valmont STRUCTURES

PRESENTERS

Jeff Simkins
National Bridge Sales Manager

Theresa O'Riorden
Regional Bridge Sales Engineer

Guy Nelson, P.E., S.E.
Product Development Engineer

U-BEAM™ Complete Bridge System

2021 AASHTO FOCUS TECHNOLOGY

GALVANIZED STEEL PRESS BRAKE FORMED TUB GIRDERS

Who is Valmont Industries?

At Valmont, we improve life by creating vital infrastructure and advancing agricultural productivity with a commitment to conserving resources.

Who is Valmont Structures?

LIGHTING

- Area Lighting Poles
- Street Lighting Poles
- Decorative Lighting Poles and Lamp Posts
- Small Cell
- High-Mast Lighting Poles
- Sports and Stadium
- Camera Poles and Security Structures
- Vibration Mitigation

TRANSPORTATION

- Traffic Structures
- Mass Transit Structures
- Sign Structures
- Vibration Damping
- Electric Bus Charging Infrastructure
- Bridge Systems

TELECOMMUNICATIONS

- Self-Supporting Towers
- Guyed Towers
- Concealment
- Portable Base Towers
- Monopoles
- Passive Repeaters
- Small Cell
- Wireless Accessories

ARCHITECTURE

- Aesthetics
- Sun Shading
- Transportation and Safety
- Parking Garages
- Façade Systems
- Façade Accessories

Who is Valmont Structures?

AISC INTERMEDIATE BRIDGE CERTIFIED FABRICATOR

Certified Bridge Fabricator - Intermediate (IBR) are typical bridges that do not require extraordinary measures. Typical examples might include: (1) a rolled beam bridge with field or shop splices, either straight or with a radius over 500 ft; (2) a built-up I-shaped plate girder bridge with constant web depth, with or without splices, either straight or with a radius over 500 ft;.

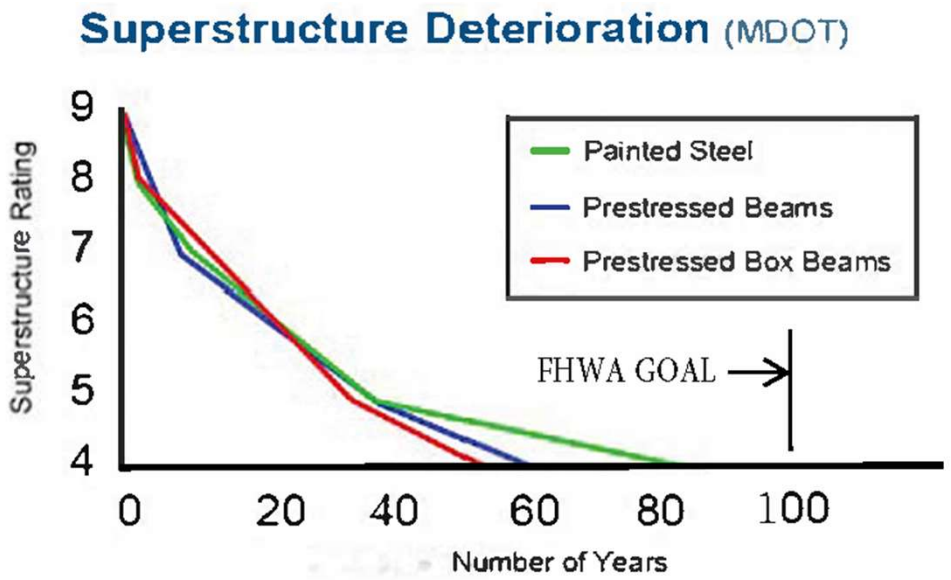
So why do we need a different solution?

"Doing the same thing over and over and expecting different results is insanity"

Albert Einstein

- Prestressed concrete box beams have been the standard solution since the 1970's for off-system, local agency, non-interstate bridges.
- MDOT study of current inventory shows pre-stressed concrete box beam service life < 50 years
- "Bridge engineers need improved design options so they can deliver bridges that are operational for 100 years or more", FHWA

1970 + 50 years = NOW!



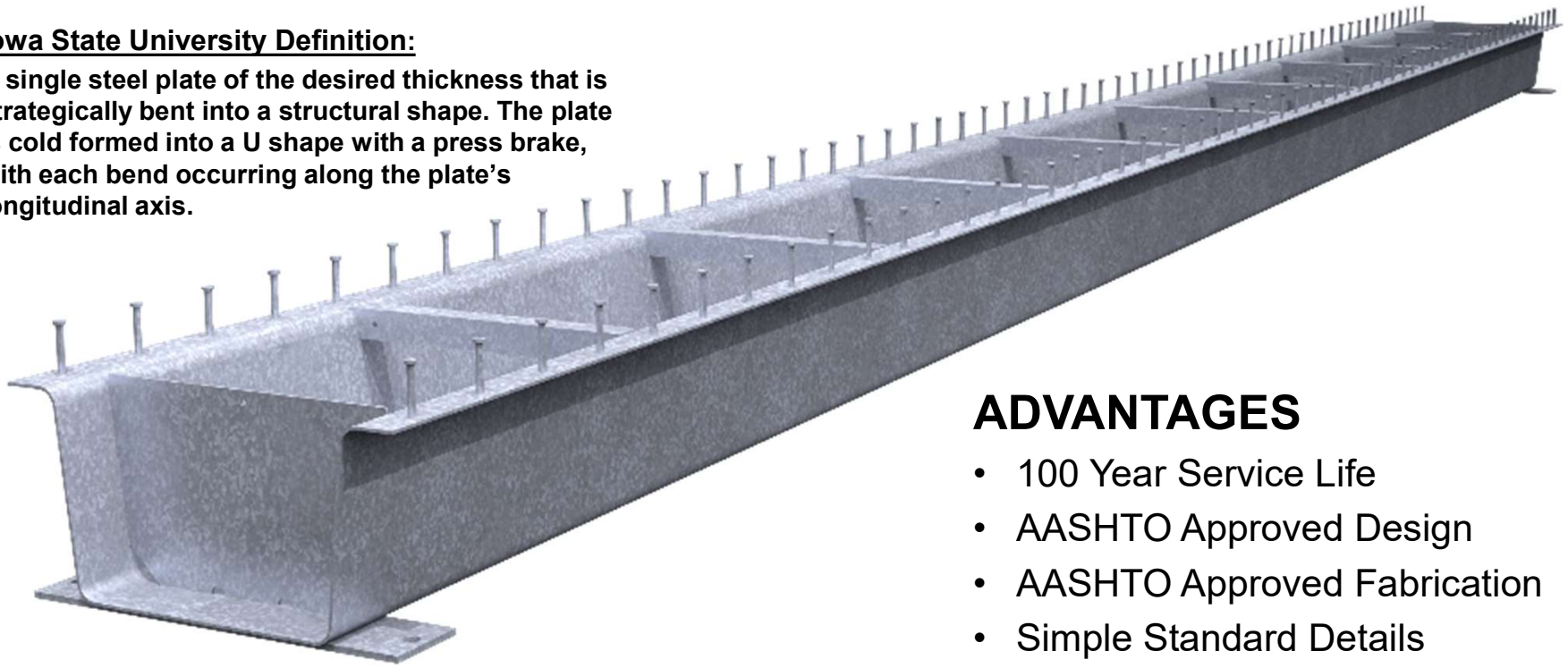
4 - POOR CONDITION - structural capacity of element is affected or jeopardized by advanced deterioration, section loss, spalling, cracking, or other deficiency

3 - SERIOUS CONDITION - loss of section, deterioration, spalling, or scour have seriously affected primary structural components. Local failures are possible.

What is a Steel Press-Brake-Formed Tub Girder?

<u>Iowa State University Definition:</u>

A single steel plate of the desired thickness that is strategically bent into a structural shape. The plate is cold formed into a U shape with a press brake, with each bend occurring along the plate's longitudinal axis.



ADVANTAGES

- 100 Year Service Life
- AASHTO Approved Design
- AASHTO Approved Fabrication
- Simple Standard Details
- Easy Installation

2021 AASHTO Focus Technology

AASHTO
AASHTO INNOVATION INITIATIVE

NATIONAL RECOGNITION WITH THE AASHTO INNOVATION INITIATIVE AWARD

2020	Press-Brake Tub Girders receive the “2020 Innovation Award” as **a ready-to-implement technology** that offers improved performance/effectiveness, and have been demonstrated in "real world" applications.
2021	Press-Brake Tub Girders become a 2021 AASHTO Focus Technology
2023	Press-Brake Tub Girders to be included in revisions to the 10th Edition of the AASHTO LRFD Bridge Design Specifications. The revisions apply to Specification Equation 6.11.2.2-3, allowing DOTs, Counties and other entities to utilize AASHTO design guidelines instead of rewriting specifications to include U-BEAMs

“This is great news for state and local Departments of Transportation that are looking for economical, sustainable and accelerated construction solutions for short span bridges, which make up over half of the U.S. bridge inventory.”

- Karl Barth, Ph.D., Associate Professor of Civil and Environmental Engineering at West Virginia University in a recent SSSBA article about the revisions

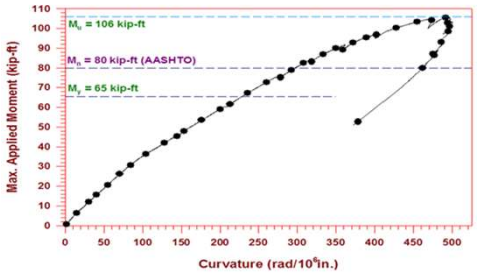
visit **aii.transportation.org** for more information

valmont STRUCTURES

The Press Brake Formed Tub Girders and the SSSBA

- The “Press Brake Tub Girder” was developed by the SSSBA
- The term “Press Brake Tub Girder” was coined by the SSSBA
- The term “Press Brake Tub Girder” cannot be found in AASHTO
- “Press Brake Tub Girders” are AASHTO Box-Section Flexural Members
- “Press Brake Tub Girders” are Non-Proprietary

SHORT SPAN STEEL BRIDGE ALLIANCE™



Press Brake Formed Tub Girder (PBFTG) Research Reports

- 10 Years of Development and Experimental Testing of Press Brake Tub Girders
- Published a 7 Volume Research Report
- https://www.shortspansteelbridges.org/testing-of-press-brake-tub-girders/

Education
- Webinars
- Workshops
- Conferences

Technical Resources
- Standards
- Guidelines
- Best Practices

Case Studies
- Economics: Steel is Cost-Effective
- Innovative & ABC Design

valmont STRUCTURES

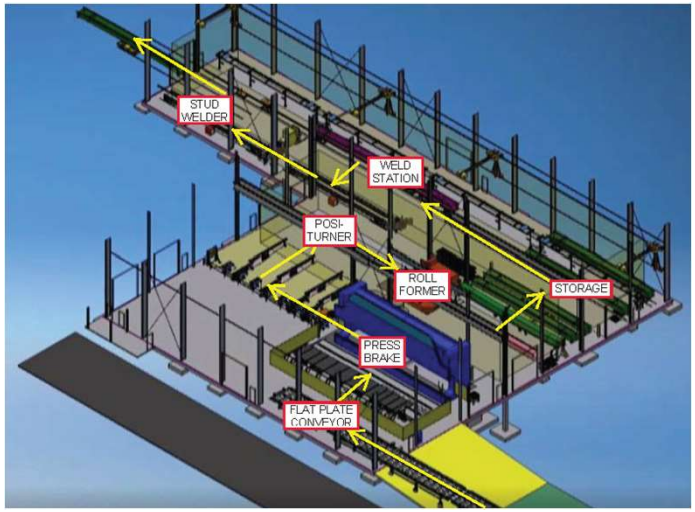
The First Press Brake Tub Girder Bridge Install

