Backgrounder: RainPave® and StormPave ® clay pavers

Pine Hall Brick, which was established in 1922, has introduced RainPave™ and StormPave™ genuine clay pavers made for use in a permeable pavement system. The advantages are that this system effectively:

- Enables stormwater to filter back into the soil, instead of draining into streams and rivers and picking up pollutants along the way
- Satisfies state and local stormwater management requirements
- Allows builders to potentially qualify for LEED credits in four ways, including stormwater design, heat island effect-non roof and recycled content (both of which depend on color chosen); and use of regional materials
- Preserves the classic aesthetic appeal of genuine clay brick pavers, while protecting and preserving the environment

Stormwater Runoff

Stormwater runoff has become a topic within our national discussion, spurred in part by government regulation. The Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) has set firm guidelines on how storm runoff is to be handled. Many federal, state and local regulators have recognized permeable paving systems as a "best management practice" to control stormwater and aid in pollutant removal.

Additionally, recent droughts – coupled with water restrictions through much of the Southeast – has brought home to many Americans how important water is.

The conversation has worked its way into the marketplace. Earlier this year, the American Society of Landscape Architects reported that a survey of its leading members shows that designs which incorporate permeable paving systems that retain or detain stormwater on site are increasingly being specified by property owners and developers.

For the first time, residential and commercial customers alike can install these infiltration systems without losing the aesthetic appeal of genuine clay pavers. Walkways, driveways, roads and plazas made out of brick have historically been an excellent way to tie the visual elements of what's on the ground together with nearby commercial buildings or private residences that are also made out of brick. And now, those brick installations, which were already green because of

their manufacturing processes, their permanence and their unlimited recycling options, can now also contribute to water conservation and purification.

The use of clay brick pavers in permeable paving systems is new, but the underlying scientific theories and successful implementation of permeable paving itself is not. A permeable system using interlocking concrete pavers has been used in Germany and elsewhere in Europe since the late 1980s and in North America since 1992, according to the Interlocking Concrete Pavement Institute. Pervious concrete pavement was first used in Florida in the early 1970s and porous asphalt emerged at the same time. Permeable pavement systems have been successfully used in a variety of soils and climates – and research has demonstrated the ability of all permeable pavements to significantly reduce urban runoff.

The problem of stormwater runoff is simple physics. It occurs when rain or snowmelt flows over the ground – and impervious surfaces, such as driveways, sidewalks and streets, prevent it from naturally soaking in, or infiltrating, into the groundwater, according to the Environmental Protection Agency (EPA).

Stormwater can pick up debris, chemicals, dirt and other pollutants and flow, untreated, into a storm sewer system or directly to a lake, stream, wetland or coastal water. The EPA says that stormwater runoff can lead to increased levels of:

- Sediment, which can cloud water, destroy aquatic habitats and make it impossible for aquatic plants to grow.
- Excess nutrients, which can cause algae blooms, effectively choking off oxygen and killing fish and other marine life
- Bacteria and other pathogens, which can wash into swimming areas and create health hazards.

Unchecked stormwater can also wash debris downstream, like plastic bags and six-pack rings, which can maim or kill wildlife. Household hazardous wastes, like insecticides, pesticides, paint, solvents, used motor oil and other auto fluids can poison aquatic life – and poison people, according to the EPA.

The problem is real. In North Carolina, which is Pine Hall Brick's home state, a total of 5,000 stream miles have been impaired by sediment pathogens, nutrients and habitat degradation, according to the N.C. Cooperative Extension Service, a division of North Carolina State University and North Carolina A&T State University.

Using a permeable pavement allows water to soak back into the groundwater, decreasing stormwater runoff, according to the EPA. The N.C. Cooperative Extension Service says that as the groundwater slowly travels back to the ocean

or streams, it is naturally cleaned of any pollutants it might have picked up along the way.

Benefits to Developers and Homeowners, including LEED

Permeable pavement systems can not only help the environment, but can help a developer's bottom line. In some commercial installations, a traditional retention pond, expensive ditching, stormwater sewer and re-direction of surface water can be reduced or eliminated with permeable pavements, which saves or offsets costs and opens up more land for development.

Use of a system that uses permeable pavers can help developers obtain a number of the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) credits.

Permeable pavers in a "best practice" installation design can qualify for the LEED ® Credit 6 Sustainable Site-Stormwater Design. Additionally, permeable pavements laid with Pine Hall Brick's lighter colored pavers (red, rose, buff) can help qualify for the Sustainable Sites Credit 7.1 Heat Island Effect: Non-Roof in LEED. The Rose color's composition is made of 53% recycled material which helps in qualifying for Materials & Resources Credit 4 Recycled Content in LEED.

Because clay brick is produced in 38 out of 50 states, it is normally transported no more than 175 miles from where it is made to a job site, according to the Brick Industry Association. Transportation costs are therefore relatively efficient, which can help qualify a particular project, which uses brick products, for LEED certification credit under Credit 5 Regional Materials: Extracted, Processed, Manufactured Regionally.

RainPave™ can also help residential developers meet new regulations regarding runoff. Large metropolitan areas like Atlanta have passed local ordinances limiting the size of impervious areas, like concrete or asphalt driveways, that don't allow water infiltration. Similar restrictions will likely see passage elsewhere, making them excellent candidates for permeable pavements with RainPave™. RainPave is a Rumbled® paver designed to look like an antique, reclaimed paver to offer a more traditional look.

