

FILE NAME: P:\dgn\standards\Culverts (Pipe)\steel\pip_std.dgn

CONSTRUCTION NOTES

GENERAL:

These structures are designed for Cooper E80 Live Load with impact, and cover as shown in Table 1.

Table 1 indicates the minimum required thickness for structural stability based on the assumptions listed below. The required gage thickness for structural steel plate pipe includes an allowance for corrosion.

DESIGN ASSUMPTIONS:

Backfill Unit Weight = 120 pcf.
 Factors of Safety: Seam Strength = 3, Wall Area = 2, Buckling = 2
 Minimum Yield Point: Steel = 33 ksi.
 Modulus of Elasticity: Steel = 29,000 ksi.
 Minimum Tensile Strength: Steel = 45 ksi

INSTALLATION:

- Installation of SPP shall conform to the current American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual for Railway Engineering, Chapter 1, Part 4. Culvert lengths are to be based on standard mainline roadbed sections.
- These standards are for installation in soil with a pH of 5-9 and resistivity $\geq 1,500$ ohm-cm. Pipes located in soils outside this range shall have additional corrosion protection as specified by the engineer.
- Wire or timber strutting used during installation must be removed immediately after installation and backfill are complete.
- Structural plate pipe culverts must be placed with the inside circumferential laps pointing downstream.
- Culverts resting on rock foundation need not be cambered. Unless otherwise specified by the engineer all other SPP culverts shall be cambered in accordance with the following:
 - Embankments up to 8 feet high (measured base of rail to flowline) require a 1/2 inch camber.
 - Embankments 8 feet to 12 feet high require a 2/2 inch camber.
 - Embankments 12 feet to 24 feet high require a 4 inch camber.
 - Embankments 24 feet to 36 feet high require a 6 inch camber.

In no case shall the culvert be cambered so high in the center that water will be pocketed at the inlet end of the pipe.

MATERIALS:

- SPP material and connecting material shall be in accordance with the current AREMA Manual for Railway Engineering, Chapter 1, Part 4, Section 6.
- The pipe shall be fabricated, assembled into sections and furnished as follows:
 - 6" x 2" annular corrugations.
 - 5% vertical elongation.
 - A minimum of 4 steel bolts per foot
- Permanently attach an identification plate inside the pipe near the end of each pipe run. The plate is to contain the following information in at least 1/4 inch high letters:
 - Name of manufacturer and plant location
 - Date manufactured
 - Gage
 - Diameter
 - Length

STRUCTURAL PLATE PIPE - STEEL GAGE TABLE FOR E-80 LOADS

| DIA. (IN.) | HEIGHT OF COVER (FT.) - BASE OF RAIL TO TOP OF PIPE | | | | | | | | | | | | | | |
|---------------|---|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 3/2-5 | 6-10 | 11-15 | 16-20 | 21-25 | 26-30 | 31-35 | 36-40 | 41-45 | 46-50 | 51-55 | 56-60 | 61-65 | 66-70 | 71-75 |
| 60 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 8 | 8 | 8 | 8 | 7 | 7 |
| 66 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 8 | 8 | 8 | 8 | 7 | 7 | 7 |
| 72 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 8 | 8 | 8 | 8 | 7 | 7 | 7 | 5 |
| 78 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 8 | 8 | 8 | 7 | 7 | 7 | 5 | 5 |
| 84 | 10 | 10 | 10 | 10 | 10 | 10 | 8 | 8 | 8 | 7 | 7 | 7 | 5 | 5 | 3 |
| 90 | 8 | 10 | 10 | 10 | 10 | 10 | 8 | 8 | 8 | 7 | 7 | 5 | 5 | 3 | 3 |
| 96 | 8 | 10 | 10 | 10 | 10 | 8 | 8 | 8 | 7 | 7 | 7 | 5 | 3 | 3 | 1 |
| 102 | 8 | 10 | 10 | 10 | 10 | 8 | 8 | 8 | 7 | 7 | 5 | 5 | 3 | 1 | 1 |
| 108 | 8 | 10 | 10 | 10 | 8 | 8 | 8 | 7 | 7 | 5 | 5 | 3 | 1 | 1 | |
| 114 | 8 | 8 | 10 | 10 | 8 | 8 | 8 | 7 | 7 | 5 | 3 | 3 | 1 | 1 | |
| 120 | 8 | 8 | 10 | 10 | 8 | 8 | 7 | 7 | 5 | 5 | 3 | 1 | 1 | | |
| 126 | 7 | 8 | 10 | 8 | 8 | 8 | 7 | 7 | 5 | 3 | 3 | 1 | | | |
| 132 | 7 | 8 | 10 | 8 | 8 | 8 | 7 | 7 | 5 | 3 | 1 | 1 | | | |
| 138 | 7 | 8 | 10 | 8 | 8 | 7 | 7 | 5 | 3 | 3 | 1 | | | | |
| 144 | 7 | 8 | 8 | 8 | 8 | 7 | 7 | 5 | 3 | 1 | 1 | | | | |
| 150 | 7 | 8 | 8 | 8 | 8 | 7 | 7 | 3 | 3 | 1 | | | | | |
| 156 | 7 | 8 | 8 | 8 | 7 | 7 | 5 | 3 | 1 | 1 | | | | | |
| 162 | 5 | 7 | 8 | 8 | 7 | 7 | 5 | 3 | 1 | | | | | | |
| 168 | 5 | 7 | 8 | 8 | 7 | 5 | 3 | 3 | 1 | | | | | | |
| 174 | 5 | 7 | 8 | 7 | 7 | 5 | 3 | 1 | 1 | | | | | | |
| 180 | 5 | 7 | 8 | 7 | 7 | 5 | 3 | 1 | | | | | | | |
| 186 | 3 | 7 | 8 | 7 | 7 | 5 | 3 | 1 | | | | | | | |
| 192 | 3 | 7 | 8 | 7 | 7 | 3 | 3 | 1 | | | | | | | |
| 198 | 3 | 7 | 8 | 7 | 5 | 3 | 1 | | | | | | | | |
| 204 | 1 | 5 | 7 | 7 | 5 | 3 | 1 | | | | | | | | |
| 210 | 1 | 5 | 7 | 7 | 3 | 1 | | | | | | | | | |
| 216 | | 3 | 7 | 5 | 3 | 1 | | | | | | | | | |
| 222 | | 3 | 7 | 5 | 3 | 1 | | | | | | | | | |
| 228 | | 3 | 5 | 3 | 1 | | | | | | | | | | |
| 234 | | 1 | 5 | 3 | 1 | | | | | | | | | | |
| 240 | | 1 | 3 | 1 | | | | | | | | | | | |

| REVISIONS | | | DESIGN BY: CLJ | DRAWN BY: CLJ | CHECKED BY: CLJ |
|-----------|------|-------------|---|---------------|-----------------|
| DATE | LTR. | DESCRIPTION | APPROVED: | | |
| / | | | <i>George J. Meyn</i> 4/4/08 UPRR - MGR SPECIAL PROJECTS STRUCTURES DESIGN | | |
| / | | | | | |
| / | | | | | |
| / | | | | | |
| / | | | | | |
| / | | | | | |



BRIDGE STANDARDS

CONSTRUCTION NOTES AND TABLE FOR STRUCTURAL PLATE PIPE CULVERTS

FILE OWNER: UPRR DATE: _____
 PLAN NO.: 680030 SHEET: 1 OF 1