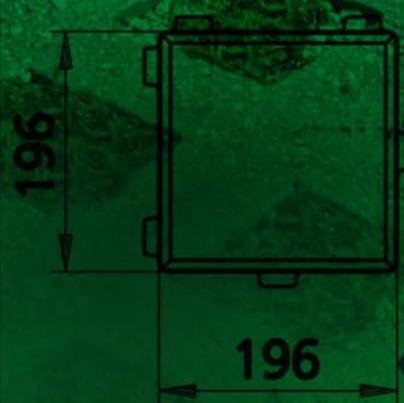


**THE TREMRON GROUP**  
**Permeable Paver Guide**

**AquaPaver & SF-Rima®**  
 Permeable Interlocking Concrete Pavers

$$\frac{180 \text{ cm}}{10^{-3} \text{ cm/sec}} = \frac{180 \text{ cm} + 30.5 \text{ cm}}{180 \text{ cm}} = 28.175 \text{ sec.}$$



Permeability means  
 Ease of passage of  
 water  
 through the material

Porosity  
 % of porosity  
 material

- Concrete Pavers
- 2" AASHTO #69 Aggregate Bedding
- 4-oz. Non-Woven Geotextile
- 2" Drainage Cell
- 4-oz. Non-Woven Geotextile
- 10" Sand (<5% Fines) with 2" Drainage Cells at 16" Spacing as Vertical Drains
- 4-oz. Non-Woven Geotextile

25" Uncompacted

100% Compacted

100% Compacted

**MIAMI**

11321 NW 112th Court  
 Medley, FL 33178  
 800.567.1480 or  
 305.825.9000  
 Fax 305.823.6614

**JACKSONVILLE**

2885 St. Clair Street  
 Jacksonville, FL 32254  
 866.358.5900 or  
 904.359.5900  
 Fax 904.359.5901

**ARCADIA**

3144 Highway 17 NE  
 Arcadia, FL 34266  
 877.490.0990 or  
 863.491.0990  
 Fax 863.491.8990



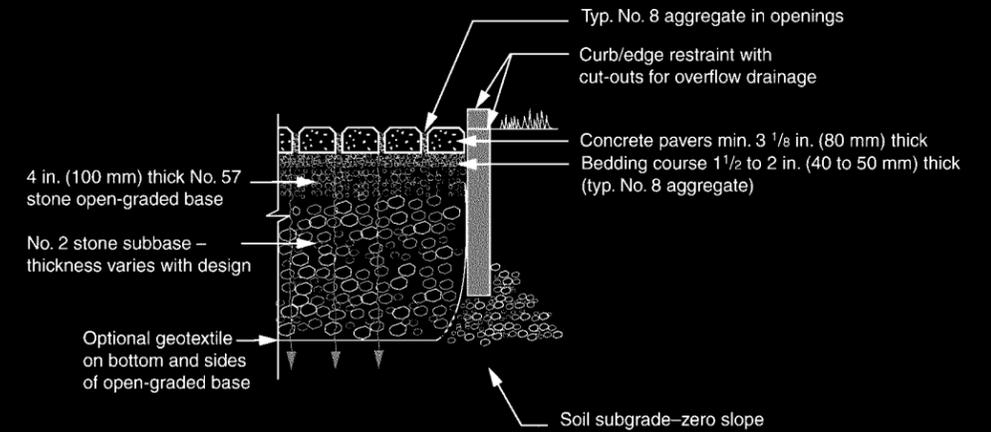
[tremrongroup.com](http://tremrongroup.com)