On the commercial side, StormPave™ works well in institutional and commercial projects where joint openings need to meet Americans with Disabilities Act restrictions regarding widths of ½" or less, in addition to reducing or eliminating the need for retention ponds, as previously noted.

The new StormPave™ and RainPave™ pavers are made to the same exacting standards as the rest of Pine Hall Brick's clay pavers. They differ from conventional clay pavers in that they create more spacing between the pavers – a higher void area – which allows water to infiltrate through the pavement surface.

The support system underneath is different too. Instead of crushed gravel and sand, which is used in conventional clay brick paving systems, open-graded aggregates without fine particles are used. A #2 stone is used as a sub-base, then, a finer grade of #57 stone is used as the base, followed by a bedding layer of #8 or 89 aggregate which is smaller again in size and it is also swept into the joints. This series of aggregates allows the water to flow as good bacteria builds around the rock over time and aids in reducing some pollutants.

The Green Story

Clay brick, whether used as a building material for houses and office buildings, or as clay pavers in streets, sidewalks, patios and driveways, has been an example of a green building material for centuries.

In its simplest terms, bricks are made out of dirt (clay or shale) and water, onto which heat is applied. Under the current definition of green as embracing sustainable design, brick may possibly be the greenest building material available. They have an unsurpassed life cycle, are energy efficient, are made of clay, which is the most abundant raw material on the planet, have minimal waste in manufacture and have countless recycling options, according to the Brick Industry Association (BIA).

Clay pavers don't require pallet packaging – and the amount of embodied energy required to mine, manufacture and transport one standard brick is 14,000 British thermal units - less than concrete, glass, steel or wood, according to the *AIA Environmental Resource Guide.*

RainPave™ and StormPave™ carry the idea of sustainability one step further, in that the new products represent one of the few building materials that can have a continuing effect on the environment. It's a green building practice when the project is built – and as part of a permeable paving system, it continues to have a positive environmental impact on groundwater, decades into the future.

America's Premier Paver

RainPave ™, for residential use, and StormPave™, for commercial applications, look similar to Rumbled ® and English Edge ® pavers, respectively, that Pine Hall Brick has offered for more than a decade. The original Rumbled ® and English Edge ® pavers, along with 20 other varieties of Pine Hall Brick clay pavers, have been used in a wide variety of applications, throughout the United

States and overseas, from original construction at Walt Disney facilities in Florida, California and Hong Kong; to college campuses like the University of Southern California, Johns Hopkins and Ball State University, to LaFayette Park and Arlington National Cemetery in Washington, D.C., to historic renovations in Savannah, Ga., Richmond, Va., and Durham, N.C.

Clay pavers, as made today, have advantages over other segmental paving materials. They are tough and durable enough to stand up to anything, whether it is pedestrian and wheelchair traffic or thousands of automobiles and trucks on a busy brick-paved street.

But it hasn't always been that way. Clay brick is brick, but brick used as walls in buildings aren't necessarily brick pavers. Fifty to 100 years ago, some brick products were installed as brick pavers, even though they were fired in a kiln exactly the same way as solid "face brick" for walls on brick houses and commercial buildings. The problem was that face brick was never intended to be walked on or driven over – and so turned out to be less durable.

Also, with the re-emerging popularity of segmental paving on crushed stone and sand, installers found clay pavers more difficult to lay due to the potentially wide range of size variation found in a traditional brick making process.

These challenges led to the adoption in the 1970s of industry-wide standards from the American Society for Testing and Materials (ASTM) for clay pavers.

Pine Hall Brick had a better way. To meet the size variation challenge, Pine Hall Brick in 1996 built a state-of-the-art manufacturing plant that is dedicated to pavers, which has effectively accomplished both goals: Brick pavers of precise dimensions meeting the highest durability standards. Pine Hall Brick pavers are easier to install because there are only slight variations in size (the best in the industry) – and once they are in place, they are tough enough to last for more than a century. Market demand for this high-quality product led to the commitment of a plant expansion less than a year after the first plant was opened.

Today, Pine Hall Brick is the largest supplier of clay brick pavers in the United States from the original plant in North Carolina and a second plant in Georgia. The pavers are constantly tested to ensure that they are of the highest quality – and they are as at home in a patio in Green Bay, Wisconsin as they are in a sidewalk and street in Celebration, Florida.

Clay brick pavers carry the advantage of being the same color throughout, so they never fade. And they're easy to maintain: Should underground utilities need work – or should a tree root heave a section of sidewalk out of place - the pavers can be removed by hand and stacked nearby, repair work can be carried out and

the pavers can then be replaced – and there is not an unsightly asphalt or concrete patch to mark the spot.

Pine Hall Brick's new StormPave™ and RainPave™ clay brick pavers successfully carry on the tradition of America's Premier Paver. Like the others, the two newest pavers are, indeed, "earth friendly and naturally green™".

For more information, please visit www.PineHallBrick.com or call 1-800-336-8689.

To arrange an interview with one of our experts or photographs of our products, please contact: Marc Barnes, Director of Public Relations, King's English LLC at (336) 574-0304, ext. 17.