USE OF GROUND PENETRATING RADAR FOR DAM SPILLWAY AND CONDUIT INVESTIGATIONS

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Abstract: Ground penetrating radar (GPR) is an effective tool for investigating defects in concrete structures. In a dams setting, concrete structures of interest include spillway slabs, outlet works conduits, and structures such as spillway gate buttresses.

This paper presents results from several spillway and canal siphon investigations. The first case is from a concrete slab spillway which contained clay tile underdrains laid in open-joint fashion, i.e. the pipe joints intentionally contained an open gap to allow under-seepage to enter the pipes and exit the spillway. This type of underdrain system had the effect of accelerating foundation erosion. The resulting voids under the spillway posed a hazard of spillway failure under a full spillway flows. GPR was used at this site to map areas of suspected voids, which were later confirmed by core drilling.

The second case here discusses investigations undertaken to assess the condition of structural steel within a canal siphon. This siphon section was constructed in the early 1960’s, and is being finished to convey water under a portion of an interstate highway. Exposed deteriorated steel is visible in the crown portion of the siphon. There is concern that rusted steel and delaminated concrete are extensive enough to compromise the strength of the siphon, which would be under about 100 feet of hydraulic head at this location. A resulting siphon failure could damage the interstate highway foundation above the siphon. GPR surveys detailed locations of suspected delaminations, voids at the concrete to soil interface, and indicated the general geometry of the steel reinforcing cages.

The final case presented here discusses investigations at a canal wasteway which experienced strong ground shaking during an earthquake. The canal headworks had been damaged during the earthquake, resulting in flows under the wasteway slab. Under slab erosion was suspected from these uncontrolled flows, and a subsequent GPR investigation was able to delineate a possible flow path under the slab. Confirmation core drilling was then used to complete the investigation.

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