

PERVIOUS



PERMEABLE



POROUS



P A V E R S

Are they really the same?

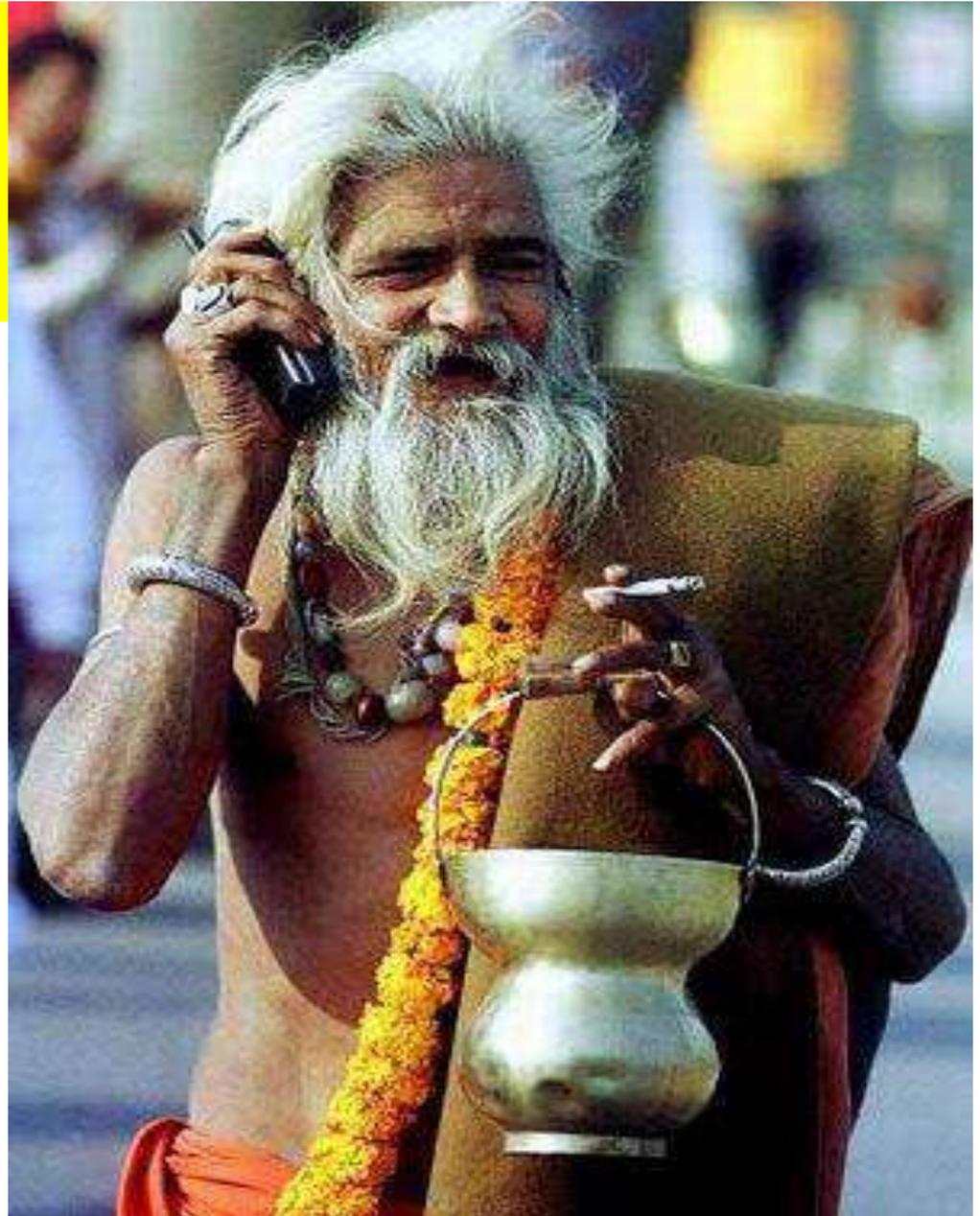
The 4-P's and how they relate to storm water management

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**\$20 Fine for Every
Cell Phone Ring!**

