Designation: A807/A807M – 19

Standard Practice for Installing Corrugated Steel Structural Plate Pipe for Sewers and Other Applications[1]

This standard is issued under the fixed designation A807/A807M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This practice primarily covers procedures, soils, and soil placement for the proper installation of corrugated steel structural plate pipe, pipe-arches, arches, and underpasses produced to Specification A761/A761M, in either trench or embankment installations. This practice also covers installation of structural plate for alternative uses that do not involve backfilling or soil-structure interaction.

1.2 A typical trench installation and a typical embankment (projection) installation are shown in Figs. 1 and 2, respectively. Structural plate structures as described herein are those structures factory fabricated in plate form and bolted together on site to provide the required shape, size, and length of structure. This practice applies to structures designed in accordance with Practice A796/A796M.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.3.1 SI units are shown in brackets in the text for clarity, but they are the applicable values when the installation is to be performed using SI units.

1.4 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A761/A761M Specification for Corrugated Steel Structural Plate, Zinc-Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches

A796/A796M Practice for Structural Design of Corrugated Steel Pipe, Pipe-Arches, and Arches for Storm and Sanitary Sewers and Other Buried Applications

A902 Terminology Relating to Metallic Coated Steel Products

D698 Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))

D1556 Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method

D1557 Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))

D2167 Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method

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

D6938 Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

D2937 Test Method for Density of Soil in Place by the Drive-Cylinder Method

2.2 *AASHTO Standard:*[3]

AASHTO LRFD Construction Specifications

3. Terminology

3.1 *Definitions*—For definitions of general terms used in this practice, refer to Terminology A902.

3.2 *Definitions of Terms Specific to This Standard:*

[1] This practice is under the jurisdiction of ASTM Committee A05 on Metallic-Coated Iron and Steel Products and is the direct responsibility of Subcommittee A05.17 on Corrugated Steel Pipe Specifications.

Current edition approved Sept. 1, 2019. Published September 2019. Originally approved in 1982. Last previous edition approved in 2017 as A807/A807M – 17. DOI: 10.1520/A0807_A0807M-19.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001, http://www.transportation.org.

