

PERVIOUS



PERMEABLE



POROUS



P A V E R S

Are they really the same?

The 3-P's and how they relate to storm water management

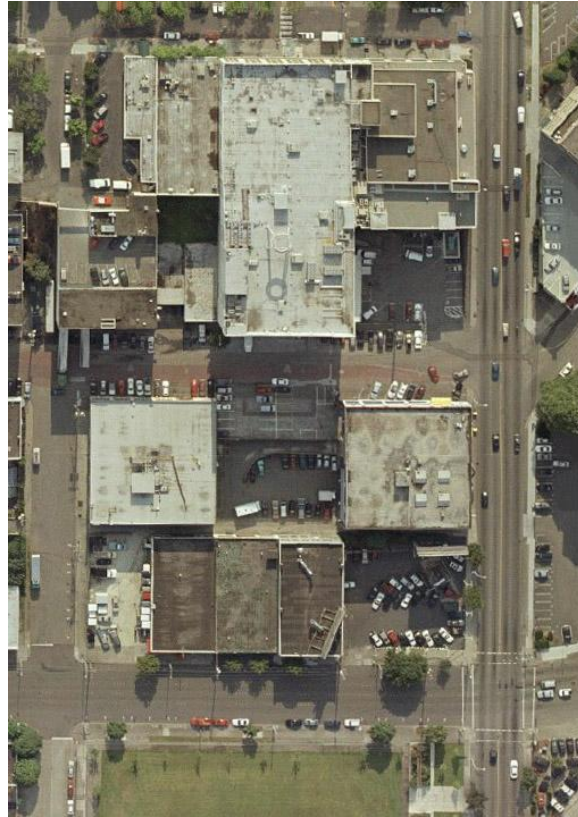
By: **Mark Walker** | Director, Business Development
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Kuert Concrete, Inc.
Corporate Office: 3402 Lincolnway West, South Bend, IN. 46628

Managing Rate and Volume to Forested Conditions



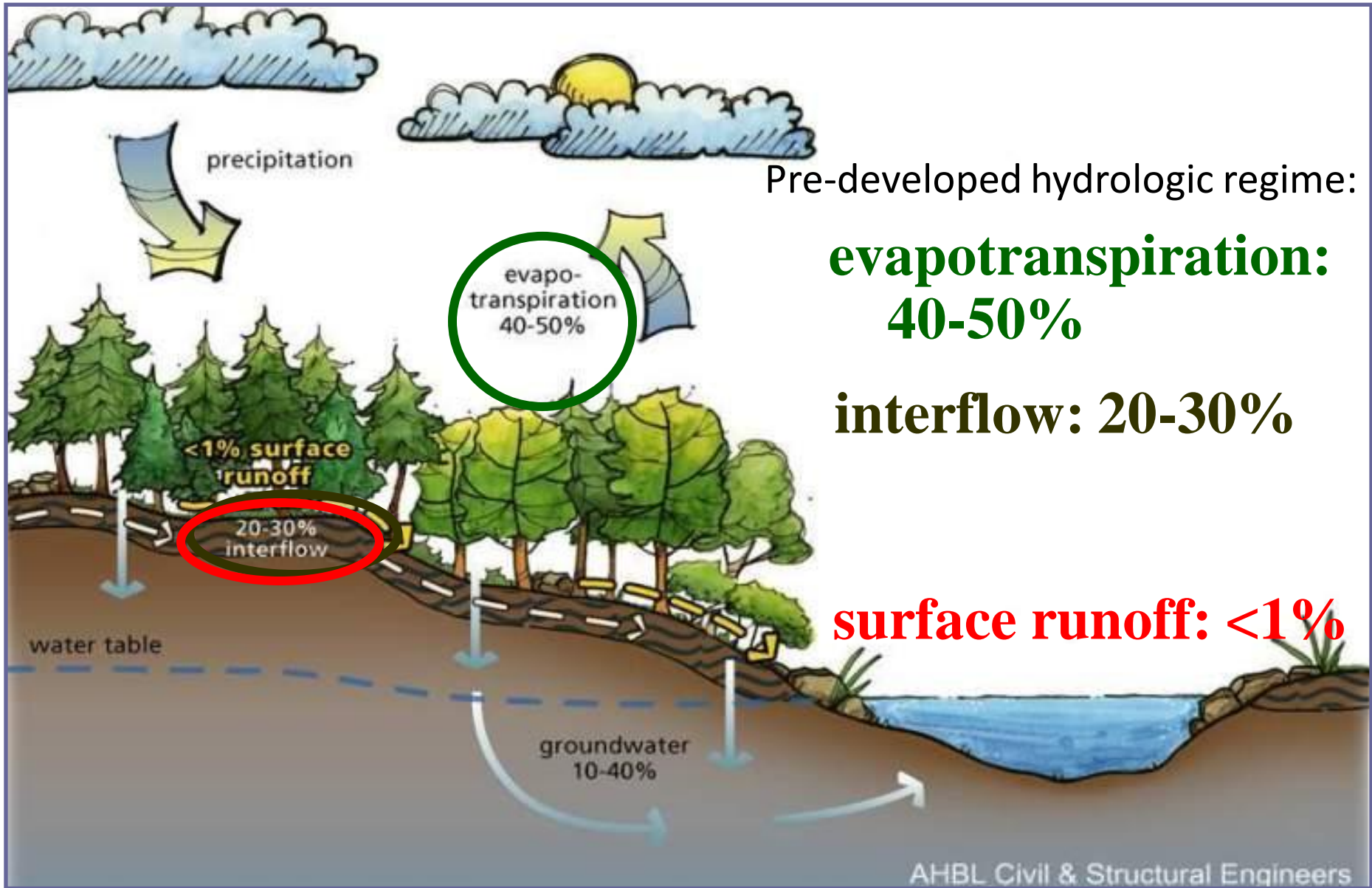
Pre-Settlement
Conditions
19th Century



Historical Urban
Development



Green
Infrastructure



Pre-developed hydrologic regime:

**evapotranspiration:
40-50%**

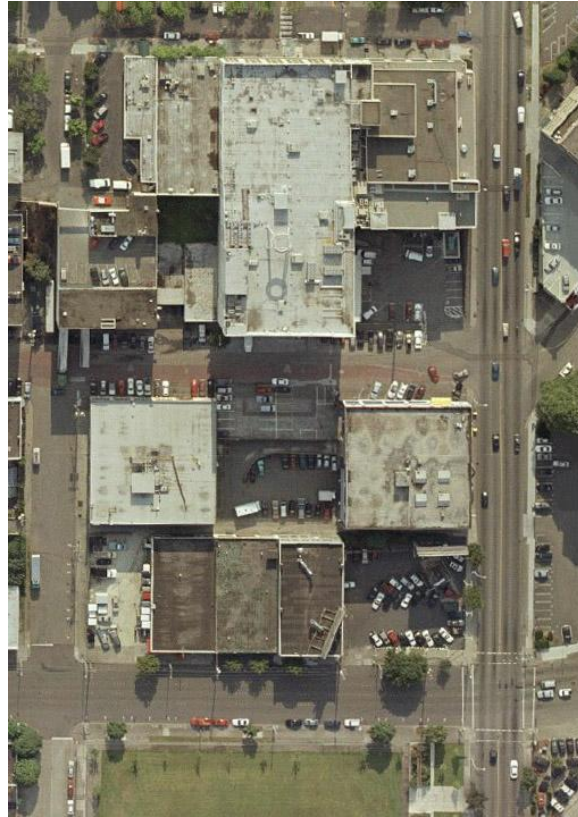
interflow: 20-30%

surface runoff: <1%

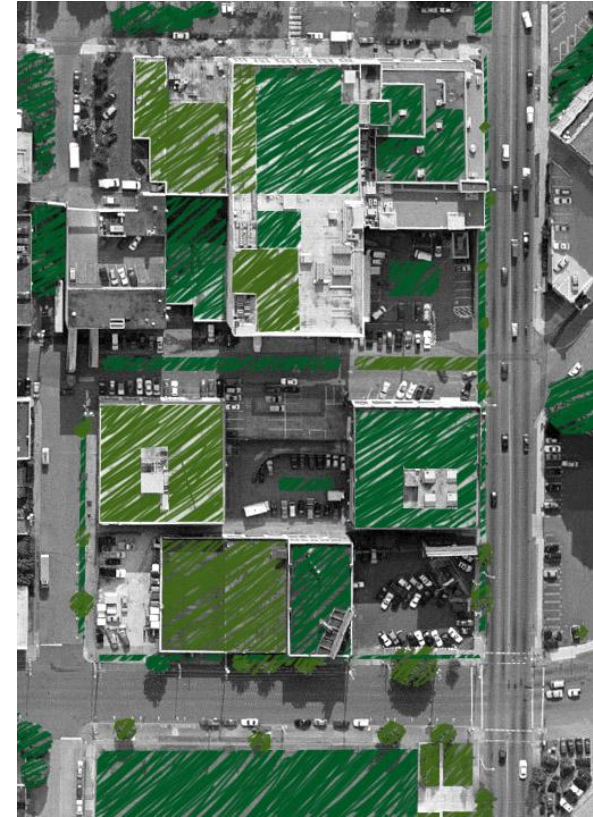
Managing Rate and Volume to Forested Conditions