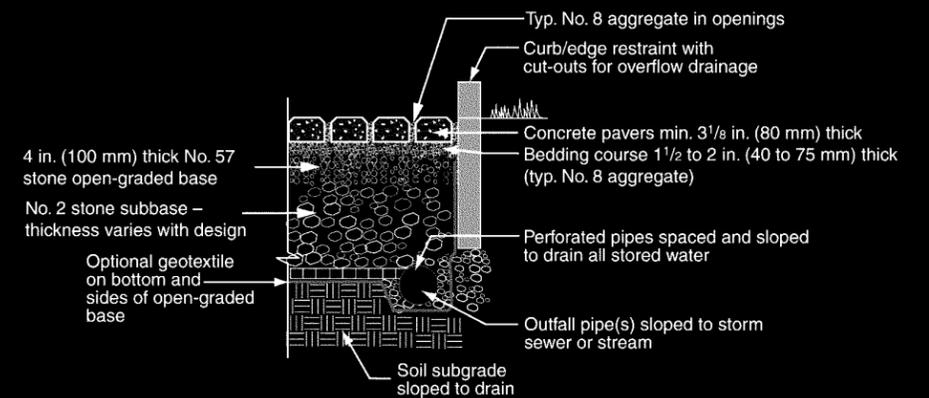
### Full Exfiltration

Scale: 1" = 1'-0"



### Partial Exfiltration

Scale: 1" = 1'-0"



# Solutions for Your Stormwater Design Challenges.

THE TREMRON GROUP  
Permeable Pavers

## 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.

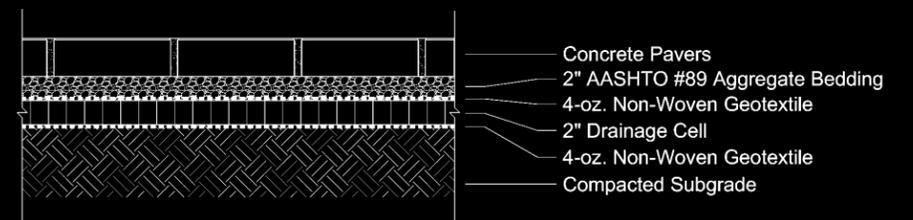
Tremron Permeable Pavers are an integral part of your sidewalk or roadway design to capture stormwater.

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.

[tremrongroup.com](http://tremrongroup.com)

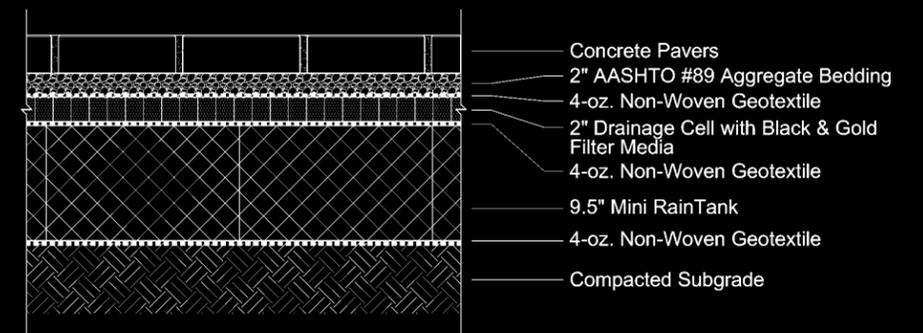
### Basic Section

Scale: 1" = 1'-0"



### Bold & Gold Media Above Rain Tank

Scale: 1" = 1'-0"



» 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.

