The American Segmental Bridge Institute (ASBI) honors seven projects in its inaugural Bridge Award of Excellence Competition, cosponsored by Concrete Products magazine. Judging for the 2003 program took place at the Federal Highway Administration's Federal Lands Bridge Office in Sterling, Va. Members of the Awards Jury were:

Shoukry Elnahal, Team Leader, FHWA Resource Center Structures Technical Service Team
Robert J. Healy, Deputy Director, Office of Bridge Development, Maryland State Highway Administration
Malcolm T. Kerley, Chair, AASHTO Subcommittee on Bridges and Structures, and Chief Engineer for Program Development Virginia Department of Transportation
James E. Roberts, Consultant (Caltrans-retired) Sacramento, Calif.

The jury recognized these projects equally as Bridge Award of Excellence winners:
• Big I Interchange (I-25/I-40), Albuquerque, N.M.
• Broadway Bridge, Daytona Beach, Fla.
• CA/T: I-93 Viaducts and Ramps north of Charles River, Boston, Mass.
• CA/T: CO9A4 Bridges, Boston, Mass.
• Foothills Parkway Bridges, Blount County, Tenn.
• Smart Road Bridge, near Blacksburg, Va.
• Vietnam Veterans Memorial Bridge, Richmond, Va.

Awards will be presented to bridge owners' representatives during the 2003 ASBI Convention Awards Luncheon, November 3 at the Hyatt Regency, Dallas, Texas. Following is a showcase of the projects, with Institute members noted in bold.
Big I Interchange (I-25/I-40) — Albuquerque, New Mexico

New Mexico’s largest transportation project ever has seen construction of 45 bridges, including eight segmental precut flyover ramps, and the rehabilitation/widening of 10 existing structures. To avoid lengthy reconstruction processes for the critical interchange, the owner developed a 16/24 program enabling design to be completed in 16 months and construction in 24 months. During construction, the interchange could not be closed and all existing traffic movements would be maintained.

The eight ramps, making the state’s first use of the segmental concrete method, were standardized for repetition and economy of construction. Four double-lane and four single-lane ramps range in length from 181 to 767 feet, with a maximum span length of 60 feet. The segmental sections are 2.79 meters deep and measure 19.914 meters wide for the double-lane and 9.914 meters wide for the single-lane ramps. Designed for the balanced counterform method, the span layouts were optimized for construction.

With a notice to proceed given to the contractor in mid-February of 2000, the entire interchange was to be completed in 24 months. Casting of the precast segments in a yard adjacent to the site ran from June 2000 and through July 2001. To optimize casting and erection of the precast segments, the contractor and construction engineers adjusted the pier and typical segment lengths. The latter were increased from 3.0 to 4.0 meters for the double-column segments and from 3.5 to 4.8 meters for the single-column segments. The pier segments, originally designed as split-pier members, were modified and cast as a single unit. The maximum weight for the pier segments and typical segment was adjusted to 85 tons with the modifications. By increasing the length and weights, the number of segments was reduced from 822 to 662.

To maximize the number of traffic phases designers developed a unique “top-down” traffic phasing scheme that required the highest structures be constructed and opened to traffic first. Much of the erection over traffic lanes was performed at night with limited closures and detours. Erection of the pier segments started in August of 2000 and set a timely pace for the remainder of construction. Traffic shifts and adjacent road and wall construction proceeded on schedule due to the quick erection of the first few segmental bridges. Almost the entire interchange core was constructed below the completed top-level segmental bridges, providing that “top-down” segmental concrete was the best construction choice. The eight ramps were completed at a cost of $362 sq. ft. In October 2001.

True to the projections, the precast segmental specification proved flexible enough for construction under completed bridges minimized disruption to existing traffic, provided an integral wearing surface to allow future maintenance activities and life-cycle economy and, yielded high-level box girder structures with an aesthetically pleasing appearance.

