AN EXPERIMENTAL SETUP FOR DYNAMIC RESPONSE OF COHESIVE SOIL SAMPLES

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SYNOPSIS

An experimental setup for the evaluation of dynamic response of cohesive soil samples subjected to a simulated earthquake motion using a shaking table-pendulum system is described. The simulated earthquake motion and the response of the soil samples in terms of acceleration, velocity and displacement were measured by means of piezoelectric compression type transducers and a direct recording oscillograph. The dynamic response of four samples was determined and observations made of the effect of soil characteristics on propogation of the simulated motion.

EXPERIMENTS, RESULTS AND CONCLUSIONS

It is noted from the investigations of earthquakes and studies of earthquake damages that major damage occurs on soft soils. Soft soils may include silts and clays or a combination of these with sand. For the present study, samples of dark brown clay and sandy clay were used.

The simulated earthquake was excited using a shaking table-pendulum system. The shaking table was constructed using an aluminium plate 60Cm x 60Cm x 1.27Cm thick and 10Cm x 7.5Cm aluminium rolled joists. Two steel bars 1.25Cm in diameter were welded to the underside of the plate to provide support through roller bearings which limited the table movement to linear motion in one horizontal direction. Impact was provided by a 70Kg pendulum striking against a steel plate at one end of the table from a distance of 30Cm. The pendulum was hung from the ceiling by a hollow steel thin tube with arrangements to hold it away from the table after the initial impact. Subsequent motion of the table was controlled by helical springs at the other end.

The soil samples were tested without any side support and were fixed to the table in such a way that the samples vibrated and did not jump or rock on the table. The instruments employed were electronic devices consisting of direct recording oscillograph, piezoelectric transducers, amplifiers and accelerometers. Considering the feasibility of transmission of vibrations through the samples and the ability of samples to withstand the applied motion without breaking, samples of size 30Cm square x 30Cm were used.

The response of sandy clay samples was observed to be more pronounced than the samples of clayey soil which may be due to the bond between particles of clay suggesting that the plastic elements play an important role in the behaviour of soil to the propogation of shock waves.

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