

Alternative Sound Barriers

The Pennsylvania Turnpike Commission is first to use innovative new product.

When it comes to highway sound barriers, options are few and far between. For years, precast has remained the industry standard due, in large part, to lack of acceptable, cost-effective alternatives. However, the Pennsylvania Turnpike Commission recently completed a sound barrier project using a composite alternative that is not only easier to install and environmentally friendly, but also has the potential to save hundreds of thousands of dollars.

The Pennsylvania Turnpike was the first to use the new barrier—Eco Sound Barrier by CENTRIA (www.centria.com)—on the \$100-million renovation of a seven-and-a-half-mile stretch of highway on the Pennsylvania Turnpike, at mile marker 7.3. The overall project involved the reconstruction of a section of the turnpike near the Ohio border that took the existing four-lane highway to six in order to keep up with today's transportation standards. Eco Sound Barrier was used to provide noise mitigation on the section of the turnpike that runs through Enon Valley, PA. For this project, SAI Consulting Engineers (www.saiengr.com) were the structural engineers, and McTish, Kunkel & Associates (www.mctish.com) were in charge of road design.

CENTRIA presented Eco Sound

Barrier to the turnpike commission as an option for the project. The only highway product to be Cradle-to-Cradle certified, Eco Sound Barrier is made from 25 percent recycled material and is 100 percent recyclable at the end of its useful life. Cradle-to-Cradle is a model based on lifecycle assessment of human industry, materials, and design and their impact on the natural environment. The barrier panels are constructed

barrier design for the Pennsylvania Turnpike project. He says that the sound barriers were an effective option and didn't create any engineering burden for him.

"It wasn't any more difficult to design the barrier using Eco Sound Barrier than it would have been using precast," Henney says. "The only real difference with this project was that the footings had to be a little wider. This was because

of the sandy soil conditions of the jobsite and to accommodate the sound barrier panels' light weight."

The wall was positioned back from the road to take advantage of a natural slope in the terrain to minimize the amount of earthwork needed to reach the required height. By utilizing this slope—and placing the wall farther from the road—the footings could be raised, reducing the height of the wall and lowering costs. Bedding was also put down to make a more suitable pad for the footings. The only

concern with the sound barriers was whether the lighter panels would stand up against high winds, but the slightly wider footings addressed that issue. The footings were also continuous along the length of the barrier instead of being spaced at the posts. This, however, was a contractor preference, not a requirement of the Eco Sound Barrier.

"It is definitely an interesting prod-



Cost of the CENTRIA composite sound barriers is about one-third that of precast concrete.

out of a polymer composite core with galvanized or aluminum substrates.

"There is certainly something to be said about the environmental benefits of this product," says Kevin Scheurich, project manager for the PA Turnpike. "It's hard to put a real cost to it, but it is definitely something we consider."

Raymond Henney, of SAI Consulting Engineers, was in charge of the sound

uct, and we don't get new materials in this industry very often," Henney says. "I think it is especially exciting for contractors because of the potential cost savings."

Even though the innovative environmental benefits were interesting to the Pennsylvania Turnpike, what was most appealing was the up-front cost savings. Cost of these sound barriers is about one-third as much as precast.

"It was very innovative, so we wanted to give it a try," Scheurich says. "It seemed like a cost-efficient alternative to precast sound barriers."

The PA Turnpike, in turn, approached Joseph B. Fay Company (www.jbfayco.com), the contractor for the turnpike renovation, with the new product.

"We received some preliminary information on the panels, and right away we saw the potential advantages of using Eco Sound Barrier," says Eric Klimas, project manager for Joseph B. Fay. "We then had our engineers spend some time with it and found it to be a good alternative to precast."

When all the different factors were figured, the 1,800-ft long by 15-ft high sound barrier came in almost \$385,000 under budget thanks, in large part, to the unique characteristics of the sound barrier.

Material costs for the barrier project were originally bid at \$600,000. Precast panels were quoted at \$25 per sq ft for the project. However, Eco Sound Barrier panels cost only \$10 per sq ft, which translated into an estimated savings of about \$366,000 in material costs alone.

Faster is Better

Additional benefits of using the sound barriers were realized throughout every step of the construction process, beginning with transportation of the panels to the jobsite. At only 2.25 to 4.25 lb/sq ft, the sound barriers weigh dramatically less than precast panels. The original estimate, which accounted for using the precast panels, called for 45 truckloads to deliver the product to the jobsite. In the end, only six were needed for the alternative sound barriers. That worked out to almost \$24,000

saved on transportation and labor spent unloading the trucks at the jobsite.

"We get all of our deliveries on site, and they all take time to unload," Klimas says. "More product on fewer trucks means less labor spent on unloading and fewer trucks in and out of traffic around the jobsite, which also really helps to increase overall safety."

Joseph B. Fay also saved on labor during the installation process. "Precast would have taken a four-man crew three to four weeks to install," Klimas says. "The same crew completed the Eco Sound Barrier installation in only five days."

The four-man crew plus one crane operator would have cost an estimated \$45,000 for four weeks of work, but because the project was completed in only five days, Joseph B. Fay was able to save more than \$33,000 in labor. And, although they used the same size cranes and equipment they would have used with precast panels on this project, Klimas says they could have easily used much smaller machines. They just decided to use what they already had on hand.

Klimas also believes the sound barriers could give Joseph B. Fay a competitive advantage when bidding future highway projects. He says that, typically, precast sound barriers cost anywhere from \$25 to \$45 per sq ft. Eco Sound Barrier material costs are only about a third of that, at \$10 to \$15 per sq ft.

Lifecycle analysis

Scheurich of the Pennsylvania Turnpike agrees the cost savings are impressive and that now it is just a matter of seeing if the barrier can withstand the test of time.

"We are looking at it from a lifecycle perspective right now," Scheurich says. "The initial savings are great, but if we

have to replace it too soon, it might not be cost-effective over the life of the barrier. Winters in Pennsylvania can be very harsh, and we would like to see how the panels hold up against freezing temperatures and road salt. We really have to weigh the risk against the reward at this point."

CENTRIA offers a 20-year finish warranty on Eco Sound Barrier panels. Although the Pennsylvania Turnpike project was the first time the technology was applied to a transportation project, CENTRIA has been using the same composite materials in structural building applications for more than 40 years.



Light weight of the composite sound barriers translated into savings because of smaller crew sizes and reduced truck shipments to the work site.

Rick Mowrey, director of marketing and business development for CENTRIA, says that these composite walls have been standing for 40 straight years or more in architectural applications without requiring any maintenance.

Overall, both the Pennsylvania Turnpike Commission and Joseph B. Fay feel the project was a complete success. And the residents of Enon Valley seem to be satisfied as well.

"Typically, if the people are happy, we don't hear from them," Scheurich says. "They only speak up if they're disappointed, and we haven't heard anything yet. So, I'm taking that as a good sign."

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