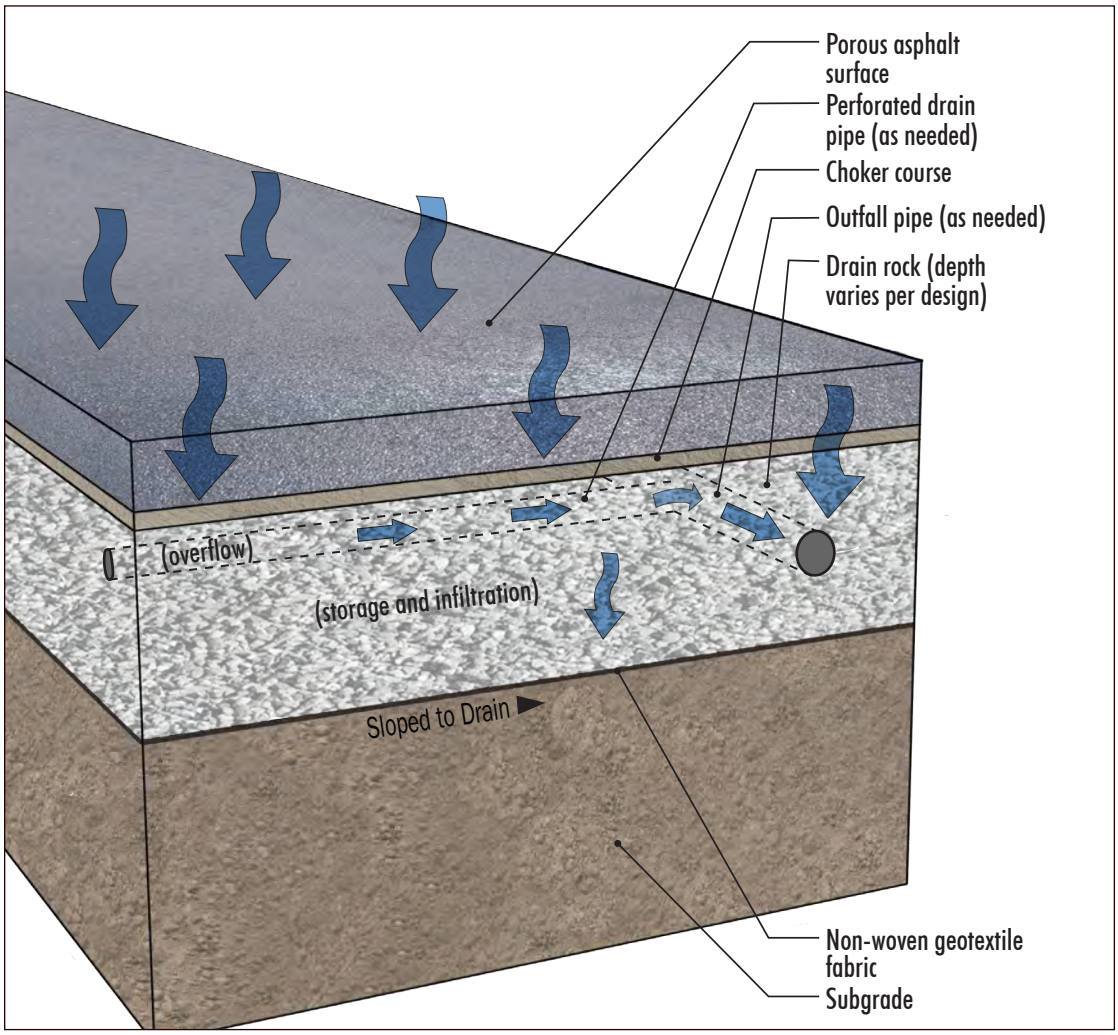
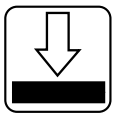
Porous Pavement



parking areas & impermeable landscape



impermeable soils

permeable soils

Description

Porous pavement is a water-permeable structural groundcover that infiltrates precipitation, attenuates stormwater runoff flows and volumes, and reduces temperatures. Porous pavement provides a stable load-bearing surface without increasing a project's total impervious area.

The two main categories of porous pavements are 1) pervious concrete and asphalt, and 2) permeable pavers. Pervious concrete and asphalt are poured in place and resemble their solid counterparts, except the fines (sand and finer material) are removed to create more void space for water to flow through. Permeable pavers are solid, discrete units typically made of pre-cast concrete, brick, stone, or cobbles and set to allow water to flow between them.

