Spillway overtopping and guidewall analysis of Lahontan Dam

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Lahontan Dam is part of the Bureau of Reclamation's Newlands Project it provides irrigation water and hydropower to the area near Fallon, Nevada. The dam was constructed between 1911 and 1915 and consists of an earthfill structure with a crest length of 1,325 feet, two spillways, two hydropower facilities and an outlet works. The two spillways release flood waters into the Carson river by passing through opposite 90 degree turns with steps and guidewalls to reduce grade and guide the flow. The final energy dissipations is achieved by a bathtub stilling basin which returns the flow down the Carson river. Some of the interior guidewalls have significant degradation and are in need of repair. Additional hydrology has raised some concerns with the existing facilities design discharge. As part of a Reclamation risk analysis a 1:48 scale physical model of the reservoir and spillways was created to help develop rating curves beyond the existing rating of the facility, evaluate the water surface profile down each spillway and identify location of potential overtopping and identify critical guide walls within each of the spillways. This paper summarizes the finding of the model study and provides insight into what happens when interior guidewalls are removed for supercritical and subcritical flow regimes.