**Proceeds
will go to
help provide
for thirsty
Presenters**

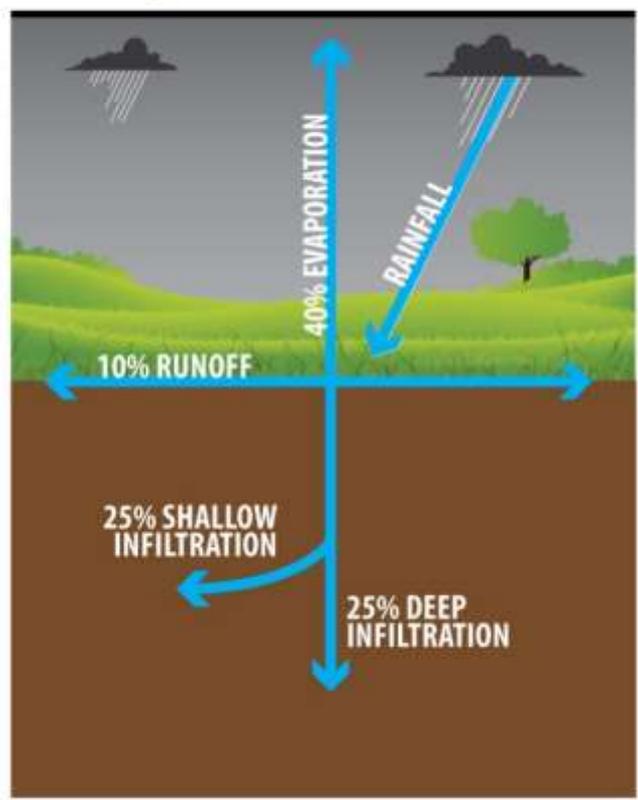


Agenda

- Background: Comparing a “Natural” vs. a “Built Environment” when considering stormwater management.
- Background: Separate & Combined Sewer Outlets, why?
- Different examples in dealing with stormwater management
 - Mulches, Aggregates
 - Permeable Pavers
 - Porous Pavers
 - Pervious Pavers
 - Percoa
- Percoa possibilities
- O&M – mandatory for all GSI projects
- Questions

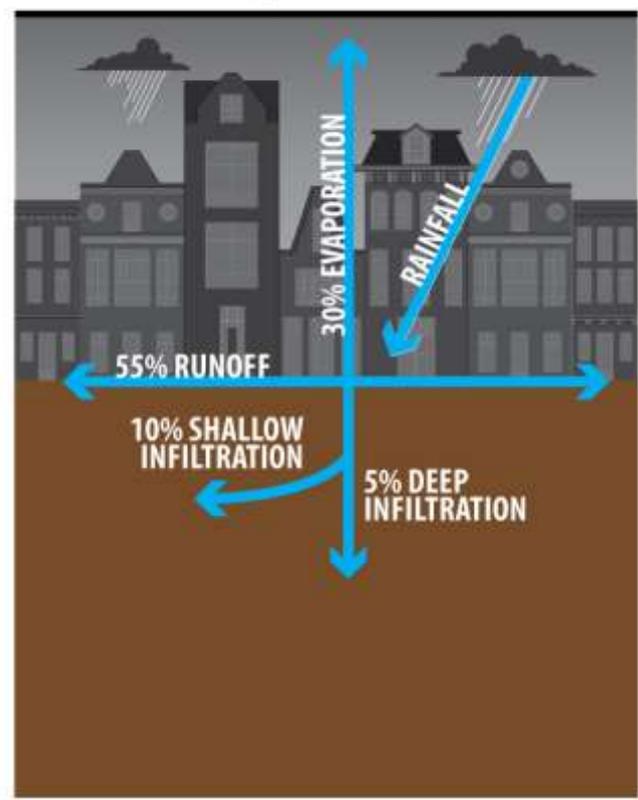
Background: Comparing Natural vs. Built Environment

NATURAL ENVIRONMENT
(natural ground cover)



Natural Environment
(0% Impervious Surface)

