PCANY MONTHLY NEWSLETTER

PRECAST CONCRETE ASSOCIATION OF NEW YORK, INC. March 2006 Volume 17, No. 3

Focus of this Issue: Bridges

SPLICED GIRDERS SPICE UP NYSDOT's EVOLVING PROGRAM

With two out of three phases of NYS Route 17 over the Wallkill River in Middletown, NY nearing completion, the very extensive design and detail of this bridge that was done by the Structures Division of NYSDOT under George Christian, is working out successfully. Much is learned with each new project, and spliced girders are earning a growing share of the long span bridge market. After many years of designing, planning, and working through the multitude of construction documents needed, this job will finish up by the end of this year. The 15 girders for Phase I were set in September, 2004; Phase II had 18 girders installed in November 2005; Phase III, also 18 girders, is scheduled around September 2006.

Route 17/Wallkill River Project Outer Segments With Enlarged Web End Blocks, Shown in Place on Old Abutments

The old steel structure being replaced consisted of three spans, and thus two intermediate piers. The new concrete bridge will have 17 lines of spliced girders, utilizing only one intermediate pier, in its total length of nearly 360 feet. The two old intermediate piers serve as temporary erection supports at the splice points, and a new center pier serves as the sole permanent intermediate support. After completion, the two old supports will be removed. A matter as seemingly simple as building and removing these intermediate structures, situated on soft ground in the river flood plain, added considerable project time for environmental review and additional site construction work to divert water to allow cranes on mats to function. The new center pier becomes the fixed bearing support for the beams, with the two old outer walls being the expansion ends.

Installation of Tapered Center Segment Beams

Installing 128-8" Modified NEBT Girders on Temporary Supports in Foreground

The Modified New England Bulb Tee Girders are a combination of plant prestressing and site post-tensioning. All beams were manufactured by J.P. Carrara & Sons, Middlebury, VT, using a 10,000 psi HPC mix, and shipped to the project on special transporter units. The two end segments are 5'-10 7/8" (1800 mm) deep, with webs thickened to

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SPLICED GIRDERS SPICE UP NYSDOT's EVOLVING PROGRAM (cont.)

7 7/8" (200 mm) to maintain proper clearance around the 4" (102 mm) diameter p/t ducts. These segments are made with end blocks to accommodate the concentrated p/t anchorage forces; girder lengths are approximately 127'-8". The center girders are also 1800 mm tall at their ends, but increase to 2600 mm (8'-6 3/8") at the center bearing; these segments are approximately 104'-6" in length.

The general construction sequence is as follows: remove one phase of the old bridge; build new center pier; erect girders on new and existing piers; install diaphragms; pour closure splices; perform post tensioning; grout post-tension ducts; complete forming and HPC deck pour. Two lanes of traffic in each direction are being maintained throughout the three construction phases.

Abutting Beams Ready for Closure Pour Work

There are four tendons in every girder, each containing nineteen 0.6" diameter low-lax strands, and they follow a predetermined multi-curved profile. During construction, numerous survey checks were made of the girder supports and the cambers that resulted from the post-tensioning. At the highest point, the post-tensioning raised the beams about 3 inches; after the deck is poured, there is about 2" deflection, and another 1/2" from the barrier load. Jerry Fasoldt, NYSDOT Concrete Structures Support Group, who contributed to this article and helped the author understand the project complexities (like matching the final bridge profile to the original design calculations), stated that the final cambers came out quite close to the designers' numbers.

Running Post-Tensioning Strands into Ducts

Gang Stressing Strands in P/T Ducts

Project credits are Owner/Designer: NYSDOT; General Contractor: Harrison & Burrowes Bridge Constructors; Erector: Burt Crane & Rigging; Post-tensioning Contractor: VSL; and Mike Weigand from Precaster J.P. Carrara & Sons was the supplier of photos, facts, (and beams).

Congratulations to PCANY Member Award Winners at the February MCPX in Anaheim, CA:

The Fort Miller Company received the 2005 Quality Award of Excellence for achieving the highest score during its 2005 NPCA Plant Certification Inspection.

Kistner Concrete Products for 10 years continuous certification.

Creative Use of Precast Concrete Award to The Fort Miller Company in the Above Ground category.

And to STANTEC for winning the Public Works Project of the Year Award for technical services since 1995 related to the Route 104 reconstruction project.

