

One PDH hour presentation on:

Porous Flexible Paving

Learning objectives:

- *Porous Flexible Paving and the difference from traditional porous paving.*
- *Components of Porous Flexible Paving*
- *Installation techniques*
- *Applications*
- *Pricing*
- *Performance*
- *Maintenance*
- *Quiz*

Landscape
Architecture
Continuing
Education
System™

LA
/CES™

EDUCATION
PROVIDER

perkepave LLC

Instructor: Tom Carroll





POROUS ASPHALT



POROUS CONCRETE



POROUS BLOCK



PAVERS

TRADITIONAL POROUS PAVING

Rigid; requires maintenance to preserve porosity. If not maintained products will need to be removed and replaced.





MDI URETHANE BINDER



GRANULATED RECYCLED TIRES



C-33 WASHED AND KILN DRIED STONE

Porous **Flexible** Paving

Flexible and extremely porous; DC Department Of Transportation's Urban Forestry Administration specified components; wire free recycled tire chips, washed and dry ASTM C 33 stone and a Methylene diphenyl diisocyanate (MDI)urethane binder.



Porous **Flexible** Paving

Extremely Porous

Producing and extremely Porous Flexible Paving; more than 2,000 gallons of rainwater will flow through a square foot of Porous Flexible Paving in 1 hour.



Porous Flexible Paving

Preparing The Base



Remove Existing



Existing Conditions



Remove soil to a maximum depth of 4" where possible; without damaging tree roots



Prepare Base



Place and tamp CLEAN 3/8-1/2 stone to an elevation of 1.5" below finish



Coat edge of mating surfaces with binder.
Note: Binder Stains



Preparing the Base



Install filter fabric to hold back soil from migrating up into the stone base



Preparing the Base



Roll or plate tamp area prior to installing paving



Temporary Forms can be staked in place



A minimum of 3-4" of clean ½" stone is recommended for under **Porous Flexible Paving** for managing stormwater runoff. Additional stone may be required depending on the engineers need for managing stormwater. Coat forms with diesel fuel or form release for ease of removal.



Temporary Forms



Temporary forms can be laid on top of the tamped stone and be moved along with the pour.



Curv Rite Edging



4000 SERIES HEAVY DUTY EDGE RESTRAINT



Porous **Flexible** Paving

Tools



Required Tools

Installation Equipment, Tools & Consumables



1- Paddle type 10 cu. ft. mortar mixer



Extra large trash bags



1- Broom



1 - Bull float



2 - Large Tarps



Form release or cooking oil



1 - Concrete rake



2- Spray bottles



2- Mag floats



1- Screed board



1 - Ex Large wheelbarrow



2 - Water buckets



Box of 2" paint brushes



Box of XL rubber gloves



1- Bottle of dish detergent



1- Garden sprayer Filled with Diesel Fuel



2- 10-20 qt. Measuring bucket



1- Wallpaper brush



Bag of rags



2 - Scrapers



2 - Razor knives

Mixer MUST be a paddle type mortar mixer. A 10 cu ft mixer is best for 2 color combinations

Porous **Flexible** Paving

Mixing and Pouring



Mist inside of mixer with form release



Mist mixer with diesel fuel or form release periodically to avoid material sticking to the inside of the mixer. Power washing the mixer with soapy water is the best way to clean the mixer.



Combine stone, rubber & binder



Mix design is per application and color choice. A typical mix will produce 16 sq. ft. (1.5" thick) in 2 minutes.
NOTE: Never introduce water into the mix and be consistent with the mix ratio and time in the mixer.



Transport to point of installation



Porous Flexible Paving falls out like wet stones; does not flow like concrete and is easy to finish. NOTE: Water reacts with the binder, installation is not to be done when raining.



Porous **Flexible** Paving

*Raking, Screeding &
Finishing*



Rake and screed perkE pave



Screeding **Porous Flexible Paving** very important and the first phase of finishing. It is necessary to achieve a flat surface .



Coat tools with Cooking Oil



Coating floats with a cooking oil or form release agent is the key to a smooth finish. The form release agent creates a film that keeps the binder from sticking to the floats; apply often..

perkE pave Finish



Porous Flexible Paving may exhibit a sheen or flat finish depending on the moisture in the atmosphere when installed. This finish will weather over time, to a consistent flat finish. Material should be installed within temperatures of 40-90 degrees F



Place Material



Pour, rake and screed material.



