

# Curve-topped spillway speeds Pathfinder water downstream

By TOM MORTON Star-Tribune staff writer trib.com | Posted: Tuesday, December 20, 2011



DAN CEPEDA Star-Tribune

Crews work on the spillway modifications at Pathfinder Dam on Monday morning. The new ogee crested spillway is designed to help the historic dam hold more water. Roads along the marina are in the process of being raised to cope with higher water levels.

Visitors to Pathfinder Dam next year will find a new feature with an odd name.

For 752 feet by the 102-year-old dam, an "ogee crested spillway" will allow the reservoir to rise 2.4 feet higher than before, and send water more efficiently down the North Platte River.

"Ogee" is the technical term for a double curve resembling an elongated S at the crest, or top, of the spillway, said Blake Bennetts, project manager and engineer for the Pathfinder Dam modification project.

The curved shape isn't for looks, even though it is more attractive than the former "flat-crested weir" with its square top.

"When water goes around a sharp corner, it takes more energy," said Bennetts of general contractor ASI Constructors Inc. of Pueblo, Colo.

"The shorter crest can spill water quicker," Bennetts said Monday.

The Pathfinder Dam and reservoir are owned by the U.S. Bureau of Reclamation. However, the Wyoming Water Development Commission is paying for the entire \$2.7 million spillway and other improvements, and no federal funds are being used, said the bureau's area manager John Lawson.

The project will recover 54,000 acre-feet of water lost over time as sediment has accumulated in the reservoir, which was designed to store 1,070,000 acre-feet of water. One acre-foot equals 325,851 gallons.

By way of comparison, Guernsey Reservoir can hold up to 45,000 acre-feet, Lawson said.

Besides holding more water for the bureau's job of irrigation, Lawson said agreements with the Wyoming Water Development Commission have assigned 34,000 acre-feet of the total for endangered species recovery along the river, and assigned another 20,000 acre-feet for cities and other Wyoming needs.

The ogee crested spillway also increases the velocity of water the reservoir can discharge, he said.

Lawson compared the shape of the spillway to an airplane wing, which is designed to make air move faster on top and giving the plane lift.

The spillway applied that aerodynamics to hydrology.

The old spillway could discharge the same amount of water measured in cubic feet per second, but the ogee crested spillway can move the same quantity water at a faster velocity, Lawson said. "The same quantity of water is going through a smaller space."

That velocity also enables the reservoir, even with its greater capacity, to discharge water fast enough so it does not threaten the earthen dike that was built during the construction of the dam, he said.

Pathfinder Dam was considered to be an engineering marvel when it was built.

The current project has its own marvels and difficulties, Bennetts said.

In 2010, and again this year, record precipitation swelled Pathfinder and sent water over the spillway for the first time since 1984.

Having two high-water seasons meant ASI Constructors needed to modify its schedule and pushed construction into the late fall, Bennetts said. "It pinched our construction [season] down."

ASI had to drill, blast and dig down as much as 18 feet to the granite bedrock foundation, Bennetts said.

Once exposed, the cold granite needed warmth for the concrete to cure, he said.

So ASI set up ground heaters, and stretched hoses covered with blankets over the rock, he said.

Once the rock was warm enough, the crews withdrew the blankets and hoses and immediately poured the concrete in 5-foot layers, Bennetts said.

Once poured, the crews stretched the hoses and blankets over the concrete to enable it to cure properly, he said.

To prepare the 17-foot-high ogee crested spillway, ASI will have excavated about 7,700 cubic yards of dirt and rock downstream from the existing flat-crested weir, and another 2,540 cubic yards of granite bedrock, according to the company's website.

To build the spillway itself, it will have poured 6,500 cubic yards of concrete, Bennetts said.

As the reservoir's capacity increases, so does the probability that the higher water will wash over the road that leads to the Pathfinder Marina, said Mike Haigler, superintendent of Natrona County's road and bridge department. The county manages Pathfinder reservoir for the U.S. Bureau of Reclamation.

Monday, Butch Robinett loaded the rock and dirt on a 30-cubic-yard articulated dump truck driven by Steve Forgey.

From the storage area of the rock and dirt near the Pathfinder museum, Forgey drove along the road to the marina and emptied the load as part of the effort to raise the road by three feet.

"It's all the rock they blew out of the dam to begin with to build that thing," Haigler said.

Reach Tom Morton at 307-266-0592, or at [tom.morton@trib.com](mailto:tom.morton@trib.com). You can read his blog at [trib.com](http://trib.com) and follow him on Twitter @GTMorton.