- Monroe County Road Commission, MI
- 2004 Install
- 40’ Long x 34’ Wide
- NBIS Bi-Annual Inspection
- No signs of deterioration of concrete driving surface or corrosion in steel girders


Current Condition (2019)

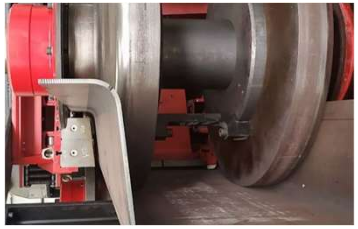
Valmont Manufacturing Innovation

STATE OF THE ART PRESS BRAKE FABRICATION FACILITY



PURPOSE BUILT PRESS BRAKE TUB GIRDER FACILITY OPENED IN 2021

60’ PRESS BRAKE

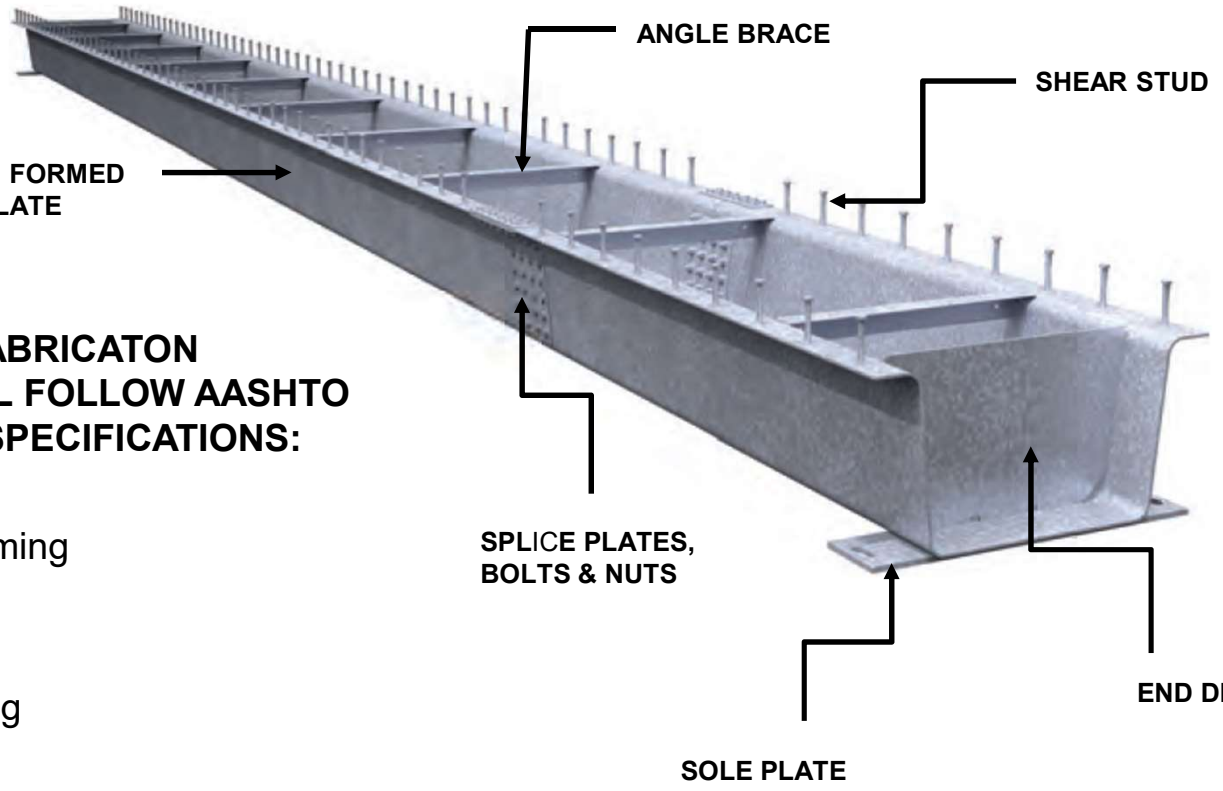


ROLL CAMBER PROCESS

FINISH WELD STATION

AUTOMATED STUD WELDING

The Valmont U-BEAM™ (a press brake formed steel tub girder)



ONLY 5 SIMPLE FABRICATON PROCEDURES ALL FOLLOW AASHTO CONSTRUCTION SPECIFICATIONS:

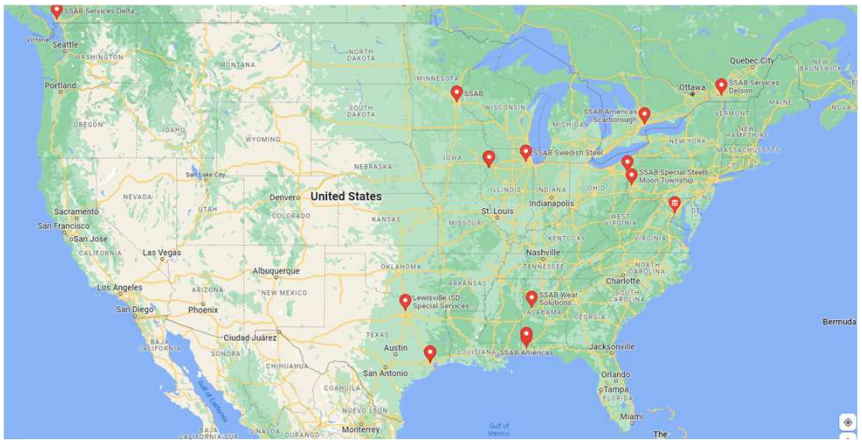
1. Material
2. Press-Brake Forming
3. Camber
4. Welding
5. Protective Coating

#1 AASHTO STEEL PLATE MATERIAL

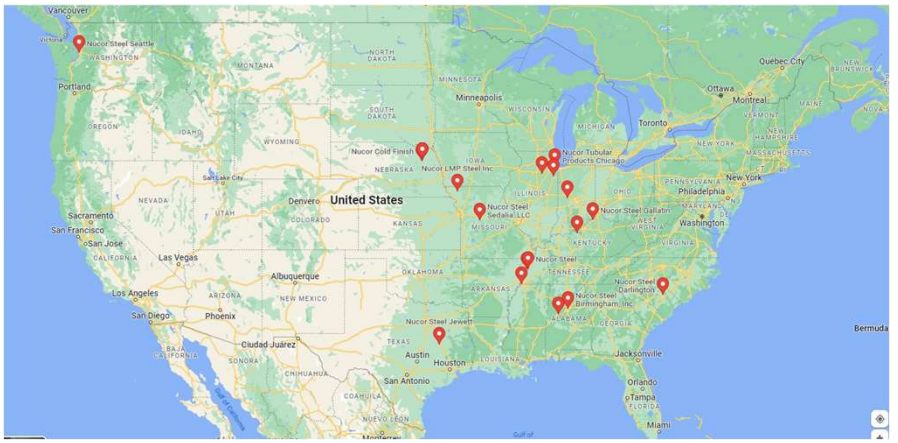
AASHTO 11.3.1.2
AASHTO M270. **Made in the USA**. Steel Plates and Structural Shapes shall conform to ASTM A709/A709M.

Where is M270 Steel Plate Made?

- In Americas Heartland!
- So why are Valmont's fabrication facilities strategically located in Omaha, NE and Jasper, TN?
    - Because Valmont purchases direct from the mills that produce it.



