MAKING MORE PERVIOUS DRIVEWAYS & WALKWAYS

Driveways often account for a large amount of a home’s total impervious surface area, making them an important target for LID approaches. The stormwater that collects and flows off driveways contains a surprising amount of pollution—including oil and heavy metals, such as copper and zinc—that threatens fish and other wildlife in local waterways.

This pollution comes from:
- Cars leaking fluids
- Fuel spills
- Gradual wearing of metal parts
- Washing cars
- Repairing cars
- Repairing and cleaning other vehicles, such as lawn mowers
- Animal and pet wastes.

Whether you plan to build a new driveway or need to replace one that is in disrepair, you’ll be able to choose from a number of LID solutions.

Benefits of LID-designed driveways include:
- Attractive
- Can require less maintenance, depending on the system
- Durable and long lasting
- Manage drainage better to eliminate troublesome puddles
- Cost effective
- Reduce impact of stormwater runoff
- Filter pollution to protect water resources
- Allow water to reach tree roots

Driveway options: Options fall into two categories: design options and style/material choice.

Design options:
- The best way to reduce stormwater runoff is to simply reduce impervious surfaces. If you’re building new, reduce the length and width of your driveway to the greatest extent possible, while remaining in compliance with local requirements. Regulations vary by community, but experts recommend eight-foot-maximum widths for straight driveways; nine-foot widths for curved driveways; and 18-foot widths for two-lane driveways.
- Share driveway access with neighbors.
- Grade and pitch driveway so that runoff flows to an on-site stormwater feature, such as a rain garden.

Style and materials choices:
- Ribbon driveway
- Broken-concrete mosaic
- Permeable pavers
- Porous aggregate containment systems or reinforced turf systems
- Pervious concrete or porous asphalt

You can combine design options with a material choice to be more effective. For instance, you could choose a pervious pavement, grade your driveway to treat runoff on site in a rain garden, and share access with a neighbor. You can also combine style and material choices. For instance, you could create a ribbon driveway with pervious concrete, and the driveway apron or parking area could be a different material, such as permeable pavers or porous aggregate.
Ribbon Driveway

Sometimes called a “California strip,” a ribbon driveway involves using the least amount of impervious surface possible, while still providing a safe driving surface. Ribbon driveways are built by laying down two strips of concrete, each two-feet wide, with an open middle space in which grass, spreading thymes, or other groundcovers are planted.

With two-foot wide strips, there will be three feet of unpaved space in between. To be effective, the unpaved space must absorb stormwater well. The top 12 to 18 inches of soil should be loosened and amended well with compost prior to planting. Apply enough compost so that your base is about two-thirds soil and one-third compost (apply more if the soil is clay, or remove some of the poorly draining soils and add in a sandier mix with compost). Alternatively, if you are concerned about potentially driving in the middle section, replace the soil in the middle with a “structural soil mix” that has large rocks in the mix allowing it to bear weight but also be free draining. A soil supplier should be able to help you with this mix.

Maintenance: Ribbon driveways require very little maintenance. The unpaved section should be weeded—especially during establishment—to prevent weeds from overtaking the groundcovers or grass. If grass is used, sustainable lawn-care practices should be used, including top dressing with compost each year, which will maintain permeability and keep the grass healthier.

Cost: Ribbon driveways can be less expensive than traditional driveways because they use a smaller volume of concrete. However, preparation costs may be higher due to forming four sides instead of two. Depending on your access, there may be additional costs for delivering the concrete.

Broken-Concrete Mosaic

This style is usually a do-it-yourself project—maybe with the help of a few strong friends! A broken-concrete driveway is usually inspired by an old concrete driveway that has already started to crack. With the help of some chisels and sledgehammers, you can finish breaking up the concrete into manageable chunks. These chunks should be temporarily moved so you can create a more permeable base in the driveway.

With the driveway clear, you will need to excavate and/or break up the old, compacted soils and be sure that the top 12 to 18 inches are adequately loosened so stormwater can drain. Then you can add clean gravel and/or sand to make a free-draining base. More excavation will be required in heavier soils than in those that are already free draining.

Once you have achieved a suitable base layer of sandy, gravelly soil, you can begin laying your concrete chunks down in an attractive design. References on laying patios will help you achieve the correct grade. Make sure you have enough support for cars’ tires by placing two lines of concrete in two-foot wide blocks five feet on center. You can mimic a ribbon driveway by placing less concrete in the center, where cars won’t drive.