***A Summary of Changes section appears at the end of this standard**

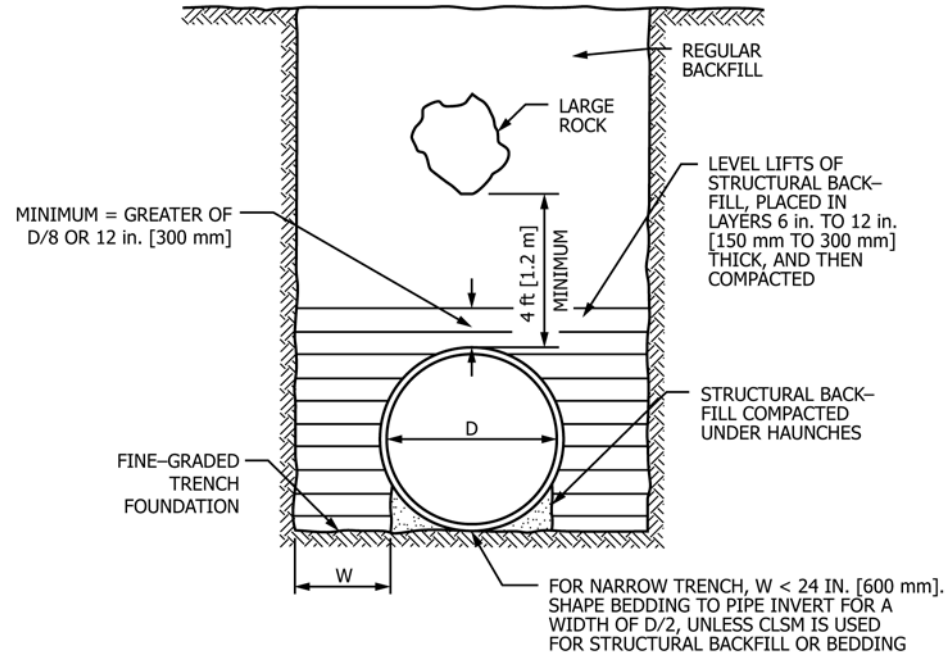


FIG. 1 Typical Trench Installation

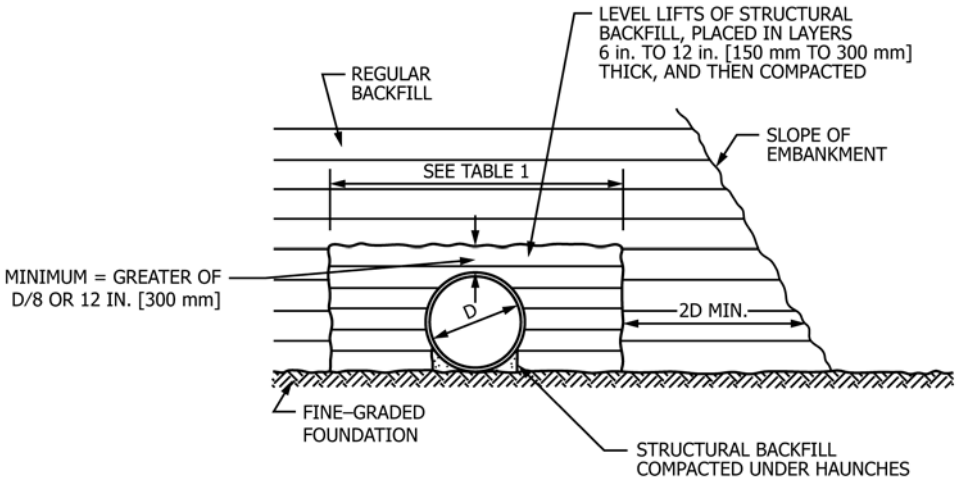


FIG. 2 Typical Embankment (Projection) Installation

3.2.1 *arch, n*—a part circle shape spanning an open invert between the footings on which it rests.

3.2.2 *bedding, n*—the earth or other material on which a pipe is supported.

3.2.3 *haunch, n*—the portion of the pipe cross section between the maximum horizontal dimension and the top of the bedding.

3.2.4 *invert, n*—the lowest point on the pipe cross section; also, the bottom portion of a pipe.

3.2.5 *pipe, n*—a conduit having full circular shape; also, in a general context, all structure shapes covered by this practice.

3.2.6 *pipe-arch, n*—an arch shape with an approximate semicircular crown, small-radius corners, and large-radius invert.

3.2.7 *underpass, n*—a high arch shape with an approximate semicircular crown, large-radius sides, small-radius corners between sides and invert, and large-radius invert.

4. Significance and Use

4.1 Structural plate structures function structurally as a flexible ring that is supported by and interacts with the compacted surrounding soil. The soil placed around the structure is thus an integral part of the structural system. It is therefore important to ensure that the soil structure is made up of acceptable material and is well constructed. Field verification of soil structure acceptability using Test Methods D1556, D2167, D6938, or D2937, as applicable, and comparing the results with either Test Methods D698 or D1557, in accordance with the specifications for each project, is the most common

basis for installation of an acceptable structure. Depending on the backfill used, other qualitative or performance-based methods acceptable to the engineer may also be used. The required density and method of measurement are not specified by this practice, but must be established in the specifications for each project.

4.2 Structural plate structures are also occasionally used in alternative applications not requiring soil-structure interaction for support. Depending on the application the structure may provide temporary or permanent support, confinement, concealment, shielding, or other functions not related to soil-structure interaction. The nature of support required, design requirements, and proper sizing of the structure will be determined by a project design engineer and is not part of the scope of this standard.