Finish surface with Mag float coated with cooking oil



Porous Flexible Paving

Application Examples



Road Verge



Perfect for managing stormwater. Build a stormwater vault in the area between the curb and the sidewalk and cap it with **Porous Flexible Paving** ; allowing rain water to trickle down into the aquifer.



Tree Damaged Sidewalks



Replace tree root damaged side walks with **Porous Flexible Paving** ; allowing rain water to feed the tree and cause the tree roots to grow down into the soil.



Paths Through Tree Lined Areas



Assure the health of mature trees when installing a walking path; provide a **Porous Flexible Paving** for a walking surface the community will enjoy.



Permanent Mulch



Mulch is held in place with our urethane binder; holding it permanently in place for a lifetime.



Alternative To Tree Grates



Save on the costly expense of tree grates; eliminate cleaning maintenance and improve the walking experience.



Save Mature Trees



Eliminate the need to cut down beautiful mature trees to replace sidewalks.



Trench Drains



Cause stormwater to flow back into the soil before it gets to the street and into the sewer system.



Rain Gardens



Create stormwater storage under **Porous Flexible Paving** , providing water storage from parking lot run off to feed rain gardens.



Improve Walking Experience



Eliminate tree root damaged sidewalks and improve the downtown walking experience.



Porous Driveways



Minimize impervious surface and create a stormwater holding area under **Porous Flexible Paving** and pipe rain gutters and down spouts into the vault.



Bunker Lining



perkEpave is perfect for preserving the integrity of golf course sand traps



Play Grounds



perkEgrave 2" thick has been tested for a 5' fall protection over a hard surface like concrete and asphalt. Easy to maintain; unlike loose rubber and wood mulch.



Stormwater Management



Hoops Park – West Chester, PA 4,400 sq. ft. trail
Managing stormwater with an inclined perkE-pave trail