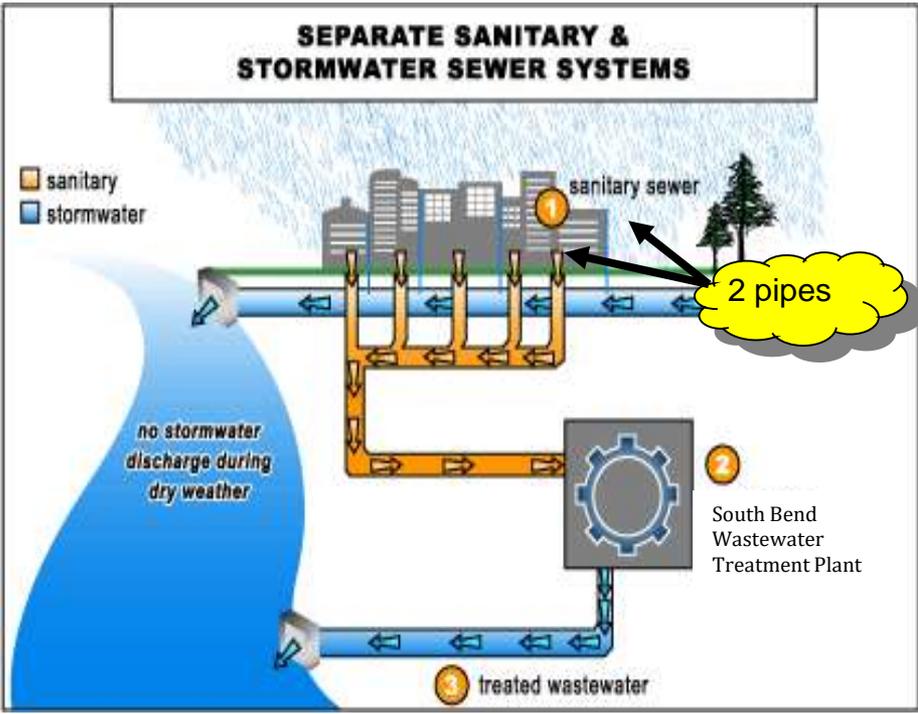
URBAN ENVIRONMENT
(75% - 100% impervious cover)



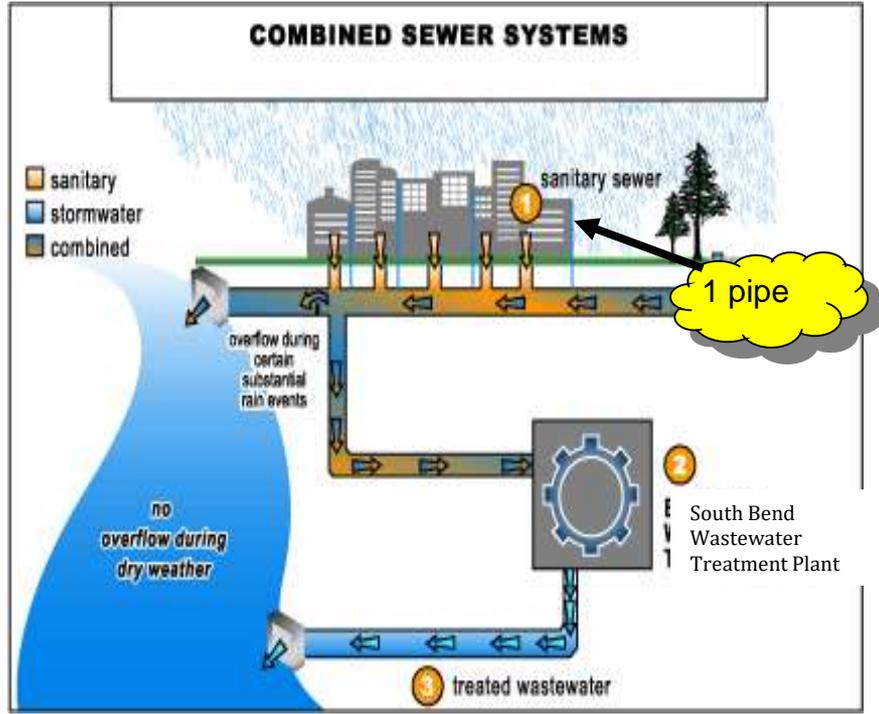
Built Environment
(75-100% Impervious Surface)

