

Feature Story

Precision Wire Sawing Aids in Largest Dam Remediation Project

Workers drilled holes 2 inches in diameter and approximately 20 inches deep on a two foot center pattern to fill with expansive grout.



Lake Murray, a man-made lake in Columbia, South Carolina, began as a source of energy for residents. Confined by the Saluda Dam, a hydroelectric plant that has a capability of 206 megawatts, Lake Murray contains 2,200,000 acre-feet of water. The dam was built on an earthen embankment in 1930 with no filter or drain protection. Because it was constructed in this way, the dam could be susceptible to liquefaction during a large earthquake, due to the loose density of the sluiced fill materials used to form the core of the dam.

In 2002, the Federal Energy Regulatory Commission directed the owner of the dam, South Carolina Electric & Gas (SCE&G) to strengthen the structure of the dam in the event of an earthquake. The Saluda Dam Remediation Project became the largest active dam project in the United States and involved seismic upgrade requirements including the construction of a new back-up dam in the event that the original dam ever failed. Any failure of the dam without a back-up dam in place could cause major flood-

ing for many miles downstream, including the city of Columbia.

In June 2003, general contractor Barnard Construction Company, Inc. contacted CSDA member Bluegrass Concrete Cutting, Inc. to assist with the Remediation Project. The \$275 million upgrade involved the construction of a combined roller-compacted concrete (RCC) mid-section and rockfill berms acting as a back-up dam located immediately downstream of the existing dam. It also included the excavation and back

filling in the toe of the dam to depths of 60 feet. During the period of excavation and back filling, the water level in the reservoir was lowered to relieve some of the pressure on the dam in order to maintain adequate stability.

Bluegrass was hired to remove a concrete retaining wall in order to create access to the tower water supply to the turbines that produce hydroelectric power, commonly called the Penstock Five towers. These round landmarks are intakes rising 223 feet high. Project



Each 40-foot riser pier was cut by a diamond wire saw before demolition could be completed.



Once the cutting stage was completed, a Brokk robotic hammer was used to break up the concrete.



Once the work was completed and all the concrete was removed, covers were placed over the holes that remained.

Manager Tony Niehaus made a special visit to the Columbia site to meet with the prospective client SCE&G, owner of the Saluda Dam. Bluegrass cut the concrete piers surrounding the discharge pipes for the dam. They used diamond saws to cut 40-foot hexagons from the 1,000-square yard riser blocks and utilized 20 cases of expansive grout per hexagon. Diamond saws were chosen to use because of the minimal vibrations they caused during operation.

"We were extremely satisfied with the project because of the challenges we overcame and the relationships made on the project that continue to grow to this day," said Tony Niehaus project manager for Bluegrass Concrete Cutting, Inc.

Any heavy vibrations could have caused hazardous materials to enter the draft tubes, which would lead to excessive

debris and tunnel deterioration. Workers drilled more than 600 holes that were 2 inches in diameter into each pier on a two-foot center pattern approximately 18 to 20 feet in depth for the utilization of expansive grout. Before the excavation, the piers were 3/4 cut and the expansive grout was loaded.

Workers left two I-beams to support the 2,000-ton sections as they made the cuts in the hexagons with a diamond wire saw, cutting in an X-pattern from one corner of the hexagon to the other. While slurry accumulated in depths of eight inches up to one foot in some areas and expansive grout broke concrete into 1/2 yard cubes half the size of the robotic hammers, workers ensured their safety by wearing the appropriate Personal Protective Equipment.

After the cuts were completed, cracks in the foundation had already begun to develop and then the hammers went to work. Breaking the concrete into these cubes enabled cleaning

and removal efforts to progress more efficiently. Bluegrass Concrete Cutting, Inc. completed their portion of the project on time and under budget. ●

COMPANY PROFILE

Since 1979, Bluegrass has been a specialized concrete cutting and demolition contractor, utilizing diamond wire saws and robotic hammers in the bridge, cement, commercial, fossil power, hydro/marine, nuclear power, petrochemical, pulp and paper, railroad, steel and tunnel markets. Bluegrass' management team and 30 technicians: 30 with nuclear experience, 21 with 40-hour hazwoper, equipped with 35 diamond wire saws and 25 robots, are uniquely capable of understanding the challenges of specialized concrete demolition and removal.

RESOURCES:

Owner:

South Carolina Electric & Gas Company
General Contractor:
Barnard Construction Company, Inc.
Bozeman, Montana

Sawing and Drilling Contractor:
Bluegrass Concrete Cutting, Inc.
Greenville, Alabama

Methods Used: Wire Sawing, Core Drilling
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Breaking the concrete into 1/2 yard cubes made it easier to remove.