

Why Pervious Concrete?

By Alan Sparkman

Before answering the 'Why Pervious Concrete' question, perhaps we should define pervious concrete. Pervious concrete is designed to allow water to flow through the concrete, while maintaining adequate strength for use in parking lots and low volume streets as a paving material. Pervious concrete is also known as 'no-fines' concrete, as the basic mix is simply coarse aggregate, cement and water (no sand). To achieve the desired permeability, the goal is to maintain approximately 20 percent voids in the concrete as placed, while achieving sufficient compaction to give the pervious concrete the necessary strength to support light traffic loads.

So why is pervious concrete becoming so popular? Basically, pervious concrete provides an excellent solution for many stormwater management problems and concerns related to Urban Heat Islands and air quality. Developers and other private companies can use pervious concrete to reduce or eliminate the need for expensive retention ponds, freeing up valuable real estate for development while still providing paved parking for customers and residents. Local governments can specify the use of pervious concrete within their boundaries to address their new responsibilities for managing stormwater runoff by mandating that a certain percentage of parking

areas utilize a pervious pavement, or by allowing developers to reduce the amount of real estate devoted to 'green space' in exchange for using an appropriate amount of pervious paving in place of typical impervious pavements.

Pervious concrete is not a new material, having been developed in Florida around 20 years ago. As we



Erwin city officials are very pleased with their new pervious parking lot. Mayor Russell Brackins, City Administrator Doris Hensley, City Project Manager Randy Trivette, and Appalachian RC&D Council Vice Chairman, Jack Hawkins.

have become increasingly aware of the need to better manage stormwater, interest in the product has gradually moved northward. This northward migration has raised some construction issues for pervious concrete, primarily with regard to freeze-thaw durability and drainage of the subgrade material – neither were considerations with Florida's mild climate and sandy soils.

Experience with pervious concrete installations over the past five years in Tennessee (and 12 years in Raleigh, NC) indicate that the product performs well in freeze-thaw environments, provided that water is not allowed to pool within the pavement structure. Most projects will have no trouble meeting this requirement, as water passes through the pavement very rapidly.

Obviously, drainage of the subgrade material will have a large impact on water retention within the pervious pavement – if the subgrade can't dissipate the volume of water coming through the pavement, it would be possible for the pavement to become filled with water.

This concern is especially true with clay-type soils, but there are strategies to address these situations. In Tennessee, most pervious installations should include at least four inches of free-draining gravel immediately beneath the pavement. This will direct surface water away from the bottom of the pervious pavement, and provide additional storage capacity for rain events. If the slope of the parking area is not sufficient to provide drainage from underneath the pavement, the installation of an appropriate number of drywell structures underneath the pavement will provide additional capacity to perk the rainwater back into the soil. As a rule of thumb, if the soil beneath a pervious pavement will

pass a perk test for the installation of a septic tank, it will provide sufficient permeability without additional measures to disperse the water.

It is important to remember some key facts about rainfall events and the percolation of this water back into the ground.

- More than half of all rainfall is provided in rain events that total one-half inch or less
- Dry pervious pavement will absorb an amount of moisture equivalent to 3 percent of the total weight of the pavement
- Pervious pavement provides a runoff coefficient at least as good as sod (40–65 percent)
- Most soils regain their perking ability in a five day cycle, or less (they dry out)

Thus, in practice, a rain event with an accumulation of 1/8 to 1/4 of an inch will just saturate all of the surfaces of the pervious pavement - in other words, there would be virtually no runoff from such events and no need to be concerned with the perking ability of the soil. In any event, since pervious pavement does nothing to inhibit the natural perking ability of the soil on which it is constructed, the area of natural ground converted to parking with pervious pavement will always provide at least the same amount of perking that it did in its natural state, and probably more.

With regard to air quality, the use of any concrete pavement will provide a much higher degree of reflection than darker pavement choices. This will produce lower surface temperatures at the pavement surface, and will contribute less to atmospheric heating (the Urban Heat Island effect) and thus lower the probability of ozone production. This higher reflectivity will also make the concrete pavement considerably easier to light at night, leading to



On this Knoxville sidewalk, pervious concrete allows water to pass through, irrigating surrounding foliage. Project completed as a donation by TRMCA, with concrete provided by American Limestone and Ready Mix of Knoxville.



Erwin demo project constructed through a collaborative effort with TVA grant money, the Appalachian RC&D Council, and TRMCA. Transit Mix and Loven Ready Mix donated some pervious concrete, and Watauga Ready Mix donated the use of the roller.

lower lighter costs both initially and over the life of parking area.

Concrete pavements also provide a significant benefit in terms of reducing the VOC's that are released into the atmosphere during both initial construction and subsequent maintenance operations, as compared to asphalt pavements. For more information on this topic, visit the Clean Air Counts project at www.cleanaircounts.org.

In summary, pervious concrete pro-

vides significant advantages for both stormwater management and cleaner air, without imposing significantly increased construction or maintenance costs, and it preserves the important functions of parking areas with regard to all-weather use and customer convenience. For more information about including pervious concrete in your next project, please visit our website at www.trmca.org, or contact our office directly by calling 615-360-7393. ■