NEW YORK SPLICE GIRDERS PAST AND PRESENT

In the early 1970's a unique splice girder bridge was constructed in New York State carrying I-88 over an interchange at Oneonta. The girder section cast by Schuylkill Products, Inc. (SPI) was a modified 63" deep AASHTO I Beam. Modifications were made to the end blocks of the beams to accommodate the post-tensioning anchorages. The end block is shown in Figure 1 at the left end of the girder. The final span is made up of two separate girders, each approximately 70 ft long, that are erected on a bent and post tensioned to form one continuous girder, about 140 ft long.

Figure 1. Erection of girder segment

This structure is unique in the type of splice that was used. The individual girders were match cast at the splice using precision steel bulkheads. Dowels were then used for alignment with an epoxy used to seal the joint similar to today's modern trapezoidal segmental girder bridges. The dowels can be seen in Figure 2. Notice the space between girders prior to tensioning to allow space for duct splicing. This space is taken up during the post-tensioning phase (one end of the girder is fixed and the other is on a temporary sliding bearing which can accommodate the large movement during post-tensioning). After post-tensioning procedures were complete and the epoxy cured, the bent was removed.

This structure designed and constructed in the early 1970's is still in service today.

A present era project fabricated by SPI for B. Anthony Construction Corporation was built some 30 years after the project in Oneonta. The girders were designed as modified New England Bulb Tees. SPI substituted the PCEF Bulb Tee with modified end blocks to accept the post-tensioning anchorage system. The individual girders were approximately 81 ft long each with the total structure length being about 162 ft. The girders were erected by Marikina Construction Corp.

Figure 2. Girder splice

The structure has a couple of differences from the structure in Oneonta. First this structure has a center bent that is permanent, verses the Oneonta structure in which the bent was removed. The second significant difference is in the splice. The structure at Oneonta used a match cast splice with steel dowels and epoxy sealing the splice. This structure uses shear keys cast into the splice ends of the girders with a field cast closure pour sealing the splice.

New York DOT currently has in place a high strength high performance concrete specified for use in all girders. Spliced girder design represents an economical means to extend the span length of precast, prestressed girders in conjunction with the high strength concrete. Extending the range of P/S girders has been a focus of the FHWA and has resulted in two recent meaningful publications. The first is *NCHRP Report 517: Extending Span Ranges of Precast prestressed Concrete Girders.* The report is available for purchase on the TRB website: http://gulliver.trb.org/bookstore/. Simply type 517 into the search bar and then click on NR517 to purchase. The second recent publication of significance for the designer is contained in the *PCI Bridge Design Manual.* Chapter 11 had been revised in June 2004 to include the latest design recommendations and research. The *PCI Manual* is available for download or hard copy purchase at http://www.pci.org/bridge/index.cfm.

Efficient use of this not-so-new design procedure can economically extend the range of prestressed concrete girders into the range previously occupied by steel or segmental concrete box girders. For additional information please visit www.spibeams.com.

This article submitted by Mark Hoover, P.E., Schuylkill Products, Cressona, PA.

PCANY BOARD OF DIRECTORS AND ANNUAL MEMBERSHIP MEETING

Producers, Associates, Professional Members and Guests spent a busy day Feb. 16 reviewing the activities of the past year and discussing the year ahead. Jim Reidy, NYSDOT Materials, graciously spoke with the group concerning our joint task force efforts to resolve the long lingering riband issue. Complete notes from the day were sent to all members via email or fax. If you did not receive them, contact Carl Buchman.

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Calendar of Coming Events

OTN Training March 16 & 17, at Albany NYSDEC – Foundations & Soils
March 23 & 24, at Thompkins County DOH – Soils & Installation

PCANY Septic Tank Group Meeting, March 21, Newburgh (location & agenda to be emailed)

2006 Annual Concrete Technical Conference, NY Construction Materials Assoc, March 23, HVCC, Troy

2006 Central & Western NY Stormwater Conference & Tradeshow, March 30, RIT Inn, Rochester

ABCD 2005 Bridge Design Award, for outstanding new or rehabilitated single or multi-span structure opened to traffic in calendar year 2005 – submittal deadline is Friday, April 14 to Stan Blas, SJB Services

2006 Concrete Bridge Conference – HPC: Build Fast, Build to Last, May 7 -10, The Nugget, Reno, NV

ACI Certification Program, May 11 & 12, Hudson Valley Community College, Troy

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AFCO Precast, Middle Island, NY
A & R Conc Specialties, New Windsor, NY
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Keeler Vault, Hudson, NY
Oneonta Block, Oneonta, NY
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