THE TREMRON GROUP
Permeable Paver Guide

AquaPaver & SF-Rima®
Permeable Interlocking Concrete Pavers

Concrete Paver:
2" AASHTO #57 Aggregate
4 oz. Non-Woven Geotextile
2" Coarse Ballast
500 sq. ft. Non-Woven Geotextile
10" Sand + 5% Finer
2" Crushed
Gravel or 10" Spacing + Trench Drain
Concrete Paver Geotechnical...
Solutions for Your Stormwater Design Challenges.

**Tremron Permeable Pavers:**
*Innovative System Designs to Prepare for the Future.*

Drought, saltwater infiltration, surface pollution contaminating ground water, chemical fertilizers feeding algae blooms in our canals — do any of these stormwater challenges affect you?

Tremron Permeable Pavers, combined with an innovative base design, can help change stormwater problems into freshwater solutions.

Tremron Permeable Pavers are an integral part of your sidewalk or roadway design to capture stormwater.

Ask us about incorporating open cell drains and tanks for retention capacity, redirection or recycling. Your designs can exceed future environmental considerations that will be legislated as stress on fresh water supplies increases.

**Preliminary designs, must be modified by an engineer to match site requirements.**

**The cross sections on this page are currently being tested at the University of Central Florida’s Storm water Management Academy under the supervision of Dr. Chopra.**

**BOLD AND GOLD IS A PROPRIETARY PRODUCT OF THE UNIVERSITY OF CENTRAL FLORIDA.**
**ENGINEERED FOR FUNCTION, MANUFACTURED FOR AESTHETICS.**

Tremron Permeable Pavers have lower life-cycle costs than asphalt and are offered in a range of colors that will let you look at roadways and parking lots differently.

**Imagine your whole project as a landscaping opportunity — and imagine the impact of having the “retention pond” under the parking lot.**

**AquaPaver**

**SF-Rima®**

Running Bond Pattern
Void Space (Open Area) = 9.1%

Herringbone Pattern
Void Space (Open Area) = 10%

Stack Bond Pattern
Void Space (Open Area) = .5"

Stack Bond Pattern
Void Space (Open Area) = 1"

7.7" (196 mm)

7.71" (196 mm)

3.15" (80mm)

3D VIEW

TOP VIEW

FRONT VIEW

SIDE VIEW

3D VIEW

TOP VIEW

FRONT VIEW

SIDE VIEW
TREMRON PERMEABLE PAVERS: AN 8,000 PSI ROADWAY SURFACE THAT’S EASY TO CLEAN, WITH NO CATCH BASINS REQUIRED.

Base design and installation are critical to the performance of the Tremron Permeable Paver system. The load on top of the pavers and water discharge requirements after it has infiltrated the surface will dictate the requirements for the base. You can consider incorporating storage systems that can handle contaminated run-off, such as a garage or airport might incur.

**DESIGN PROCEDURE FLOWCHART**

**DISTRIBUTION OF TRAFFIC LOADS ONTO UNDERLYING LAYERS**

**TRAFFIC LOADS.**

Once site feasibility has been determined, structural capacity requirements can be calculated. Adequate thicknesses must be designed in order to ensure that subgrades are protected from traffic loads.

**POLLUTION REMOVAL EFFICIENCIES.**

<table>
<thead>
<tr>
<th>Substance</th>
<th>Efficiency Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc</td>
<td>62-88%</td>
</tr>
<tr>
<td>Copper</td>
<td>50-89%</td>
</tr>
<tr>
<td>Total suspended solids</td>
<td>60-90%</td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>65%</td>
</tr>
</tbody>
</table>

**ADA REGULATIONS FOR INSTALLING PERMEABLE PAVERS.**

**G R A T I N G S**

If gratings are located in walking surfaces, then they shall have spaces no greater than 1/2 in (13 mm) wide in one direction.

**TRAVEL LOADS.**

Changes in level greater than 1/2 in (13 mm) shall be accomplished by means of a ramp that complies with sections 4.7 or 4.8 of the ADA Accessibility Guidelines.

