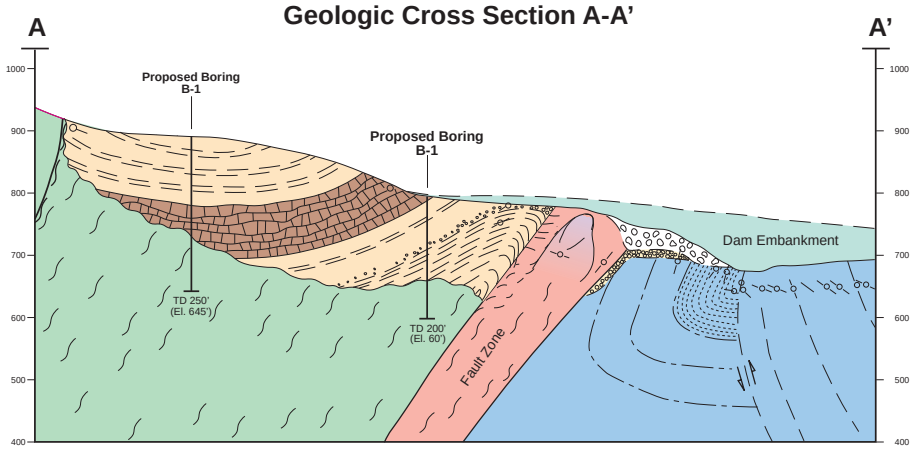
EVALUATION OF EMBANKMENT DEFORMATION

COYOTE DAM PROJECT
SANTA CLARA COUNTY, CALIFORNIA

PROJECT DESCRIPTION



Coyote Dam is an earthfill embankment constructed in the late 1930's across a narrow valley in southeastern Santa Clara County, California. In the late 1980's, the State of California became aware that routine surveying of monuments established along the axis of the dam crest showed inconsistent results, and asked the dam's owner, the Santa Clara Valley Water District, to provide an explanation of the resulting deformation pattern. This led to the onset of several studies, which offered various hypotheses to explain the cause of deformation. These previous studies suggested that the deformation could be due to any of several causes, including: survey error and inconsistencies (which was eventually eliminated from consideration), landsliding at the left dam abutment, settlement of the embankment due to normal consolidation, earthquake-induced settlement caused by earthquakes in 1979 and 1984, or active creep of the Calaveras fault, which was thought to be close to the dam. Some of the studies resulted in conflicting hypotheses, and Cotton, Shires and Associates, Inc. was part of the team selected to resolve the issue.

An important component of our work involved research and review of survey records, original construction photographs and construction field notes by geologic inspectors. The results of our mapping, drilling, fault trenching and research programs led us to determine that the dam was constructed across the major trace of the Calaveras fault. At the time of construction, the fault was not known to represent a modern earthquake hazard. Since that time, it has been discovered that the Calaveras fault is not only active, but is one of the major geologic elements controlling the modern tectonic regime of the San Francisco Bay region. Kinematic reconstruction of fault geometry and fault movement led us to conclude that slow creep along the fault was the leading candidate for causing dam deformation.

Slope inclinometers were installed in, and upslope from, the left abutment to detect any potential landslide movement in the area, and to test the validity of our theory that landsliding was not occurring at the left abutment. Additionally, we recommended that surveying across a larger region, using Global Positioning Satellite receivers, be utilized to quantify the amount of active fault creep and dam deformation. The Water District is currently pursuing installation of a GPS network of several facilities, including Coyote Dam. Subsequent studies of the Calaveras fault have confirmed the presence of fault creep along this segment of the fault.