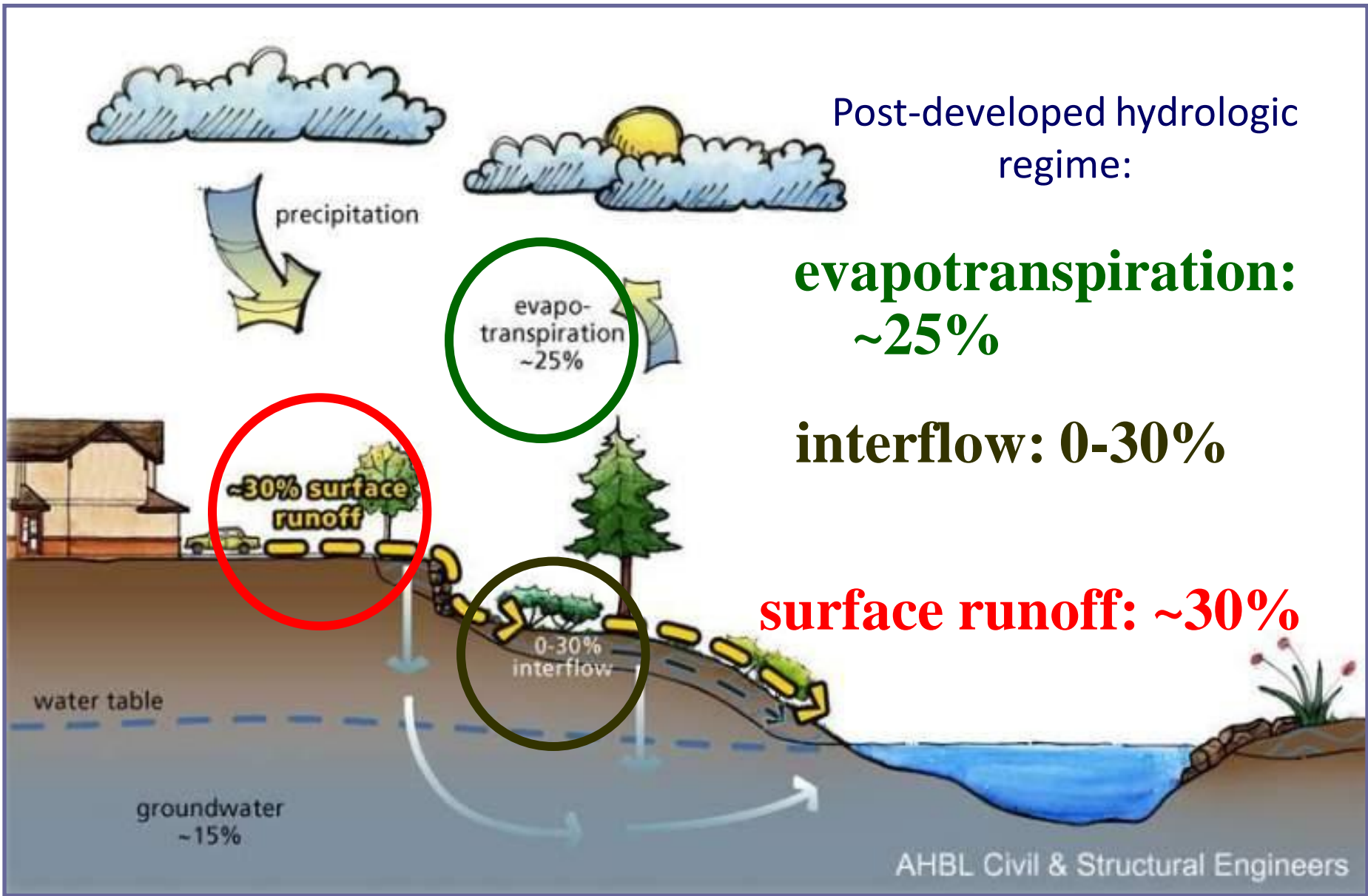
Pre-Settlement
Conditions
19th Century



Historical Urban
Development
20th Century



Green
Infrastructure



Post-developed hydrologic regime:

evapotranspiration: ~25%

interflow: 0-30%

surface runoff: ~30%

~30% surface runoff

0-30% interflow

water table

groundwater ~15%

AHBL Civil & Structural Engineers

Water Quantity and Volume

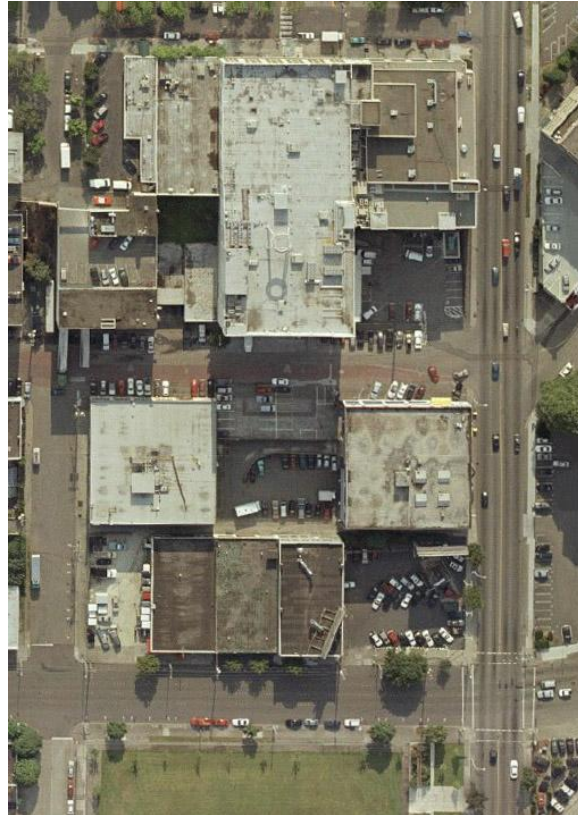
- Increased peak flows
 - Accelerated erosion
 - Habitat degradation
- Increased runoff volume: flooding and SS Overflows



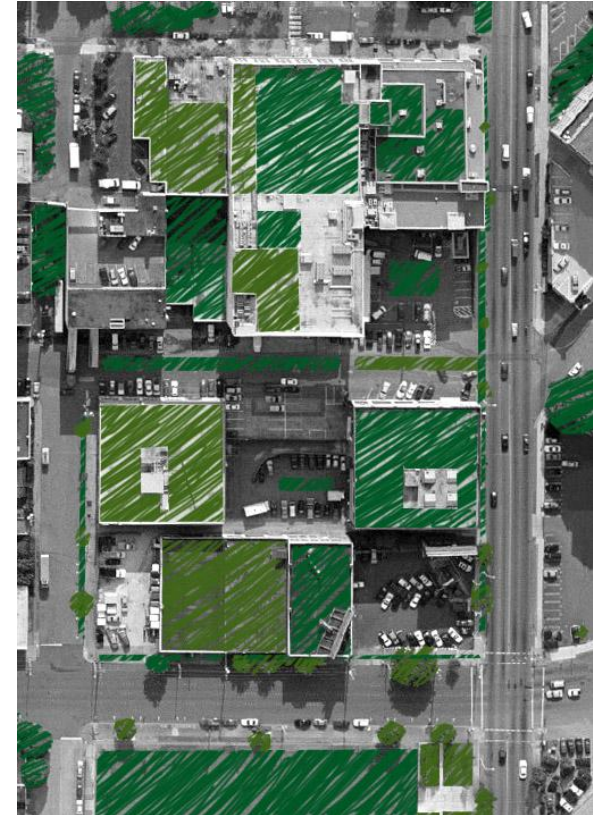
Managing Rate and Volume to Forested Conditions