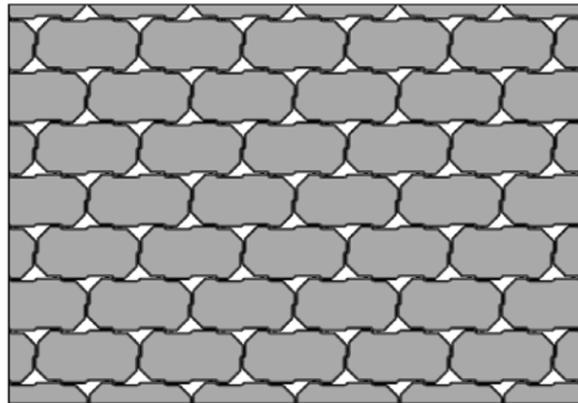
**Tremron**  
GROUP *we make it easy*

# ENGINEERED FOR FUNCTION, MANUFACTURED FOR AESTHETICS.

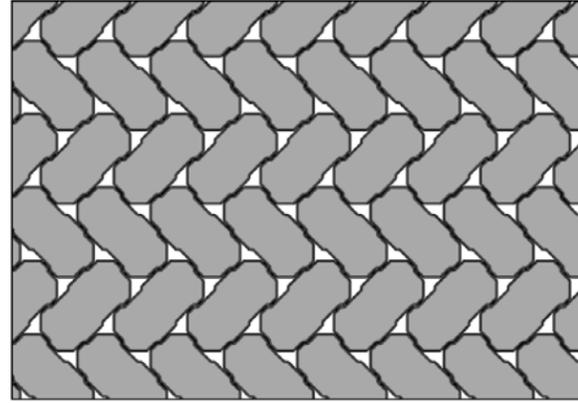
Tremron Permeable Pavers have lower life-cycle costs than asphalt and are offered in a range of colors that will let you look at roadways and parking lots differently.

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

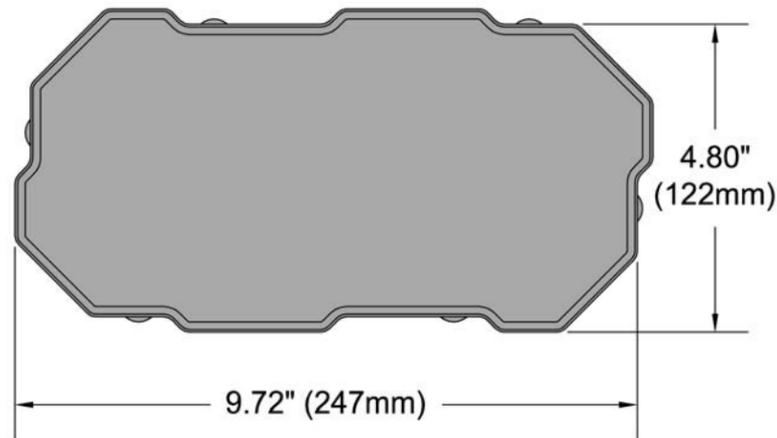
## AquaPaver



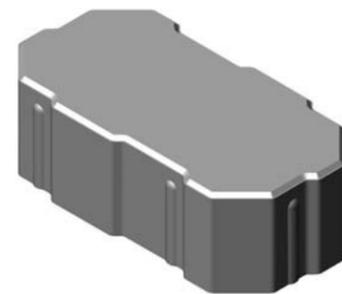
Running Bond Pattern  
Void Space (Open Area) = 9.1%



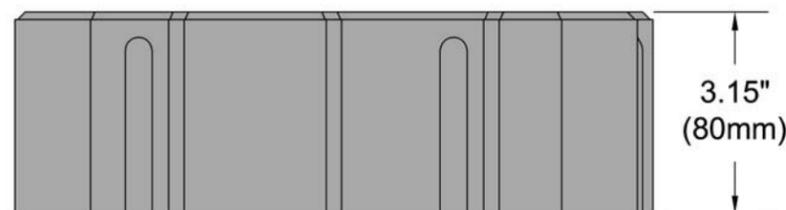
Herringbone Pattern  
Void Space (Open Area) = 10%



