

## Focus of This Issue: Three-Sided Bridges

### County Route 34 Washout Over Hollow Brook Stemmed

Multiple severe storms and harsh weather resulted in flooding and other weather-related damage to the site where County Route 34 crosses Hollow Brook in the Town of New Lebanon in Columbia County, NY. As a result, the Federal Emergency Management Agency (FEMA) declared the County an eligible disaster area under Disaster No. FEMA 1654 DR NY.

The culvert carrying CR 34 over the Hollow Brook previously consisted of two distinct types of construction that were interconnected with one another. The downstream portion of the culvert, which was immediately beneath the roadway, consisted of a concrete superstructure and concrete abutments constructed by the County in 1946. The upstream half of the culvert was a dry-laid stone masonry arch and headwall which carried a previous roadway alignment of CR 34. This stone arch and headwall took the place of wingwalls on the upstream end of the concrete culvert and as such the two distinct portions of the culvert were integral with each other for conveying stream flow and retaining the roadway embankments.



Partially Collapsed Stone Arch



Original Laid-up Stone Arch at Upstream Face



Installation of Rigid Frame Units

The referenced flooding caused washout and collapse of approximately half of the stone masonry arch and headwall on the upstream end of the culvert. This collapse of the stone arch structure resulted in slope failure of a portion of the 6-meter high roadway embankment, putting the safety and stability of the roadway in jeopardy. Barton & Loguidice, P.C. (B&L) was retained to investigate the site and develop an engineering design report and remediation plan. Through coordination with Federal Emergency Management Agency (FEMA) and the New York State Emergency Management Office (SEMO), the Columbia County Department of Public Works secured emergency funding (both federal and state) and proceeded with the design and construction of a replacement structure.

The replacement structure utilized a combination of pre-cast and cast-in-place concrete construction. The structure consisted of six precast concrete, three-sided rigid frame units, each with a 18-foot span and a 10-foot rise. The rigid frame units were founded on cast-in-place concrete footings that were stepped to accommodate the change in rock elevations at the project site. Wing walls were also cast in place, since the unknown rock elevations would have necessitated more borings, more time, and more cost, just to enable pre-fabrication detailing. Staging and assembly of the precast structural units went smoothly, helping to keep the project on its aggressive schedule.

*(continued on page 2)*

## Flood Damage – Another Fast Bridge Replacement Required



Installation of 29'-9" Span Units over Steele Creek

Barton & Loguidice, P.C. (B&L), was retained by both the Town of German Flatts and the Village of Ilion to design a replacement for the Third Street Bridge over Steele Creek. The bridge was irreparably damaged during the flood event in the summer of 2006. Flood waters breached through the spandrel wall and stone parapet causing significant deformation of the slip-lined corrugated arch system and severing the sanitary sewer located beneath the stream. A two-part project was initiated by the Town (owners of the bridge) and the Village (owners of the sewer). The demolition of the bridge and repair of the sewerline were completed under emergency procurement procedures.

The existing bridge was a 6.7 meter, single-span stone arch bridge with earth fill and a paved wearing surface. A slightly longer bridge was constructed in order to improve the hydraulic performance of the structure as much as possible. Both abutments were set back 1.1 m and wingwall alignments were altered to provide the best transition possible. A four-rail bridge railing was utilized to allow the overtopping of future

flood waters rather than obstructing it. The replacement structure consists of precast, three-sided units with a clear span of 9.0 m. Piles were driven to support the abutment footings and two of the four wingwalls. The width of the bridge matches the existing bridge with sidewalks on both sides of the road. Concrete pylons were placed on all four corners of the bridge, at the ends of the railing. Formliner was used on the fascias of the precast units, wingwalls, and pylons.

B&L prepared Final Design Plans and Bid Documents for the sewerline and bridge replacement contracts, and also provided Construction Administration and Inspection. Construction for the bridge replacement took place in the spring and summer of 2007. Total project cost was \$525,000. Precast supplier: The Fort Miller Co. Thanks to Paul Sudol, P.E., Barton & Loguidice, Syracuse, NY for this story.



Replacement Third St. Bridge over Steele Creek, Herkimer County

Photos by Barton & Loguidice

### News From Our Professional Members

FRA Engineering and Architecture, PC has joined with T.Y. Lin International. FRA's four major offices, in Henrietta and Orchard Park, NY, Atlanta, GA and Danville, KY will now be FRA, a T.Y. Lin International Company.

TVGA Consultants has announced that Wales Engineering has joined their team. This adds two eastern New York offices, located in Saratoga Springs and Cooperstown, to the FRA offices located in Elma, Niagara Falls, Jamestown, and Syracuse, NY.

