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Dams

INTERNATIONAL TEAM TO PLUG LEAKY DAM WITH SECANT PILE WALL

TO STOP SEEPAGE BENEATH A powerhouse, lock and dam on the border of Alabama and Georgia, an Italian joint venture contractor is preparing to construct a concrete cutoff wall comprising an underwater secant pile section flanked by two land-side slurry wall wings.

The wall's most challenging aspect is the centerpiece, featuring 480 54-in.-dia interlocking piles driven approximately 200 ft through layers of limestone mixed with earth, shell and sand into impervious sandy Providence Formation bedrock—under a 90-ft head of water in front of the powerhouse. "It's a very unusual job for us," says Donald E. Simpson, Corps of Engineers resident engineer. "We're used to working on lock and dam jobs on land where you can physically see what's going on."

The U.S. arms of two Italian foundation contractors—Boston-based Trevicos Corp. and Rodio International, Cuddy, Pa.—combined to propose an innovative solution that won a \$50-million design-build contract from the Corps in August 2001. The agency's main concern was 30,000 gal per minute of water seeping beneath the George F. Walker lock and dam. The Corps completed the \$85-million project in 1961. The concrete portion of the dam is 340 ft long and 155 ft at maximum height. An adjacent 82 x 450-ft lock chamber and earthfill wingwalls, each approximately 5,000 ft long, extend the dam length to 1,457 ft across the face. Lake Eufala backs up 65 miles along the Chatahoochee River.

"We knew what we wanted—a cutoff wall, with a minimum thickness of 24 in., connected to the dam face by a concrete cap beam. We pretty much let the competitors tell us how they'd do it," says Robert A. Bugg, contract administration officer for the Corps' South Alabama office. "This solution won on technical merit and cost."

Two other finalists proposed monolithic slurry walls, costing between \$80



LINING UP Temporary steel casings are used to place piles.

million and \$85 million. "Like our competitors, we will cut bentonite slurry walls on the land. But we believed that we could avoid the enormous cost of cofferdams and dewatering by sinking secant piles underwater," says Arturo L. Ressi, Trevicos director.

Secant piles are constructed to overlap and form a sealed, continuous bulkhead. To place the piles, the contractor fabricated a movable guide template that is fixed to the dam face. Barge-mounted cranes place temporary 54-in.-dia, 140-ft-long casings of 3/4-in.-thick steel pipe to the template. The casings, aligned on 66-in. centers, are sunk into a flowable fill-grouted apron placed on the lake bed in front of the dam by Oakland, Calif.-based marine subcontractor Vortex Diving Inc. "As the template aligns the first casing properly, all of the rest will follow," says Gianfran-

co Di Cicco, special projects manager for the joint venture. "We will place the primary casings in a 1-4-7 sequence, then come back with the overlapping No. 2 and 3 and 5 and 6 casings."

The contractor purchased two new German-made Wirth top-mounted reverse pile drilling rigs to drill shafts from atop the casing tubes. Each has two counter-rotating drill heads at the end of an extendible 230-ft drilling string that is designed to ensure that the pile shafts are drilled vertically and in parallel. A vacuum tube removes material from the cutting face through the steel casing, and transports it to a distribution barge that will deposit spoil on the lakebed. As shafts are drilled, the contractor will construct the secant piles using bottom-up Tremie replacement of the slurry mix with a 1,000-psi plastic concrete mix prepared at an onsite batch plant. The contractor will drill the first shafts this month. A 6-ft-wide, 2-ft-thick concrete cap will tie the secant piles to the dam face.

On land, the contractor will cut slurry wall trenches with a hydromill, creating space for overlapping bentonite cement panels that will extend to a maximum depth of 230 ft. Diaphragm walls will tie the slurry wall wings to the secant pile section.

While working, the contractor must minimize disruption to lock and powerhouse operations. Swiss-based V.A. Tech Hydro is simultaneously refurbishing powerhouse equipment under an \$18-million contract. The goal is to improve generation capacity from four 32.5-Mw turbines by 20%. Both contracts are scheduled for conclusion in 2004.

The Walter Andrews dam a few miles downstream is another of the scores of Corps of Engineers structures that are facing rehabilitation in the next few years. "This is a very high-profile project for the Corps. A lot of people will watch this technique to see if it can be used at other sites," says Bugg. □

By Andrew G. Wright



GUIDES Templates ensure alignment.