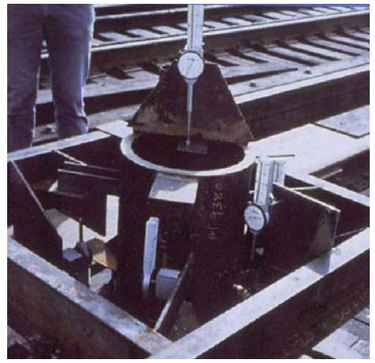
The O-Cell Advantages

- ***Design:*** *Excellent tool for value engineering foundation redesign for pile and barrettes for both compression and tension tests.*
- ***High test load capacities:*** *Test loads exceed 27 MN on a routine basis. O-cell test capacities are available from 0.4 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 overlaying soils, which eliminates the need for de-bonding techniques.*
- ***Deep cut-off levels:*** *O-cell tests can be performed with the top of concrete far below ground, eliminating the need for pile extensions to ground level, pile head preparations or provision for zones of reduced shear.*
- ***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 traditional 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 pile/shafts and barrettes.*
- ***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 convenience and numerous advantages illustrated above. Tests have been performed with piles completely submerged under water.*
- ***Foundation behaviour analysis:*** *Numerous advanced analysis techniques can be used to enhance the accuracy of the interpretation of the pile behaviour, Cemset®/Cemsolve® & Timeset®.*
- ***Industry expertise:*** *All genuine O-cell tests come with planning, installation, testing, analysis and reporting services performed by the world's leading experts in static load testing of deep foundations.*



Steel Pipe pile load testing with the O-Cell

Installing an O-cell into a precast pile

Installation of O-Cells into a barrette

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Successful Bi-Directional Load Testing Worldwide

Over 5000 O-Cell load tests have been performed in over 65 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 steel pipe piles, pre-cast concrete piles, battered/raking 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 concrete/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 panel sections efficiently at depths beyond 95 m and in multilevel configurations mobilising more than 363 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 traditional lateral load tests with or without simultaneous axial loading.

Crosshole Sonic Logging (CSL)

LOADTEST provides complete CSL testing services.

Hole Calipering

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

Low and High Strain tests

Pile driving analysis, dynamic load tests and integrity tests.

Thermal Integrity tests

Integrity of the cast concrete is evaluated by the manner in which it hydrates in time.

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: In 2010, 320 MN on a 3.35 m diameter pile in a rock socket for the foundations of the New Mississippi River Bridge; by 2013, the maximum load mobilised in a 2.2 m pile was 323 MN for the Ohio River bridges project, for a barrette the maximum is 363 MN. As of 2016, Fugro Loadtest has completed over 5000 load tests and adding a further 300-400 tests per year. Over 20% 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

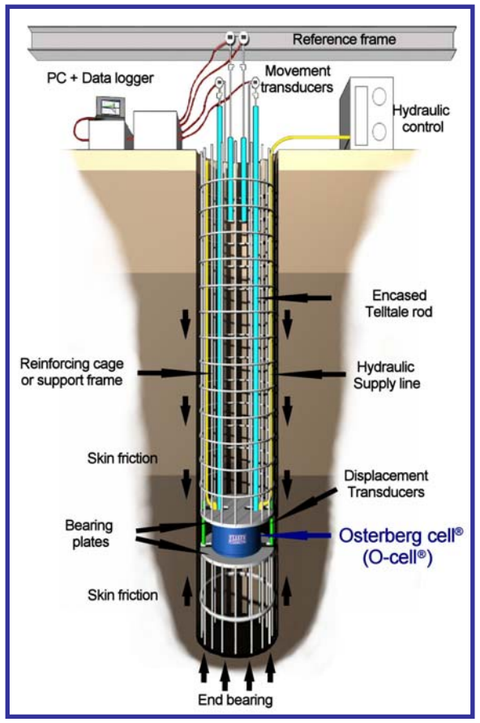
O-cell test setup

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 0.4 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.

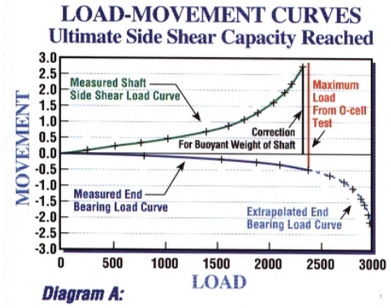


Diagram A:
Illustration of a typical bi-directional load test where the ultimate side shear capacity was reached.

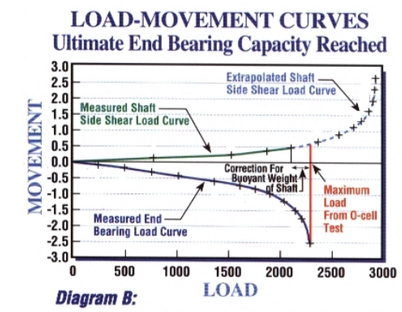


Diagram B:
Illustration of a typical bi-directional load test where the ultimate end bearing capacity was reached.

LOADTEST