SSAB STEEL PLATE MILL FACILITIES



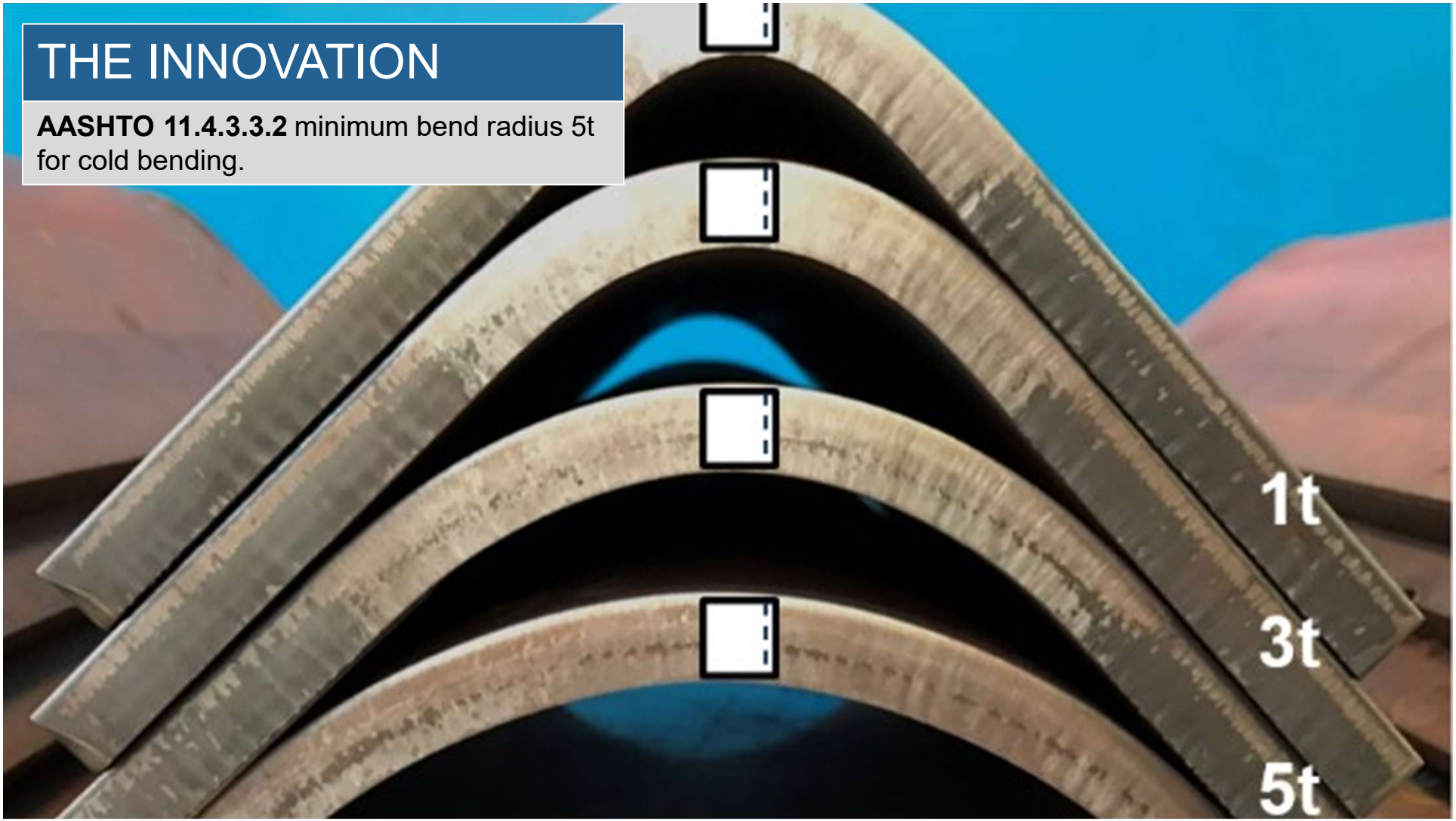
NUCOR STEEL PLATE MILL FACILITIES

#2 AASHTO FORMING

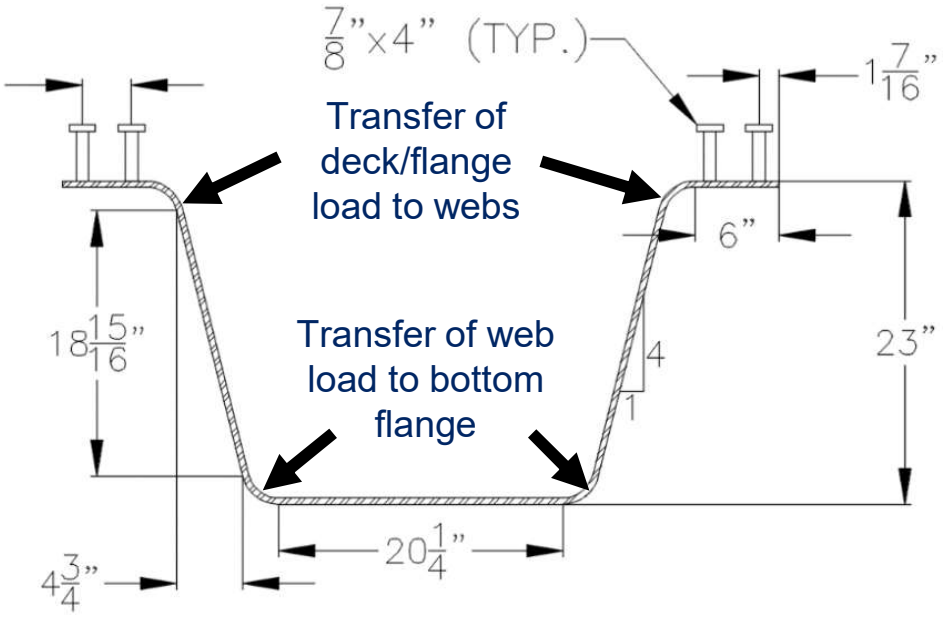
AASHTO 11.4.3.3 - Bent Plates
Fracture-critical and Non-fracture critical plates and bars shall be cold bent.

THE INNOVATION

AASHTO 11.4.3.3.2 minimum bend radius 5t for cold bending.



Fatigue Testing of Composite PBFTG-Deck Module



The Press Brake Tub Girder exhibited no damage under fatigue testing simulating:
800 ADT, 15% Truck Traffic, 75 year service life, full AASHTO fatigue truck loading

#3 AASHTO CAMBERING

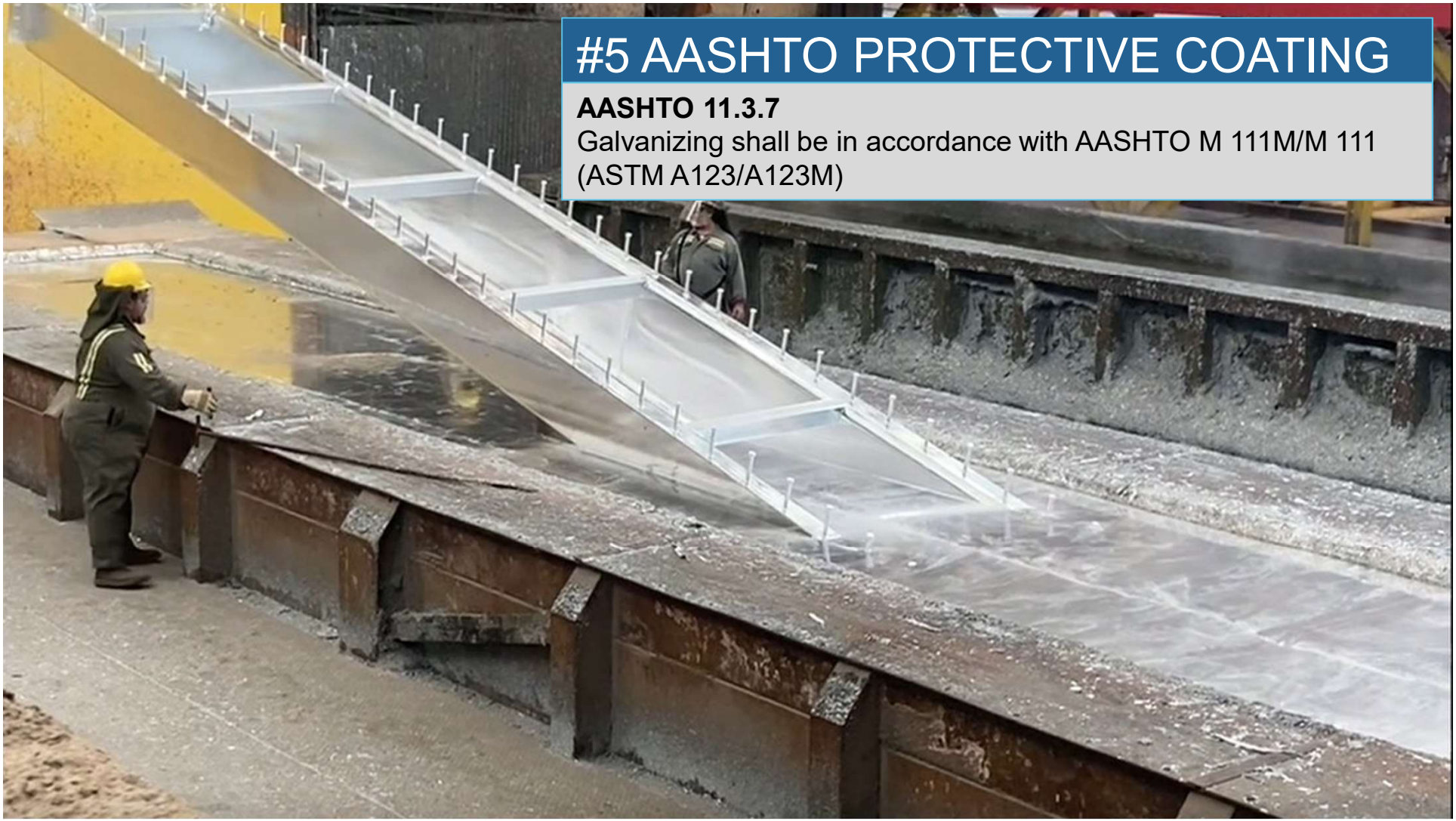
AASHTO 11.4.12.2.7

Cold cambering is a customary means of achieving camber…to avoid impact damage to the steel, is appropriate to introduce bending pressure in a controlled fashion.

#4 AASHTO WELDING AND SHEAR STUDS

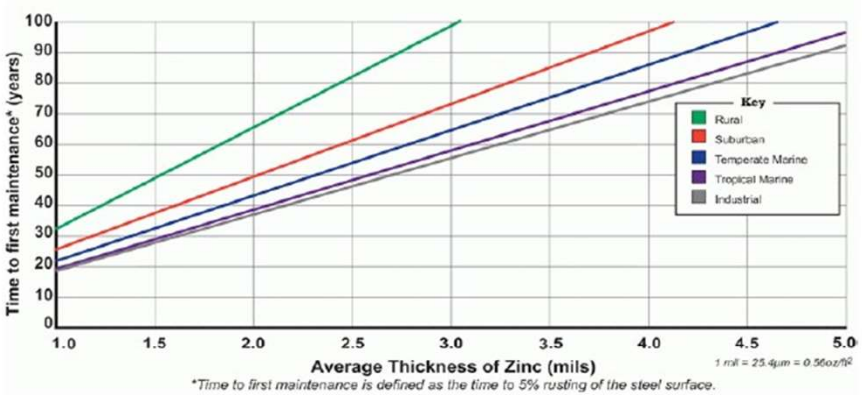
AASHTO 11.3.3

Certified Welders and welded stud shear connectors shall satisfy all requirements of the AASHTO/AWS D1.5M/D1.5 Bridge Welding Code related to material, manufacturing, physical properties, certification, and welding.



#5 AASHTO PROTECTIVE COATING

AASHTO 11.3.7
Galvanizing shall be in accordance with AASHTO M 111M/M 111 (ASTM A123/A123M)



*Time to first maintenance is defined as the time to 5% rusting of the steel surface.

Valmont Coatings has the Largest Galvanizing Capacity in North America

"If you can design it, Valmont Coatings can Galvanize It!"

- *Length in excess of 94 feet*
- *Lifting Capacity of 100 Tons*

Case Studies find Steel Bridges Saves 25% Over Concrete Precast Bridges

- Steel bridges do not require the heavier equipment that's needed for heavier concrete bridge girders.
- Galvanized steel I-beam bridges have the lowest initial cost and life cycle cost compared to concrete bridges.
- Galvanized steel bridges offer accelerated fabrication, 40% LESS construction time, reducing expensive down time for residents and business.

eSPAN140

Complimentary Web-Based Design Tool provides customized steel solutions for bridges up to 140 feet.

www.eSpan140.com

Duplex System is formed by painting or powder-coating over hot-dip galvanized steel. This process not only enhances the aesthetic value of the bridge, but also increases the corrosion protection by 1.5-2.3 times the sum of the expected life of each system.

Believed to be the first fully hot-dip galvanized bridge in the U.S

Check out the video, Google AGA STEARNS BAYOU BRIDGE

Case Study:

Sterns Bayou Bridge

Ottawa County, MI United States

This is believed to be the first fully galvanized bridge in the United States. Galvanized and installed in 1966, this county bridge measures 420 ft. (128 m) long with a 30-foot clear roadway and a five-foot walkway along each side. All the steel was galvanized including the handrail, diaphragms, fasteners, shear connectors, and beams - some with 30-inch wide flanges, weighing between 99 and 108 pounds per foot. All steel used to erect the Stearns Bayou Bridge has no signs of rusting or staining, and is in excellent shape. The average mil thickness is 4.7 (160µm). Projected life expectancy to first maintenance is 106 years for the principal steel and 44 years for the handrail.

Details:

Year Galvanized	***1966***
Sectors	***Bridge & Highway***
Location	***Ottawa County, MI United States***
Environment	***Rural***

The majority of the steelwork is six feet above a fresh water river in a rural location. Traffic is light to moderate. The entire bridge is subject to winter salting.

At the 2016 inspection, all beams and diaphragms were in very good shape and showed no signs of rusting or staining. The average mil thickness was 4.7. All bolted connections looked good and showed no signs of rust. Bearing pads and expansion areas subject to salt and standing water had an average coating of 2.9 mils.

Projected life expectancy was 106 years for the principal steel.


