ANSI/ASAE EP486.3 SEP2017
Shallow Post and Pier Foundation Design

American Society of
Agricultural and Biological Engineers

STANDARD

ASABE is a professional and technical organization, of members worldwide, who are dedicated to advancement of engineering applicable to agricultural, food, and biological systems. ASABE Standards are consensus documents developed and adopted by the American Society of Agricultural and Biological Engineers to meet standardization needs within the scope of the Society; principally agricultural field equipment, farmstead equipment, structures, soil and water resource management, turf and landscape equipment, forest engineering, food and process engineering, electric power applications, plant and animal environment, and waste management.

NOTE: ASABE Standards, Engineering Practices, and Data are informational and advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. The ASABE assumes no responsibility for results attributable to the application of ASABE Standards, Engineering Practices, and Data. Conformity does not ensure compliance with applicable ordinances, laws and regulations. Prospective users are responsible for protecting themselves against liability for infringement of patents.

ASABE Standards, Engineering Practices, and Data initially approved prior to the society name change in July of 2005 are designated as "ASAE", regardless of the revision approval date. Newly developed Standards, Engineering Practices and Data approved after July of 2005 are designated as "ASABE".

Standards designated as "ANSI" are American National Standards as are all ISO adoptions published by ASABE. Adoption as an American National Standard requires verification by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by ASABE.

Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

CAUTION NOTICE: ASABE and ANSI standards may be revised or withdrawn at any time. Additionally, procedures of ASABE require that action be taken periodically to reaffirm, revise, or withdraw each standard.

ASABE, 2950 Niles Road, St. Joseph, MI 49085-9659, USA, phone 269-429-0300, fax 269-429-3852, hq@asabe.org

ANSI/ASAE EP486.3 SEP2017
Revision approved 2017 as an American National Standard

Shallow Post and Pier Foundation Design

Developed by the ASAE Post and Pole Foundation Subcommittee; approved by the Structures and Environment Division Standards Committee; adopted by ASAE March 1991; revised editorially December 1992; reaffirmed December 1995, December 1996, December 1997, December 1998; revised December 1999; approved as an American National Standard October 2000; reaffirmed by ASAE February 2005;reaffirmed by ANSI March 2005; periodic review extension for two years approved October 2009; revised October 2012; revision approved by ANSI October 2012; editorial revision June 2013; reaffirmed by ASABE and ANSI December 2016; revised ASABE and approved by ANSI September 2017.

Keywords: Foundation, Post, Shallow, Structures

1 Purpose and scope

1.1 Purpose. The purpose of this Engineering Practice is to present a procedure for determining the adequacy of shallow, isolated post and pier foundations in resisting applied structural loads. This Engineering Practice will help ensure that soil and backfill are not overloaded, foundation elements have adequate strength, frost heave is minimized, and lateral movements are not excessive.

1.2 Scope. This engineering practice contains safety factors and other provisions for allowable stress design (ASD) which is also known as working stress design, and for load and resistance factor design (LRFD) which is also known as strength design. It also contains properties and procedures for modeling soil deformation for use in structural building frame analyses.

1.2.1 Limitations. Application of this Engineering Practice is limited to post and pier foundations with the following characteristics:

- vertically installed in relatively level terrain;
- concentrically-loaded footings;
- minimum post or pier foundation spacing equal to the greater of 4.5 times the maximum dimension of the post/pier cross-section, or three times the maximum dimension of a footing or attached collar.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies unless noted. For undated references, the latest approved edition of the referenced document (including any amendments) applies.

2.1 Structural design specifications

ACI 318, Building Code Requirements for Structural Concrete and Commentary

ANSI/AWC NDS, National Design Specification (NDS) for Wood Construction with Commentary

ANSI/ASAE EP484, Diaphragm Design of Metal-Clad, Wood-Frame Rectangular Buildings

ANSI/ASAE EP559, Design Requirements and Bending Properties for Mechanically Laminated-Wood Assemblies

ASCE/SEI 7-10, Minimum Design Loads for Buildings and Other Structures

SEI/ASCE 32, Design and Construction of Frost-Protected Shallow Foundations

2.2 Laboratory soil testing standards

ASTM D422, Standard Test Method for Particle-Size Analysis of Soils

ASTM D854, Standard Test Methods for Specific Gravity of Soil Solids by Water Pycnometer

ASTM D2166, Standard Test Method for Unconfined Compressive Strength of Cohesive Soil

ASTM D2435, Standard Test Methods for One-Dimensional Consolidation Properties of Soils Using Incremental Loading

ASTM D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D2850, Standard Test Method for Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils

ASTM D3080, Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions

ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D4643, Test Method for Determination of Water (Moisture) Content of Soil by Microwave Oven Heating

ASTM D4767, Standard Test Method for Consolidated Undrained Triaxial Compression Test for Cohesive Soils

ASTM D7181, Standard Test Method for Consolidated Drained Triaxial Compression Test for Soils

2.3. In-situ soil testing standards

ASTM D1586, Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils

ASTM D2573, Standard Test Method for Field Vane Shear Test in Cohesive Soil

ASTM D3441, Standard Test Method for Mechanical Cone Penetration Tests of Soil

ASTM D4719, Standard Test Method for Prebored Pressuremeter Testing in Soils

ASTM D1194, Standard Test Method for Bearing Capacity of Soil for Static Load and Spread Footings (withdrawn 2003)

ASTM D4750, Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well)

ASTM D5778, Standard Test Method for Electronic Friction Cone and Piezocone Penetration Testing of Soils

2.4 Preservative-treated wood standard

AWPA U1, Use Category System: User Specification for Treated Wood

2.5 Nomenclature standard

ANSI/ASABE S618, Post-Frame Building System Nomenclature

3 Definitions

3.1 Foundation types and components

3.1.1 backfill: Material filling the excavation around a post or pier foundation. See Figure 5.

3.1.2 collar: Foundation component attached to a post or pier, and that moves with it to resist lateral and vertical loads. See Figure 5.