



Abstract Submittal for 2023 ASDSO Conference

“The Impact of Vibration Loads on Liquefaction Susceptible Soils in Earth Embankment Dams”.

Following the failure of Edenville Dam, liquefaction failure modes are being considered in earth embankment dams with heightened awareness. One load case that could potentially lead to liquefaction triggering is vibratory loading from construction equipment, specifically vibratory hammers for steel sheet pile (SSP) installation. Often SSP is installed as a hydraulic cutoff in granular embankments, whose soils can be susceptible to liquefaction. The pore pressure response of those liquefaction susceptible soils under vibratory loads is largely undocumented. Therefore, as part of the SSP cutoff wall installation at Secord Dam, a series of grouted vibrating wire piezometers (VWPZs) were installed and monitored real-time during SSP driving to monitor pore pressure response and allow the embankment soils to drain by pausing SSP driving activities when pore pressures approached project-specific limits. In addition, a vibration monitor was installed on an adjacent concrete training wall to monitor the zone of influence in which the vibrations were felt.

Data from the VWPZs and vibration monitor at Secord Dam during SSP installation will be presented along with conclusions about the sensitivity of loose, saturated foundation soils from vibration loads at Secord Dam. The pore pressure response based on horizontal and vertical proximity of the load (at the SSP tip) relative to the VWPZ sensor is presented. This data can be used to help predict allowable proximity and maximum vibration tolerances (inches per second, ips) in liquefaction susceptible soils.