Axial Compressive Pile Load Testing
ASTM D1143-94 (per ICC-ES AC358)

1. Scope
   1.1. This test plan details the apparatus and procedures to be used for field proof loading tests of production piles.

2. Apparatus
   2.1. Test loads shall be applied with calibrated hydraulic jacking system acting against an anchored reaction frame. Pile head movement shall be monitored with two independent measuring systems. The primary system shall utilize dial indicators and the secondary system shall utilize a graduated scale and transit level.
   2.2. The reaction frame shall consist of two W18x35 end beams and one W18x35 cross beam configured in an "H" arrangement and centered above the test pile. Each W18x35 end beam shall be supported by two helical anchors at its ends so as to provide a clear distance of at least three (3'-0) feet between the test pile and each anchor. The W18x35 cross beam shall be attached to the end beam webs with 2-L4x3x3/8" clips with (10) 3/4" diameter A325-N bolts at each end. (See attached reaction frame plan SK-1).
   2.3. The hydraulic jacking system shall consist of one hydraulic jack, one hydraulic pump and one hydraulic gage. This hydraulic system has a maximum load capability of 127 kips, a stroke of six (6") inches. The system shall be calibrated as a unit to an accuracy of 5% or less of applied load, traceable to NIST standards.
   2.4. A PL 1"x 8"x 0'-8 bearing plate with a centering ring welded to its bottom surface shall be placed between the top of the test pile and the bottom of the hydraulic jack.
   2.5. The primary pile head movement measuring system shall consist of two dial indicators bearing on glass plates attached to the top surface of the bearing plate. Each dial indicator shall have a stroke of at least 2" and measure movement to a precision of 0.001".

3. Setup
   3.1. Install test pile to tip embedment and effective torsional resistance termination criteria. Cut the pile shaft off smooth and square between one (1'-0) foot and six (6") inches above grade. If it can be done without violating maximum tip embedment or minimum effective torsional resistance criteria, pile may be installed a maximum of two feet beyond initial satisfaction of the termination criteria to avoid having to cut the pile shaft off.
   3.2. Install reaction anchors to minimum tip embedment of fifteen (15'-0) feet and minimum effective torsional resistance of 3,400 lb-ft. Locate anchors four (4'-0) feet from the center of the test pile in a square pattern, arranged such that no anchor is closer than three (3'-0) feet to any production or test pile or any previous reaction anchor location.
   3.3. Install 1 ¼" diameter dywidag rods with leveling nuts in tops of reaction anchors. Adjust leveling nuts to form a level surface +/- 1/4".
   3.4. Install end beams on reaction anchors and secure with locking nuts.

3.5. Place cross beam between flanges of end beams and secure L4x3x3/8" clips with (10) ¾" diameter A325-N into end beams and (5) ¾" diameter A325-N bolts into cross beam.
3.6. Place bearing plate on top of test pile with pile shaft inside centering ring.
3.7. Center hydraulic jack on top of bearing plate. Locate Hydraulic pump and gage far enough away for safety.
3.8. Secure glass plates to top of bearing plate in two opposing corners with their centers equidistant from the test pile.
3.9. Drive dial indicator support stakes into ground at least one (1'-0) foot from test pile and all reaction anchors. Mount dial indicators to side of test pile with their stems vertical and equidistant from the test pile and no less than 2" of stem movement remaining.

4. Loading and Recording Pile Head Movement

4.1. Actuate jacking system to bring jack ram up against the cross beam bearing surface and take the slack out of the system. This seating load may not exceed 1000 lbs. Record pile head vertical position readings from measuring system.
4.2. Apply test loads in accordance with the following loading schedule. Hold each load for 2-1/2 minutes; hold Load Increment 7 for an additional 2-1/2 minutes. Record gage pressure, elapsed time since initiation of load increment, and pile head vertical position readings from measuring system at the beginning and end of each load increment and at the 2-1/2 minute mark during Load Increment 7. Continue the loading until the minimum specified ultimate capacity of 2.0 x DL is reached, or, failing that, until continuous movement at a rate of two inches/minute produces a constant or decreasing load indication.

Load Increment	% Design Load
1	15
2	30
3	45
4	60
5	75
6	90
7	100
8	125
9	150
10	175
11	200

4.3. If load increment 11 is successfully completed, maintain the load an additional 5 minutes before unloading. If continuous movement is encountered at a load less than 2.0DL, discontinue jacking and wait 5 minutes before unloading. In either case, unload in reverse sequence of the same increments recording gage pressure, time and movement readings at the beginning and end of each load increment. It is not necessary to hold the 100% Design Load increment longer than 2-1/2 minutes during the unloading sequence.

5. Report

5.1. Include in formal test reports the following information:
5.2. Name of helical pile contractor.
5.3. Project Name.
5.4. Descriptions and catalog numbers of test pile components.
5.5. Date of installation and name of pile contractor's supervisor during installation of the test pile.
5.6. Name of third party test agency, if any.
5.7. Date, starting time and duration of field loading test.
5.8. Unique identifier of test pile and its location relative to the structure.
5.9. Type of test performed (proof test in axial compression).
5.10. Description of test setup.
5.11. Pressure gage readings, times and pile head vertical positions for each loading increment.
5.12. Applied loads, durations and cumulative head movements for each loading increment.
5.13. Listing of the calibrated apparatus used in installing, loading and movement monitoring of the test pile.

6. Interpretation of Results

6.1. The acceptance criteria for these piles are based on ICC-ES Acceptance Criteria for Helical Foundation Systems and Devices (AC358) Section 4.4.1.2. The maximum load capacity shall be that which is achieved when plunging of the helical plate occurs or when net deflection exceeds 10 percent of the helix plate diameter, whichever occurs first. Net deflection shall be the total deflection minus shaft elastic shortening or lengthening. For multiple helix configurations, the average helix diameter shall be used in this criterion. The allowable design capacity of the pile shall be taken as one-half the maximum load capacity of the pile.