

PERMEABLE PAVERS

DRIVEWAYS, PERMEABLE DRIVEWAYS & PATIOS



PERMEABLE PAVEMENTS

TECHO-BLOC PERMEABLE PAVEMENTS REDUCE RUNOFF AND IMPROVE THE QUALITY OF WATER RETURNING TO THE ENVIRONMENT. STORMWATER SEEPS THROUGH THE PAVING STONE JOINTS AND IS THEN DIRECTED INTO THE GROUND OR STORED TEMPORARILY IN THE BASE/SUBBASE STRUCTURE (OPEN GRADED STONE) RATHER THAN TURNING INTO RUNOFF HEADED DIRECTLY INTO THE SEWER SYSTEM.

PHYSICAL AND GEOMETRICAL CHARACTERISTICS

CHARACTERISTICS	ASTM C936
Compressive strength	8000 psi [55 MPa] min.
Absorption	5 % max.
Resistance to freezing and thawing	Mass loss (max.): 225 g/m ² at 28 cycles, or 500 g/m ² at 49 cycles
Dimensional tolerance	Length and Width: ± 0.063 in. [1.6 mm] Thickness: ± 0.125 in. [3.2 mm]

Notes: Dimensional tolerances prior to the application of architectural finishes.

INSTALLATION GUIDE

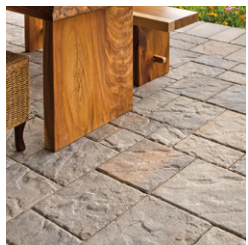
SURFACE INFILTRATION CHARACTERISTICS

PERMEABLE PAVERS	PERCENT OF SURFACE OPENING (%)	JOINT WIDTH	INITIAL POST-CONSTRUCTION INFILTRATION RATE ¹
ANTIKA ²	Variable	Variable	993 in./hr (25 227 mm/hr)
AQUASTORM ²	38.4	1 5/8" (41mm)	2 395 in./hr (60 842 mm/hr)
BLU 60 mm (6x13) ²	4.6	9/32" (7mm)	570 in./hr (14 475 mm/hr)
BLU 60 mm	3.0	9/32" (7mm)	570 in./hr (14 475 mm/hr)
BLU 80 mm (6x13) ²	4.6	9/32" (7mm)	570 in./hr (14 475 mm/hr)
BLU 80 mm	3.0	9/32" (7mm)	570 in./hr (14 475 mm/hr)
HYDRA	8.3	1/2" (13mm)	605 in./hr (15 345 mm/hr)
MIKA ²	7.8	5/8" (15mm)	909 in./hr (23 094 mm/hr)
MISTA random ¹	6.3	3/16" (4mm) to 9/16" (14mm)	610 in./hr (15 505 mm/hr)
PURE ²	5.0	3/8" (10mm)	726 in./hr (18 440 mm/hr)
TRAVERTINA RAW ²	7.8	5/8" (15mm)	793 in./hr (20 150 mm/hr)
VALET ²	5.9	9/32" (7mm)	400 in./hr (10 160 mm/hr)
VICTORIEN 60 mm Permeable ¹	9.6	3/8" (10mm)	909 in./hr (23 085 mm/hr)
VILLAGIO ¹	8.0	3/8" (9mm) to 9/16" (15mm)	896 in./hr (22 750 mm/hr)

¹ Measurements were taken at various sites in conformity to the standard ASTM C 1701-09

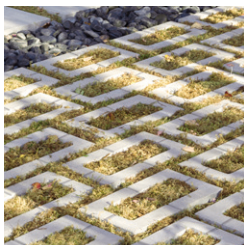
² Measurements were taken at various sites in conformity to the standard ASTM C 1781.

