



TrueNorth Steel®

TrueNorth Steel Presents

Corrugated Steel Pipe & Modular Bridge



PRESENTATION

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Sales Engineer
TrueNorth Steel



ABOUT US

TrueNorth Steel's story began in 1945 when Ole Rommesmo Sr., a Norwegian immigrant, launched his first company: Fargo Tank. From the very beginning, the business reflected Ole Sr., his values and his principles. **Integrity, humility, focus and knowledge.** These words describe Ole Sr., and they describe the entire TrueNorth Steel team today.

Celebrating 75 Years of Steel



FOUR PRODUCT LINES AND LOGISTICS COMPANY



FTC
Transport, Inc.



ABOVE & UNDER GROUND STORAGE TANKS



COMMERCIAL & INDUSTRIAL STRUCTURAL STEEL



STEEL MODULAR & WELDED PLATE GIRDER BRIDGES



DRAINAGE & STORMWATER MANAGEMENT SOLUTIONS



Corrugated Steel Pipe

History

- CSP was first invented in 1896. Yes, that's 128 years ago.
- CSP can be made in diameters ranging from 6" to 196"
- Lengths upwards of 80' are possible
- CSP is produced out of flat rolled coil stock
- It can withstand extremely deep fill heights in excess of 100'
- Steel contains the highest % of recycled material compared to competing products used in drainage applications (i.e. concrete, HDPE, PVC, etc.)
- CSP steel thicknesses vary between 18 gauge – 8 gauge



Corrugated Steel Pipe

1. Cost Effective

Corrugated Steel Pipe (CSP) is the most economical installed solution when considering material, installation and life cycle costs.

2. Structural Capacity, Durability and Hydraulic Performance

CSP has superior structural capacity to HDPE pipe and can handle deeper cover than RCP. Premium coatings and heavier gages are available to meet any service life requirements. Spiral Rib CSP and Double Wall CSP have a Manning's "n" coefficient of 0.012 and are excellent storm sewer products.

3. Proven History and Track Record

With more than 100 years of usage, there is no other drainage pipe product that has been tested and proven more than CSP. Engineers and Agencies can be confident they are specifying the right product for the right application.

4. Ease of Installation

CSP is easy to install due to its lightweight, long lengths and prefabricated fittings. Most contractors are familiar with CSP, facilitating a smooth installation process.

5. System Layout Flexibility

Custom lengths and fittings give CSP the ability to fit any site with minimal waste.



Specifications

Summary

Standard Specifications

- Materials
 - Aluminized T2: AASHTO M274 / ASTM A-929
 - Galvanized 2oz: AASHTO M218 / ASTM A929
 - Polymer Coated: AASHTO M246 / ASTM A742
- Fabrication
 - Alum-T2 and Galvanized: AASHTO M36 / ASTM A760
 - Polymer Coated: AASHTO M245 / ASTM A762
 - Reinforcement: ASTM A998
- Installation
 - AASHTO Standard Specifications for Highway Bridges, Section 26, Division II / ASTM A798

All Steel Items are Melted and Manufactured in the U.S.A.

All components meet the requirements for materials, workmanship, and finished products as set forth in the federal specification W-P-405B and/or AASHTO M36.



Corrugated Steel Pipe

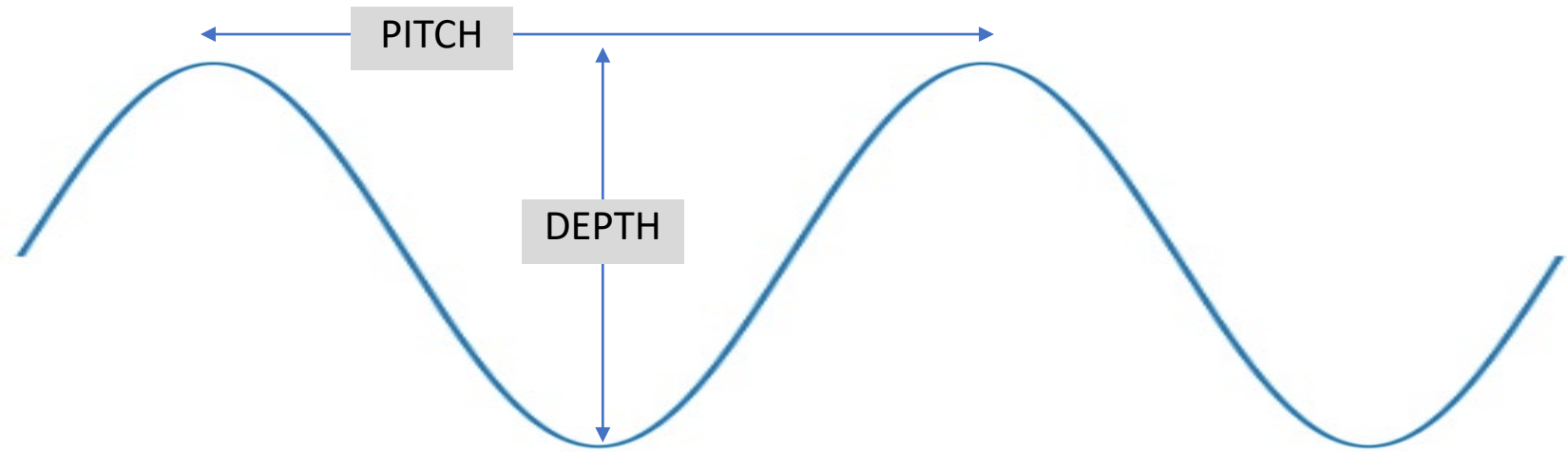
Design Factors

- Size, Shape, Alignment, and Grade can all have effects on hydraulics and service life
- Structural Integrity: What is needed to meet embankment and superimposed live loads and hydraulic forces
- Trouble-Free Service Life through material selection. Gauge and Coating.
- Economics – Cost of the materials, installation, and maintenance over the life of the pipe

Corrugated Steel Pipe

Corrugation Profiles

- Corrugating a flat sheet increases it's stiffness and strength.
- The corrugations are commonly sinusoidal

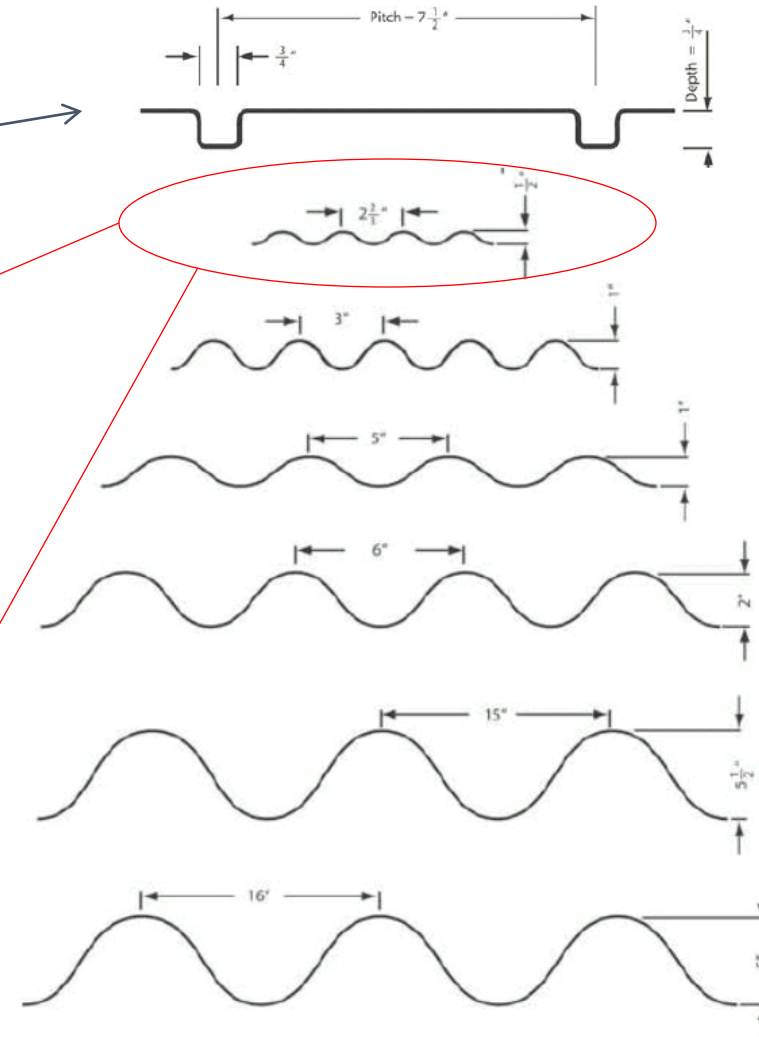
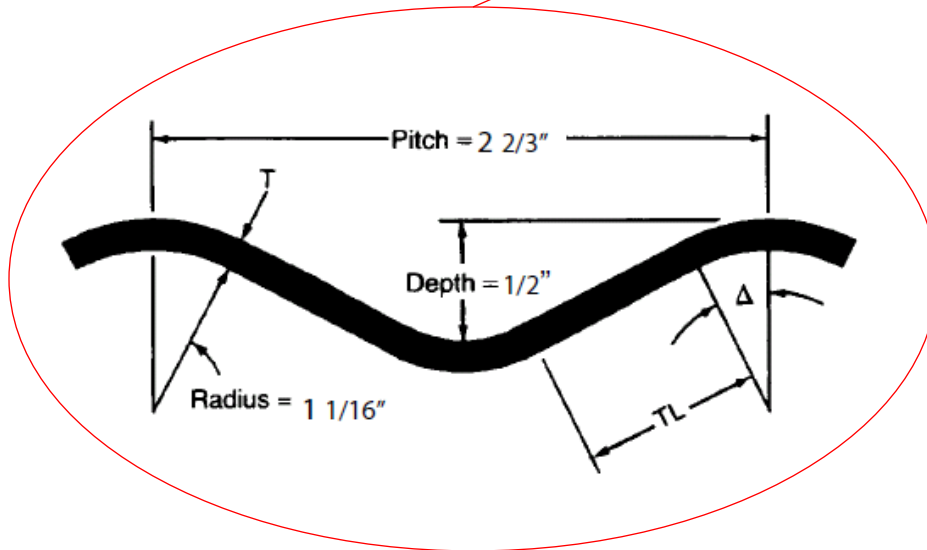


Corrugated Steel Pipe

Corrugation Profiles

- Common Profiles Include:

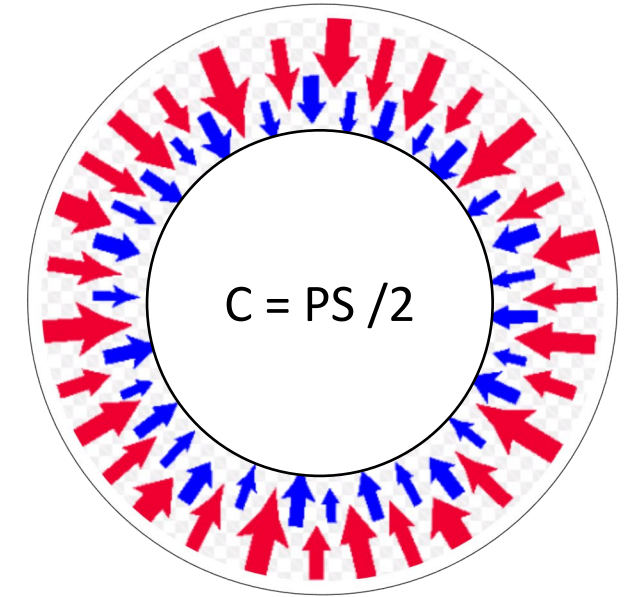
- $\frac{3}{4}" \times \frac{3}{4}" \times 7\frac{1}{2}"$
 - Manning's "n" = 0.012
- $2\frac{2}{3}" \times \frac{1}{2}"$
- $5" \times 1"$



Corrugated Steel Pipe

Corrugation Profiles

- Ring Compression (C) is the principal stress in a confined thin circular ring subjected to external pressure.
- **Proper backfill and compaction is essential to achieve ring compression**
 - You have to pack them!!!!!!
 - All types of conduit rely on proper fill and compaction



$$C = P_v(S/2)$$

where

- C = Ring compression, lbs/ft
- P_v = Vertical design pressure, psf
- S = Span, ft

Corrugated Steel Pipe

Loading

- Earth Loads or Dead Loads
 - Weights from soils, pipe, fluids, foundations, and surcharges
- Live Loads
 - Loading from highways, trains, aircraft
 - Most common are H20, HL-93, & E80
- Construction Loads
 - Usually necessary to add cover over the pipe to distribute the construction loads effectively
 - Jacking Loads
 - Axial loading due to installation and earth loading due to overburdens
- Other Loads
 - Groundwater is an example that could cause the pipe to “float”.

Corrugated Steel Pipe

Service Life

So How Long Does CSP Really Last?

ANSWER...

- It depends on:
 - Native Soils
 - Backfill Materials Used
 - CSP Material and Coating Characteristics
 - Installation Methods
 - Size, Shape, Hardness, and Volume of Bedload
 - Anticipated changes in the upstream watershed (i.e. development, mining, or logging)



Corrugated Steel Pipe

Service Life

Table 9.1			
Estimated Material Service Life for CSP			
CSP Material	Estimated Service Life	Site Environmental Conditions	Maximum FHWA Abrasion Level
GALVANIZED CSP	AVERAGE 50 YEARS	$6.0 \leq \text{pH} \leq 10.0$ $2000 \leq r \leq 10,000$ (ohm-cm) Water Hardness (> 50 ppm CaCO ₃)	LEVEL #2
ALUMINIZED TYPE 2 CSP	MINIMUM 75 YEARS	$5.0 \leq \text{pH} \leq 9.0$ $r > 1500$ ohm-cm	LEVEL #2
POLYMER COATED CSP*	MINIMUM 100 YEARS	$5.0 \leq \text{pH} \leq 9.0$ $r > 1500$ ohm-cm	LEVEL #3
	MINIMUM 75 YEARS	$4.0 \leq \text{pH} \leq 9.0$ $r \geq 750$ ohm-cm	
	MINIMUM 50 YEARS	$3.0 \leq \text{pH} \leq 12.0$ $r \geq 250$ ohm-cm	
NOTE: Refer to Table 9.3 for definition of FHWA abrasion levels. * Polymer coating is 0.010 in. on each side.			



Table 9.3		
FHWA Abrasion Levels		
Level 1	Non-Abrasive	No bed load regardless of velocity; or storm sewer applications
Level 2	Low Abrasion	Minor bed loads of sand and gravel and velocities of 5 ft/sec. or less
Level 3	Moderate Abrasion	Bed loads of sand and small stone or gravel with velocities between 5 and 15 ft/sec.
Level 4	Severe Abrasion	Heavy bed loads of gravel and rock with velocities exceeding 15 ft/sec.
NOTE: Consideration of velocities should be based on a frequent storm event, such as a 2-year storm.		

Corrugated Steel Pipe

Service Life

Corrugated Steel Pipe Material Selection **IS NOT** a “One Size Fits All” Proposition...

What is the Project’s Design Life?

- 25 years
- 50 years
- 75 years
- 100 years

It is important to realize that culverts are not assumed to be at or near the point of collapse at the end of their design service life.

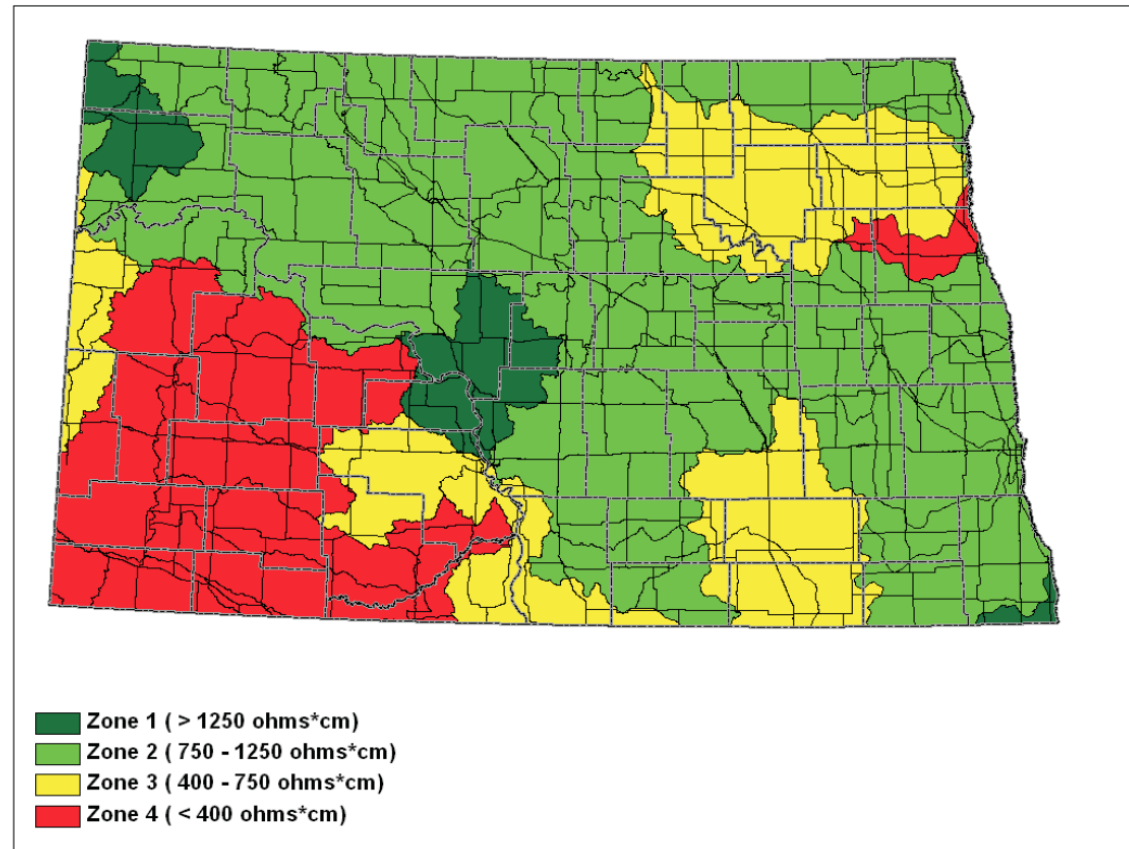
Rather, it is the period of little to no rehabilitative maintenance.

Corrugated Steel Pipe

Service Life

Corrosion Zone Map & Tables

North Dakota Corrosion Zones (Map 1)
(Based on Soil Resistivity)



Corrugated Steel Pipe

Service Life

Corrosion Table: 4a

Mainline Drainage
(Design Service Life – 75 Years)

		Corrosion Zone			
Pipe Material		Zone 1	Zone 2	Zone 3	Zone 4
Concrete Pipe (Section 830.01)		Y	Y	Y	Y
Metal Pipe (Section 830.02)	Gauge				
Zinc Coated Corrugated Steel	16 ga.				
	14 ga.				
	12 ga.				
	10 ga.	Y			
	8 ga.	Y	Y		
Aluminum Coated Corrugated Steel (Type 2)	16 ga.				
	14 ga.				
	12 ga.	Y			
	10 ga.	Y	Y		
	8 ga.	Y	Y	Y	
Polymeric Coated Steel (over Zinc or Aluminum Coated Steel)	16 ga.	Y	Y	Y	Y
	14 ga.	Y	Y	Y	Y
	12 ga.	Y	Y	Y	Y
	10 ga.	Y	Y	Y	Y
	8 ga.	Y	Y	Y	Y
Plastic Pipe (Section 830.03)					
Polypropylene Pipe (Type S)		Y	Y	Y	Y