Background: Separate and Combined Sewer Systems

South Bend, Indiana (659 total miles of underground outlets)



20% (132 miles) Separated Storm
34% (224 miles) Separated Sanitary



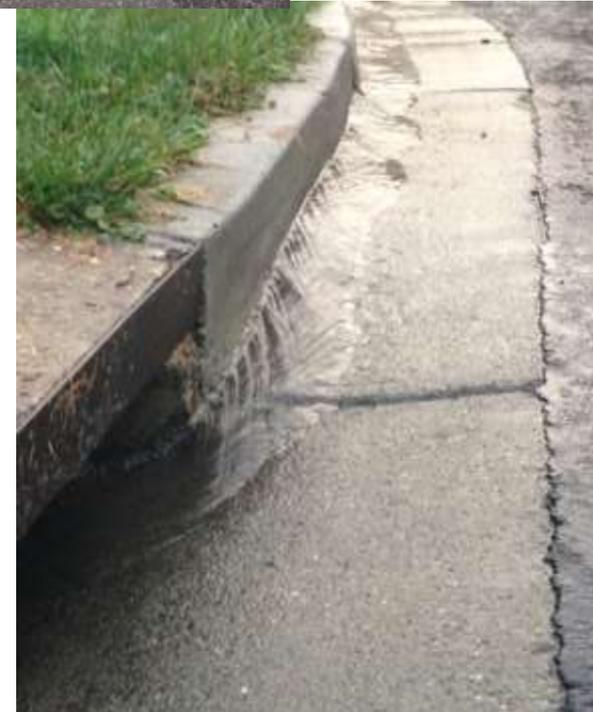
46% (303 miles) Combined Sewer Outlets

Background: Why is stormwater runoff a problem?



Stormwater:

- Carries trash, excess nutrients (such as nitrogen and phosphorus), sediment and other pollutants;
- Impacts waterbodies we use for swimming, fishing and providing drinking water.
- Increased peak flows
 - Accelerated erosion
 - Habitat degradation
- Increased runoff volume: flooding and SS Overflows



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

- ✓ Wood / Rubber Mulch
Biodegradable / washes out
- ✓ Porous Asphalt
Poorest of all SRI
- ✓ Pervious Concrete
Too many installation variables
Serious spalling issues
- ✓ Poor-Man's Permeable Pavement
Isn't this what we're trying to fix??





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.

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.



10% - 15% void
spacing filled with
ASTM #8, #9, or #89
clean crushed
aggregate



What is Percoa?

PERCOA acquires PATENT FOR PRECAST PERVIOUS CONCRETE July 8th 2014

- Patented as a segmental paver / slab with a key-way design.
- Manufactured & Steamed Cured in an environmentally controlled factory
- Reproducible strength and flow characteristics
- Pervious sections are removable & reusable
- Product arrives to project site pre-cured & ready for immediate traffic
- Paver and / or Slab sections are easily replaced
- Reduced life-cycle costs vs. poured-in-place pervious
- Adaptable to small areas (retrofits), where retention ponds are outdated or not practical
- Initial installations show a drastic reduction in the use of deicing salts over traditional bituminous and impervious concrete surfaces.
- Effectively filtrates 80% minimum total suspended solids (TSS)
- ADA Slip / Skid resistant
- Up to 7 LEED Credits: SS-C6.1, SS-C6.2, WE-C1.1, MR-C4.1, MR-C4.2, MR-C5.1, and MR-C5.2