Pre-Settlement
Conditions
19th Century



Historical Urban
Development
20th Century



Green
Infrastructure
21st Century

Several attempts have been utilized in minimizing storm water run-off issues caused by impervious surfaces.

Impervious Concrete



Impervious Asphalt



Poor-Mans Permeable
Pavement



Pervious Concrete
(No-Fines Concrete)



Pervious Asphalt



Wood/Rubber Mulch



Permeable pavers are comprised of a layer of concrete or fired clay brick pavers separated by joints filled with crushed aggregate. Permeable pavers are different from pervious and porous pavers, as rainwater passes around the paver opposed to passing through the paver.



Porous pavers are manufactured in a variety of designs and materials. Concrete turfblock for grass paving began in the mid-1940's and plastic versions were invented in the late 70's and early 80's. Porous pavers are generally a cellular grid system filled with dirt, sand, or gravel.



INNOVATIVE WATER SOLUTIONS



SUPER PERVIOUS PAVER



www.xeripave.com



Xeripave on asphalt road's edge



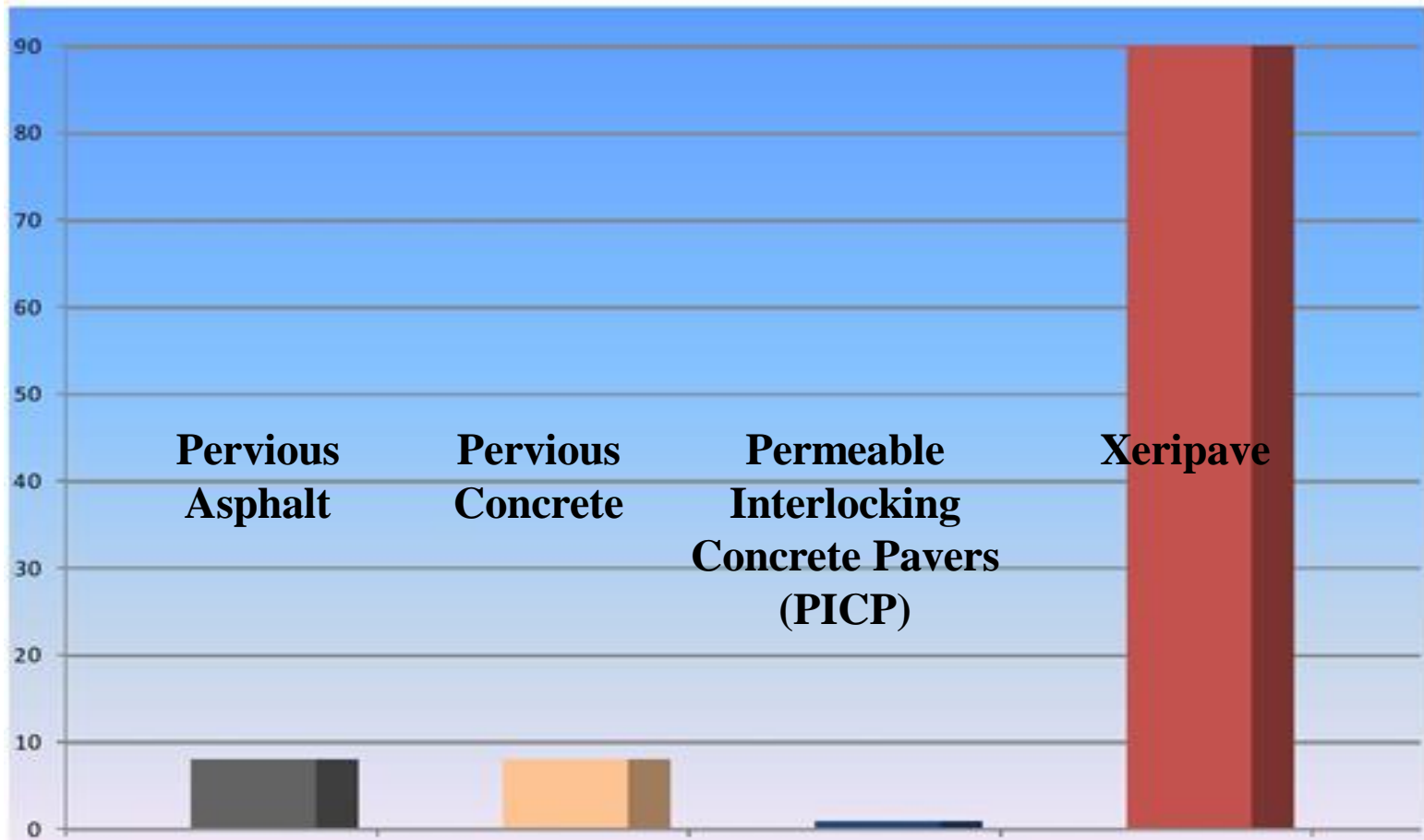
Xeripave® SUPER PERVIOUS PAVERS

- Made with natural aggregate bonded together with a high strength (low VOC) clear polyurethane binder w/UV Inhibitor
- Not affected by the Sun's UV rays or Salt!
- Not affected by freeze / thaw
- ADA Slip / Skid resistant



