

INTRODUCTION

The O-cell® method for testing the lateral stiffness of a foundation element provides numerous advantages over conventional lateral loading tests.



Two 16 MN (3600 kip) O-cell® used to test the lateral stiffness of the Cooper Marl (between 19-21 m depth) on a 2400 mm (96") pile for the Cooper River Bridge.

DESCRIPTION

An O-cell® assembly is cast within a section of the test shaft with the axis of the cell perpendicular to the axis of the shaft. When the O-cell® is pressurized, each "semi-cylinder" is loaded laterally from within, against the surrounding soil or rock formation. Where multiple O-cells are used along the axis of the pile the test can be conducted by adjusting the load of each cell so that each cell is at approximately the same expansion at each loading interval.

In general, the split cylinder test is not carried out in the same manner as a typical lateral load test would be performed (ASTM D3966 or ICE 1996 specification). It should be appreciated that the loads are being applied directly to the selected zone of interest and the results not influenced by elastic lateral deformation.

At each increment, load and lateral displacement are recorded and the data is tabulated and plotted for use by the Engineer.

ADVANTAGES

Much like a full-scale pressure meter test, the obvious advantage of using this application of O-cell® technology, is the ability to test the lateral loading capacities of discrete soil stratum or other isolated depth ranges along the length of the test shaft.

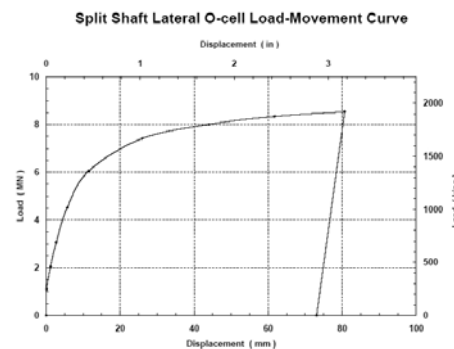
The O-cell® method allows one portion of the pile to react against the other during loading.

Lateral capacities of discrete zones can only be obtained from a traditional lateral load test after much analysis and manipulation of both the lateral pile head displacements and inclinometer data. For example, the lateral loading capacity of a rock socket may be tested directly simply by placing the O-cell® assembly at the appropriate depth.

The O-cell® method is particularly advantageous in congested construction areas and where a lateral load test would be impractical or over water.

RESULTS

The information obtained from the split-cylinder lateral test consists primarily of load and displacement data. Since the load is being applied at the actual location of the zone of interest, the approximate $p-y$ relationships for the material may be obtained directly from the data presented in the report.



Typical data presentation of lateral load movement of each shaft element.

APPLICATIONS

The O-cell® method is well suited for any size and capacity drilled shaft or pile, for tests both on land and off-shore.



An O-cell® assembly is prepared for installation using two 4 MN (900 kip) cells for use in a 1200 mm (48") diameter shaft.

LOAD RANGE

Shaft/pile diameter permitting, split-cylinder lateral tests may be performed over a wide range of loads: from 1 MN to 27 MN (150 to 6,000 kips) using a single O-cell. With multiple O-cells, the vertical length of the tested zone can be increased and larger loads may be applied.



A 27MN (6000 kip) O-cell® used to test a 1500 mm (5') long by 1200 mm (4') diameter rock socket. Bearing plates are greased along the inside plane to facilitate concrete de-bonding.