STEEL BEAMS MADE SIMPLE
FINISHED U-BEAM™ PRODUCT
COMPONENT REVIEW
1. Material – M270 (ASTM A709)
2. Press Brake Forming - AASHTO 11.4.3.3
3. Camber - AASHTO 11.4.12.2.7
4. Welding – AASHTO AWS D1.5
5. Galvanizing – AASHTO M111 (ASTM A123)

DEVELOPMENT AND EXPERIMENTAL TESTING OF PRESS-BRAK FORMED STEEL TUB GIRDERS FOR SHORT SPAN BRIDGE APPLICATIONS

Karl E. Barth, Ph.D.
Gregory K. Michaelson, Ph.D.
Cory L. Gibbs

Submitted to the AISI Steel Market
Development Institute Short Span
Steel Bridge Alliance

Table 2.2: Equation Legend (AASHTO, 2014)

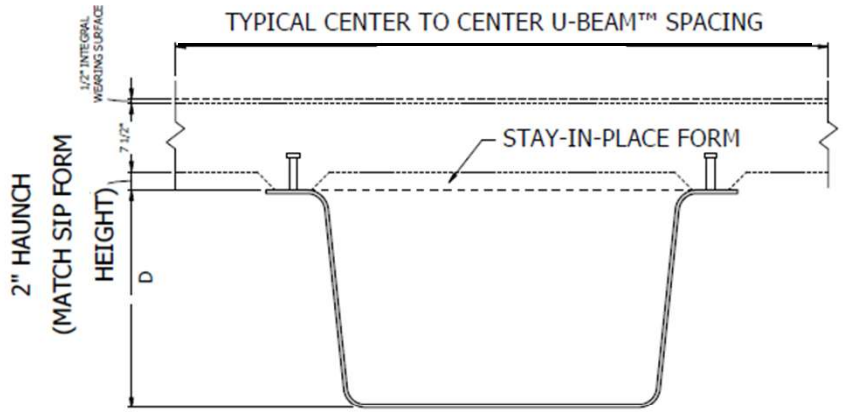
Chapter 2	AASHTO 7th Edition
Equation 2.1	Equation 6.11.2.1.2-1
Equation 2.2	Equation 6.11.2.1.3-1
Equation 2.3	Equation 6.11.2.2-1
Equation 2.4	Equation 6.11.2.2-2
Equation 2.5	Equation 6.11.2.2-3
Equation 2.6	Equation 6.10.3.2.1-1
Equation 2.7	Equation 6.10.3.2.1-2
Equation 2.8	Equation 6.10.3.2.1-3
Equation 2.9	Equation 6.10.3.2.2-1
Equation 2.10	Equation 6.10.3.2.3-1
Equation 2.11	Equation 6.11.3.2-1
Equation 2.12	Equation 6.11.3.2-2
Equation 2.13	Equation 6.11.3.2-3
Equation 2.14	Equation 6.11.3.2-4
Equation 2.15	Equation 6.11.3.2-5
Equation 2.16	Equation 6.10.3.3-1
Equation 2.17	Equation 6.11.9-1
Equation 2.18	Equation 6.10.4.2.2-1
Equation 2.19	Equation 6.10.4.2.2-2
Equation 2.2	Equation 6.10.4.2.2-3
Equation 2.21	Equation 6.10.4.2.2-4
Equation 2.22	Equation 6.6.1.2.2-1
Equation 2.23	Equation 6.6.1.2.5-1
Equation 2.24	Equation 6.6.1.2.5-2
Equation 2.25	Equation 6.6.1.2.5-3
Equation 2.26	Equation 6.11.6.2.2-1

Chapter 2	AASHTO 7th Edition
Equation 2.39	Equation 6.11.8.2.2-4
Equation 2.40	Equation 6.11.8.2.2-5
Equation 2.41	Equation 6.11.8.2.2-6
Equation 2.42	Equation 6.11.8.2.2-7
Equation 2.43	Equation 6.11.8.2.2-8
Equation 2.44	Equation 6.11.8.2.2-9
Equation 2.45	Equation 6.11.8.2.2-10
Equation 2.46	Equation 6.11.8.2.2-11
Equation 2.47	Equation 6.11.8.2.2-12
Equation 2.48	Equation 6.11.8.2.3-1
Equation 2.49	Equation 6.11.8.2.3-2
Equation 2.50	Equation 6.11.8.2.3-3
Equation 2.51	Equation 6.11.8.3-1
Equation 2.52	Equation 6.10.9.1-1
Equation 2.53	Equation 6.10.9.2-1
Equation 2.54	Equation 6.10.9.2-2
Equation 2.55	Equation 6.10.9.3.2-1
Equation 2.56	Equation 6.10.9.3.2-2
Equation 2.57	Equation 6.10.9.3.2-3
Equation 2.58	Equation 6.10.9.3.2-4
Equation 2.59	Equation 6.10.9.3.2-5
Equation 2.60	Equation 6.10.9.3.2-6
Equation 2.61	Equation 6.10.9.3.2-7
Equation 2.62	Equation 6.10.9.3.2-8
Equation 2.63	Equation 6.10.9.3.3-1
Equation 2.64	Equation 6.10.9.3.3-2

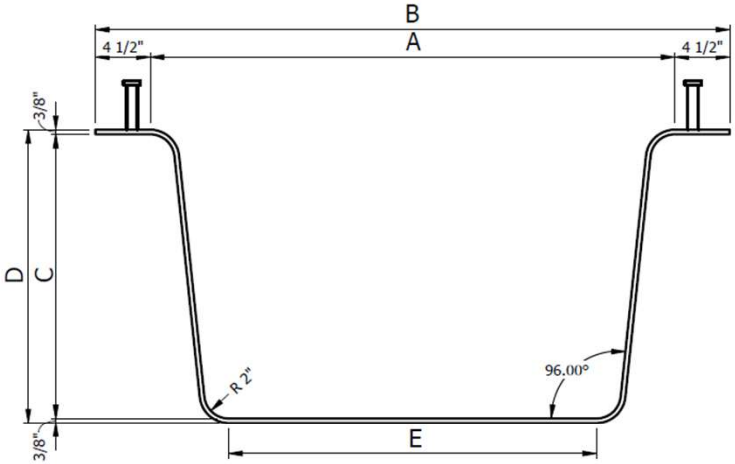
AASHTO DESIGN

AASHTO LRFD Bridge Design Specifications 8th Edition (2017) Section 6.11.
Steel Structures. Box-Section Flexural Members. SSSBA Verification.

valmont STRUCTURES



VALMONT® U-BEAM™ STANDARD COMPOSITE CROSS SECTION



VALMONT® U-BEAM™ STANDARD CROSS SECTION

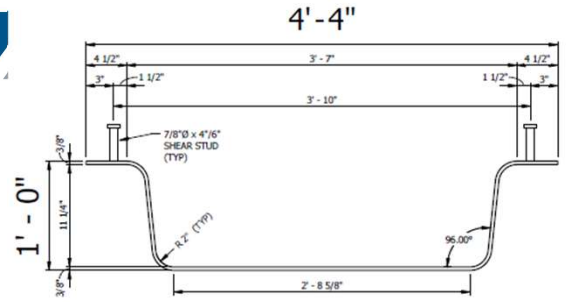
U-BEAM™ SPACING	BRIDGE LENGTH (ft)															
	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
4' - 6"	U12	U12	U12	U12	U12	U18	U18	U18	U24	U24	U24	U30	U30	U33	U33	S.D.
5' - 0"	U12	U12	U12	U12	U12	U18	U18	U18	U24	U24	U30	U30	U33	U33	S.D.	S.D.
5' - 6"	U12	U12	U12	U12	U18	U18	U18	U24	U24	U24	U30	U30	U33	U33	S.D.	
6' - 0"	U12	U12	U12	U12	U18	U18	U18	U24	U24	U30	U30	U30	U33	S.D.	S.D.	
6' - 6"	U12	U12	U12	U12	U18	U18	U18	U24	U24	U30	U30	U33	U33	S.D.		
7' - 0"	U12	U12	U12	U12	U18	U18	U24	U24	U24	U30	U30	U33	S.D.	S.D.		
7' - 6"	U12	U12	U12	U12	U18	U18	U24	U24	U30	U30	U33	U33	S.D.			
8' - 0"	U12	U12	U12	U18	U18	U18	U24	U24	U30	U30	U33	S.D.	S.D.			

DESIGNATION	A	B	C	D	E
U12	43"	52"	11 1/4"	12"	32 5/8"
U18	43"	52"	17 1/4"	18"	31 3/8"
U24	43"	52"	23 1/4"	24"	30 1/8"
U30	43"	52"	29 1/4"	30"	28 7/8"
U33	45"	54"	32 1/4"	33"	30 1/4"

VALMONT U-BEAM™ DESIGN GUIDELINES

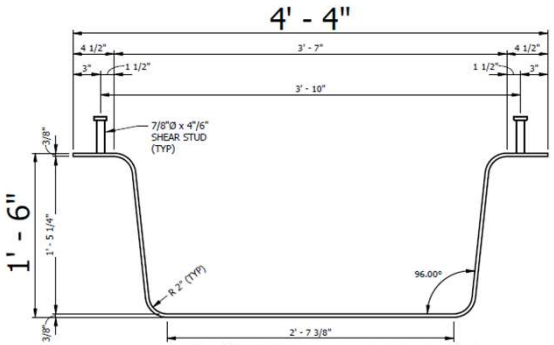
AASHTO LRFD Bridge Design Specifications 8th Edition (2017) Section 6.11.
Steel Structures. Box-Section Flexural Members

valmont STRUCTURES



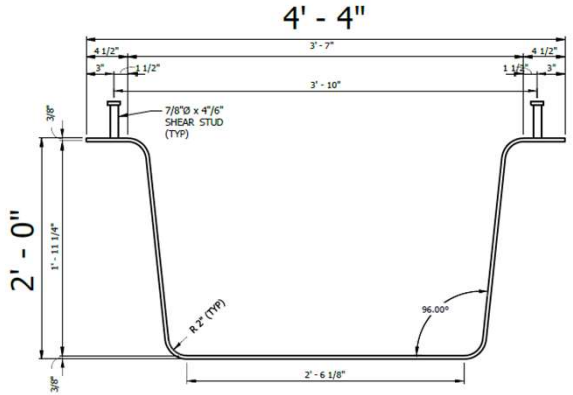
U12 STEEL U-BEAM™

(AASHTO M270, ASTM A709 GR50 T2)



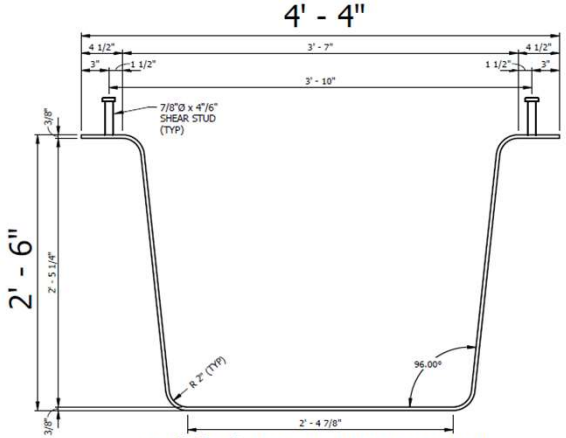
U18 STEEL U-BEAM™

(AASHTO M270, ASTM A709 GR50 T2)



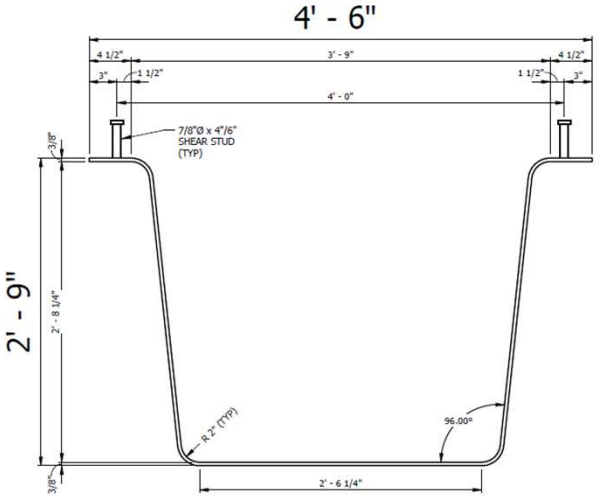
U24 STEEL U-BEAM™

(AASHTO M270, ASTM A709 GR50 T2)



