PLANNING BY DESIGN

Montgomery County Planning Commission

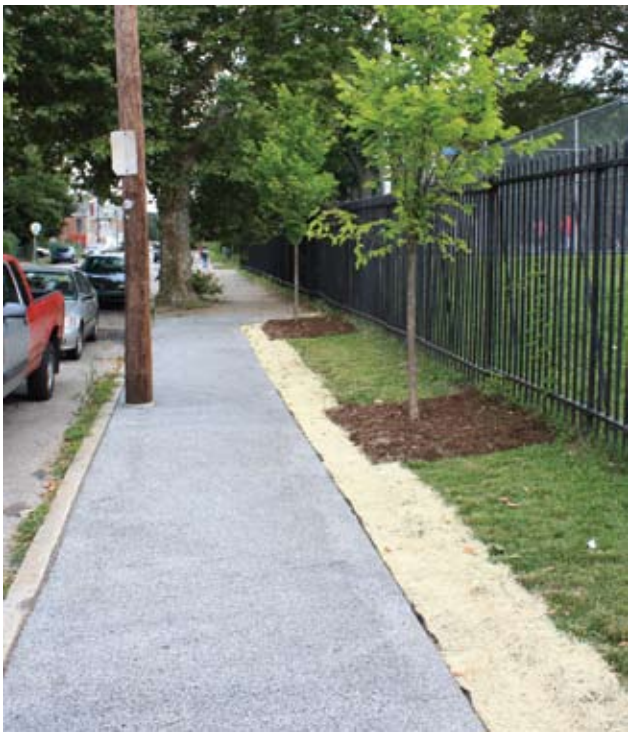
Sustainable Paving

Sustainable paving is an innovative paving concept that actually reduces stormwater runoff. This environmentally friendly alternative to conventional paving (asphalt and concrete) can help green our communities. Its innovative design allows rain to pass through surfaces and soak into the ground. Sustainable paving, or permeable paving, helps mitigate the negative impacts of conventional paving by reducing stormwater runoff, improving water quality, reducing flooding, and recharging groundwater. It can be part of an overall strategy to improve the environmental performance of our developed areas. Using permeable paving in parking and pedestrian areas helps reduce the temperature, volume, and velocity of stormwater runoff, filters and removes pollutants, and creates more sustainable communities.

Paving Types

Sustainable paving applies to a number of different materials, including porous asphalt and concrete, permeable interlocking pavers, and reinforced grass/gravel paving. It resembles traditional asphalt, concrete, and pavers but functions differently. Permeable paving systems allow rainwater to either pass

Photo: Johnson & Johnson Research Facility, Springhouse, PA—Porous Asphalt.



Top photo: Morris Arboretum—Porous Asphalt

Middle photo: Waterview Recreation Center, Philadelphia, PA—Porous Concrete

Bottom photo: Bounty Creek Park, Moorestown, NJ—Permeable Pavers

through the paving material itself or through the joints between pavers instead of running across the surface. Runoff then enters an underground stone-filled storage bed where it can be released slowly, helping to manage stormwater in a sustainable manner at its source.

Porous Asphalt and Concrete

Asphalt and concrete are the most common paving materials used today. Porous asphalt or concrete is made without fine particles and differs in this way from conventional paving. Without these fine particles, the paving material contains more voids, or air spaces, allowing water to pass through the pavement into a reservoir of crushed stone and then into the ground. This results in a mix having a consistency of popcorn or rice cakes. Porous asphalt and concrete can be mixed and installed on-site in the same manner as conventional paving, although installation requires more expertise. When the finer particles are removed, these surfaces lose some of their strength. For this reason, permeable paving is not currently recommended for high-traffic areas such as roadways. It is typically recommended for low-use areas where load-bearing or weight issues are less critical, such as pedestrian walkways, parking bays, reserve parking areas, or in low-traffic areas such as driveways and loading areas.

