



Designation: A 807/A 807M – 02^{ε1}

Standard Practice for Installing Corrugated Steel Structural Plate Pipe for Sewers and Other Applications¹

This standard is issued under the fixed designation A 807/A 807M; 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 reappraisal. A superscript epsilon (ε) indicates an editorial change since the last revision or reappraisal.

^{ε1} NOTE—Editorially corrected the term specification to practice in 3.2.4 in September 2002.

1. Scope

1.1 This practice covers procedures, soils, and soil placement for the proper installation of corrugated steel structural plate pipe, pipe-arches, arches, and underpasses produced to Specification A 761/A 761M, in either trench or embankment installations. 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 A 796/A 796M.

1.2 *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 determine the applicability of regulatory limitations prior to use.*

1.3 The values stated in either inch-pound units or SI units shall be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system must be used independently of the other, without combining values in any way. 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.

2. Referenced Documents

2.1 ASTM Standards:

A 761/A 761M Specification for Corrugated Steel Structural Plates, Zinc Coated, for Field-Bolted Pipe, Pipe Arches, and Arches²

A 796/A 796M Practice for the Structural Design of Corrugated Steel Pipe, Pipe-Arches, and Arches for Storm and

Sanitary Sewers and Other Buried Applications²

A 902 Terminology Relating to Metallic Coated Steel Products²

D 698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ [600 kN-m/m³])³

D 1556 Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method³

D 1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56 000 ft-lbf/ft³ [2700 kN-m/m³])³

D 2167 Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method³

D 2487 Classification of Soils for Engineering Purposes (Unified Soil Classification System)³

D 2922 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)³

D 2937 Test Method for Density of Soil in Place by the Drive-Cylinder Method³

3. Terminology

3.1 *Definitions*—For definitions of general terms used in this practice, refer to Terminology A 902.

3.2 *Definitions of Terms Specific to This Standard:*

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

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

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

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

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

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

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.

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² *Annual Book of ASTM Standards*, Vol 01.06.

³ *Annual Book of ASTM Standards*, Vol 04.08.

