

Aesthetics Play Key Role in Dam Rehabilitation

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A rapidly growing metropolitan county depends on RCC to rehabilitate an aging dam and restore the focal point of a prominent park.

The Yellow River Watershed Dam No. 17 (Y-17) is located approximately 30 miles (48 kilometers) northeast of Atlanta, Georgia. The dam is part of a 92 acre (37.2 hectare) facility owned and operated by the Gwinnett County Department of Parks and Recreation.

For more than a decade Gwinnett County has been one of the fastest growing counties in metropolitan Atlanta. As a result of this rapid development, the Y-17 structure which was originally constructed to protect rural pasture and farmland now protects recently constructed subdivisions, apartment complexes, office parks, retail businesses, and a high school located downstream of the dam. This development caused the classification of the dam to change from low hazard to high hazard.

The Y-17 structure consists of an earthen embankment dam approximately 30 ft (9.1 m) high and 900 ft (274 m) long. Studies of the Y-17 structure determined that the existing 200 feet (61 m) wide vegetated earthen spillway was inadequate for the design flows. An options assessment determined that the most cost effective solution was to armor the entire downstream slope and abutments of the dam with roller-compacted concrete (RCC).

The RCC forms a spillway approximately 550 ft (168 m) wide that overtops the dam and allows the existing earthen spillway to be abandoned. The spillway is asymmetric and designed to correspond with the varying topography along the downstream abutments. The crest has three stages to control flow over the spillway and to provide flood protection during more frequent storm events, with the lowest stage crest elevation corresponding to the crest of the existing earthen auxiliary spillway. The spillway crest was designed to maintain peak stage during the 1/3 PMP design storm below the existing dam crest. To prevent dam overtopping during the PMP design storm, the spillway sidewalls extend an additional 4 feet (1.2 m) above



Aerial view of the Y-17 dam and downstream reach prior to rehabilitation.



Completion of the RCC stilling basin and construction of the RCC spillway steps and sidewalls.



Placement of earthfill over the completed RCC spillway.



Completed project with grass covered downstream slope.

the original dam crest and an earthen berm was constructed up to the PMP design storm peak stage in the existing auxiliary spillway.

Construction began in October 2004 and was completed by early April 2005. The total project cost was \$2.1 million. Approximately 65% of the funding for the project was provided by the National Resource Conservation Service (NRCS) Watershed Rehabilitation Program since the structure was originally constructed by them. ASI RCC, Inc. was awarded the job at a cost of \$1.46 million with an in-place RCC cost of \$110 per yd³ (\$143.87 per m³) for approximately 6,700 yd³ (5,123 m³) of RCC.

Early in construction, thick deposits of alluvial soils with high liquid limits and very low shear strength were identified along the downstream toe of the existing embankment. This discovery necessitated the removal of more than 8,000 yd³ (6,116 m³) of additional soil. A re-design of the RCC spillway stilling basin was carried out after removal of the unsuitable material to correspond with the newly excavated site topography. The re-design resulted in an additional 900 yd³ (688 m³) of RCC. RCC placement began in mid December 2004 and was completed in early February 2005.

The RCC design compressive strength was 2,250 psi (15.5 MPa) at 28-days. The average compressive strengths of RCC cylinders molded per ASTM C 1435 were 2,300 psi (15.9 MPa), 3,400 psi (23.4 MPa), and 3,550 psi (24.5 MPa) at 28, 60, and 90 days, respectively.

The completed RCC spillway safely routes approximately 18,950 cfs (537 m³/sec.) through the Y-17 watershed during the PMP design storm. Since the structure is located in a prominent park, the downstream slopes of the RCC

spillway were covered with earthfill and vegetated to hide the RCC. The crest and crest sidewalls are still exposed. The spillway activates for storms at or less than a 25 year frequency. As a result, earthfill covering the RCC may erode during these storms requiring some future maintenance.

Vital Statistics

Remediation Features

Maximum height of embankment.	30 ft (9.1 m)
Overall length of dam	900 ft (274 m)
Width of RCC spillway crest.	524 ft (160 m)
Height of RCC spillway steps	12 in (300 cm)
Width of RCC steps	9 ft (2.7 m)
Slope of chute steps	3H:1V
Slope of training wall steps.	3H:1V

RCC Mix Design

Type I/II Portland cement.	250 lbs/yd ³ (148 kg/m ³)
Class F fly ash	80 lbs/yd ³ (47.5 kg/m ³)
Graded Road Base Aggregate (1-1/2 in. (37.5 mm) MSA)	3,488 lbs/yd ³ (2,069 kg/m ³)
Moisture Content	6.5%
Specified Comp. Str. @ 28 days	2,250 psi (15.5 MPa)

Credits

Owner/Construction Manager: Gwinnett County, Georgia

Federal Sponsor: Natural Resources Conservation Service

Designer: U.S. Army Corps of Engineers, Savannah District

Resident Engineer/QA Testing: Golder Associates Inc., Atlanta, Georgia

RCC Mix Design: Schnabel Engineering Associates, Inc., Atlanta, Georgia

Contractor: ASI RCC, Inc., Buena Vista, Colorado



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