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Focus of This Issue: Bridges

High Falls Road Extension over the Kaaterskill Creek

High Falls Road Extension serves as a connecting road between High Falls Road and NYS Route 23A and is an important travel link for the local community within the Town of Catskill, Greene County, NY. The site where High Falls Road Extension crosses the Kaaterskill Creek lies just to the east of the Catskill Park boundary and just to the west of the site of High Falls, which is among the most picturesque and significant natural resources in the area. The Kaaterskill Creek served an important role in the industrial development of the eastern Catskill Mountains with mills and tanneries lining the Creek, as evidenced by the remnants of the 19th Century dam/spillway structure upstream of the High Falls Road Extension Bridge. Remains of old stone foundations and retaining walls, along with the historic Myers (Schram) House (circa 1807), located in the southwest bridge quadrant, contribute to the natural, aesthetic and cultural setting of the bridge site and stream corridor.

Existing Dam/Spillway Upstream of Bridge

Barton & Loguidice, P.C. (B&L), was retained by Greene County to design the replacement of the High Falls Road Extension Bridge over the Kaaterskill Creek. The two-span structure had a history of retaining debris washing downstream at the pier location and exhibited signs of structural deterioration. Replacement with a single span structure provided an improved hydraulic opening and capacities at the site. Due to the significant natural and historical resources in the project area, integration of the replacement structure into the natural, visual and historic character of the area was also a primary concern of the design engineers and the bridge owner. The bridge design included the use of colored concrete and form-liners on the bridge abutments, wingwalls, fascias and parapets as an aesthetic treatment to emulate the existing stone work in the vicinity of the project site.

Fascia Beam with Aesthetic Treatment

The replacement bridge is a single span structure which utilized nine 30-inch deep, 87-foot long precast, prestressed concrete box beams. The original design called for aesthetic treatment on the bridge fascias to be applied during the forming and placement of the concrete bridge deck, however, the Contractor and Precast Beam Manufacturer proposed an alternate detail in order to simplify construction and reduce fabrication and construction costs. Jefferson Concrete Corp. used colored concrete and applied the form-liner treatment directly to the fascia beams during the precast manufacturing process. Also, Jefferson Concrete Corp. worked closely with the Arch Bridge Contracting Corp. to purchase form liners from the same supplier and to match color samples to ensure the aesthetic treatment on the fascia beams would match that on the cast-in-place bridge abutments and parapets. Additionally, both fascia beams were detailed with precast recess holes for the post-tension tendons and Jefferson concrete cast plugs that matched the fascia beam pattern which were installed after the tensioning was completed to give a finished and continuous stone appearance.

(continued on page 2)

High Falls Road Extension *(continued)*

Owner: Greene County DPW

Design Engineers: Barton & Loguidice, P.C.

CI/CA: Creighton Manning Engineering, LLP

Contractor: Arch Bridge Contracting Corporation

Precast Beam Manufacturer: Jefferson Concrete Corp.

Special thanks to Jeremy M. Bourdeau, P.E., Senior Project Engineer with Barton & Loguidice for writing this article and submitting the pictures.

Completed Structure, Downstream Elevation

Completed Bridge and Historic Myers House

Project Spotlight – Tioga County Bridge Project

In Keystone Associates' *News & Notes* for February 2009, they featured the design of a bridge project for Tioga County done by their Structural Group. By utilizing a pre-engineered and precast structure, Keystone was able to compress the design phase by releasing two contracts – one for the precast structure and one for the general construction. Both bid packages were completed in just seven weeks – from the time they received the topographic survey to the date of the general construction bid. Construction time was also reduced and the pre-cast structure allowed for winter construction without increased costs or negative effects on the concrete products. The entire bridge structure, including the wingwalls, was set in one day. Our thanks to Alexis Dugon, EIT, Senior Project Manager, Keystone Associates, for this article.

Creative Use of Precast Awards

Part of the NPCA Precast Show in Houston this year was the Salute to Excellence evening, "Honoring the Best in the Precast Concrete Industry". A Quality Award of Excellence for Plant Certification was given to AFCO Division of Oldcastle Precast for achieving the ***highest score ever*** in the Plant Certification Program, which was accepted by George Schramm. Also receiving a Pinnacle Award was Mike Kistner, Kistner Concrete Products, for their contest entry on their Kast Block Segmental Forming System, used on bridge abutments and wing walls. The 2008 Quality Award of Merit was also given to Coastal Pipeline Products Corp., Jefferson Concrete Corp, and Oldcastle Precast Inc. dba AFCO Precast. Also, Jefferson and AFCO were recognized for their years of continuous certification.

