

## Pervious pavements have potential



PHOTO © NATIONAL READY MIXED CONCRETE ASSOC.

Water draining through pervious concrete.

*“You have to do a careful balancing act between the strength you need and the perviousness you want.”*

The industry terms are: pervious concrete, porous asphalt or HMA

**PERVIOUS PAVEMENTS** are a growing trend for parking lots, sidewalks and paths, and other low volume or light-duty surfaces. Available as concrete and asphalt, these coarse, open surfaces let water run right through.

The pavements offer safety benefits, stormwater management options, and other environmental benefits. They also need specialized installation, extra maintenance to retain their perviousness, and gentle treatment by snow plows and other equipment. They have been used in southern states for years, but concerns about freeze/thaw durability limited their use here. Recent Wisconsin installations using improved technology and design are proving themselves in our climate.

Permeability is created by using a small-diameter aggregate that is uniform size or “gap-graded,” with little or no fines. This produces pavements with 15%-25% void space, a portion of which is interconnected allowing water to move through. Strength is reduced, however, when there is less contact between the aggregate pieces. “You have to do a careful balancing act between the strength you need and the perviousness you want,” says Willie Gonwa, a senior project manager with Symbiont in West Allis.

In 2005 Gonwa supervised a pervious paving project at the Milwaukee School of Engineering (MSOE). It was one of several area demonstration sites for runoff reduction and stormwater management tools.

The 1.25 acre site at MSOE is about 65% pervious pavement. Of that a quarter is pervious concrete and three-quarters is porous asphalt. Parking stalls are pervious while the main access drives are standard asphalt, as is a 10 foot strip abutting a building. The School follows maintenance recommendations: vacuum sweeping the lot at least three times a year to prevent clogging, and using a rubber blade on the snow plow.

After the first year the porous asphalt pavement was graying as surface oils wore away, and it showed some scuff marks. Indentations made on hot summer days have healed over time. The pervious concrete pavement was considerably stronger than the asphalt at the beginning. However, durability became a concern because it was losing a lot of stone from the surface and raveling at the joints. Pressed to fix the surface before classes started, MSOE covered the concrete with a 2-inch overlay of porous asphalt. “The parking lot is still permeable pavement and is working just fine,” says Gonwa

“Looking at the American Concrete Institute (ACI) recommendations that came out later, it turns out we violated a few rules,” Gonwa says. The newly placed mix should have been covered within 20 minutes and kept tightly covered for 10 days to retain water for curing. For better joints the concrete should have been placed in alternating strips, allowing the edges to cure for a day before the abutting strip was put in.

“Pervious concrete is very sensitive to installation and product mix,” says Gonwa. “There’s not much room for error. To be successful you need a contractor who has had training and certification and really knows how to install it.” Contractor certification programs to train installers, developed by the National Ready Mixed Concrete Association, are now available in Wisconsin. Anyone planning to request bids on a pervious concrete installation should require the contractor to be certified.

There has been considerable pervious concrete research, testing, and improvements in technical specifications recently. “[It] has come along way in Wisconsin



Rain water drains through porous asphalt top and bottom, but remains on standard asphalt (center).

since 2005. With refined technology, we are moving forward," says Heath Schopf, Director of Construction Engineering at the Wisconsin Concrete Pavement Association (WCPA).

Asphalt installation is not as sensitive. However, the liquid asphalt binder is quite sticky, so paving in cooler months is better. Rolling should be limited and done at cooler temperatures so compaction doesn't damage the porosity. It's also important not to seal coat the surface in future years or the gaps will be filled. The National Asphalt Pavement Association has developed detailed specs and guidelines.

### Benefits and considerations

Safety is a significant benefit of pervious pavement. Since rain and snow melt run through, pavements don't get slick; there's less opportunity for hydroplaning or for skidding on patches that freeze overnight. For safety reasons, a related asphalt product called stone matrix asphalt (SMA) is often the surface layer on Interstate roadways. SMA is made with open graded aggregate, using larger stones for greater strength.

In parking lots, pervious pavements can help in handling stormwater and runoff because rainfall is detained in a deep base of open aggregate. The technology is approved by the U.S. Environmental Protection Agency as a best management practice. A hydrologist or engineer should calculate the effectiveness, however.

