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[a] Discussion period closed for this paper. Any other discussion received during this period will be published in subsequent Journals.

5056 SHEAR STRENGTH OF STRATIFIED CLAY

KEY WORDS: anisotropy; clay (material); shear strength; slope stability; soil mechanics; strata; stresses; vane test

ABSTRACT: Owing to their intrinsic structure, the undrained strength of stratified clays is a directional property dependent on the orientation of the applied major principal stress. Results of unconfined compression tests performed on specimens trimmed from block samples showed that for the two clays tested, the minimum strengths are considerably lower than the principal strengths. A comparative study demonstrated that the shear behavior of stratified clays are considerably different from those of homogeneous clays. These observations can be explained by a failure hypothesis for stratified clays. The practical implications of these results are examined. The choice of shear strength in slope stability studies is illustrated by the analysis of several case records.

REFERENCE: Lo, Kwan Yee, and Milligan, Victor, "Shear Strength Properties of Two Stratified Clays," Journal of the Soil Mechanics and Foundation Division, ASCE, Vol. 93, No. SM1, Proc. Paper 5056, January, 1967, pp. 1-15.

5057 SUBGRADE STRESS AND DEFORMATION

KEY WORDS: clay (material); dynamic tests; elastic theory; pavements; soil mechanics; strains; stresses; transducers

ABSTRACT: An experimental investigation to determine the complete pattern of dynamic stress, strain, and surface deflections in a clay subgrade material subjected to a uniform surface contact pressure applied over a circular area is described. This is the first stage in a major research project, the aim of which is to obtain comprehensive information on the stress and deformation in a three-layer pavement structure under dynamic load. Details of calibration tests on transducers for measuring in-situ stress and strain are described. Results indicate stresses to be predicted adequately by elastic theory, but that strains, being dependent on the soil modulus, are less well predicted. At the low stress levels encountered, the soil stress-strain curve is markedly nonlinear.

REFERENCE: Brown, Stephen F., and Pell, Peter S., "Subgrade Stress and Deformation Under Dynamic Load," Journal of the Soil Mechanics and Foundation Division, ASCE, Vol. 93, No. SM1, Proc. Paper 5057, January, 1967, pp. 17-46.

5058 LIQUEFACTION OF SAND BY CYCLIC STRESS

KEY WORDS: cyclic loads; earthquakes; liquefaction; pore-water pressure; sand (material); soil mechanics; soil strength; stresses; testing; triaxial tests

ABSTRACT: Liquefaction of saturated sand was studied using a cyclic loading triaxial test. Quantitative data were obtained providing numerical values for the several important factors necessary to produce liquefaction. Under cyclic loading, four different conditions must be considered; initial liquefaction, partial liquefaction, complete liquefaction, and failure. At relative densities below about 50%, these three conditions occurred almost simultaneously, whereas for relative densities above about 80%, a considerable number of stress cycles were required after initial liquefaction to develop large strains defining a failure condition. There was an approximately linear relationship between the relative density and the stress required to cause initial liquefaction in a given number of cycles. It was also found that the magnitude of cyclic stress required to cause initial liquefaction increases almost linearly with confining pressure. Suggestions are presented as to applications of this type of data in predicting the susceptibility of a field deposit to liquefaction during an earthquake.

REFERENCE: Lee, Kenneth L., and Seed, H. Bolton, "Cyclic Stress Conditions Causing Liquefaction of Sand," Journal of the Soil Mechanics and Foundation Division, ASCE, Vol. 93, No. SM1, Proc. Paper 5058, January 1967, pp. 47-70.