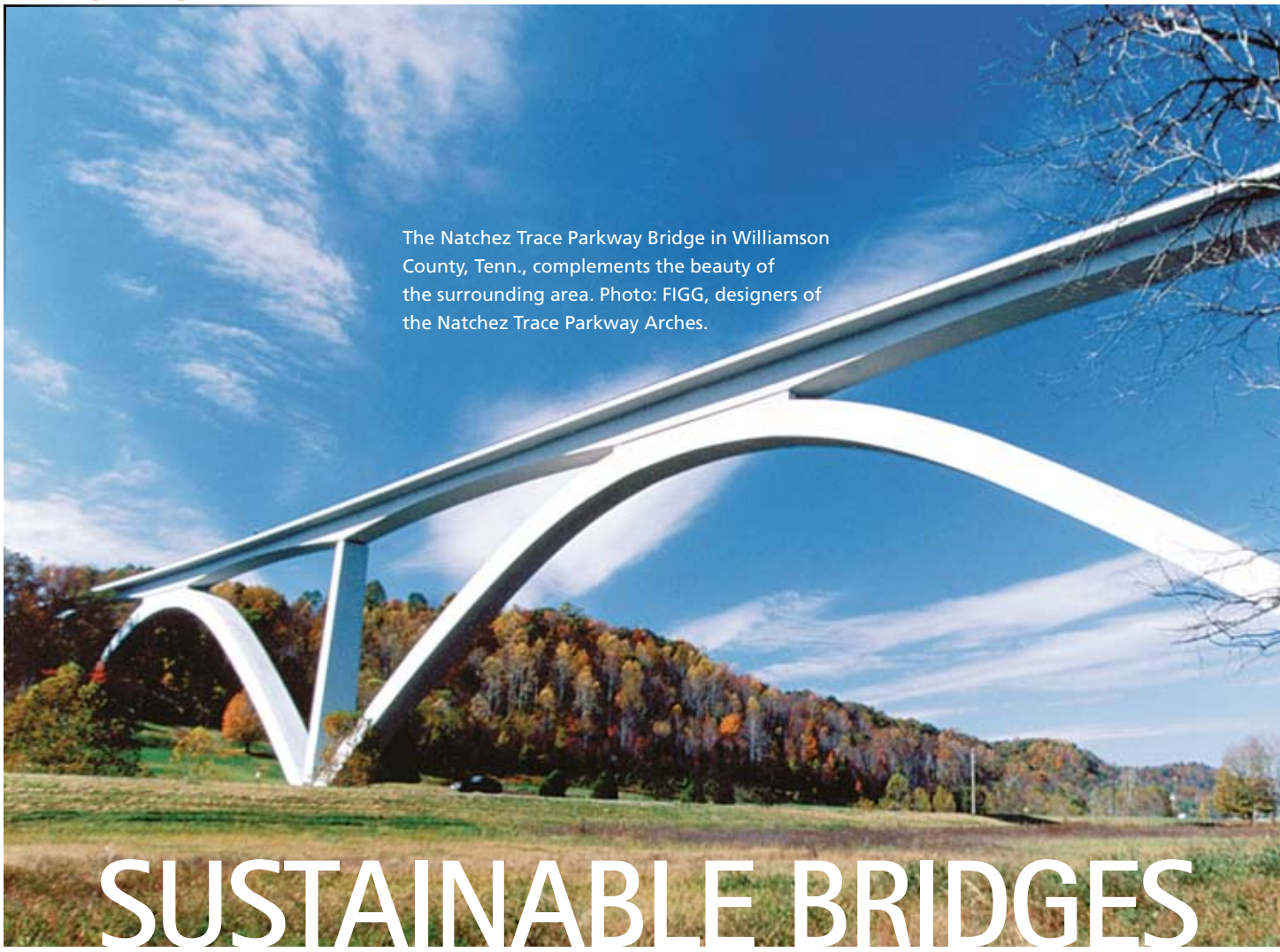


The Natchez Trace Parkway Bridge in Williamson County, Tenn., complements the beauty of the surrounding area. Photo: FIGG, designers of the Natchez Trace Parkway Arches.

