SECTION 527 STRUCTURAL PLATE PIPE AND PIPE ARCHES

527.1 Description

(1) This section describes furnishing and installing structural plate pipe, or structural plate pipe arches.

527.2 Materials

(1) Furnish structural plate pipe or structural plate pipe arches fabricated from zinc coated corrugated steel or aluminum alloy structural plates unless the contract specifies otherwise.

(2) Furnish erection bolts and zinc coated corrugated steel plate conforming to AASHTO M 167.

(3) Furnish erection bolts and aluminum alloy structural plate conforming to AASHTO M 219, except do not use aluminum bolts and nuts.

(4) Furnish plates of the thickness the plans show or the contract specifies.

(5) Furnish pipe arches, for a designated span width, conforming to the span and rise dimensions, and the radii of curvatures the contract designates.

(6) Unless the contract specify otherwise, furnish structural plate pipe and pipe arches with square ends.

(7) Repair damaged spelter coating according to AASHTO M 167.

527.3 Construction

527.3.1 Fabrication

527.3.1.1 Description of Plates

(1) Plates shall consist of zinc coated corrugated steel or aluminum alloy structural units. Use the manufacturer's standard plate width and length for the size structure specified, and stagger the joints either circumferentially or longitudinally. Measure plate width circumferentially, or parallel to the highway centerline. Plates shall include an approximately 2 inch (50 mm) lip beyond each end crest, resulting in the given structure's actual length being approximately 4 inches (100 mm) longer than the nominal length, except if skewed or beveled. Connect the plates at longitudinal and circumferential seams by bolts.

(2) Provide the radius of curvature the plans show.

527.3.1.2 Forming and Punching Plates

(1) Curve each plate to the proper radius and punch the bolt holes so all plates curved to the same radius, except end plates, are interchangeable during erection.

(2) Place bolt holes along those plate edges that form longitudinal seams in rows 2 inches (50 mm) apart, with one row in the valley and one in the crest of the corrugations. Stagger the bolt holes between crest and valley for steel plates.

(3) Space the bolt holes along those plate edges that form the circumferential seams in the finished structure approximately 10 inches (250 mm).

(4) Place the center of the hole no closer to the plate edge than 1 3/4 times the diameter of the bolt.

(5) Punch the bolt holes in steel plates 3/16 inch to 9/32 inch (4.78 mm to 7.11 mm) in thickness, inclusive, before zinc coating the plates.

(6) If the completed structure is a circular pipe, curve the plates so that if bolted together they form true circles of the required diameters.

(7) Cut plates for forming skewed or sloped ends to produce the angle of skew or slope specified. Keep burned edges free from oxide and burrs. Place legible identification numerals on each plate part to designate its proper position in the finished structure.

527.3.2 Erection

(1) If erecting a pipe or pipe arch structure in a trench, make the trench a sufficient width to allow thorough backfill compaction.

(2) Bed the pipe or pipe arch in an earth foundation of uniform density, carefully shaped by a template supported at the specified grade to fit the lower plates of the structure. If rock, in either ledge or boulder form is encountered, remove it below grade and replace with granular backfill to provide a compacted cushion of a thickness of not less than 1/2 inch for every foot (13 mm for every 300 mm) of fill above the

structure, with a minimum allowable thickness of 8 inches (200 mm). If there is no stable foundation at the grade established, remove and replace all unstable soil under the structure and for a width of at least one diameter on each side of the structure with granular backfill, and compact to provide adequate support for the structure, unless the plans or special provisions specify other special construction methods.

(3) Provide the camber the plans show or the engineer specifies in the foundation bed for a pipe or pipe arch.

(4) After placing all the plates, tighten all bolts to a torque value between 100 foot-pounds (135.6 Nm) and 300 foot-pounds (406.7 Nm) inclusive. Tighten all bolts before starting backfilling.

527.3.3 Backfilling Pipe and Pipe Arches

(1) If the contract contains the Backfill Structure bid item, use backfill material as specified in 210.2. If the contract does not contain the Backfill Structure bid item, use select material from excavation for the backfill material, free from large lumps, clods, rocks, and other objectionable substances.

(2) After assembling the pipe or pipe arch, deposit backfill material evenly on both sides of the pipe or pipe arch in layers not greater than 6 inches (150 mm) until at least 3/4 of the depth is backfilled. Ensure thorough backfill compaction at the haunches of pipe arches and between the pipe or pipe arch and the sides of the trench, or for a distance each side of the pipe or pipe arch equal to the diameter of the pipe or pipe arch. Place the remaining 1/4 depth of fill to the top of structure equally on each side of the structure in layers not greater than 12 inches (300 mm).

(3) If the backfill material contains 3-inch (75 mm) or larger rocks, place so that the rocks do not contact the pipe during compaction.

(4) Under the engineer's supervision, construct an earth cover over the structure before driving heavy construction equipment over it.

527.3.4 Vertical Elongation

(1) If the plans specify pipe of 60 inch (1500 mm) diameter or more, elongate it vertically 5 percent before placing fill. Pre-form the plates in the shop to provide the required elongation.

527.3.5 Defective Work

(1) The department may reject work containing one or more of the following defects:

Elliptical shaping, unless specified.	Uneven laps.
Variation from a straight centerline.	Ragged edges.
Loose, unevenly lined, or spaced bolts.	Illegible brand.
Bruised, scaled, or broken spelter coating.	Dents or bends in the metal.

527.4 Measurement

(1) The department will measure the Pipe Structural Plate and Pipe Arch Structural Plate bid items installed by the linear foot acceptably completed, measured along the centerline of the structure on the flow line, end to end of the metal.

527.5 Payment

(1) The department will pay for measured quantities at the contract unit price under the following bid items:

ITEM NUMBER	DESCRIPTION	UNIT
527.0100 - 0299	Pipe Structural Plate (size)	LF
527.0300 - 0499	Pipe Arch Structural Plate (span)	LF

(2) Payment for the Pipe Structural Plate and Pipe Arch Structural Plate bid items is full compensation for providing, handling, erecting, and installing the structure. The department will pay separately for cast-in-place concrete and alternate endwall installations under the Concrete Masonry Endwalls bid item as specified in 504.5 and other associated bid items.

(3) Payment also includes backfilling except, if the contract contains the Backfill Structure bid item, the department will pay separately for backfilling under 210.5.

(4) The department will pay separately for excavation under the Excavation for Structures Structural Plate Pipe or Pipe Arches bid item as specified in 206.5.