Corrosion Table: 4b

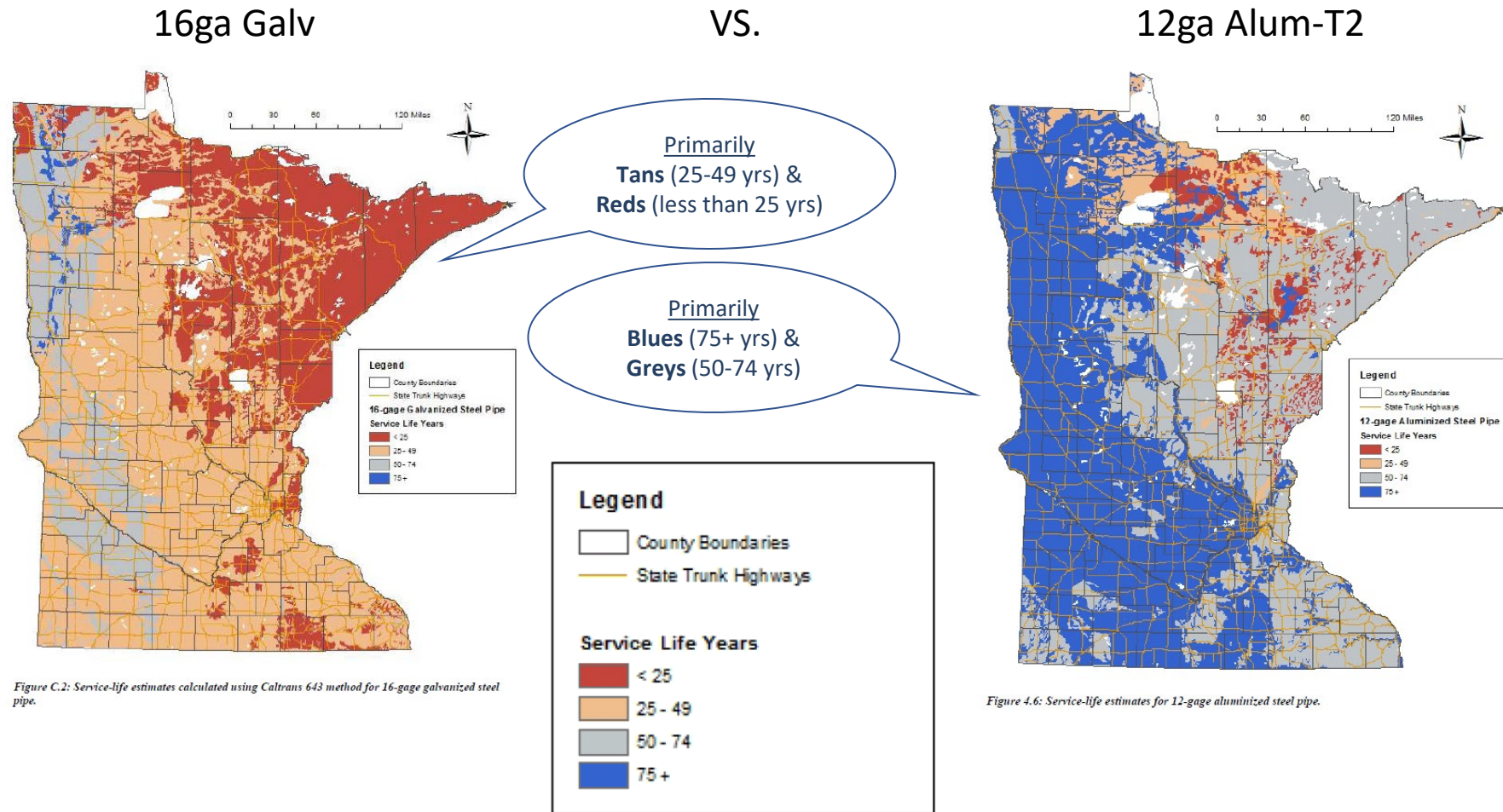
Approach Drainage
(Design Service Life – 40 Years)

		Corrosion Zone			
Pipe Material		Zone 1	Zone 2	Zone 3	Zone 4
Concrete Pipe (Section 830.01)		Y	Y	Y	Y
Metal Pipe (Section 830.02)	Gauge				
Zinc Coated Corrugated Steel	16 ga.	Y	Y	Y	Y
	14 ga.	Y	Y	Y	Y
	12 ga.	Y	Y	Y	Y
	10 ga.	Y	Y	Y	Y
	8 ga.	Y	Y	Y	Y
Aluminum Coated Corrugated Steel (Type 2)	16 ga.	Y	Y	Y	Y
	14 ga.	Y	Y	Y	Y
	12 ga.	Y	Y	Y	Y
	10 ga.	Y	Y	Y	Y
	8 ga.	Y	Y	Y	Y
Polymeric Coated Steel (over Zinc or Aluminum Coated Steel)	16 ga.	Y	Y	Y	Y
	14 ga.	Y	Y	Y	Y
	12 ga.	Y	Y	Y	Y
	10 ga.	Y	Y	Y	Y
	8 ga.	Y	Y	Y	Y
Plastic Pipe (Section 830.03)					
High-Density Polyethylene (Type S)		Y	Y	Y	Y
Polypropylene Pipe (Type S)		Y	Y	Y	Y

This information is taken from the Ch. 5 of NDDOT Pipe Design Manual

Corrugated Steel Pipe

Service Life



This information is taken from the Minnesota Steel Culvert Pipe Service-Life Map published by the MNDOT in June 2015

Corrugated Steel Pipe

Service Life

- The American Iron and Steel Institute (AISI) assisted our industry in developing this chart for Estimating average invert life for **16 gauge galvanized** CSP.
- Resistivity** (R, ohm-cm) & **pH** of the native soil and water is required to determine the **Average Invert Life for Galvanized CSP**

Example

Soil Resistivity = **2000 ohm*cm**

Soil pH = **7.0**

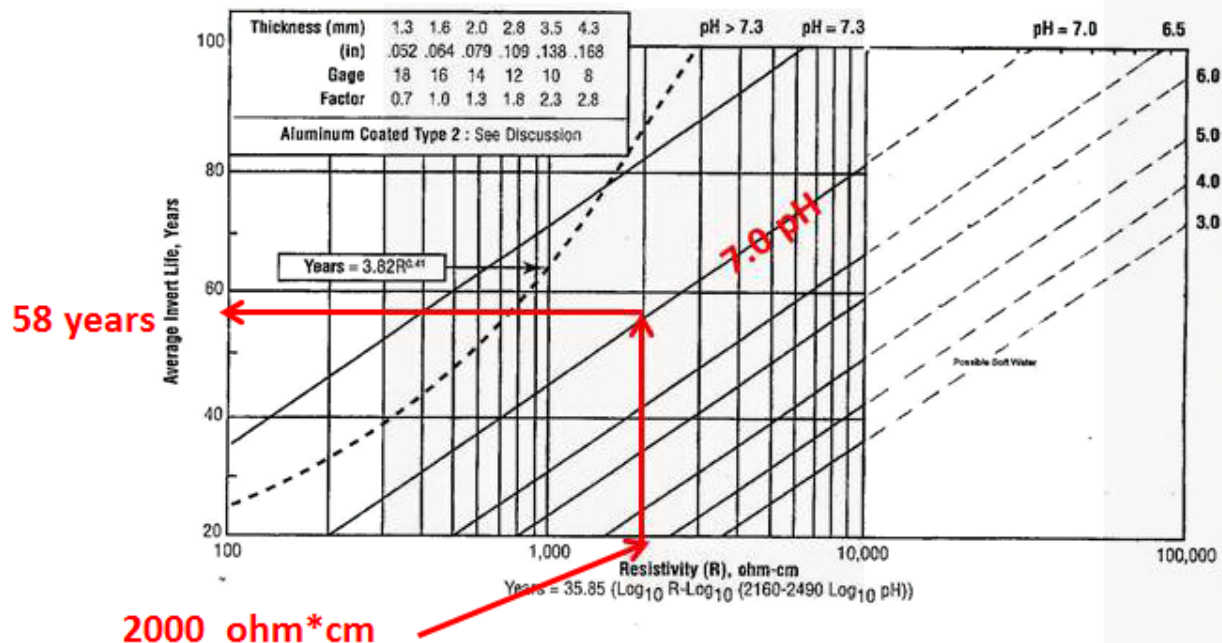
THEN

Average Invert Life 16g = **58 years**

Average Invert Life 14g = **75 years**

Average Invert Life 12g = **104 years**

AISI Chart for Estimating Average Invert Life for Galvanized CSP



Corrugated Steel Pipe

Soil Classifications

Table 7.6

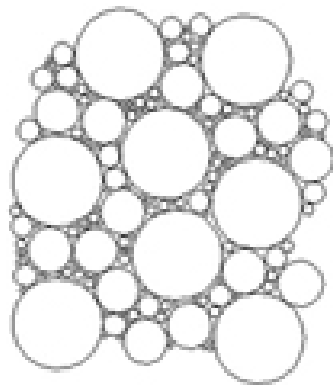
Soil types by UCS and AASHTO classifications

UCS Soil Classification	AASHTO M 145 Soil Classification		Soil Description
	Group A1	Subgroup	
GW GP SP GM SM SP SM		A1-a A1-b	Well graded gravel Gravelly sand
	A2		
GM SM ML SP GP SC GC GM SC GC SC GC		A2-4 A2-5 A2-6 A2-7	Sand and gravel with low plasticity silt Sand and gravels with elastic silt Sands with clay fines Sands with highly plastic clay fines
SW SP SM	A3		Fine sands, such as beach sand
ML CL OL	A4		Low compressibility silts
MH OH ML OL	A5		High compressibility silts
CL ML CH	A6		Low to medium compressibility silts
OL OH CH CM CL	A7		High compressibility silts and clays
PT OH	A8		Peat and organics; Not suitable as backfill

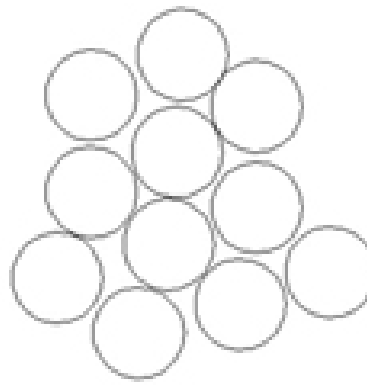
Corrugated Steel Pipe

Soil Gradation

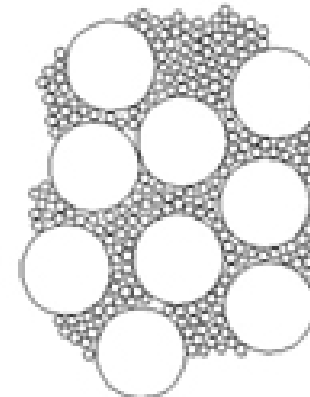
- The best backfill material is an angular, clean, well graded, granular fill meeting the requirements of AASHTO A-1-a
 - If the bedding is uniformly or poorly graded (particles all one size), a geotextile separation fabric should be used to prevent the migration of fines between the backfill and bedding layers.



