

Final Design of Eagle Canyon Dam and Debris Basin

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Eagle Canyon Dam is an earthfill embankment dam designed on a foundation of alluvial materials in a highly active seismic area. It was constructed in Riverside County, California in 2016 to serve as a debris retention and flood control facility. It is 55 feet in height and 370 feet in crest length with a storage capacity of 187 acre-feet at spillway crest elevation. This is the first dam that was completed after 2000 in Riverside County to provide 100-year flood protection for Highway 111, homes, and businesses. This paper will present the types of geotechnical investigations performed for the design phase to evaluate the potential for liquefaction and seismic-induced settlement of deep alluvial foundation soils with gravel content, and to determine the overexcavation needed to minimize the settlement of the dam foundation under static and high seismic loading conditions and to achieve safe level of seepage through the dam and its foundation. This paper will also discuss the challenges in designing and constructing a dam using on-site materials that are highly erodible sandy materials with low fines content, design features of the dam embankment, abutments shaping and treatment, sloping intake structure and its location to accommodate anticipated debris volume, the outlet through the dam embankment, filter diaphragm behind the headwall, emergency spillway to carry 8,770 cfs, Type III stilling basin for energy dissipation, slope protection for the dam embankment, other erosion protection measures, access roads for maintenance, and artificial coloring to the downstream riprap slope protection to blend with surroundings. This paper will also include discussion about how some unique constructability issues were addressed. One of the challenges was building the support cradle for the through-embankment outlet pipe. The constructability challenge was created in placing of concrete for a flexible but monolithic cradle around 19, sixteen-foot segments of 42-inch-diameter reinforced concrete pressure pipe while suspending the joints 18-inches above a carefully prepared foundation subgrade. This paper will discuss how the contractor was able to build the support cradle without creating any undesirable construction joints. Further, discussions on the methods and cleaning expectations at the abutment/embankment contact will also be presented.