

Berkeley, Feb. 1925.

Los Angeles County

Flood Control District,

Los Angeles, California.

Gentlemen:-

I have made an examination of the sites of the Pacoima Creek and Big Santa Anita Creek dams with the object of ascertaining the geological conditions at each site as these affect the foundations, abutments and general security of the proposed dams; and beg to advise you as follows:

Both dams are situated in the complex of dioritic, granitic and metamorphic rocks which constitutes the main central mass of the San Gabriel Mountains. This range is of geologically recent uplift; so recent that the streams traversing it have not yet reached the base level of erosion, but are still vigorously deepening their trenches. The process of down cutting has proceeded so rapidly that the atmospheric erosion of the canon walls has scarcely been able to keep pace with it; so that the streams of the San Gabriel Mountains are found in narrow gorges which, in their lower parts, represent the corrasive action of the running water not at all widened by horizontal corrasion, or by atmospheric work. A few hundred feet above the stream line, where the rock surfaces have been longer exposed to the weather these gorges have less precipitous slopes, and the rocks exhibit symptoms of decay due to atmospheric attack. It results from this that the rocks in the bottom of the

canons are sound and fresh. It would be a most remarkable and surprising thing to find decayed or rotten rock at any point in the bottom of these gorges which an engineer, with due regard to minimum yardage in his structure, would select for a dam site.

The rocks which are to serve as the foundations and abutments of the Pacoima and Big Santa Anita dams are perfectly fresh and strong. In this respect there is nothing more to be desired. At both sites the foundations and abutments are ideal as to strength of rock, continuity of rock surface, narrowness of gorge and the smallness of the excavation and striping; and these statements hold for whatever height of dam may be desired.

In the mountain making movements which gave rise to the San Gabriel Mountains the rocks were subjected to great and varied stresses. At innumerable places in the mass of the mountain the stresses were so great that they exceeded the strength of the rocks, and were relieved by ruptures and slips. The evidence of these slips may be seen everywhere in the canon walls in the form of shears and slickensided surfaces, and it would be futile to try to count them. They represent the local relief of stresses in the mass of the mountain that have long since found adequate adjustment and ceased to exist. There is no tendency today for further slips to occur. The region of accumulating stress has shifted to zones outside of the mountain front to the north and to the south; and any slipping

which may occur in the future will be in these zones. A concrete dam well within a mountain gorge, such as that of the Pacoima and Big Santa Anita, is about as strong as the rocks upon which it rests, and will not suffer serious damage from a slip at the outer margin of the mountains. A few days after the great earthquake of 1906 I examined in detail the Crystal Springs dam, which is situated only a few hundred feet from the San Andreas fault on which a large displacement took place, but could not find even a hair crack in the structure.

The innumerable shears and slickensides in the rocks of the San Gabriel Mountains, in the gorges of the Pacoima and Big Santa Anita as elsewhere, are not significant of active stresses but are merely records of a condition which has long since passed. The dams to be built at these sites are not menaced by impending movements, and the fact that earthquakes occur in various parts of the state from time to time is no more reason for not utilizing properly considered dam sites than it is for stopping all construction in the cities of San Francisco and Los Angeles.

With great respect, Gentlemen, I am

Yours Sincerely,

Andrew C. Lawson.