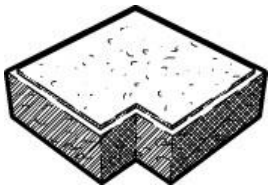
ECOSTONE

PERMEABLE PAVEMENTS

Permeability can range from 0 to 26.5% of area paved, depending upon pattern layout.

GENERAL SPECIFICATIONS



Section Includes A. Concrete units
B. Bedding sand C. Topsoil and grass.
- OR -
C. Open-graded aggregate

References
A. American Society of Testing Materials (ASTM)
1. C 1319, Standard Specification for Concrete Grid Paving Units
2. C 140, Standard Test Methods of Sampling and Testing Concrete Masonry Units 3. C 136, Method for Sieve Analysis for Fine and Coarse Aggregate
4. C 33, Specification for Concrete Aggregates.
5. D 2940, Standard Specification for Graded Aggregate Material for Bases or Sub-bases for Highways or Airports
6. D 5268, Specification for Topsoil Used for Landscaping Purposes.

Quality Assurance
A. Engage an installer who has successfully completed installations similar in type and size to this project. Installer shall provide certification of experience.
B. As applicable by state/provincial and local laws, contractor shall hold a current contractor's and business license in the state/ province and locality where work is performed.

Delivery, Storage And Handling
A. Deliver concrete permeable pavers to the site in plastic wrapped cubes capable of transfer by fork lift. Unload pavers at job site in such a manner that no damage occurs to the product.
B. Cover sand and topsoil shall be protected with waterproof covering to prevent exposure to rainfall or removal by wind. Secure the covering in place.

Environmental Conditions
A. Do not install sand or pavers during heavy rain or snowfall.
B. Do not install frozen sand or topsoil.
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PART 2: PRODUCTS

EcoStone: 8” x 8” x 2 3/8”, Corner Indent: 2” x2”
Stones per SF: 1.6 sf
Stones per pallet: 240
Coverage: 100 sf per pallet
Weight: 24# /sf, 2473# /plt

Meets the requirements of ASTM C936-08: Exposed face area of ≤ 101 in^2 (0.065 m^2), average compressive strength not less than 8000psi (55MPa) with no individual unit less than 7200 psi (50 MPa). Dimensional tolerance: Measured length or width shall not differ by more than ±0.063” [1/16”] (±1.6mm) from specified dimensions. Measured height shall not differ by more than ±0.125” [1/8”] (±3.2mm) from the specified dimensions. Test results are certified by the manufacturer.

Bedding Sand

Note: The type of sand used for bedding is often called concrete sand. Sands vary regionally. Contact contractors local to the project and confirm sand(s) successfully used in previous similar applications. Bedding sand is not used in ditch liner applications, slope protection, riparian stabilization, or with boat ramps constructed with concrete grid pavers.

Table 1

Grading Requirements for Bedding Sand ASTM C33 CSA A23.1-M94 Sieve Size / Percent Passing Sieve Size / Percent Passing

3/8 in. (9.5 mm)	100	10 mm	100
No. 4 (4.75 mm)	95 to 100	5 mm	95 to 100
No. 8 (2.36 mm)	85 to 100	2.5 mm	80 to 100
No. 16 (1.18 mm)	50 to 85	1.25 mm	50 to 90
No. 30 (0.600 mm)	25 to 60	0.63 mm	25 to 65
No. 50 (0.150 mm)	0 to 30	0.315 mm	10 to 35
No. 100 (0.150 mm)	2 to 10	0.16 mm	2 to 10

Sieve Size / Percent Passing	
1/2 in. (12.5 mm)	100
3/8 in. (9.5 mm)	85 to 100
No. 4 (4.75 mm)	10 to 30 No. 8
(2.36 mm)	0 to 10
No. 16 (1.18 mm)	0 to 5

Note: Local, state or provincial standards for aggregate base materials should be used for the gradation and quality of dense-graded aggregate base materials under concrete interlock paving installations. This material should be compacted to a minimum of 95% standard Proctor density.

Table 3 ASTM D 2940 Gradation for Dense-Graded Base Sieve Size / Percent Passing

2 in. (50 mm)	100
1/2 in. (37.5 mm)	95 to 100
3/4 in. (19.0 mm)	70 to 92
½ in. (9.5 mm)	50 to 70
No. 4 (4.75 mm)	35 to 55
No. 30 (0.600 mm)	12 to 25
No. 200 (0.075 mm)	0 to 8

Note: For open-graded bases, gradation conforming to ASTM No. 57 crushed stone aggregate is recommended. The material is typically placed in 4 to 6 in. (100 to 150 mm) thick lifts and compacted with at least four passes of a 10 T static roller. The base material should show no visible movement when compaction is complete. It should be kept free from sediment throughout the entire job. The gradation for No. 57 material is given in Table 4 below:

Table 4 ASTM No. 57 Gradation for Open-Graded Base Sieve Size / Percent Passing

11/2 in. (37.5 mm)	100
1 in. (25 mm)	95 to 100 ½ in.
(12.5 mm)	25 to 60 No. 4
(4.75 mm)	0 to 10 No. 8
(2.36 mm)	0 to 5

PART 3: EXECUTION

Note: The specifier should be aware that the top surface of the pavers after compaction might be 1/8 to 1/4 in. (3 to 7 mm) above the final elevations after compaction. This difference in initial and final elevations is to compensate for possible minor settling.