Well Graded



Poorly Graded



Gap Graded











Corrugated Steel Pipe

Cross-Sectional Profiles

- Round and Pipe-Arch profiles are the most common
- Round Pipe is more economical
- Pipe-Arch profiles are made from round pipe
- Pipe Arch profiles often require heavier gauge steel and have a higher “minimum fill” requirement
- Pipe Arch allows for an increased waterway area at lower elevations. This is a benefit in situations where vertical space is limited so that the finished grade elevation does not have to be raised.

Table 2.1

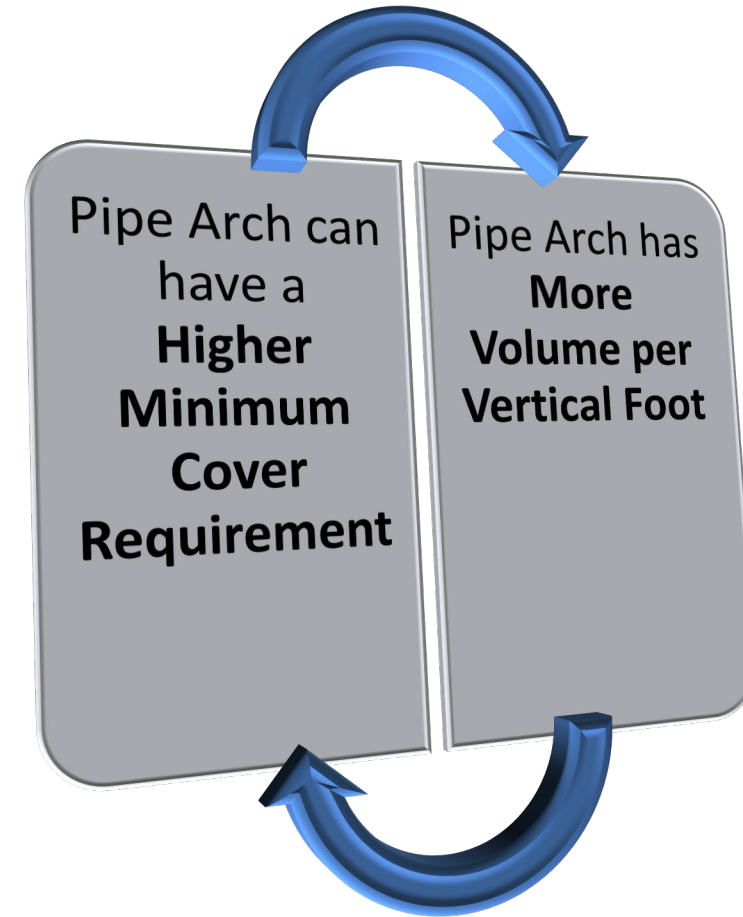
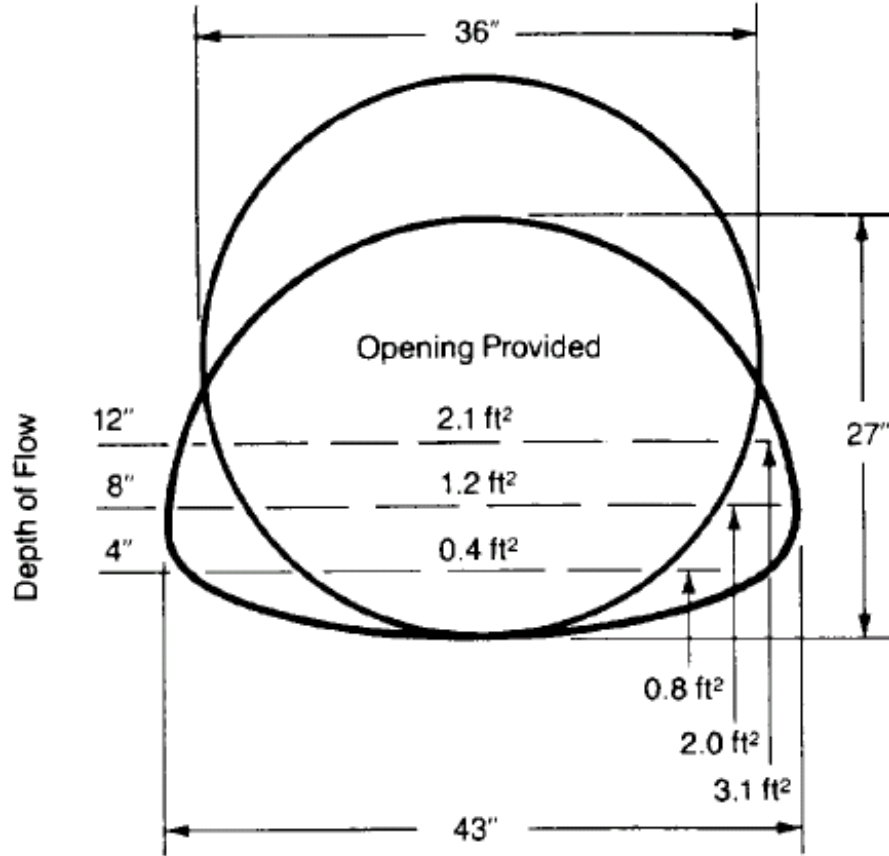
Shapes and uses of corrugated conduits

Shape	Range of Sizes	Common Uses
Round 	6 in. - 51 ft	Culverts, subdrains, sewers, service tunnels, etc. All plates same radius. For medium and high fills (or trenches).
Vertical ellipse 5% nominal 	4 - 21 ft nominal; before elongating	Culverts, sewers, service tunnels, recovery tunnels. Plates of varying radii; shop fabrication. For appearance and where backfill compaction is only moderate.
Pipe Arch 	Span x Rise 17 in. x 13 in. to 20 ft 7 in x 13 ft 2 in.	Where headroom is limited. Has hydraulic advantages at low flows. Corner plate radius 18 inches or 31 inches for structural plate.
Underpass* 	Span x Rise 5 ft 8 in. x 5 ft 9 in. to 20 ft 4 in. x 17 ft 9 in.	For pedestrians, livestock or vehicles (structural plate).
Arch 	Span x Rise 5 ft x 1 ft 9 1/2 in. to 82 ft x 42 ft	For low clearance large waterway opening, and aesthetics (structural plate).
Horizontal Ellipse 	Span 7 - 40 ft	Culverts, grade separations, storm sewers, tunnels (structural plate).
Pear 	Span 25 - 30 ft	Grade separations, culverts, storm sewers, tunnels (structural plate).
High Profile Arch 	Span 20 - 83 ft	Culverts, grade separations, storm sewers and tunnels. Ammunition magazines, earth covered storage (structural plate).
Low Profile Arch 	Span 20 - 83 ft	Low-wide waterway enclosures, culverts, storm sewers (structural plate).
Box Culverts 	Span 10 - 53 ft	Low-wide waterway enclosures, culverts, storm sewers (structural plate).
Specials	Various	For lining old structures or other special purposes. Special fabrication.

Notes: *For equal area or clearance, the round shape is generally more economical and easier to assemble.

Corrugated Steel Pipe

Cross-Sectional Profiles



Joints and Connections

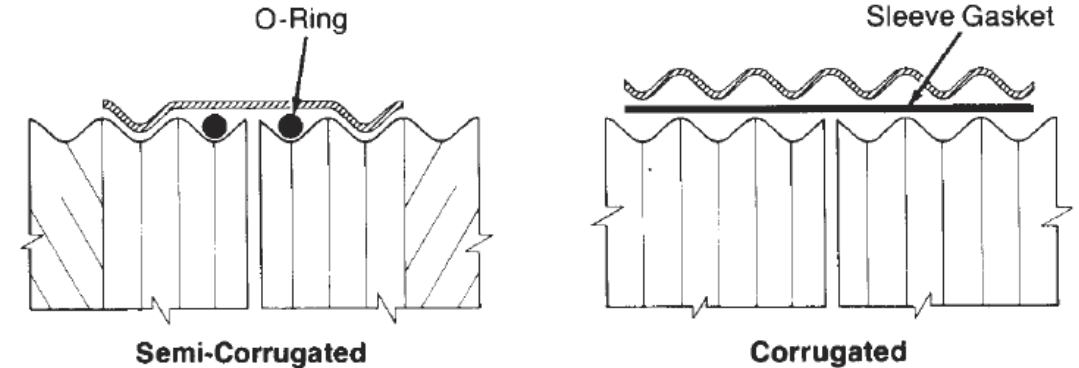
Purpose

The purpose of joining systems is to connect adjacent pipe sections, maintain alignment, transfer shear loads, prevent pipe from separating, and to provide the means for drainage flow to pass from one pipe section to another.

Joining systems are classified as:

- Soil Tight
- Silt Tight
- Leak Resistant
- Special Design







Standard CSP Band Types

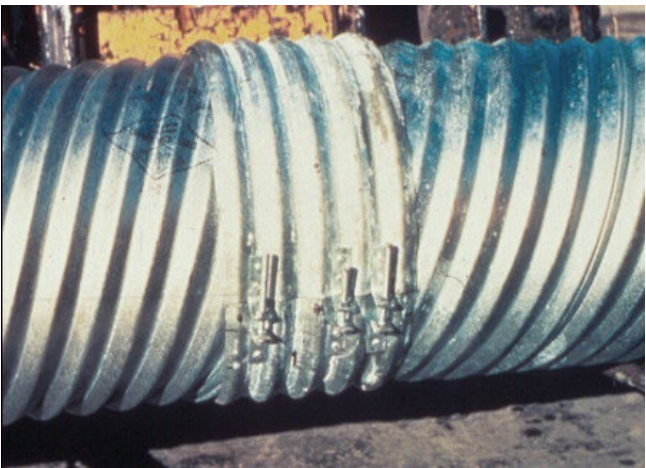


Joints and Connections

Purpose

- Positive Joints (i.e. fully corrugated bands) are preferred by many DOT's and Counties as they outperform the competition in regards to keeping the pipes connected especially in northern environment where frost can separate those pipes easily (this is called "differential settlement")
- Bands are typically 12" wide or 24" wide and can be 1pc, 2pc, or 3pc depending on the diameter and profile of the pipes.
- Band width depends on many factors (State Guidance, AASHTO, ASTM, AREMA