Porous Flexible Paving

Colors, Details & Specifications



Porous Flexible Paving

RUBBER COLOR OPTIONS



TAN



BLUE



REDWOOD



BLACK



GREEN



GRAY



BROWN



CYPRESS

STONE OPTIONS

Stone must be clean and dry

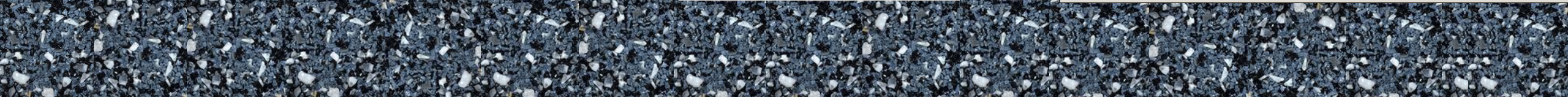


BEIGE



SALT & PEPPER

**Request
A
Sample**



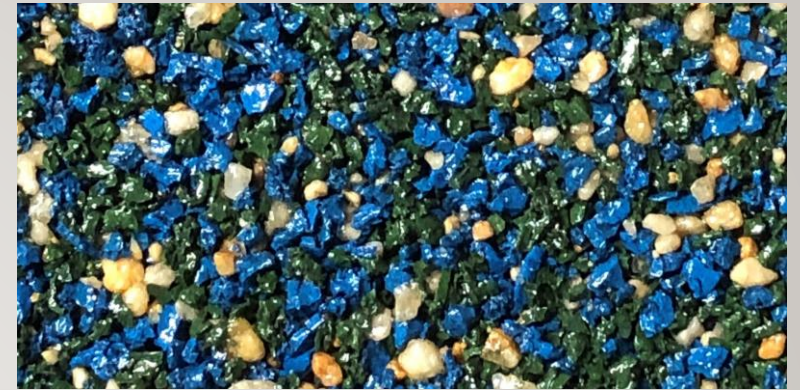
Popular Color Combinations

11 Mix

Walk, Run, Tree Pits



Tan Gray – S&P Stone



Blue Green – Beige Stone



Green Black – S&P Stone



Redwood Gray – S&P Stone



Tan Brown – S&P Stone



Cypress Black – S&P Stone



Tan Brown – Beige Stone



Black Gray – S&P Stone

Popular Color Combinations

41 Mix
Ride, Drive Park



Redwood Black – S&P Stone



Brown – Beige Stone



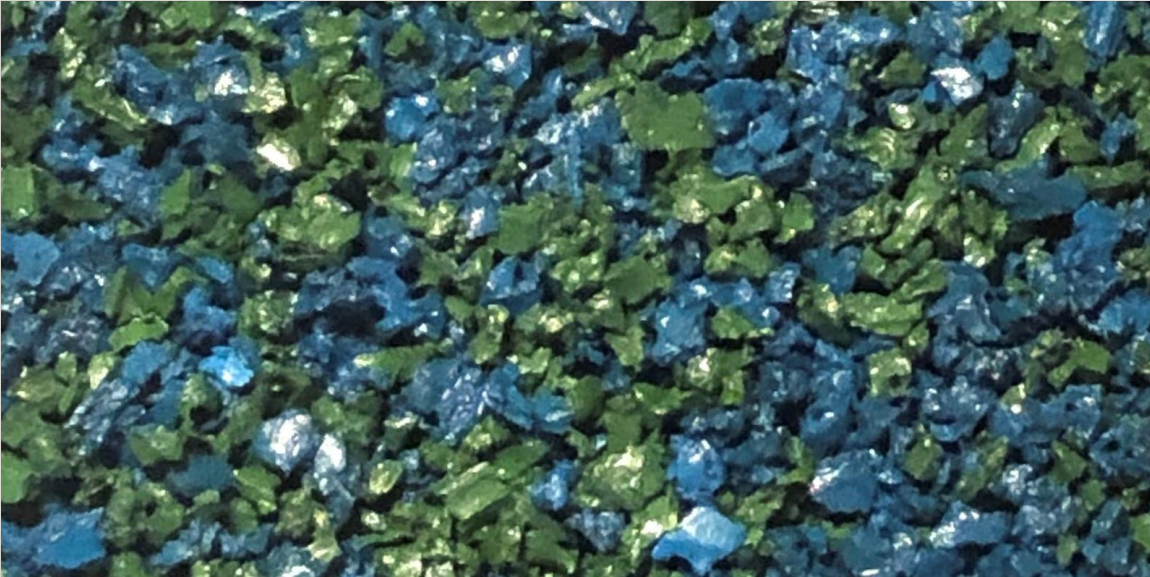
Tan – S&P & Beige Stone

Popular Color Combinations

01 Mix
Play Safe



Tan Gray



Blue Green

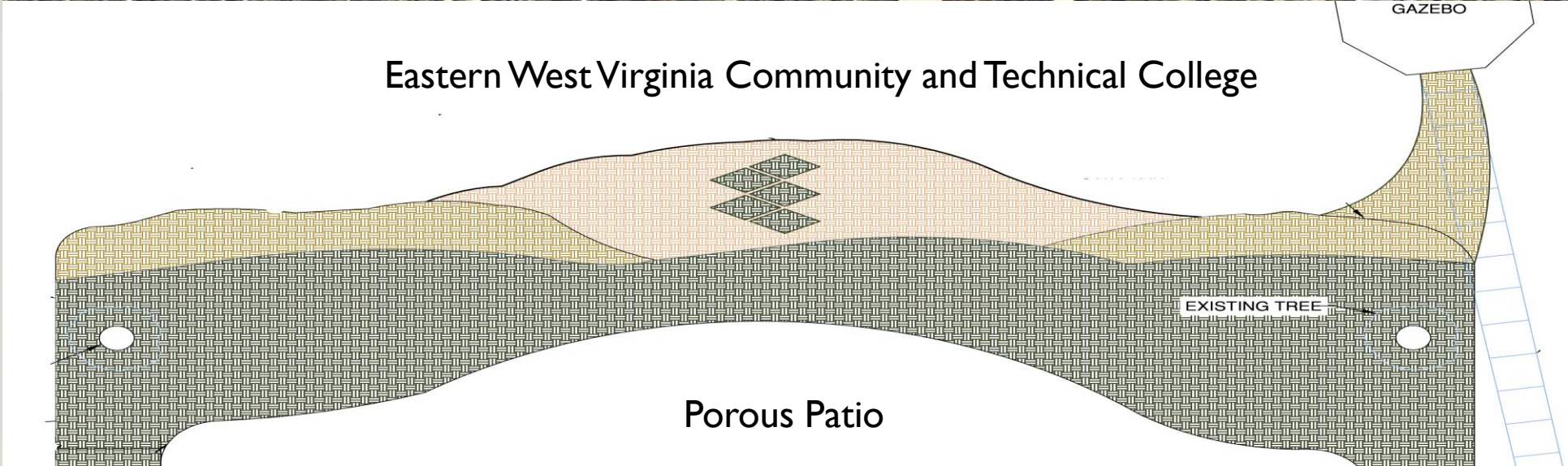


Red Blue

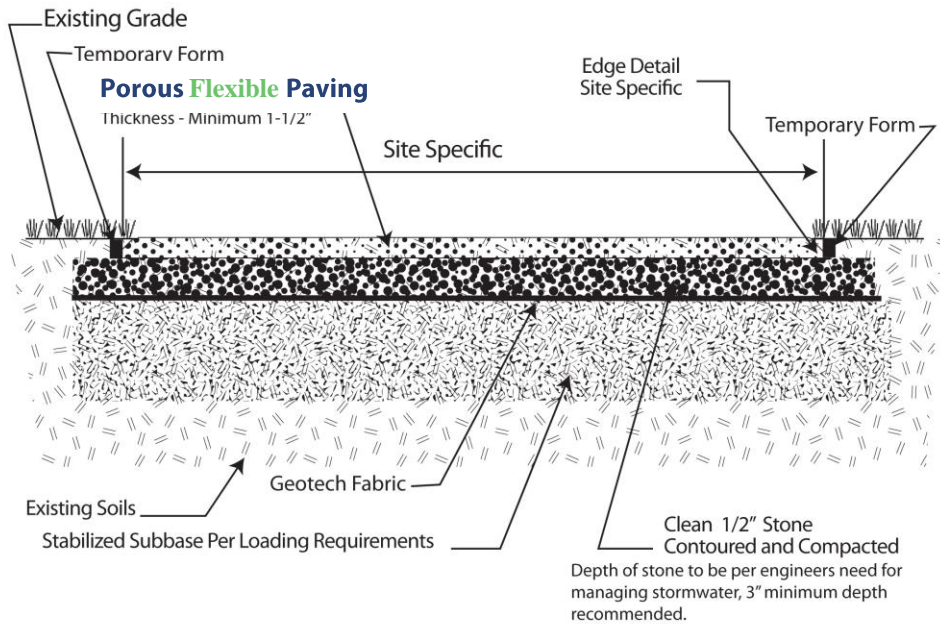
Custom

Color

Blends



Porous Flexible Paving



STANDARD ELEVATION DETAIL

Note: The 3" of clean 1/2" stone is a recommendation for creating a reservoir for holding stormwater. The actual calculation of the volume needed for managing stormwater is a function of the design professional

This drawing is the property of PerkPave designs. The drawing is being furnished for information only. The use does not represent an engineers certification of required local building codes or regulations unless it has been approved by local authorities

Porous Flexible Paving			
drw	scale	date	rev
TEC	NTS	6/15/18	0

DEFINITION

- A. Flexible Porous Paving: Paving system comprised of combination of three components: recycled passenger car tires, aggregate, and urethane binder that provides a strong, pervious, yet flexible paving.

INSTALLER QUALIFICATIONS

- A. Flexible Porous Paving installer shall be required to be familiar with installation procedures and to have attended the Manufacturer installation training program.
- B. Flexible Porous Paving installer shall employ no less than two Manufacturer-trained Flexible Porous Paving technicians on staff who directly oversee and perform the installations during all Flexible Porous Paving placement.

PROJECT CONDITIONS

- A. Protect stored rubber and aggregate from moisture by covering material with sheet plastic. Binder to be stored within a temperature range of 45 to 90 degrees F.
- B. Avoid placing pervious paving if rain, snow, or frost is forecast within 24 hours. Protect fresh paving from moisture and freezing.
- C. Base aggregate shall be a clean #57 stone.