Welcome to
MnROAD

MnROAD
Office of Minnesota Road Research

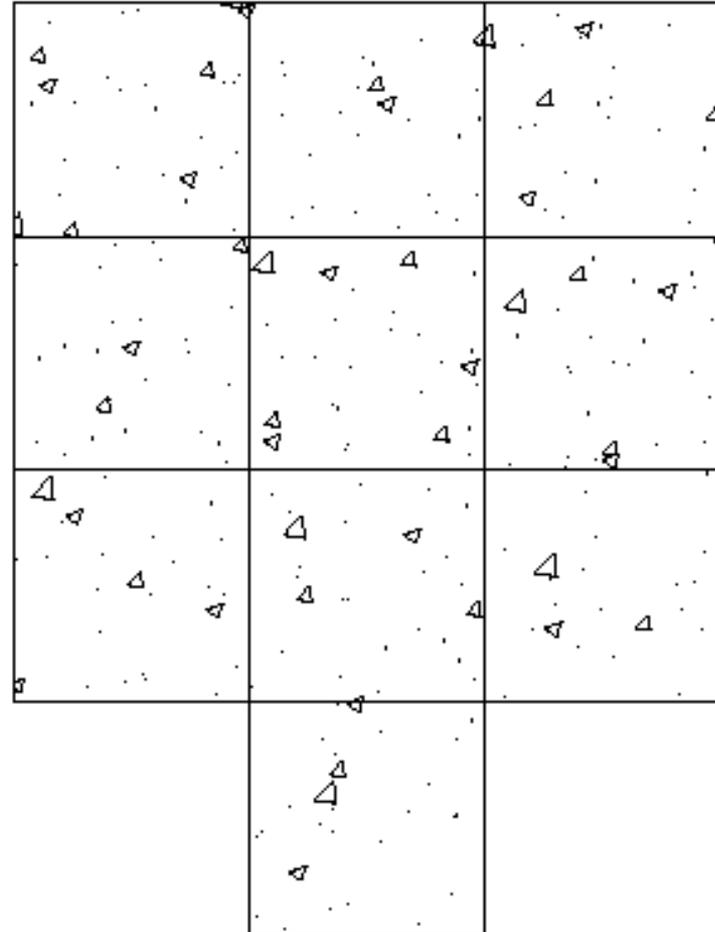
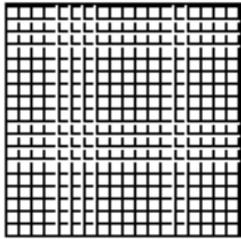
Building a Better Foundation for the Future



Minnesota road research facility

VIDEO OF PERVIOUS PAVERS DEMONSTRATION OMITTED DUE TO SIZE LIMITATIONS

VIDEO OF PERVIOUS PAVERS DEMONSTRATION OMITTED DUE TO SIZE LIMITATIONS



Percoa Pervious
(16" x 16" paver)

Permeable Pavers



Percoa Patented Key-Way System

Patented “key-way” system allows for interlocking action and non-rotational movement.





Different designs, sizes & colors



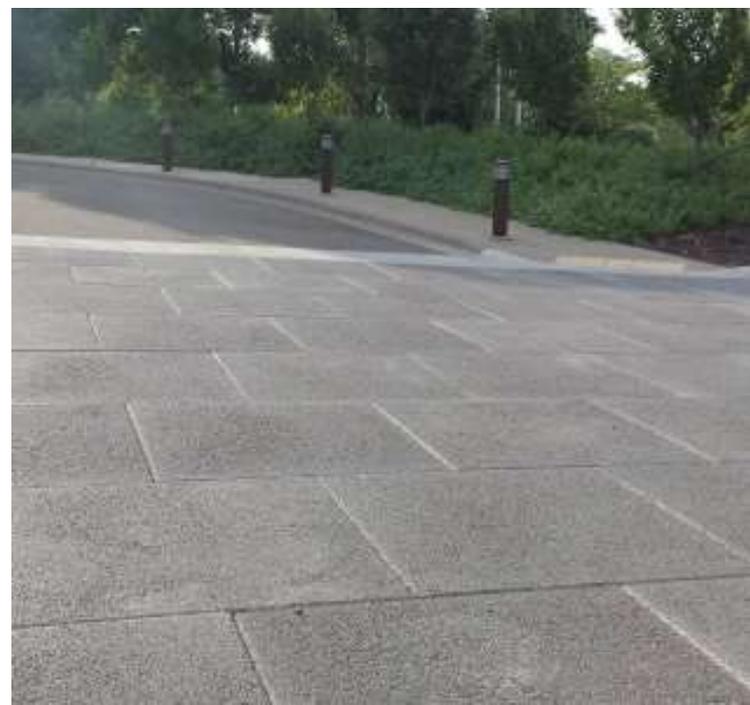
Wheelchair and High Heel Friendly





WHAT ARE THE POSSIBILITIES?