Type Of Band	Cross Section	Angles	Bar, Bolt & Strap	Wedge Lock	Gaskets			Pipe Type		
					O Ring	Sleeve or Strip	Mastic	Annular	Helical	
									Plain End	Reformed End
Universal		X	X	X		X	X	X	X	X
Corrugated		X	X	X		X	X	X	X	X
Semi-Corrugated		X	X	X	X		X	X		X
Channel		X	X		X		X			X
Flat		X	X	X		X	X	X	X	X
Hat		X	X				X			X



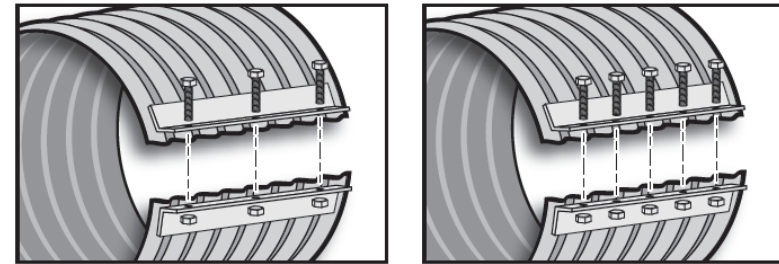
Joins and Connections

Connecting Band Hardware

- Angle Connectors are most common
- Rod & Lug Connectors further enhance “circumferential pressure” on the joint and are utilized when you want to really minimize water leakage in conjunction with a sleeve gasket
- Our standard sleeve gaskets are 3/8” thick x 14.5” wide neoprene

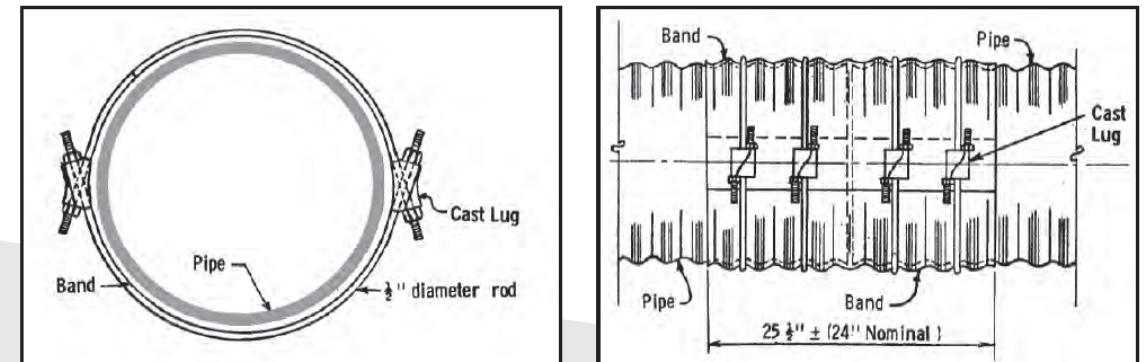
Angle Connector

The angle connector assembly uses the three-bolt configuration for 12” wide bands and a five-bolt configuration for 24” wide bands. Bands can be supplied as galvanized, Aluminized Type 2 steel or polymer coated steel to match the associated pipe coating.



Rod & Lug

This assembly typically consists of dual rod configuration (left) and may be used on corrugated and partially corrugated bands. The multiple rod configuration (right) is used for 24” corrugated bands only.



Joints and Connections

Tying It All Together



Corrugated Steel Pipe

Handling

- One of the many benefits of corrugated steel pipe is its long length.
 - Up to 44' with 16 gauge steel
 - Up to 60' with 12 gauge steel
- Straps or lifting lugs are available and are recommended
 - This greatly reduces installation time and possible damages to the coating or pipe itself

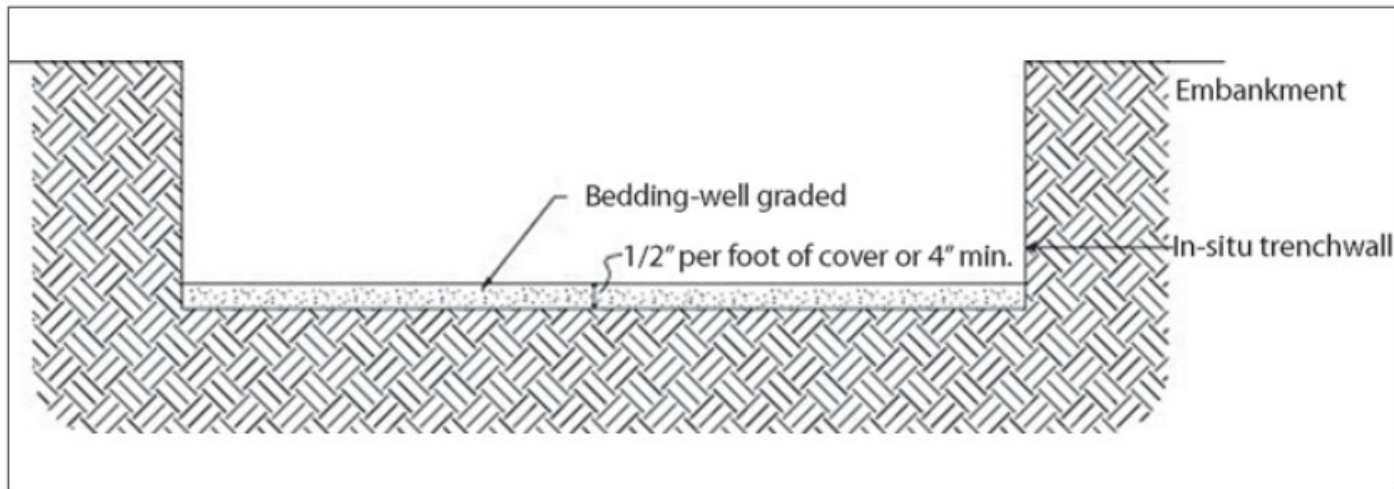


Installation

Foundation and Bedding

A stable foundation must be constructed prior to the placement of the bedding material.

A well-graded granular material placed a minimum of 4 inches in depth works best for the bedding.



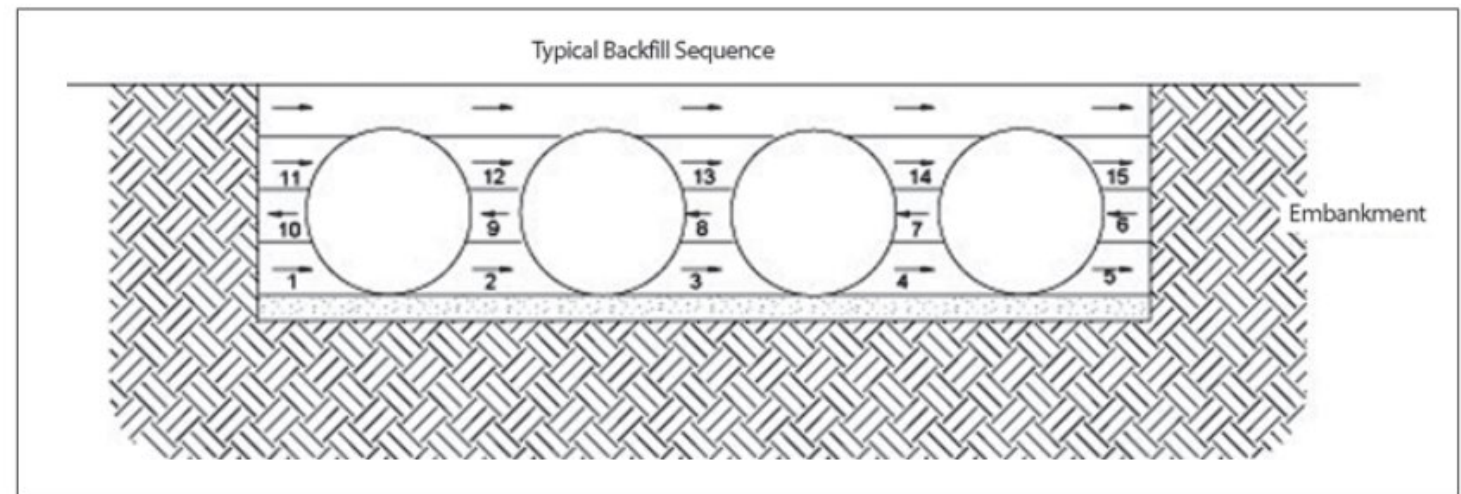
■ **Figure 10.34** Bedding considerations



Installation

Backfilling

- Backfill should be placed in 6-8" loose lifts and compacted to 90% AASHTO T99 standard proctor density.
- If stone is being used for backfill, care must be taken to ensure there are no areas or voids where stone is not present. This is especially important under the haunches of the pipes.
- Backfill needs to be done in a "balanced" fashion such that no more than a "2 lift differential" is present from one pipe side to the other.



■ **Figure 10.40** Backfill placement sequence

Installation

Backfilling and Compaction

- Backfill is most commonly placed with standard equipment (i.e. an excavator and skid steer)
- In rare circumstances on large footprint systems, using long-reach equipment can reduce installation costs for the installing contractor
- Install only what pipe can be backfilled that day to reduce the risk of any potential pipe floatation issues
- Well compacted fill around the pipe helps to support the pipe load and reduce settlement which can result in deflection in of the pipe



