LNVA Repairs Jones Crossing at the Devers Canal

This fully automated cutter not only produces perfectly cut pipes, but does so quickly and in a more environmentally friendly manner. Since cutting is done in a wet environment, no dust is generated.

Hobas Pipe USA supplied 600 feet of 48-inch pipe to the Lower Neches Valley Authority. LNVA crews installed the pipe relatively easily with no previous experience installing this type of pipe.

THE LOWER NECHES VALLEY AUTHORITY (LNVA) is one of the 23 River Authorities created by the State of Texas to develop and manage the waters of the State. The LNVA is responsible for fresh water management in far southeastern Texas in the entirety of Jefferson, Hardin, and Tyler Counties, and portions of Liberty and Chambers Counties. The watersheds of the Neches River and its tributaries occupy an area of approximately 10,000 square miles. The area receives generous amounts of rainfall, producing stream flows in the Neches and its tributaries of around 4,323,000 acre-feet of water a year at Port Arthur, Texas, where it empties into Sabine Lake, and ultimately into the Gulf of Mexico.

Although water in the Devers Canal System is pulled from the Trinity River, the LNVA acquired the Devers Canal System in 2008.

Potential Failure

Known as the Jones Crossing, the site of the potential breach is approximately 21 canal miles downstream from LVNA's Devers first pump station at the Trinity River. At this particular location about 20 miles southwest of Beaumont, an aged drainage system was piped under the Devers Canal via three parallel 48-inch reinforced concrete pipes. The canal, in turn, was piped directly under a farm access road also via three parallel 48 -inch reinforced concrete pipes. All three features converged at various angles at the Jones Crossing point.

"We were experiencing problems with the existing reinforced concrete pipe joints separating and allowing canal water to leak into the ditch," said Ryan Ard, P.E., Inva engineering manager. "LNVA made several repairs over time to patch any leaks that appeared. Over the years, erosion and weathering had deteriorated the original timber headwalls in the drainage ditch. This ongoing erosion exacerbated by the heavy rains in early 2015 and again in early 2016 eventually infiltrated and undermined the headwalls, allowing the banks of the drainage ditch to creep toward the canal. Had we allowed the problem to persist, the canal banks would have ultimately been breached by erosion, thereby allowing canal water to spill into the drainage ditch below."

As originally planned, this project would be designed by LNVA staff and put out for public bid for a general contractor in mid to late 2017. Given the circumstances and the need for urgency, and because LNVA's canal system is not in operation from October 31 thru March 15 over the winter months due to the agricultural cycle, LNVA decided to take on the construction project internally.

(continued on reverse)

LNVA Repairs Jones Crossing at the Devers Canal

Year of Construction
2016
Total Length of Pipe
600 feet
Diameter
48-inch
Stiffness Class
46 & 72 psi
Installation Method
Direct Bury
Application
Stormwater
Client
Lower Neches Valley Authority (LNVA)
Installer
LNVA
Advantages
Lightweight, Special Miter Cuts

The Approach

The scope of the repair would include excavating and removing the existing drainage ditch and canal crossings. The drainage ditch and canal both included three runs of 48-inch reinforced concrete pipe. The pipe in the ditch measured approximately 160-feet and the pipe in the canal was approximately 40-feet long. The total depth of the drainage ditch was approximately 12 feet.

LNVA engineers analyzed several alternative repair designs, but ultimately decided the best option was to rebuild the crossing in its original configuration. The layout was somewhat complicated by the fact that a private road crosses both the drainage ditch and the canal at this location.

Because the hydraulics of both the canal and the drainage culverts had been performing satisfactorily for many years, and also because of vertical space limitations, they decided to use the same size pipe for the reconstruction. The driving consideration was trying to maximize the depth of the canal while maintaining the existing flow line of the drainage ditch.

The original headwalls in the drainage ditch were constructed of vertical timbers. "We wanted to go back with a hard armored headwall such as concrete or articulated block," explained Ard. "We determined a vertical headwall in the drainage ditch would be more costly to construct and maintain over the years compared to a sloped concrete liner. Based on this decision, we requested the pipe ends be mitered at a 2:1 slope from the factory. Once installed, the ditch slope would be graded to match and a concrete liner poured for erosion protection."

LNVA considered different types of pipe material for this application. Although corrugated metal and concrete are most commonly used materials for drainage culverts, LNVA engineers considered the life cycle cost benefit of fiberglass pipe. Leakage associated with corrugated and concrete drainage culverts are not generally of concern, but over time they will cause erosion and corrosion. For this particular site where a canal, a drainage ditch and a road all converged, the type of pipe material raised concern for LNVA engineers.

Ard stated, "At this diameter, the pricing was competitive with reinforced concrete pipe; however, the benefits of fiberglass pipe outweighed that of a reinforced concrete pipe in terms of handling the material and placement during construction." While the needed pipe would measure only 600 linear feet of 48-inch pipe, generally an amount falling below the dollar value required for a formal bid process, LNVA nonetheless, publicly advertised for bids to supply Fiberglass Reinforced Pipe (FRP). HOBAS Pipe USA was the low bidder.

Installation

The LNVA ultimately chose HOBAS centrifugally cast, fiberglass reinforced, polymer mortar (CCFRPM) pipe because, according to Ard, "We have a good service history with HOBAS and it is installed in various other locations on our system. We liked the fact that the joints came in 20-ft lengths and would be watertight, the pipe is lightweight when compared to its concrete counterparts, and HOBAS would factory miter the pipe ends to our specifications and install a headwall ring to be cast into a concrete headwall."

HOBAS pipe is easily customizable for specialty jobs, a task that is made even easier and faster thanks to the custom built water jet cutter, according to Kirk Eager, southeast texas/ louisiana sales rep, HOBAS Pipe USA. Drawings are created in 3D mechanical CAD software and transposed into the required code. The water jet machine is then run by a computer-controlled program that produces perfectly cut pipes, quickly and in a more environmentally friendly manner.

All of these benefits facilitated the LNVA crews being able to install the pipe relatively easily with no previous experience installing this type of pipe. LNVA has several crews and operates a fleet of its own heavy equipment to perform day to day business. This allowed LNVA to help control costs by utilizing internal equipment and manpower to construct the project.

The installation of the three 160-foot runs in the drainage ditch took four days, while installation of the three 40-foot runs in the canal under the roadway was completed in only one day. Once the new HOBAS pipe was installed, LNVA crews re-graded the drainage ditch slopes and reconstructed the canal banks and rock road back to their pre-existing grades. Because repairs to the roadway and canal system were performed in the agricultural off-season, the road was closed for duration of construction, as no residences or local traffic were affected.