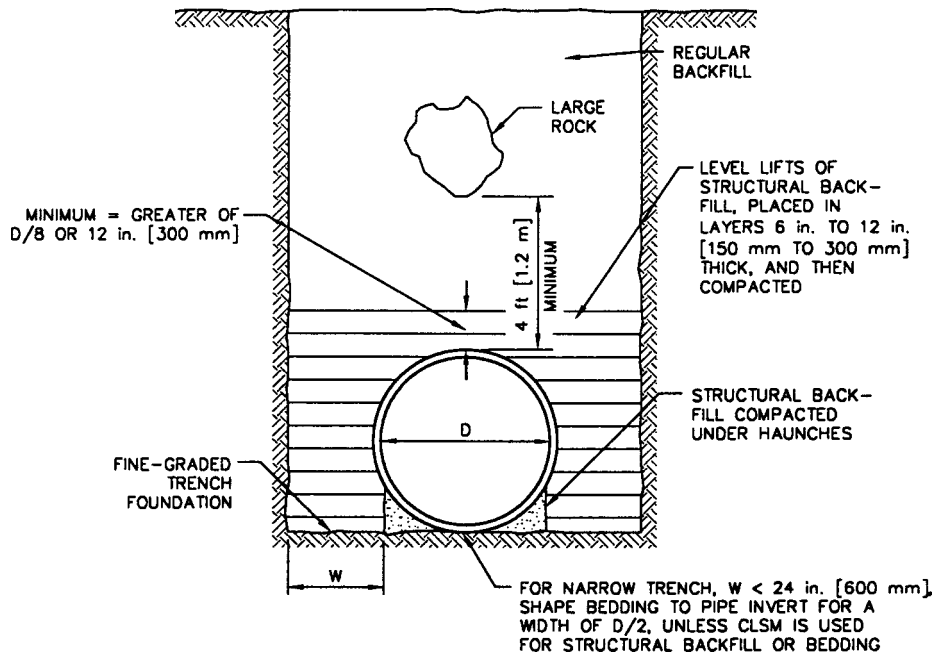


FIG. 1 Typical Trench Installation

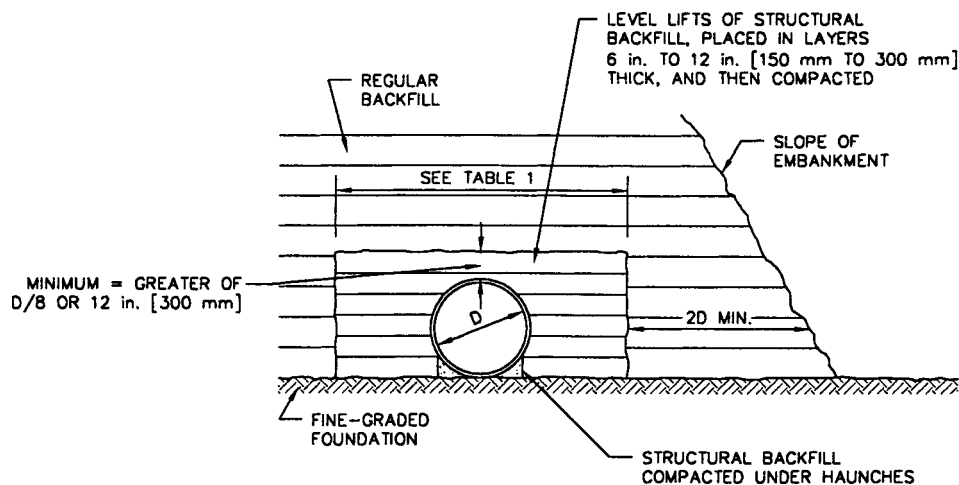


FIG. 2 Typical Embankment (Projection) Installation

3.2.7 *underpass*—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 D 1556, D 2167, D 2922, or D 2937, as applicable, and comparing the results with either Test Methods D 698 or D 1557, in accordance with the specifications for each project, is the most

reliable basis for installation of an acceptable structure. The required density and method of measurement are not specified by this practice, but must be established in the specifications for each project.

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

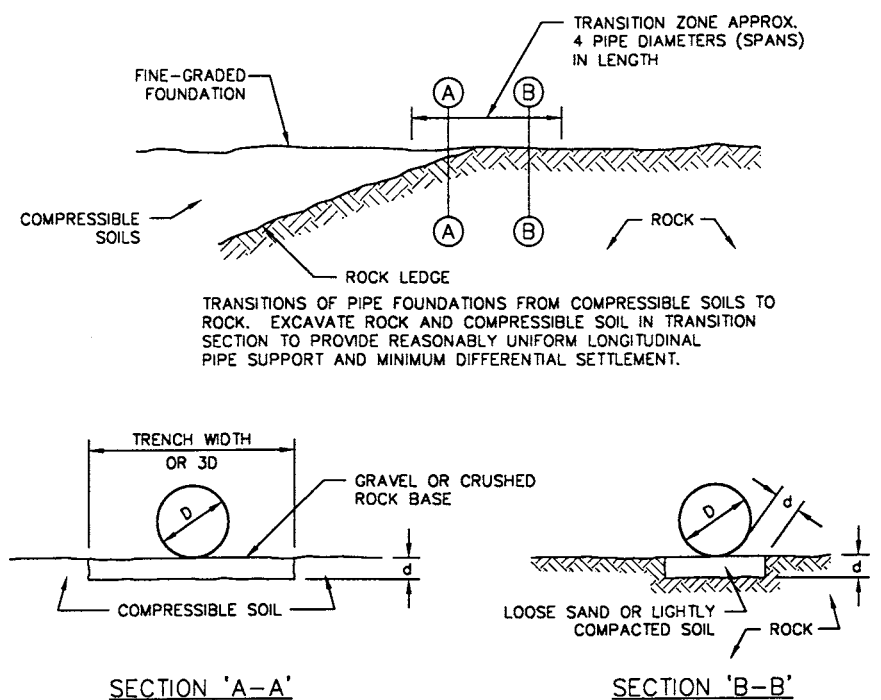
that is less densely compacted than the soil alongside. This is particularly important on structures with relatively large-radius invert plates.

6.4 For all structures with relatively small-radius corner plates adjacent to large-radius invert plates (such as pipe-arches or underpass structures), excellent soil support must be provided adjacent to the small-radius corner plates by both the in situ foundation and the structural backfill. See Figs. 4 and 5. A yielding foundation must be provided beneath the invert plates for such structures when soft foundation conditions are encountered.

6.5 The engineer is encouraged to develop details specific to the site based on the general principles for foundation conditions given in 6.1 through 6.4.

7. Bedding

7.1 In most cases, structural plate structures may be assembled directly on in-situ material fine-graded to proper alignment and grade. Take care to compact the material beneath the haunches before placing structural backfill. Material in contact with the pipe must not contain rock retained on a 3 in. [75 mm] diameter ring, frozen lumps, chunks of highly plastic clay, organic matter, corrosive material, or other deleterious material. For structures with relatively small-radius corner plates adjacent to large-radius invert plates, it is recommended to either shape the bedding to the invert plate radius or fine-grade the foundation to a slight V-shape. The soil adjacent to the corners shall be of an excellent quality and highly compacted to accommodate the high reaction pressures that can develop at that location. See Fig. 5.



$d = 1/2$ in./ft [40 mm/m] of fill over pipe, with a 24-in. [600 mm] maximum

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

FIG. 3 Foundation Transition Zones and Rock Foundations