FLEXIBLE POROUS PAVING

- A. Stone: Triple-washed and dried coarse aggregate (1/4 to 3/8 inch) per ASTM C 33. Bagged in 50 lb. quantity.
- B. Nominal maximum aggregate size shall not exceed 1/3 of the specified paving thickness.
- C. Rubber: Recycled passenger tires ground to 1/4" nominal with wire remnants removed.
- D. Binding agent: urethane liquid prepolymer based upon Diphenylmethane Diisocyanate.
- E. Mix Design: Using materials mix ratio as acceptable by the Manufacturer for the intended application.
- F. The volume by weight of aggregate shall be as required by the Manufacturer for the intended application.
- G. Forms shall be clean and free of debris of any kind, rust, and hardened concrete and make use of a Bio-diesel or vegetable oil as a form release.

EXECUTION

- A. Prepare subgrade as specified in the contract documents or as directed by the Engineer. Porous Flexible Paving has a thickness of 1.5", over Clean Coarse Aggregate (#57 stone) with 95% compaction per AASHTO T-180, with an ideal thickness of 4 inches over stabilized sub-base,
- B. Construct subgrade to ensure that the required paving thickness is obtained in all locations.

Porous Flexible Paving

*Products, Pricing
Installations & Facts*



Products & Pricing



Made With Recycled Tires

BUDGET PRICING 2020
FREIGHT INCLUDED

Description	192-896 sq.ft.	897-2,099 sq.ft.	3,000-11,999 sq. ft.	12,000 - 59,999 sq. ft. +	60,000+ sq. ft.
perkEpave is sold by the square foot at the standard thickness of 1.5". Pricing is based on the 1.5" thickness; requests for thicker installations will be factored by the 1.5" pricing quoted. Pricing includes shipping cost in Pennsylvania.	\$ 7.85	\$ 5.95	\$ 5.50	\$ 4.75	\$ 4.25

APPLICATIONS

Running Tracks, Trails, Paths, Sidewalks, Tree Surrounds, Bridge Overlays, Erosion Control, Stormwater Management, Trench Drains, Bunker Lining (Golf Courses), Horse Stalls, Wash Down Stations, Road Verge (area between the curb and sidewalk), Driveways, Parking Stalls, Perimeter Drainage, Dog Parks, Permanent Mulch, Playground Safety Surface

Installation Training: Desktop Webinar plus 1/2 day onsite supervision (PA, NJ, DE, MD, OH, VA, WV, NY, CT, RI, MA) \$650. Additional fee for outside this area

Products Line

Products are provided in various colors and can be a mix of colors to fit in with your design.

<p>11</p> <p>Walk, Run, Tree Pits</p>  <p>Assuring tree health</p>	<p>41</p> <p>Ride, Drive, Park</p>  <p>Vehicular parking No impervious surface</p>	<p>01</p> <p>Play Safe</p>  <p>Fall protection Around play equipment</p>	<p>Permanent Mulch</p> 
<p>11</p> <p>Walk, Run, Tree Pits</p> <p>A flexible walking and running surface; Walk, Run, Tree Pits relieves joint pain that comes from walking on concrete and asphalt and is also perfect for eliminating tree root damaged sidewalks</p>	<p>41</p> <p>Ride, Drive, Park</p> <p>For driveways, access roads and parking stalls; strong and durable Ride, Drive, Park will withstand vehicular traffic while reducing the chance of cracking during freeze thaw.</p>	<p>01</p> <p>Play Safe</p> <p>An permeable, recycled tire product with a softer binder; the Play Safe system is tested for 5', 6', 8', and 10' fall heights for fall protection around playground equipment.</p>	<p>Permanent Mulch</p> <p>Permanent Mulch is a lifetime product that stays in place and eliminates maintenance cost.</p>



Providing professional development education webinars on "Porous Flexible Paving"



DC department of transportation recommended product for tree damaged sidewalk replacement

Installations & Facts

- Mt Rainier, MD
- Roselle Park, NJ
- Tacoma Park, MD
- Philadelphia School District, PA
- West Chester, PA
- Eastern West Virginia Community College, WV
- Arlington, VA
- Oley, PA
- Milburn, NJ
- Ocean City, NJ
- Jenkintown, PA
- Chambersburg, PA
- New Bern, NC
- Specified as a porous flexible paving by DC DOT for the safe walks to school program.
- Extremely porous, over 2,000 gallons will pass through a square foot in one hour
- Crack resistant through freeze-thaw.
- Slip resistant and ADA suitable
- Able to support 22,000 pounds per square foot over a properly install sub-base.
- Manufactured in the USA
- Requires minimal maintenance
- Simple to install
- Made of the highest quality components
- Acknowledged by the American Society of Landscape Architects.
- Best pricing in today's market.



