

In 1997

Pipeline & Utilities Construction

DECEMBER 1996

For Over 50 Years, The Leading Publication Of The Underground Construction & Rehabilitation Industry

Cable Construction

UCT '97 Preview



FEATURING
The Devil's Directional Bore
Contractor Guides Company Growth On The Job
High-Tech Construction In Low-Tech Environment
Cliffside Constructs Experimental Cable Program
Pipeline Safety Bill Lacking Key Elements

becomes . . .

The Devil's Directional Bore

By Jeff Griffin
Contributing Editor

Contractors enjoy sharing stories about projects they have completed.

Difficult jobs often make the best stories. Not only are tales about overcoming obstacles interesting, they provide valuable lessons that can make future jobs easier for other contractors.

Utility contractors who make horizontal directional drilling installations must deal with many different types of job situations. There are so many variables on a directional drilling job, much can go wrong.

Rock, soils that change several times during the course of a bore, selecting the correct fluid for different conditions, losing fluid flow, getting stuck in the hole, encountering unexpected obstacles, malfunctioning equipment -all are in a day's work for directional drilling crews.

Mickey Redwine, president of Dynamic Cable Construction Co" Inc., Ben Wheeler, TX, has been involved in directional drilling about as long as anyone, and he thought that he had experienced about every possible problem.

But he was confronted with a situation on a recent project that few contractors can match.

Redwine's company was subcontractor for six bores on a large fiber optic project in Mexico. On a river crossing -of the last segments of the project - Redwine's crew was told by local residents that the bore would be impossible to complete. The reason: The devil would not allow it.

The bore was under the Puente Grande River, approximately 15 miles north of Guadalajara.

The route of the 1,100-foot bore was parallel to a stone bridge, built almost 400 years ago across the shallow river. "The legend about the bridge's construction," said Redwine, "is that in order to complete the bridge, its builder made a deal with the devil. But the man tricked the devil to escape the bargain, and the angry devil placed a curse on the bridge.

"Local residents told us the devil's curse would prevent us from ever completing the bore."

To provide continuity during construction, the river bore was one of the last scheduled in the first phase of a five-phase telecommunications project scheduled over a five-year period. The first phase included installation of 3,100 miles of cable, most of it by trenching and plowing. Hand labor was used extensively in many areas.

Horizontal directional drilling was used on portions of the project where other construction methods were impractical or impossible. Another contractor had tried unsuccessfully to make most of the bore completed by Dynamic Cable Construction Co. Dynamic was called in to use its larger equipment with rock drilling capabilities.

Redwine said workers listened to stories about the Puente Grande Bridge and the devil's curse. The stories were unusual and interesting. But they had little time to worry about superstitions.

Using an American Directional Drill DD-120 with 120,000 pounds of thrust and pullback, equipped with a 6 3/4-inch mud motor supplied by Inrock, Houston, TX, and using a mud system manufactured by Tulsa Rig Iron, Dynamic's crew began what was planned to be a seven-day job.

"We knew the bore would be difficult," said Redwine. "Subsoil conditions were sand, clay, gravel, and cobblestone. But we thought it was realistic to expect to finish in a week."

The job was completed on the 29th day. Work days averaged 18 hours. Eight bores failed, before the bit was brought to the surface on the ninth attempt.



Legend Of The Puente Grande River Bridge

Although the uninformed might mistake the statue as that of a young girl, it's actually the devil in a cape. The tail can be seen extending behind the figure.

There are many stories about Mexico's Puente Grande River Bridge and the curse the devil is said to have imposed on the day it was completed almost 400 years ago.

Over the years many events have become a part of the legend of the bridge and its mysterious story. Many people are said to have met their death attempting to cross the bridge.

Dynamic Cable Construction Co. President Mickey Redwine learned about the legend while his crew bored beneath the river adjacent to the bridge to install fiber optic cable. From the accounts told by local residents, Redwine pieced together this story.



In 1702, the local government decided to construct a bridge across Puente Grande River. The site selected was shallow with a rocky bottom. The bridge would be about 400-feet long and constructed of stone. The government contracted with a local monk, who was said to have engineering experience, to oversee the project.

It is said the monk employed as many as 200 workers to hand lay the stones and secure them with mortar. It was a difficult and tedious task, and progress was much slower than expected.

The monk, it is said, realized he would never meet the deadline for completion. Desperate, he decided the only way the work could be finished on time was to enlist the help of the devil. The devil readily agreed to help. But, of course, there was a catch. If the devil completed the bridge prior to the deadline, on completion of the deadline, the monk must give his soul to the devil.

According to the deal, the bridge must be finished before the rooster crowed on the morning of the specified completion date.

Work on the bridge progressed, and as it neared completion, the monk became concerned for his soul. To finish the job, the devil worked through the night before the dawn of the deadline. Just before the devil placed the last stone, the monk put a lantern in front of a mirror and shined a beam of light into the eye of the rooster, causing the rooster to crow before daybreak.

Believing he had lost the bet, the devil stopped work.

The monk then laid the last stone.

When the devil learned he had been tricked and could not take possession of the monk's soul, he imposed a curse on the bridge. The devil erected a statue of himself at one end of the bridge and told townspeople a tribute to him would be required to guarantee safe passage across the bridge.

At the other end of the bridge, the monk placed a statue of himself. He told local people to kneel before his statue and pray to insure a safe trip across the bridge.



The bridge over the Puente Grande River in Mexico.

Both statues still stand, and many local residents continue to take the devil's curse seriously.