<i>Xeripave Slab Pavers</i>	
Size	Application
12" x 12" x 2"	Cart paths & pedestrian traffic
12" x 12" x 4"	Vehicular traffic, Alleyway projects
16" x 16" x 2"	Cart paths & pedestrian traffic
<i>XeriBrix Pavers</i>	
4.5" x 9" x 2.38"	Vehicular traffic, Alleyway projects
4.5" x 9" x 3.125"	AASHTO HS-20 & H-20 load tested (pending)

Hydraulic Conductivity (K in/min)



Permeability of Xeripave Pervious Pavers vs. other pervious / permeable surfaces shows an average performance of 10x better hydraulic conductivity.

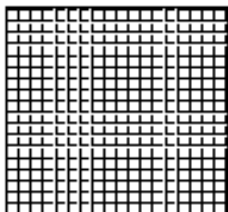
Test result for Xeripave derived from permeability of porous materials "Falling Head Test" (09-28-2006)

INNOVATIVE WATER SOLUTIONS

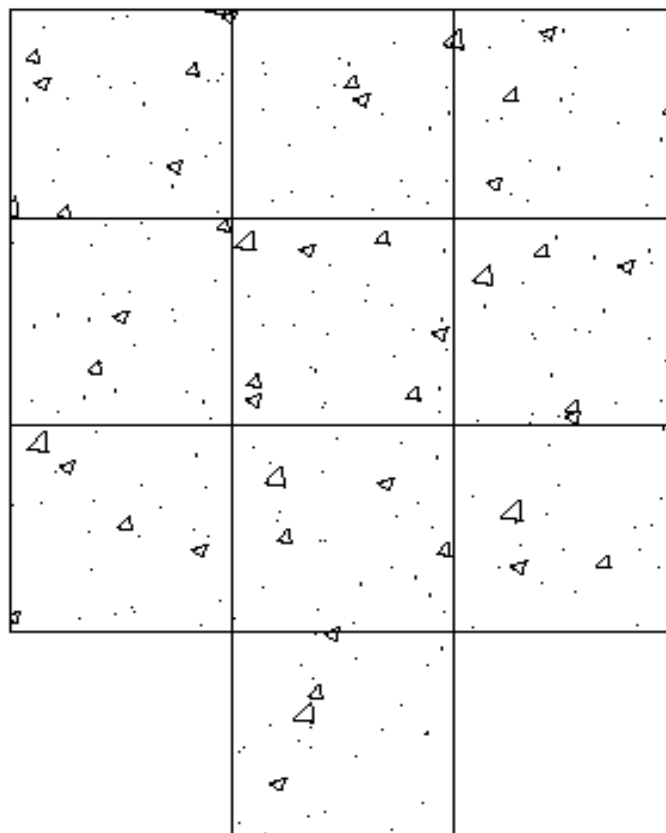


SO PERVIOUS THAT...





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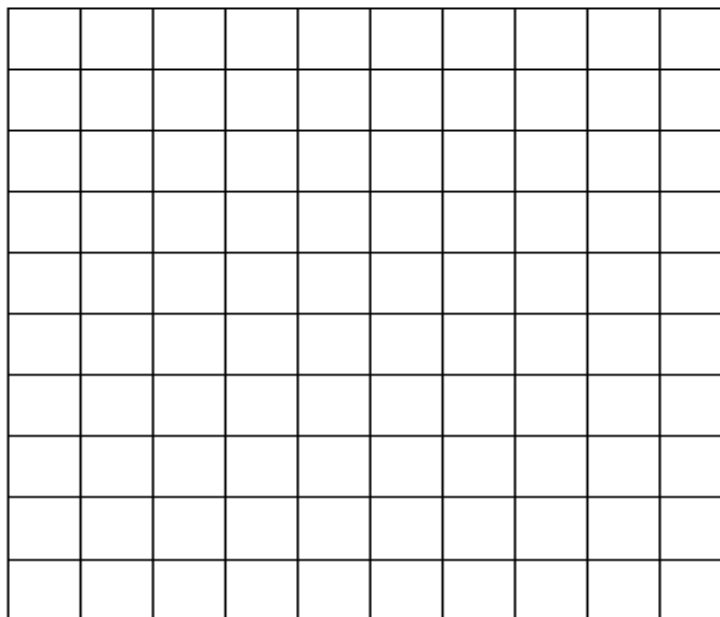
Xeripave (12" x 12" Paver)

Pervious Concrete/Asphalt (10+ sqft)

		613 N.E. 172nd Ave. VANCOUVER, WA 98084 800-377-3877 PH 360-694-0281 FAX	
TYPE: XERIPAVE vs. Pervious Concrete	DESIGNED BY: MJA	DATE: 8/2000	REVISION:
		DRAWN BY: EWB	

****FOR DEMONSTRATION PURPOSES ONLY. SEE ENGINEER FOR CONSTRUCTION DESIGN****

SO PERVIOUS THAT...



