

Permeable Surfaces and Driveways

Overview

In nature, most of the rain that falls is absorbed into the ground where it is taken up by plants, recharges ground water or flows slowly downhill to valley bottoms where it surfaces in creeks and rivers. When rain falls on roofs, roads and parking lots – even lawns and golf courses – it stays on the surface and runs off more quickly into creeks and rivers, often carrying sediment and other pollutants. This rapid runoff results in less groundwater recharge, erosion from higher streamflows in winter, and low stream flow from low water tables in the summer. By using permeable surfaces, which allows precipitation to trickle through, for driveways, patios, parking areas and roads, the effects of development on water quality, erosion and groundwater levels can be reduced.

Permeable *surfaces* are typically used for low-traffic, low-load areas, such as pathways and patios whereas permeable *pavements* are structural surfaces capable of supporting traffic loads. Permeable pavements may be made up of impermeable pavers, with spaces between them that allow water to soak into the ground below, or of *porous* material, which has an open network of spaces built into it, allowing the water to soak through the pavement itself.



Instead of running off, water flows right through porous concrete. Source: [JJ Harrison](#).

When is This Applicable?

Depending on the scope of your project and size of your site, you may be required to include measures to improve the permeability of your site. Permeable surfaces are examples of what are called Flow Control Best Management Practices or BMPs, which are listed in Appendix C of the King County Surface Water Design Manual. Permeable Paving is one of the potential BMPs (described in Section C.2.6. of Appendix C).

Whether you are using permeable surfaces to meet your surface water requirements or not, they can always be used instead of traditional *impermeable* surfaces for most common applications.



What Makes it Green?

Permeable surfaces help to reduce or even eliminate the negative impacts of rapid stormwater runoff, such as flooding, uneven stream bed erosion and sedimentation, pesticide, gasoline and heavy metal pollution, elevated stream temperatures, reduced groundwater recharge, and low summertime stream flows. All of these effects contribute to loss of aquatic habitat in stream and rivers and ultimately affects the quality of Puget Sound habitat that supports healthy fish, bird and mammal populations that are icons of King County's commercial fisheries and tourism industries.

Besides contributing to Flow Control BMPs, benefits of permeable paving include:

- Decreased runoff into nearby areas
- Faster drying of the surface, including faster snowmelt
- Greater resilience to freeze/thaw impacts such as cracking – if sub-surface storage is properly sized, designed and installed
- Counts towards green rating system certification, including Built Green and LEED for Homes



Permeable grass pavers are an attractive permeable alternative for parking areas and patios.

Source: [Immanuel Giel](#).

Best Practices

Driveways and parking areas are especially good places to install permeable pavement, as they receive less wear and tear than roads.

Initial Steps as a Homeowner if you want to install a permeable surface or pavement:

1. Decide which type of permeable surface best matches your budget, needs, and property:



APPLICATION EXAMPLES

Application	Most Suitable	Relative cost	Considerations
Driveways	Porous Asphalt	\$\$	Not suitable for heavy vehicles or point loads (such as emergency vehicle jacks)
Patios and play areas	Permeable Pavers	\$\$\$	Selection should be based on planned use, desired surface stability
	Modular Grid Pavement	\$\$	
	Grassed Modular Grid Pavement	\$\$	
	Porous rubber mats	\$\$\$	
Parking areas	High-traffic - Porous asphalt	\$\$\$	Tight soils: Porous asphalt or concrete with deep storage layer beneath
	Low-traffic - Modular Grid Pavement	\$\$	Free-draining soils: Conventional asphalt or concrete that drains to raingardens/infiltration facilities
Sidewalks	Permeable asphalt	\$\$	Gravel not recommended for high-traffic areas and where accessibility is required.
	Permeable pavers, Modular Grid Pavement,	\$\$\$	
		\$\$	
Roads	Porous concrete	\$\$\$\$	Typically requires thicker sections for design load. Generally not for high-speed pavement

2. Hire a contractor with experience working with designers and installers of the system you want to use.

When hiring a contractor, ensure she/he is familiar with the best practices for installing permeable pavement including:

- Provide sufficient sub-surface materials—typically crushed rock or gravel—to temporarily hold the water that flows through the paving material, until it is absorbed into the underlying soil. It should

be designed to perform even during very heavy precipitation.

- Establish “No Heavy Equipment” zones to protect the subsoils under future permeable paving from compaction. Do not allow construction debris or concrete “wash-out” in these areas.
- Protect the permeable paving from sedimentation to the extent feasible. Avoid grading plans that direct runoff from landscape areas onto permeable paving areas. The sediment load of this run-off may choke the permeability of the permeable paving area.





This mock up shows a typical cross section of engineered subsurface that contributes to permeable surfaces. Source: O'Brien & Company.

and sediment through regular sweeping or vacuum sweeping.

- For vegetated surfaces, regularly mow and maintain the grassed surface of the pavement in a good condition. Replant all bare spots in the spring or fall.

Guidance on best practices in permeable pavement design and installation is available in the *King County Surface Water Design Manual, Appendix C*.

Applicable References/ Standards

[2009 King County Surface Water Design Manual \(SWDM\): Appendix C](#) and Section C.2.6 Permeable Pavement

[2012 LID Technical Guidance Manual for Puget Sound](#): Note: While this is an excellent resource with helpful guidance, some of the strategies in this manual will not specifically meet the requirements for Unincorporated King County. Refer to SWDM Appendix C.

DPER Bulletins:

[29 Drainage Review](#)

[34B Surface Water Design Manual Variances or Adjustments](#)

Maintenance Requirements

A typical permeable pavement system has a life expectancy of approximately 25-years; this duration can be protected with ongoing maintenance.

- Inspect permeable pavements after one major storm each year to make sure it is working properly. Prolonged ponding or standing water on the pavement surface is a sign that the system is defective and may need to be replaced.
- Keep the surface of the permeable pavement clean and free of leaves, debris,

Resources

For the complete King County Green Building Handbook and individual Green Sheet PDF files, please visit our website at: <http://kingcounty.gov/property/permits/publications/greenbuild.aspx>. For additional information, please email dperwebinquiries@kingcounty.gov or call 206-296-6600.



See these related DPER Green Sheets (GS):

- Amended Soils, GS Number 1
- Roofing Materials, GS Number 4
- Routine Maintenance, GS Number 5

The National Ready Mix Concrete Association (NRMCA) hosts a website specific to [Porous Concrete](#).

[NRMCA's database](#) provides contact information for Certified Permeable Pavement Contractors – choose Pervious Concrete Craftsman, Installer, or Technician from the drop-down menu.

Watch [Martha Rose's](#) crew install Pervious Pavement.

Permit Tips

If your project involves clearing, filling, or grading more than 2,000 square feet of area, then a grading permit is required, in addition to following the applicable reference standards and requirements above.

When permitting permeable paving projects the following will help smooth the process:

- Know your soil conditions prior to submittal. You may need to have them tested to determine if they are conducive to permeable pavements.
- Know that inspections will include a preapproval field check to verify soil conditions and a final inspection for compliance with the Surface Water Design Manual.
- Permeable pavement may have unique or specialized standards or permit requirements, so ask your contractor or DPER.
- There are specific requirements for sub-surface materials (e.g. drainage rock) and a site subgrade review or inspection may be required by a qualified professional.
- Permeable concrete should be installed by an NRMCA-certified contractor.
- Permeable concrete and asphalt mixes must meet local codes and development standards (e.g. King County Road Design and Construction Standards).