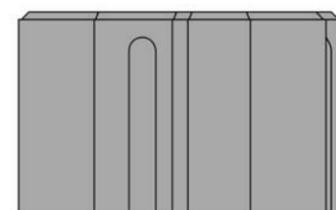
TOP VIEW



3D VIEW

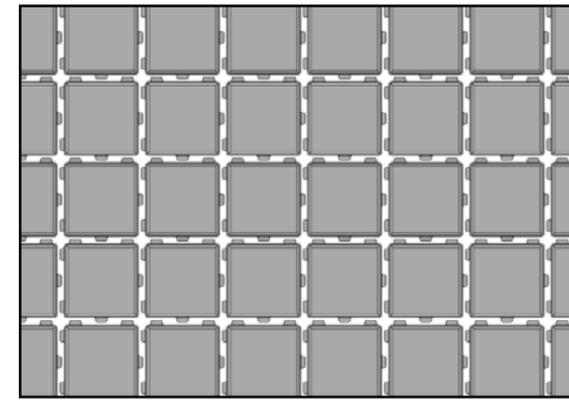


FRONT VIEW

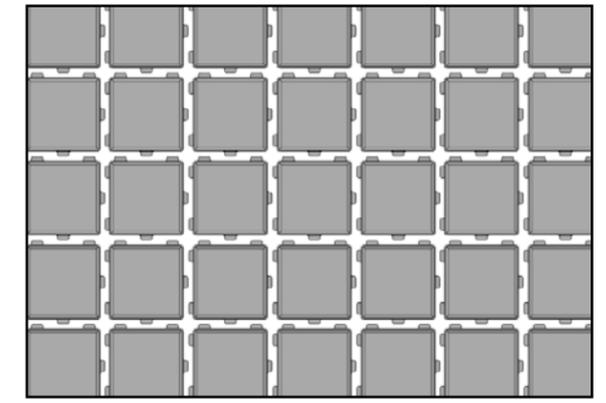


SIDE VIEW

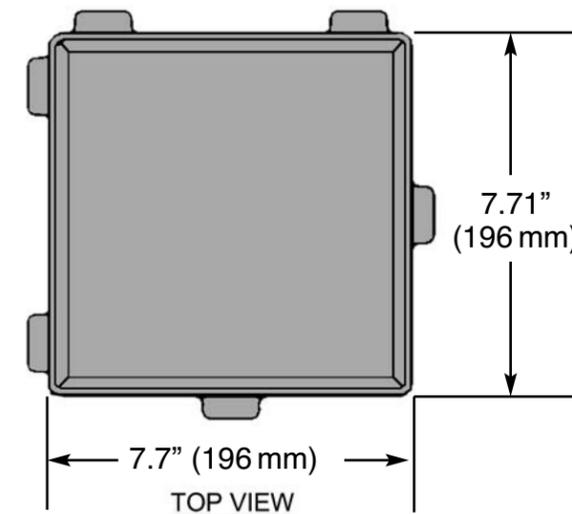
## SF-Rima®



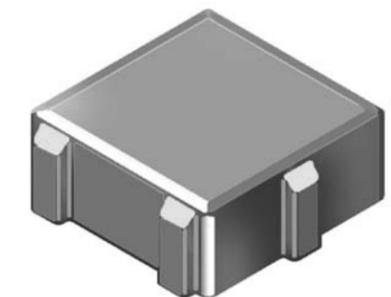
Stack Bond Pattern  
Void Space (Open Area) = .5"



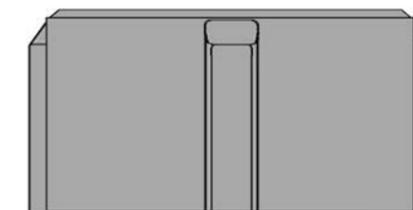
Stack Bond Pattern  
Void Space (Open Area) = 1"



