Designation: A798/A798M – 22

Standard Practice for Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications[1]

This standard is issued under the fixed designation A798/A798M; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This practice covers procedures, soils, and soil placement for the proper installation of corrugated steel pipe and pipe-arches produced to Specification A760/A760M or A762/A762M, in either trench or embankment installations. This practice also covers installation of corrugated steel pipe 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. The pipes described in this practice are manufactured in a factory and furnished to the job in lengths ordinarily from 10 to 30 ft [3 to 9 m], with 20 ft [6 m] being common, for field joining. This practice applies to structures designed in accordance with Practice A796/A796M.

1.3 *Units*—This practice is applicable to design in inch-pound units as A798 or in SI units as A798M. Inch-pound units and SI units are not necessarily equivalent. SI units are shown in brackets in the text for clarity, but they are the applicable values when the installation is to be performed in accordance with A798M.

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]

A760/A760M Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains

A762/A762M Specification for Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains

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

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)

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

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

3. Terminology

3.1 *Definitions*—For definitions of general terms used in this practice, refer to Terminology A902. For definition of terms specific to this practice, refer to 3.2.

3.2 *Definitions of Terms Specific to This Standard:*

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

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

[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] 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.

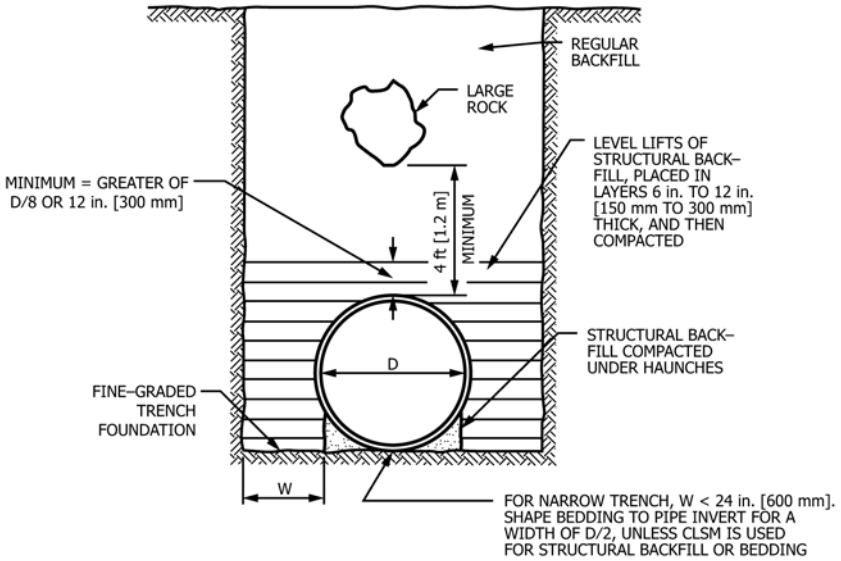


FIG. 1 Typical Trench Installation

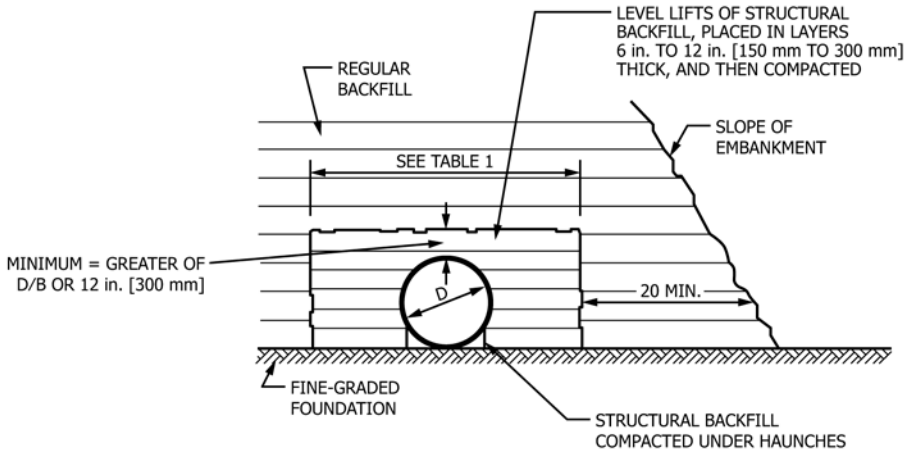


FIG. 2 Typical Embankment (Projection) Installation

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

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

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

4. Significance and Use

4.1 Corrugated steel pipe functions structurally as a flexible ring which is supported by and interacts with the compacted surrounding soil. The soil constructed around the pipe is thus an integral part of the structural "system." It is therefore important to ensure that the soil structure or backfill is made up of acceptable material and well-constructed. Field verification of soil structure acceptability using Test Methods D1556, D2167, D6938, or D2937, as applicable, and comparing the results with Test Method D698 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.

