The LIRR’s North Highway Bridge was built in 1907, the Montauk Highway Bridge in 1920 and the Shinnecock Canal Bridge in 1931. Based on routine bridge inspections, the LIRR determined that the bridges were in need of rehabilitation. The LIRR inspections found that the superstructures of the bridges were in fair-to-good condition, but in need of waterproofing and painting. The substructures of the bridges, including abutments, wing walls and pedestals, were in poor-to-fair condition. For the scope of work to be performed, all deteriorated superstructure and substructure elements had to be repaired. The above-deck waterproofing, drainage system, bearings and bridge seats also would be replaced. Additional work included painting and other site improvements.

One of the primary goals of the project was to perform the work during the hours that would affect the fewest customers. So repairs to the bridge abutments and pedestals were using precast concrete elements produced by Roman Stone Construction Company in Bay Shore, NY.

Panels mocked up in precast yard to demonstrate fitment

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Step one: Remove tracks, prepare for installation of precast panels

A panel sits on delivery truck awaiting unloading, due to lack of space for a staging area, each panel had to be kept on a truck until it was needed for installation. Then the truck driver would bring it into position for the crane pick.

Rehabilitation of North Highway Bridge, Hampton Bays, New York

(continued on page 2)
Rehabilitation of North Highway Bridge (continued from page 1)

A total of two abutment slabs and 6 precast bridge elements were manufactured and installed in a 48-hour work window. The work involved shutting down the train tracks and diverting the traveling public on buses around the construction. The train tracks were removed, the precast bridge abutments and panels installed, then reinstallation of the train tracks all within a 48-hour work window. Other interesting facts concerning the design:

The precast concrete elements were built to match the skew of the tracks in relationship to the highway that it passes over. Each unit was a different length but all three elements had to fit together for post tensioning.

The largest element was 20 feet long, 4 feet thick and weighed 24,000 pounds. Complicating the installation was the narrowness of Highway 100’s 2 lanes with no shoulder between the bridge abutments and the existing road. Active power lines further complicated the installation, as well as, the 48-hour window for installation with significant penalties to the contractor if that timeline was exceeded.

Due to the advantages of using precast units, the installation was accomplished successfully and all work was performed within the 48-hour window. The contractor was very satisfied with the results and quality of the product. Once again, precast proves to be the best alternative. In addition, Roman Stone was glad to gain the valuable experience that this bridge slab project provided.

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Article submitted by Tom Montalbine, Roman Stone Construction
Seismic Test of Ultra High-Performance Concrete (UHPC) Connections

The use of precast concrete can offer many advantages compared to conventional cast-in-place decks, such as high quality and durability, and ease of construction. However, the appropriate installation of connecting elements is a key component of the overall bridge system. Recently, MCEER-University at Buffalo conducted a unique experiment for Federal Highway Administration to assess these connections when they are constructed with Ultra-High Performance Concrete (UHPC). The testing focused on deck-level connections between modular precast deck-bulb tee girders. Dr. George Lee and Dr. Chao Huang investigated the structural performance of field-cast UHPC connections for modular bridge deck components by both cyclic and static loading tests. Preliminary findings show that the use of UHPC field joints facilitates construction while maintaining or exceeding the performance of conventional cast-in-place joints.

A shake table test was designed to test two UHPC connected girders, shown in the figure below. The purpose was to observe and compare seismic performances (strength) of UHPC connection between two girders with numerical analysis. Several earthquake ground motion records (Northridge, Kobe, Chichi etc.) were directly applied to the shaking tables, ignoring interaction effects between bridge columns and/or seismic isolation bearings. To demonstrate the seismic performance under different load cases, the entire test is separated into three phases: 1) two UHPC connected girders with steel diaphragms at both ends; 2) two girders with steel diaphragms at both ends and additional mass to simulate the truck load; and 3) two girders with additional mass but without the diaphragms. A full report will be published late in 2013.

