

# Permeable Pavement Overview

- Permeable asphalt
- Permeable concrete
- Precast permeable concrete (e.g. Spancrete)
- Brick Pavers
- Pavedrain
- Grasspave/Turf Stone

# Permeable Pavement Overview

- Permeable Asphalt
  - Hot-mix asphalt with reduced sand and fines to allow water to drain through it
  - Typically placed over an open graded stone bed 18 to 36 inches in depth to provide storm water storage; underdrain sometimes provided
  - Handling issues – can't store for long periods of time – drain down
  - Reduced structural capacity – go with thicker pavement section
  - Raveling of surface – common issue

# Permeable Pavement Overview

- Clogging of pours – annual vacuuming recommended
- Do not apply sand during winter
- Life of 20+ years
- Cost \$16-\$17 per square yard; \$11-\$12 per square yard standard asphalt (pavement only; no base courses)



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# Permeable Pavement Overview

- Permeable Concrete
  - Concrete mix with reduced sand and fines to allow water to infiltrate through it; admixtures typically added to increase strength; mixes have improved
  - Typically placed over an open graded stone bed 18” to 36” in depth to provide for storm water storage; underdrain sometimes provided
  - Has reduced strength due to air voids; pavement section typically increased up to 25% from standard concrete
  - Raveling of surface a common problem
  - Clogging of pores – annual vacuuming recommended

# Permeable Pavement Overview

- Requires less salting for deicing during winter than standard concrete
- For 8" drive section: \$8-9/S.F. for permeable concrete; \$4-5/S.F. for standard concrete (pavement material only; does not include base courses)

# Permeable Pavement Overview

- Precast Permeable Concrete
  - Concrete mix with reduced sand and fines precast in slabs under controlled conditions to eliminate issues with improper curing
  - Spancrete available in slab widths from 4' to 9' and thickness from 4" to 16"
  - Typically placed over an open graded stone bed 18" to 36" in depth to provide for storm water storage; underdrain sometimes provided
  - Clogging of pores – annual vacuuming recommended
  - Limited applications to date

# Permeable Pavement Overview

- Price varies on size and thickness of precast slabs required; size of job, etc.
- Typical installation costs are \$11 to \$15 per square foot (5' x 5' x 6" slabs); standard concrete \$4 to \$5 per square foot (pavement only; does not include base courses)

### An Industry First

Spancrete has revolutionized stormwater management with the introduction of precast pervious hollowcore concrete systems that are effective in runoff reduction and filtration. As water flows through the pervious concrete it can be collected and reused, filtered before entering a wastewater treatment facility, or it can naturally flow into the earth thereby replenishing aquifers.

### Advantages of Precast

Spancrete uses patent-pending technology, the first of its kind in the industry, to manufacture its precast pervious concrete slabs in a controlled environment, under strict quality and performance guidelines. The pre-manufacturing process ensures that only fully cured pieces are installed onsite, with significantly reduced installation time.

### Residential Applications

Many builders and architects who construct new single-family homes and multi-family residences choose Spancrete precast pervious concrete slabs for patios, walkways, driveways and additional parking. The versatility of the pre-manufactured slabs allows for quicker installation and greater customization in shape, size and color to expand and enhance outdoor living spaces.

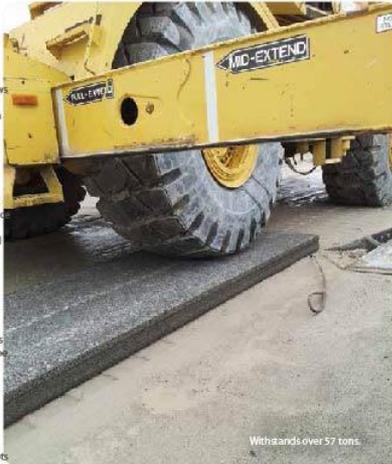
Spancrete precast pervious concrete systems withstand the effects of freezing and thawing, while maintaining outstanding permeability qualities to reduce stormwater runoff.

### Commercial and Municipal Construction

In areas that require large, long, open spaces, such as parking lots and sidewalks, Spancrete precast pervious concrete systems offer many benefits over other pervious concrete options.

Traditional pour-in-place pervious concrete must be sheltered from the elements and cannot be walked or driven upon until curing is complete, typically up to 28 days. Spancrete precast pervious concrete slabs, however, can be installed in all weather conditions and used immediately after installation.

The unique manufacturing process also offers **durability** in casting pervious concrete slabs in various sizes to cover large surface areas. The slabs are as strong and durable as standard concrete and they utilize 15% less material, lowering production costs and reducing greenhouse gas emissions. Because the slabs arrive ready for use, there is no need to store materials at the jobsite.



Withstands over 57 tons.

### Better for the Environment

As stormwater races across paved surfaces such as patios, parking lots and sidewalks on its way to the storm drain, it quickly picks up pollutants and other contaminants. Spancrete precast pervious concrete systems feature exceptional permeability and filtration – up to 8 inches per minute – to help recharge local ground water and aquifers, while preventing harmful impurities from entering area sewer and drainage systems.

