

TIC CROSSROADS

<http://tic.engr.wisc.edu>

WISCONSIN TRANSPORTATION INFORMATION CENTER – LTAP

"A quality geogrid product can cut your aggregate thickness in half, or more, and reduce or completely eliminate the need for subexcavation."

INSIDE

- 1 Geosynthetic on town road
- 2 Highway Watch® training picks up speed
- 3 Key changes to MUTCD Wisconsin Supplement
- 4 Agreement eases emergency cleanup
- 5 Sharing stretches budgets
- 6 [RESOURCES](#)
- 7 [Pavement ratings 2005](#)
- 8 [CALENDAR](#)

Geosynthetic on town road—less aggregate, stronger base

LAST YEAR when La Pointe Town Foreman Keith Sowl rebuilt three small road sections, his crews laid down geotextiles. It was the first they time used fabric on a town road. "It was a good test," he says. "I hope to use a lot more. I have 12 miles of road I want to work with."

La Pointe is on Madeleine Island about 12 miles out into Lake Superior from the rest of Ashland County. The soils are a greasy clay and every ton of aggregate has to be barged in across the lake. At about \$22 a ton, aggregate costs four to five times as much as on the mainland.

When Sowl attended a TIC Road Maintenance Workshop in Hayward, it piqued his interest in the savings and benefits. A layer of geotextile fabric could separate the clay from the aggregate. That would prevent the fine particles from pumping through the gravel, weakening the road. As a result, they could reduce the gravel layer from 12 inches to just 8. Next, Sowl attended "Geosynthetics for Beginners," a two-day engineering seminar in Madison.

Last spring they did the work. "The crew put the fabric down the way they taught us in that class," says Sowl. "Lapping it over. Making sure there are no wrinkles. We pinned it frequently so nothing came up as we were pushing gravel out over it." The new sections held up well after their first winter. "Right now they look beautiful," he says.



TOP: Careful installation of geotextile is important. **БОТТОМ:** Fabric holds clay back, keeping it out of the aggregate.

Help also came from Ashland County Highway Commissioner Emmer Shields, who assisted with cost/savings analysis; and consulting engineer Scott Turner, Becher-Hoppe, Associates.

A couple years ago Shields designed a new taxiway for the Madeleine Island airport. The work involved digging out three feet of bad soil, putting in an underdrain, sand fill, geotextile fabric, and geogrid. It was then covered with 8 inches of gravel and 3 inches of asphalt. "It's the strongest piece of road on the island," says Sowl. "That experience gave us the confidence to go ahead." Town crews helped on the project.

What to use and when

The hardest part of the project was figuring out which geosynthetic product to use, says Sowl. There are many products with different strengths and functions, and they are continually evolving. Fortunately, the U.S. Army Corps of Engineers has published some good studies showing the differences between many of these products. Geosynthetic manufacturer Tensar also gives out cost estimating and design tools to help select the appropriate geosynthetic and required fill thickness for soft soil applications and pavement reinforcement.

"People use the term geotextiles loosely," says Contech Construction Products sales rep Keith Johnson. "Actually there are fabrics which are used to separate and grids for reinforcing the base." Fabrics do a good job of keeping soil in place and moving water, but they are really not designed to strengthen the base, he says. Geogrids, which look like rigid plastic snow fence, lock aggregate in place and provide strength. "They work kind of like a snowshoe in snow; they grip and spread the load."

"Geogrid has the same function as re-bar in concrete," says Ashland County Highway Superintendent Emmer Shields. "Up here where we have a lot of suspect subgrades it's really helping an awful lot." Local soils vary tremendously within a short distance, he says. You can't anticipate a soft

Continues on page 2

Geosynthetics

from page 1

“Up here where we have a lot of suspect subgrades it’s really helping an awful lot.”



Using geotextile fabric over bad soils, like this clay on Madeleine Island, saves money and makes a better road.



Geogrid spreads the load and locks aggregate in place. It works like rebar in concrete.

TIC Road Maintenance workshops are held every March in eight locations around the state. Watch for information in the Winter **Crossroads** or on the TIC Web page.

The publication *Use of Geogrids in Pavement Construction*, U.S. Army Corps of Engineers, Technical Letter No. 1110-1-189, 14 February 2003, is available as a pdf online at: <http://www.usace.army.mil/inet/usace-docs/leng-tech-ltrs/let1110-1-189/entire.pdf#search=>

See page 4 for other resources.

spot, and often it’s impossible to dig it out and replace it with good material. Road builders in other parts of the state are also using geogrid over peats and other compressible soils to minimize fill thickness and reduce differential settlement.

Geogrid, geotextile, digging out all can work, says Dan Baker, P.E., North Central Region Manager for Tensar. “It comes down to economics. Customers want what will cost the least now to build and is proven to work.”

Currently geotextiles cost \$.50 to \$1.50 per sq yd; geogrid \$1 to \$4 per sq yd. “The price sometime shocks people,” Baker says. “But if you look at the bottom line, a quality geogrid product can cut your aggregate thickness in half, or more, and reduce or completely eliminate the need for subexcavation. The economics work out and you are frequently left with a better performing road than typical dig out and replace.”

Four factors go in to the calculation: soil softness, vehicle loading during construction (axle load and quantity), aggregate thickness, and the presence/type of geosynthetic. While softness is measured by engineering tests like Standard Penetration and California Bearing Ratio (CBR), you can make a rough visual estimate for some preliminary calculations. The total CBR range is 0-100, but the critical measurements for soft soil are 0-4, Baker says.

According to a Tensar guide, a man standing on a very soft soil will sink more than 3 inches, approximating a CBR of less than

0.4. When a man walking sinks one inch, the soil is “medium” or about a CBR of 0.8-1.6. On a “very stiff” soil, where a loaded dump truck ruts 1-3 inches, the CBR is 3.2-6.4. The guide is in a handy paper “slide rule” that can be used in the field. It has visual cues, test value approximations, and a way to calculate required aggregate thickness both unreinforced and reinforced with geogrid.

On small projects, like the ones rebuilt last year in La Pointe, such estimates are good enough. On bigger projects, you can make more specific calculations in the pavement design, and calculate the aggregate depth and costs more precisely. For constructing a road over bad soils, geo-synthetics make a lot of sense, and there’s help available to make it happen, as Keith Sowl found out.

Highway Watch® training picks up speed

The number of volunteer observers on our roadways is growing as local agencies schedule Highway Watch® training. This nationwide safety and security program for the highway sector is being coordinated statewide by the Wisconsin Motor Carriers Association (WMCA).

“I really think it’s a great program,” says Highway Watch® instructor Jim De Pouw. “It’s of great importance for counties and municipalities to become involved. Their employees are around every day, and they know what appears to be normal.” A retired over-the-road truck driver, De Pouw has been presenting training sessions since December. The two-hour program was recently part of safety training days in several counties.

“We thought it was beneficial,” says Gary Kennedy, Manitowoc County Highway Commissioner. “The presenters were truck drivers themselves, so they could talk on same level as our staff. That kind of sold the program to our guys.”

Usually about 80% of each group chooses to become part of the program after the training, De Pouw says. Participation is voluntary. Those who join receive an ID card with a unique spotter number which they give if they report a safety incident.

“It would be nice if we could get most of the other counties to participate,” says De Pouw. “That would be a huge addition to this network.”

To request Highway Watch® training call Bob Young or Sue Webb at the WMCA: 608-833-8200, ext.18. Go to www.highwaywatch.com for general information.