

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.

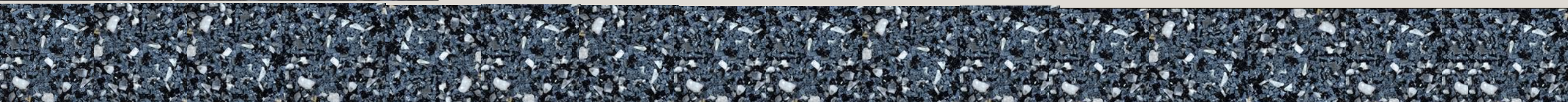




Porous **Flexible** Paving

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

Existing Conditions



Sidewalk Remediation



Tree roots search for moisture under concrete sidewalks

Pain & Arthritis



Joint damage from running on hard surfaces



Stormwater Run Off



Flooding, erosion, property damage and water pollution



Porous Flexible Paving

**Application
Examples**



Tree Damaged Sidewalks

**Sidewalks Replacements Near Trees
Slocum Farm Rd Neighborhood
South Dartmouth, MA**



perkE pave Finish



Miles Park
303 Germatown Pike
Lafayette Hill, PA

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

Trails and Paths



Alternative To Tree Grates



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

Trench Drains



Cause stormwater to flow into the ground before it gets into the sewer system.



Improve Walking Experience



Playgrounds



perkEpave — Playsafe — available in 5', 6', 8' and 10' fall protection

Paths Through Tree Lined Areas



Assure the health of mature trees; provides a **Porous Flexible Paving**; a walking surface the community will enjoy.



Stormwater Management



**Hoopes Park
West Chester, PA
Inclined path to lower
Parking lot**

Bike Lanes Through Out DC



DC Citywide Improvement Program
391 Michigan Ave NE
Washington, DC 20017

Save Mature Trees



Permanent Mulch



Porous Flexible Paving

Installation Process

Prepare The Base



Tree Surrounds



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



Prepare Base



Place and tamp CLEAN #57 stone to 1.5”
below finished elevation

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 paving installation.

Temporary Forms can be staked in place



A minimum of 3-4" of clean $\frac{1}{2}$ " 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



Installation Equipment, Tools & Consumables



1- Paddle type 10 cu. ft.
mortar mixer



Extra large trash bags



1- Broom



24" - 30"
1- Fresno Float



2 - Large Tarps



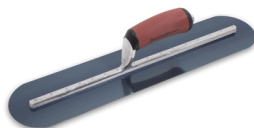
Concrete Form Release



1 - Concrete rake



2- Spray bottles



2-Fully Rounded Trowel



1 X 6 Screed board



2 - Ex Large wheelbarrow



2 - Water buckets



Box of 2" paint brushes



Box of XL rubber gloves



1- Bottle of dish
detergent



2 Garden sprayers
1 with water
1 with form release



2- 10-20 qt.
Measuring bucket



1- Wallpaper brush



Bag of rags



2 - Scrappers



2 - Razor knives

Porous **Flexible** Paving

Mixing and Pouring



Mix Materials



Rubber



Stone



Binder



Combine rubber, stone and binder in **paddle type mortar 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

Screeding & Finishing



Screed & Finish



Screeding Porous Flexible Paving is first phase of finishing.
It is necessary to achieve a flat surface; **cures in 24 hours.**



Coat tools with A Form Release



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.



