



# Deep Drilling Necessary to Test Dam's Integrity

## **A CSDA Member Is Called Upon After Severe Flooding Threatens to Collapse the Structure**

The Summer of 2002 will go down in history books as one of the worst years for flooding in San Antonio, Texas. In July, San Antonio and the hill country to the north received an unbelievable amount of rain with 35 inches of rain falling over an 8-day period. The average rainfall for Texas for the entire month of July is only 2.66 inches. With the heavy rain, the Medina River peaked at 36 feet, 25 feet above flood stage.

**Above:** The Summer 2002 flooding was the worst anyone could remember in San Antonio, Texas. **Inset photo:** It was believed more flooding could cause the dam to give way.

This swollen river filled Lake Medina beyond capacity. The water was within 14 inches of going over the top of the Medina Dam. The water was 11 feet over the spillway. One expert feared that if the water were to crest the dam, it would rush down the backside of the 180-foot-tall dam, hitting a top speed of 70 mph. This rushing water would undermine the backside of the dam and could cause the dam to fail.

There were other concerns about the dam as well. The dam was built in 1911 and had visible cracks and leaks. Experts speculated that if the dam failed, a 70-foot-tall wall of water would hit the small town of nearby Castroville, washing it away. All the small towns below the dam were evacuated.

Once the rains stopped, the Lake Medina Conservation Society hosted a public question-and-answer session with the Texas Commission on Environmental Quality. The public wanted to know if the Medina Dam was safe, and if it was not, they wanted answers about the course of action necessary to fix it. There was much speculation from several experts, but in the end no one knew the answer. It was determined that an in-depth study and analysis would be necessary to determine the dam's integrity.

URS Corporation was contracted to perform the analysis. URS Corporation is

a worldwide, full-service organization employing planners, engineers, architects, scientists and construction managers. One of the key elements to the company's analysis was installing five piezometers, instruments that measure water uplift. These meters, designed to transmit information about ground water uplift beneath the dam, would let engineers know if the 92-year-old dam was in danger of washing away.

URS needed five 4-inch-diameter holes, 16 feet deep, drilled in the very bottom of the dam. Holes of San Antonio, Inc. was selected for the job based on their reputation and experience in drilling deep holes. Charles Lopez and CSDA certified operator Dean Karpen were chosen to tackle the job. Karpen has been with Holes of San Antonio for over 15 years and is the company's top core driller. Lopez, who has been with Holes for one year, was chosen to assist Karpen in order to gain experience in core drilling.

The two operators reported to the job site for the first time in May of 2003. On the backside of the dam down at the river level, two inspection tunnels ran through the center of the dam. The tunnels were 4 feet wide and 5 feet, 6 inches tall and were half full of water. URS needed five holes drilled approximately 20 feet apart and 100 feet inside the tunnels for placement of the piezometers.

After submitting their proposal to URS, Holes of San Antonio had to wait six months for the water level to recede enough to allow operators access to the tunnels. When the water went down to an acceptable level, Holes began working immediately.

Five holes, 4 inches in diameter were drilled through the bottom of the dam and then drilled 8 feet into the bedrock beneath the dam, giving URS a total hole depth of 16 feet. The biggest challenge operators faced was working in a confined space — drilling deep holes with no headroom was time consuming and tedious. Extracting the cores also proved to be a slow process given the space constraints and lack of headroom. Once the holes were complete, URS began setting the piezometers in the holes.

The core drilling was performed with a Cushion Cut HCD series hydraulic drill motor mounted to Diamond Tech Dovetail quick disconnect carriage spacer. Hydraulic power was supplied by a Cushion Cut 2525DD power unit. The bits were supplied by Diamond Products in their POL spec. Operators used a 24-inch-long bit with 0.250 wide segments to begin the hole and then switched to a 4-inch-long bit with 0.187 wide segments to complete the holes. All appropriate safety precautions were followed.

Operators were able to finish the job in three 8-hour days. This time frame was more than adequate for URS, who had expected Holes to be on the job for a week or more.

*Holes of San Antonio, a CSDA member since 1993, is a full-service sawing, drilling and demolition contractor. Holes has been serving south and central Texas since 1977 and currently runs 15 service trucks. Services include curb cutting, core drilling, flat sawing, wall sawing, grinding, hand sawing, decorative sawing, demolition, grooving and specialized concrete placement. ●*

**Resources:**

General Contractor: URS Corporation  
Sawing and Drilling Contractor:  
Holes of San Antonio, Inc.  
San Antonio, TX  
Method: Core Drilling  
Tel: 800-756-5208  
Fax: 210-349-0727  
Web site: [www.holesofsa.com](http://www.holesofsa.com)



**Above: The biggest constraint on this job was space—or lack thereof. Holes were core drilled into the bottom of the dam so piezometers could be installed.**