OTHER PERMEABLE POSSIBILITIES



**BLU 60 mm
SLAB**

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**AQUASTORM
PAVER**

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**ANTIKA
PAVER**

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**BLU 80 mm
PAVER**

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**MIKA
PAVER**

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**MISTA RANDOM
PAVER**

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**TRAVERTINA RAW
PAVER**

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**VALET
PAVER**

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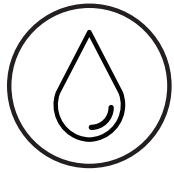


**VILLAGIO
PAVER**

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INSTALLATION GUIDE

SEGMENTAL PERMEABLE PAVEMENT



INSTALLATION OUTLINE

01 DATA COLLECTION

- A. Determine the size, shape, and intended use of finished areas (i.e. residential driveway, secondary commercial parking, etc.).
- B. Classify sub-grade soils.
- C. Document all existing conditions (i.e. fixed points, existing grades, site contours, etc.).
- D. Document soil type, location, and elevation of below grade and overhead utilities both public and private.
- E. Ensure public utilities are marked through the use of a locating service.
- F. Determine the cross section design of the system based on soil type and application, showing proposed sub-grade and finished grade elevations and all geotextiles and drainage pipes needed for the construction.
- G. Establish the type, location, and elevation of relief structures if required (i.e. overflow pipe discharging to rain garden, etc.).
- H. Determine the curb or edge restraint type, elevation, and location.
- I. Choose a pattern appropriate to the application (traffic type and load).

02 EXCAVATION

- A. Before digging, contact the concerned companies if wires or pipes are located in the area to be excavated.
- B. Excavation depth is determined from the foundation thickness according to the project specifications (foundation thickness is determined by a qualified engineer based on structural and hydrological analyses).
- C. Although the slope of the sub-grade will depend on the drainage design and infiltration type, a minimum slope of 0.5% ($\frac{1}{16}$ " per ft, or 5 mm per meter) is recommended.
- D. The distance that the excavated area should extend beyond the area to be paved should be one to 1.5 times the thickness of the foundation. This extra space will ensure the stability of the pavers near the edge and the edge restraints.
- E. Level the bottom of the excavated area with a rake.

Compaction will reduce the permeability of the sub-grade and it should be executed according to the project specifications. If compaction is not specified, care should be taken to maintain undisturbed soil infiltration during excavation and construction. Stabilization of the sub-grade may be required with weak, continually saturated soils, or when subject to high traffic conditions. If the compaction or stabilization of sub-grade is necessary, reduced infiltration may require drainage pipes within the sub-base to conform to storm water drainage requirements.

03 GEOTEXTILE, IMPERMEABLE LINERS, AND DRAIN PIPES

- A. Use the geotextile specified and install it according to project specifications. The use of a woven geotextile with bi-axel strength that meets design criteria is recommended.
- B. Place the geotextile on the bottom and sides of the soil sub-grade. Eliminate wrinkles in the geotextile and ensure it is not damaged during construction.
- C. Overlap of geotextile should be a minimum of 2' (600 mm) in the direction of drainage. Overlapping should be "shingle" style with respect to any slope direction and base stone distribution direction. Keep properly tensioned, eliminate wrinkles, and avoid damaging fabric (no spikes).
- D. If impermeable liners are required, install them according to project specifications and manufacturer's instructions. Impermeable liners are used when full exfiltration from the reservoir (sub-base and base) into the underlying sub grade is not allowed (no infiltration design). Perforated drainage pipes are usually required in no infiltration and partial infiltration designs.
- E. If drainage pipes are required, install them according to project specifications. The aggregate cover over drainage pipes should be at least 12" (300 mm) to protect them from damage during sub-base or base compaction.

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SEGMENTAL PERMEABLE PAVEMENT

04 SUB-BASE

For residential pedestrian applications, the sub-base may not be required and then only ASTM No. 57 (CSA 5-28) aggregate base layer with a minimum thickness of 6" (150 mm) can be used (use a thicker base for additional water storage). Refer to Base (see below 06).

