Old Problems, New Solutions: Rehabilitating Beaverdam Creek Dam

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Loudoun Water purchased the 50-year old Beaverdam Creek Dam near Leesburg, Virginia in 2014 and prioritized making Beaverdam Creek Dam and its reservoir a safe and reliable source for water and recreation. The primary deficiencies at the dam included a deteriorated side-channel spillway with inadequate discharge capacity. The spillway underdrain system reached a condition where it was flowing at capacity with the spillway slabs showing signs of uplifting. The embankment dam also lacked defensive measures common for a dam of that period, with unfiltered seepage being a primary concern. The need to address the known dam safety deficiencies, improve the operational efficiency of the facility, and address public safety at the site drove the rehabilitation design that included a new labyrinth spillway, modernization of the dam embankment, and installing automated controls. This presentation focuses on the unique solutions used to overcome several complex geotechnical challenges during construction. Localized differential weathering of the diabase bedrock affected structure foundation preparation, dewatering, and rock anchor installation. The spillway grout curtain design was modified during construction to intercept an exposed weathered bedrock seam. Lessons learned from the design and construction of the dam modifications will be shared to help designers find solutions for similar projects.