



## **New Heights and Unknown Depths: Anchoring a 150-year-old Wall for Modern Floods**

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The Kents Falls Dam was originally constructed to power a sawmill, and some of its components are estimated to date back to the mid-1800s, though very little documentation from its early history remains. Massive reconstruction projects were completed from the 1940s through the 1990s to convert the facility into the current FERC-regulated hydropower generation station. A moderate flood event overtopped the right abutment in 2015 causing significant scouring downstream of the intake structure and under the penstock. The owner and regulator concluded that the walls protecting the right side of the site needed to be raised to at least contain the 100-yr flood within the channel. The left abutment had been reconstructed in previous efforts, requiring only a doweled concrete cap to retain the 100-year flood. The 450-foot-long right approach wall was still stone masonry with a concrete cap and facing, with varying widths and depths along its length. To come up with a comprehensive design solution, the owner leveraged the structural design capabilities of LaBella, while also bringing Colliers Engineering & Design (CED) onto the team. CED provided expertise in hydrology and hydraulics, FERC compliance guidance, and experience in specialized design elements. Borings and test pits dug during the design phase found large variations in bedrock elevation and wall geometry. Inferences in the design of the wall had to be made from the available field information and the limited drawings and history of the structure. Design would need to be amended where possible while core rock anchor drilling ultimately verified bedrock depth and wall construction. The tallest portion of the existing wall was approximately 32 feet tall near the intake. Further upstream, the wall met bedrock only a few feet below its cap. A new concrete cap was placed along the top of the wall, varying in width and depth to reach the height and geometry required with contain the 100-year flood with a nominal foot of freeboard and to remain stable up to the PMF even with scour of the downstream grade. This concrete cap would act as a beam distributing the loads from 34 new post-tensioned permanent rock anchors along the length of the wall.