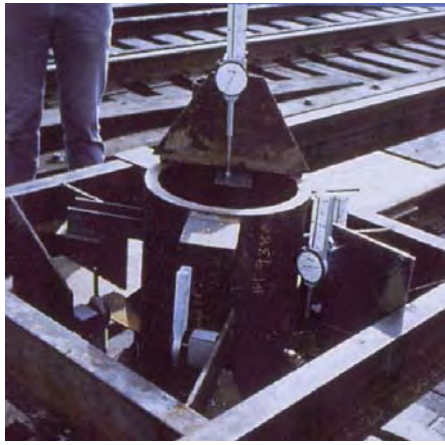


## The O-Cell Advantages

- **Design:** Excellent tool for value engineering foundation redesign.
- **High test load capacities:** Test loads exceed 27 MN on a routine basis. O-cell test capacities are available from 0.44 MN to greater than 220 MN under suitable conditions.
- **Reduced work area:** Required work area (overhead and laterally) is greatly reduced vs. any other static load testing system. Testing has been performed inside buildings, under overpasses, in narrow interstate/highway median strips and off-shore.
- **Time:** Testing is performed once concrete has reached suitable strength (which typically takes 7-14 days from pile installation).
- **Improved safety:** No reaction system is required at ground level and the test energy is safely buried well below ground.
- **Rock sockets:** High test loads can be applied directly on deeply buried rock or soil formations without load shedding in overlying soils, which eliminates the need for de-bonding techniques.
- **Deep cut-off levels:** O-cell testing with deep cut-off levels below ground can be performed, eliminating pile extensions to ground level and pile head preparations.
- **Piles with Plunged Columns:** Where steel columns have been cast in the top of the pile, these often interfere with top-down testing techniques, and the O-cell testing method is likely to be the only cost effective way of performing a full scale static load tests on these piles.
- **Accuracy:** Since there are no anchors, reaction piles or a reaction mass required, the influences, in terms of modified test pile performance, resulting from the construction and use of anchors, reaction piles or a reaction mass required in top-down static testing are eliminated.
- **Economy:** The O-cell method becomes more economical as loads increase, unlike top-down static tests.
- **Shear / end bearing components:** The O-cell tests are designed to separate test piles into 2 or 3 pile sections; thus automatically measuring the reaction of each of the components.
- **Automation / static creep effects:** The O-cell test is a static maintained load test and uses automatic data acquisition techniques and load maintenance for accurate, efficient data processing and creep measurements.
- **Production / working Piles:** Post-test grouting techniques allow for testing of production shafts.
- **Performance:** The subsequent pile performance of O-cell tested production piles will be similar to the non-tested production piles due to the lower amount of generated residual stresses in the pile, as compared to applying full test loads "top-down".
- **Off-shore:** The O-cell test method particularly excels in off-shore testing environments due to its numerous advantages illustrated above.



Pipe pile load testing with the O-Cell



Installing an O-cell into a precast pile



Installation of O-Cells into a slurry filled barrette

## International Offices:

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## Successful Bi-Directional Load Testing Worldwide

Over 2000 O-Cell load tests have been performed in over 46 countries, each expanding on LOADTEST's unmatched record of success.

### Drilled shafts

The O-cell can be used in drilled shafts or bored piles either attached to the reinforcing steel cage or placed using a steel beam carrier frame. Multiple O-cells can be used in the same shaft, either in the same plane to increase the available test capacity or in multiple levels to isolate distinct soil or rock strata.

### Driven Piles

Load testing can be performed on pre-cast concrete piles, steel pipe piles, battered piles and cylinder piles. For driven piles, a rugged design has ensured that even O-cells driven to refusal conditions of 80 blows/100 mm perform flawlessly.

### CFA/Auger Cast Piles

O-cells can be inserted into the fresh grout immediately after drilling to depths in excess of 50 m and diameters of 900 mm.

### Slurry Walls / Barrettes

Multiple O-cells have been placed in series to test rectangular panel sections at depths up to 95 m and in multilevel configurations mobilising up to 239 MN.

## Additional Services

### Top-down Load Testing

Using completely automated hydraulic control and data recording systems, where the safe progress of the test can be supervised by remote control and comprehensive instrumentation.