### Fast, Year-Round Installation

Because Spancrete manufactures its products to match project's specifications in an environmentally and quality-controlled production setting, the interlocking pervious hollowcore concrete slabs can be delivered directly to the construction site, ready to install upon arrival, no matter the season or weather conditions. Typical installation for Spancrete precast pervious concrete slabs is often greater than 2000 square feet per day, which allows other outdoor contractors, such as landscape crews, to start and finish their work sooner.



### Specifications:

- Minimum 4,000 psi compression strength
- Minimum infiltration rate of 500 inches/hour per ASTM C1701
- Void Ratio depending on application range from 15%-25% per ASTM C1754 (Hardened) and ASTM C1688 (Freshly Mixed)



### Spancrete® Brand pervious hollowcore concrete systems are more diverse:

- All-season installation
- Greater design flexibility
- Long spans for rapid construction
- Extremely weather resistant
- Interlocking hollowcore sections
- Exceptional economy and value
- Environmentally friendly
- Strength that meets or exceeds traditional concrete



**INTERLOCKING, PERVIOUS  
CONCRETE BLOCKS**

The impact of stormwater run-off from impervious surfaces, such as parking lots, sidewalks and roads, has challenged our environmental balance; this ever increasing impervious area imposes an imbalance upon our natural ecosystem. Impervious areas are a driver of flash floods, pollution of our rivers, streams and lakes, and the depletion of our water aquifers.

The utilization and installation of a SmartCrete™ pervious and permeable concrete block system provides an effective and efficient stormwater management tool for the capture of stormwater run-off and pollutants. The Smartcrete system allows stormwater to infiltrate the underlying stone detention layer and soils, replenishing our ground water and aquifers. The SmartCrete block is 100% pervious, however combined with the space between (less than 3/8") the block itself is also a permeable paver. The Smartcrete block allows the transmission of up to 15 inches of water per square foot per minute.

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## Pervious Concrete Parking Lane



### BENEFITS - CHARACTERISTICS

- Meets or exceeds compressive strengths required for road pavement
- Less than 1 gram of mass loss from freeze-thaw cycle tests
- Captures and filters pollutants and reduces the amount of stormwater entering the local sewer system, saving tax payer dollars
- Allows run-off to infiltrate and replenish the groundwater and aquifers
- Available in a variety of colors
- ADA compliant

### APPLICATIONS

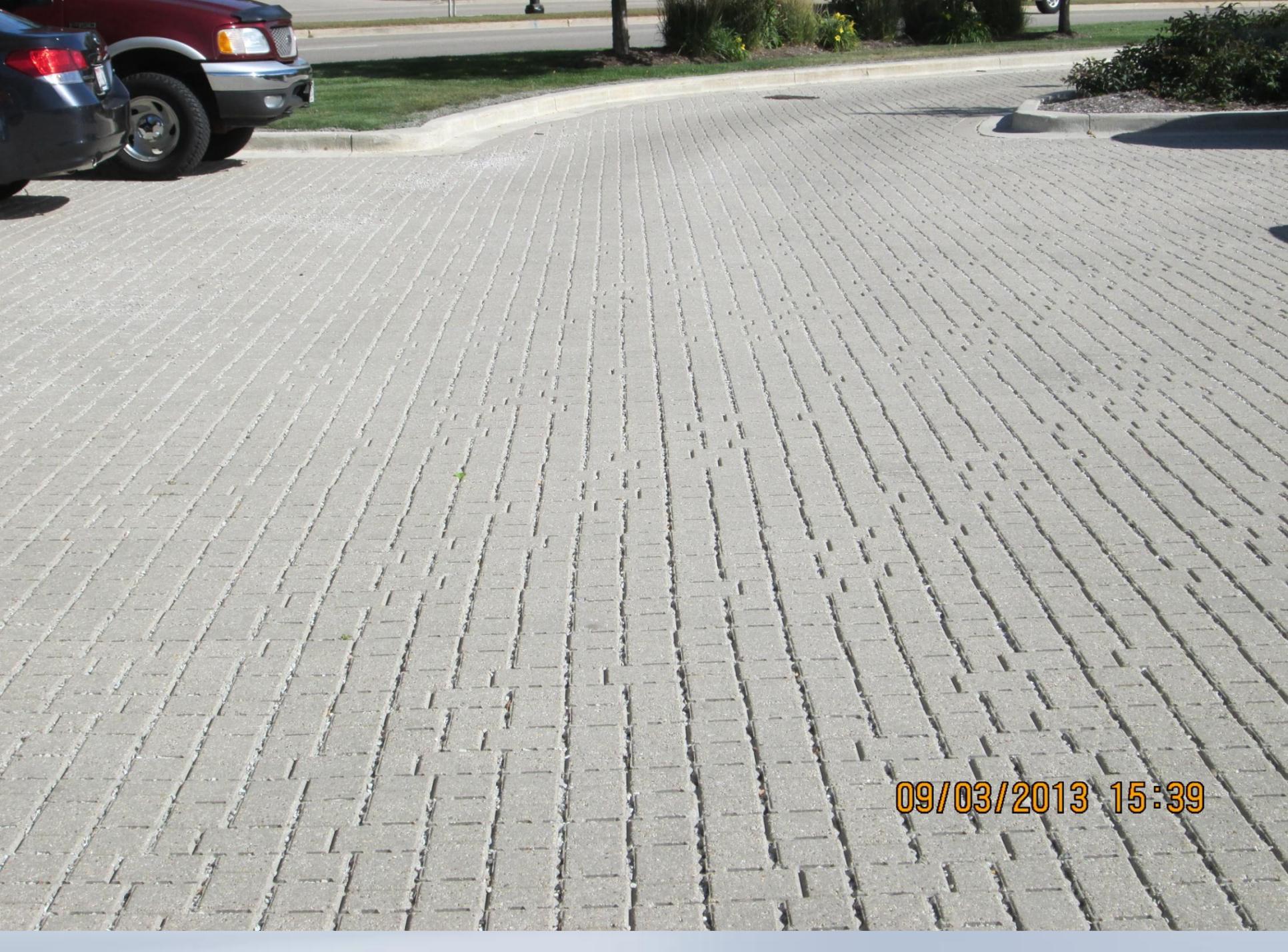
- Parking Lanes
- Green Alleys
- Parking Lots
- Driveways
- Plazas
- Bike Paths
- Road Shoulders