4.2 Corrugated steel pipe 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 practice.

5. Trench Excavation

5.1 To obtain anticipated structural performance of corrugated steel pipe, it is not necessary to control trench width beyond the minimum required for proper installation of pipe and backfill. However, the soil on each side beyond the excavated trench must be able to support anticipated loads. 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 pipe 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 pipe runs along a continuous rock foundation, it is necessary to provide a suitable soil bedding under the pipe. See Fig. 3.

6.2 Lateral changes in foundation shall never be such that the pipe is firmly supported while the backfill alongside is not. When soft material is encountered and must be removed in order to maintain the pipe on grade during construction, it must be removed for at least three pipe widths, unless the engineer has set another limit.

6.3 Performance of buried pipe is enhanced by allowing the pipe to settle slightly under load compared to the columns of soil alongside. Thus, for larger pipes, it can be beneficial to purposely create a foundation under the pipe itself which will yield under load more than will the foundation under the columns of soil to each side. It can usually be obtained by placing beneath the structure a suitable-thickness layer of compressible soil, less densely compacted than the soil alongside. This creates "favorable" relative movement between pipe and the soil on each side. It is of particular importance on pipe-arches.

6.4 *Pipe-Arches*—All pipe-arch structures shall have excellent soil support at their corners by both the in-situ foundation and the structural backfill. See Figs. 4 and 5. They do not require the same degree of support under their large-radius inverts.

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

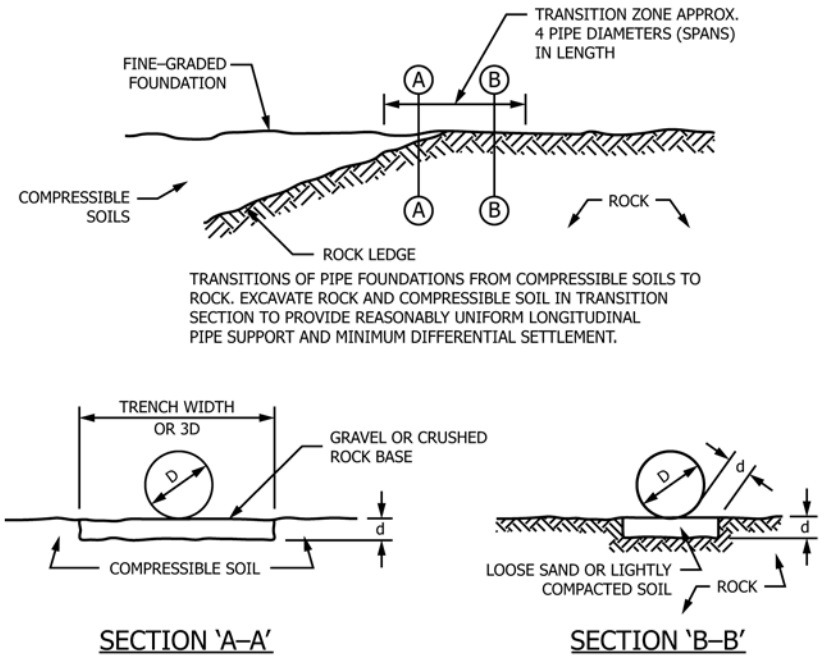
7.1 .Material used for bedding beneath the pipe shall meet the requirements of this section. Material in contact with the pipe shall not contain rock retained on a 3 in. [75 mm] ring, frozen lumps, chunks of highly plastic clay, organic matter, corrosive material, or other deleterious material. It is not required to shape the bedding to the pipe geometry. However, for pipe-arches, it is recommended to either shape the bedding to the relatively flat bottom arc or fine-grade the foundation to a slight v-shape. This avoids the problem of trying to backfill the difficult area beneath the invert of pipe-arches. See Fig. 5.

8. Pipe Installation

8.1 All pipe shall be unloaded and handled with reasonable care. Pipe shall not be rolled or dragged over gravel or rock and shall be prevented from striking rock or other hard objects during placement on bedding. Pipe with protective coatings shall be handled with special care to avoid damage. Paved inverts shall be placed and centered in the invert. Riveted pipe should be installed so that outside circumferential joints point upgrade.

8.2 *Joining Systems:*

8.2.1 *Purpose of Joining Systems*—Joining systems for corrugated steel pipe serve several purposes: to maintain pipe



NOTE 1—*d* = ½ in./ft [40 mm/m] of fill over pipe, with a 24 in. [600 mm] maximum.

NOTE 2—Section B–B is applicable to all continuous rock foundations.

FIG. 3 Foundation Transition Zones and Rock Foundations