

## *A Device for Evaluating Horizontal Soil Resistance for Overhead Sign Supports*

W. C. ANDERSON, Chief Research and Development Engineer,  
The Union Metal Manufacturing Company, Canton, Ohio

●THE PROBLEM of estimating lateral strength of soils is complicated by such unpredictable factors as slope, adjacent disturbances, changing soil conditions, and even questions as to adequacy of established soil constants. Again, usually when a hole is to be dug for a foundation, the

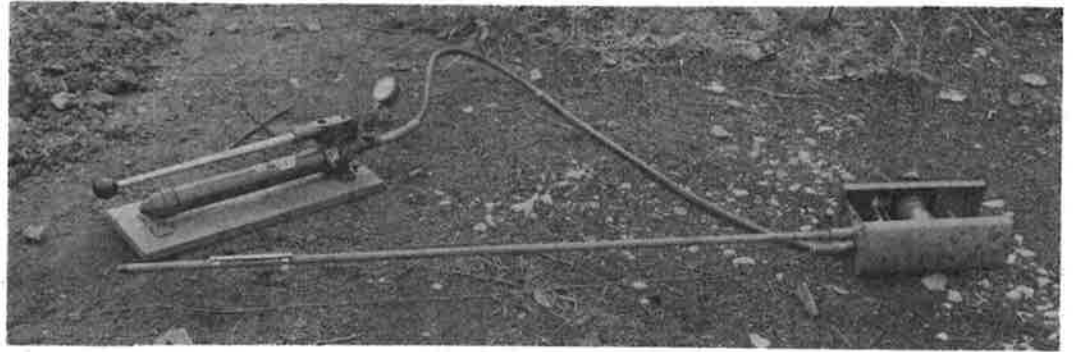


Figure 1. Device for evaluating horizontal soil resistance.

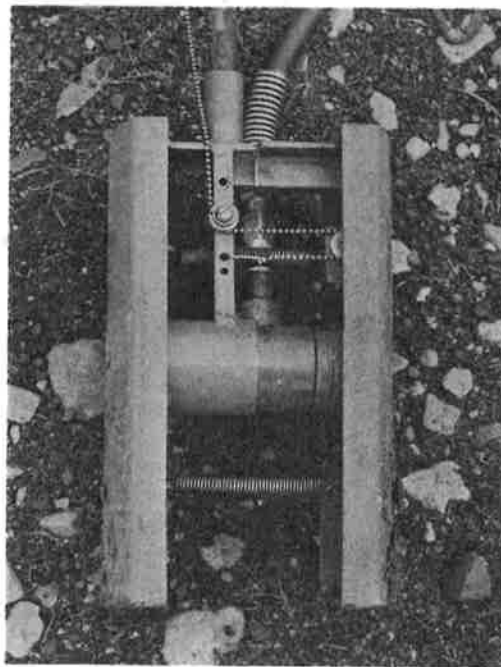


Figure 2. Detail of loading head, showing chain deflection gage.

answer is required immediately. Such values can be determined by a simple device (Fig. 1) consisting of two partial sections of a cylinder, each 12 in. long and 4 in. wide, with a 6-ton hydraulic jack between (Fig. 2). The jack is fed through a rubber hose connected to a pump above ground. The cylinder sections retract together by means of two springs. The jack is attached to  $\frac{1}{2}$ -in. pipe, which can be extended as needed in the field. An indicator consisting of a ball chain over two pulleys, which doubles the movement of the chain compared to the distance the cylinder sections move apart, is provided. Force is read with an oxygen-type gage attached to the high-pressure pump end of the hose (Fig. 3).

To use the device, an 8-in. diameter hole is bored to the required depth. The device is lowered to the test depth and an in-



Figure 3. Device installed and under preload deflection.

itial side pressure, or preload, is applied. Then additional pressure is applied until the desired deflection is reached. The jack is then collapsed and the process repeated at different levels.

Specifically, the device has a projected area of 0.375 sq ft and a 1.48-to-1 pressure ratio factor. Thus, 1,000 psi equals 4,400 psf.

A preload of 100 psi gage or 440 psf, and a deflection of  $3/4$  in. total, or  $3/8$  in. on each half-cylinder, is suggested. This is multiplied by two at the scale and is fairly easy to read.

The device could be used by field crews who make the installations, simply referring to tables giving depth of foundation for various pressures read, perhaps modified for certain types of soils and a few notes covering adjacent slopes, drainage conditions, etc.

If sufficient interest in this device is evidenced, it probably can be made available, either through plans furnished to the highway departments, or through manufacturers, depending on the quantity required.