Broadway Bridge — Daytona Beach, Florida

Demonstrating the growing importance of bridge aesthetics, this 3,008-ft. precast segmental concrete structure carries U.S. 92 International Speedway Boulevard, over the Intracoastal Waterway. Design elements were selected in community charrettes, allowing the bridge to present a public image determined largely by the local populace. A community-wide celebration including a parade, fireworks and a street fair marked the dedication of the bridge in July 2001.

Composed of twin parallel structures, the Broadway Bridge has a total deck area of 956,132 sq. ft. Segments cast in Flagler Beach, Fla., were transported by barge 10 miles down the Intracoastal Waterway. The contractor used three machines and the shortform casting method to fabricate the project’s 352 segments, which are 48 ft. wide and vary in depth from 33 ft. to 9 ft. 9 in. The maximum segment weight is 120 tons. To reduce construction time, the contractor erected multiple cantilevers concurrently, placing up to eight segments daily. The bridge was designed with an as-cut riding surface, where one-half inch of sacrificial concrete was milled to satisfy profilograph tolerances and provide an excellent riding surface. Elliptically shaped piers were cast in place. The lower portion is solid to minimize potential vessel impact damage. A godetree beam at the pier transition is a widened element to reduce overall weight. Pier heights vary from 12 ft. 6 in. to 37 ft. Due to the existing street elevation at the western landing of the bridge, a 34,500-sq. ft. cast-in-place flat slab was placed with bi-directional post-tensioning to limit cracking and chloride ion intrusion in the saltwater environment. The flat slab transitions to concrete segments once adequate clearance is achieved.

Pursuing a Timestone theme, charrette participants selected colorful, glass mosaic tile designs of wildlife indigenous to the Atlantic Coast. Ten-ft. tall mosaic panels of dolphins and manatees wrap each of the bridge’s 26 piers. The mosaic design is custom, but shifts by 10 degrees on each pier, providing a sense of motion to the manatees and dolphins. Additionally, as pedestrians cross the bridge on the wide辟ed sidewalk, they experience 16 different wildlife mosaics, one at each of the span segments. The mosaics are repeated on the opposite walkway, for a total of 36 images.
FOOTHILL PARKWAY BRIDGES - BLOUNT COUNTY, TENNESSEE

In 1944, Congress authorized construction of the Foothill Parkway, a 116-km highway through the Tennessee mountains along the Northwestern edge of Great Smoky Mountains National Park. The intention was to provide motorists a majestic view of the scenery from its pinnacles while reducing automobile traffic within the park itself. Fifty-seven years later, the National Park Service has completed about 17 km of the parkway on its eastern and western ends. A large central portion of the alignment, however, remains untouched and a 2.7-km gap called the "missing link" seems a partially completed segment inaccessible to motorists. The present bridges are the first two of 10 needed to complete the missing link for the Foothill Parkway along the Blount-Seyvier county line.

The original owner-developed design for Bridges 9 and 10 was based on a similar type of project, the Linx Cove Parkway on North Carolina's Blue Ridge Parkway. It called for a precured segmental superstructure built partially on falsework, the rest to be erected using the progressive placement technique. This precure placement construction method would allow for "top-down construction" in this environmentally sensitive area. This construction method specified precast segments 2.5m long, 2.75m deep, and 1.1m wide to be added one at a time as construction progressed from one end of the bridge to the other. Each 1.1m-wide bridge would have spans of 42.5m, 90m and 42.5m for a total bridge length of 188m. Horizontally curved with radii as small as 138m, the bridges would have a grade of up to 10 percent.

Based on the limited access and relatively short length of the bridges, it was determined that a cost-conscious alternative would be the most economical and constructible solution. The challenge was to build the bridges without having ground access to most of the site and without reflecting any environmental damage to the wilderness below. A construction sequence was developed where a decrinking crane would be used to build the bridges in a lower fashion using cast-in-place segmental superstructures. This would allow the bridges to be built "over the top," assuring the contractor would not have to build falsework and temporary towers on the steep mountain ridges.

