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Geosynthetic Systems and Materials

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When FHWA Administrator Rick Capka was invited to deliver the keynote address at the Geosynthetics 2007 Conference on January 19, 2007, he decided that he would come a little early. This would give him the chance to speak with some of the attendees, notably public transportation officials, industry professionals, and academia.



FHWA Administrator Rick Capka (left) wanted to chat with some of the Conference attendees before he made his presentation. He made it a point to arrive early to do this.

"When I was invited to speak to your group," Administrator Capka said, "I jumped at the chance to speak with this large industry that is an important part of the transportation industry."

If you go to look up the word "geosynthetics" in the dictionary, you probably won't find it. But ". . .there are over 500 unique geosynthetic products sold today in North America that have been successfully applied to over 100 unique civil engineering applications," the Administrator noted. "Jerry DiMaggio, one of Federal Highways' top experts in geosynthetics, tells me that during the past 25 years, geosynthetics have saved hundreds of millions of dollars on civil engineering facilities."

Just what are geosynthetics and why are they so important to the transportation community? Loosely described, geosynthetics are manufactured plastics used in civil

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engineering works and related fields. When combined with natural material, such as soil (this is the “geo” part of the word), these plastics (the “synthetics” part of the word) are capable of producing structures—such as bridge abutments—that are easier and faster to build, require less material, are less expensive and, in general, reduce life-cycle costs.

FHWA has invested heavily in promoting the use of geosynthetics technology. At the Turner-Fairbank Highway Research Center, FHWA has supported research on geosynthetic reinforced soil abutments and footings to advance bridge applications. Known as the Geosynthetics Reinforced Soil (GRS) bridge system, the technology has been applied to six different bridges constructed in Defiance County, Ohio. The County notes that it saved on the order of \$245,000 by employing GRS technology, mainly due to the reduction in the length of the bridge. A fallout benefit is convenience. GRS systems typically eliminate having to pour concrete on site; they are constructed with readily available material, using common construction equipment and without the need for highly skilled labor.



The completed Bowman Road bridge, located in Defiance County, Ohio. Although it looks very conventional, this bridge's abutments were constructed with GRS systems. There are five others in the County, constructed in much the same way.

Federal Lands Highway (FLH) also employs geosynthetics frequently, on and within our Nation's most cherished lands. At the Upper Ouachita National Wildlife Refuge in Northcentral Louisiana, for example, abutments and footings for three bridges are constructed of GRS. FLH also chooses geosynthetic systems as a Context Sensitive Solution to deliver “green infrastructure” that ensures facilities blend into their surrounding natural environment.



Here's another bridge constructed with GRS abutments. This one is one of three and is located in the Upper Ouachita National Wildlife Range in North central Louisiana. It has performance-monitoring instrumentation to measure how well the structure is performing.

And right here in Washington, DC, one of the largest bridge projects in the country—the new Woodrow Wilson Bridge project—employs extensive geosynthetic systems and materials. Geosynthetics were widely used to maintain the construction schedule and project cost in earth retaining structures, ground improvement, and erosion control applications. Geofoam, for example, was used in a large ground improvement application over weak and compressible soils.



Crews are installing geotextiles at the Woodrow Wilson Bridge site in Washington, D.C. The process looks a little like laying wall-to-wall carpet.

FHWA's Office of Bridge Technology and the Resource Center have encouraged training for the deployment of geosynthetics in transportation throughout the years. This included development of two National Highway Institute (NHI) training courses specifically addressing geosynthetic materials and seven other NHI training courses where transportation applications of geosynthetic systems are covered. Numerous publications and state-of-the-art software applications have also been developed. Technical training continues to be delivered throughout the country at both the project and organizational levels.



This is a view of work crews installing geofoam materials. It almost looks like fun doesn't it?

“Geosynthetic systems and materials can also support the *Highways for Life* program, by accelerating construction schedules, improving performance, lowering life cycle costs, and extending service life,” Administrator Capka noted during his speech. “They benefit our transportation infrastructure in pavement, bridge, earth retention, earthwork, ground improvement, and erosion control applications.”

Highways for Life was specifically created to speed up the adoption of new and better techniques in highway construction.

“New technologies, such as geosynthetics, have traditionally been adopted slowly into standard highway practice, a normally conservative industry. To address this ‘ooze’ of new technology, the *Highways for Life* program encourages the use of new building materials and methods to reduce work zone congestion and cut the time needed to build and repair highways. Financial incentives are offered to transportation agencies under the *Highways for Life* program,” the Administrator continued.



Administrator Capka during the Questions and Answers segment that followed his Keynote Speech.

The Administrator's enthusiasm was infectious. He energized the audience during his closing remarks by bringing the subject down to the individual level.

“Whether it's a conference like this one or work on pavement, a bridge, a foundation, ground improvement, or erosion control, ultimately you—each of you—make transportation. Never question the significance of the role you play as well as the incredible opportunity we have to make a difference.”

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