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

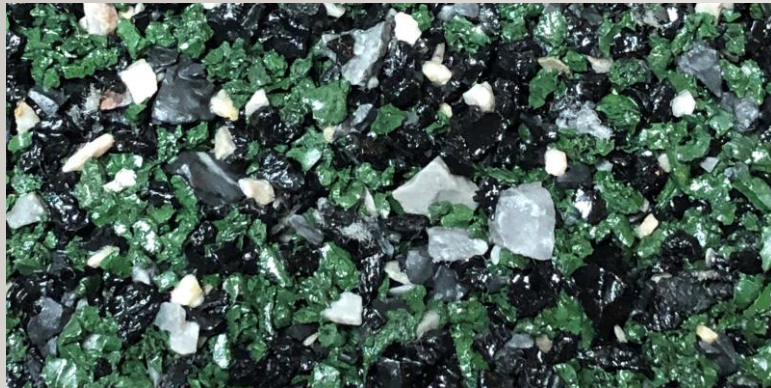
Walk, Run, Tree Pits



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



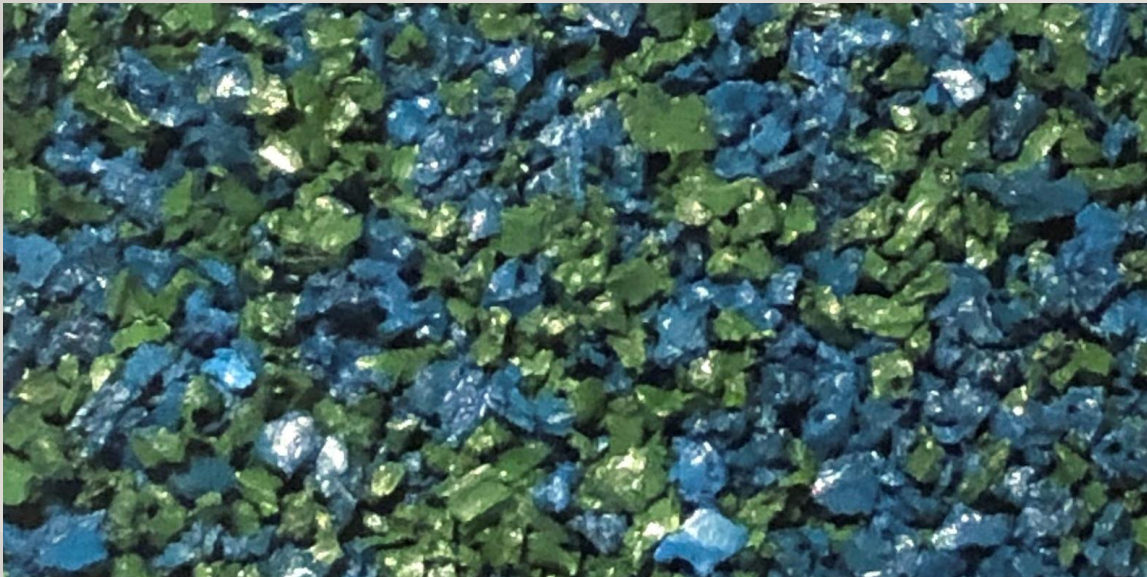
Tan – S&P & Beige Stone

Popular Color Combinations

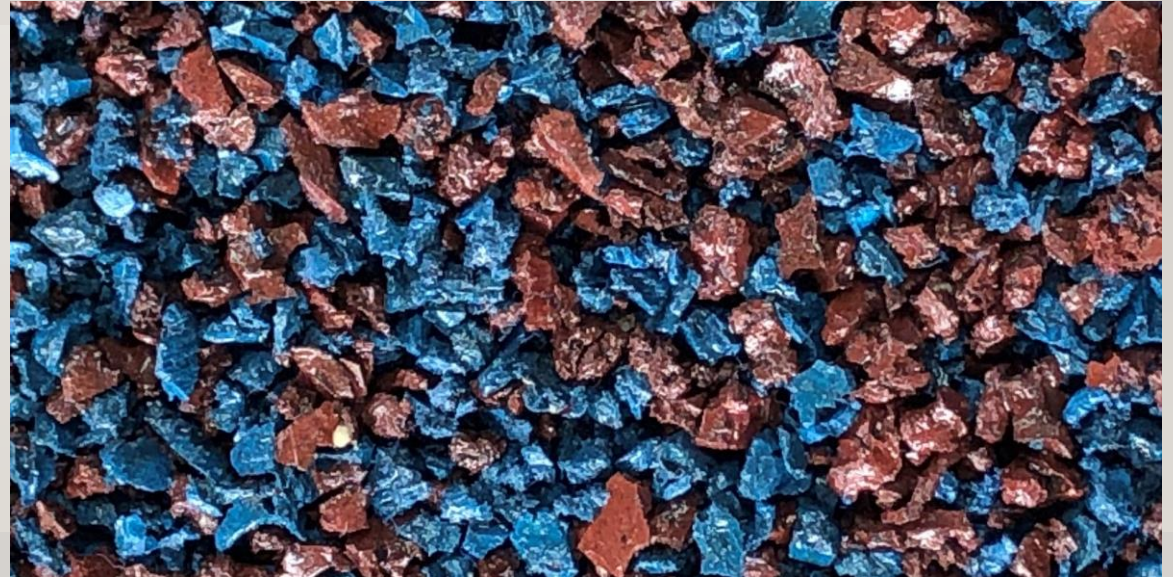
01 Mix Play Safe



Tan Gray

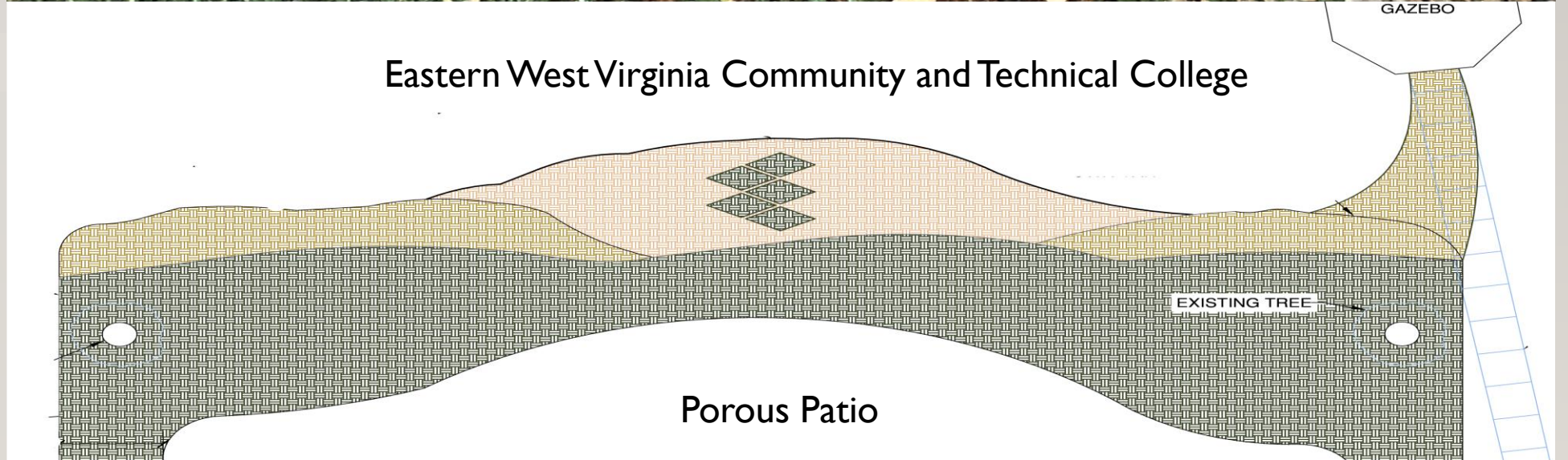


Blue Green

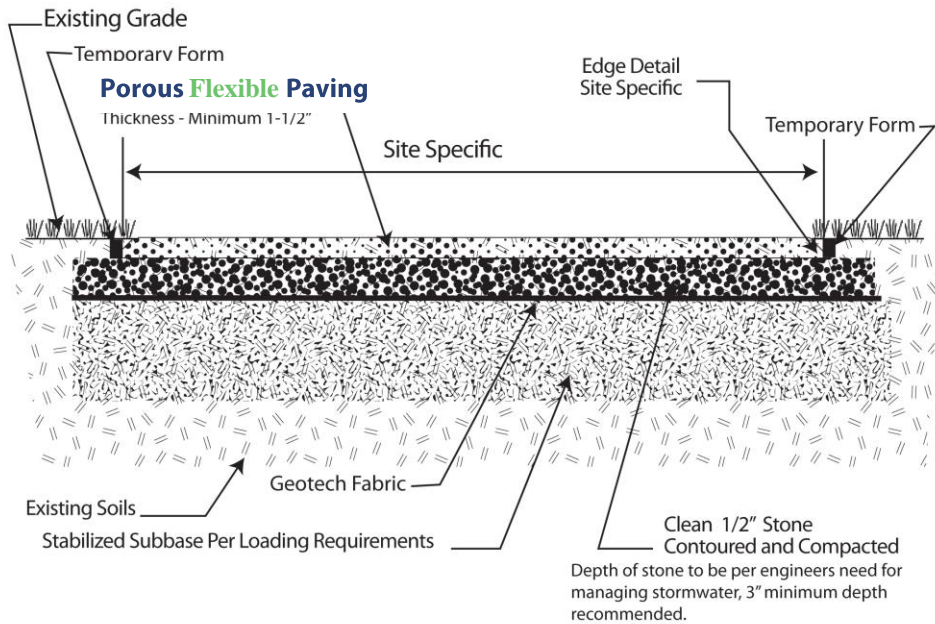


Red Blue

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

- 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

- Flexible Porous Paving installer shall be required to be familiar with installation procedures and to have attended the Manufacturer installation training program.
- 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

- 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.
- Avoid placing pervious paving if rain, snow, or frost is forecast within 24 hours. Protect fresh paving from moisture and freezing.
- Base aggregate shall be a clean #57 stone.

FLEXIBLE POROUS PAVING

- Stone: Triple-washed and dried coarse aggregate (1/4 to 3/8 inch) per ASTM C 33. Bagged in 50 lb. quantity.
