

**Description** Porous pavement is a permeable pavement surface with an underlying stone reservoir that temporarily stores surface runoff before infiltrating into the subsoil. This porous surface replaces traditional pavement, allowing parking lot runoff to infiltrate directly into the soil and receive water quality treatment.

There are several pavement options, including porous asphalt, pervious concrete, and grass pavers. Porous asphalt and pervious concrete appear the same as traditional pavement from the surface, but are manufactured without “fine” materials, and incorporate void spaces to allow infiltration. Grass pavers are concrete interlocking blocks or synthetic fibrous grid systems with open areas designed to allow grass to grow within the void areas.

- Applications**
- The ideal application for porous pavement is to treat a low-traffic or overflow parking area.
  - Porous pavement may also have some application on highways, where it is currently used as a surface material to reduce hydroplaning.
  - Ultra urban areas are densely developed urban areas in which little pervious surface exists. Porous pavement is a good option for these areas because they consume no land area.
  - Porous pavement can be applied in most regions of the country, but the practice has unique challenges in cold climates.

- Limitations**
- |                             |                           |
|-----------------------------|---------------------------|
| Drainage area – unlimited   | Max slope – N/A           |
| Minimum bedrock depth - N/A | Minimum water table – N/A |
| NRCS soil type – A, B, CD   | Freeze/thaw – fair        |
| Drainage/flood control – no |                           |
- Since porous pavement is an infiltration practice, it should not be applied on stormwater hotspots due to the potential for ground-water contamination.
  - Not ideal for high traffic areas, however, because of the potential for failure due to clogging.
  - Porous pavement cannot be used where sand is applied to the pavement surface because the sand will clog the surface of the material. Care also needs to be taken when applying salt to a porous pavement surface since chlorides from road salt may migrate into the ground water.

**Targeted Pollutants**

Sediment – 95%  
 Phosphorus – 82%  
 Trace metals – 98%

**Design Parameters**

**Siting Considerations**  
 Porous pavement has site constraints as other infiltration practices. A potential porous pavement site needs to meet the following criteria:

- Soils need to have permeability between 0.5 and 3.0 inches per hour.
- The bottom of the stone reservoir should be completely flat so that infiltrated runoff will be able to infiltrate through the entire surface.
- Porous pavement should be located at least 2 to 5 feet above the seasonally high ground-water table, and at least 100 feet away from drinking water wells.
- Porous pavement should be located only on low-traffic or overflow parking areas, which are expected to be not sanded during wintertime conditions.

### **Design Considerations**

Five basic features should be incorporated into all porous pavement practices:

1. Pretreatment- In most porous pavement designs, the pavement itself acts as pretreatment to the stone reservoir below. Because the surface serves this purpose, frequent maintenance of the pavement surface is critical to prevent clogging. Another pretreatment element is a fine gravel layer above the coarse gravel treatment reservoir. The effectiveness of both of these pretreatment measures are marginal, which is one reason frequent vacuum sweeping is needed to keep the surface clean.
2. One design option incorporates an “overflow edge,” which is a trench surrounding the edge of the pavement. The trench connects to the stone reservoir below the surface of the pavement. Although this feature does not in itself reduce maintenance requirements, it acts as a backup in case the surface clogs. If the surface clogs, stormwater will flow over the surface and into the trench, where some infiltration and treatment will occur.
3. Treatment - The stone reservoir below the pavement surface should be composed of layers of small stone directly below the pavement surface, and the stone bed below the permeable surface should be sized to attenuate storm flows for the storm event to be treated. Typically, porous pavement is sized to treat a small event, such as the water quality storm (i.e., the storm that will be treated for pollutant removal) which can range from 0.5 to 1.5 inches. Like infiltration trenches, water can only be stored in the void spaces of the stone reservoir.
4. Conveyance - Water is conveyed to the stone reservoir through the surface of the pavement and infiltrates into the ground through the bottom of this stone reservoir. A geosynthetic liner and sand layer should be placed below the stone reservoir to prevent preferential flow paths and to maintain a flat bottom. Designs also need some method to convey larger storms to the storm drain system. One option is to set storm drain inlets slightly above the surface elevation of the pavement. This allows for temporary ponding above the surface if the surface clogs but bypasses larger flows that are too large to be treated by the system.
5. Maintenance Reduction - One non-structural component that can help ensure proper maintenance of porous pavement is the use of a carefully worded maintenance agreement that provides specific

guidance to the parking lot, including how to conduct routine maintenance and how the surface should be repaved. Ideally, signs should be posted on the site identifying porous pavement areas.

6. Landscaping - The most important landscaping objective for porous pavements is to ensure that its drainage area is fully stabilized, thereby preventing sediment loads from clogging the pavement.

### **Regional Adaptations**

In cold climates, the base of the stone reservoir should extend below the frost line to reduce the risk of frost heave.

### **Maintenance**

Porous pavement requires extensive maintenance compared with other practices. In addition to owners not being aware of porous pavement on a site, not performing these maintenance activities is the chief reason for failure of this practice. Typical requirements follow below:

#### **Monthly:**

- Ensure that paving area is clean of debris
- Ensure that paving dewaterers between storms
- Ensure that the area is clean of sediments

#### **As Needed:**

- Mow upland and adjacent areas, and seed bare areas
- Vacuum Sweep frequently to keep the surface free of sediment (typically three to four times per year)

**Annual:** Inspect the surface for deterioration or spalling