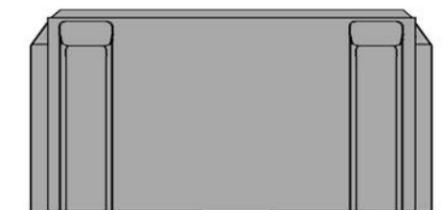
TOP VIEW



3D VIEW

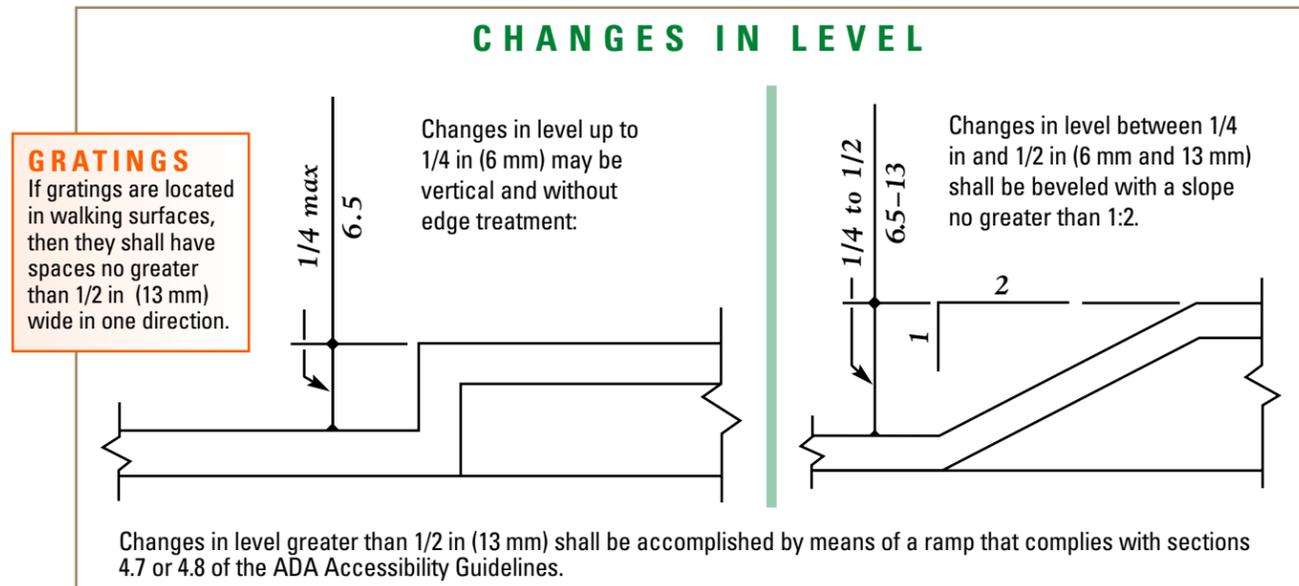


FRONT VIEW



SIDE VIEW

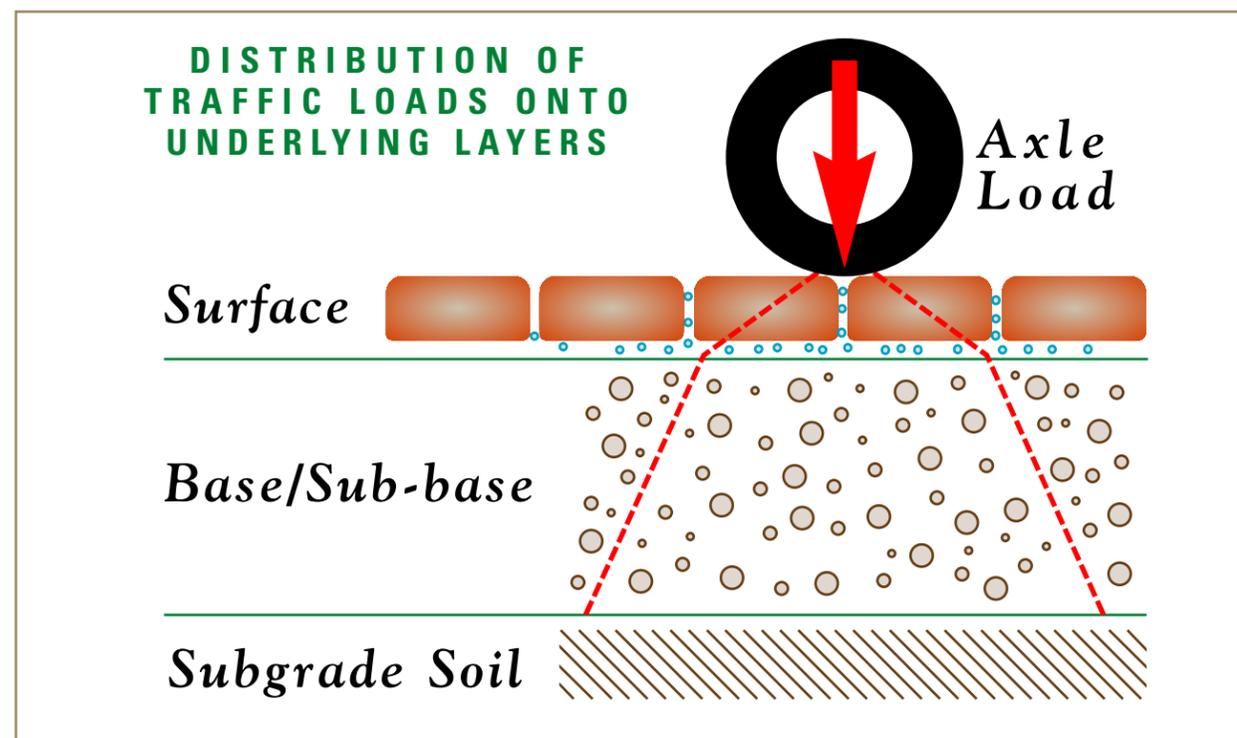
## ADA REGULATIONS FOR INSTALLING PERMEABLE PAVERS.



