50} \text{ bedding material} < 5 \text{ and } D_{50} \text{ open graded base} / D_{50} \text{ bedding material} > 2$$

#### Where:

Open graded base = AASHTO # 2

Open graded base = AASHTO #57

Bedding material = AASHTO #8

$D_{15}$  = sieve size for which 15 percent of material is smaller  
 $D_{50}$  = sieve size for which 50 percent of material is smaller