



Photo: Neill Hampton

The installation of new jet flow gates.

Solving the Underwater Dilemma

An Innovative Solution for Cobble Mountain Dam

When the water main break occurred in Weston this May, 700,000 households were affected, experiencing firsthand the inconvenience of not having safe drinking water at the turn of a tap. Cobble Mountain Dam supplies drinking water for more than 250,000 residents and businesses in Springfield, Mass., and surrounding towns. When a problem with the potential to disrupt the area's water supply was discovered in 2002, local officials acted quickly.

Maintenance at the dam, built in the 1920s, revealed that

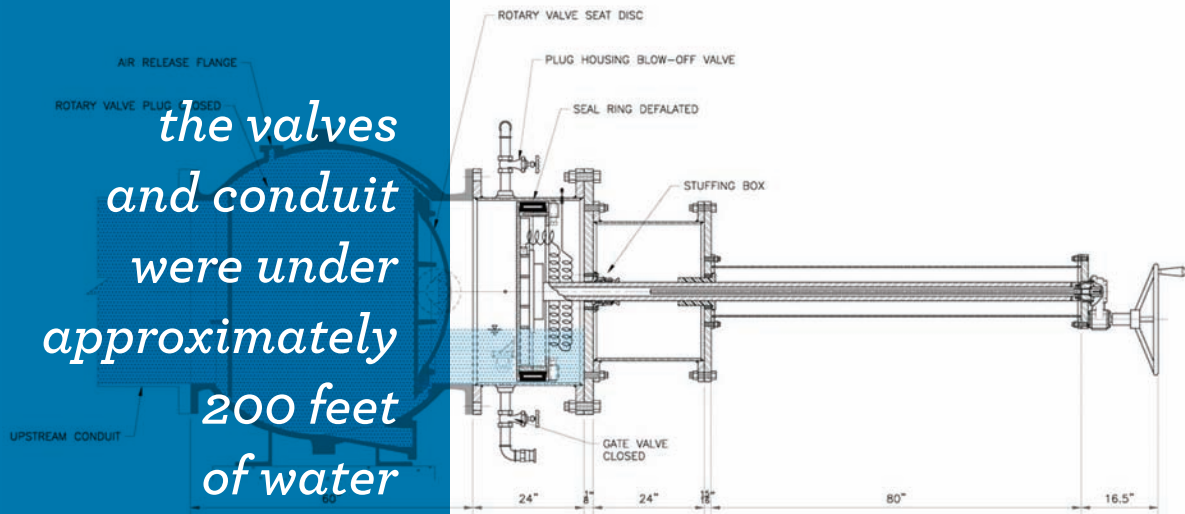
a replacement surge tank was needed. The surge tank controls elevated pressure in the power tunnel—the primary conduit that conveys raw water to the water treatment plant. The power tunnel would have to be removed from service in order to replace the surge tank. The town hired CDM, a consulting engineering firm, in 2002 to develop a solution.

When CDM's lead designer for the project, Neill Hampton, CE '94, and his colleagues visited the site, they found that in order to replace the tank, they had to repair valves that were in a

confined valve chamber. The chamber was in the diversion tunnel, which diverted river flow around the dam during construction. The only method previously used to isolate the valves was installing a bulkhead within the tunnel from the reservoir side. Because the valves and conduit were under approximately 200 feet of water, the work would have to be done by divers using decompression diving techniques. This project would have cost approximately \$3 million, double the allotted budget.



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Technical illustration of the plugging mechanism designed by Neill Hampton.

Trying to reduce costs, Hampton developed a device that would allow a mechanical contractor to fix the valves without entering the reservoir. It would bolt to the front of the main valve and allow a plug to be inserted through the valve and into the piping upstream. The plug would be inflated to drain the water out of the valve. The result would be depressurized conditions, and work could be completed “in-the-dry” within the valve chamber.

Because there were risks involved, the Commissioner’s Board in Springfield required that a concrete wall be built downstream in the tunnel. A wall had existed during previous maintenance, and rebuilding it would ensure that if the valve failed, the entire reservoir would not drain. “If that happened, every guy working in there was going to get killed, including me,” says Hampton.

“I had a lot of confidence with what we came up with, so I tried to put it out of my mind, but it was always there.”

The design was completed and bid out, and the contract was awarded to R.H. White Construction. They worked closely with Hampton to execute his vision. The device was a success, and there was no leakage during deployment or construction. Upon completion of the refurbishment, a flow test was conducted, which went perfectly and restored the diversion tunnel to its intended use.

The project has received various awards, including the Association of State Dam Safety Officials’ 2007 National Rehabilitation Project of the Year Award, the American Council of Engineering Companies (ACEC) Grand Conceptor Awards in Massachusetts and Connecticut, and a National Grand Award in 2008. Hampton has also

published various papers about the project in magazines, including *International Water Power and Dam Construction*, *Civil Engineering Practice: Journal of the Boston Society of Civil Engineers*, and the *Journal of the New England Water Works Association*.

Now a principal at CDM in the Fort Worth, Texas, office, Hampton is developing a similar device for a project in Milwaukee, Wis. He is also working on large water supply and hydropower projects around the country.

“Developing a design and seeing it come to fruition, especially like the Cobble Mountain project, that had never been done before, creates a long-term sense of pride and accomplishment,” Hampton says. He has also presented the project to college students and says that inspiring them to become strong design engineers has been extremely rewarding.