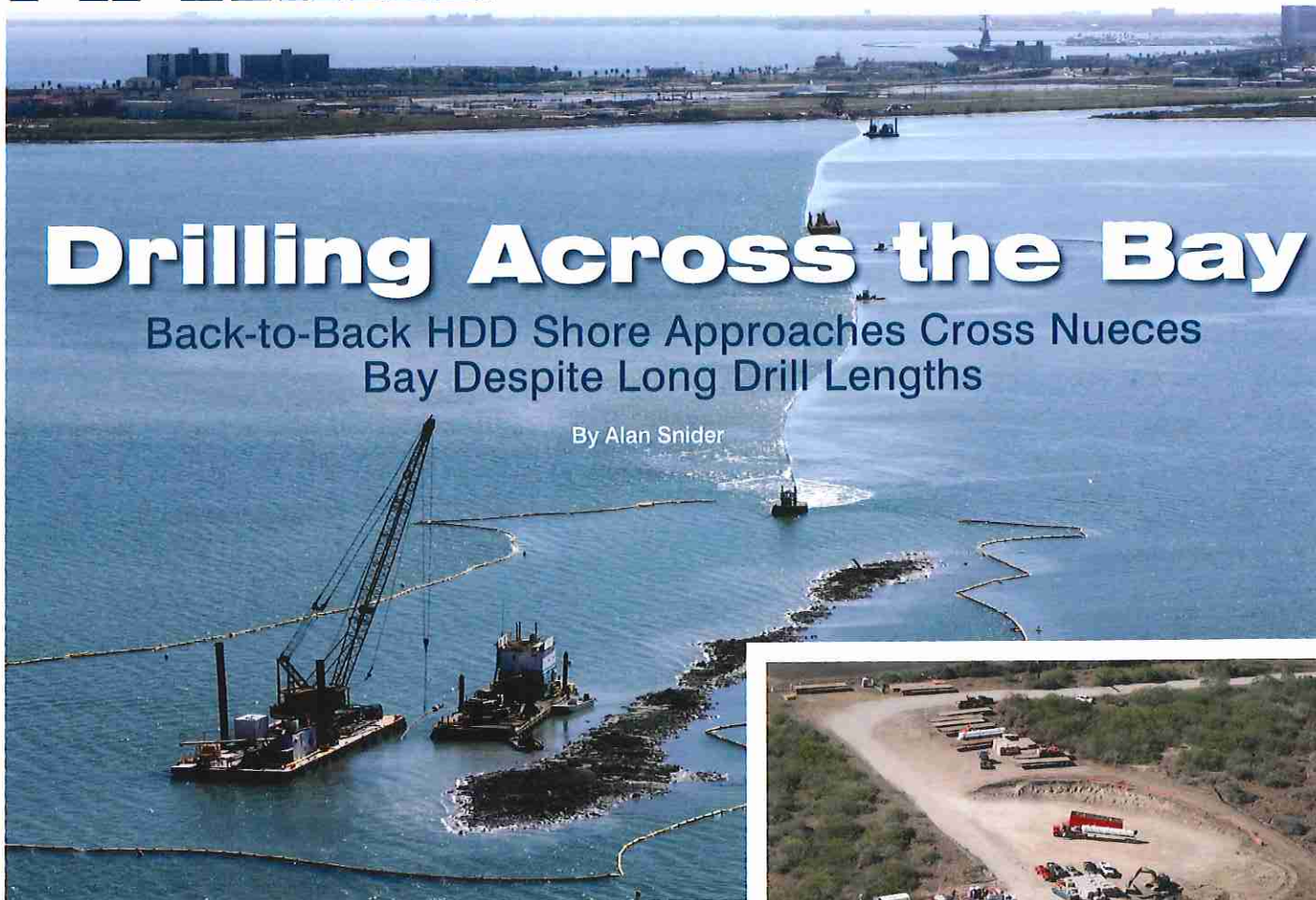


Drilling Across the Bay

Back-to-Back HDD Shore Approaches Cross Nueces Bay Despite Long Drill Lengths

By Alan Snider



Laney's crossing of Nueces Bay in Corpus Christi, Texas, included two HDDs, one drilled from land on the north side and the other drilled from the port on the south side.