Be sure you place concrete chunks far enough apart from each other that you can pull or flame-torch any weeds that settle in the cracks. When all the concrete is placed, you can fill the cracks with attractive crushed rock, sand, or fine pea gravel to hold the chunks securely in place—look for interesting colors to add interest to your design.

On the non-driving surfaces, you can add tough groundcovers such as spreading thymes, just like in a ribbon driveway. If planting in spaces between the concrete chunks, add compost to support the plants and add permeability to the soil.
Maintenance: If built correctly, your broken-concrete driveway should be trouble free. You will need to occasionally replace the aggregate between the concrete chunks, or sweep it back into place if it is disturbed. Prevent weeds from taking hold in the cracks by removing them or flame-weeding them as soon as they appear.

Cost: Since they rely on recycled materials, broken-concrete mosaics are one of the most affordable LID driveway strategies, and they offer you a chance to create a unique, personally appealing landscape feature. (See photo.) Your main expenses will be from soil amendments and any plants you choose to install.

Permeable Pavers
These pavers are made of pre-cast concrete and are assembled in an interlocking pattern that creates gaps between each stone. The gaps are filled with gravel, allowing stormwater to percolate through (see photo). Permeable pavers can withstand very heavy loads and regular, low-speed traffic. Permeable pavers are produced in a range of colors to suit various architectural styles.

The key to successful stormwater absorption is creating just the right grading, soil preparation, and base layer below the pavers. Permeable paver systems have specific, technical installation requirements, and are installed by experienced contractors with certifications in working with these materials. To find an installer in your area, use the service provided by the Interlocking Concrete Pavement Institute (see resources). Ask vendors about their specific experience with permeable pavers. (See the tips in the box “Free-draining pavements,” for more ideas in finding a qualified contractor.)

Maintenance: Each manufacturer will recommend a specified maintenance plan for its brand of pervious pavers. It’s important to inspect them at least annually and to keep them clean to prevent the voids from becoming clogged. Regular sweeping is usually recommended. If the small stones in the joints become clogged with soil, they should be removed and replaced with clean stones.

Cost: Permeable-paver systems can range in cost from $7 to $12 per square foot, installed. (Smaller projects might have a higher cost per square foot.) Permeable pavers have the advantage of being very durable, and—if repairs become necessary—they can be replaced in small sections, making maintenance more affordable than with traditional paving systems.

Porous Aggregate-Containment & Reinforced Turf Systems
These systems are another form of pervious paving in which an interlocking grid keeps free-draining gravel in place or protects grass from compaction. The grid can be made of high-strength plastic, concrete, or non-corrosive metal.

Reinforced turf systems are most suitable for driveways or parking areas that are relatively flat, as turf is slippery when wet. Grass must be well established before driving on it.

As with other porous pavements, these systems require careful work to properly excavate, grade, and prepare the soils and aggregate base layer below the grids. Proper installation is critical for these systems to work; some manufacturers require hiring trained installers, others will provide instructions for those wanting to do their own installations.

Free-draining pavements—important tips:

Regardless of what kind of pervious system you choose, keep these tips in mind:

Hire qualified, experienced contractors. All these systems are proven to work, but only if they are installed correctly. Ask potential contractors to document their training and experience specific to pervious pavement, and then follow up to check out their work. Traditional paving systems require different techniques, so make sure the projects you investigate are really pervious paving.

Make sure suppliers provide materials exactly matching the manufacturer’s specifications. Technical specifications have been developed to ensure that the pervious pavement system functions as designed. Substituting a different material—especially in preparing the site—could render your pavement ineffective for stormwater and structurally unsound.

Control sediment. Eroding sediment running off from nearby areas can cause the air spaces in pervious systems to get clogged. Always make sure that sediment is being properly controlled through mulching, planting, and other stabilizing techniques. During new construction, especially, you must be vigilant in preventing muddy construction vehicles from affecting new pervious pavement.

Planning for Weeds
The adage “nature abhors a vacuum” might have been coined to describe weeds!