When traffic load, soil conditions, and climate require greater than 12" (300 mm) of base or volume requirements for detention are higher, a sub-base may be required. Use sub-base ASTM No. 2 or No. 3 (CSA 40-80) meeting the following requirements:

- 90% fractured symmetrical particles
 - Less than 5% passing the 200 sieve
 - Industry hardness tested
- A. Moisten, spread and compact the ASTM No. 2 (CSA 40-80) aggregate sub-base in minimum 6" (150 mm) lifts (without distorting or damaging the geotextile) according to the project specifications.
 - B. Make at least two passes in the vibratory mode followed by at least two passes in the static mode with a minimum 10 ton (9 metric ton) vibratory roller, until there is no visible movement of the aggregate. Alternately, a 13,500 lbf (60 kN) plate compactor can be used to compact the ASTM No. 2 (CSA 40-80) aggregate sub-base.
 - C. Do not allow the compactor to crush the aggregate.
 - D. Surface tolerance of the ASTM No. 2 (CSA 40-80) sub-base should be $\pm 2 \frac{1}{2}$ " (64 mm) over 10' (3 m).

05 EDGE RESTRAINT

- A. Install edge restraint according to project specifications.
- B. Depending on the design, the top of the edge restraint can be hidden or exposed.
- C. Install Avignon, Belgik or Pietra edge units. Cast-in-place concrete or precast concrete curbs should be considered in vehicular use applications (commercial/industrial driveways, parking lots or streets).
- D. Edge restraint may rest on an open-graded or dense-graded aggregate base.

06 BASE

- A. Moisten, spread and compact the ASTM No. 57 (CSA 5-28) aggregate base layer in one 4" (100 mm) thick lift.
- B. Make a minimum of two passes in vibratory mode followed by at least two in static mode with a minimum 10 ton (9 metric ton) vibratory roller, until there is no visible movement of the aggregate. Alternately, a 13,500 lbf (60 kN) plate compactor can be used to compact the ASTM No. 57 (CSA 5-28) aggregate base.
- C. Do not allow the compactor to crush the aggregate.
- D. Surface tolerance of the ASTM No. 57 (CSA 5-28) base should be ± 1 " (25 mm) over 10' (3 m). Verify prior to setting bed installation.

07 BEDDING COURSE

- A. Moisten, spread and screed the ASTM No. 8 (CSA 2.5-10) aggregate bedding layer in one 2" (50 mm) thick lift.
- B. Surface tolerance of the ASTM No. 8 (CSA 2.5-10) bedding course should be $\pm 3 \frac{3}{8}$ " (10 mm) over 10' (3 m).
- C. Construction equipment and pedestrian traffic on the screeded bedding course should not be permitted.

08 PAVER

- A. Pavers should be placed in the pattern shown on the drawings. Lay units hand tight to designated laying patterns. Units have lugs to maintain consistent joint width.
- B. In sloped conditions, it is preferable to start laying from the bottom in an uphill direction.
- C. The minimum slope recommended for permeable pavement surface is 1%.
- D. Hydra pavers can be installed with a mechanical tool to expedite installation.
- E. When subject to vehicular traffic, cut units should not be smaller than $\frac{1}{3}$ of a whole paver. When using cut pieces, maintain joint.
- F. In vehicular applications, pattern strength will increase if laying pattern is perpendicular to traffic flow.

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SEGMENTAL PERMEABLE PAVEMENT

09 JOINT FILL

- A. Fill the paver joint openings with ASTM No. 8 (CSA 2.5-10) aggregate (or No. 89, No. 9 depending on joint width). Sweep stone to fill joints. Surface must be swept clean prior to compaction.
- B. Compact with a minimum 5,000 lbf (22 kN) plate compactor (two passes minimum). The installation of a neoprene pad is recommended to protect the texture of the paving units.
- C. Do not compact within 6' (1.8 m) of unrestrained edges of the pavers.
- D. Apply additional aggregate to fill the joint openings if needed and compact.
- E. Surface tolerance of compacted pavers should be $\pm \frac{3}{8}$ " (10 mm) over 10' (3 m).

