

Concrete experiment may eliminate storm drains

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Shoreview, Minn., is betting on a new "green" concrete paving method that lets rainwater pass right through the street surface to prevent damaging runoff.

Pervious [concrete](#) _ made of gravel and cement minus the sand that gives regular concrete its impenetrable density _ has the porous quality of a Rice Krispies bar.

Because it will allow water to drain straight to the ground below, Shoreview will install about a mile of pervious concrete streets without storm sewers in a neighborhood on Lake Owasso.

This \$1 million, all-in bet on the new pavement technology has many cities looking over Shoreview's shoulder, wondering whether they might try the same approach.

"This is the first complete commitment to using a pervious pavement on a residential street replacement" in Minnesota, said Shoreview Public Works Director Mark Maloney.

Over the past five years, other Minnesota cities, including Minneapolis and Richfield, have been experimenting with pervious concrete on parking lots and other hard surfaces, hoping for better storm-water management.

But in Shoreview, "We are completely replacing a storm drainage system

with a pavement that will infiltrate" water to the ground, Maloney said.

Tests "have shown that it is as durable as standard concrete for low-volume roads," Maloney said. "The science behind that is very sound and supported."

But there are few examples of a local government saying "this is going to be our pavement in lieu of a sewer system," he said. "We won't have catch basins, pipes and (settling) ponds."

Cities are finding that piping storm water to settling ponds eventually fills the ponds with sediment that has to be dredged out and disposed of as toxic material, Maloney said.

If there is an alternative that lets soil naturally filter out pollutants as rain soaks into the ground, cities are keenly interested, he said.

That possibility sold the Shoreview City Council on the project.

Some residents questioned how the unusual pavement would look and how it would perform under severe weather conditions. They also asked how it might feel to someone who fell off a bike onto the surface.

Despite such questions, council members were eager to use the pavement to protect nearby Lake Owasso, whose water quality has been declining.

"This community is very nicely positioned on Lake Owasso, and currently the storm water from the street just washes directly into the lake," said Mayor Sandy Martin.

"For years, some of the people who live near the discharge have asked the city to create a holding pond or a way to divert the water before it goes into the lake, carrying salt and sand and oil and all those things. But

there is no land available in this neighborhood to create any kind of a holding pond."

Because the soil under the street has the high sand content that would promote the desired drainage, "We thought this would be the perfect opportunity to use the pervious concrete," Martin said.

Pervious concrete has been in use in Minnesota on a limited basis for about five years, said John Lee, an engineer and sales manager for Cemstone, a Mendota Heights, Minn.-based concrete supplier for the Midwest, which will supply pervious concrete to Shoreview.

The Minnesota Department of Transportation, working with the Aggregate Ready Mix Association, began studying pervious concrete in 2005 on a driveway, sidewalk and road test strips at its MnROAD research center at Albertville.

Although MnDOT is still evaluating its performance, "We think, based on the tests at Albertville, that it can be made freeze-thaw durable," Lee said.

The original theory was that snow and ice would build up in the pores of the pervious concrete and tear it apart during the freeze-thaw cycle, Lee said. But the pavement design includes a layer of aggregate under the pervious layer that stores water while it filters into the ground. "The whole point is that you don't have ice and water building up in the pervious concrete itself. It is designed to be free-draining."

Making it work also requires using an aggregate that does not break down with freezing and thawing and a cement paste that also stands up to the cold, he said.

Because of these requirements, pervious concrete is a third to 50 percent

more expensive than regular concrete, Lee said. "But now you have a pavement that is not only a pavement but also a storm-water management system."

Pervious concrete requires special installation and maintenance.

Keeping its pores open for optimum draining requires monthly vacuuming with a special air-brush street-sweeper. Shoreview plans to buy one to handle the job.

The concrete installation also requires special skill and experience because the concrete comes from the mixer stiff and dry, and must be worked into place with minimal handling to keep the voids open. It also must be allowed to cure slowly under a membrane that holds in moisture.

"If it dries out too quickly and doesn't gain the strength it needs, then you get little pieces of rock popping off," Maloney said.

Shoreview set rigid requirements for installation and rejected three of six of bids for the contract because the companies lacked experience with pervious concrete, Maloney said. The winning bid was slightly more than \$1 million.

Work is expected to be completed by fall.

Representatives are going to be watching the project as well, making sure it is installed properly and using it as a training ground, Maloney said.

The Ramsey Conservation District also will be watching. Four wells will be sunk when the streets are built, so it can monitor how drainage through the pavement affects the level and purity of the area's groundwater.

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