Installation

Backfilling and Compaction

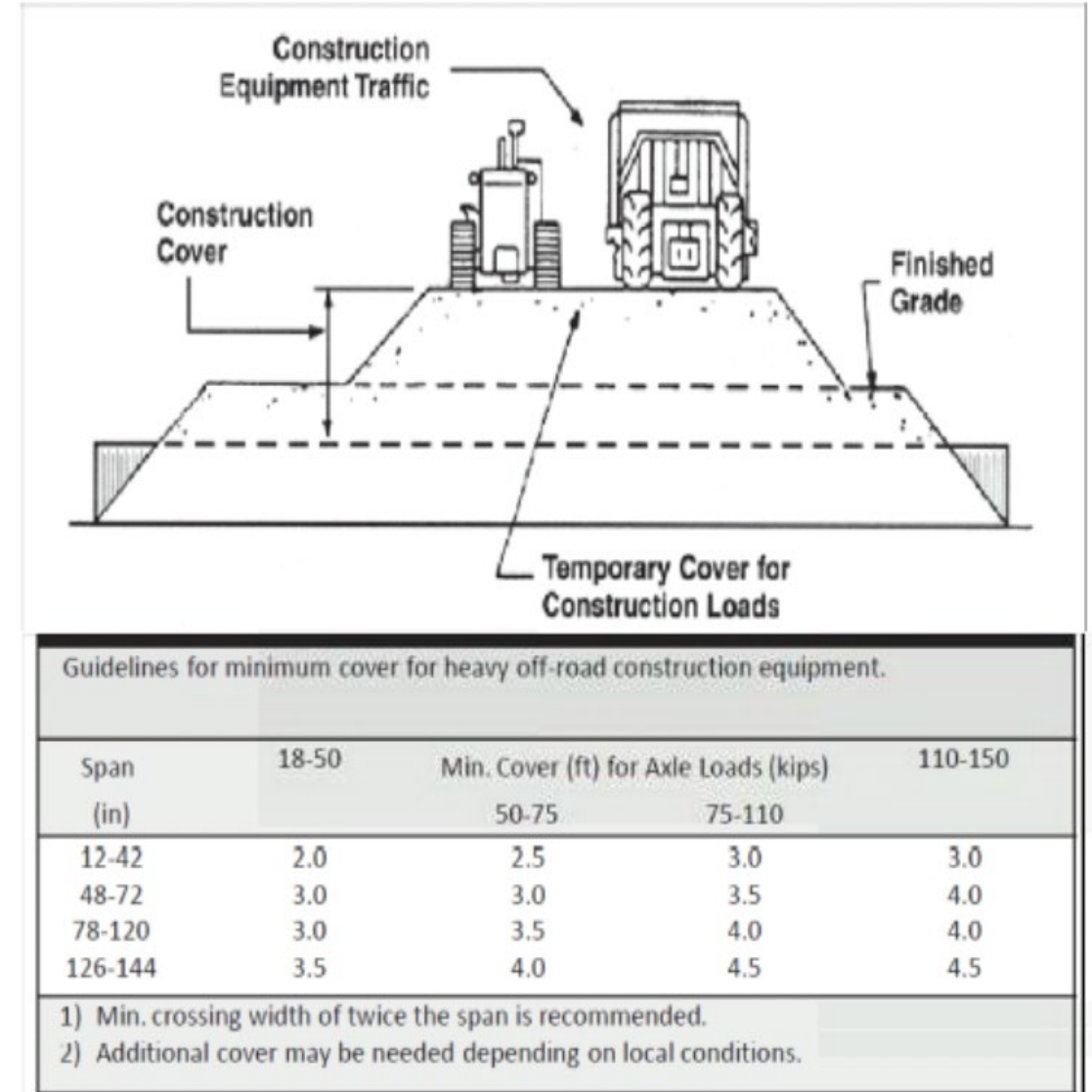
- Fill directly over the pipe should be free of any rocks that may cause point loading on the pipe
- Minimum fill height is 12" for AASHTO HL-93 loading for all diameters less than 96"
- Additional moisture may need to be added to lubricate soil particles.



Installation

Construction Loading

- Live loads for construction traffic shall be in accordance with the manufacturer's recommendation.
- During construction phases it is sometimes necessary to cross over the pipe with heavy equipment.
- To accommodate the loads imposed by construction equipment excess fill material may be needed.
- The minimum cover shall be 4 feet unless field conditions and experience justify modifications.



*FROM NCSA DESIGN MANUAL

Corrugated Steel Pipe

End Treatments

- End treatments come in many shapes and forms (i.e. flared end sections, safety ends, headwalls, step bevels, etc.)
- Beveled Ends limit scour and improve hydraulics through the opening.



Flared End Section



Safety Slope Flared End Section



1½:1 Bevel Top and Bottom Step



3:1 Bevel Top and Bottom Step

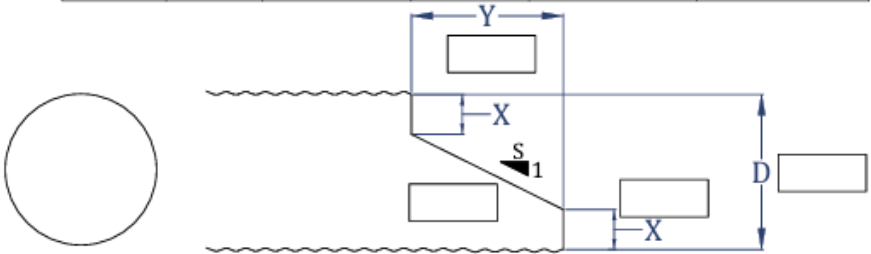
Corrugated Steel Pipe

Step Bevels

- Beveled Ends require “Steps” for rigidity and structural integrity.
- Bottom “Steps” are utilized on all beveled ends and top “Steps” should be utilized on larger profiles (i.e. greater than 84” span).
- Step bevels require longer lengths of pipe because the invert length is increased.
 - Ex. 8’ DIA with a 2:1 Bevel requires 8’ of additional invert length. A 3:1 Bevel requires 12’ of additional invert length
- These are more common on larger diameters because of the costs of large flared ends

TOP AND BOTTOM STEP BEVELS FOR ROUND PIPE
(2 2/3"x1/2", 3"x1", or 5"x1")

DIAMETER (IN)	X (IN)	S = 1 1/2 TO 1 Y(FEET)	S = 2 TO 1 Y(FEET)	S = 2 1/2 TO 1 Y(FEET)	S = 3 TO 1 Y(FEET)
12	3.00	0.75	1.00	1.25	1.50
15	3.75	0.94	1.25	1.56	1.88
18	4.50	1.13	1.50	1.88	2.25
21	5.25	1.31	1.75	2.19	2.63
24	6.00	1.50	2.00	2.50	3.00
30	7.50	1.88	2.50	3.13	3.75
36	9.00	2.25	3.00	3.75	4.50
42	10.50	2.63	3.50	4.38	5.25
48	12.00	3.00	4.00	5.00	6.00
54	13.50	3.38	4.50	5.63	6.75
60	15.00	3.75	5.00	6.25	7.50
66	16.50	4.13	5.50	6.88	8.25
72	18.00	4.50	6.00	7.50	9.00
78	19.50	4.88	6.50	8.13	9.75
84	21.00	5.25	7.00	8.75	10.50
90	22.50	5.63	7.50	9.38	11.25
96	24.00	6.00	8.00	10.00	12.00
102	25.50	6.38	8.50	10.63	12.75
108	27.00	6.75	9.00	11.25	13.50
114	28.50	7.13	9.50	11.88	14.25
120	30.00	7.50	10.00	12.50	15.00
126	31.50	7.88	10.50	13.13	15.75
132	33.00	8.25	11.00	13.75	16.50
138	34.50	8.63	11.50	14.38	17.25
144	36.00	9.00	12.00	15.00	18.00



Corrugated Steel Pipe Headwalls

- Protect the surrounding soil and streambed from scour and erosion
- Increase hydraulics
- Pre-attached to the ends of the pipe
- Easy Field Assembly
- Wingwalls are available too



Prefabricated Modular Steel Vehicular & Pedestrian Bridges



MODULAR STEEL

Vehicular Bridges
Abutments
Pedestrian Bridges



INSTALLATION

Vehicular Bridges
Pedestrian Bridges



SPECIALTY

Specialty Bridges



WELDED PLATE

Steel Welded Plate
Girder Bridges



REDIDEK®

Bridge Replacement
System





Pre-Engineered Vehicular Bridges

- County Roads
- Public Works, Government & Municipality Projects
- State and National Parks
- Timber Development Locations
- Energy, Mining, Industrial

What advantage does modular steel have over on-site field fabricated construction?

- Lead Time
- Quality
- Ease of Installation



Pre-Engineered Vehicular Bridges

- DESIGNED TO AASHTO CODE
 - Pre-engineered and stamped by a professional engineer
- MEETS THE BUY AMERICAN ACT
 - Material melted and manufactured in the USA
- LOW-MAINTENANCE
 - Manufactured from weathering steel



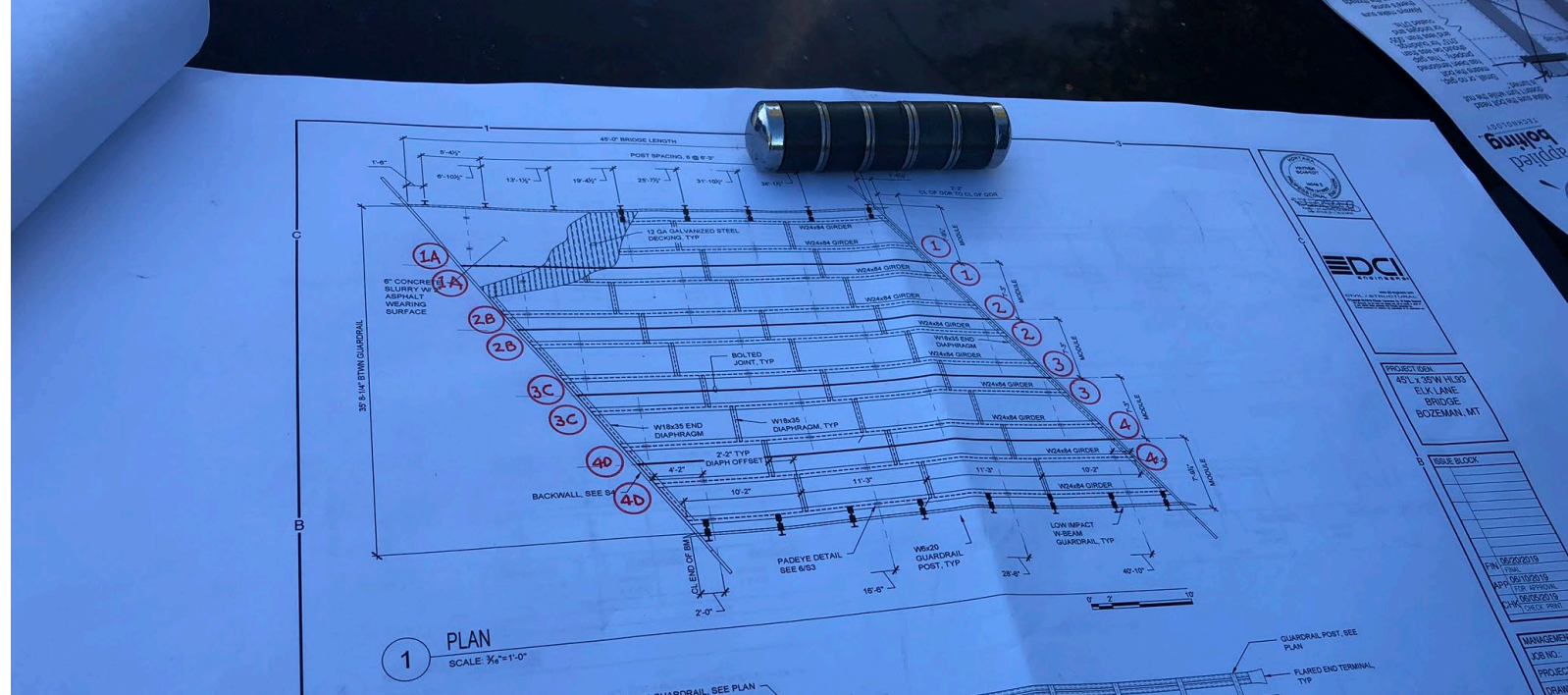


Length and Width

- Virtually Any Width
 - Standard modules widths: 7', 8', & 12'
 - Standard travel way between the Guardrail: 14', 16', 21', 24', 28', & 32'
- Clear Spans up to 140 Feet Utilizing Rolled Beams
- Clear Spans up to 240 Feet Utilizing Plate Girders
 - Install up to 50-feet with excavators