SCC for the Route 52 Bridge Over the Wallkill River

written by Mathew Royce, NYSDOT

Photo and Story reprinted from *HPC Bridge Views,* Issue 53, Jan/Feb 2009, http://www.hpcbridgeviews.com//i53/Article3.asp

The Route 52 bridge over the Wallkill River is located in the village of Walden, NY, 50 miles north of New York City. This new bridge was completed in 2005, replacing a 176-ft. long steel truss bridge built in 1934.

The main span of the bridge consists of two cast-in-place concrete arches with a clear span of 148.8 ft. The arches support precast concrete spandrel columns, cap beams, and prestressed concrete adjacent box beams, with a cast-in-place concrete composite deck slab. Precast and cast-in-place components were efficiently combined in the bridge to build an aesthetically pleasing structure within a reasonable cost. The bridge is expected to have a service life of 75 years with low maintenance.

The cast-in-place concrete elements for the bridge were made using conventional concrete. The precast elements contained self-consolidating, high performance concrete (SCHPC). This was the first use of SCHPC in precast concrete components by the New York State Department of Transportation. The SCHPC resulted in improved production efficiency with minimal repairs to the components after removal from the forms. The surface textures of the components were significantly better than those of components made using conventional concrete. No treatment for filling 'bug holes' was necessary.

SCHPC Specifications

The concrete mix requirements for the SCHPC included the following:

Entrained air content ≥ 3%
Silica fume content ≥ 5% of the total cementitious material
Water-cementitious materials ratio < 0.40
Calcium nitrite corrosion inhibitor at a dosage rate of 4.04 gal/yd^3
Concrete spread of 22 to 30 in.
Visual stability index ≤ 2
Only materials from the NYSDOT approved list to be used.

The hardened concrete performance criteria were as follows:

Concrete compressive strength (f'_c) at 56 days per AASHTO T 22 ≥ 10,150 psi
Modulus of elasticity per ASTM C469 ≥ 4351 ksi when f'_c ≥ 10,150 psi
Shrinkage after 56 days of drying per AASHTO T 160 < 600 millionths
Specific creep at 56 days per ASTM C512 ≤ 0.41 millionths/psi
Freeze-thaw durability per AASHTO T 161 Proc. A ≥ 80%
Scaling resistance per ASTM C672 ≤ Rating of 3
Chloride penetration per AASHTO T 259 modified < 0.025% at 1 in.

In addition to the above requirements, reinforcement in the substructure components was epoxy-coated and the precast components and top surface of the concrete deck were coated with a penetrating sealer to prevent chloride and water ingress. Uncoated reinforcement was used in the prestressed concrete beams.

Cost of SCHPC

NYSDOT did not incur any additional cost for the use of SCHPC for the precast components. Based on the feedback from the precaster, cost savings in fabrication labor offset the additional material costs associated with use of SCHPC. Improved appearance of the components and reduction in repair needs were added benefits.

Conclusion

In general, the use of SCHPC concrete bridge components for the Route 52 bridge over the Wallkill River has been a remarkable success. Based on the current specifications, producers are now free to choose SCHPC or conventional HPC for bridge components. Due to the labor savings associated with SCHPC, more and more producers are now opting for SCHPC.

Further Information

A more detailed description of this bridge is provided in the article titled "Wallkill River Arch Bridge" published in the *PCI Journal*, July-August 2008, pp. 44-50.

From PCA "Material Usage and Condition of Existing Bridges in the U.S."

For all classes of road or highway systems, **reinforced and prestressed concrete bridges have a significantly lower rate of structural deficiency than steel bridges.** Not only do concrete bridges have lower rates of deficiencies, but they make up an increasingly larger share of the bridge market.

"As our nation's infrastructure needs investment of funds to repair and replace structurally deficient and functionally obsolete bridges, concrete's competitive cost and durability are key considerations for building economical and long-lasting bridges," Sue Lane, PCA's program manager for bridges and other transportation structures said. (from Nov 2008, *Concrete MONTHLY*)

From February *ASCE News* – America's Infrastructure G.P.A. = D (poor)

ASCE's Infrastructure Report Card for Bridges gets a grade of C (mediocre). More than 26 percent, or one in four, of the nation's bridges are either structurally deficient or functionally obsolete. While some progress has been made in recent years to reduce the number of deficient and obsolete bridges in rural areas, the number in urban areas is rising. A $17 billion annual investment is needed to substantially improve current bridge conditions. Currently, only $10.5 billion is spent annually on the construction and maintenance of bridges.

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