5. Trench Excavation

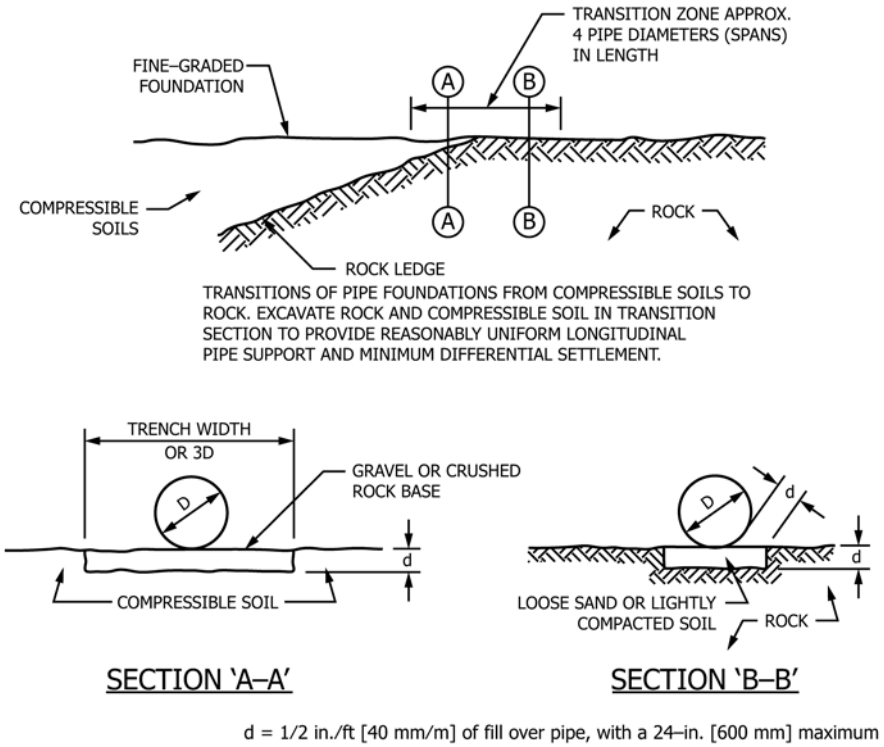
5.1 To obtain the anticipated structural performance of structural plate structures, it is not necessary to control trench width beyond the minimum necessary for proper assembly of the structure and placement of the structural backfill. However, the soil on each side beyond the excavated trench must be able to support anticipated loads. Any sloughed material shall be removed from the trench or compacted to provide the necessary support. When a construction situation calls for a relatively wide trench, it may be made as wide as required, for its full depth if so desired. However, trench excavation must be in compliance with any local, state, and federal codes and safety regulations.

6. Foundation

6.1 The supporting soil beneath the structure must provide a reasonably uniform resistance to the imposed load, both longitudinally and laterally. Sharp variations in the foundation must be avoided. When rock is encountered, it must be excavated and replaced with soil. If the structure is to be placed on a continuous rock foundation, it will be necessary to provide a bedding of soil between rock and structure. See Fig. 3.

6.2 Lateral changes in foundation should never be such that the structure is firmly supported while the backfill on either side is not. When soft material is encountered in the structure excavation and must be removed to maintain the grade (limit settlement) of the structure, then it must be removed, usually for a minimum of three structure widths (see Fig. 4). A smaller width of removal can sometimes be used if established by the engineer.

6.3 Performance of buried structures is enhanced by allowing the structure to settle slightly relative to the columns of earth alongside. Therefore, when significant settlement of the overall foundation is expected, it is beneficial to provide a yielding foundation under structural plate structures. A yielding foundation is one that allows the structure to settle vertically by a greater amount than the vertical settlement of the columns of earth alongside. It can usually be obtained by placing a layer of compressible soil of suitable thickness beneath the structure that is less densely compacted than the soil alongside. This is particularly important on structures with relatively large-radius invert plates.



NOTE 1—Section *B-B* is applicable to all continuous rock foundations.

FIG. 3 Foundation Transition Zones and Rock Foundations