Xeripave (12" x 12" Paver)

Permeable Concrete Pavers (100+ sqft)

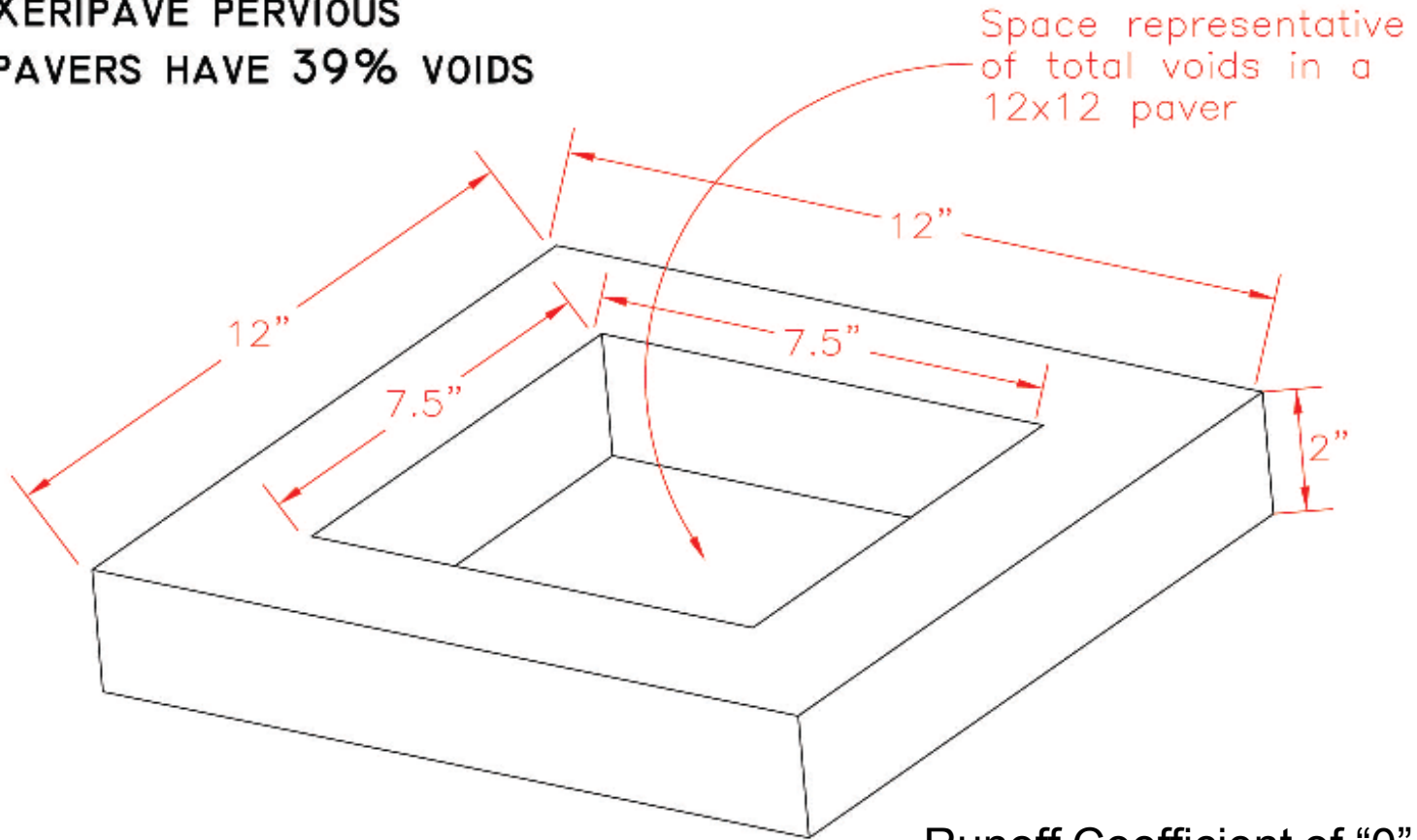
		813 N.E. 172nd Ave. VANCOUVER, WA 98044 800-377-3877 PH 360-494-0281 FAX	
TYPE: XERIPAVE vs. Permeable Pavers	DRAWN BY: MCA	DATE: 08/08/08	SHEET: 01

****FOR DEMONSTRATION PURPOSES ONLY. SEE ENGINEER FOR CONSTRUCTION DESIGN****



WHY SO PERVIOUS?

**XERIPAVE PERVIOUS
PAVERS HAVE 39% VOIDS**



Space representative
of total voids in a
12x12 paver

Runoff Coefficient of "0"

FLOW RATE WITH GRAVEL BASE- 5,220" PER HOUR

WHAT ARE THE POSSIBILITIES?





15% – 18% surface area covered in Xeripave handles 100% of entire surface!
The other remaining area can be impervious or permeable , saving on initial costs and future maintenance