Application & Limitations

Porous pavement is not considered a water quality facility to provide treatment of runoff from other impervious surfaces. However, pollutants captured from direct rainfall on the porous pavement area are treated through filtration, absorption, and other microbial degradation actions in the subgrade. Porous pavement area may be considered 100% pervious in water quality calculations, thus reducing the size of required water quality facilities.

Pervious asphalt, pervious concrete, and permeable pavers can be used in most pedestrian areas, residential driveways, public sidewalks, and parking lots. Local jurisdictions may approve pervious asphalt and concrete for private streets and public roadways on a case-by-case basis.

Porous pavements should not be located over cisterns, utility vaults, underground parking or other impervious surfaces and should be applied only where the seasonal high water table is at least 10 feet beneath the facility's bottom or drain rock layer. Porous pavement should not be applied in locations where there is a high risk of chemical spillage.

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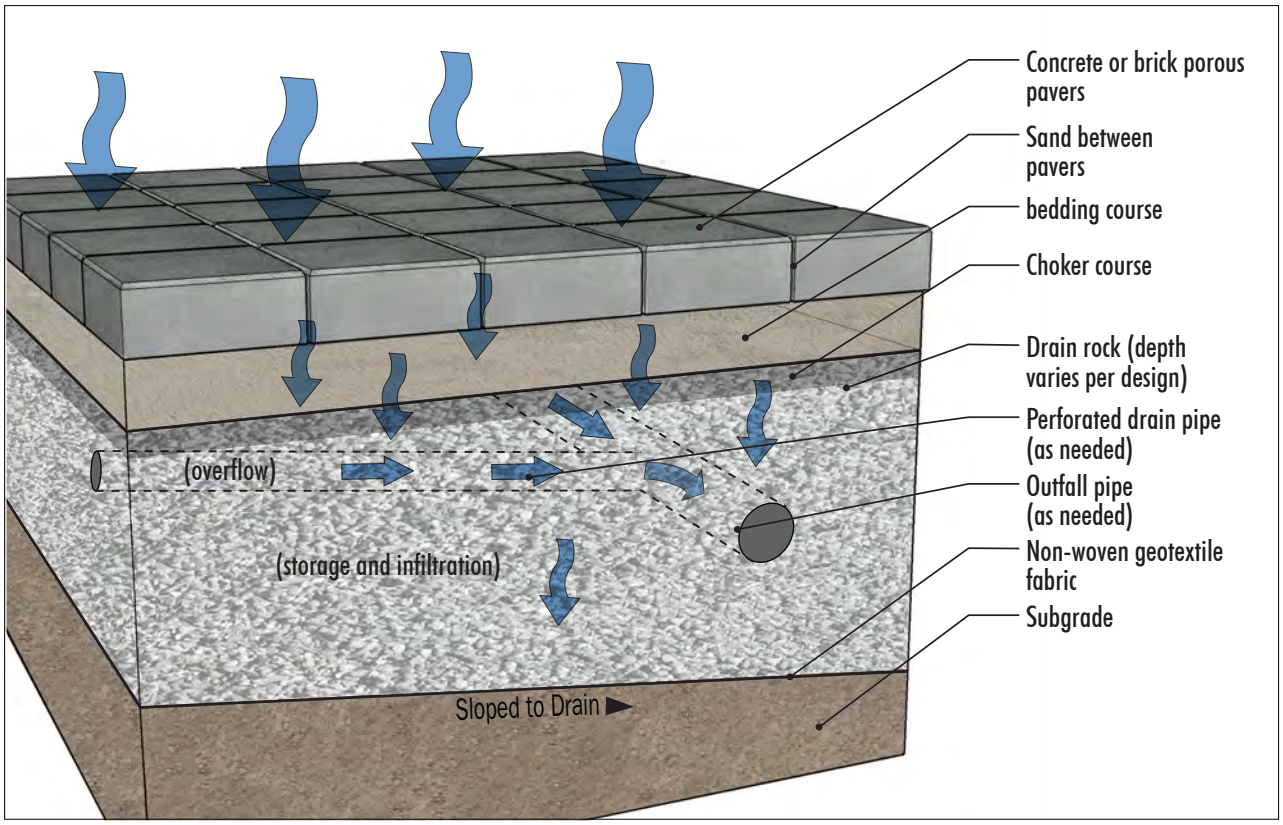

Design Factors

Sizing
Porous pavement replaces impervious area at a 1:1 ratio. All stormwater from the porous pavement surface must infiltrate directly into a crushed rock storage layer.
To deter clogging over time, porous pavement should capture only direct rainfall. If approved by the local jurisdiction, detention storage may be constructed beneath the porous pavement and sized by approved calculation. Water quality treatment must be provided for any stormwater flowing from adjacent impervious areas across the porous pavement.

