GREEN INFRASTRUCTURE: POROUS PAVEMENT

Porous pavement consists of a permeable surface course (porous asphalt, porous concrete, or various porous structural pavers), which allow rapid infiltration of stormwater. The surface course is underlain by a uniformly-graded stone bed, which provides temporary storage for peak rate control and promotes infiltration. Porous concrete systems require a very high level of construction workmanship to ensure that they function as designed. They experience a high failure rate if they are not designed, constructed, and maintained properly.

DESIGN CONSIDERATIONS*

Design Storm	2-year
Drainage Area	0.25 - 10 acres
Site Slopes	5% (max.)
Sizing	N/A
Dimensions	Varies
Ponding Depth	N/A
Drawdown Time	48 hour (max.)
Underlying Soils	0.27 inch/hour infiltration rate (min.) 30% Clay (max.)
Water Table Depth	2- to 4-feet below the bottom layer (min.)
Pretreatment	Vegetated filter strip
Observation Wells	N/A
Additional Parameters	Infiltration beds shall have a flat slope. Any fill should be done using the stone subbase material. All systems should be designed with an overflow system. Water level should never rise to the level of pavement surface.

** Industry standards; permitting through the Village to ensure compliance with local and county requirements.*

CONSTRUCTION AND COSTS

Some of the key constructability considerations for porous pavement include control of erosion and sediment, installation at the end of construction, avoiding compaction of subgrade, the bottom of the storage bed should be at a level grade, geotextile and bed aggregate should be placed immediately after approval of subgrade preparation, clean, uniformly graded aggregate is placed in the bed in 8-inch lifts and lightly compacted. Porous pavement is most susceptible to failure during construction, and therefore it is important that the construction be undertaken in such a way as to prevent compaction and contamination of soils. Pervious asphalt is higher in cost than standard asphalt due to additional labor and experience required for installation as well as the added cost in the underlying stone bed, which is generally deeper than a conventional subbase and wrapped in geotextile.

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ADVANTAGES	DISADVANTAGES
• Reduce the rate and volume of runoff, • Increases groundwater recharge, • Applicable in ultra-urban environments, • Provides reduction in runoff volume, • Improved water quality, • Improved traction in rain and snow conditions.	• High failure rate and short life span, • High maintenance requirements, • Special attention to design and construction needed • Restrictions on use in areas with low permeability soils, wellhead protection zones, or aquifer. • Recharge areas, • Restrictions on use by heavy vehicles, • Increased cost compared to conventional pavements, • Potential for groundwater contamination in high permeability soils and high-water table, • Siting must be carefully planned to avoid areas of recent fill or compacted fill, and • Limited salt application and regular plowings required.

MAINTENANCE

Similar to other infiltration practices, clogging is the primary maintenance concern of porous pavement. To prevent clogging of the porous pavement after construction, flow onto the pavement should be limited and routine cleaning should be performed.

Maintenance Activity	Frequency
• Ensure that the tributary area, facility, and inlets are clear of debris. • Ensure that the tributary area is stabilized. • Remove sediment and oil/grease from pretreatment devices and overflow structures. • Mow grass; filter strips should be mowed as necessary; remove grass clippings.	Monthly
• Abrasives such as sand should not be applied on or adjacent to the pervious pavement. • Snow plowing should be done with the blade about one inch above the surface. • Salt is an acceptable deicer, though nontoxic, organic deicers are preferred.	Winter
• Check observation wells following 3 days of dry weather; failure to percolate within this time period indicates clogging. • Inspect pretreatment devices and diversion structures for sediment buildup and structural damage. • Remove trees that start to grow in the vicinity of the trench. • Clean all inlet structures within or draining to the infiltration bed.	Semi-annually
• Perform complete rehabilitation of the trench to maintain design storage capacity. • Excavate trench walls to expose clean soils. • Vacuum pavement 2 or 3 times per year. • Maintain planted areas adjacent to pavement. • Immediately clean any soil deposited on pavement. • Clean inlets draining to the subsurface bed twice per year. • Patch damaged pavement areas less than 50 square feet with standard pavement. • Patch damaged pavement area greater than 50 square feet with porous pavement.	As needed

FLOOD REDUCTION

When compared to traditional asphalt pavement, porous pavement has been shown to reduce runoff volume. Runoff from permeable pavement is less than the runoff from traditional asphalt pavement depending on the type of permeable pavement used, with higher runoff reductions from increased void space and voids filled with sand, which had less clogging.