Porous Flexible Paving

Maintenance



Porous Flexible Paving

- Maintenance is largely dependent on the location and amount of use.
- perkEpave requires minimal maintenance
- Routine maintenance can be achieved with the use of a leaf blower
- Snow plowing perkEpave is an acceptable
- Salting perkEpave is not required

Prior to extensive maintenance

- Visually inspect the surface for sediment deposit and deterioration.
- Pour water on the area and note the perk rate.
- Vacuum area if ponding occurs.
- If after 4 to 6 years of hard use, with deterioration of the surface beginning to show; rolling on coating of perkEpave binder is the solution to maintaining the surface appearance

Maintenance is largely dependent on the location and amount of use. Keeping the surface clean and clear of debris; maintaining porosity and aesthetics of the surface is important.

Because of the 20 percent void capacity and flexibility of the recycled tires, perkEpave requires minimal maintenance. Small particles of debris will flow through the product, not stick to the recycled tire chips and accumulate in the clean #57 stone under the perkEpave to dissipate into the soil.

Routine maintenance can be achieved with the use of a leaf blower or light sweeping with a broom.

Extensive maintenance may become necessary when the porosity of the product becomes clogged (which is rare) or if the surface of the material begins to show signs of deterioration.

Prior to pursuing extensive maintenance, it is recommended the following be done on a yearly basis.

- Visually inspect the surface for evidence of sediment deposit and deterioration of the surface
- Pour water on the suspected area and note the water perk rate.
- Vacuum area if ponding occurs.
- If after 4 to 6 years of hard use, with deterioration of the surface beginning to show; a roll-on coating of perkEpave binder is the solution to maintaining the surface appearance.

Winter maintenance:

- Snow plowing perkEpave is an acceptable method for removing snow, as long as care is taken to not dig the plow blade into the surface
- Salting perkEpave is not required, but salt on the surface will not damage perkEpave.

In general; perkEpave should be maintained like any other outside surface; remove trash, leaves and debris that appear on the surface of the product and vacuum if necessary..



Porous Flexible Paving

Testing



Porous Flexible Paving

COMPRESSION TESTING

**STANDARD
(Non-Vehicular) MIX**
22,000 lbs per sq. ft.

**HIGH DENSITY
(Vehicular) MIX**
26,000 lbs per sq. ft.



CLIENT: perkEpave, LLC DATE TYPED: 9/26/18
PROJECT: perkEpave REPORT NO: PP-1
DATE RECEIVED: September 26, 2018 TECHNICIAN: CTL/G. Riegel

COMPRESSION TEST

MATERIAL: Flexible Porous Paving (4" x 4") Material

IDENTIFICATION	Standard Mix #1	Standard Mix #2	Standard Mix #3	HD Mix #1	HD Mix #2
Submitted Measurement:	1.71	1.64	1.52	1.69	1.66
Measurement after 1,000 lbs.	1.68	--	--	--	--
Measurement after 2,000 lbs.	--	1.60	--	--	--
Measurement after 3,000 lbs.	--	--	1.49	1.69	--
Measurement after 4,000 lbs.				1.65	1.56
Measurement after 10,000 lbs.	1.55			1.53	

REMARKS: The high density (HD) mix retained its rigidity structure up to 3,000 lbs. (13.5 TSF), it sprung back to original thickness within 0.10", and the destruction of its rigidity and bond was at 4,000 lbs.

The standard mix retained its rigidity structure up to 2,500 lbs. (11.25 TSF), it sprung back to original thickness within 0.10", and the destruction of its rigidity and bond was at 3,000 lbs.

Report to: – Email

Respectfully submitted,
CERTIFIED TESTING LABORATORIES, INC.