Article submitted by Jerome S. O’Connor, P.E, F, ASCE, Manager, Bridge Engineering Program, Department of Civil, Structural, and Environmental Engineering, University at Buffalo.
Prestressed Box Beams Chosen to Facilitate Landfill Expansion

A Seneca Meadows landfill expansion project in Seneca Falls, NY required the main channel of the Black Brook to be realigned through one of its smaller tributaries. The existing 2-cell concrete box culvert that carried State Route 414 over the tributary needed to be replaced to accommodate the much larger hydraulic opening required for the main channel. While the project was privately funded, New York State was involved with coordination and the review process since the bridge carries a state highway. Separate contractors were used to perform the stream realignment and the bridge replacement.

Based on soil investigations and a hydraulic scour analysis, deep foundations, consisting of steel H-piles driven to bedrock, were used. Eleven precast concrete box beams were supported by cast-in-place abutments and footings, and flanked by cast-in-place wingwalls. This superstructure provided the largest freeboard, as well as a smooth underside, to minimize the potential for debris to become lodged during flooding events.

The 96-foot-long precast units are 48 in. wide by 36 in. deep, and contain 30, 0.6 in. diameter straight prestressed strands, six of which are debonded for a length of 4 ft. from each end. The design compressive strength was 7 ksi at transfer and 10 ksi at 56 days. As each beam was delivered onsite, one end of the beam was lifted onto a temporary steel slider beam while the other end remained attached to the truck. Once secured to the slider platform, the precast unit was slowly backed across the slider beam. Cranes placed at each abutment then lifted and set the beam on the Steel Laminated Elastomeric Bearings.

A temporary bridge on an adjacent alignment was utilized to maintain two-way traffic during construction, which was completed within the 2012 season.

Precast Credits: Owner – NYSDOT Region 3; Sponsor – Seneca Meadows, Inc.; Engineer – CHA; Contractor – Vector Construction Corporation; Precaster – The L.C. Whitford Co., Inc.
The Pennsylvania Department of Transportation recently notified Concrete Sealants that their Penetrating Sealer, ConBlock SH, has been approved for listing in Bulletin 15, “Approved Construction Materials.”

Sidewalks, parking areas, roadways, and steps made of concrete are notoriously vulnerable to de-icing salts. Concrete Sealants, Inc. has a new product which promises to solve the problem. ConBlock SH is a penetrating reactive surface treatment that reacts with the Calcium Hydroxide in concrete and forms silicate crystals that fill the pores in concrete. Imagine a bucket of golf balls. If you pour water on it, the water goes right through the balls. Imagine further, that we add a treatment that reacts with golf balls and forms a hard gel. Then, when you pour the water, it sheds right off. That is how ConBlock SH works with concrete. In 7-14 days the chemical reaction fills in the spaces of the concrete, where water would be able to enter.

Salt doesn’t hurt concrete by itself. They are still hauling concrete out of the Mediterranean that Romans made thousands of years ago. Bridge pilings, made of concrete, cross the Chesapeake at Virginia beach. They are just fine after all these years. But, when salt water enters the concrete, and it gets cold enough, the salt water freezes and expands, breaking the concrete at the surface.

ASTM C-672 standard test method for scaling resistance of concrete surfaces exposed to de-icing chemicals, calls for repeated cycles of freeze-thaw with heavy doses of deicer. In this case, two blocks were tested. One was treated with ConBlock SH, the other was not. Concrete from one batch was used to make both blocks. After 100 cycles, one block is so deeply spalled, that the aggregate is completely exposed. The treated block is barely affected.

Thanks to Ed Pennypacker, Jepco Sales, for offering this article.
PCANY Meeting
May 9, 9:00 am to 12:00 pm, 50 Wolf Road, Albany; Joint Meeting with NYSDOT Structures and Materials, 1:30 pm to 4:30 pm.

Open House Well Attended
Over 50 Engineers, Architects, and Professionals attended the April 24 NEXT Beam Seminar and Plant Tour at the L C Whitford plant in Wellsville, sponsored by the New York State Association of Transportation Engineers, Section 6, Greenman-Pedersen, Inc, L C Whitford, and PCANY. Introductory talks about the development of the NEXT beam, were followed by a brief presentation of the first NEXT Beam project and then a tour of the plant. Many various bridge members and other products were available for inspection, but the newly cast NEXT beam members were awesome!