FROM AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES, SECTIONS 4.5.2 AND 4.5.4.

## 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.

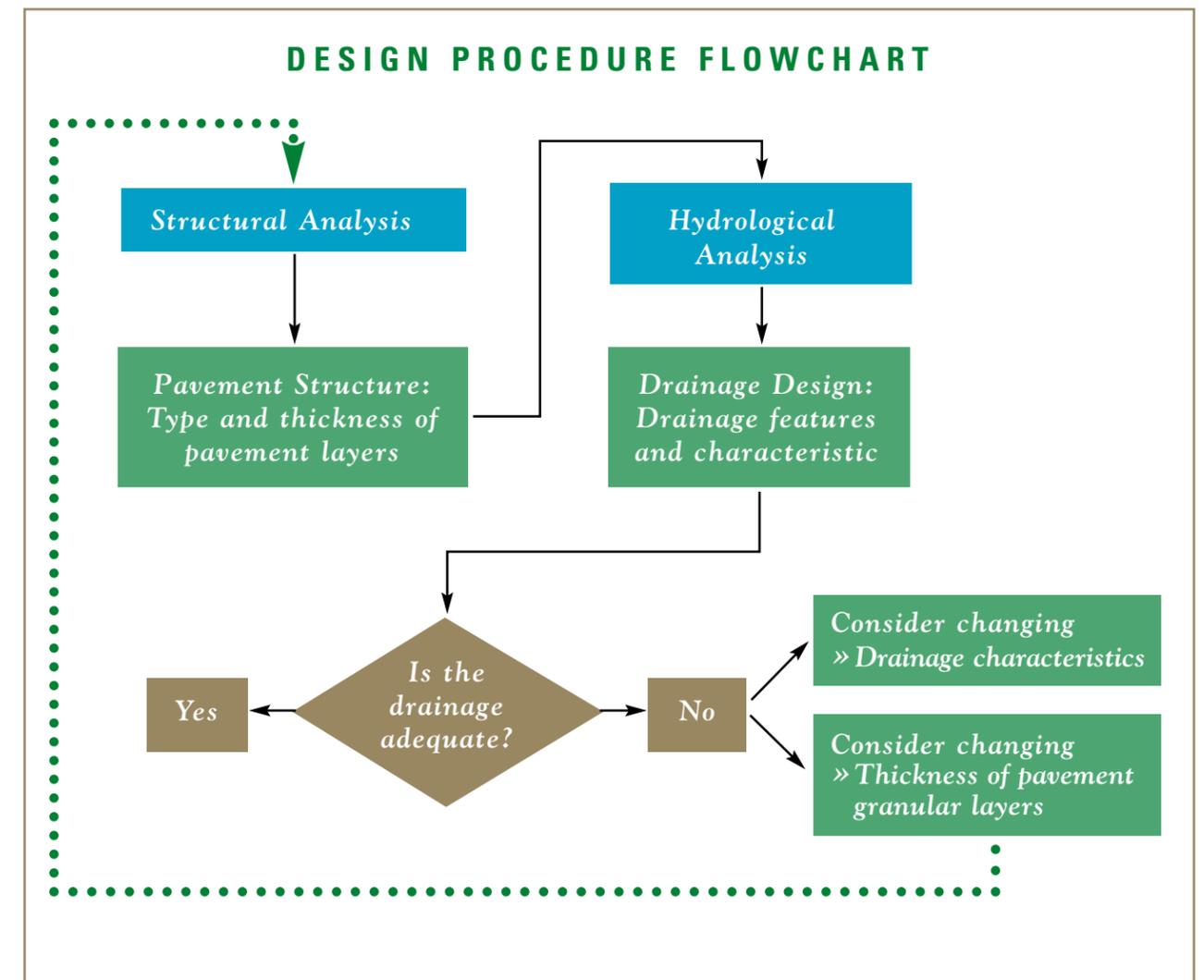


