ITEM 17551.5021 M - OSTERBERG CELL LOAD TEST OF DRILLED SHAFTS

DESCRIPTION.

Furnish all materials, equipment and labor to install the Osterberg cell where indicated on the plans or ordered by the Engineer. Supply electric power for assembly and operation. After the drilled shaft is filled with concrete (paid for under another item) and attains the required strength, conduct the load test, report the results, and remove external test apparatus. Grout the cell and casings in drilled shafts used for structural support.

See the contract plans for the required load capacity in each direction and purchase the patented Osterberg cell from:

Loadtest, Inc.
5420 S. Klee Mill Road, Suite 4
Sykesville, Maryland 21784
Phone (800) 436-2355 or (410) 552-1979
Fax (410) 552-1843

Install the Osterberg cell equipped with all hydraulic lines, fittings, pressure source, pressure gage, and telltale devices according to the Contract Plans and Loadtest, Inc. recommendations.

Provide an air compressor (minimum 4.25 CMM) for pump operation during the load test and assist Loadtest, Inc. in performing the load test.

MATERIALS REQUIREMENTS.

Portland Cement	§701-01
Admixtures	§711-08
Water	§712-01

Mix water with a water soluble oil provided by Loadtest, Inc. to provide hydraulic fluid to pressurize the Osterberg cell.

Use a neat cement grout (cement and water) with a water to cement ratio of 0.5 or less (15-23 liters per 43 kg bag of cement) for post-test grouting of the Osterberg cell, the annular space around the Osterberg cell, and telltale casings, as recommended by Loadtest, Inc., and approved by the Engineer.

CONSTRUCTION DETAILS.

Weld in accordance with Section 564 - Structural Steel, and the New York State Steel Construction Manual.
Assemble the test equipment as recommended by Loadtest, Inc., and attach hydraulic fittings and telltales to the Osterberg cell.

Construct a reference beam system to monitor shaft movement, and support it independently of the test shaft at a minimum distance of 3 shaft diameters from the center of the test shaft.

Protect the drilled shaft and reference beam from wind, direct sunlight, frost action, and other disturbances. It may be necessary to construct a heated, test enclosure, acceptable to the Engineer, to maintain a minimum 10°C temperature throughout the duration of the test.

Provide a thermometer to monitor temperature, and if required, adequate lighting for the duration of the test.

Assemble the Osterberg cell, hydraulic supply and other attachments, and install as recommended by Loadtest, Inc. Attach the Osterberg cell assembly and associated hardware to a placement frame or steel reinforcement cage. When a steel reinforcement cage is required for the shaft, weld the Osterberg cell assembly to the bottom of the cage during construction of the cage. If the Osterberg cell is located at an intermediate location along the shaft, weld the lower cage to the bottom of the Osterberg cell assembly.

After test shaft inspection and the Engineer's approval, fill the drilled shaft with the class of concrete noted on the plans according to the procedure for dry or wet (water filled) shafts.

Dry Shaft Procedure (The wet shaft procedure may also be used in a dry shaft.)
Place about a ⅓ meter thick, bottom seating layer of concrete at the base of the clean shaft by a method approved by the Engineer. Lower the Osterberg cell placement frame, or steel reinforcement cage, into the test shaft so that the Osterberg cell is firmly pressed into the plastic concrete. Continue to place concrete as specified for construction of structural shafts.

Wet Shaft Procedure
Prior to lowering the placement frame or reinforcement cage, attach a tremie tube or pipe line that reaches below the Osterberg cell and to the bottom of the frame or cage. Use a tremie tube or pipe line that can be lowered empty or be emptied of water later. Use a method that will leave no debris on the bottom of the drilled shaft.

Lower the placement frame or reinforcment cage assembly with the attached tremie tube or pipe line to the bottom of the test shaft. Detach the tremie tube or pipe line from the assembly and slowly raise the assembly about ⅓ meter, leaving the tremie tube or pipe line on the bottom. Follow the concrete placement procedures according to specifications in another item, and slowly place a ⅓ meter bottom seating layer of concrete. Stop the placement, if necessary, and slowly lower the frame or cage with the attached cell into the plastic concrete. Continue to place concrete as specified for construction of structural shafts.

Carefully handle the test assembly during installation. Repair or replace damaged equipment at no cost to the State. If the seating layer of concrete sets prior to repairs, stop the operation, clean out the drilled shaft and start over.

TEST PROCEDURE.

Cure concrete cylinders at the inground temperature of the Osterberg cell location. Begin the load test after the concrete has attained a minimum compressive strength of 24 MPa, as determined by cylinder breaks. Test at least 2 cylinders on the day of the load test.

During the time period required to perform the load test, do not vibrate the area, drive casings into place, or drill an adjacent shaft within 15 meters from the center of the test shaft.

Conduct the load test in accordance with the requirements of ASTM D1143 (Quick Test Method). Initially, apply the loads in increments equaling 5% of the anticipated ultimate

resistance of the test shaft. The magnitude of load increments may be increased or decreased depending on the test shaft capacity.

Take direct movement indicator measurements of the following:

- Downward shaft end-bearing movement (minimum of 2 indicators)
- Upward top-of-shaft movement (minimum of 2 indicators)
- Shaft compression (minimum of 2 indicators)

Apply loads at the prescribed intervals until the ultimate shaft resistance or maximum stroke of the Osterberg cell is reached, unless directed otherwise by the D.C.E.S. At each load increment, read movement indicators at 1.0, 2.0 and 4.0 minute intervals while holding the load constant. During unloading cycles, acquire at least 4 data points for the load versus movement curve. Additional cycles of loading and unloading, using similar procedures, may be required by the D.C.E.S. after the initial test cycle.

Use dial gages, digital gages, or Linear Vibrating Wire Displacement Transducers (LVWDTs) with a 100 mm minimum travel and readable to the nearest 0.0025 mm to measure end bearing and side shear movement. End bearing movement may be alternately monitored using LVWDTs capable of measuring the expansion of the Osterberg cell (maximum 150 mm). Use dial gages, digital gages, or LVWDTs with a minimum travel of 25 mm and readable to the nearest 0.0025 mm to measure shaft compression.

Unless otherwise specified by the D.C.E.S., supply 8 copies of each load test report as prepared by Loadtest, Inc. Provide a preliminary report containing the load-movement curves and test data to the Engineer within 3 working days after load testing. Upon receipt, 5 working days will be required for review, after which the D.C.E.S. will forward the findings to the Regional Director.

If the ultimate capacity of the test shaft is less than 2 times the design load, the D.C.E.S. may order an additional test. Submit a final report of every load test to the Engineer within 15 working days after all load testing on site.

If using the test shaft for structural support, grout the interior of the Osterberg cell, annular spaces, and all casings in accordance with procedures outlined by Loadtest, Inc. and at the direction of the Engineer.

METHOD OF MEASUREMENT.

The Engineer will measure the work as the number of drilled shafts with installed Osterberg cells tested in accordance with this specification. All work associated with the construction of the drilled shafts will be measured and paid for under separate items.

BASIS OF PAYMENT.

Include the cost of all labor, materials and equipment necessary to complete the work in the unit bid price for each Osterberg cell load test of drilled shafts.