QUANTITY CHART FOR PERMEABLE JOINTS

Approximate clean stone quantity in kg (lb) to cover an area of 1 m² (1 pi²) to fill between joints.
It is recommended to always start with a small area.

PRODUCTS	JOINT FILL MATERIAL	(lbs/sq. ft)	(kg/sq. m)
Antika	ASTM No. 8 (CSA 2.5 - 10) ($\frac{1}{4}$ "	1.9	9.3
Aquastorm	ASTM No. 8 (CSA 2.5 - 10) ($\frac{1}{4}$ "	12.2	59.5
Blu 60 mm	ASTM No. 9 (CSA 2.5 - 5) ($\frac{1}{8}$ "	0.6	3.0
Blu 60 mm (6x13)	ASTM No. 9 (CSA 2.5 - 5) ($\frac{1}{8}$ "	0.9	4.2
Blu 80 mm	ASTM No. 9 (CSA 2.5 - 5) ($\frac{1}{8}$ "	0.8	4.0
Blu 80 mm (6x13)	ASTM No. 9 (CSA 2.5 - 5) ($\frac{1}{8}$ "	1.2	5.7
Hydra	ASTM No. 8 (CSA 2.5 - 10) ($\frac{1}{4}$ "	2.9	14.4
Mika	ASTM No. 8 (CSA 2.5 - 10) ($\frac{1}{4}$ "	2.5	12.2
Mista random	ASTM No. 9 (CSA 2.5 - 5) ($\frac{1}{8}$ "	1.0	5.0
Pure	ASTM No. 9 (CSA 2.5 - 5) ($\frac{1}{8}$ "	1.4	7.0
Travertina Raw	ASTM No. 8 (CSA 2.5 - 10) ($\frac{1}{4}$ "	2.5	12.2
Valet	ASTM No. 9 (CSA 2.5 - 5) ($\frac{1}{8}$ "	1.3	6.2
Victorien 60 mm permeable	ASTM No. 9 (CSA 2.5 - 5) ($\frac{1}{8}$ "	1.7	8.5
Villagio	ASTM No. 8 (CSA 2.5 - 10) ($\frac{1}{4}$ "	2.1	10.2

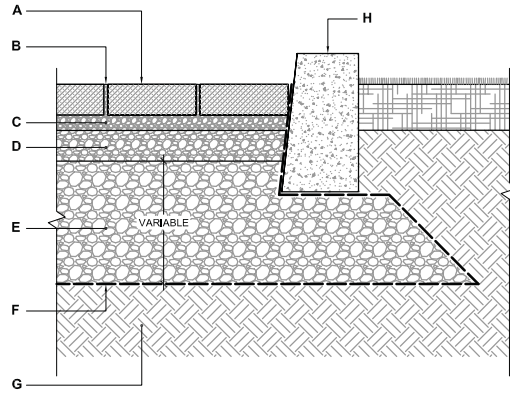
Note: Gator Aqua Rock permeable stone (bagged) can be used to meet the ASTM No. 9 gradation.

10 POST INSTALLATION PROTECTION

Prevent contamination of the porous (permeable) pavement system from fine aggregates and debris by maintaining erosion and sedimentation (E&S) measures at the perimeter.

