

BEST OF  
**2007**  
AWARDS

## Gilboa Dam

PROJECT OF THE YEAR: Public Works

Two years ago, the Department of Environmental Protection determined that an 80-year-old dam on a reservoir that provides 15 % of New York City's drinking water needed immediate stability and safety improvements. Given the time-critical and massive scope of the project, the \$19 million restoration of the Gilboa Dam in New York State's Catskills region was poised from the start to become a major engineering feat and set time records.

The 180-ft-high, 2,100-ft-long dam was built between 1920 and 1927 to impound the 20-billion-gallon Schoharie Reservoir in New York's Schoharie County and scheduled for a major upgrade in 2008 when the NYCDEP realized that a more rapid response was necessary. During a fast-tracked 90-day design period starting in November 2005, a joint venture of Gannett Fleming/Hazen and Sawyer had to provide for major structural and geotechnical repairs as well as a way to divert and store the excess water during work on the water side of the dam. After considering several alternatives and conducting studies, the team decided to improve stability with vertical and inclined rock anchors, such as those used in over 300 dams across the United States. Before this work could begin, however, the team had to prepare the dam – in the dead of winter.



To divert the water, the design team proposed cutting a 220-ft-wide, 5-ft-deep notch into the dam. In December 2005, with D. A. Collins Construction Co. of Mechanicville, N.Y. serving as the general contractor, crews installed precast concrete anchors on both shores of the reservoir and a tugboat pulled in a 2,100-ft-long debris boom constructed of 16-in-high flotation units made of polyethylene and filled with polystyrene. The boom, which included a 15-ft-wide gate for boats, would stop flotsam from disrupting construction and damaging a siphon system designed to drain the water away from the dam. In addition, crews cleaned out the logs and tree limbs already clogging the reservoir. Meanwhile, the team had to continue meeting with the local residents concerned with recent incidents at other dams around the country and the destruction of homes during Hurricane Katrina.

D.A. Collins started work on the siphon a day after winning that contract in Janu-

### Key Players

**Owner:** New York City Department of Environmental Protection, Corona, N.Y.

**Engineers:** Gannett Fleming/Hazen and Sawyer, a Joint Venture, New York

**Geotechnical Subconsultant:** Mueser Rutledge Consulting Engineers, New York

**Debris Boom and Siphon:** D. A. Collins Construction Co., Mechanicville, N.Y.

**Notch and Waste Channel:** Jett Industries, Colliersville, N.Y.

**Anchors:** Nicholson Construction Co., Cuddy, PA

ary, installing four separate four-ft-diameter steel siphons, the largest temporary siphons among New York State dams, because the accelerated construction schedule allowed no time to test the system and the team went with a conservative estimate. The siphons, placed on the upstream side to collect water and >>

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discharge it into a channel at the base of the of the dam on the other side, had a combined capacity of 500 mgd, which proved indispensable during the June 2006 floods in the Catskill/Delaware basin. The high capacity allowed the anchor contractor, Nicholson Construction Co. of Cuddy, Penn., enough time to stop work before the flood waters came in, and shortened the time necessary to drain the flood water to restart construction.

Jett Industries of Colliersville, N.Y., was the general contractor on the spillway notch, a straightforward project once the siphons and boom were in place. In the spring, however, NYCDEP decided to expand the scope of the water diversion project in order to ensure that waste water flowing from the reservoir, through the Shandaken Tunnel and via Esopus Creek, would not overflow the waste channel the

team planned to use at nearby Ashokan Reservoir. Studies found that as little as an extra 25 mgd could flood nearby State University of New York's Ashokan Field Campus. In 39 days, the team designed and constructed a temporary flood berm that allowed for 600 mgd capacity at the Waste Channel.

Typically, such "advance" work requires one to two years; on Gilboa's expedited schedule, all the design and construction was completed in four months. Once these extensive preparations were in place, Nicholson Construction installed 42 vertical anchors running the length of the spillway from the crest of the dam. An additional 32 anchors run at 45 degree angles from the middle of the dam. Two types of anchors were drilled into the foundation rock and grouted. The first type consisted of 38 strands of epoxy-coat-

ed steel, while the other consisted of 58 strands of 0.6-in-diameter steel with service loads of over 1,000 tons, "approaching the practical limit in anchor technology." The anchors, designed to last 100 years, included head details that allowed for spillway modifications scheduled for the next phase of work starting in 2008. In addition to long-duration tests for load loss over time, the team also installed test anchors at an adjacent site to monitor performance. By November 2006, Repairs on the dam were completed in just 11 months, roughly half the time usually associated with this type of work. <<