

Investigation of a Significant Slide in the Embankment of an Old Dam

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Abstract - Shortly after construction was completed, a significant slide occurred in the lower portion of the embankment of an earth dam built in the period 1920-22 but did not affect the function of the reservoir (140 x 180 feet in plain view). Between 1922-1930 various remedies to fix the slide were tried but the slide kept moving downhill during rainy season. Monitoring of water table in the sliding area and stability analysis in the past (during 1970s) indicated a safe slope. The embankment was remodeled slightly in 1954, 1956, and 1971. However, the embankment section in the old slide area remained a matter of serious concern; because Hayward fault is located about 1000 ft. East of the dam and a preliminary analysis indicated the dam to be unsafe during an earthquake event. Yet, the movement was observed during the rainy season. Finally, in 1980, a comprehensive field and laboratory investigation revealed an important but significant information that escaped previous investigations. The stability analysis of the past had failed to identify the failure surface. The surface of sliding was due to a very thin and highly plastic clay layer that was discovered in 1980 by a combination of boring and in-situ cone testing. This combination was also helpful in reaching at the appropriate strength parameters of the highly plastic clay layer which was at its residual angle of friction. This led to the conclusion to remove the clay layer. The paper presents the details of how the discovery of the thin clay layer. Also presented briefly the remedial measures adopted to replace the clay layer by a free draining granular soil layer. This was achieved by emptying the reservoir and excavating the overlying embankment material and re-compacted it back after the replacement of the clay layer. The paper discusses the importance of combining Geotechnical and Geological details in establishing what is down there (the subsurface profile). The paper briefly presents the remedial measures to fix the slide.

Keywords: Sliding for years, Sliding Surface, Detection by Cone Testing.