PCANY MONTHLY NEWSLETTER

PRECAST CONCRETE ASSOCIATION OF NEW YORK, INC. September 2006 Volume 17, No. 9

Focus of this Issue: Bridges

Winning Combination Replicates Original Bridge

To keep the look and feel of the old Lime Kiln Road Bridge between Colchester and South Burlington, VT (just north of the Burlington International Airport), the Vermont Agency of Transportation designed a replacement structure featuring cast in place concrete for the tall columns, pier cap beams, and arches spanning the deep river gorge, and prestressed concrete beams for the horizontal framing members of the bridge deck.

Simple installation of 60 foot long box beams.
Photo by Kubricky Construction.

The bridge consists of eight spans, each containing ten 4' wide prestressed concrete beams. The first span (see aerial installation photo) uses 42" deep x 60' box beams. The next six spans each use 12" thick solid slabs, each 21.5' long. And the last span also used 42" deep box beams, but these were 103.5' long. All eighty precast concrete components were shipped and erected in 5 days. As you might surmise from the trucking photo, getting the longest beams to the site was one of the controlling factors.

Transporting 103.5' beams over small town roads.
Photo by J.P. Carrara & Sons.

Project credits are VAOT for design, Kubricky Construction Corp., Glens Falls, NY for all site work, including installing the prestressed concrete beams, and J.P. Carrara and Sons, Middlebury, VT, beam supplier. Thanks to John Walsh of Kubricky, who has installed many prestressed bridge members in the past, and graciously said his friends at Carrara gave him everything needed, when he needed it, to move this project along. They were pouring the deck and rail as this was being written, and he expects to open the bridge October 1.

Concrete Greenfield – epoxy coated composite bars await deck pour.
Photo by J.P. Carrara & Sons.

Bayshore Concrete Products Celebrates 45th Anniversary

17 Mile Long Chesapeake Bay Bridge Tunnel.
Photo by Bayshore Concrete Products.

Established in 1961 to produce the precast prestressed concrete components for the world famous 17 mile long Chesapeake Bay Bridge Tunnel, connecting Virginia Beach with the Eastern Shore of Virginia, Bayshore Concrete has continued as a premier supplier of a wide variety of precast prestressed concrete structural products.

Operated by a management and staff with world wide engineering and manufacturing experience, Bayshore has expanded its production capacity, and diversified its product line, while maintaining a strong emphasis on quality control. Bayshore personnel are proud of their reputation for outstanding product quality and customer service.

Bayshore's main plant in Cape Charles, Virginia employs approximately 275 people and is centrally located for east coast shipment and readily accessible to ocean, coastal and inland waterways, as well as rail and highway networks.

Bayshore Concrete Products, Cape Charles Plant.
Photo by Bayshore Concrete Products.

In the years since the initial Chesapeake Bay Bridge-Tunnel, Bayshore has expanded its product line in addition to centrifugally spun cast cylinder piles, pile caps and deck beams to include square piles, AASHTO and Bulb-tee bridge girders, deck slabs, segmental box girders, columns, wall panels, sheet piles, nuclear waste storage vaults, and double-tee slabs for numerous bridge, marine and commercial structures from New England to Florida, as well as installations in South America, Vietnam, and Puerto Rico.

Centrifugally spun cylinder piles are made in three standard diameters and are available in a variety of wall thickness with up to 32 post tensioning tendons as applicable. The piles are cast in standard 16 foot sections with makeup sections in four foot intervals. After casting and proper curing, the cylinder piles are post tensioned in lengths up to 224', with longer lengths available utilizing a specially designed pile splice.

In 1989 Bayshore Concrete opened a second plant in Chesapeake, Virginia to produce a variety of square piles and smaller structural members to better service the Tidewater/Hampton Roads area of Virginia. The newest addition to their product line at the Chesapeake plant is the double-tee which is used extensively in the construction of parking structures. The Chesapeake facility employs approximately 85 people.

Bayshore is a leader in the precast prestressed concrete industry, and they take particular pride in their ability to fabricate unusually long, unwieldy or massive precast components which are most economical if marine transportation and erection are feasible. They look forward to current trends in the construction field leading to the use of larger offsite cast structural components and they are equipped to play a significant part in the development of such concepts.

To celebrate their 45th anniversary, Bayshore is planning an open house with plant tours and lunch provided at both plants in conjunction with National Precast Month sponsored by the Precast/Prestressed Concrete Institute (PCI). The open houses will be held on September 20 at the Cape Charles plant and September 21 at the Chesapeake plant. For more information contact Bayshore Concrete Products at 757-331-2300. There are many other open houses scheduled throughout the country; check the PCI website (www.pci.org) for complete details. This article appreciatively taken from a news release put out by Bayshore Concrete Products.

