

7-03 STRUCTURAL PLATE PIPE, PIPE ARCH, ARCH, AND UNDERPASS

7-03.1 Description

This Work consists of constructing structural plate pipe, pipe arches, arches, and underpasses of the various types and designs in accordance with the Plans, these Specifications, and the Standard Plans, at the locations and in conformity with the lines and grades staked.

Structural plate pipes shall be full circle of the type, gage or thickness, and diameter specified.

Structural plate pipe arches shall be a multi-centered shape made up of 4 circular arcs tangent to each other at their junctions and symmetrical about the vertical axis and of the type, gage or thickness, and span specified.

Structural plate arches shall be a single-centered circular arc shape, placed on a reinforced concrete foundation, and of the design, type, gage or thickness, and span as provided for in the Plans.

Structural plate underpasses shall be a multi-centered shape made up of a variable number of circular arcs tangent to each other at their junctions and symmetrical about the vertical axis and of the design, type, gage or thickness, and span specified.

7-03.2 Materials

Materials shall meet the requirements of the following sections:

Concrete Class 3000	6-02
Corrugated Steel	9-05.6(8)
Corrugated Aluminum	9-05.6(8)
Reinforcing Steel	9-07

Alternate installations shown in the Proposal may be constructed provided there is no increase in the total cost of the installation or detriment to the Contracting Agency.

Measurement for payment of the Bid items associated with the drainage installation will be based on the size of the installation described by the Bid item in the Proposal.

If the Contractor elects to use an alternate installation, plans for the alternate shall be submitted to the Engineer for approval prior to procuring or constructing the alternate.

7-03.3 Construction Requirements

7-03.3(1) Foundations, General

Structural plate pipes, pipe arches, underpasses, and bases for arches shall be placed on stable foundations prepared to the widths, depth, and grade given by the Engineer. Soft spots encountered in the base shall be excavated to a depth designated by the Engineer and be backfilled with gravel or other suitable material and thoroughly compacted.

Rock, in either ledge or boulder formation, hard pan, or cemented gravel occurring in the base material shall be excavated below grade and backfilled with suitable material so there will be a minimum 8-inch cushion under the pipes, pipe arches, or underpasses.

7-03.3(1)A Structural Plate Pipe, Pipe Arch, and Underpass

The base for structural plate pipes, pipe arches and underpasses shall be shaped to conform to their bottom and shall form firm and uniform bearing throughout their length. Where pipes, pipe arches, or underpasses are to be installed in new embankment, the embankment shall be constructed to the $\frac{1}{3}$ point of structural plate pipes (measured from the invert of the pipe), to the height of maximum horizontal dimension of structural plate pipe arches and as provided for in the Standard Plan or, in the case of a special design, in the Plans for structural plate underpasses, after which the trench shall be excavated and installation made.

7-03.3(1)B Structural Plate Arch

The base for structural plate arches shall be as shown in the Plans.

7-03.3(2) Assembling

Structural plate pipes, pipe arches, arches, and underpasses shall be assembled in place in accordance with the manufacturer's instructions, which shall accompany the shipment of materials and show the position of each plate and the order of assembly.

Bolts and bolted connections shall conform to the requirements of AASHTO M 167 for steel and AASHTO M 219 for aluminum.

7-03.3(3) Backfilling

After the structural plate pipe, pipe arch, arch, or underpass has been placed in position it shall be backfilled in accordance with [Section 7-08.3\(3\)](#).

7-03.3(4) Invert Treatment

Earth, or other material as specified, shall be placed and compacted in the invert of structural plate pipes, pipe arches, or underpasses in conformance with the Plans, Special Provisions, or the Standard Plan.

7-03.3(5) Headwalls

If headwalls are specified in the Plans, they shall be constructed as soon as the embankment has been completed to a sufficient height over the Structure to allow the required Work. Headwalls shall be constructed in accordance with the applicable portions of Section 6-02.

7-03.3(6) Safety Bars for Culvert Pipe

When shown in the Plans, safety bars for culvert pipe shall be constructed in accordance with the Standard Plans and shall meet the requirements of [Section 9-05.18](#).

7-03.4 Measurement

The length of structural plate pipes, pipe arches, arches, and underpasses will be the number of linear feet of completed installation measured along the invert. Pipe placed in excess of the length designated by the Engineer will not be measured or paid for.

Concrete will be measured by the cubic yard as specified in [Section 6-02](#).

Steel reinforcing bars will be measured by the pound as specified in [Section 6-02](#).

Structure excavation Class B and Structure excavation Class B including haul will be measured by the cubic yard as specified in [Section 2-09.4](#).

Gravel backfill for foundation Class A or Class B will be measured by the cubic yard as specified in [Section 2-09.4](#).

Shoring or extra excavation will be measured as specified in [Section 2-09.4](#).

The length of safety bars for culvert pipe will be the number of linear feet of each safety bar installed.

Tapered end Section with safety bars will be measured by the unit per each.

7-03.5 Payment

Payment will be made in accordance with [Section 1-04.1](#), for each of the following Bid items that are included in the Proposal:

“St. Str. Plate Pipe ___ Gage ___ In. Diam.”, per linear foot.

“St. Str. Plate Pipe Arch ___ Gage ___ Ft. Span”, per linear foot.

“St. Str. Plate Arch ___ Gage ___ Ft. Span”, per linear foot.

“Design ___ St. Underpass ___ Gage ___ Ft. Span”, per linear foot.

All costs involved in obtaining, hauling, placing, and finishing earth to be placed in the invert of the underpass shall be included in the unit Contract price for “Design ___ St. Underpass ___ Gage ___ Ft. ___ In. Span”.

“Al. Str. Plate Pipe ___ In. Th. ___ In. Diam.”, per linear foot.

“Al. Str. Plate Pipe Arch ___ In. Th. ___ Ft. ___ In. Span”, per linear foot.

“Al. Str. Plate Arch ___ In. Th. ___ Ft. ___ In. Span”, per linear foot.

“Design ___ Al. Underpass ___ In. Th. ___ Ft. ___ In. Span”, per linear foot.

All costs involved in obtaining, hauling, placing, and finishing earth to be placed in the invert of the underpass shall be included in the unit Contract price for “Design ___ Al. Underpass ___ In. Th. ___ Ft. ___ In. Span”.

“Conc. Class ___”, per cubic yard.

The unit Contract price per cubic yard for “Conc. Class ___” shall be paid as specified in [Section 6-02](#).

“St. Reinf. Bar”, per pound.

The unit Contract price per pound for “St. Reinf. Bar” shall be paid as specified in [Section 6-02](#).

“Structure Excavation Class B”, per cubic yard.

“Structure Excavation Class B Incl. Haul”, per cubic yard.

“Gravel Backfill for Foundation Class ___”, per cubic yard.

“Shoring or Extra Excavation Class B”, per square foot.

“Safety Bars for Culvert Pipe Type ___”, per linear foot.

“Tapered End Section with Type ___ Safety Bars ___ In. Diam.”, per each.

“Tapered End Section with Type ___ Safety Bars ___ In. Span”, per each.