SUSTAINABLE BRIDGES

and the Value of Innovation

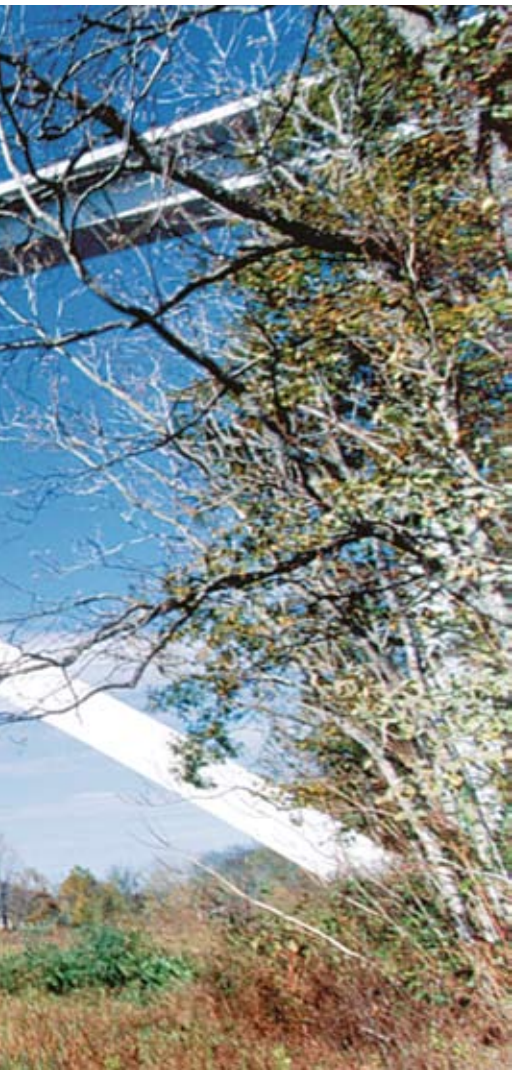
by John Horsley, American Association of State Highway and Transportation Officials

At this critical stage in our nation's history, we are faced with myriad challenges when it comes to preserving a viable transportation infrastructure. An especially urgent challenge involves promoting and designing bridges that are sustainable over the long haul.

Sustainability is not a mere buzzword, nor is it a passing fad. It is a thoughtful, wide-ranging approach that weds ongoing practical considerations with far-reaching innovations. Sustainability can be best understood, in the words of the 1987 United Nations World Commission on Environment and Development report *Our Common Future*, as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

In the world of transportation, sustainability includes designing, building, and maintaining bridges that are durable, safe, context-sensitive, and cost-effective. A lot of emphasis is placed on bridge design that imaginatively and seamlessly brings together those various elements. The sustainable bridge is therefore a structure that has been built quickly but efficiently to last a long time with an optimal use of resources, as well as minimal disruption of the surrounding environment and zero tolerance for wasted materials.

That is indeed a tall order, but it is an imperative one in today's socioeconomic climate and amid the sweeping environmental concerns all around us. I can likewise testify, however, that the state departments of transportation have in



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This can be seen in such practices as the completion of bridge construction projects in the quickest time possible without sacrificing safety and quality, while also keeping down costs and sparing the traveling public the prolonged ordeals of detours and congestion. The states have also exhibited other trademarks of sustainability, including protection of a construction area's ecological integrity and the incorporation of adaptable designs rather than just something in a "one-size-fits-all" mold.

A case in point is the Natchez Trace Parkway Bridge in Williamson County, Tenn. That bridge, which carries the two-lane parkway over Tennessee State Route 96 and a picturesque valley, was constructed with a first-of-its kind concrete design to reduce piers and other impacts. The use of this design enabled the construction impacts on the valley below to be minimized. Specifically, the bridge's arches are able to support the deck without evenly spaced spandrel columns; a major result of this—besides better safeguarding the environment—is providing an aesthetically pleasing appearance that complements rather than clashes with the surrounding postcard-perfect area.

This technologically innovative, on-time project has earned widespread recognition, including a Presidential Award for Excellence and an Award of Merit from the Federal Highway Administration. The structure is among several highlighted in AASHTO's report *Bridging the Gap: Restoring and Rebuilding the Nation's Bridges*.