## TREMIRON PERMEABLE PAVERS: AN 8,000 PSI ROADWAY SURFACE THAT'S EASY TO CLEAN, WITH NO CATCH BASINS REQUIRED.

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.

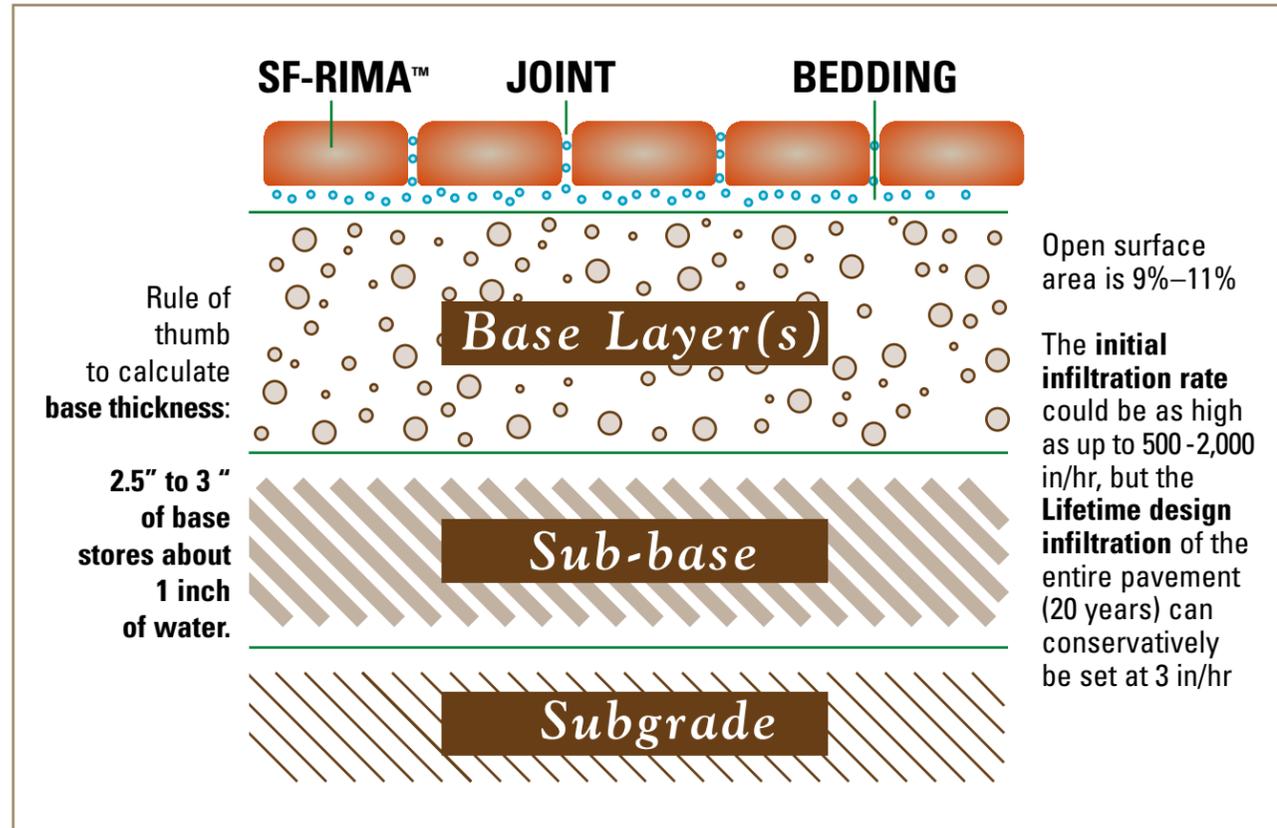
### POLLUTION REMOVAL EFFICIENCIES.