Skew

45-degree max



Low Profile

Minimize approach grade by:

- Decreasing girder spacing
- Decreasing girder depth

This can add about 25% to the cost of the bridge





Wearing Surface

- Gravel
- Douglas Fir Running planks
- Full Timber
- Concrete
- Asphalt





Deck Drainage

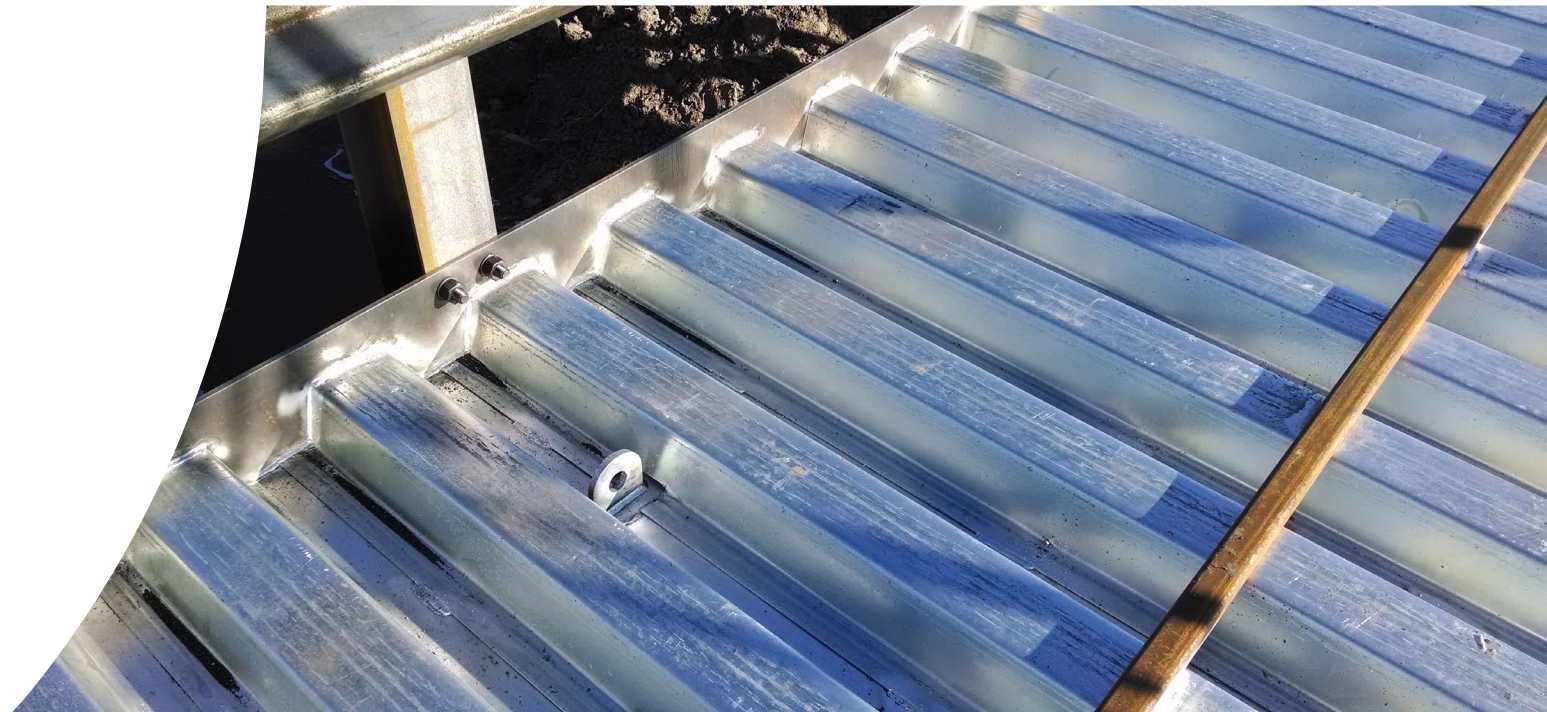
Guide Rails

- Engineered to Test Level 1-5
- Multiple guide rail materials are available
 - Weathering Steel
 - Timber
 - Galvanized



Gravel Deck Blade Runners

- Tube Steel
- Angle



Steel Backwalls

- Typically project 4' out from each side
- 2 bolts and your attached
- These provide a nice place to build up your road approaches





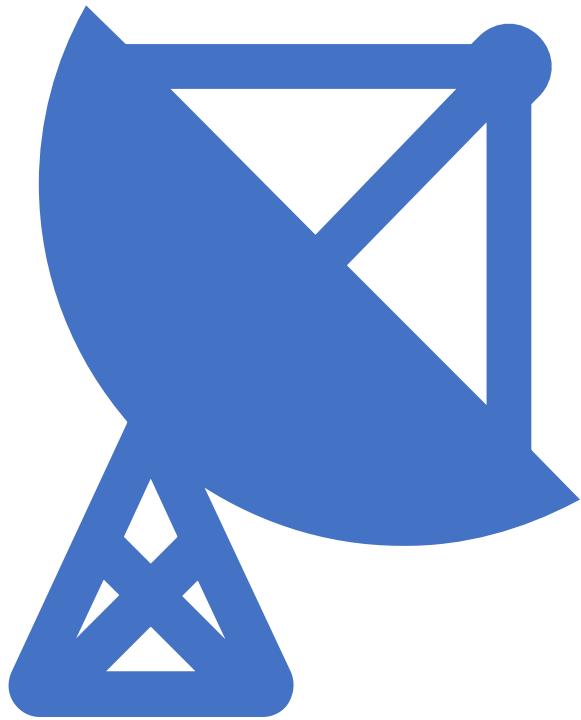
SuperSill® Abutment System

- The SuperSill® is a steel abutment form for concrete or ballast.
- Fabricated using corrugated sheeting, wide-flanged W-beams, and a heavy duty welded support frame.
- Pre-engineered and standardized to eliminate unique abutment design fees.
- Geotechnical Information is required (i.e. subgrade bearing capacity)



TrueNorth Steel Abutment Design Options

- Pre-cast concrete and cast-in place (CIP) abutments
- Driven steel pile foundations



BEFORE WE MOVE
ON. LET'S SHARE
SOME EXCITING
NEWS!!

AISI recently posted that a Grand Forks County Prefabricated Modular Bridge in Northwood, ND was selected to be the recipient of a National Award in the Short Span class of bridges!!

Owner's Representative: Grand Forks County, Grand Forks, N.D.

General Contractor: Industrial Builders Inc, West Fargo, N.D.

Structural Engineer: KLJ Engineering, Grafton, N.D.

Fabricator/Detailer/Erector: TrueNorth Steel, Fargo, N.D. **AISC full member; AISC-Certified fabricator**

PRIZE BRIDGE INFORMATION

Year Awarded: 2024

Year Completed: 2022

Coating System: Weathering Steel

Structure Length (ft): 80'

Average Deck Width (ft): 32'







- “The project team took full advantage of offsite fabrication to cut down on construction time in the bitter cold of a North Dakota winter.”

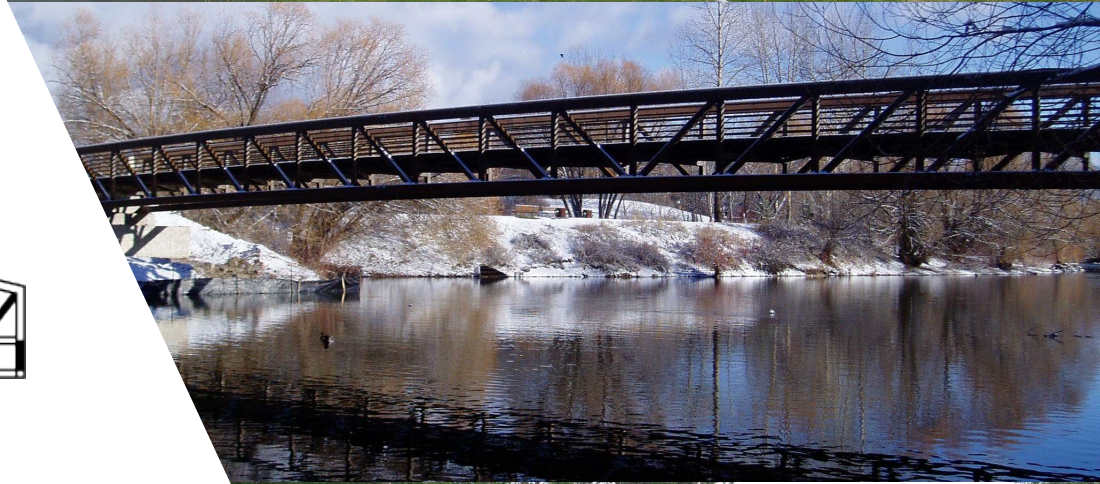
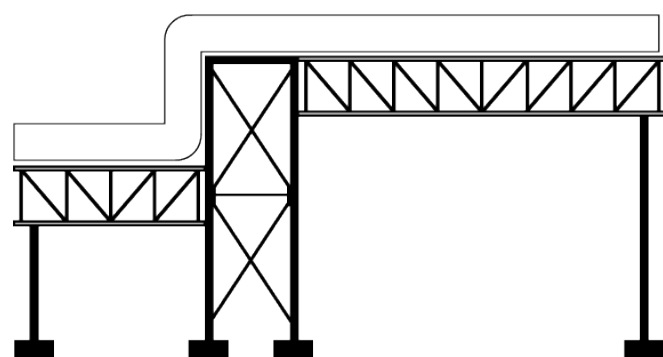
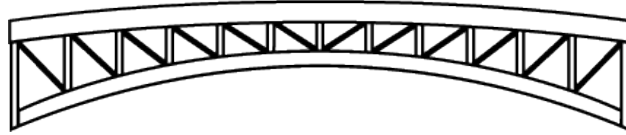
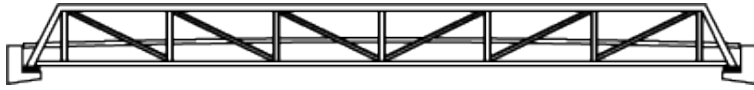
Pre-Engineered Pedestrian Truss Bridge