Examination

Note: For vehicular areas, specify compaction of the soil sub grade to a minimum of 95% standard Proctor density for dense-graded aggregate bases. Density should be monitored in the field with a nuclear density gauge. Compaction of open-graded bases should be with at least five passes of roller compactor without vibration. Stabilization of the soil and/or base material may be necessary with weak or saturated soils.

A. Verify that base is dry, uniform, even, free of any sediment (if open-graded), and ready to support sand, pavers and imposed loads.
B. Verify gradients and elevations of base are correct.
C. Verify location, type, installation and elevations of edge restraints around the perimeter area to be paved.
D. Beginning of installation means acceptance of base and edge restraints.

Installation

A. Spread the sand evenly over the compacted, dense-graded base course and screed uniformly to 1 – 1 ½ ° in. (25 - 40 mm) thickness. The screeded sand s hould not be disturbed. Place sufficient sand to stay ahead of the laid grid pavers.

-OR

A. Spread the No. 8 material evenly over the compacted, open-graded base course and screed uniformly to 3-in. (75-mm) thickness. Compact with at least four passes of 10 T static rollers until there is no visible movement. Place sufficient material to stay ahead of the laid grid pavers. Keep free from sediment during entire job.
B. Ensure that grid pavers are free from foreign materials before installation.
C. Lay the pavers in the pattern(s) as shown on the drawings. Maintain straight pattern lines.
D. Joints between the pavers shall be between 1/16 in. and 1/8 in. (2 to 4 mm) wide.
E. Fill gaps at the edges of the paved area with cut permeable pavers or edge units.
F. Cut pavers to be placed along the edge with a double-bladed splitter or masonry saw.
G. Compact and seat the pavers into the screeded [bedding sand] [aggregate] using low amplitude, 75-90 Hz plate compactor capable of at least 5,000 lbs. (22 kN) centrifugal compaction force. Note: A rubber or neoprene pad between the compactor and grids may be necessary to prevent cracking or chipping. H. Vibrate and compact the pavers again, sweeping [topsoil] [the small fraction of the No. 8 aggregate] into the joints and openings until it is within ½ in. (13 mm) from the top surface. This will require at least two or three passes with the compactor. Do not compact within 3-ft (1 m) of the unrestrained edges of the paving units.

Note: Choose paragraph H and below when designing pavement for storm water runoff control ***with*** grass and topsoil. Choose paragraph H above, Delete items J through M below when designing pavements ***without*** grass and topsoil.

I. Spread ASTM No. 8 aggregate and fill openings in the pavement.
J. All work to within 3-ft (1 m) of the laying face must be left fully compacted at the completion of each day.
K. Broadcast grass seed at the rate recommended by seed source.
L. Remove excess [topsoil] [aggregate] on surface when the job is complete.

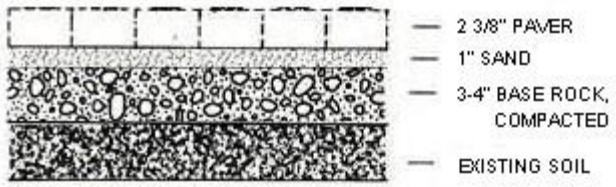
Note: Use L and below for installation with grass and topsoil.

M. Distribute straw covering to protect germinating grass seed. Do not traffic pavement for [30] days. N. The final surface elevations shall not deviate more than ± 3/8 in. (±10 mm) under a 10 ft (3 m) long straightedge.

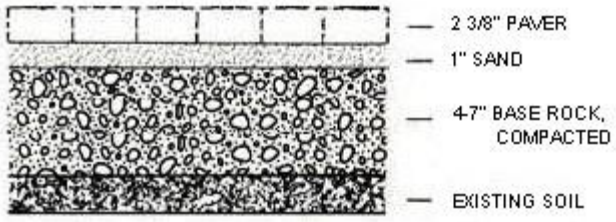
O. The surface elevation of pavers shall be 1/8 to 1/4 in. (3 to 7 mm) above adjacent drainage inlets, concrete collars or channels. 3.03 Field Quality Control

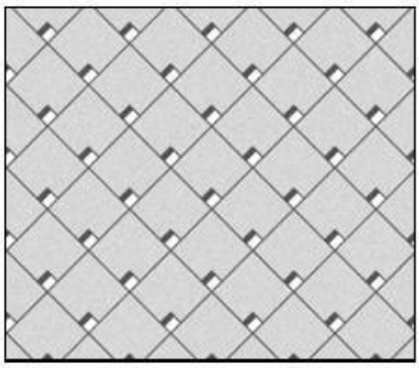
A. After removal of excess ton soil/aggregate, check final elevations for conformance to the drawings.

