

Santan Freeway Siphon in Phoenix Marks SSC's Largest and Longest Project

By Bradley Kramer

56-ft Trash Pile Delays Bore

Beneath the busy Santan Freeway in Phoenix, just 4 ft below the surface, a work crew tunnels its way from one side of the road toward the other, 502 ft away. At an average of 20 ft per day, a Barbcoboring machine tunnel attachment (BMTA), a man-steered cutting head connected to an auger boring machine, pushes forward and lays 60-in. diameter steel casing in its wake.

Once installed, the casing will carry 30-in. diameter pipe to divert irrigation water from a retention basin to surrounding land. But after 220 ft, progress grinds to a halt. A large chunk of concrete lies in the way — a problem that will become all too familiar for the next eight days.

After two weeks of setting up the project, Specialized Services Co. (SSC) — a family-owned excavation company in Phoenix — began installing the siphon under Loop 202 near Interstate 10 in April. SSC subcontracted the project under Hayden Building Corp., which the Arizona Department of Transportation (ADOT) hired as the primary contractor. ADOT hoped to find a way to help the Salt River Project utility company reduce standing water in the area and use the water for irrigation around Phoenix.

The 502-ft jack-and-bore project was the longest SSC had done involving 60-in. diameter casing. The company meticulously set up the project, employing a laser to guide the way for the BMTA operator, who could then adjust direction of the articulated cutting head (vertically and horizontally) to stay on target.

Although the hard soil made progress sluggish, it wasn't until the SSC crew discovered chunks of concrete and asphalt in its path that the project really slowed down. The large debris turned out to be part of a 56-ft wide "undisclosed trash pile," says Arvid Veidmark III, SSC estimator and co-owner. The trash pile was a result of previous construction at the site.

"It slowed us down drastically," Veidmark says. "We dropped to about 7 ft per day from about 20 ft per day. We had to crawl out and dig out the chunks of concrete and asphalt because it was tearing up the bit."

Instead of what would have taken three days, the 56-ft span became an eight-day delay. SSC filed for a change in condition with ADOT to make up for the slowdown. "Once we got on through that," Veidmark says, "we were able to tunnel on through." After four months of work, SSC finished the project June 13.

A Tight Fit

Before the Santan Freeway siphon project, the longest boring project SSC had completed was a 740-ft bore with 24-in. casing. The longest it had done using 60-in. casing measured 310 ft, but that was using conventional auger boring. SSC had to increase that length by nearly 200 ft and maintain line and grade to connect to the irrigation basin on the other side of the freeway. Because the BMTA is operator controlled, it offered the best solution.

"One of the biggest successes was the accuracy with which we came out on the other end," Veidmark says. "We were within 2-in. line and grade of where we needed to be."

Setup for the project began Feb. 28. The Salt River Project surveyed the area so that SSC could plan its path under the freeway. Because the bore was so long, SSC took every precaution to make sure its aim was true. A laser set up on a fixed-base platform marked the target where the BMTA operator would aim throughout the bore. Every week the surveyors returned to check the accuracy of the laser. Using the BMTA pilot controls to align the red laser dot with a set of crosshairs on the front of the machine, the operator was able to maintain the line and grade of the dig.



SSC was able to maintain line and grade to within 2 in. of its target.

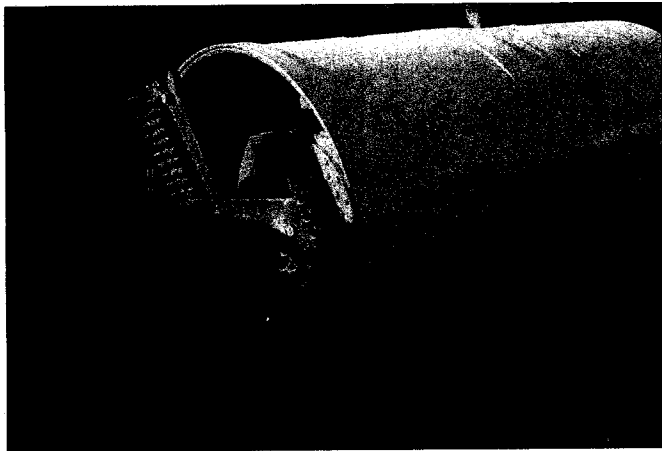
Just a 1/16-in. change at the laser could put the bore off target by up to 2 ft at the endpoint, says field operations manager Aaron Veidmark, co-owner and Arvid's brother. However, when the bit broke through the other side, the hole was barely off line and grade — just 1 1/2 in. vertically and 1 3/4 in. horizontally. He judged the bore to be 99.5 percent accurate.

"We pride ourselves on hitting the mark," says Aaron Veidmark, adding that the ability of the crew to monitor the laser and stay on target ensured the precision of the bore. "We take the time to make sure it's perfect. We are held to the same standards as a contractor would be if it was open-cut."

Changed Conditions

Originally, the bore was expected to take 30 days to complete, Aaron Veidmark says. Considering the hard caliche soil and two five-man crews working 12-hour shifts, SSC planned to have the job done near the end of May. The unexpected contents of the trash pile changed all that.

When the crew learned that a previous contractor had backfilled a water retention basin that Loop 202 was built over, Aaron Veidmark thought the different soil material might help the progress of the bore.



SSC used a Barbco boring machine tunnel attachment (BMTA) for the job.

“We were encouraged it would be a softer material,” he says. “We were changing cutting teeth an average of every 20 ft. We were hoping we’d get to the fill area and it would soften and speed up our progress.”

The caliche chewed up an average of 30 cutting teeth on the BMTA every day. Softer ground would have allowed the team to push through the soil faster while reducing the wear on the cutting teeth. Instead, the area was filled

with 24-in. long chunks of concrete and asphalt. Progress slowed to 5 to 7 ft per day as the BMTA operator had to stop and pull out the debris by hand. The delay created an additional cost of \$16,000 for SSC, which filed for changed conditions to recoup some of the loss.

The Finish Line

After the steel casing was in place, SSC installed 30-in. rubber gasket reinforced concrete pipe to carry water under Loop 202. The pipe functions as a reverse siphon, using air pressure and gravity to suck water through the pipe and keep water from stagnating.

Since its founding in 1969 by Aaron and Arvid’s grandfather, Arvid Veidmark Sr., and father, Arvid Jr., who retired three years ago, SSC has adapted its business to specialize in boring, directional drilling and vacuum excavation. Aaron and Arvid share ownership of the company with their mother, Marcia. Although the company had never undertaken a project as big as the siphon project, the Veidmarks were excited to take it on so they could prove what the company was capable of accomplishing with the proper equipment and its experienced personnel.

“It gives you a confidence booster,” Aaron says. “You learn from it and it makes you a better contractor. Not all jobs go as well this one did.” Following the success of the project, he says SSC can confidently bid on future projects and say, “Look what we’ve done. We can do it again.”

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