

## Installation

### Corrugated Aluminum Pipe

#### Required elements

Satisfactory site preparation, trench excavation, bedding and backfill operations are essential to develop the strength of any flexible conduit. In order to obtain proper strength while preventing settlement, it is necessary that the soil envelope around the pipe be of good granular material, properly placed and carefully compacted.

A qualified engineer should be engaged to design a proper foundation, adequate bedding and backfill. (Reference: ASTM B788).

#### Trench excavation

If the adjacent embankment material is structurally adequate, the trench requires only a bottom clear width of the pipe's span, plus sufficient room for compaction equipment.

#### Bedding

Bedding preparation is critical to both pipe performance and service life. The bed should be constructed to uniform line and grade to avoid distortions that may create undesirable stresses in the pipe and/or rapid deterioration of the roadway. The bed should be free of rock formations, protruding stones, frozen lumps, roots and other foreign matter that may cause unequal settlement.

*It is recommended that the bedding be a stable, well graded, granular material. Placing the pipe on the bedding surface is generally accomplished by one of two methods to ensure satisfactory compaction in the haunch area. One method is shaping the bedding surface to conform to the lower section of the pipe.*

*The other is carefully tamping a granular or select material in the haunch area to achieve a well-compacted condition.*

#### Backfill

Satisfactory backfill material, proper placement and compaction are key factors in obtaining maximum strength and stability.

*The backfill material should be free of rocks, frozen lumps and foreign matter that could cause hard spots or decompose to create voids. Backfill material should be a well graded, granular material that meets the requirements of AASHTO M145. Backfill should be placed symmetrically on each side of the pipe in six-inch to eight-inch loose lifts. Each lift is to be compacted to a minimum of 90 percent density per AASHTO T180.*

*A high percent of silt or fine sand in the native soils suggests the need for a well graded, granular backfill material to prevent soil migration, or a geotextile separator can be used.*

During backfill, only small tracked vehicles (D-4 or smaller) should be near the pipe as fill progresses above the top and to finished grade. The engineer and contractor are cautioned that the minimum cover may need to be increased to handle temporary construction vehicle loads (larger than a D-4). Refer to Heavy construction loads below.

#### Salt water installation

In salt water installations, the bedding and backfill around the pipe must be clean granular material. If the backfill is subject to possible infiltration by the adjacent native soil, the clean granular backfill should be wrapped in a geotextile.

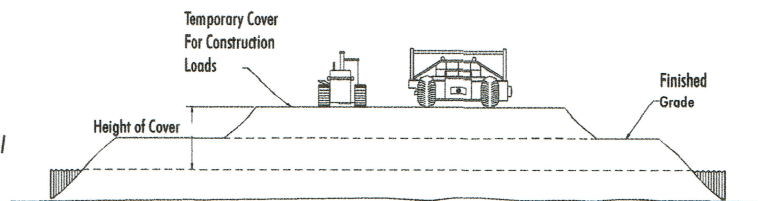
#### Pavement

For minimum cover applications, Contech recommends that a properly designed flexible or rigid pavement be provided to distribute level loads and maintain cover heights.

#### Heavy construction loads

For temporary construction vehicle loads, an extra amount of **compacted cover** may be required over the top of the pipe. The height-of-cover shall meet the minimum requirements shown in the Table below. The use of heavy construction equipment necessitates greater protection for the pipe than finished grade cover minimums for normal highway traffic.

Min. Height-of-Cover Requirements for Construction Loads On Corrugated Aluminum Pipe				
Diameter/ Span (Inches) Aluminum	Axle Load (Kips)			
	18-50	50-75	75-110	110-150
12-42	3.0'	3.5'	4.0'	4.0'
48-72	4.0'	4.0'	5.0'	5.5'
78-120	4.0'	5.0'	5.5'	5.5'





## Aluminum Structural Plate

**Scope:** This specification covers the manufacture and installation of the Aluminum Structural Plate structure detailed in the plans.

**Material:** The Aluminum Structural Plate structure shall consist of plates and appurtenant items as shown on the plans and shall conform to the requirements of A.A.S.H.T.O. 219 and ASTM B 746. The corrugated plate (and ribs if required) shall be curved and bolt hole punched at the plant. Plate thickness and rib spacings shall be as indicated on the plans. All manufacturing processes including corrugating, punching, and curving, shall be performed within the United States.