Cross Section Typical Installation for Patios and Sidewalks



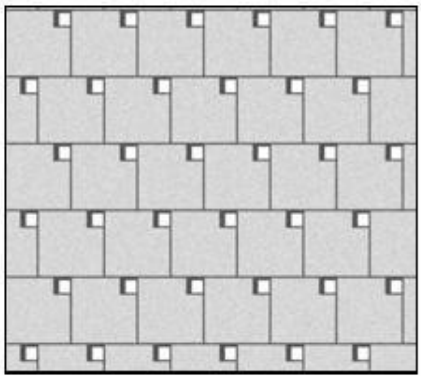
Cross Section Typical Installation Driveways



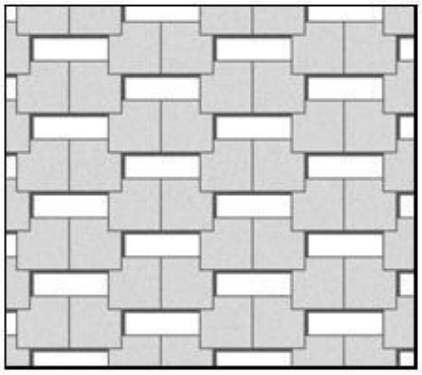


Patterns 1 & 2

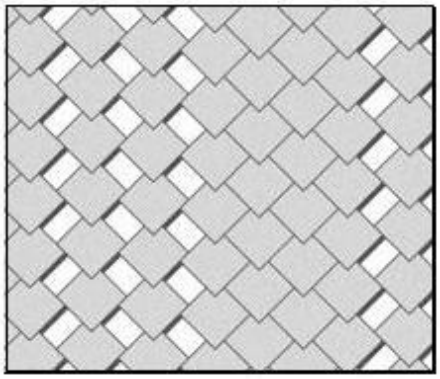
6% Permeability



ADDITIONAL PATTERNS:



Pattern 3



Pattern 4

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PATTERN PERMEABILITY

Pattern 3 : 32%

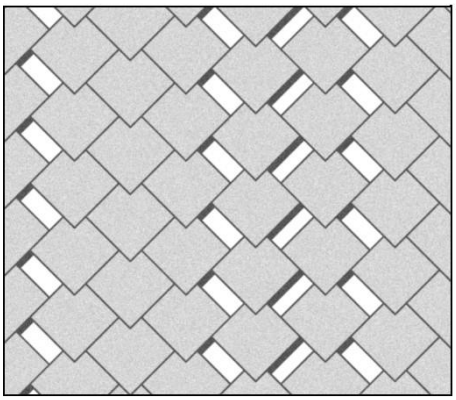
Pattern 4 : 12%

Pattern 5 : 8%

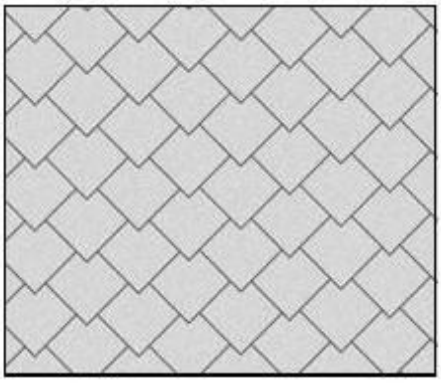
Pattern 6 : 0%

Pattern 7 : 24%

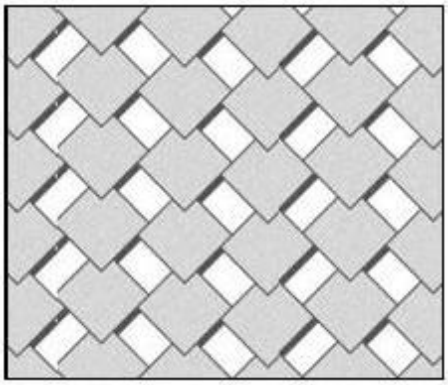
Pattern 8 : 16%



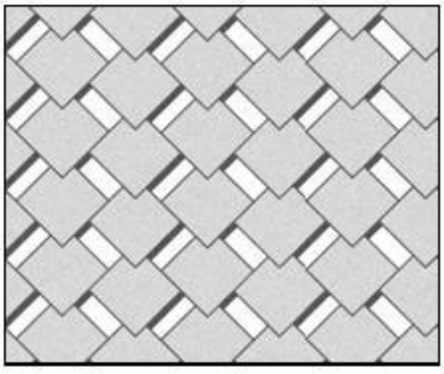
Pattern 5



Pattern 6



Pattern 7



Pattern 8

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