

Dynamic Cone for Shallow In-Situ Penetration Testing

REFERENCE: George F. Sowers and Charles S. Hedges, "Dynamic Cone for Shallow In-Situ Penetration Testing," Vane Shear and Cone Penetration Resistance Testing of In-Situ Soils, ASTM STP 399, Am. Soc. Testing Mats., 1966, p. 29.

ABSTRACT: Field calibration of a portable dynamic cone penetrometer was made to determine a penetration resistance relationship with the standard penetration resistance. The penetrometer has been found useful in the inspection of footing foundations and for light field exploration where the standard penetration range of limits is generally known. The test data show that it is capable of approximating the standard penetration resistance for the virgin soils of the southeastern United States.

KEY WORDS: soil (material), field tests, and penetrometer penetration resistance, cone penetrometers, footings.

Penetration tests have long been used to evaluate soil consistency and density. The primitive builder may have sounded the ground with a pointed stick or his heel, as can be seen in some tribal villages today. The skilled workman forced the point of a pick or drove a rod into the ground with a mallet of known weight. Today there are numerous penetrometers of standardized design, but all based on the same principle; the penetration of an object into the soil, forcing the soil aside and failure of a foundation [1-4]³. The relationship between soil strength and penetration resistance is a function of the shear pattern. This can be determined by a plastic analysis of the shear zone or by empirical correlation with laboratory tests. In each case the results depend on the shape of the penetrometer, which varies with the type of soil and its consistency and density.

Various shapes of penetrometers are in use, including flat-tipped rods, cones of different sizes and shapes, augers with cone-shaped tips, and cutting edges of thick-wall samplers. Although there are few comparative data on the effect of shape, there is some belief that the cones yield

More consistent results than the others. Two types of loading are used; static and dynamic. Static loading stimulates the shear developed in laboratory testing and can be easily adapted to continuous penetration and automatic recording. Dynamic loading is adapted to a very wide range of soil strengths but introduces the variable effect of dynamic shear