# Permeable Pavement Overview

- Brick Pavers
  - Full strength brick pavers installed with gaps to promote infiltration of water
  - Set on a bedding aggregate (crushed, angular, chipped stone) and placed over an open graded stone bed 18" to 36" in depth to provide for storm water storage; underdrain sometimes provided; crushed, angular, chipped stone used in lieu of sand to provide rapid infiltration
  - Can be installed mechanically; up to 10,000 square feet per day with 3 person crew

# Permeable Pavement Overview

- Different architectural finishes available
- Do not use sand during winter
- “Level Installation”
- Preventative maintenance includes sweeping one to two times per year
- Restorative maintenance includes vacuuming and replacement of the joint material every 10 to 20 years
- Brick material costs typically \$2 to \$3 per S.F.; \$5 to \$8 per S.F. including bedding material, 18” of base stone, and edging



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# Permeable Pavement Overview

- Pavedrain System
  - Permeable articulating concrete block mat system
  - Full strength concrete blocks
  - Infiltration occurs in joints between concrete blocks
  - Half arch design provides additional storm water storage
  - Typically placed over an open graded stone bed 18” to 36” in depth to provide for storm water storage; underdrain sometimes provided

# Permeable Pavement Overview

- Typical Costs
  - \$6 - \$7 per S.F. for product mats
  - \$0.50 - \$1.00 per S.F. shipping
  - \$0.35 - \$0.50 per S.F. geotextile
  - \$1.00 - \$1.25 per S.F. 6"-10" rock base
  - \$1.00 - \$2.00 per S.F. installation
- Preventative maintenance includes blowing out of joints with compressed air
- Restorative maintenance – mechanically lifted and cleaned

# The PaveDrain Installation



# Permeable Pavement Overview

- Grasspave
  - Series of rings connected together on flexible grid system; cylinders designed to withstand significant structural loads and provide for stability and flexibility over large areas
  - Grid is placed over prepared base course and rings are filled with clean sharp concrete sand and area is sodded or seeded/mulched
  - Allows for infiltration of water through rooting zone
  - Meets and exceeds most standard vehicle loading criteria
  - Used for driveways, parking lots, fire lanes, recreational trail/paths

# Permeable Pavement Overview

- Cut, mow, water like normal lawn
- Meets or exceeds most standard vehicle loading criteria
- Used for driveways, parking lots, fire lanes, recreational trails/paths
- 15-20% higher installation costs than standard pavements



# Permeable Pavement Overview

- Turf Stone
  - Similar to brick paver but more open space to allow for growth of grass
  - Allows for infiltration of water; reduces heat island effect associated with standard pavements
  - Meets and exceeds most standard vehicle loading criteria
  - Used for driveways, parking lots, fire lanes, recreational trail/paths
  - Material typical \$2 per S.F.



### A COOL SOLUTION TO URBAN HEATING

Urban heat islands contribute to the hot summer temperatures we experience in our cities. An example of a city that has seen the positive results of green roofs is Toronto, which has installed green roofs on projects between 2006 and 2014. Green roofs reduce the amount of heat that is absorbed by roofs, which in turn helps to cool the air around the building. This can help to reduce the need for air conditioning, which in turn helps to reduce the amount of greenhouse gas emissions from buildings.