"Bendable Concrete" Replaces Bridge Expansion Joints

DOTs across the nation face potential failure of mechanical expansion joints installed between adjacent simple span bridge decks. These joints are necessary to accommodate the many types of necessary movements of the bridge decks caused by variations in temperature, vehicle loads, or settlement. In addition, bridge joints need to withstand traffic loads and provide good riding quality while producing minimal noise. Joints that fall into disrepair can lead to the deterioration of the entire structure.

Working with Michigan Department of Transportation (MDOT) designers, University of Michigan researchers have developed a possible solution for durability and maintenance problems in these expansion joints. To allow designers to maintain simple span designs, and to permit retrofitting of existing bridge structures, the use of "Engineered Cementitious Composites (ECC) Link Slabs," rather than mechanical expansion joints, was proposed by the University of Michigan researchers.

Bendable Concrete.

Bendable concrete ECC is an ultra-ductile, high-performance fiber-reinforced cementitious composite (HPFRCC) developed by the Advanced Civil Engineering Materials Research Laboratory (ACE-MRL) under the direction of Professor Victor C. Li at the University of Michigan. ECC has been shown to limit cracking as well as exhibit high ductility. This ductility has led to ECC being called "bendable concrete". ECC has been developed as a proprietary mix design using cement, sand, fly ash, water, admixtures, and fibers. It's most distinctive mechanical property is an ultimate tensile strain capacity of 3%-5%. This strain capacity, over 300 times that of normal concrete, is realized through the formation of a large number of microcracks as the load increases. This allows the material to deform similar to ductile metals.

ECC "Link Slabs" are created by removing the expansion joint and a portion of each of the two adjoining slabs and replacing it all with a section of ECC material. This creates a continuous deck surface, but the ability of the ECC material to deform allows the ECC link slab to accommodate the deformations imposed by the adjacent decks while protecting the underlying superstructure and substructure from any corrosives present on the deck surface.

A demonstration ECC link slab was completed by MDOT on the Grove Street Bridge over I-94 in Ypsilanti, Michigan in November 2005. The Grove Street Bridge over I-94, a four-lane bridge constructed in 1971, is a composite steel girder concrete deck structure. The 230 mm (9 in.) thick concrete deck rests upon 10 built-up steel girder sections across the 20 m (66 ft) width of the bridge. Traffic was carried over I-94 on four pin-and-hangar supported spans. Since construction in the early 1970's, the bridge has experienced significant deterioration. The most recent repair work performed on this structure was a thin overlay of bituminous asphalt placed in 2000 to extend the service life of the bridge another 5 to 7 years. The goal of this construction work was to return the bridge to fully operational conditions, along with improving the bridge through wider sidewalks and dedicated bike lanes. The Grove Street Bridge project included replacing the entire deck as well as painting the steel girders, but the noteworthy portion of this project was the inclusion of an ECC link slab element at the bridge center. Periodic inspections after the first winter have shown no changes in the link slab. The long-term durability and maintenance significance of this project won't be apparent for many years, but the application of this innovative material is an exciting development in the use of the latest concrete technology. Depending on the results of this project, the use of ECC is expected to increase throughout the State of Michigan in upcoming years.

Hand finishing of ECC link slab on Grove Street Bridge project.

Reprinted from Concrete Technology, Portland Cement Association, August 2006; Reference: M. Lepech and V.C. Li, "Bridge Decks in Michigan Go Jointless" in Civil & Environmental Engineering Newsletter for Alumni and Friends, University of Michigan, Ann Arbor, MI 48109-2125, Fall, 2005, pp. 12-16.

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PCANY Meetings Scheduled in September

Meet at the AGC Conference Room, 10 Airline Drive, Suite 203, Albany (near the airport) for an Association Meeting starting at 1 p.m. on September 27. A group dinner with a speaker is being arranged for that evening. Then the next day, Thursday Sept 28, we will have our annual fall joint meetings with the NYSDOT – Materials in the morning and Structures in the afternoon. Complete details will be emailed to members, and can also be found on our website, www.pcany.org.

PCANY Website

All PCANY members now have access to the Members Only Page, where varied reports, communications, meeting notes, etc. will be posted. There is also a new category listing, Complimentary One Year Membership, which will be given to every attendee at a PCANY seminar or workshop; or it may be requested simply by visiting...

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