

**PUTNAM VALLEY
CENTRAL SCHOOL
DISTRICT
PUTNAM VALLEY, NY**

**MS4PY4 STORMWATER
PROGRAM**

**FACT SHEET # 5
APRIL 2014**

**GREEN INFRASTRUCTURE
PRACTICE: POROUS
PAVEMENTS**

**FOR MORE INFORMATION CONTACT
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1. Onsite Stormwater Runoff Control

The best way to control contamination to stormwater is ideally at the source, where the contaminants can be identified, reduced or contained before being conveyed to surface water. According to USEPA research, it is more expensive and difficult to remove the combination of contaminants that are present at the end-of-pipe where stormwater is finally discharged directly to a receiving water body. Sometimes, significant improvements can be made by employing best management practices, or "BMPs". Proper storage of chemicals, good housekeeping and just paying attention to what is happening during runoff events can lead to relatively inexpensive ways of preventing pollutants from getting into the runoff in the first place and then our waterways. Alternatively, newer green stormwater infrastructure practices can be used to reduce quantity of stormwater being discharged as well as improve water quality of the stormwater leaving the site. This Fact sheet focuses on the use of porous pavements as a green stormwater infrastructure practice.

2. Benefits of Porous Pavements

Porous pavements have the potential to:

- Reduce stormwater runoff volume, flow rate and water temperature
- Increase the groundwater infiltration and recharge
- Remove pollutants carried by stormwater, especially if the infiltrated runoff is collected and discharged to a bio-retention system before being released to a nearby waterway
- Reduce the need for traditional stormwater underground piping systems and consequently the overall project costs
- Extend the life of paved areas in cold climates where cracking and buckling frequently occurs due to freezing and thawing cycles
- Reduce amount of sand and salt used in the winter months, due to low or no black ice development
- Increase vehicle traction especially during wet weather conditions

3. Design of Porous Pavements

Porous pavements utilize the same design principles as standard pavement and essentially involve:

- Surface course
- Base course
- Subgrade

Depending on the type of porous pavement, and the type of materials used; the thickness of the surface course, base course and subgrade may vary to suit site conditions and pavement settings.

4. Porous Pavement Materials

There are various types of porous paving materials, each with distinctive costs, installation methods, performance standards and maintenance requirements:

Pervious concrete: is a mixture of Portland cement, coarse aggregate or gravel and water. Unlike conventional concrete, pervious concrete contains a void content of 15 to 35% that is achieved by reducing the finer particles. The voids allow the water to infiltrate into the underlying soil, instead of pooling on the surface and being discharged to the nearby waterway. Sidewalks and parking lots are ideal applications because of the lighter loads generated by pedestrians and bicycle traffic.

Porous asphalt: is similar to porous concrete in that the void space is 15 to 35%, achieved by using less fine aggregate. Porous asphalt looks the same as any conventional asphalt except that the surface has a rougher texture. The compressive strength of porous asphalt is comparable to standard asphalt. Porous asphalt is typically used for low volume, low speed vehicular traffic applications such as parking lots, curbside parking lanes and residential side streets.

Pavers: consist of either permeable interlocking concrete pavers (PICP), clay brick pavers (CBP), concrete grid pavers (CGP) and plastic turf reinforcing grids (PTRG). They are similar in installation and function but are made from different materials. PICPs are solid concrete blocks that fit together to form a pattern with small aggregate-filled spaces (5 to 15%) designed to permit stormwater to infiltrate. CBPs are the same as PICPs, except the material is brick instead of concrete. CGPs, also made of concrete, have larger lattice-style patterns, which account for 20 to 50% of stormwater infiltration. The openings in CGPs are filled with small aggregate or grass. PTRGs are made of interlocking plastic units with the spaces filled with

small aggregate or grass. Infiltration occurs through the openings and is enhanced if grass is used, as the plant roots increase the permeability of the underlying soil.

5. Porous Pavement Site Limitations

Porous pavements are made with built-in void spaces that let air and water pass through. This technology is being utilized extensively in any new or reconstruction projects for parking lots, walkways and sidewalks. However there are some site limitations where porous pavement can be used:

Site slope conditions: porous pavements should only be used ideally on shallow slopes less than 0.5% or less so that the stormwater runoff is evenly distributed and has a chance to infiltrate. However, porous pavements have been reported to be use on sites with slopes of up to 5%.

Permeability of the underlying soils: the underlying soils should be field evaluated to determine the permeability rate of the soils. The USEPA lists soils with 0.27 in/hr. as the minimum acceptable infiltration rate, although ideally soils should have a field-verified permeability rate of no less than 0.5 inches per hour. If the underlying soils do not meet the permeability rate, the soils should be modified using gravel and sand and should include an underdrain piping system that will convey stormwater to a nearby bio-retention system for treatment, prior to being discharged to the nearby waterway.

Silt/Clay soils: if the combined silt/clay content exceeds 40%, and/or the clay content exceeds 30%, the percolation it has been reported, will be poor and frost heaving is likely to occur.

Water table and bedrock depth: the depth to bedrock and the high water table from the bottom of the sub-base layer should be at least 2 feet, although 4 feet is more desirable.

Location from wells and buildings: to avoid contamination to wells and to prevent damage to building foundations from stormwater seepage, a minimum of 100 feet up-gradient and 10 feet down-gradient is recommended.