PERVIOUS PAVEMENT:
Concrete Solutions to Stormwater Problems

Driveway Maintenance, Inc.

Pervious Pavement: Remedy Improves Water Drainage and Sustainability at Miami, Florida, Mini-Warehouse Storage Facility

A White Paper

by Driveway Maintenance, Inc.

http://www.driveway.net

About Driveway Maintenance, Inc.

Driveway Maintenance Inc. (DMI) is a LEED-accredited full-service, self-performing paving contractor and sealcoating company serving clients throughout Florida, including Miami, Naples, Orlando, Palm Beach, Ft. Lauderdale, Ft. Myers, Tampa, Ft. Pierce, Delray and Daytona. DMI provides paving and sealcoating services to commercial entities, including apartment complexes, community associations, commercial office parks and retail shopping centers. Learn more at Driveway.net.

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Property owners at a Miami, Florida, location of self-storage facility were awash in problems. During the rainy season, poor drainage would cause water from heavy rains to pool and rise in the asphalt driveways and access ways between the bays. Vehicle and customer access was limited or cut off – sometimes for hours – until water drained or retreated. Contents inside the storage units were threatened by rising waters. Customers were frustrated.

Aisle 1 - Photo taken October 21, 2011, two minutes after rain storm, without pervious pavement installation.

The obvious solution was untenable and costly. It called for digging up the asphalt pavement and installing catch basins and corrugated pipe with French drains to manage the stormwater.

The price would be $40,000 or more, and would require extensive permitting and disruption of customer access.

The lack of sufficient drainage was causing problems for access and the protection of customers' belongings. The company needed a solution that would boost drainage and facilitate access without investing months or unreasonable costs in improvements.

Driveway Maintenance Inc., presented another solution: Pervious pavement. Pervious pavement can be installed at a fraction of the cost and time of traditional drainage solutions. The pervious pavement would create a permanent remedy that hastened rainwater drainage, reduced the threat of damage from rising waters, and increased customer access – and customer satisfaction – following rain storms.

The cost: less than a third to half the cost – and far less time – required over installing new drainage systems. Driveway Maintenance presented a less-disruptive, long-term solution the property owner could afford.

A RAIN-SOAKED DILEMMA

The use of porous, pervious pavement mitigates issues related to pooling or standing water or damaging runoff, especially where seasonal storms and flash floods overwhelm traditional drainage systems. These can include:

- Sidewalks, paths and pedestrian walkways in business, retail and educational developments, where standing water can become hazardous to pedestrians.
- Driveways, parking lots and thoroughfares, where trapped water pools and rises, frustrating customers and property managers alike. Property damage is common, as rising water gets into storage bays, or seeps beneath building foundations.
- Surrounding grounds, where runoff and erosion can damage expensive landscaping.
- Natural water systems, where pollution and impurities stream unfiltered into nearby lakes or canals, instead of percolating through pervious pavement and filtering naturally through the ground and back into the aquifer.

Pervious pavement is a misnomer. Also known as permeable concrete, porous concrete, gap-graded concrete, no-fines concrete, enhanced-porosity concrete, and pervious asphalt, the "pavement" is a mix of porous cementitious material and larger aggregate particles that create interconnected voids through which water can seep. Little sand is used in this mix; the resulting voids encourage the downward flow of water. Water flow rates through pervious pavement generally approach 480 in./hr (0.34 cm/s, which is 5 gal/ft²/ min or 200 L/m²/min), according to the National Ready Mixed Concrete Association.

Here's how it works.

For existing driveways or walkways, a section of surface material – either asphalt or concrete – running the length of the installation area is removed to a minimum of six inches in depth. There's no need to remove the entire surface. At the facility, underlayment was excavated and removed to a total depth of about 12 inches.

Six inches of drain field rock was laid in the resulting trench. This created an additional reservoir for added drainage capacity. Atop that, six inches of pervious cement was poured. The water now drains through the pervious pavement and drainage rock and into the ground below. From there, it filters directly into the ground and water table below.

Aisle 2 - Photo taken October 21, 2011, two minutes after rain storm, with pervious pavement installation.

COST & ENVIRONMENTAL SAVINGS

Aside from initial cost savings over traditional drainage systems, pervious pavement has low lifecycle and maintenance costs. The catch basin and corrugated pipes should be regularly jet washed and vacuumed. Pervious pavement surfaces should be vacuumed annually. No driveway sealcoating should be done.

Pervious pavement is saving the environment, as well as budgets. In Philadelphia, like many other cities, stormwater often drains directly into area waterways via traditional aging stormwater systems. In the flow are pollutants and impurities common to urban runoff, like motor oil, radiator coolant and other automobile fluids. With pervious pavement, runoff percolates through the surface into the ground; naturally occurring soil biology filters, treats and reduces the pollutants. The city plans to manage stormwater by installing permeable roads that will let rain slowly percolate underground instead of flowing into storm drains, Time magazine wrote. They plan to do the same with basketball courts and other hard surfaces. The moves will help the city comply with the Clean Water Act – and save billions over installing a new sewer system.

Pervious concrete's natural lighter color also reduces the "heat island" effect from solar radiation common to traditional asphalt pavement.

Pervious pavement is seen as part of an overall U.S. Green Building Council's Leadership in Energy & Environmental Design (LEED) Green Building Rating System solution for new building construction plans. Depending on the municipality, this also may mitigate stormwater impact permit fees.

Commercial properties, residential facilities and even college campuses are finding favor with local environmental authorities and even the U.S. Environmental Protection Agency (EPA) by using pervious pavement to meet stormwater regulations. One South Florida university campus needed new sidewalks. The local water management authority believed the designs for new sidewalks created too much impervious area and reduced stormwater management and reclamation. Using pervious pavement, the school was able to create safe walkways with reduced pooling and satisfy the water management authority.

Water that drains through pervious pavements can be reclaimed and recaptured in the catch basin or cistern for non-potable uses, like irrigation and flushing of toilets. Overall water sustainability is improved.

Pervious pavement also has improved structural benefits. The textured surface is safer for walking or driving when wet. Because water drains faster, pooling, glare and hydroplaning are reduced, especially when used in residential subdivisions.

Pervious pavement is stronger and more durable than asphalt pavement. Its flexibility as a solution make it adaptable in a multitude of situations. It can be used in common areas around planters and trees; since water and air both get through to tree roots, uplift is less common than with traditional pavement. Property managers are using pervious pavement as a replacement for turf block, reducing tripping and personal injury and property liability concerns. It also can be color-treated as needed.

For many areas, rain storms and pooling water create hazards to people and property alike. Property owners, maintenance companies and others who face these issues in driveways, parking lots, walkways and other surfaces where water pools as a result of poor drainage should contact a building contractor versed in pervious pavement installations. When compared to other remediation options, the cost and installation time are lower, and benefits to property and the environment are greater.

For many property owners, pervious pavement is a lasting solution with enduring benefits for long-term success.

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