U30 STEEL U-BEAM™

(AASHTO M270, ASTM A709 GR50 T2)



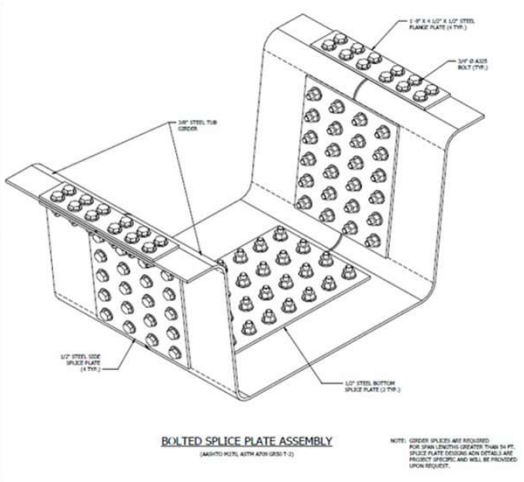
U33 STEEL U-BEAM™

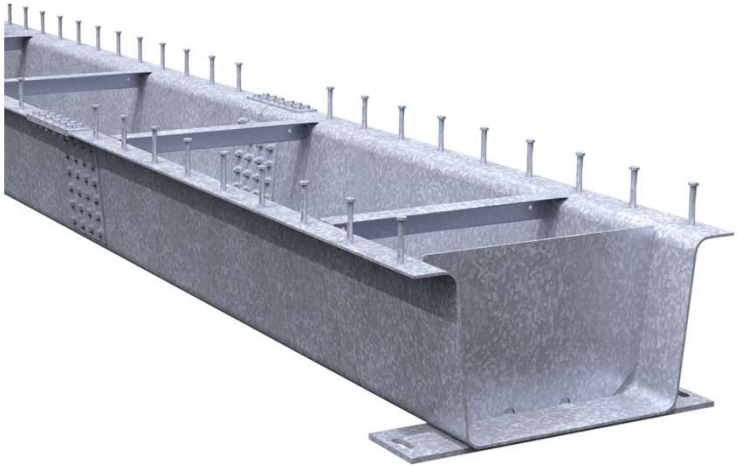
(AASHTO M270, ASTM A572 GR50 T2)

U12 - U33 STANDARD DESIGN SECTIONS

Valmont U-BEAM™ Design Cross Sections.

valmont STRUCTURES





Surface Condition	Definition	Ks (Slip Coefficient)
Class A	Unpainted clean mill scale Blast-cleaned surfaces with Class A coatings	0.30
Class B	Unpainted blast-cleaned surfaces to SSPC-SP 6 or better Blast-cleaned surfaces with Class B coatings Unsealed (pure Zn or 85/15 Zn/Al) thermal-sprayed coatings with a thickness ? 16 mils	0.50
Class C	Hot-dip galvanized surfaces (roughening by wire brushing no longer required)	0.30
Class D	Blast-cleaned surfaces (including HDG) painted with organic zinc-rich coatings	0.45

AASHTO BOLTED SPLICE DESIGN

AASHTO LRFD Bridge Construction Specifications 4th Edition (2017) Section11.5.5.3 Surface Conditions. Faying surfaces specified to be galvanized shall be hot-dip galvanized in accordance with AASHTO M111 (ASTM A123).
AASHTO LRFD Bridge Design Specifications 8th Edition (2017) Section 6.13.2.8 Slip Resistance. Class C Surface: hot-dip galvanized surfaces (K_s=0.30)

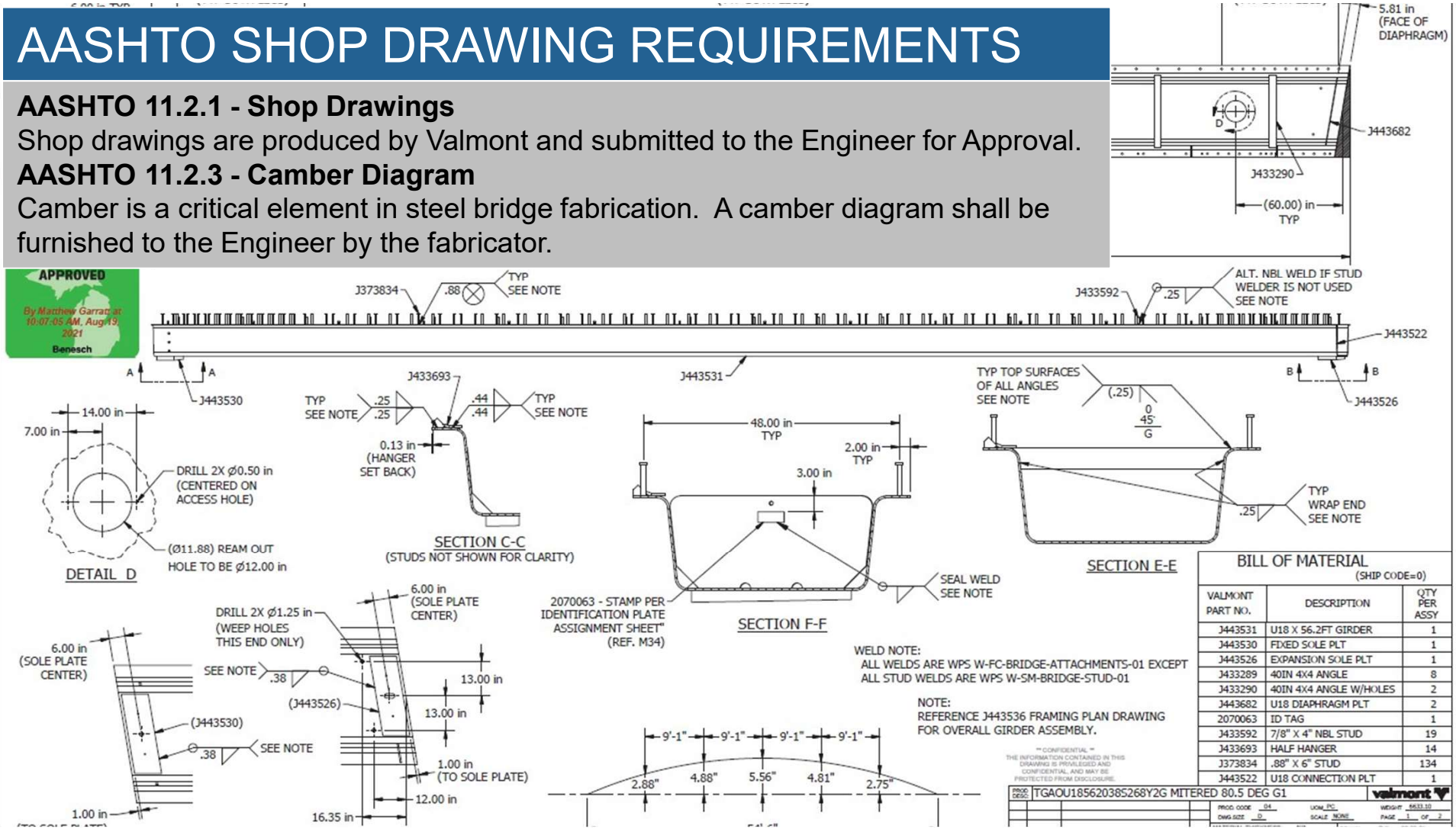
AASHTO SHOP DRAWING REQUIREMENTS

AASHTO 11.2.1 - Shop Drawings

Shop drawings are produced by Valmont and submitted to the Engineer for Approval.

AASHTO 11.2.3 - Camber Diagram

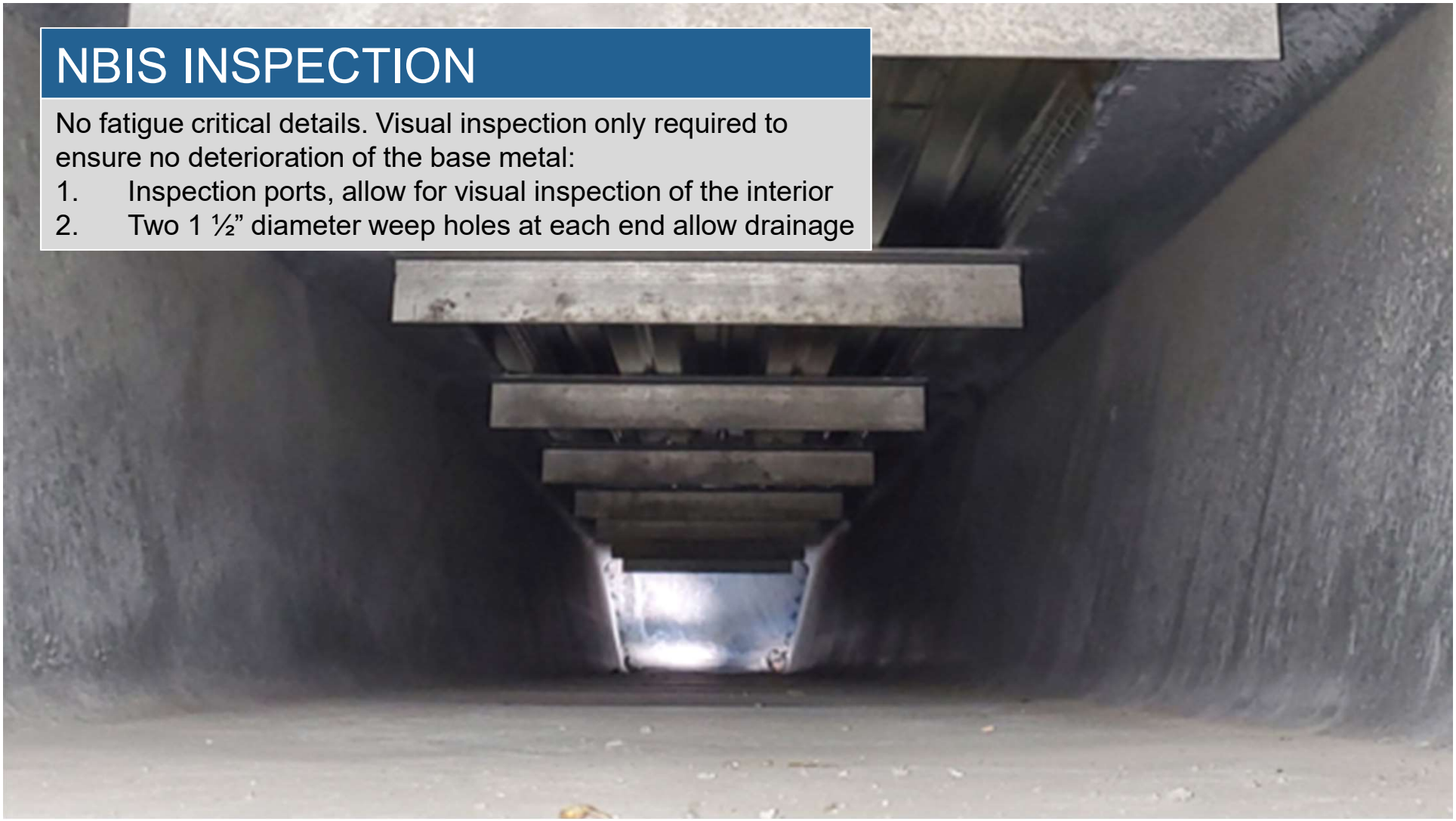
Camber is a critical element in steel bridge fabrication. A camber diagram shall be furnished to the Engineer by the fabricator.