Permeable Interlocking Pavers

Permeable interlocking pavers, available in a variety of colors, styles, and patterns, are an attractive alternative to asphalt or concrete and provide greater design flexibility. These systems consist of interlocking concrete pavers with a permeable material in the voids, or joints, between the pavers. Water seeps through these joints and infiltrates into a stone base and eventually into the ground. Interlocking paving systems effectively provide infiltration, detention, and treatment of stormwater runoff. They are applicable to small or large paved areas and offer flexibility in surface repair since sections can be removed and replaced. Recent advances allow installation of larger modules—50 to 100 individual pavers—reducing labor installation costs.

Top photo: Austin, Texas, GrassPave2—Grass Pavers
Credit: Invisible Structure, Inc.

Middle photo: Washington, DC, GravelPave2—Gravel Paving
Invisible Structures, Inc

Bottom photo: Limerick Square Shopping Center, Limerick, PA—Porous Asphalt

Reinforced grass/gravel paving

Reinforced grass/gravel paving is appropriate for low-use facilities, such as emergency lanes, occasional-use parking, weekend markets, and events. This system consists of a stable base (grid framework) usually constructed of concrete or plastic which contains voids for the placement of turf grass or gravel. A stone or sand drainage system is placed under the framework for stormwater management. This type of paving supports frequent light and occasional heavy loads without damaging the structure and the underlying soil. Grass and gravel dissipate heat and are an effective alternative to conventional paving in appropriate conditions. This system has been used in underutilized parking areas for schools, universities, and stadiums and in alleys and driveways to create more hospitable environments.

Installation and Maintenance

The key to effective sustainable paving systems is proper installation and ongoing maintenance. Proper installation is critical to the success of permeable paving. For example, heavy equipment should be restricted from infiltration zones to prevent soil compaction, and the paving and stone bed should be protected from sediment during construction or the infiltration benefit can be lost. Regular maintenance to prevent pavement surfaces and the underlying infiltration (stone) bed from being clogged with sediment is required for the long-term viability of these systems. All permeable surfaces should be kept clean and vacuumed regularly, some as frequently as twice a year, to remove any sediment. Permeable paving should never be sealed.

Routine inspection and maintenance programs should be established to ensure long-term durability and performance. Effective sustainable paving systems have been functioning for more than 20 years because of ongoing routine maintenance. While initial construction costs for these systems may be higher than traditional paving, overall savings will be realized through long-term environmental benefits and stormwater management cost savings. For example, sustainable paving can lead to less piping and curbing, smaller detention facilities, and less land area needed for stormwater management.

Top photo: Burlington County Agricultural Center, Moorestown, NJ—Porous Asphalt

Middle photo: High Point Neighborhood, Seattle, Washington—Permeable Pavers
Credit: SvR Design Company

Bottom photo: Wissahickon Valley Watershed Association, Ambler, PA—Grass Pavers

Sustainable Paving in Our Communities

Sustainable paving is being used successfully in this region and other metropolitan areas throughout the country. As part of its stormwater management program, Philadelphia is installing these paving systems to improve the quality and reduce the quantity of stormwater entering the municipal system. The City of Chicago has an ambitious program using permeable paving to transform its alleys into stormwater management facilities. Seattle, Washington and Portland, Oregon have long pioneered innovative stormwater techniques including permeable paving. Sustainable paving systems may not be appropriate for every site due to factors such as the use of the area, soil infiltration rates, slope, soil contamination, and cost. When used in appropriate areas in our communities, they can effectively manage stormwater, offering environmental benefits and creating more sustainable and greener communities.

Online Resources

City of Chicago Green Alley Program
www.cityofchicago.org/city/en/depts/cdot/provdrs/alley/svcs/green_alleys.html

EPA Green Infrastructure
cfpub.epa.gov/npdes/home.cfm?program_id=298

North Carolina State University Permeable Pavement Research
www.perviouspavement.org/PDFs/ncsu_study.pdf

Urban Design Tools - Low Impact Development (LID)
www.lid-stormwater.net/permpaver_specs.htm#specs

Villanova Urban Stormwater Partnership
www3.villanova.edu/VUSP

Trade Associations
Interlocking Concrete Pavement Institute (ICPI)
National Ready Mixed Concrete Association (NRMCA)
National Asphalt Pavement Association (NAPA)

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