Retro-Fit into an existing project

STORM WATER STAYS ON PROPERTY *CAPTURES FIRST FLUSH*





County Market

PHARMACY

County Market
The Way to Health

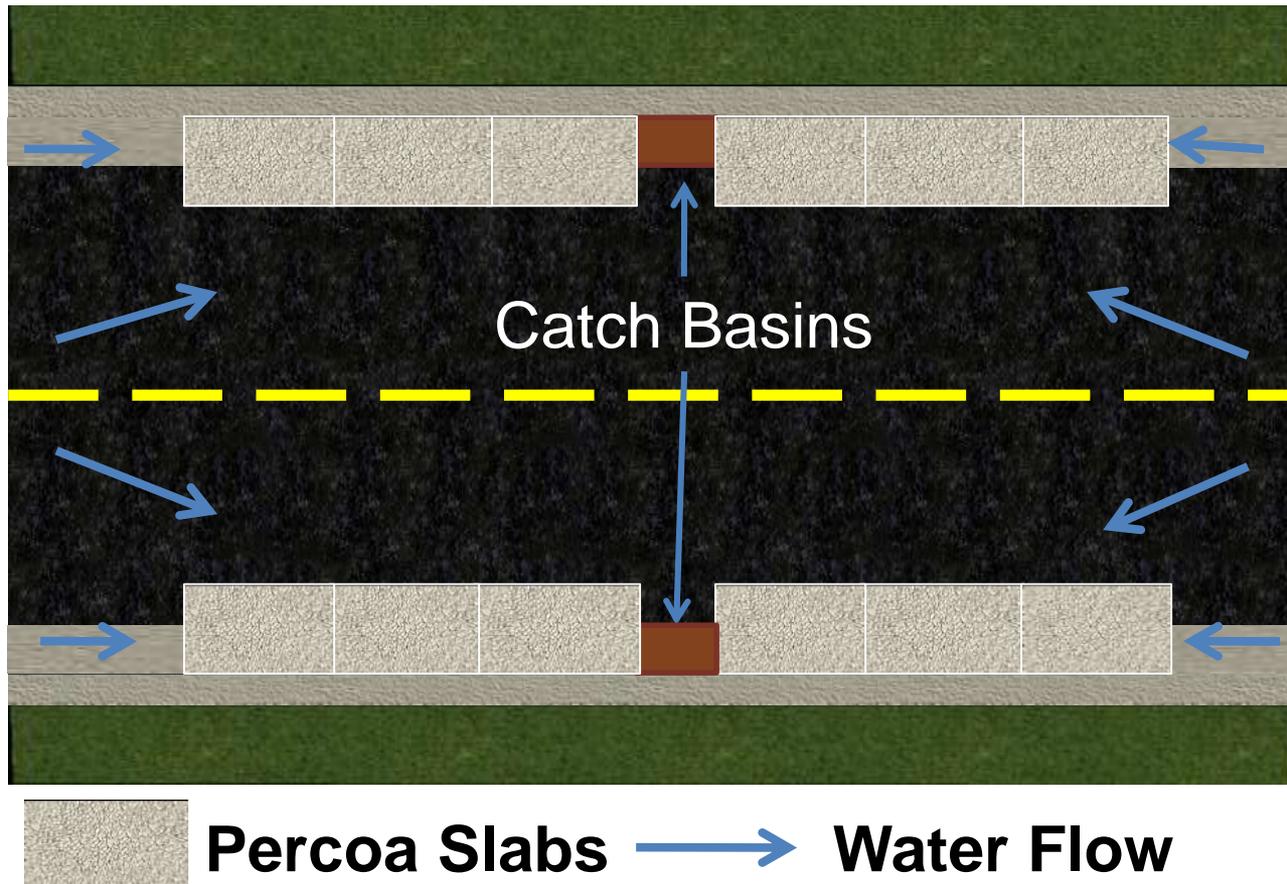


STORE HOURS:

EXIT

EXIT

Installed Around Catch Basins





3 Percoa Slabs each

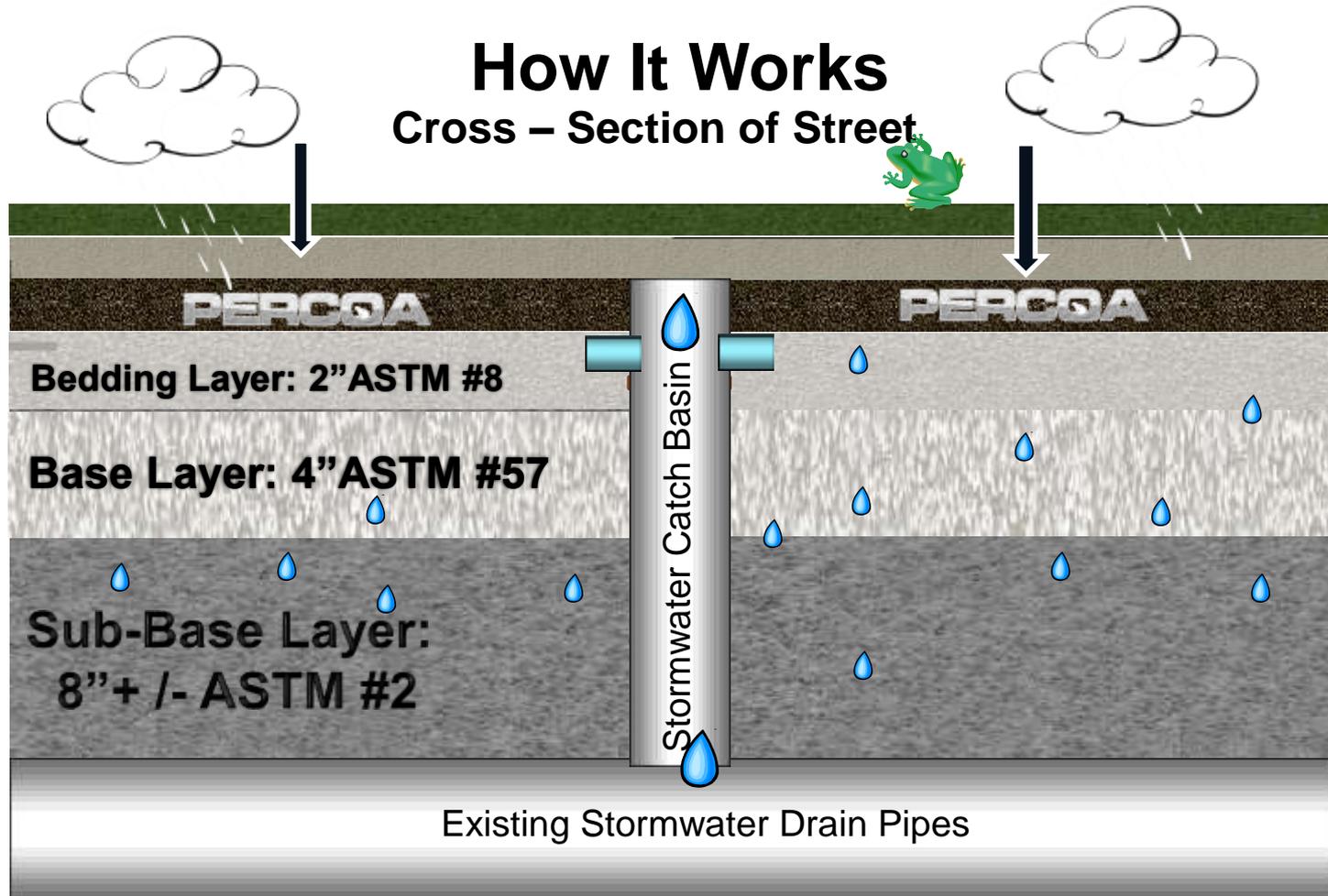
Catch Basin

Debris is stopped!
Short of catch basin

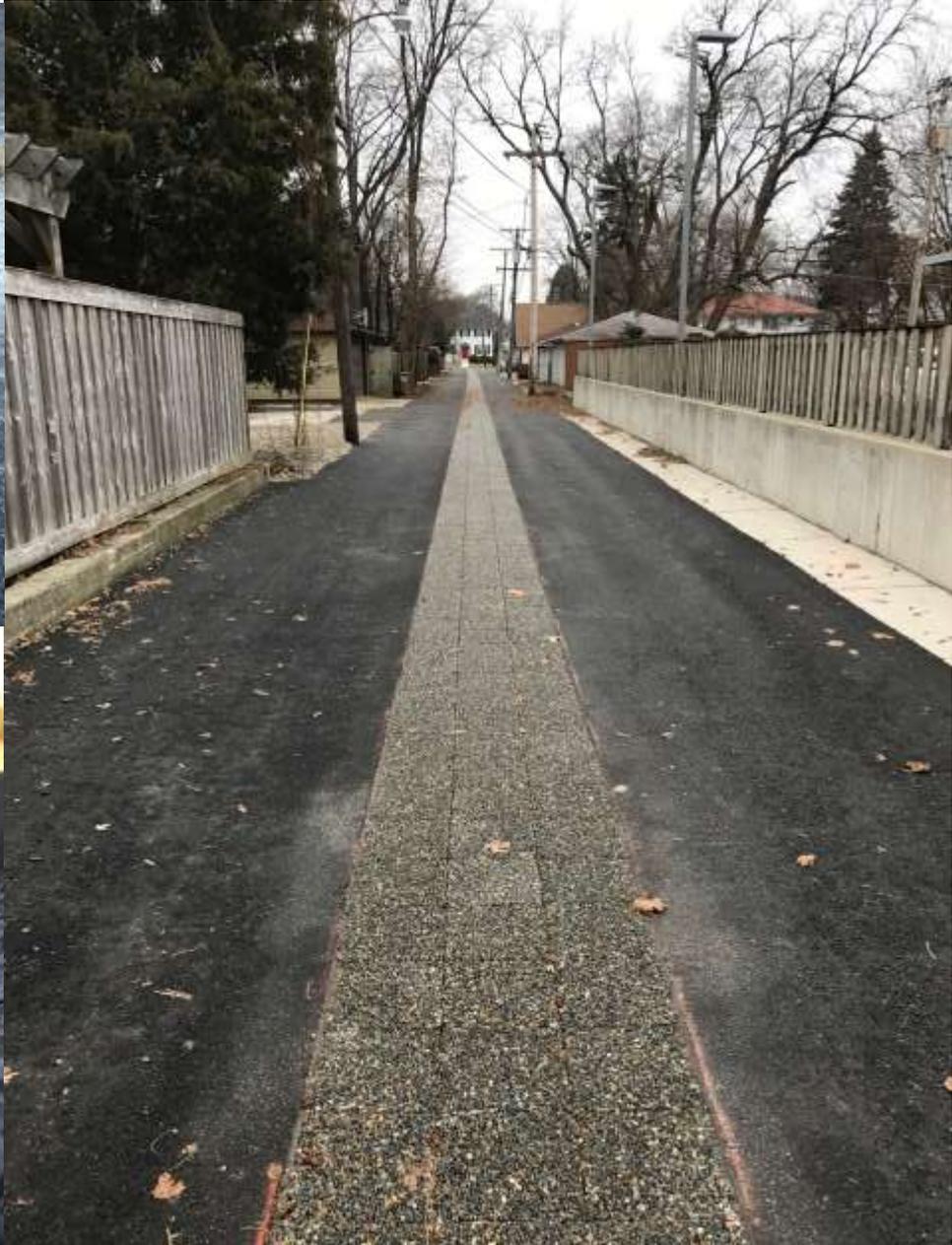


How It Works

Cross - Section of Street



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

State Parks





BOAT LANDINGS



Anderson, IN Downtown
Streetscape Project



Maintenance

- Percoa is an effective filter that requires contaminants to be removed periodically. The frequency will depend on the area contaminant profile. Cleaning is handled with a mechanical vacuum. Severely clogged areas require a pressure washer with vacuum.





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

Video of Guy Stacking bricks on head
omitted due to size limitations

Questions?

Please contact me if you would like a copy of my white paper titled:
Pervious, Permeable, and Porous Surfaces....are they really the same?
Thank you for your time!

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ICPI Certified – PICP Specialist