Tip the Fusegates: Risk Reduction at North Fork Dam

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The North Fork Spillway and Embankment Improvements Project is being implemented by the City of Asheville to increase the hydraulic capacity and improve the seismic stability of the dam. North Fork Dam, a high hazard structure, impounds the primary water source for the City of Asheville and surrounding communities. Since construction of the dam in the early 1950's, dam safety regulations and criteria have changed significantly. Given that the dam is considered critical infrastructure, the City has proactively moved forward with remedial activities to comply with current engineering guidelines for dam safety. The alternatives analysis focused on construction of a new auxiliary spillway and ruled out a conventional labyrinth spillway due to site constraints; the Hydroplus Fusegate system was selected and the footprint was about half of the labyrinth option. In addition to reduced cost and physical footprint impact, the Fusegate system also provided an alternative to a mechanical spillway, which the City preferred due to reduced maintenance and lower risk of spillway mis-operation. This is the first completed tipping Fusegate project in North Carolina. Numerical (CFD) hydraulic modeling was performed for the auxiliary spillway, including the Fusegate crest control, converging chute, and flip bucket outlet. The construction of this auxiliary spillway presented an opportunity to modify the existing primary spillway and to eliminate reliance on operation of the existing radial gates. This reduces risks related to operational issues and releases; the gates were replaced with fixed crest weirs and a single, smaller Obermeyer gate. Other primary improvements include: Parapet along the upstream edge of the crest of the Main Dam. Addition of blanket and trench drain systems for the Main Dam and Saddle Dam. Principal Spillway chute concrete overlay.