Designation: B788/B788M – 04

# Standard Practice for Installing Factory-Made Corrugated Aluminum Culverts and Storm Sewer Pipe[1]

This standard is issued under the fixed designation B788/B788M; 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 Department of Defense.*

## 1. Scope*

1.1 This practice describes procedures, soils, and soil placement for the proper installation of corrugated aluminum culverts and storm sewers in either trench or projection installations. A typical trench installation is shown in Fig. 1, and a typical embankment (projection) installation is shown in Fig. 2. 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 B790/B790M.

1.2 This practice is applicable to either inch-pound units as B788 or to SI units as B788M. Inch-pound units are not necessary equivalent to SI units. SI units are shown in the text in brackets, and they are the applicable values for metric installation.

1.3 *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.*

## 2. Referenced Documents

2.1 *ASTM Standards:*[2]

B745/B745M Specification for Corrugated Aluminum Pipe for Sewers and Drains

B790/B790M Practice for Structural Design of Corrugated Aluminum Pipe, Pipe-Arches, and Arches for Culverts, Storm Sewers, and Other Buried Conduits

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

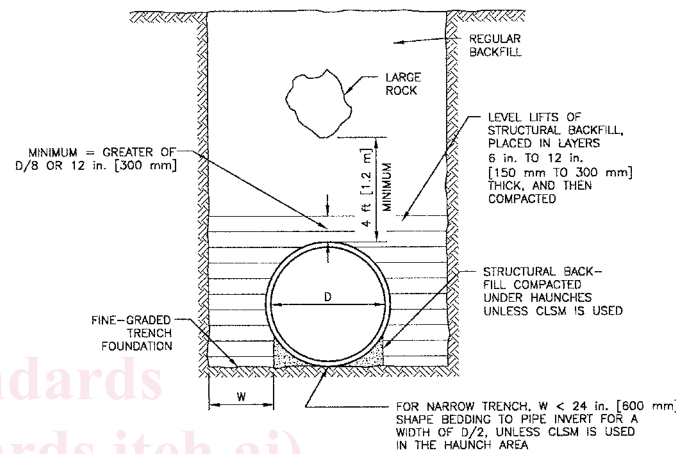


FIG. 1 Typical Trench Installation

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)

D2922 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)[3]



[3] Withdrawn. The last approved version of this historical standard is referenced on www.astm.org.

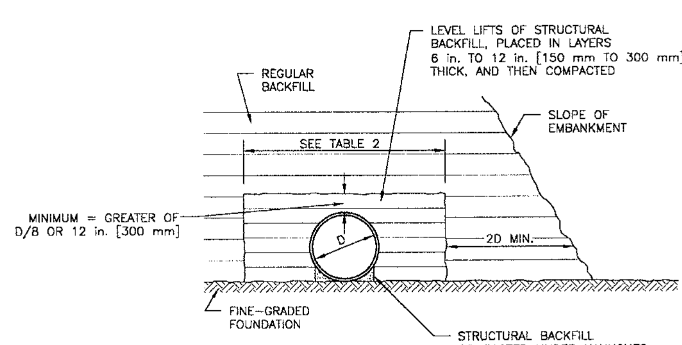


FIG. 2 Typical Embankment (Projection) Installation

[1] This practice is under the jurisdiction of ASTM Committee B07 on Light Metals and Alloys and is the direct responsibility of Subcommittee B07.08 on Aluminum Culvert.

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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.

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

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

## 3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

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

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

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

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

3.1.5 *pipe–arch*, *n*—a pipe with an approximate semicircular crown, small-radius corners, and large-radius invert.

## 4. Significance and Use

4.1 Corrugated aluminum 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 is well-constructed. Field verification of soil structure acceptability using Test Methods D1556, D2167, D2922, 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 they must be established in the specifications for each project.

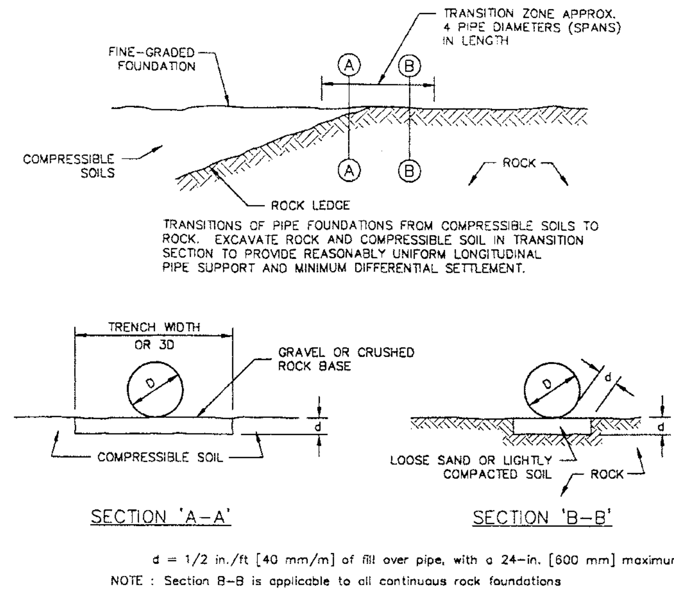
## 5. Trench Excavation

5.1 To obtain anticipated structural performance of corrugated aluminum 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 shall 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 should never be such that the pipe is firmly supported while the backfill alongside is not. When soft material is encountered during construction and must be removed in order to provide an adequate foundation, remove the soft material for a distance of three pipe widths, unless the engineer has set another limit. See Fig. 4.




*d* = ½ 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**

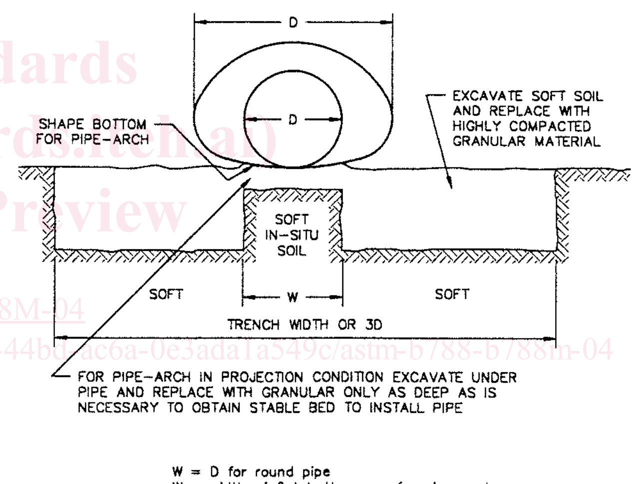



**FIG. 4 Soft Foundation Treatment**

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 a layer of compressible soil of a suitable thickness, less densely compacted than the soil alongside, beneath the structure. 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 must have excellent soil support at their corners by both the in-situ foundation and the structural backfill. See Fig. 4 and Fig. 5. They do not require the same degree of support under their large-radius inverts.