INSTALLATION GUIDE

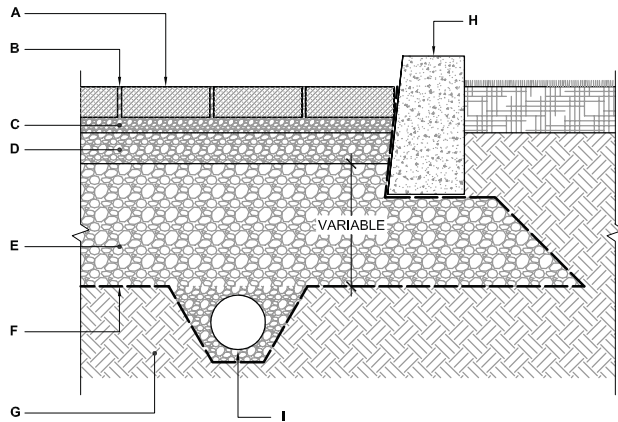
SEGMENTAL PERMEABLE PAVEMENT



- A.** PERMEABLE PAVER FROM TECO-BLOC
- B.** JOINT FILLING MATERIAL
ASTM No 8 (CSA 2.5-10 mm) AGGREGATE
- C.** BEDDING COURSE 2" (50 mm) ASTM
No 8 (CSA 2.5-10 mm) AGGREGATE
- D.** BASE COURSE 4" (100 mm)
ASTM No 57 (CSA 5-28 mm) AGGREGATE
- E.** SUBBASE COURSE
ASTM No 2 (CSA 40-80 mm) AGGREGATE
- F.** GEOTEXTILE
- G.** SUBGRADE
- H.** CONCRETE EDGE

SEGMENTAL PERMEABLE PAVEMENT – FULL INFILTRATION

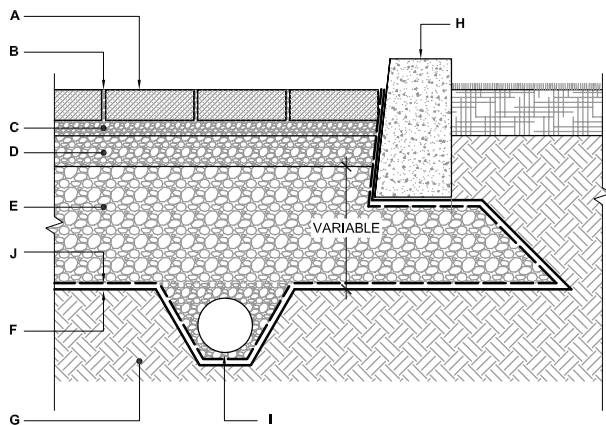
Typical cross section



- A.** PERMEABLE PAVER FROM TECO-BLOC
- B.** JOINT FILLING MATERIAL
ASTM No 8 (CSA 2.5-10 mm) AGGREGATE
- C.** BEDDING COURSE 2" (50 mm) ASTM
No 8 (CSA 2.5-10 mm) AGGREGATE
- D.** BASE COURSE 4" (100 mm)
ASTM No 57 (CSA 5-28 mm) AGGREGATE
- E.** SUBBASE COURSE
ASTM No 2 (CSA 40-80 mm) AGGREGATE
- F.** GEOTEXTILE
- G.** SUBGRADE
- H.** CONCRETE EDGE
- I.** PERFORATED DRAIN CONNECTED TO DRAINAGE
SYSTEM

SEGMENTAL PERMEABLE PAVEMENT – PARTIAL INFILTRATION

Typical cross section



- A.** PERMEABLE PAVER FROM TECO-BLOC
- B.** JOINT FILLING MATERIAL
ASTM No 8 (CSA 2.5-10 mm) AGGREGATE
- C.** BEDDING COURSE 2" (50 mm) ASTM
No 8 (CSA 2.5-10 mm) AGGREGATE
- D.** BASE COURSE 4" (100 mm)
ASTM No 57 (CSA 5-28 mm) AGGREGATE
- E.** SUBBASE COURSE
ASTM No 2 (CSA 40-80 mm) AGGREGATE
- F.** IMPERMEABLE MEMBRANE
- G.** SUBGRADE
- H.** CONCRETE EDGE
- I.** PERFORATED DRAIN CONNECTED TO DRAINAGE
SYSTEM
- J.** GEOTEXTILE

SEGMENTAL PERMEABLE PAVEMENT – NO INFILTRATION

Typical cross section