Focus of This Issue: Box Culverts, Three-Sided Structures

Precast Concrete Box Culvert with Turning Sections
Route 425, Wheatfield

Above (right): Shop drawing illustrates section shape and arrangement to achieve turns in culvert direction for US Rt. 425, Wheatfield, NY. Left: Installed culverts form turn in layout, with precast end headwalls and wingwalls set last.

Kistner Concrete Products regularly supplies many shapes, sizes, types, and custom products for culverts, as well as for other utility projects and building structures. For this NYSDOT project in Wheatfield, NY, Kistner cast what they called “special turn pieces” to achieve the required serpentine shape in a most basic manner – use of a standard, repetitive trapezoidal piece. The six typical 12'-0" x 3'-0" rectangular sections weighed 17 tons each, and the remaining 11 pieces varied per its geometry. It is rather subtle, but there are four bends actually made to satisfy the required layout.

Installation of all the precast was done in one day, nevertheless achieving the tight geometric requirements, and avoiding existing utilities. Project credits include the NYSDOT as engineer and owner, CATCO Construction, Alden, NY, contractor, and Kistner Concrete Products, Lockport, NY, precast supplier. Thanks to Mike Kistner for sending this article, as well as others in this newsletter; to quote Mike: “Customer / Owner / Engineer all very pleased with the precast solution.”

Hudson Valley Rail Trail – Mile Hill Road, Town of Lloyd

By Jeremy Bourdeau, P.E., Barton & Loguidice, P.C.

Construction is currently underway on Phase II of the Hudson Valley Rail Trail in the Town of Lloyd, Ulster County, NY. The 1.25 mile long section of trail will connect the existing trail in the Town to the recently completed Walkway over the Hudson. The trail segment will ultimately provide users a fully off-highway, multi-use trail that connects the Town of Lloyd and the City of Poughkeepsie.

One of the most significant engineering challenges of the project is at the location where Mile Hill Road bisects the former railroad corridor. An old concrete arch bridge once carried Mile Hill Road over the railroad; however this arch was demolished and filled in when the railroad was abandoned, creating a roadway embankment that was approximately 25 feet high and 180 feet wide at its base. One of the main objectives during the design of this segment of the Hudson Valley Rail Trail was to re-establish this underpass so that trail users could pass underneath Mile Hill Road and remain traveling through the pristine countryside while avoiding an at grade road crossing.

(continued on page 2)
Route 20, Sheridan

They make it look so easy! For US Rt. 20 in Sheridan, NY, Kistner supplied fourteen 30-ton sections of 12'-0" x 11'-0" box culverts, with special ends, plus 2 toe walls. Two 22.5 degree special turning pieces were supplied to achieve a 45-degree bend, as shown in the accompanying picture.

Contractor Union Concrete and Construction Corporation’s Jack Ford said the erection was both a tight fit and a quick completion. They took off the top of the old bridge, and set a portion of the new one (the box culverts) inside next to the old walls. This simplified the amount of demolition and excavation they had to do, which saved time – because they had a contractual time restrain of 14 days to close the road. He said that by careful organization and execution, they were able to get the job done. One key was the delivery of the precast units, which was performed exactly as scheduled in one 8-hour day, thus not incurring another $5-6k for the large crane for a second day. Road closure was avoided by pushing traffic to the shoulder to enable installation of the culvert turn, some required cast in place work at the inlet and outlet ends. He said the CIP flared ends were very complicated. As in the first article (page 1), Mike Kistner reported “Customer / Owner / Engineer all very pleased with the precast solution”, and Jack agreed. Credits: Owner and engineer – NYSDOT; Contractor – Union Concrete and Construction Corporation; Precaster – Kistner Concrete Products, Lockport, NY.

Hudson Valley Rail Trail (continued from page 1)

The new structure utilized a combination of pre-cast and cast-in-place concrete construction. The main structure consists of nine precast concrete ConSpan arch units each with a span of 28 feet and an 11 foot rise. These units are founded on cast-in-place concrete stem walls and footings. Cast-in-place concrete wingwalls were utilized to tie the structure into the steep rock outcrops that line the project site. The precast headwalls and end arch units were constructed with concrete form-liner to give the structure the appearance of a stone arch. The concrete will be stained to emulate natural limestone and a “keystone” will be installed in the recess at the center of the arch.

Project credits include: Owner – Town of Lloyd; Engineer – Barton & Loguidice, P.C.; Contractor – Merritt Construction, Inc.; Precast Supplier – Contech Construction Products, Inc.
American Public Works Association Award Winner for Small Structures

Ongoing inspections found the old West Avenue Bridges’ structural deck longitudinally cracked, the concrete hollow sounding, spalling of large areas of concrete and exposed, rusting reinforcement. The City of Canandaigua clearly needed a replacement for the bridge, and engaged Hunt Engineers, Architects, and Land Surveyors, P.C. to prepare the needed design and documents. To keep costs low, shorten construction time, and minimize the impact on the detoured traveling public, a precast concrete box-culvert scheme was chosen, rather than replace the old structural deck. The West Avenue Bridge replacement project was approved as a Stimulus Project, and won an award from the APWA for small structures. It was identified by NYSDOT Region 4 Staff as one of the top two best ARRA projects within the region; it was also submitted by them to Albany for inclusion in an AASHTO Report that discussed AARA projects.

The project was awarded for design to Hunt EAS in February 2009, had design approval in April, a PS&E submission in May and was substantially complete in December 2009 with only punch items remaining for spring-time cleanup.

Preparation of sub-bed after removal of old structure

The old structure included a pedestrian bridge on both sides of the roadway. In the picture above, note that one pedestrian bridge was left in place during construction to not encumber the local foot traffic. It was removed (as unnecessary) after the bridge was completed. Credits: Contractor was Wind-Sun Construction, Precaster was Lakelands Concrete Products, and HUNT Engineers, Architects, & Land Surveyors, P.C. did the design. Many thanks to HUNT’s Barry J. Dumbauld, P.E. for the article, the photos, and his help.

Installing 22’ clear-span, 6’ clear-rise box-culvert sections

Culvert joints taped, backfilled, and ready for 8” of asphalt

Looks like this bridge has always been there, doesn’t it?
Rambling Road Culvert Replacement, Amherst

Fourteen 30-ton box-culvert sections, 24'-0" x 7'-0", with sloped ends and precast toe walls, all erected in one 8-hour day – it sounds so routine. Designed by Wendel Engineers for the Town of Amherst, E & R General Contracting did the site construction, and the precaster was Kistner Concrete Products, Lockport, NY. Our thanks, again, to Mike Kistner for the photos and stories.