Soil type is very important. Over soils with higher permeability rates the water will percolate through the aggregate and subsoil, eventually recharging the groundwater. For such sites, the subsoil should be at least 3 to 4 feet thick above the water table and bedrock to reduce the chance of groundwater contamination. Over clays, the installation can become an underground detention pond. Water is held in the aggregate then released slowly through a drainage field into streams or storm sewers.



Pervious concrete pavers

In parks, near schools, and similar areas, pervious pavements can keep contaminants out of surface waters better than conventional pavements. Some contaminants filter into the pavement and base where biological activity seems to break them down. Since there's no appreciable runoff, other contaminants stay on the surface where they can be collected by vacuum sweepers and disposed of in landfills. Pervious pavements are not recommended on sites like truck stops or heavy industrial areas with a high potential to contaminate groundwater.

Air and water can get through the pavement to reach tree roots that extend underneath the pavement and keep the trees healthy. Typically, roots extend underground 1½ to 2 times the height of the tree.

"Urban retrofits are where it really shines," says Gonwa.

"There are sites where you don't have space to install a detention pond or bioretention, but you do have parking lots. When a Walgreens is building on a 'million dollar corner' they have to use every square inch. They can't afford not to. That's a great application for it."

There are other pervious surfacing options such as pervious pavers and a plastic matrix seeded with grass. Pavers can be used in smaller areas where the job size is uneconomical for contractors or where esthetics is at a premium. Grass reinforced with plastic matrix has great potential for big parking areas that are used intermittently, like overflow parking at fair grounds, for example.

As more land surface gets covered every day, pervious pavements offer an opportunity to make a big difference. If you are considering them:

- Make sure you follow current industry group specs and recommendations.
- Test the subsoil and develop a design that accommodates the drainage characteristics.
- Protect the aggregate base and surface course during construction. Require that contractors keep soil from being washed or tracked into it, and protect it from compaction.
- For pervious concrete, require that contractors have NRMCA Pervious Concrete training and certification.

*"Urban retrofits are where it really shines."*

For information on pervious concrete contact Heath Schopf, Director of Construction Engineering, Wisconsin Concrete Pavement Association, 608/240-1020, [hschopf@wisconcrete.org](mailto:hschopf@wisconcrete.org)

or visit:

National Ready Mixed Concrete Association Web site at [www.nrmca.org](http://www.nrmca.org)

Pervious Pavement Web site: [www.perviouspavement.org/](http://www.perviouspavement.org/)

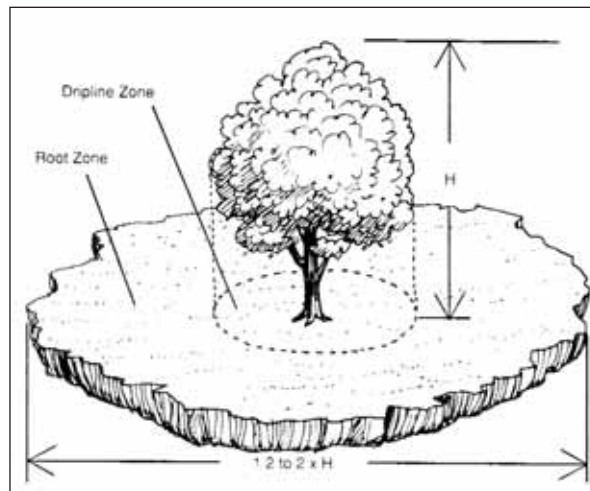
The American Concrete Institute Web site: <http://www.aci-int.org>

For information on pervious asphalt, contact Scot Schwandt, Director of Engineering at the Wisconsin Asphalt Pavement Association, 608/255-3114, [scot@wispave.org](mailto:scot@wispave.org)

or visit:

National Asphalt Pavements Association Web site: <http://hotmix.org>

Contact Willie Gonwa at 414/291-8840 [willie.gonwa@symbiontonline.com](mailto:willie.gonwa@symbiontonline.com)



*Pervious pavements protect mature trees by helping roots stay healthy.*