### Lateral Load Testing

Lateral testing of soil and rock formations for modulus determinations can be performed with O-Cells modified for placement within a single shaft or pile. LOADTEST also conducts conventional lateral load tests with or without simultaneous axial loading.

### Crosshole Sonic Logging (CSL)

LOADTEST provides complete CSL testing services.

### Hole Caliper

Sonic based caliper provides full high resolution 3-D image of bored shaft excavations.

### Shaft Bottom Inspection

Inspection of the shaft bottom in wet and dry holes.

### Low and High Strain tests

Pile driving analysis, dynamic load tests and integrity tests.



# BI-DIRECTIONAL Osterberg Cell LOAD TESTING



DEEP FOUNDATION TESTING, EQUIPMENT & SERVICES • SPECIALIZING IN OSTERBERG CELL TECHNOLOGY  
A member of the Fugro Group of companies with offices throughout the world

## Founded in 1991, LOADTEST

specializes in bi-directional deep foundation load testing using the award winning O-Cell. Through its research and hard work, LOADTEST has redefined the art of load testing.

No job has been too big or too small to enjoy the advantages of the O-Cell. Numerous world testing records have been set using the O-Cell. The latest achieved in 2010 was 320 MN on the 3.35 m diameter pile in a rock socket for the foundations of the New Mississippi River Bridge connecting Missouri and Illinois. As of early 2011, LOADTEST has completed over 2000 load tests adding a further 300-400 tests per year. Over 10% of these tests had total loads in excess of 40 MN. The O-Cell can be used to isolate portions of a drilled shaft or pile for testing, or can be used to test multiple levels within the same pile.

Whether in the middle of the Mekong River in Vietnam, off the coast of South Africa or just down the road, LOADTEST and the O-Cell have risen to every challenge.

LOADTEST offers O-Cell load testing equipment and installation assistance.

LOADTEST can also provide full planning and specification support, field load testing and analytical services. LOADTEST is dedicated to advancing state-of-the-art deep foundation load testing.

In 2009, LOADTEST are proud to have joined the Fugro Group of Companies.



Test shafts/piles from 4.5-107 m have been successfully installed. Precast piles as long as 40 m have been driven and tested with the O-Cell.



Single level O-cell assembly ready to install



Steel carrying frame can be used



O-cell test setup



Conventional lateral load test

# The O-Cell®

Dr. Jorj O. Osterberg, Professor Emeritus of Civil Engineering at Northwestern University, invented and developed a deep foundation load testing device to meet the construction industry's need for an innovative effective method for testing high capacity drilled shafts, piles and barrettes. Osterberg's invention, the Osterberg Cell, or O-cell, has radically changed the way foundation load tests are designed, performed and interpreted.

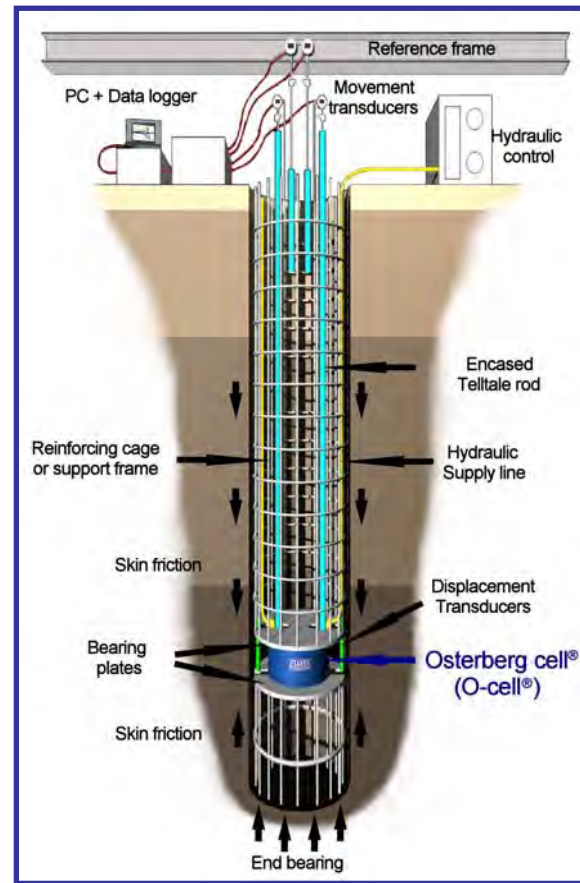
No longer do engineers need to rely on small, scaled down test piles due to the enormous expense of conventionally testing large diameter piles. Non-conservative scaling errors can be eliminated by testing the full size production piles even if loads exceed 200 MN. The O-cell is a hydraulically driven, calibrated, sacrificial jacking device installed within the foundation unit. Working in two directions, upward against side-shear and downward against end-bearing, the O-cell automatically separates the resistance data. By virtue of its installation within the foundation member, the O-Cell load test is not restricted by the limits of overhead structural beams and tie-down piles or anchors.