*Retro-Designed
Projects*



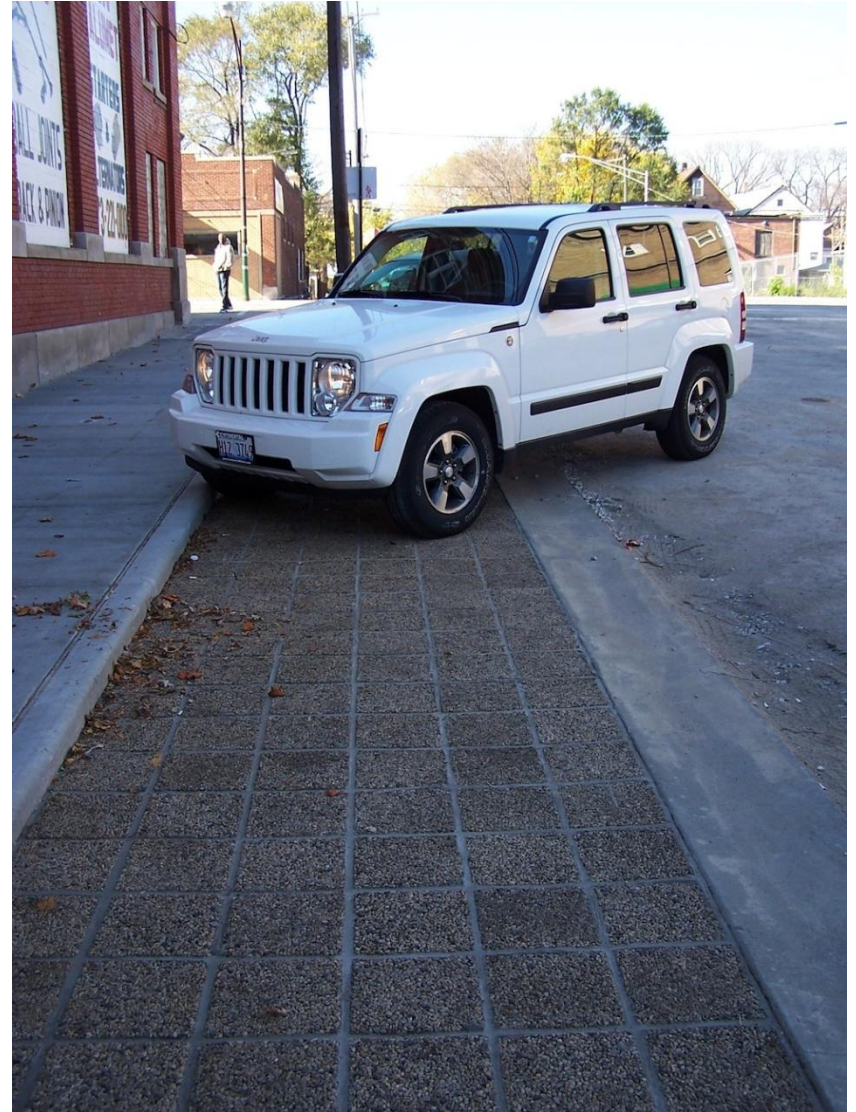


1133
JACKSON

16
Pie
Ball



CURB AREA DRAINAGE



CHICAGO GREEN ALLEYWAY



Chicago Green-Alleyway Project

The city of Chicago's Department of Transportation was intrigued by the potential for pervious pavers to inhibit flooding. So 3 years ago they began a pilot program. Project Manager Ibrahim Hadzic says pervious pavers allowed them to do partial reconstruction of alleyways with just a 2'-wide strip in the center of a 16'-wide alley, and achieve good drainage.

Ibrahim says, "We have had promising results and I expect to start using it more. If I compare the cost of pervious pavers to the cost of other solutions, they are around 20% less expensive. Which is quite a lot.

"In my opinion there is one huge advantage no one is talking about: The pervious pavers are the highest level of environmentally friendly material. If you need to modify or repave an alley, you can take the pavers out and reuse them. Other materials have to be recycled. They must be excavated and taken away to be crushed and reprocessed. And in their place you put new material."

<http://www.hardscapemagazine.com/pavers-designed-for-drainage.htm>

Hardscape Magazine February/March 2014 issue



XERIBRIX APPLICATIONS

4.5" x 9" (ASPECT RATIO)