Changing from a precast to a cast-in-place segmental construction scheme required a redesign of the superstructure. As in most projects involving a redesign, however, no additional time was available in the contractor's schedule. When the contractor began work immediately, the design team had to produce final calculations for the redesign as rapidly as possible so that the ordering of materials, forms, and erection equipment could begin.

In February 1999, the owner awarded the project for $12.8 million — $4 million less than the next lowest bid, which was based on the original construction design. Slightly more than two years after the project was awarded, Bridges 9 and 10 on the Foothill Parkway were accepted by the owner. These bridges attest to the fact that designers, contractors, and owners who work together can produce a rural bridge that blends in beautifully with minimal impact on pristine, unspoiled landscapes.

SMART ROAD BRIDGE — NEAR BLACKSUG, VIRGINIA

The 1,985-ft. Smart Road Bridge located outside of Blacksburg, Virginia, is a cast-in-place concrete segmental box girder structure built by the balanced cantilever method with form travelers. A composite of the second phase of the 5.2-mile Smart Road that will eventually connect to Interstate 81, it was dedicated in May 2001 and serves as a state-of-the-art test bed for researchers from Virginia Tech Transportation Institute (VTI).

Cast-in-place, segmental box girder construction was the selected technology from aesthetic, economic, and maintenance points of view. An added benefit of the open box girder is the ability to house testing and monitoring equipment associated with the research mission of the Smart Road. Typical research supports advancement of the transportation industry, including improved communications systems, variable message signs, experimental pavements and intelligent transportation systems.

The Smart Road bridge contains a unique monolithic connection designed for the pier/superstructure interface, with the longitudinal faces of the piers continuing vertically as they intersect with the superstructure web. In addition to providing an aesthetic feature, this monolithic connection eliminated the need for gusset plates at this juncture as well as the associated temporary falsework towers for resisting loads during construction. The Smart Road Bridge is a single continuous unit, with expansion joints only at each end. Steel finger joints were used to accommodate large movements at these locations. The minimal number of expansion joints decreased maintenance requirements and associated expenses, along with allowing traffic to pass over the bridge at lower levels, which is desirable in this rural valley.

Both the substructure and superstructure of the bridge consist of high-performance concrete with low permeability and a compressive strength of 8,400 psi. The low permeability mix was specified by Virginia Department of Transportation and developed by the VDOT Research Council.

The rural beauty of the Elliot Valley in southwestern Virginia made aesthetics a major priority for VDOT and the designer. Considering the mix of pasture land and rural residential areas under and around the bridge, preserving the open views and scenic impact of the valley was deemed essential. This resulted in long spans to minimize the number of piers in the valley. The bridge rises up to 175 feet above the valley and features three interior spans of 472 ft., with 284 ft. end spans. In order to address local citizens' concerns about the bridge, VDOT formed a Citizen's Advisory Board that provided input on various elements of the bridge design. The designer proposed options that were within the owner's budget for presentation to the group. Participants selected the aesthetic treatment for the piers in addition to such elements as an open barrier rail (to provide drivers with unobstructed views of the valley) and the finish color (light tan) applied to the cast-in-place concrete.

PROJECT PRINCIPALS, SUPPLIERS

Owner: Virginia DOT
Designer: FIMM- Federal Lands Highway
Contractor: PCI-Civil Construction, Inc.
Construction Engineering: Jassar & Spakos Engineering, Inc.
Post-Tensioning Materials: FIMM- Eastern Federal Lands Highway Division
Dyrect Systems International, USA, Inc.
Epoxy: Pidco, Inc.
Expansion Joint: The U.S. Brown Company
Bearings: TecSta, Inc.

PROJECT PRINCIPALS, SUPPLIERS

Owner: National Park Service
Designer: FIMM- Federal Lands Highway
Bridge Office & Parsons
Contractor: PCI-Civil Construction
Construction Engineering: Parsons
Construction Engineering Inspection: FIMM- Eastern Federal Lands Highway Division
Post-Tensioning Materials: Form Travelers
Dyrect Systems International, USA, Inc.
Epoxy: Pidco, Inc.
Expansion Joint: The U.S. Brown Company
Bearings: TecSta, Inc.