

ASCE STANDARD

ASCE/CI

15-17

Standard Practice for Direct Design of Buried Precast Concrete Pipe Using Standard Installations (SIDD)

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PART I GENERAL

1.0 SCOPE

1.1 This standard practice covers the direct design of buried precast concrete pipe using Standard Installations Direct Design (SIDD) manufactured in accordance with ASTM C 1417 and the design and construction of the soil–pipe interaction system, intended for the conveyance of sewage, industrial wastes, storm water, and drainage.

1.2 When buried, concrete pipe is part of a composite system made up of the pipe and the surrounding soil envelope, which interact and contribute to the strength and structural behavior of the system.

1.3 Part II of this standard practice presents the SIDD method for buried precast concrete pipe. SIDD is a design and analysis method that accounts for the interaction between the pipe and soil envelope in determining loads, pressure distributions, moment, thrust, and shear in the pipe and includes a procedure for calculating the required reinforcement.

1.4 Part III of this standard practice presents construction requirements for precast concrete pipe designed by the SIDD method.

1.5 This standard practice may be used as a reference by the owner and the owner's engineer in preparing project specifications based on the SIDD method.

1.6 The design procedures given in this standard practice are intended for use by engineers who are familiar with the installation and pipe characteristics that affect the structural behavior of buried concrete pipe installations and the significance of the installation requirements associated with each SIDD type. Before applying the design procedures given in Part II, the engineer should review the guidance and requirements given in other sections of this standard practice and its accompanying commentary.

1.7 The values of dimensions and quantities are expressed in inch–pound (English) units, which are to be regarded as standard. English unit values are converted to SI unit values, which are presented in parentheses or a section following the English units. For clarity, Appendix A repeats the notation and contains the full translation of equations to SI units. The use of SI units is in accordance with ASTM Practice E 380. SI units expressed in parentheses and in Appendix A are supplied for information only and are not a part of this standard practice.

Note: Some of the applicable standards referenced may have a double designation (Axxx/AxxxM) or separate inch–pound (English) and SI (metric) unit editions. Only the inch–pound unit edition of a standard is listed in this practice. If the practice is

used in an SI unit design, the user should investigate whether separate SI unit editions of the referenced standards are available.

2.0 APPLICABLE DOCUMENTS

2.1 ASTM (American Society for Testing and Materials)

2.1.1 A 1064/A 1064M Standard Specification for Carbon–Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

2.1.2 C 822 Definitions of Concrete Pipe and Related Products

2.1.3 C 985 Standard Specification for Nonreinforced Concrete Specified Strength Culvert, Storm Drain, and Sewer Pipe

2.1.4 C 1417 Standard Specification for Manufacture of Reinforced Concrete Sewer, Storm Drain, and Culvert Pipe for Direct Design

2.1.5 C 1479 Standard Specification for Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations

2.1.6 C 1628 Standard Specification for Joints for Concrete Gravity Flow Sewer Pipe, Using Rubber Gaskets

2.1.7 D 698 Moisture–Density Relations of Soils and Soil–Aggregate Mixtures Using 5.5-lb Rammer and 12-in. Drop

2.1.8 D 1557 Moisture–Density Relations of Soils and Soil–Aggregate Mixtures Using 10-lb Rammer and 18-in. Drop

2.1.9 D 2487 Classification of Soils for Engineering Purposes

2.1.10 D 2488 Recommended Practice for Description of Soils (Visual Manual and Procedure)

2.1.11 E 380 Standard Practice for Use of the International System of Units (SI) (the Modernized Metric System)

2.2 AASHTO (American Association of State Highway and Transportation Officials)

2.2.1 Standard Specifications for Highway Bridges, 17th Edition

2.2.2 T 99 The Moisture–Density Relations of Soils Using a 5.5-lb (2.5 kg) Rammer and a 12-in. (305 mm) Drop

2.2.3 T 180 The Moisture–Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-in. (457 mm) Drop

2.3 AREMA (American Railway Engineering and Maintenance-of-Way Association)

2.3.1 Manual for Railway Engineering