Slopes
In general, porous pavement should not be used on slopes greater than 20H: 1V.

Piping
As needed, and where existing soils have low perm-eability and an infiltration rate of 0.5" per hour or less, provide an under-drain to an approved outlet structure.

Setbacks
Check with the local building department to confirm site-specific requirements. Impermeable liners are recommended between base rock and adjacent foundations and conventional Asphalt Cement Concrete (ACC) or Portland Cement Concrete (PCC) pavement.

Porous Pavement Design
For specific design mix, use the following references:

- Pervious asphalt
  ODOT 2008 Standard Specification, or as updated. See National Asphalt Pavement Association Information Series 131 for additional information.
- Pervious concrete
  Stormwater Management Manual, Chapter 2, Pervious Pavement section, City of Portland Bureau of Environmental Services, 2008 or as updated.
- Pavers
  Interlocking Concrete Pavement Institute specifications and Portland Department of Transportation 2007 Standard Specification Section 00760.00 or as updated.

Porous Pavers, Portland Community College, Rock Creek Campus

Porous Pavement

Porous Pavers

Porous Asphalt

Design Factors (Continued)

Choker Course
The choker course beneath pervious asphalt or concrete pavement consists of 3/4″ to 1/4″ clean, crushed drain rock, minimum 2″ depth.

Aggregate Base
The base course consists of clean, crushed 3/4″ to 2″ uniformly graded aggregate. The depth of the aggregate base course will vary per design.

Geotextile Fabric
Non-woven geotextile fabric should be placed between the subgrade (native soil) and the aggregate base for proper separation.

Subgrade
Excavate to the bed bottom elevation. Care should be taken to avoid compaction of the subgrade surface and all construction equipment should be kept off the subgrade. If based on the soil type, the excavation of the surface has been sealed, the surface should be lightly scarified or raked to provide infiltration values consistent with the design.

For traffic areas, compact the subgrade soil for public roadways, private streets, parking lots, and fire lanes to ensure structural stability and minimize rutting. Com-paction should be to 95%. Because compaction reduces soil permeability it should be done with caution and scarified prior to setting the aggregate base. Protect the subgrade from truck traffic. It is imperative to protect the porous pavement subgrade from over-compaction. If the subgrade is to be compacted, infiltration testing should be conducted during design of porous pavement to adequately account for reduced soil permeability.

Construction
Porous pavement is to be protected from fines infiltration during site construction by covering with visqueen or similar impervious material.

Porous Concrete

Porous Recycled Concrete

Porous Pavement

Porous Concrete, SW Broadway and Lombard, Beaverton

Porous Pavers, Tigard Library

Maintenance Assurance Period

- Check with the local jurisdiction about use of porous pavement for public facilities.
- If approved for use in the public right-of-way, the permittee must comply with local jurisdiction requirements for a maintenance assurance period.

Long Term Maintenance

- If private, the property owner is responsible for ongoing maintenance per a recorded maintenance agreement (see page 88 for example maintenance agreement).
- Porous pavement on private roads must be in a separate tract.
- Porous pavement requires regenerative air style vacuuming at least once a year, but twice a year is recommended to remove fine particulates from the infiltration spaces. Without this ongoing maintenance, the facility may become impervious.
- Over time, settling may occur and aggregate base, washed sand, and/or pavers may need to be replaced or repaired.
- Sealing is a common maintenance practice with conventional asphalt. Pervious asphalt must not be sealed or it will lose its pervious function. Owners should take extra care not to seal pervious asphalt pavement. If porous pavement is sealed, additional stormwater treatment may be required.
- For detailed Operation and Maintenance Plans that describe proper maintenance activities please refer to page 91.

References

- Clean Water Services Design and Construction Standards

Porous Concrete, Clean Water Services Field Operations Center

Porous Pavers, West Linn Willamette Park