That report, in addition to describing other specific state bridge enhancement projects, showcases more comprehensive sustainability-oriented initiatives. An example of this involves the Iowa Department of Transportation, which is currently testing fiber-reinforced polymers to use in both replacing deteriorated concrete bridge decks and building new bridges in their entirety. That agency is also utilizing high-performance concrete to build bridges that will be ultimately and carefully monitored for their cost, strength, and durability.

The Oregon Department of Transportation is also assimilating sustainability concepts in its own bridge program. As detailed further in AASHTO's award winning report *Above and Beyond: The Environmental and Social Contributions of America's Highway Program*, that agency has undertaken a $1.3 billion statewide effort for repairing or replacing approximately 300 bridges. This approach includes a streamlined programmatic permit for each bridge, outcome-based environmental standards, and broad stakeholder involvement throughout the process.

In adopting this approach, the Oregon Department of Transportation aims to maintain mobility throughout the state, stimulate the economy, draw on cost-effective delivery practices, stay sensitive to the needs of adjacent communities and the landscape, and make the most of available funding opportunities. This program, incidentally, was named a winner of AASHTO's Best Practices in Context Sensitive Solutions Competition.

These examples and others illustrate what is being done to make sustainable bridges an integral part of our national highways network. We are all working harder than ever before to come up with creative and workable solutions for our bridges that take into account each project's unique and most urgent environmental, economic, and societal demands.

The state departments of transportation are among those in the forefront seeking to meet and master those easier-said-

The optimized "Pi" beam developed for the Federal Highway Administration and first used in Buchanan County, Iowa, has a concrete design strength of 21,500 psi. The full structural depth of the deck is just 4⅛ in. Photo: Iowa DOT.

In their quest to maintain mobility, the Oregon DOT designed Elk Creek Crossing No. 4 on OR 38 to be constructed alongside the existing bridge. In one weekend traffic closure, the old bridge was slid aside and the new concrete bridge moved into place with the use of self-propelled modular transporters. Photos: Slayden Construction Group Inc.

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than-done challenges. As *Bridging the Gap* underscores, however, we are fighting an uphill battle in this regard.

The future of sufficient funding is uncertain, as government agencies at all levels find themselves increasingly hard-hit financially despite the increasing importance of additional investments in our nation's infrastructure. The National Surface Transportation Policy and Revenue Study Commission confirmed that we should be investing about $225 billion annually over the next 50 years. A significant portion of that projected investment is needed to bring into existence more sustainable bridges.

In short, we have a wealth of talent and techniques to forge a new generation of sustainable bridges that promise greater strength, safety, service, sensitivity, savings, and stability for all who use them. What we lack, however, is a more vigorous national commitment to investment for those structures and other key transportation priorities.

That is why we all must get together, stand forward, speak up, and make the case for that funding. We need to better promote the exemplary work already being done with high-performance sustainable bridges nationwide and their many benefits. In doing so, we should focus on environmental, economic, and social impacts and allocate full and fair consideration to each of these vital driving forces. This "triple bottom line" approach is more than just a winning strategy; it is an indispensable one.

AASHTO, for its part, recently called for increased funding for the nation's transportation infrastructure as Congress considers authorization legislation for federal highway and transit programs in the coming year. The current legislation expires September 30, 2009. The proposed funding includes a $375 billion investment from 2010 through 2015 for highways, with the annual funding level reaching $75 billion by 2015. AASHTO specifically recommends, as a subtotal of that amount, an annual funding level of $8.4 billion by 2015 for bridge preservation. That is double the current funding level for this crucial program.

To further support the need for that increased funding, we should all use every possible opportunity to point out how sustainable bridges are making life better in today's world. That means sharing our stories and statistics on why we need to more extensively move beyond just the blueprint stage for those structures and instead towards their larger-scale development.

"How do you demonstrate the value of innovation?" asserts futurist Durwin Sharp of the Houston-based Virtual Thinking Expedition Company. "By translating ideas into something that even skeptics can understand: results." Those are words that we who care about sustainable bridges and their worth should take to heart.

For more information on this or other projects, visit www.aspirebridge.org.