

December 2005 • Volume 59, Number 12

Pipeline News

www.pipeline-news.com

From the Publisher of *Underground Construction* and *Pipeline & Gas Journal*



The portable bridge, rock rip rap and pipe wrap shown here are only some of the products and components Williams Companies used to stabilize a \$1 million, Transco operated gas transmission pipeline crossing the Guadalupe River near Victoria, TX.



Unique Approach Solves Pipeline Exposure, River Erosion

By Rita Tubb, Editor

Williams recently took a different approach to solving a pipeline exposure problem caused by river erosion in the Guadalupe River, near Victoria, TX. Instead of relocating the pipe and letting the river meander naturally, a decision was made to stabilize the pipeline and re-establish the river bank and shoreline to prevent further erosion.

Williams Senior Project Engineer Mark Bordelon said the erosion and pipe exposure was due to ever increasing flood events since the historical flood of 1998. Over time, approximately 70 feet of river-bank was lost, resulting in an exposure of a 120-foot section of the 26-inch diameter Transco natural gas transmission line that had been installed under the Guadalupe River bed in 1950.

According to the Williams official, the Mainline A pipeline is operated by Transco, an affiliate of Tulsa, OK-based Williams Companies Inc. The route of the line begins in Hidalgo County in South Texas and runs 2,000 miles to the Metro New York area. While the pipeline transports approximately 10 percent of all natural gas consumed in the U.S., the portion crossing Victoria County moves about 12 MMcf/d.

Bordelon indicated that while a significant portion of the transmission line was exposed, it had not been taken out of service nor did it have any punctures or other problems that were a cause for concern.

The decision to stabilize the pipeline and shoreline with a combination of rock rip rap and concrete mats proved to be the most economical as compared with an HDD installation.

Contract award

Bordelon said the turnkey contract to provide erosion stabilization and protect the pipeline, valued at \$1 million, was awarded to Submar, Inc. of Houma, LA.

Prior to the contract award, Submar had completed the initial design phase of the project. After award of the contract, Submar finalized all design and construction details. This work, carried out at the company's Houma office, was under the direction of John Lewis, who also served as project manager during the construction phase.

According to Lewis, Submar's crews mobilized to the job site in late May. Also in the preliminary design phase, he had visited Medina Crushed Stone in Medina, TX to evaluate and select the 12,000 tons of rock that would be required for the project.

Continuing, he noted that the first work on the project focused on construction of a 240-foot long, 30-foot wide temporary bridge over the Guadalupe River.

Lewis explained that the bridge was constructed using the Flexifloat construction system provided by Robishaw Engineering of Houston.

Rockshield

Lewis noted that Submar's three-man dive team was responsible for establishing the length of the pipeline exposure, which proved to be about 90 feet from the overbend of the pipe projecting into the water. There was an additional 30 feet of pipe exposed from the overbend to the bank.

The dive team's responsibility also included wrapping the pipe, both above and below the water line, with a spaghetti type PVC, or Tuff Nuff Rockshield, to prevent any abrasive materials from contacting the protective pipeline coating.

Shortly after the Tuff Nuff Rockshield was secured to the pipe, crews followed with rock placement until it was level with the top of the pipe. At this point, Submar Revetment mats were placed directly over the pipeline and then an excavator was used to trench the mats into the rock to secure them in place.

In describing other major job activities, Lewis said rock was used to provide a work area out into the water. "We did not dam up the river, we only constructed a small rock island to allow the front-end loaders and excavators to have a relatively dry place to work and gain the reach needed to place the large amounts of rock required on the project.

Bendway weirs

The three Bendway Weirs constructed upstream of the pipeline posed special challenges.

Construction started by cutting a ramp from the bank that sloped down to the river, which was about 28 feet below the high bank. The water level at the time was running around 13 feet.

Constructed purely of rock, the largest of the three weirs was approximately 35 feet long, 14 feet tall and 26 feet wide at the base. The two weirs constructed upstream and downstream were slightly smaller, measuring about 30 feet in overall length.

Stone toe protection

Another significant structure completed on the project was the Longitudinal Peaked Stone Toe Protection (L.P.S.T.P.) system.



Lewis indicated that construction started by placing rock at the toe on the western bank of the river and building a two-foot foundation below the mud line and then building up the rock until it reached the water elevation.

Next, two layers of large 24 to 36-inch diameter rip rap was placed parallel to the bank.

Over the rock, construction crews used a crane to place Submar-manufactured Revetment Mats to span over the top of the pipe. Each mat section is 8 feet wide, 20 feet long and 4 1/2 inches thick weighing 6,200 pounds. Each mat section is interconnected with binding straps.

Submar installed a total of 45 pre-cast concrete revetment mats. Lewis said the mats were placed from the top of the 28-foot high river bank down to where the pipeline had four feet of cover in the river.

To secure the mats in place, they were trenched into the rock both in the water and on the bank.

Permitting

It took Williams a number of months to receive a U.S. Army Corps of Engineers permit to stabilize the exposed pipeline.

Williams demonstrated their commitment to maintaining pipeline integrity by initiating the start of construction within three weeks after receipt of permits. In addition, Williams felt that this was a long-term solution to protect the pipeline by mitigating any future stream erosion at this location.

Final site restoration included re-planting native hardwood trees set back from the bank and planting willow posts into the rock on the embankment. Willow trees will establish into the embankment and create a natural setting. This method re-establishes the bank and provides protection for the pipeline by putting in enough mass to resist the rivers natural erosional forces. It is an alternative available to the pipeline operating company and it includes time-proven technology that the Army Corps of Engineers has used on the

Mississippi River for approximately 50 years to maintain the commercial navigation of the river channel.

Conclusion

In conclusion, Bordelon said, "The restoration and stabilization project resulted in a stable bank and protection for the pipeline. The bendway weirs created a zone of calm waters which is beneficial to aquatic habitat. The landowner benefited by eliminating any future land loss at this location. This was a win-win situation for both the pipeline operating company and the landowner."

Editor's Note: Full Text of this article may be reviewed in PLN's sister publication Underground Construction, November 2005.