05/15/2014 04:38



05/15/2014 05:24

TREE SURROUNDS AND SIDEWALKS USING 12" X 12" GRANITE PAVERS
AMTRAC TRAIN STATION, OREGON CITY, OR



TREE SURROUNDS / SIDEWALK





GREEN ROOF WALKWAY



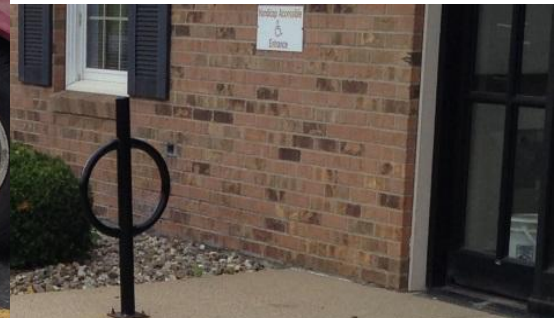


ADVENTIST HOSPITAL PORTLAND, OR





Winter 2013 Concrete-Heave Issues



BEFORE



1st Source Bank
South Bend, IN

AFTER





St. Source Bank

1751



INNOVATIVE WATER SOLUTIONS



ORACLE SOFTWARE COMPLEX BEDFORD, MA



09/16/2013 22:28

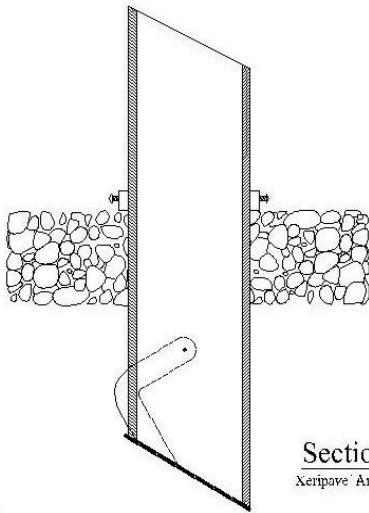
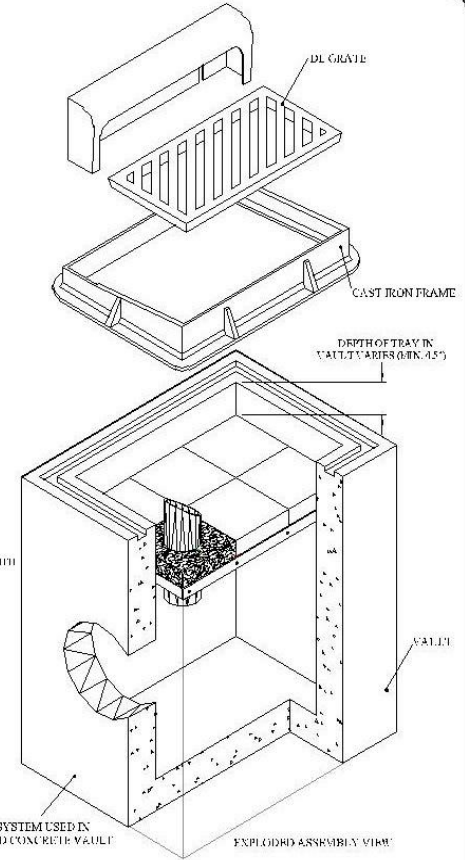
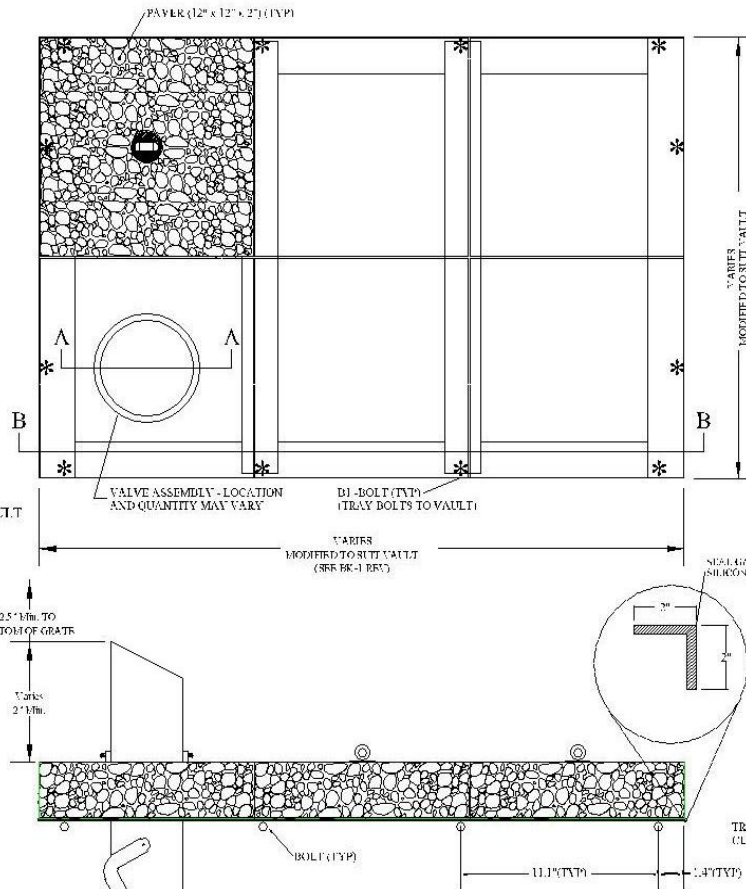
Xeripave® Storm Water Catch Basin Tray System



PHOTO OF XERIPAVE TRAY SYSTEM DURING INSTALLATION

NOTE:

- MINIMUM CLEARANCE OF 2.5" BETWEEN TOP OF OVER FLOW PIPE AND BOTTOM OF GRATE
- TRAY ASSEMBLY BOLTS TO WALLS OF VAULT
- TRAY SYSTEM USED WITH CLOSED SIDED CONCRETE VAULT
- SYSTEM CAPTURES 100% OF DEBRIS AND TRASH GREATER THAN 5mm.



Section A-A
Xeripave® Angle Iron Flapper Valve

Section B-B
Profile of Tray and Pavers

****PATENT PENDING****

		815 N.E. 172nd Ave. VANCOUVER, WA 98684 800-377-3877 PH 360-694-0281 FAX	
		TITLE: Xeripave -Paver Grate with Flapper Valve Washoe County Orange Book Spec	DRAWN BY: MLS



300 TO 400 GPM





Maintenance

Xeripave is an effective filter that requires contaminants to be removed periodically. The frequency will depend on the area contaminant profile. Typical cleaning is accomplished with a pressure washer and / or mechanical vacuum.





***LIKE CELL PHONES....
PAVERS HAVE COME A LONG WAY BABY!***



STANDARD COLORS





NORTHWEST



MONTANA



GREY

A close-up, top-down view of a large quantity of smooth, rounded pebbles. The pebbles are densely packed and exhibit a wide variety of colors, including deep black, dark grey, light grey, brown, tan, and off-white. The surfaces of the pebbles are highly reflective, showing bright highlights and dark shadows that emphasize their smooth, polished texture. The overall composition is a complex, multi-colored mosaic of natural stone.

DUPONT

A close-up, high-resolution image of granite aggregate. The background is a dense field of small, irregularly shaped stones in various shades of grey, white, and black, with some yellowish and reddish-brown spots. A semi-transparent horizontal banner is centered across the middle of the image.

GRANITE



WHITE

Questions?



www.Xeripave.com