**Zinc 62-88%**  
**Copper 50-89%**  
**Total suspended solids 60-90%**  
**Total Phosphorous 65%**



FROM "PERMEABLE INTERLOCKING CONCRETE PAVEMENT DESIGN PROFESSIONAL FACT SHEET, © 2008, INTERLOCKING CONCRETE PAVEMENT INSTITUTE."

# INFILTRATION.



# INFILTRATION RATES.

**MEASURED FIELD INFILTRATION RATES OF SF-RIMA™ (DATA FROM BORGWARDT 1995)**

Inst. No.	Application	Age	Joint Filling	Infiltration Rate	
				l/sec x ha	in/hr
1	Storage Area	New	Chippings, 2/5 mm	640	8.7
2	Parking Lot	2 yrs	Chippings, 2/5 mm	140	2.0
3	Parking Lot	4 yrs	Chippings, 2/5 mm	230	3.2
4	Parking Lot	4 yrs	Chippings, 2/5 mm with vegetation growth	210	2.9
5	Parking Lot	New	Sand	120	1.7
6	Parking Lot	5 yrs	Sand	20	0.3

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 m<sup>2</sup> 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.

POTENTIAL LEED CREDITS AVAILABLE TO PERMEABLE PAVEMENTS			
CREDIT NO.	CREDIT NAME	CREDIT REQUIREMENTS	PRODUCT COMPATIBILITY
6.1	Stormwater Management: Rate and Quantity	To minimize impervious surfaces and to encourage the natural processes of infiltration. Determine existing site imperviousness. Design for 50 percent or less imperviousness within a 1.5 year, 24 hr peak discharge rate.	SF-Rima™ and AquaPaver permeable concrete pavements can reduce runoff up to 100 percent from frequent, low intensity and short rainstorms. The long-term infiltration rate is estimated at 75mm/hr (3 in/hr) for a 20-year initial service life. It is recommended however, to provide drainage swales to handle flows that exceed the design rainstorm.
6.2	Stormwater Management: Treatment	Removes 80 percent of the average annual post-development total suspended solids (TSS) and 40 percent of the average annual post-development total phosphorous (TP) based on the average annual loadings from all storms less than or equal to the 2-year/24-hour storm.	SF permeable concrete pavements can reduce TSS by up to 95 percent and TP by up to 70 percent.
7.1	Heat Island Effect: Non-Roof	Provide shade (within 5 years) and/or use light-colored/high-albedo materials (reflectance of at least 0.3) and/or open grid pavement for at least 30 percent of the site's non-roof impervious surfaces, including parking lots, walkways, plazas, etc.	SF permeable pavements which are light colored can assist in meeting this LEED requirement.
4.1 & 4.2	Recycled Content: 7.5 percent and 15 percent (post consumer + post industrial)	7.5 percent to 15 percent recycled content as a project average (by weight) of all Division 2-10 project materials.	Product contains 3.5 percent post-industrial and 0 percent post-consumer recycled content.
5.1 & 5.2	Regional Materials: 10 percent and 20 percent (Extracted and Manufactured Regionally)	10 percent to 20 percent of all Division 2-10 project materials (by weight) to be extracted and manufactured within 800 to 2,400 km (500 to 1,500 miles) via truck or rail respectively.	This criteria is dependent on manufacturer and site location.

