

## **USING GROUND PENETRATING RADAR AND REMOTE VISUAL INSPECTIONS TO ASSIST THE REHABILITATION OF THE LAKE RAVEN DAM SPILLWAY AT HUNTSVILLE STATE PARK, TEXAS**

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Lake Raven Dam is located within the Huntsville State Park, 70 miles north of Houston. The original 1,000-foot earthen dam was rebuilt with a concrete spillway in 1956 from funds from timber sales when the park opened. In 2009, the Texas Commission for Environmental Quality determined the dam was one of the 1,773 dams in Texas that requires an Emergency Action Plan. To assist the development of this plan, the Texas Parks and Wildlife Department commissioned a geotechnical investigation of the earthen dam and a non-destructive evaluation of the concrete spillway.

This paper presents the findings of an initial ground penetrating radar (GPR) survey of the concrete spillway conducted in 2011. A GPR system with a 900 MHz antenna was used to evaluate the subgrade material underlying the spillway and identified numerous anomalies indicative of voiding and washout. To ground truth the GPR survey results, remote visual inspections with a video endoscope and direct void measurements were conducted through small-diameter drill holes in the spillway. This data was then used to establish a volumetric estimate of voids and to assist the design a subsequent grouting program to rehabilitate the spillway. The construction activities associated with the dam rehabilitation were conducted during the winter of 2016 and upon completion, the GPR survey was repeated and the new data were compared to the original survey. The results of this pseudo-time-lapse evaluation are also presented in this paper and proved valuable in assessing the effectiveness of the grouting program and the updating of the dams' Emergency Action Plan.