But now a new story is part of the legend.

It tells of the American construction company who beat the devil to install telephone cable beside the bridge of the devil.

Early Woes

Problems - many of them which seemed to occur for no identifiable reason - began immediately.

On the first try, Dynamic Cable rig foreman Chad Osborne and driller Randy Scamps attempted to track the bore head with walk-over equipment. Digital Control Inc., Renton, WA, had designed a sonde especially for the project which used four D-cell batteries to minimize trips to change batteries. "We got interference and strange readings like we've never experienced," said Redwine.

When Osborne placed the DigiTrak receiver on the ground to track the bore path, the instrument would make electronic beeps which sounded like a musical tune.

"We contacted Digital Control," said Redwine, "and were told the company had never experienced such a phenomena, nor had other users every reported receiving such signals."

The crew knew nothing was wrong with the tracker. It had worked perfectly before this bore (and it would operate normally after the river project).

Unable to track the bore from the surface, Redwine decided to try a wireline system and solicited the services of Centerline Directional Guidance Systems, based in Houston. Problems continued. Centerline specialist Kevin Russell found interference producing readings unlike any he had experienced.

"We had to trip out of the hole a number of times because of electrical shorts in the wireline," said Redwine. "We never found a cause for the shorts."

Nothing could be found wrong with the wireline equipment. It tested perfectly and it, too, would operate without incident after the river bore was completed.

Every day seemed to bring another setback.

Large boulders - some the size of a small car - stopped bores abruptly. Bores went off course. Mud circulation would be lost, and drill strings became hopelessly stuck in the hole. Gravel and cobblestone caused excessive wear on bits and sonde housings (three housings were broken in the course of the job).

"On one unsuccessful try," said Redwine, "we got within 100 feet of punching out, but the bore was too deep to get the bore up within the specified window."



As Dynamic Cable's attempts on the crossing mounted, it became more an area event with spectators gathering round to witness the "battle with the devil."

Twilight Zone

Local residents were quick to point out that they had said the bore could not be completed. The difficulties simply were the natural result of the devil's curse.

The devil seemed to have plenty of ways to create trouble. A federal prison is located nearby, and local residents told crew members that when prisoners die, the devil takes their souls, placing them under the bridge to help implement the curse.

Numerous lives, local people told the Americans, had been lost while crossing the bridge when careless victims ignore the curse.

"The bridge is too narrow for two trucks to pass," said Redwine, "and many fights develop as drivers argue over who should cross first. One we saw involved knives."

As if to confirm the curse, at times the river would turn blood red.

Dynamic personnel quickly discovered a worldly explanation for the water's color. There is a slaughterhouse up river. The red in the water was blood, but the blood of cattle which is released into the river.

"One elderly man," said Redwine, "was so certain the bore could not be completed - unless we met the devil's demands - that he promised to cut off his own left ear if we finished the job. He came to the job site every day to monitor progress."

The work drug on. Large rocks deflected the drill head, taking the drill string off course.

The drill's mud motor needed the mud system to pump 350 to 400 gallons per minute, and it was difficult to find enough tank trucks to haul in necessary supplies of water.

Mud flow would be lost, and the drill string would become stuck.

Getting replacement parts and equipment through customs was difficult, slow, and expensive.

"We had parts that were lost for weeks, or never showed up at all," said Redwine.

"To get one non-mag collar into Mexico, we ordered three 10-foot sections, rather than one 30-foot length. Two sections were delayed several days, and the third was lost for more than a week."

Because it is difficult to ship bentonite fluid additive into the country, Redwine decided to use a product manufactured in Mexico.

"But it was a very low-yield bentonite," he said, "used mostly for soil stabilization and shallow water well drilling. It was not suitable for our work."

**Difficult jobs often make
the best stories. Not only are
tales about overcoming obstacles
interesting, they provide
valuable lessons that can make
future jobs easier for other contractors.**

Redwine drove to the factory between Monterey and Zacatecas. Through an interpreter, he explained to a company chemist details of the project and that a higher yield product was needed. After a series of experiments with a dry polymer, a satisfactory formula was achieved and several truckloads were ordered and delivered.

As the days wore on and problems continued to prevent completion of the bore, all involved began to face the additional pressure of the rapidly-approaching deadline for finishing the project.

"The locals," said Redwine, "told us the only chance we had was to submit to the devil. The devil had erected a statue of himself at one end of the bridge. The only way to guarantee safe passage over the bridge - or in our case to complete the bore - was to go the devil's statue and commit an act of deference. You can't print what would be required. Let's just say it would be humiliating and degrading.

"One day when it truly appeared all efforts would fail, one of our customer's supervisors said - jokingly, I think - that perhaps we should give up and send someone to the devil's statue and make our own deal with him. We had to finish the job!"

Relief

But finally a bore began to get closer to its exit point. It was staying on course, and progress was slow but steady.

On the day the bore was to be brought to its exit point and out of the ground, a large crowd of local people and construction workers gathered to watch. The old man who had promised to cut off his ear if the job succeeded was there. He appeared nervous.

"When the ground began to rumble, and drilling fluid burst out of the ground," said Redwine, "the man disappeared into the crowd, and we never saw him again. Everyone applauded and cheered as the bit surfaced."

Dynamic Cable bought food and drink for all crew members and the local people who joined the celebration.

"It was the toughest bore we ever made," said Redwine. "We overcame all kinds of problems, and it took us more than three times as long as we planned. But we finished the job. We beat the deadline.

"And, we finished the bore without meeting the devil's demands."