

Devices for in situ Determination of Soil Modulus E_s

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In Jamiolkowski's report the flat dilatometer was mentioned as one of the potential in situ tests for E_s evaluation. It might be of interest to mention that the flat dilatometer (see Spec. Sess.5), also used for the determination of parameters other than E_s , was fruit of a research designedly aimed to the development of a routine in situ device for E_s evaluation. Different devices were examined:

(a) Small diameter short penetration pipe: E_s can be worked out by the ratio load/deflection; however this system can supply only E_s values near ground surface.

(b) Small diameter pipe, with an internal jack producing inflection of an embedded pile portion. The shortcoming is that, if the pipe has to be robust enough to withstand driving forces, almost the totality of the inflecting action is absorbed by the pipe, so obscuring the influence of soil deformability.

(c) Pipe of elliptical cross section: by pumping a fluid into the pipe, measured changes of diameter enable soil deformability evaluation. Same shortcoming as (b). Also corrugated shapes as (d) have the same shortcoming.

(e, f) The conclusion was that two members, having separate tasks, were necessary: the first one to carry driving forces, the second one to provide an easily expandable element.

(g) This "flat dilatometer" was finally chosen; the circular shape of the membrane makes easier mechanical construction and test interpretation. In situ tests with (g) closely duplicate (although in different scale) the load sequence induced on soil by driven piles subsequently subjected to lateral loads: to the penetration stage follows the stage in which the points at contact are displaced horizontally, all in the

same direction. Correlations between E_s and soil modulus determined by dilatometer should be more direct than other existing correlations. Comparative tests are planned to confirm such inference.