Glenn M. Riegel
Laboratory Manager

lls

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Porous Flexible Paving

Average perk rate:
2,000 gallons per
square foot per hour



perkEpavetm
 ECO friendly porous paving made with recycled tires

playsafe

2" thick = 5', 6', 8' & 10' fall protection available



6598 E Canton S. Boston Rd. | Salem, IN 47167 | USA

Engineering Consulting

Product Research

Field Testing and Inspections

Phone: 812.528.2743

Fax: 866.331.0045

www.asetervices.com

Suitability Test Report

Issued To:
 perkEpave LLC
 418 Wilson Street
 Pottstown, PA 19464
 USA

Standard:
 F1292 (2018): Standard Specification for Impact Attenuation of Surfacing Materials
 Within the Use Zone of Playground Equipment

System Name:
 perkEpave – 2 inch

Date of Suitability Testing	Jun 03, 2019
Suggested Retest Date	Jun 03, 2026
Report Number	F1292-060319-01
Pages	5

Evaluated ASTM F2970 (2015) Performance Property	Test Results @ 4 ft Fall (Avg Values)		Test Results @ 5 ft Fall (Avg Values)	
	Gmax	HIC	Gmax	HIC
Point 1	127	595	155	887
Point 2	133	602	158	890
Average	130	599	157	889

Meets a critical fall height of 5 ft using ASTM F1292-18

Notes:

1 – Key construction details are highlighted in Section 1 (page 3) of this report. Specifications and installation instructions containing these key details have been supplied and reviewed. Necessary tools and methods to achieve proper anchoring have also been addressed in the specification and installation instructions.

2 – This document contains enhanced digital and duplication security features. More information can be found on our website: www.asetervices.com/blog.

3 – This report contains 5 pages, and may not be used for commercial purposes unless it is reproduced in its entirety.

4 – Suggested Retest: Periodic retesting is suggested ASET Services in order to ensure that products continue to conform to the standard. Periodic retesting can involve lab or field testing.

Porous Flexible Paving

Quiz



What are the 3 components that make up Porous Flexible Paving?

Stone aggregate, recycled tire chips & urethane binder



What reacts with the binder and should never be introduced into the mix?

Water



How long does it take for porous flexible paving to cure?

24 hours



What is the first step in finishing the surface of porous flexible paving?

Screeding



What should be sprayed on the face of the floats to assure a smooth surface?

Cooking Oil or Form release



What is the ideal temperature range for installing porous flexible paving?

40 to 90 degrees F



How can you assure mating surfaces of porous flexible paving will not separate?

Coating the surfaces with binder



What is the average perk rate of Porous Flexible Paving?

2,000 gallons per hour per square foot.



What type of mortar mixer should be used for mixing porous flexible paving?

Paddle type



Why should care be taken when applying binder to mating surfaces?

Binder stains



perk **E**pavetm
ECO friendly porous paving made with recycled tires

Questions



Porous Flexible Paving

WEBINARS & INSTALLATION TRAINING

Webinar

- Desktop Webinar
- PDH Certificate Issued (Continuing education for self reporting professional engineers and landscape architects)

Return schedule of participants & evaluation form to receive certificate

Installation Training

- Desktop Webinar
- Onsite Supervision During Initial Installation
- Training Certificate Issued

PDH CERTIFICATE

the individual named below has attended a one hour presentation on porous paving with emphasis on the new technology of urethane based porous paving products

Name _____

Dated _____

Professionals can earn professional development hours through college courses, work-related training and conferences. Licensed workers are required to keep their own records of their participation with transcripts or attendance certificates. The licensed professional is required to submit the proof of their professional development to the licensure board in their state.

Tom Carroll Instructor

Sign 

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ECO friendly porous paving made with recycled tires
perkEpave LLC • 418 Wilson St. Pottstown, PA 19464
PH: (215) 316-6383 • www.perkEpave.com

CERTIFICATE
Installation Training Session

Company: _____

Individual: _____

Date: _____

This document serves as evidence that the above individual has attended an installation training session on perkEpave's porous paving products. perkEpave LLC manufactures' warranty is based on the installation completed by trained and qualified team of tradesmen. Faulty workmanship by tradesmen is not the responsibility of perkEpave LLC.

*ECO friendly porous paving
Made With Recycled Tires
Trails, Paths, Sidewalks, Tree Surrounds,
Driveways, Parking Stalls, Erosion Control,
Stormwater Management*

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