NBIS INSPECTION

No fatigue critical details. Visual inspection only required to ensure no deterioration of the base metal:

1. Inspection ports, allow for visual inspection of the interior
2. Two 1 ½” diameter weep holes at each end allow drainage



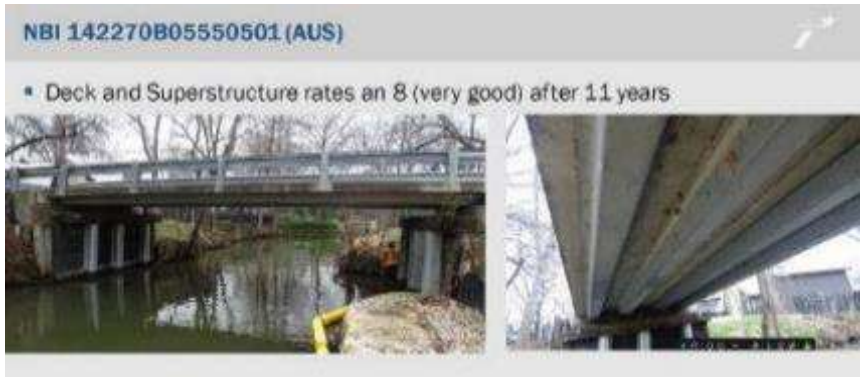
Valmont U-BEAM™ Inspection

- NBIS inspection requirements for U-BEAMs are limited to section loss due to corrosion
- Visual observation of the interior U-BEAM elements through openings at each end
- Visual inspection should look for chalky white staining or zinc oxide build-up on the surface
- **Base metal thickness and coating thickness can both be measured from the outside with an electromagnetic gauge per ASTM E376**.

Example TxDOT NBIS Inspection

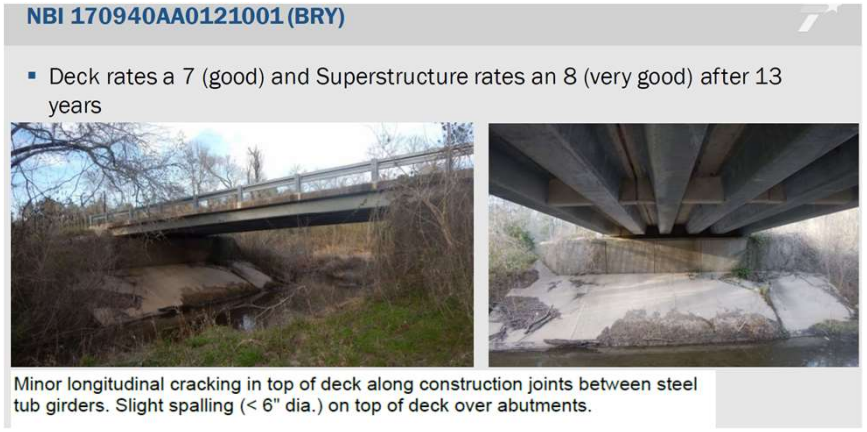
TxDOT Bi-Annual Inspections:

Owner: City of Austin
- Installed 2011
- Superstructure Rating Very Good



Channel Road Bridge, Austin TX

Owner: Grimes County
- Installed 2007
- Superstructure Rating Very Good



Grimes County Bridge, Houston, TX

Reference: TxDOT Design Updates Presentation
11/22/21 Michael Hyzak, P.E. Bridge Division

CONCRETE DRIVING SURFACE OPTIONS

valmont STRUCTURES

CAST-IN-PLACE CONCRETE BRIDGE DECK

- Local DOT Approved Concrete Mix Design
- Contractor Installed

VALMONT COMPLETE BRIDGE SYSYTEM

- Local DOT Approved Concrete Mix Design
- Precast with Local Qualified Supplier and Approved Procedures

VALMONT U-BEAM™ CASE STUDIES

valmont STRUCTURES

GALVANIZED STEEL VALMONT U-BEAM™ CASE STUDIES

1. 2019 CHAMPAIGN COUNTY, IL LIFE CYCLE COST
2. 20121 MDOT GRAND TRAVERSE COUNTY SUPERSTRUCTURE
3. 2022 IMPERIAL COUNTY, CA PREFABRICATED BRIDGE UNITS
4. 2022 TENNESSE DOT EMERGENCY BRIDGE REPLACEMENT
5. 2022 MICHIGAN DOT DESIGN-BUILD 19 BRIDGES BUNDLE

2019 CHAMPAIGN COUNTY, IL LIFE CYCLE COST

JOB SITE TOUR: PBTG TECHNOLOGY

How it compares to traditional construction methods.

JOIN CHAMPAIGN COUNTY ENGINEER JEFF BLUE FOR A JOB SITE TOUR OF A PBTG BRIDGE

Wednesday, March 2 | 1-3pm CT

826 County Road 800N, Tolono, IL

(Located 15 minutes southwest of THE Conference venue)

Review an existing installation up close and personal for a better understanding of the PBTG technology and how it compares to traditional construction methods.

Most Long-Term Bang For Your Buck?

Precast Beams	Steel Beams With Concrete Deck	Concrete Slab Bridge	Galvanized PBTG With Concrete Deck
• $200/SF • Expected Life - 50 Years	• $300/SF • Expected Life - 75 Years	• $500/SF • Expected Life - 75 Years	• $263/SF • Expected Life - 100 Years

U-BEAM™ Advantage – Lifetime Value

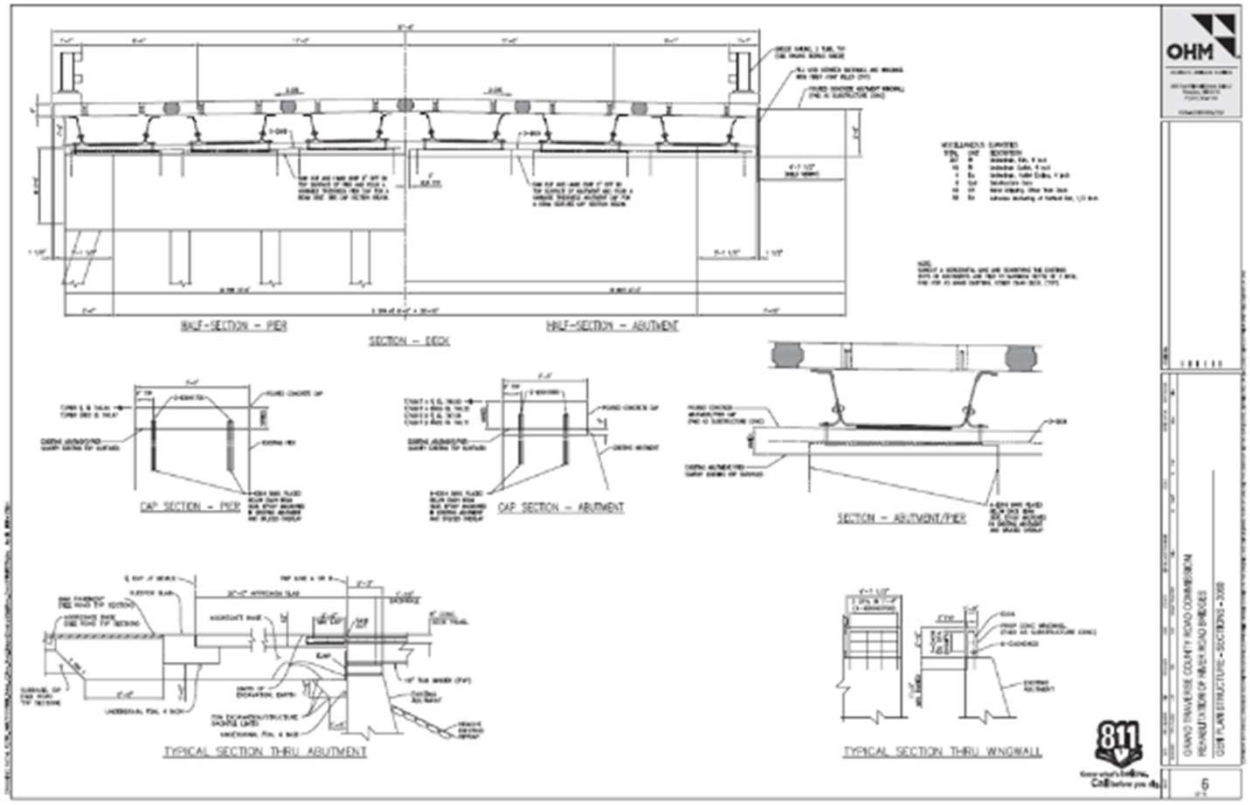
HIGHEST LIFETIME VALUE – Press Brake Tub Girder				
Bridge Technology	Precast Beams	Galvanized PBTG with Concrete Deck	Steel Beams with Concrete Deck	Concrete Slab Bridge
Cost Per Square Foot	$200	$263	$300F	$500
Expected Service Life	50 years	100 years	75 years	75 years
Cost Per Square Foot Over Lifetime	**$4**	★ **$2.6** ★	**$4**	**$6.7**

Reference: Jeff Blue, P.E., Champagne County Bridge Division

2021 MDOT GRAND TRAVERSE COUNTY

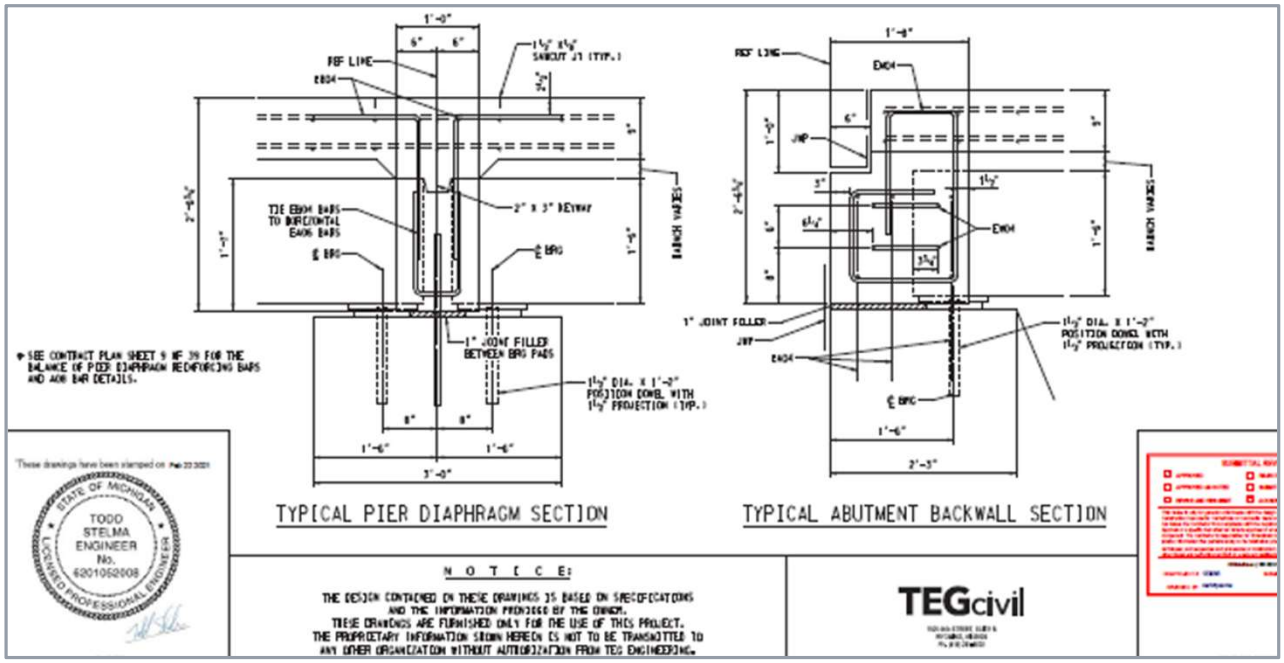
Latest Installation, Grand Traverse County, MI

