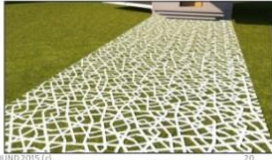


Advantages of Using Pervious Surfaces

Types of Permeable Surfaces

- Permeable Pavers



Project SOURCEBOOK (2)

What is a pervious surface? A pervious surface is designed to permit infiltration or percolation of storm water through soil surface into the ground where water is filtered naturally thus allowing pollutants to be removed.

Normal pavement is an **impervious** surface. Imperviousness refers to the inability of a surface to allow water to percolate through.

A marble countertop is impervious, a sponge is pervious, cardboard is somewhere in between. Sandy soils are pervious; a concrete driveway is not.

On an impervious surface, water is forced to travel downhill until it finds a place it can filter into soil or enter a low lying area. As it travels along these impervious areas, water can pick up potentially

toxic substances (like oil or fertilizer) and carry these materials to our water sources.

Impervious surfaces include sidewalks, roads, driveways, parking lots, pools, patios, rooftops, and very compacted soils caused by excavation, grading and landscaping. The greatest amount of area covered by impervious surface areas are surfaces designed for automobiles.

Knowing the percentage of your watershed that is covered by impervious surfaces is important. In natural areas, the majority of runoff occurs after the beginning of a storm or major melt. However, wherever impervious surfaces increase, storm and melt water running off them increases quantity, velocity, pollution load and a rise on the water's temperature. These factors add to the degradation of water quality. Degradation to water bodies from storm water pollution becomes noticeable when the watershed reaches 10-20% imperviousness.



Examples of runoff from impervious surfaces:

Sediment can be harmful to aquatic plants, fish and animals that live in or near the water. Harm can occur when sediment carries chemicals that could cause the oxygen levels in the receiving streams to be dangerously low and unable to support plant and fish life. Habitats that support aquatic insects and plants can also be destroyed by sediment.

Household wastes include paint solvents and thinners, petroleum products (gasoline, oil, and grease), pesticides, insecticides, auto fluids, etc. that can reduce oxygen in waterways and can have toxic effects in organisms that may be eaten by people.

Nutrients such as nitrogen and phosphorus can contribute to extreme plant growth such as algae. Algae can choke waterways, obstruct sunlight and decrease oxygen needed by aquatic life. Over the past decade, **blue-green algal** blooms, which sometimes turn toxic, have become an annual summer plague on **Lake Erie**. Some produce microcystin, a bacteria more poisonous than cyanide that can sicken or kill people, fish, birds, dogs and livestock. Typical sources for these nutrients are detergents, lawn and farm fertilizers, and animal feces and sewage.

Bacteria entering the waterways from animal excrement or pet waste, as well as leaking sewers and septic tanks that are not maintained properly can cause disease and other health hazards in both animals and humans.

Debris such as six-pack rings, bottles, plastic bags, cigarette butts, cans, etc. may wash into the waterways and choke, suffocate, or hinder aquatic life such as turtles, fish, ducks, and other birds. Toxic chemicals and bacteria often accompany this debris.

Research shows that high levels of impervious surfaces are linked to this water quality degradation. Two thirds of the impervious surfaces in developed communities are in the form of pavement related to automobile usage. Any design that uses alternatives to reduce impervious pavement is a positive step towards improving the quality of a community's water resource.



Uses of Pervious Surfaces

Many communities are now increasing their use of pervious pavements which slow and reduce runoff. Pervious surface coverings if installed correctly and properly maintained duplicate the structural and functional features of traditional pavement.

Pervious pavements can be used in the development of:

1. Low-traffic roads, fire lanes and emergency access roads; Parking areas; especially over-flow parking and those associated with office buildings, shopping centers and recreational facilities;
2. Patios and pool decks;
3. Residential driveways and sidewalks;
4. Vehicle cross-overs on divided highways and road shoulders;
5. Boat launching ramps.



Picture of pervious pavement around rain garden at Jefferson Primary School in Findlay.

When communities have used pervious pavement, they have found that they:

1. Decrease flooding which could over-load combined sewer sewage treatment plants;
2. Lesson the cost for development of retention basins and reduce the amount of land set aside;
3. Reduce irrigation of area plantings based on the seepage of rain into the sub soil surfaces;
4. Replenish groundwater;
5. Decrease glare on roadways and help prevent automobile hydroplaning (skidding) accidents;
6. Reduce ice buildup on pavement.
7. Diminish thermal pollution caused by water runoff from warm surfaces
8. Reduce storm water runoff. (Even saturated pervious pavement, because of its rough surface texture, will continue to slow the flow of storm water from surfaces);
9. Diminish pollutants in run-off.



Disadvantages of Pervious Surfaces

One disadvantage of pervious pavements in northern climates is that the pervious pavement is easily compromised as snowplows can dislodge pavers while sanding can clog and reduce the pavement's filtration process.

The heavy clay soils found in northern climates can limit the usefulness of pervious pavement. Clay soils tend to be impervious and reduce expected water quality improvements. Using a graveled water storage area built on top of clay soils may not be a workable solution since storage capacity can be overcome quickly. Some additional issues for concern include navigation problems for wheelchairs and people with various disabilities, the need to sweep small sand or pebbles in parking lots, and possible damage from snowplowing and de-icing operations.

Tips for reducing the amount of storm water running off your property:

Landscaping Tips

Landscape to conserve and treat water. Plantings and trees are much more effective in trapping water than grass. The smaller the lawn the more effective the water treatment and less mowing is necessary.

Driveway tips

- Design shorter and narrower drives
- Design wide turnaround areas only where needed
- Design drives to follow land contours and drain to pervious areas
- Use pervious alternatives such as grid pavers and block pavers.

Sidewalk tips

- Use paved sidewalks sparingly
- Separate sidewalks from driveway, road & drainage system by vegetated strips
- Consider pervious alternatives (porous concrete, permeable brick pavers, porous asphalt, gravel, mulch)

Residential Roofs - Residential Roof water is relatively clean, and can be easily taken out of the storm water loop:

- Redirect down spouts to pervious areas
- Capture rainwater in rain barrels and rain gardens
- Consider a green roof! (an extension of a conventional roof which involves instillation of a layered system of membranes, substrate and plants).

Rain Garden at Findlay Family Center



How can I help reduce storm water pollution?

- **Never dump anything down the storm drains.**
- Sweep up debris on your driveway and sidewalks instead of washing it into the street and then to the storm water system.
- Pick up after your pet and dispose of waste properly.
- Use fertilizers sparingly and avoid pesticides. Learn about integrated pest control.
- Compost your yard waste.
- Vegetate bare spots in your yard.
- Wash your car in your yard instead of on your driveway.
- Check your vehicles for leaks.
- Recycle used motor oil
- Direct downspouts away from paved surfaces.
- Have your septic tank pumped and system inspected regularly.

SOURCES:

City of Findlay Website: <https://www.findlayohio.com/findlayanswers/how-can-i-help-to-stop-storm-water-pollution/>

Lake Superior, Duluth Streams.org

<http://www.lakesuperiorstreams.org/stormwater/toolkit/paving.html>