- Standard travel way widths: 3'-0" through 20'-0"
- Clear spans up to 250'
- Truss splices are required above 80'-0"



Styles

- Pratt Truss
- Arch Truss
- Beam Stringer
- BowString
- Brown Truss
- Modified Bowstring
- Howe Truss
- Warren Truss
- Vierendeel Truss
- Pipeline Support



Pedestrian Bridges

- Pre-engineered and stamped by a registered engineer
- Material melted and manufactured in the USA
- Manufactured from galvanized, painted, and weathering steel





Pre-Engineered Pedestrian Truss Bridge

Common Design Loads

- Pedestrian 90PSF
- H5 (10,000 #'s)
- H10 (20,000 #'s)

We can design to any design load

Surfacing Types

Concrete

Wood



Sky Bridge

Enclosed

Covered



Combination Vehicular and Pedestrian

Separate Pedestrian Access





Where You Will Find Our Bridges

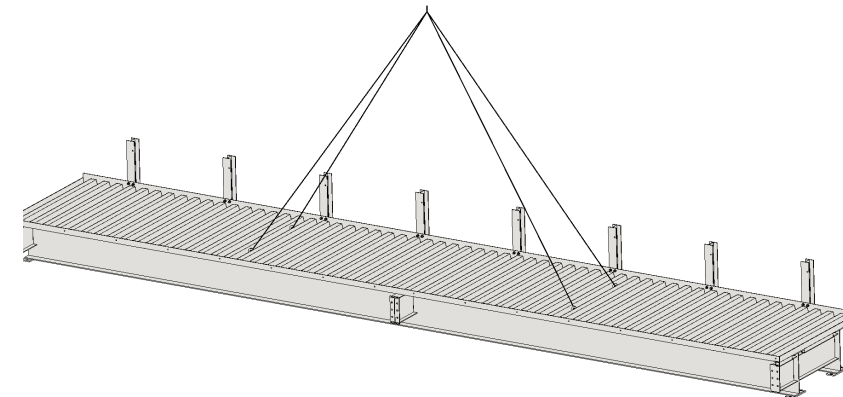
- County Roads
- Fish Enhancement Areas
- Golf Courses
- Commercial and Residential Development
- Private Properties
- Trail Systems
- Public Works, Government & Municipality Projects
- Resorts
- State and National Parks
- Timber Development Locations
- Educational Campuses



Lifting Lugs

Minimum of 4

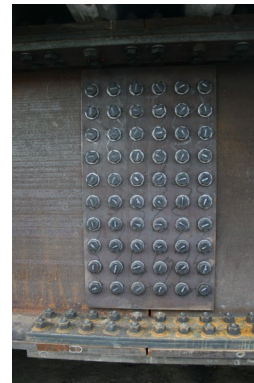
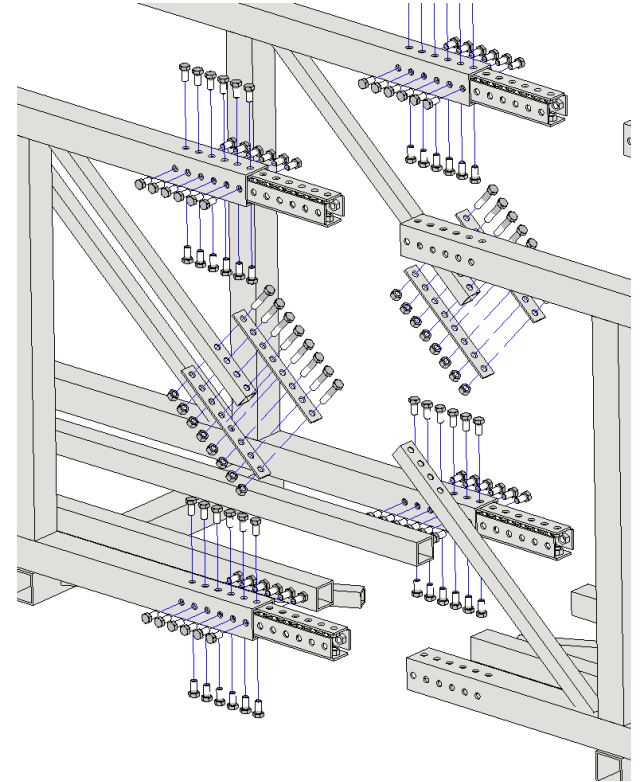
Angles not less than 45 degrees



Bearing Plates



Transverse Splicing



Match Mark

Information provided on the
plans

Each bridge module is marked
for ease of installation



Certifications & Capabilities

AISC-Certified Intermediate Bridge Fabricator

Fracture Critical Fabrication

Sophisticated Paint Endorsement

Designed and fabricated to applicable AASHTO/ASTM Standards

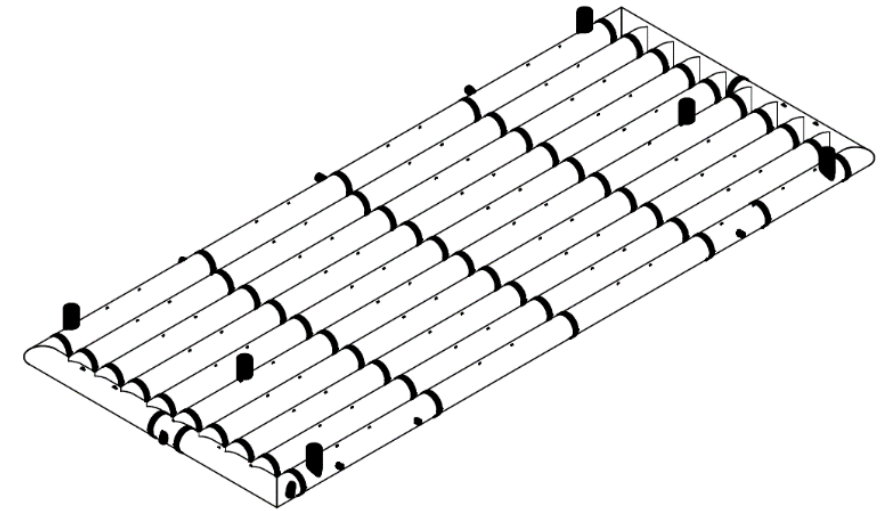
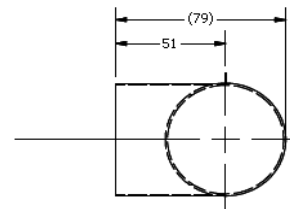
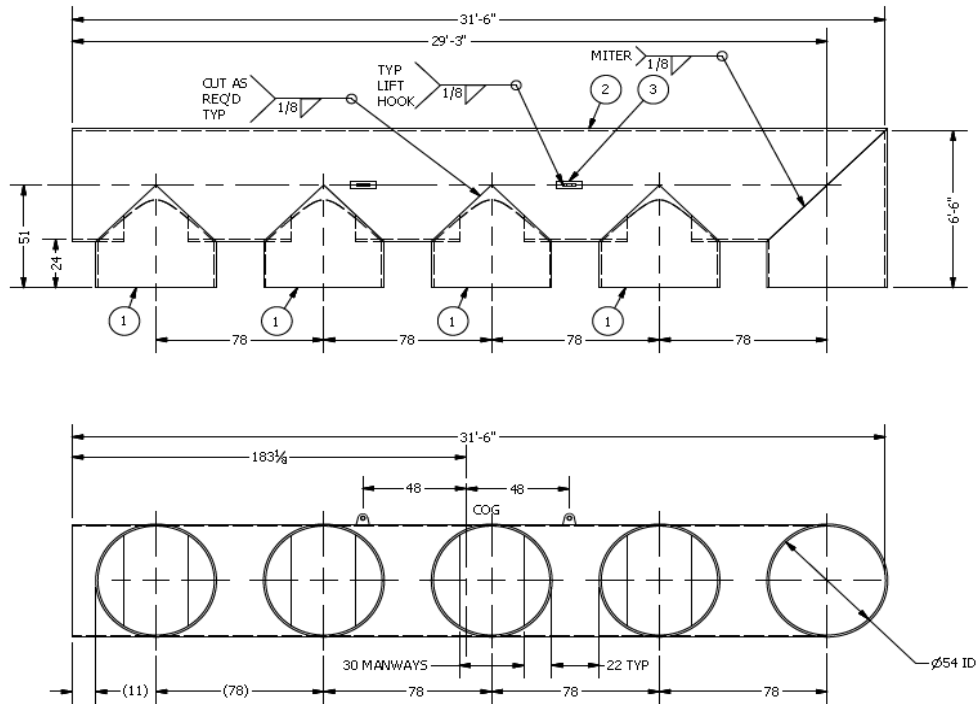
AWS Certified Welding Fabricator





Contact TrueNorth Steel

- Let TrueNorth Steel assist with your next project design!
- We have a competent drafting and engineering team that can draw up your next system.



Contact TrueNorth Steel

- TrueNorth Steel is available to assist with any further questions you may have regarding Corrugation Steel Pipe or Bridge
- Please check out our new website at <http://truenorthsteel.com> for more information

- Sizing and system type selection
- Layout
- Drawings
- Outlet control sizing
- Specifications
- Cost estimates
- Minimizing cost
- Construction assistance

Thank you all for being a valuable partner. If you have any more ideas, suggestions, or questions, please don't hesitate to reach out. We're here and eager to listen.



TrueNorth Steel®



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TrueNorthSteel.com



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