

## **Somewhere over the Spillway: Rainbow Falls Dam Restoration after Hurricane Irene**

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Rainbow Falls hydroelectric plant is located on the Ausable River fifteen miles south of Plattsburgh, NY. In August 2011, Hurricane Irene flooded the power plant and destroyed most of the plant equipment. Intervals of peak flow exceeded the 500-year flood at 9 stream gauges in the Schoharie Creek and Ausable River Basins. The spillway, located at the top of the falls, handled flow estimated at 45,000 cfs, however, structural deficiencies were observed and resurfacing was deemed necessary.

LaBella Associates provided engineering analysis and design, project management services, and construction oversight. Resurfacing of the spillway presented unique dam stability and flow management challenges, which required custom design solutions by both the engineer and contractor to maintain dam safety. The ogee dam is 345 feet long and varies in height from 10 feet tall on the east side to 25 feet on the west side. The dam had significant concrete loss on the face of the spillway and significant delamination on both the east and west abutments. The Ausable River is very “flashy,” meaning that the magnitude of flow spikes happen quickly. It is fed by many tributaries in the mountains of the Adirondack Park where the watershed area is steep. All flows needed to be managed with the spillway and other intake gates since the plant was offline due to the hurricane.

To overcome these challenges, LaBella designed a two-phase construction sequence, in which flows were diverted to the “non-work” side of the spillway. A cofferdam system was placed on the crest of the dam to protect the work area, but was also designed to fail under flood conditions to relieve loads on the dam.

The face of the spillway was demolished using a milling head mounted to an excavator to grind and smooth out the undulating concrete surface. This method enabled the contractor to follow strict concrete removal guidelines, so the stability of the dam was not compromised in the event of a 100-year design flood. The new reinforced concrete overlay was poured on alternating monoliths using custom EFCO concrete forms to restore the original 1925 spillway ogee shape in varying radiuses. The toe was keyed into the existing bedrock riverbed to prevent undermining and an under-drainage system was installed to relieve seepage through the existing dam.

The project was successfully installed on schedule in November 2019 and budget (\$2.5M) while maintaining worker safety, dam safety, and regulatory flow requirements.