Bolts and nuts shall conform to the requirements of ASTM A307 or A449 for steel fasteners or ASTM F467 and F468 for aluminum fasteners.

**Assembly:** The structure shall be assembled in accordance with the shop drawings provided by the manufacturer and per the manufacturer's recommendations. Bolts shall be tightened using an applied torque of between 90 and 135 ft.-lbs.

**Installation:** The structure shall be installed in accordance with the plans and specifications, the manufacturer's recommendations and the A.A.S.H.T.O. Standard Specifications for Highway Bridges, Section 26 (Division II).

**Backfill:** The structure shall be backfilled using clean, well graded granular material that meets the requirements of A.A.S.H.T.O. M 145 for soil classifications A-1, A-2 or A-3. Backfill must be placed symmetrically on each side of the structure in 6 to 8 inch lifts. Each lift shall be compacted to a minimum of 90 percent density per A.A.S.H.T.O. T 99.

**Note:** Construction loads that exceed highway load limits are not allowed on the structure without approval from the Project Engineer.



Assembly of Aluminum Structural Plate Arch



## Installation

### Required elements

Satisfactory site preparation, trench excavation, bedding and backfill operations are essential to develop the strength of any flexible conduit. In order to obtain proper strength while preventing settlement, it is necessary that the soil envelope around the structure be of good granular material, properly placed, and carefully compacted.

Pipe-arch and underpass shapes pose special installation problems not found in other shapes. These two shapes generate high corner bearing pressures against the side fill and foundation (see Page 59 for the corner bearing pressure). Therefore, special installation care must be implemented to achieve a composite soil structure.

A qualified Engineer should be engaged to design a proper foundation, adequate bedding, and backfill.

### Trench excavation

If the adjacent embankment material is structurally adequate, the trench requires only a bottom clear width of the structure's span plus sufficient room for compaction equipment.

### Bedding

Proper bedding preparation is critical to both structure performance and service life. The bed should be constructed to avoid distortions that may create undesirable stresses in the structure and/or rapid deterioration of the roadway. The bed should be free of rock formations, protruding stones, and frozen matter that may cause unequal settlement.

It is recommended that the bedding be stable, *well graded* granular material. Placing the structure on the bedding surface is generally accomplished by one of the two following methods:

- Shaping the bedding surface to conform to the lower section of the structure
- Carefully tamping a granular or select material beneath the haunches to achieve a well-compacted condition

Using one of these two methods ensures satisfactory compaction beneath the haunches.

### Assembly

Assembly drawings and detailed assembly instructions are shipped with each order. Structures can be preassembled and lifted into place all at once or in sections, allowing for staged construction. If the site conditions allow, structures can be assembled in place. A qualified engineer should be engaged to determine the most appropriate site conditions.

For additional information contact your local CONTECH representative.

### Backfill

Satisfactory backfill material, proper placement, and compaction are key factors in obtaining maximum strength and stability.

The backfill material should be free of rocks, frozen lumps, and foreign material that could cause hard spots or decompose to created voids. Backfill material should be *well graded* granular material that meets the requirements of A.A.S.H.T.O. M 145 for soil classifications A-1, A-2, or A-3. Backfill must be placed symmetrically on each side of the structure in six-inch loose lifts. Each lift is to be compacted to a minimum of 90 percent density per A.A.S.H.T.O. T 99.

A high percentage of silt or fine sand in the native soils suggests the need for a *well graded* granular backfill material to prevent soil migration.

During backfill, only small tracked vehicles (D-4 or smaller) should be near the structure as fill progresses above the crown and to the finished grade. The engineer and contractor are cautioned that the minimum cover may need to be increased to handle temporary construction vehicle loads (larger than D-4).

### Salt water installation

In salt water installations, the bedding and backfill around the structure must be clean granular material. If the backfill is subject to possible infiltration by the adjacent native soil, the clean granular backfill should be wrapped in a geotextile.

### Pavement

For minimum cover applications, CONTECH recommends that a properly designed flexible or rigid pavement be provided above the structure to distribute live loads and maintain cover.

### Precautions

During installation and prior to the construction of permanent erosion control and end treatment protection, special precautions may be necessary.

The structure must be protected from unbalanced loads from any structural loads or hydraulic forces that might bend or distort the unsupported ends of the structure.

Erosion or washout of previously placed soil support must be prevented to ensure that the structure maintains its load capacity.