**CHANGES IN LEVEL**

- Changes in level greater than 1/2 in (13 mm) shall be accomplished by means of a ramp that complies with sections 4.7 or 4.8 of the ADA Accessibility Guidelines.
MEASURED FIELD INFILTRATION RATES OF SF-RIMA™ (DATA FROM BORGWARTD 1995)

<table>
<thead>
<tr>
<th>Inst. No.</th>
<th>Application</th>
<th>Age</th>
<th>Joint Filling</th>
<th>Infiltration Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Storage Area</td>
<td>New</td>
<td>Chippings, 2/5 mm</td>
<td>640 in/hr 8.7/hr</td>
</tr>
<tr>
<td>2</td>
<td>Parking Lot</td>
<td>2 yrs</td>
<td>Chippings, 2/5 mm</td>
<td>140 in/hr 2.0/hr</td>
</tr>
<tr>
<td>3</td>
<td>Parking Lot</td>
<td>4 yrs</td>
<td>Chippings, 2/5 mm</td>
<td>230 in/hr 3.2/hr</td>
</tr>
<tr>
<td>4</td>
<td>Parking Lot</td>
<td>4 yrs</td>
<td>Chippings, 2/5 mm with vegetation growth</td>
<td>210 in/hr 2.9/hr</td>
</tr>
<tr>
<td>5</td>
<td>Parking Lot</td>
<td>New</td>
<td>Sand</td>
<td>120 in/hr 1.7/hr</td>
</tr>
<tr>
<td>6</td>
<td>Parking Lot</td>
<td>5 yrs</td>
<td>Sand</td>
<td>20 in/hr 0.3/hr</td>
</tr>
</tbody>
</table>

Notes: All testing done under the direction of Dr. Sönke Borgwardt, a scientific advisor for ecological planning in Hannover, Germany. Testing used a percolating infiltrometer that simulates rainfall onto a sealed 0.2 m² area on the pavement surface. Infiltration curves are developed that show an exponential drop in infiltration rate with time that approaches an asymptotic value when the joint materials are saturated. Infiltration rates reported in this table are at 15 minutes which in all tested materials was on the asymptotic portion of the curve as the joint materials were at or near saturation. This indicates the steady, long-term infiltration rate under prolonged rainfall. Chippings are crushed aggregate with all particles between 2 and 5. The sand was appreciably finer with particles between 0 and 2 mm. Test No. 4 was at the same location as No. 3 but was in an unused area where vegetation had begun growing in the joints. Test No. 4 had an asphalt base which some believe had become plugged with fine materials and had an unexpectedly low permeability.

The infiltration rates are dependent upon the joint filling material, the bedding and base materials.

Open graded crushed aggregate filled into the joints of SF-Rima pavements have an initial infiltration of over 500 in/hr. The open graded base material has even higher infiltration, normally between 500 to 2,000 in/hr. Although the percentage of the openings of the pavement surface is small, it provides a large amount of infiltration into the pavement. However, the infiltration capacity decreases over time due to deposits of fine materials clogging of the surface and the base. A few years ago when only a limited survey on the long term performance of permeable pavements was available, scientists and researchers in Germany, commissioned by SF, came to the preliminary conclusion that without having the experience of actual testing 20 year old pavements in the field, a very conservative lifetime infiltration rate of 1.1 in/hr would be a reasonable – although this was a very conservative estimate. Years have gone by and more experiences and results are available which suggest that the actual long term infiltration is much higher and can be given now – and that is also a conservative approach – at 3 in/hr. This infiltration rate for a lifetime design infiltration corresponds with experiences in the United States. This design infiltration rate will take in most storms.
LEED® CERTIFICATION CREDITS WITH TREMRON PERMEABLE PAVERS.

Think outside the box...literally. Earn more LEED credits for your project by making the parking areas more attractive and integrated into the environment.

<table>
<thead>
<tr>
<th>POTENTIAL LEED CREDITS AVAILABLE TO PERMEABLE PAVEMENTS</th>
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</thead>
<tbody>
<tr>
<td>CREDIT NO.</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>6.1</td>
</tr>
<tr>
<td>6.2</td>
</tr>
<tr>
<td>7.1</td>
</tr>
<tr>
<td>4.1 &amp; 4.2</td>
</tr>
<tr>
<td>5.1 &amp; 5.2</td>
</tr>
</tbody>
</table>