Long horizontal directional drill (HDD) lengths made a pipeline crossing of Nueces Bay near Corpus Christi, Texas, a challenge — more than 14,000 ft worth of challenge. So when Arrowhead Eagle Ford Pipeline LLC needed to install a 16-in. diameter crude oil pipeline to address increased capacity needs of the Eagle Ford shale, it turned to a drilling contractor it had worked with before, Laney Directional Drilling Co., to help accomplish its goal.

The Nueces Bay HDD crossing is part of the 48-mile, new installation Gardendale Pipeline in Texas, running through Live Oak, San Patricio and Nueces counties, between Swinney Switch and Corpus Christi. The product pipe itself was a 16-in. diameter steel pipe with a wall thickness of 0.406 in. and yield strength of 52,000 psi.


During the design phase, Laney originally suggested one long HDD to span the more than 14,000 ft, but after

reviewing the results of the geotechnical investigation, the soil was very loose sands with some gravel, Arrowhead and Laney agreed to split the HDD into two segments. Dividing the HDD into two segments helped avoid potential inadvertent returns of drilling fluid under the environmentally sensitive Bay waters.

Instead Laney designed two HDDs: One was drilled from land on the north side while the other HDD was drilled from the Port of Corpus Christi on the south side of the bay. The two HDDs met in the middle of Nueces Bay at a large glory hole or dredged area, constructed by Orion, a sub-contractor to Progressive Pipeline, the general pipeline contractor. The glory hole was an approximately 900- by 30-ft trench 7 ft below the bay's bottom.

Kyle Orum, Laney's field superintendent of the south HDD, says the company completed the pilot hole, one reaming pass and one swab pass before pulling the product pipe through to the intercept point, where Progressive Pipeline managed the construction. Laney's field superintendent of the north HDD was Carlton Loftin, a 23-year veteran of the HDD industry.

"Divers went down and found the drill bits from each side," Orum explains. "All in all, the way the project was bid and planned and put together, it went pretty smoothly."



The Nueces Bay HDD crossing, which included two drilling segments of more than 7,000 ft, was part of the 48-mile Gardendale Pipeline, built to serve increased capacity in the Eagle Ford shale.

Via barge Progressive Pipeline pulled the two pipes above the water level to weld them together. The Laney rig on the north side of the bay then pulled the slack out of the continuous pipe, lowering it back into the glory hole, where it was covered with backfill.

A Matter of Soil

The geotechnical investigation at the site identified very soft soils for a significant depth, and the density of the overburden of soil was almost non-existent according to Paul Bearden, director of development, research and quality with Laney. This brought up the risk of drilling fluid inadvertent returns, which is an issue needing mitigation in most HDDs. To address this risk and have the ability to contain the drilling fluid, Laney's design incorporated small diameter casing installed on both crossings (north and south sides of the bay). The HDDs went to depths of about 60 ft below the bay's mudline to reach a sand layer. The soft soil also increased

the chances for steering complications when the HDDs reached the end of their long lengths. It took work to stay on course, but the drills were completed successfully.

"We were drilling through shells and fine sands and gravels, which created torque on the drill string," Orum adds.

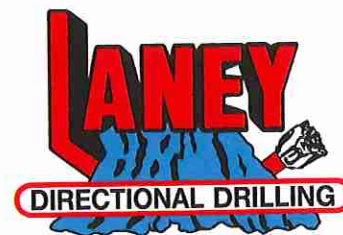
The south HDD reached 7,250 ft and was started on Oct. 19, 2011, and completed on Nov. 24, 2011. The north HDD was 7,303 ft long and rig-up started on it Nov. 3, 2011, with pipe pulled into the hole on Nov. 30, 2011. Of course, time was of the essence since offshore and barge work is expensive. Laney kept the project on track, though, finishing on time and on budget.

In addition to the crossing of Nueces Bay, the project included a land-to-land HDD with a distance of 1,876 ft completed by Laney. Rig-up for this crossing was on Oct. 10, 2011, kicking off the project. The land-to-land HDD was completed by Oct. 17 and the crew moved on to begin the south HDD.

Project construction challenges of long HDD lengths, working in water

and on barges, and the monitoring and scrutiny brought on by environmentally sensitive areas can be addressed with solid soil investigations and HDD design up front. Laney planned for the challenges and was able to deliver a successful HDD crossing of Nueces Bay to Arrowhead as a result.

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