- Nominal maximum aggregate size shall not exceed 1/3 of the specified paving thickness.
- Rubber: Recycled passenger tires ground to 1/4" nominal with wire remnants removed.
- Binding agent: urethane liquid prepolymer based upon Diphenylmethane Diisocyanate.
- Mix Design: Using materials mix ratio as acceptable by the Manufacturer for the intended application.
- The volume by weight of aggregate shall be as required by the Manufacturer for the intended application.
- 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

- 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,
- Construct subgrade to ensure that the required paving thickness is obtained in all locations.

Porous Flexible Paving

**Products, Pricing
Installations & Facts**



Pricing & Products

2021 Budget Pricing
Contact us for a firm price proposal



Approved Vendor

Description	360 -640 sq.ft.	641-3,000 sq.ft.	3,001-10,000 sq. ft.	10,001 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.	\$ 7.85	\$ 5.95	\$ 5.50	\$ 4.75

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

Remote webinar and onsite supervision and installation training. \$650.00

perkEpave LLC
perkepave.com
(215) 316-6383

Specified as a porous flexible paving by DC DOT for the safe walks to school program.

Extremely permeable; over 4,000 gallons of rain water can pass through a square foot in one hour

Crack resistant through freeze-thaw.

Slip resistant and ADA compliant

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



Facts

- 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 compliant
- 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.
- Competitive pricing.



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

l/s

All reports are the confidential property of Clients, and information contained may not be published or reproduced, pending our written approval.

Porous Flexible Paving

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



perkEpavetm
ECO friendly porous paving made with recycled tires

playsafe

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.asetservices.comyou

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.asetservices.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





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



perkEpavetm
ECO friendly porous paving made with recycled tires

perkEpave.com

