Standard Method of Test for

Deep Foundation Elements under Bidirectional Static Axial Compressive Load

AASHTO Designation: T 385-19[1]

Technical Subcommittee: 1b, Geotechnical Exploration, Instrumentation, Stabilization, and Field Testing

Release: Group 3 (July)

AASHTO

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1. SCOPE

1.1. This test method describes procedures for testing vertical or inclined deep foundation elements to determine their behavior characteristics in response to an internally applied axial static load. This method is applicable to all deep foundations that function in the same manner as bored piles, regardless of their method of construction and installation.

Note 1—Bidirectional load testing has been successfully performed on driven piles. However, the installation and procedural differences associated with bidirectional load testing of driven piles are not covered in this standard.

1.2. This standard provides minimum requirements for bidirectional testing for deep foundation elements under controlled application of static axial compressive load.

1.2.1. The engineer responsible for the foundation design, referred to herein as the engineer, shall approve any deviations, deletions, or additions to the requirements of this standard.

Note 2—Plans, specifications, or provisions, or some combination thereof, prepared by a qualified engineer, may provide additional requirements and procedures as needed to satisfy the objectives of a particular test program.

Note 3—To determine the long-term performance of the foundation, the duration of each load step application may be extended and the test results may need additional interpretation.

1.3. A qualified engineer shall design and approve all loading apparatus, loaded members, and test procedures.

1.4. The values stated in SI units shall be regarded as the standard. The inch-pound equivalents of the SI units may be approximate.

1.5. All observed and calculated values shall conform to the guidelines for significant digits and rounding established in ASTM D6026.

1.6. The method used to specify how data are collected, calculated, or recorded in this standard is not directly related to the accuracy to which the data can be applied in design or other uses, or both. How the results obtained using this standard are applied is beyond the scope of this test standard.

1.7. *This standard may involve hazardous materials, operations, or equipment. This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility*

of the user of this standard to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standard*:

- R 13, Conducting Geotechnical Subsurface Investigations

2.2. *ASTM Standards*:

- D653, Standard Terminology Relating to Soil, Rock, and Contained Fluids
- D1143/D1143M, Standard Test Methods for Deep Foundations Under Static Axial Compressive Load
- D3740, Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
- D6026, Standard Practice for Using Significant Digits in Geotechnical Data

3. TERMINOLOGY

3.1. In this document, the term "pile" is used to represent any type of deep foundation element that functions in the same manner as drilled shafts or bored piles, regardless of their method of construction and installation.

3.2. Except as defined in Section 3.2, the terminology used in this test method conforms to terminology in ASTM D653.

3.2.1. *bidirectional loading device (or jack)*—A fabricated assembly of one or more symmetrically positioned hydraulic load cells capable of producing an accurately measured axial force (or load) sufficient to mobilize the resistive forces of the foundation element, both above and below the device. Multiple jacks may be used on a single level to increase load capacity, or jacks may be installed on different levels. Generally herein, "jack" may refer to one or more jacks.

3.2.2. *fracture plane*—The horizontal planar fracture zone created in the pile when the load applied by the hydraulic load jack assembly exceeds the tensile capacity of the pile concrete.

3.2.3. *side shear (skin friction)*—The force resistance that develops on the perimeter surface of the pile at the interface of the pile and the surrounding soil or rock strata when applying loads with the bidirectional loading device.

3.2.4. *end bearing*—The force resistance that develops at the base or toe of the pile when applying loads with the bidirectional loading device.

3.2.5. *telltale casing, rod*—A telltale casing is typically half-inch National Pipe Thread (NPT) steel pipe. A telltale or telltale rod is typically a solid steel rod 6 mm to 8 mm ($^{1}/_{4}$ in. to $^{5}/_{16}$ in.) in diameter that extends from some point in a pile to the top of the pile or above.

3.2.6. *encased compression telltales (ECT)*—Similar to a telltale casing and rod except that the transducer measuring the telltale movement is attached directly to the rod and the outside is attached to the casing. The entire apparatus is then embedded (encased) in concrete with only the data cable extending to ground surface.

3.2.7. *carrying frame*—A rigid steel structure made of channel, angle, or beams that may be used instead of a rebar cage when specified as part of the load test program and as approved by the engineer.