### 2008 Concrete Bridge Awards Competition

The Portland Cement Association invites entries for its 11th Biennial Bridge Awards Competition to recognize excellence in design and construction of concrete bridges. Structures must have been essentially completed between June 2006 and March 2008 and must be located within the US or Canada. Entries are due March 28, 2008. Contact PCA or PCANY for entry forms.

### County Route 34 Washout (continued)



Completed Structure — Precast Three-Sided Culvert on Stepped Concrete Footings

Project credits include: Owner – Columbia County DPW; Emergency Funding Agencies – FEMA & SEMO; Engineer – Barton & Loguidice, P.C.; Contractor – A. Colarusso & Son, Inc.; Precast Manufacturer – Rotondo Precast, Avon, CT. This article and photographs were submitted by Jeremy M. Bourdeau, P.E., Project Manager with Barton & Loguidice, Albany Office. Thanks also to Erin Shannon Bullard for her help with this story.

## GRIA Goes Underground for Safety

A runway safety area (RSA) surrounds a runway to enhance the safety of aircraft and passengers if the plane undershoots, overruns, or veers off the runway, and to provide greater accessibility for firefighting and rescue equipment during such incidents. Several serious accidents resulting from non-standard RSAs provided the impetus for an FAA mandate requiring RSA improvements. The Greater Rochester International Airport (GRIA) was one of the airports where improvements were needed.

GRIA's Runway 28 (one of its main runways) had two service roads located within its RSA; the roads therefore required relocation. In addition, the runway was 900 feet shorter than FAA's recommended length for a secondary runway for an airport with GRIA's commercial mix of aircraft. The runway could not be shortened or eliminated and still have the airport function as a small hub commercial airport. The runway length issue made the need for a standard RSA even more critical.

Relocating the existing essential service roads outside the RSA was studied and determined to not be feasible. As an alternative solution, it was decided to "bury" the roads beneath the RSA. Two tunnels were constructed to carry the roads under the RSA.



Tunnels Relocate Roadways Underground at End of Runway

The tunnels each consist of precast concrete, three-sided, rigid frame, arch structures supported on C-I-P stem walls. The span lengths are 42' and 32' and the tunnel lengths are 658' and 614', respectively. The inside height of the tunnels is a minimum of 15 feet, and the units were designed to support the load of an Airbus 320-200 group III wheel load of 78,000 lbs. and 33% impact force over the top in the event of an overrun on takeoff or landing. One tunnel incorporates a sidewalk for pedestrian/bicycle traffic.

In addition to the safety concerns, the tunnels and associated retaining walls were designed to be aesthetically pleasing. The Mechanically Stabilized Earth Structures (MSES) retaining walls and the tunnels' headwalls incorporated ashlar stone pattern form liners to resemble the natural façade stone of the Erie Canal and provide aesthetic continuity.

Special lighting was required due to the orientation of the tunnels with respect to the rising/setting of the sun, and the lighting design required addressing tunnel moisture and



Installation of Twin Tunnels Using Precast Arch Members

vibration considerations. Automatic controls were implemented to maintain adequate and safe light levels based on environmental conditions such as time of day, climatic conditions, and seasonal considerations as well as the geometry of the tunnels. Approximately 750 metal halide fixtures were installed in both tunnels.

The construction cost of the project was approximately \$16 million.

While the purpose of this project was to meet FAA's mandate for RSA standards to protect the safety of the public and airport personnel, it also resulted in a relatively unique application of the precast units that provides striking structures. Every traveler on the expressway or runway will be reminded of GRIA's commitment to safety.



Special Lighting Enhances Driving Safety

Clough Harbour & Associates LLP were the project designers for the owner, Monroe County, and the contractor was Crane-Hogan, Structural Systems, Inc. Precast was supplied by Lakelands Concrete Products, Kistner Concrete Products, The Reinforced Earth Company, and CONSPAN Bridge Systems. Thanks to Tony Papile, P.E., Clough Harbour & Associates for this article and the photographs.

**Precast Concrete Association of New York, Inc.**  
2829 East Avenue  
Rochester, NY 14610  
Tel: 585-249-9564 • Fax: 585-381-0945  
Email: [pcany@aol.com](mailto:pcany@aol.com) • Web: [www.pcany.org](http://www.pcany.org)

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PRECAST CONCRETE ASSOCIATION OF NEW YORK

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## PCANY Meetings

**Thursday, January 31, 2008**

Plan to attend the Septic Tank Group Meeting, 9 am to 12 pm;  
the PCANY Annual Business Meeting, 1 pm to 4 pm;  
and lunch 12 noon to 1 pm,  
at the AGC Conference Room, 10 Airline Drive, Albany.

*(Please advise Carl of your plans so he can get a count for lunch.)*

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