Weeds love to colonize cracks in driveways and sidewalks, and they’ll take advantage of open areas in a pervious driveway, too. Plan ahead to prevent problems:

- Intentionally plant tough, drought-tolerant plants in gaps that receive foot traffic only.
- Fill other gaps with pea gravel or other small stones that will allow weeding.
- Check out non-toxic weeding methods appropriate for hard surfaces, such as flame weeder and horticultural-grade vinegar.
Maintenance: Aggregate-containment systems are generally trouble free. In high-traffic areas, you may need to refill the grids with new, clean stones, or brush dislodged stones back into place. This should not be necessary more than once or twice per year. Reinforced turf systems require the same maintenance as normal lawns: mow and irrigate as needed. It is not necessary to aerate—in fact aerating may damage structures.

Costs: The systems vary in cost depending on the type chosen, size of project, and where you live. Generally, these systems are comparable in price to traditional concrete paving and about 10 to 15 percent more than traditional asphalt paving. Aggregate containment systems last 15 to 20 years and don’t require repaving maintenance expenses of traditional asphalt and concrete. Reinforced turf systems last up to 60 years.

Pervious Concrete & Porous Asphalt
Pervious concrete and porous asphalt look similar to their traditional counterparts, but they don’t include fine aggregate and they are established over a base specifically designed to store stormwater. By not adding the fine aggregate, they have more pores, or air space. The pores allow stormwater to drain through the pavement and into the reservoir base before absorbing back into the ground. Both these pervious pavements have been used in states throughout the country and have performed well in a wide range of climates.

Pervious concrete is a specially formulated mix of Portland cement, coarse aggregate, and water. Because of the way it is constructed, and the removal of the fine particles, it has void spaces of 15 to 20 percent of its volume. It has an open appearance, similar to exposed-aggregate concrete. Pervious concrete also provides filtering and biological removal of pollutants. The rock layer beneath the concrete pavement provides storage for stormwater so it has a longer time to absorb into the ground before there is any runoff.

Pervious concrete pavement is as durable and lasts as long as conventional concrete pavement. Pervious concrete has been found to be resistant to damage from freeze-thaw cycles. In fact, because the water flows through the surface, rather than freezing on top of it, ice is less of a problem with pervious pavement than conventional pavement.

Porous asphalt is made from coarse stone aggregate and an asphalt binder. It has very little fine aggregate, which allows for more voids to be left in the finished product. These voids allow stormwater to drain through the pavement. A clean gravel base layer allows water to absorb quickly back into the ground. Porous asphalt has a rougher appearance than traditional asphalt. When properly designed, constructed and maintained, porous asphalt pavements last as long as—and in some cases longer than—conventional asphalt. They have a more substantial base than conventional asphalt pavements and wear from freeze-thaw cycles is reduced.

Installation: All permeable pavement systems require careful preparation to prepare the site and ensure a proper base layer that holds and drains water back to the soil. Each paving material has its own specifications and must be installed by well-qualified, experienced professionals.

Maintenance: The most important maintenance concern for pervious pavements is preventing sediments from filling the void spaces. If there is any adjacent construction occurring, it is critical to adequately protect pervious pavement from fine sediment. Erosion-control systems are a must to ensure that no sediment runs off from other areas on your site to the pervious pavement. If the system should become clogged, some studies report that pressure washing pervious concrete will restore its porosity. Remove leaves and surface debris as needed to maintain permeability.

A seal coat should never be applied to porous asphalt, as it will render it impermeable. It’s important that any future owners know about any pervious pavements on the property and how to maintain them.

Costs: Materials costs for pervious concrete and porous asphalt are not necessarily higher than for traditional, but there may be secondary costs in creating batches or installing them at this point in their development. For concrete, where each load is always custom mixed, the contractor may have additional costs in working with an unfamiliar material correctly. For asphalt, which is produced at a plant in a continuous flow, there will likely be a charge from the asphalt plant for shutting down equipment and changing the formula to create a special batch of porous asphalt. Ordering in larger batches will likely be more cost effective, so porous asphalt is best applied to larger projects or when several small projects in close proximity can be done simultaneously. Costs are expected to drop as orders for pervious pavements rise.

These guidelines were prepared by Erica Gutman, Native Plant Salvage Project, WSU Thurston County Extension, with support from the Puget Sound Action Team. Special thanks for the guidance of Curtis Hinman, WSU Pierce County Extension. For more information, please see www.nativeplantsalvage.org.