Fission Chips and Train Trips: Adventures in Dam Safety

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Our team of professionals undertook the repair of an earthen auxiliary spillway used to discharge overflow from two embankment dams in Ashford, NY (30 miles south of Buffalo, NY). The dams are under the jurisdiction of the Department of Energy (DOE) and New York State Energy Research and Development Authority (NYSERDA). Development Dam #1 (Lake 1 Dam) and New York State Atomic Development Dam #2 (Lake 2 Dam) are both Class A or Low Hazard Dams and were initially built to supply water to the West Valley Demonstration Project (an abandoned nuclear waste recycling plant). The dams drain a total watershed of just under 5 square miles and consist of two separate earthen embankments that run in a series from northwest to southeast. The spillway for Lake 2 Dam is a 36" Reinforced Concrete Pipe (RCP). Lake 1 Dam has a 150' +/- wide grass lined spillway (which is the subject spillway) that discharges into Buttermilk Creek. The 2000' long canal connecting the lakes has a history of sedimentation from landslides and is the only hydraulic connection between the separate reservoirs. The project was necessitated by overtopping events that have caused significant erosion to Lake 1 Dam's earthen spillway and the eastern edge of the lake's shoreline. These incidents resulted in damage to the rail line that run over the top of each embankment by washing out the track ballast and posed a serious risk of catastrophic dam failure and loss of the reservoir. We formulated comprehensive plans and specifications to address the erosion of the dam's spillway with challenges including: Complex 2D and 3D hydraulic modeling of the unique reservoir system; extremely poor glacial soils on which to found a new structure; limited staging area and an outlet stream that is perpendicular to the proposed spillway which has a long history of flooding and lateral migration. The discharge creek also progressed through a culvert immediately downstream of the spillway discharge that was well undersized for design storms. The solution included replacing the turf-reinforced earthen spillway with a reinforced concrete structure, thereby enhancing the spillway's capacity to prevent overtopping and safeguarding the railroad situated atop the dam. The project provided morphologic improvements to the downstream, while creatively handling the high velocities (25-30 ft/sec) discharging into the highly erosive creek bed. The project was designed from 2020 to 2024 with construction completed in 2025.