- Consultant designed as precast concrete bridge deck



Latest Installation, Grand Traverse County, MI

- Contractor chose to VECP cast-in-place deck option



Grand Traverse County, MI Installation

Consultant designed as precast concrete bridge deck, contractor chose to VECP cast-in-place deck option

The Boardman River is considered one of the top ten trout streams in Michigan

Grand Traverse County, MI Installation

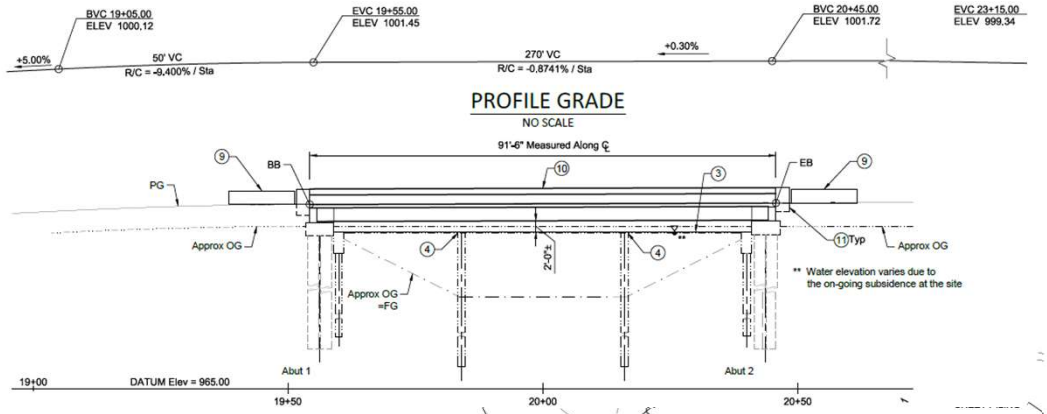
2 Span cast-in-place deck, open to traffic 2 week after U-BEAMs delivered

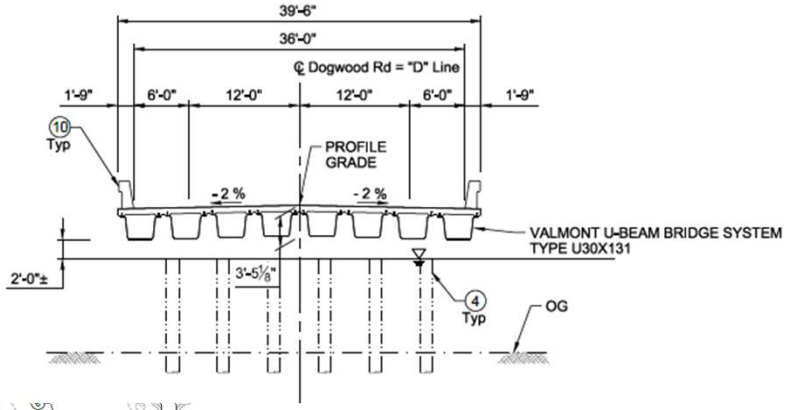
Grand Traverse County, MI Finished Product

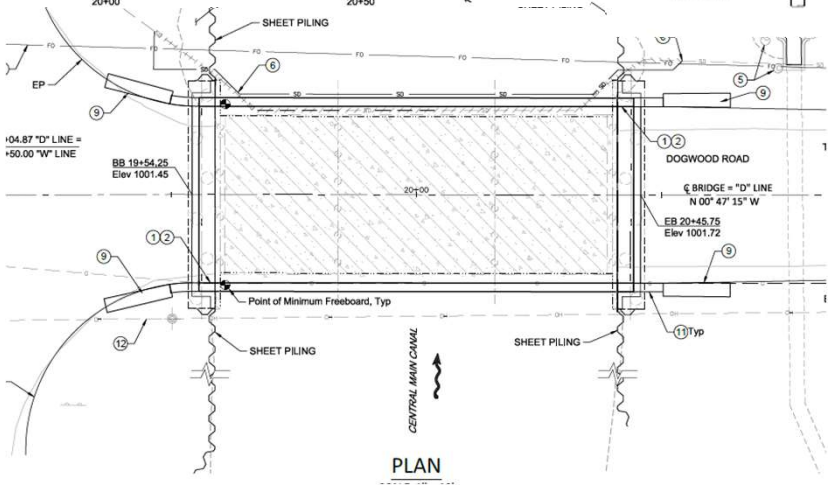
Finished Product, August 2021

2022 IMPERIAL COUNTY CALIFORNIA

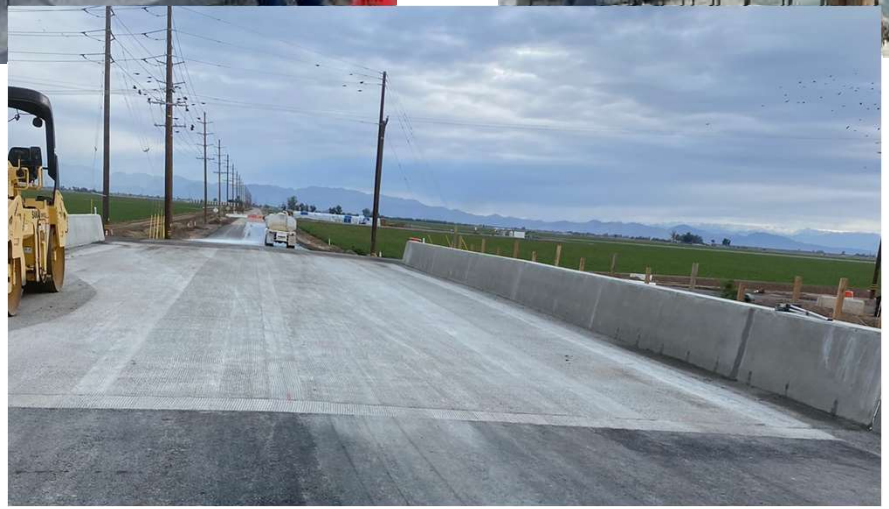
Dogwood Road over Main Canal, Imperial County







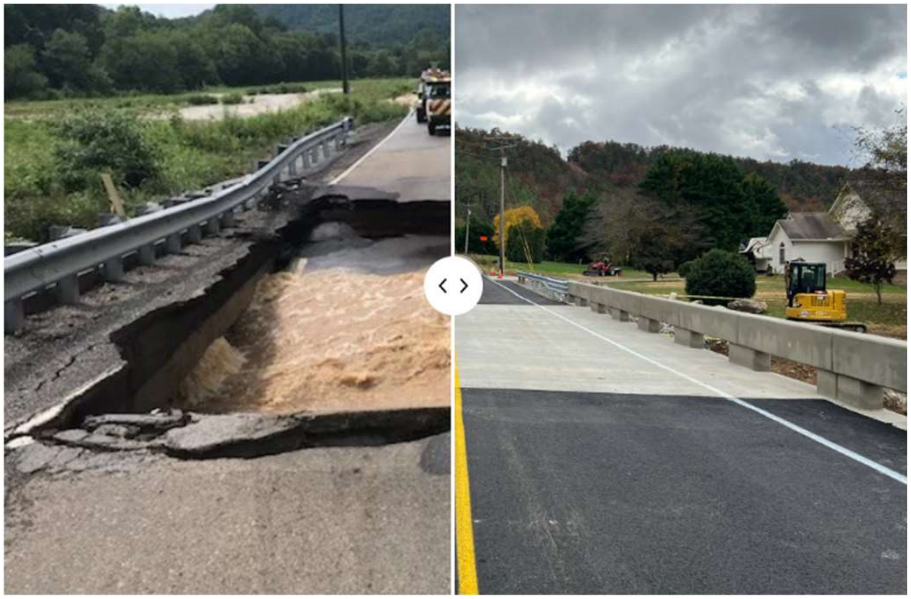
Dogwood Road over Main Canal, Imperial County



2022 TDOT
SEVIER COUNTY

Expedited U-BEAM™ Bridge Installations

- TDOT Sevier County, TN Emergency Bridge Replacement
- TDOT purchased U-BEAMs direct from Valmont
- Beams supplied in 6 weeks
- Bridge opened in less than 3 months



2022 MDOT BRIDGE BUNDLING

2018 Michigan “FIX THE DAMN ROADS” Promise

In November 2018, Gretchen Whitmer was elected to a resounding victory as Michigan’s governor. Her eponymous slogan?

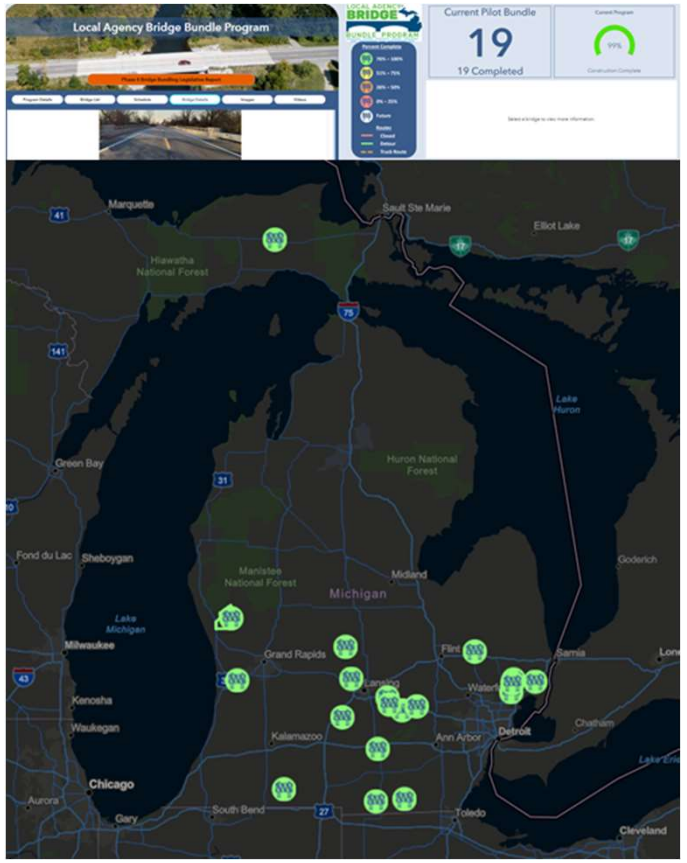
“Fix the damn roads” -Whitmer

- By the end of 2022, Governor Whitmer and Lt. Governor Gilchrist will have fixed, repaired, or replaced more than 16,000 lane miles of road and 1,200 bridges.
- A $1.2 trillion federal infrastructure law is expected to provide Michigan with another $2.3 billion in road and bridge funding over five years.
- MDOT expects bridge bundling, which covers several bridge locations under one contract, to streamline coordination and permitting, increase economies of scale, and improve bridge conditions on local routes around the state.

