



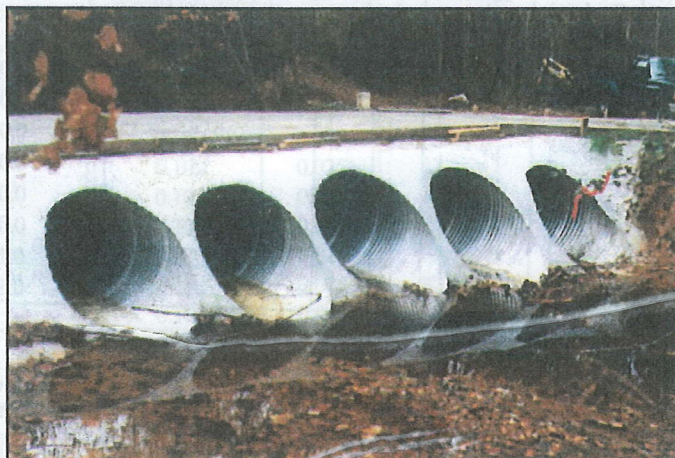
SOUTHEAST CULVERT, INC.

## Corrugated Steel Pipe



### Corrugated Metal Pipe Products

- CSP
- Max Flow
- Detention Systems
- End Treatments
- Specialty Fabrications





# Corrugated Steel Pipe

## Structural Integrity

### Height of Cover for 2'- $\frac{2}{3}$ " x $\frac{1}{2}$ " Corrugated Steel Pipe H20 or H25 Live Loads

Diameter or Span, Inches	Minimum Cover <sup>2</sup> , Inches	Maximum Cover, Feet				Manning's "n" for full flow - unpaved	Volume (ft <sup>3</sup> /ft)
		Specified Thickness/Gage					
		0.064	0.079	0.109	0.138		
		16	14	12	10		
12	12	248	310			0.011	0.8
15		199	248			0.012	1.2
18		166	207			0.013	1.8
24		124	155	218		0.015	3.1
30		99	124	174		0.017	4.9
36		83	103	145	186	0.018	7.1
42		71	88	124	160	0.019	9.6
48		62	77	109	140	0.020	12.6
54			66	93	122	0.021	15.9
60				79	104	0.021	19.6
66			68	88	0.021	23.8	
72	12				75	0.021	28.3

### Height of Cover for 2'- $\frac{2}{3}$ " x $\frac{1}{2}$ " Corrugated Steel Pipe-Arch H20 or H25 Live Loads

Span & Rise, (Inches)	Round Pipe Equiv. (inches)	Minimum Cover <sup>2</sup> , Inches	Maximum Cover, (Feet) Over Pipe-Arch for Soil Bearing Capacity <sup>1</sup> of 2 tons/ft <sup>2</sup>	Minimum Specified Sheet Thickness Required (inch)	Manning's "n" for full flow - unpaved	Volume (ft <sup>3</sup> /ft)
17 x 13	15	12	16	0.064	0.013	1.1
21 x 15	18		15	0.064	0.014	1.6
28 x 20	24		15	0.064	0.016	2.9
35 x 24	30		15	0.064	0.018	4.5
42 x 29	36		15	0.064	0.019	6.5
49 x 33	42		15	0.079	0.020	8.9
57 x 38	48		15	0.109	0.021	11.6
64 x 43	54	12	15	0.109	0.022	14.7

#### NOTES:

- 1 - Soil bearing capacity refers to the soil in the region of the pipe corners. The remaining backfill must be compacted to a specified AASHTO T-99 density of 90%.
  - 2 - Minimum covers for heavy construction loads may be more than minimums shown. Minimum cover are measured from top of pipe to bottom of flexible pavement or top of rigid pavement.
- Minimum cover must be maintained in unpaved traffic areas.

No express warranties of merchantability or fitness are created or intended by the document or its illustrative text.



# Corrugated Steel Pipe

## Structural Integrity

### Height of Cover for 5" x 1" Corrugated Steel Pipe

H20 or H25 Live Loads

Diameter or Span, Inches	Minimum Cover <sup>2</sup> , Inches	Maximum Cover, Feet				Manning's "n" for full flow - unpaved	Volume (ft <sup>3</sup> /ft)	
		Specified Thickness/Gage						
		0.064	0.079	0.109	0.138			
		16	14	12	10			
54	12	56	70	98	126	0.022	15.9	
60		50	63	88	114	0.023	19.6	
66		46	57	80	103	0.024	23.8	
72		42	52	73	95	0.024	28.1	
78		*	48	68	87	0.025	33.2	
84		*	45	63	81	0.025	38.5	
90		*	42	59	76	0.025	44.2	
96		12	*	*	55	71	0.025	50.3
102		18	*	*	52	67	0.025	56.8
108				*	49	63	0.025	63.6
114				*	45	58	0.025	70.9
120			*	41	54	0.025	78.5	
126				39	50	0.025	86.6	
132				*	47	0.025	95.0	
138				*	43	0.025	103.9	
144		18			39	0.025	113.1	

#### Notes:

\* - Pipe can be provided in these lighter gages, call for maximum cover.