Instead, the O-cell derives all reaction from the soil and/or rock system. End bearing and

lower side shear provide reaction for the upper side shear portion of the O-cell load test and upper side shear provides reaction for the end bearing and lower side shear portion of the load test.

Load testing with the O-cell continues until one of three things occurs: ultimate skin friction or side shear capacity is reached, ultimate end bearing capacity is reached or the maximum O-cell capacity is reached. Each O-Cell is specially instrumented to allow for direct measurement of the cell's expansion. By also measuring the top of shaft movement and compression, the downward movement is determined. O-cells range in capacities from 0.7 MN to 27 MN. By using one or multiple O-cells on a single horizontal plane, the available test capacity can be increased to more than 220 MN. By utilizing multiple cells on

different planes, distinct elements within a shaft or pile can be isolated for testing. Using the O-cell, LOADTEST has elevated the application of deep foundation load testing, from expensive, time consuming, small scale field tests to state-of-the-art, short duration, full scale static load testing of dedicated or production shafts and piles.



Multilevel O-cell assembly



High capacity testing with multiple O-cells



Testing multiple test piles



Split cylinder lateral rock modulus testing using an O-cell

## Test Results

The results from the O-cell load test are the reason more engineers and contractors are turning to the O-cell. Since the end bearing and the upward shear resistance are measured independently, there is no guesswork in how much load was carried by each component. Testing is typically performed until the ultimate capacity in either shear or end bearing is reached, so the maximum unit loads can accurately be obtained (See Diagrams A & B). The addition of strain gages within the shaft/pile can help in determining the distribution of load throughout the shaft length. An O-cell load test also provides information about creep limit loads in shear and end bearing. As required, LOADTEST can provide, or assist with preparing a complete report documenting the O-cell test data and results. We routinely provide the equivalent top load movement curve and have several methods at our disposal.

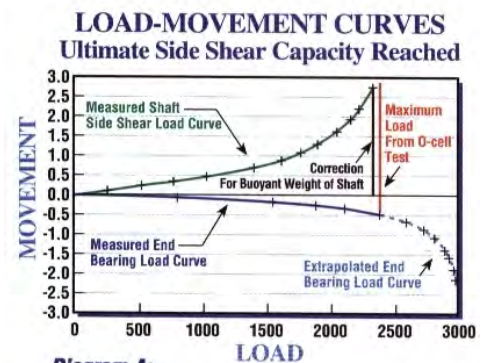


Diagram A: Illustration of a typical bi-directional load test where the ultimate side shear capacity was reached.

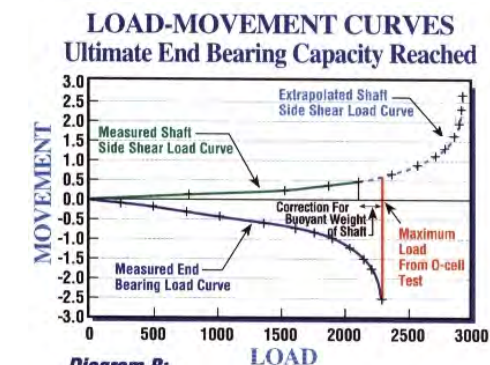


Diagram B: Illustration of a typical bi-directional load test where the ultimate end bearing capacity was reached.