2021 MDOT 19 Bridges Design-Build Bundle Project

Project timeline:

12/13/19	MDOT Pilot Announcement
08/20/20	5 Contractor Teams Shortlisted
11/19/20	MDOT Design-Build Request for Proposal
12/04/20	VALMONT Provided U-BEAM™ Priced Solutions to All Shortlisted Contractors
02/19/21	CA HULL Named Low Bidder for Project Engineers Estimate $23,785,860 Low Bidder $24,262,230
03/12/21	CA HULL Provided Valmont Letter of Intent
08/11/21	Received Preliminary Designs
12/21/21	Started Fabrication
11/01/23	Contract Planned Completion Date



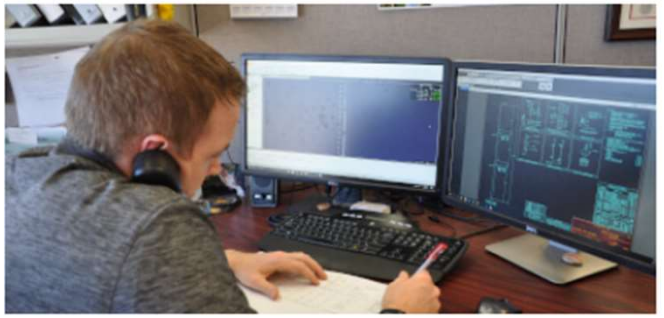
U-BEAM™ ADVANTAGES – DEPLOY INNOVATION

Valmont Engineered Support Services

Valmont provided all 5 shortlisted teams with specific design solutions and prices for each of the 19 bridges. Including:

- Most Economical U-BEAM™ Solution
- Construction Accessories (bearing pads, metal deck, forming hardware)
- Stamped Design and Shop Drawings
- Stamped Load Rating

Smart Infrastructure



From Concept to Reality

At Valmont® Structures, we've been turning concepts into reality for decades. We've learned firsthand that the ability to move a concept to reality starts with experience. At Valmont, we have over 100 engineers on staff around the world. Their collective global experience enables us to create unique structures while also meeting specific architectural requirements and municipal codes. But our experience doesn't end there. Instead it extends with the knowledge that is gained working across a wide array of solutions that include lighting, traffic, mass transit, signage, communications structures and even foundation design.

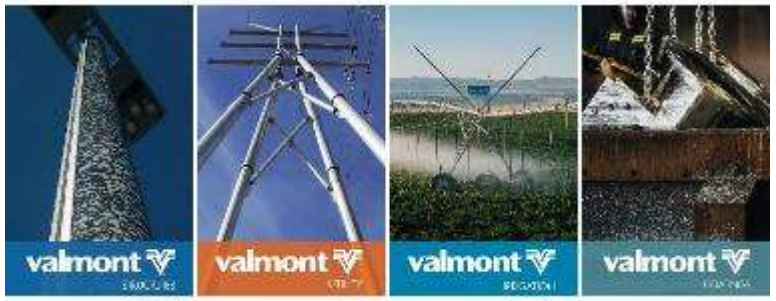
U-BEAM™ ADVANTAGES – SAVE TIME

Reduced Construction Schedule By 1 Year!

Valmont provided all 157 U-BEAMs in an 8 month construction season:

- Secured ALL 500 Tons Of Material For Project By 3/12/21
- 3rd Party Inspection At Valmont Jasper Facility
- Hot Dip Galvazning At Valmont Birmingham Facility

VALMONT FABRICATION AND COATINGS CAPABILITIES



Valmont Structures

LIGHTING
- Area Lighting Poles
- Street Lighting Poles
- Decorative Lighting Poles and Lamp Posts
- Small Cell
- High-Mast Lighting Poles
- Sports and Stadium
- Camera Poles and Security Structures
- Vibration Mitigation

TRANSPORTATION
- Traffic Structures
- Mass Transit Structures
- Sign Structures
- Vibration Damping
- Electric Bus Charging Infrastructure
- Bridge Systems

TELECOMMUNICATIONS
- Self-Supporting Towers
- Guyed Towers
- Concealment
- Portable Base Towers
- Monopoles
- Passive Repeaters
- Small Cell
- Wireless Accessories

ARCHITECTURE
- Aesthetics
- Sun Shading
- Transportation and Safety
- Parking Garages
- Façade Systems
- Façade Accessories

U-BEAM™ ADVANTAGES – EFFICIENT PRODUCTION

Valmont State of the Art Fabrication Facility

New plant opened August 2020:

- AISC and MDOT Certification
- Designed for Manufacturing Efficiency and Sustainability
- Cut Production Time by 70%
- Capabilities include:
  - 2000 Ton 60’ Press Brake
  - Roll form camber capabilities
  - Automated stud welding
  - Safe and efficient material handling

PURPOSE BUILT PRESS BRAKE TUB GIRDER FACILITY

U-BEAM™ ADVANTAGES – ECONOMY OF SCALE

<u>Efficient Freight, Easy Handling</u>

Utilized regional carries on standard trailers:

- Deliver As Many As 6 U-BEAMs In A Single Load
- Unload With Light Equipment (Rubber Mounted)
- Easy Job Site Storage (Smaller Footprint)
- Easy Accessibility to Job Site (Important in Rural Locations)

U-BEAM™ ADVANTAGES – SAVE CONSTRUCTION COSTS

Simple Rigging, Smaller Equipment

Installation made easy:

- Nylon Slings with Basket Rigging
- Extended Reach Of Equipment (Eliminated Use of Barges)
- Use Of Smaller Equipment (Some Sites Only Need An Excavator)
- Easy Accessibility to Job Site (Important in Rural Locations)

U-BEAM™ ADVANTAGES – SAVE CONSTRUCTION COSTS

<u>Less Field Work, Less Exposure to Hazardous Conditions</u>

Forming made easy:

- No External Intermediate Diaphragms
- Concrete Forming Directly Atop Top Flanges (No Welding)
- Constant Haunch (No Survey Prior to Installation)
- Pre-Installed Formwork Hardware (Half-Hangers and Screed Studs)
- Easily, Safely Install Fascia Brackets On The Ground

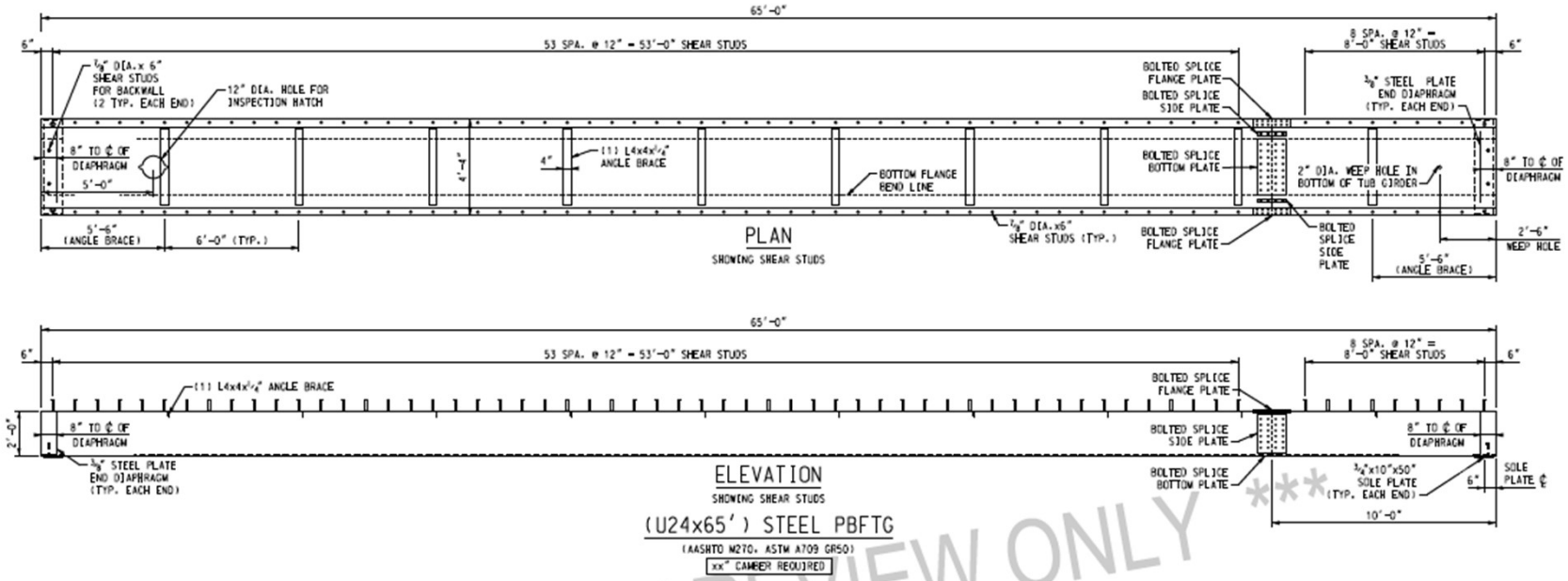
U-BEAM™ ADVANTAGES – REDUCED COST

- Lower Cost (2022 Pricing)
  - Tub girder priced at approx. $2.75 per pound
    - Fully fabricated and galvanized
    - On a length basis this equates to $290 to $430 per linear foot depending on girder type (U12 to U33)
  - Reduced Installation costs
    - Lighter units require smaller crane
    - Accelerated delivery and light weight allow more girders to be installed in a single day
    - Light weight allows for ease of stockpile on jobsite

U-BEAM™ ADVANTAGES – REDUCED COST

U-BEAM™ BUDGETARY PRICING		
Price Per Pound $2.75 $/lbs (fully fabricated and galvanized)		
U-BEAM™ Designation	Pounds per Foot (fully fabricated and galvanized)	Price per Foot (fully fabricated and galvanized)
U12	106 #/ft	$290 $/ft
U18	117 #/ft	$320 $/ft
U24	134 #/ft	$370 $/ft
U30	148 #/ft	$410 $/ft
U33	157 #/ft	$430 $/ft
Price does not include bearing pads, anchor bolts, metal deck forms		
Price does not include Engineering fee for non-standard shapes		

U-BEAM™ ADVANTAGES – STANDARD SHAPES



Valmont U-BEAM™ Bridge System Solution

QUESTIONS?

Major benefits include:

- Competitive installation pricing
- Reduced installation time
- **100 year service life =** 60 year maintenance free protective coating + 40 year service life steel beam underneath
- AASHTO LRFD Design
- Valmont bridge design support
- Flexible options:
  - Valmont U-BEAM™ only
  - Complete Bridge Solution – Field Assembly

    U-BEAM™ with precast deck panels
  - Complete Bridge Solution – Accelerated Construction Assembly (ABC)

    U-BEAM™ integral with concrete deck

THANK YOU

PRESENTED BY
Guy Nelson, P.E., S.E.
Product Development Engineer
Valmont Industries, Inc.
Guy.Nelson@valmont.com
616-813-8514

PRESENTED BY
Jeff Simkins
National Bridge Sales Manager
Valmont Industries, Inc.
Jeff.Simkins@valmont.com
618-570-6841

PRESENTED BY
Theresa O'Riorden
Regional Bridge Sales Engineer
Valmont Industries, Inc.
Theresa.Oriorden@valmont.com
978-502-8458