### Height of Cover for 5" x 1" Corrugated Steel Pipe-Arch

H20 or H25 Live Loads

Span & Rise, (Inches)	Round Pipe Equiv. (inches)	Minimum Cover <sup>2</sup> , Inches	Maximum Cover, (Feet) Over Pipe-Arch for Soil Bearing Capacity <sup>1</sup> of 2 tons/ft <sup>2</sup>	Minimum Specified Sheet Thickness Required (inch)	Manning's "n" for full flow - unpaved	Volume (ft <sup>3</sup> /ft)
60 x 46	54	15	25	0.109	0.025	15.6
66 x 51	60	15	25	0.109	0.025	19.3
73 x 55	66	18	25	0.109	0.025	23.2
81 x 59	72	18	24	0.109	0.025	27.4
87 x 63	78	18	21	0.109	0.025	32.1
95 x 67	84	18	20	0.109	0.025	37.0
103 x 71	90	18	20	0.109	0.025	42.4
112 x 75 <sup>3</sup>	96	21	20	0.109	0.025	48.0

#### NOTES:

1 - Soil bearing capacity refers to the soil in the region of the pipe corners. The remaining backfill must be compacted to a specified AASHTO T-99 density of 90%.

2 - Minimum covers for heavy construction loads may be more than minimums shown. Minimum cover are measured from top of pipe to bottom of flexible pavement or top of rigid pavement.

Minimum cover must be maintained in unpaved traffic areas.

3 - Larger sizes are available, please call for information.

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CSP Information -pg 3

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# Corrugated Steel Pipe

## CSP Installation & Specification

### Bedding

Proper bedding is an important element of the installation procedure. All pipe must be placed on stable earth or fine granular foundation. Never install pipe on sod, frozen earth or large rocks. Any bedding should provide uniform support to the pipe.

### Backfill Material

Proper backfill material, placement and compaction are the keys to a successful pipe installation. Generally, local fill materials are suitable if properly placed and compacted. Select drainable structural fill material is the best material for backfill. All fill material must be free from rocks and hard earth clods larger than 3 inches in size. It must not contain any frozen material, sod, cinders or earth containing organic matter. If the material is questionable, the design engineer or a qualified soils engineer should be consulted.

### Placing the Backfill

Adequate compaction of backfill is a necessity for all types of pipe products, rigid and flexible. The backfill should be most carefully placed under the haunches, equally on both sides to a compacted depth of 6 to 8 inches. The compaction should be to a minimum 90% Standard Proctor density. The backfill must be compacted fully to the minimum cover level before any highway or *light* construction loading is placed on the structure. Extra cover is required for heavy construction equipment. Please refer to the construction load chart for the required minimum cover during construction operations.

### Durability

Corrugated Steel Pipe is available in a wide variety of coatings and steel thicknesses. The typical Corrugated Steel Pipe specification calls for either an Aluminized Steel Type 2 Coating or Bituminous Coating. Aluminized offers a life of 100 years minimum in the recommended environment. A combination of coatings and steel thickness can provide the service life for any storm drain project. A service life of 50 years to 100 years can be obtained with the proper selection of coatings and gages. More information is available about the durability of metal pipe. Please call us or visit [www.ncspa.org](http://www.ncspa.org) for more information.

### CSP Specifications

#### Scope

This specification covers the manufacture of Corrugated Steel Pipe.

#### Material

The pipe material shall be Aluminized, Galvanized, Bituminous Coated or Polymer Coated.

#### Pipe

Corrugated Steel Pipe shall be manufactured with the pipe sizes, gages and corrugation profile shall be as shown on the project plans.

#### Reference Specifications

**Pipe** Steel - Galvanized and Aluminized  
AASHTO M36, ASTM A760  
Polymer Coated  
AASHTO M245, ASTM A762

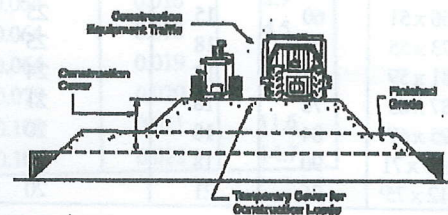
#### Material

Galvanized  
AASHTO M246, ASTM A929  
Aluminized  
AASHTO M274, ASTM A929  
Polymer Coated  
AASHTO M246, ASTM A742

#### Installation

AASHTO Section 26, ASTM A798

### Construction Loads



Pipe Span, (in.)	Min. Cover for axle loading(kips)			
	18-50	50-75	75-110	110-150
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

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