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ENERGY LOSS IN LONG ROD PENETRATION TESTING - TERMINUS DAM LIQUEFACTION INVESTIGATION

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ABSTRACT

In order to evaluate liquefaction potential at Terminus Dam, investigations consisting of Becker Penetration Testing, cross-hole shear wave velocity, and Standard Penetration Testing (SPT) were performed. SPT drill rod lengths of up to 60 m (200 ft) were anticipated. Measurements were made to evaluate the loss in transmitted energy in long drill rods in the SPT. SPT tests were performed with a Mobile automatic hammer and NWJ drill rod. Instrumented subassemblies were located at the top of the rod string and at varying locations in the bottom of the rod string to measure energy. Energy loss was evaluated by determining the energy content in the incident wave pulse as a function of the length of the rods tested. Test results indicate an energy loss rate of 1% per 3 m (10 ft) of rod. The results indicate that for long drill rods, adjustments are required to SPT data.

INTRODUCTION

Terminus Dam, primarily a flood control and water conservation structure, is located on the Kaweah River, about 34 km east and upstream of the town of Visalia, Tulare County, California. Construction of the dam began in February 1959 and was

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measurements using the EFV method, however, much higher data has been measured with the EF2 method during earlier measurements. There is still some concern over how to use new EFV data in the energy corrections proposed by Seed, et. al., (1985) which are based on older EF2 data. The Mobile hammer was very consistent in energy delivery. Using the down hole transducer, the change in incident wave energy content could be determined for the long drill rods used in the investigation. These measurements showed that energy was decreased at rates of about 1 percent per 3 m length of drill rod. The measurements seem to agree with those of previous researchers, but it was surprising that higher rates were not observed in these large diameter drill rods. At this time it is still not clear how SPT data should be corrected for long drill rod lengths. Future studies including wave equation analysis should be performed. Until further study can be performed, a recommendation of applying a 1 percent correction for every 3 meter (10 ft) of rod in excess of 30 m (100 ft) appears appropriate.

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