

Bureau of Reclamation Experience with Instrumented Rolled Earth Fill Dams

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ABSTRACT: This report summarizes the work of Dr. G.P. Gould who studied instrumented performance of Earth Dams during a 3 year stay at the Bureau of Reclamation. Settlement and pore pressures were measured in over 20 earth dams from a period of the 1930s through the 1950s. Detailed measurements were made possible by using multiple cross arm settlement columns and hydraulic piezometer arrays. Compression records indicated most of the consolidation occurs during construction, and that for soils compacted dry of optimum, most of the compression occurs by reduction of air voids. From the compression data, typical compressions indices were correlated to Unified Soil Classification System soil types. Three phase media theory was used to develop equations to predict pore air and pore water pressure development in compacted soils during compression. Compressible soils compacted wetter than 0.6 % of dry of optimum moisture, exhibited undesirably high pore water pressure increases during construction. On dams where soils were compacted to an average 1.5 to 0.5 % dry of optimum, there were no significant excess pore pressures. This study and several related studies performed during the 1950s at Reclamation constitute some of the most important contributions to dam engineering. By using this information, earth dam designers can confidently design earth dams, and gradually, instrumentation has been reduced in new earth dam construction.

INTRODUCTION

This report summarizes a comprehensive study of compression and pore pressure behavior of over 20 rolled earthfill dams constructed by the U.S. Bureau of Reclamation. This study was summarized by Dr. James P. Gould (deceased of Musser

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