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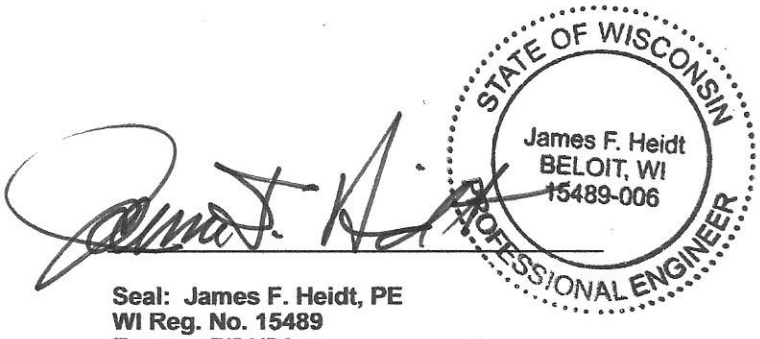
STRUCTURAL CALCULATIONS

38' x 12' Flat Snowmobile Bridge #857

Watertown, Jefferson County, Wisconsin

Fabricator

Custom Manufacturing, Inc.
606 Delco Drive, P.O. Box 279
Clinton, Wisconsin 53525



Seal: James F. Heidt, PE
WI Reg. No. 15489
Exp. 7/31/24

Project No. 22-129

Pages: 11

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TRAIL BRIDGE - Dead Loading Calculations

Project: 38' x 12' Flat Snowmobile Bridge #857
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Client: Custom Manufacturing, Inc.
606 Delco Drive, Clinton, WI

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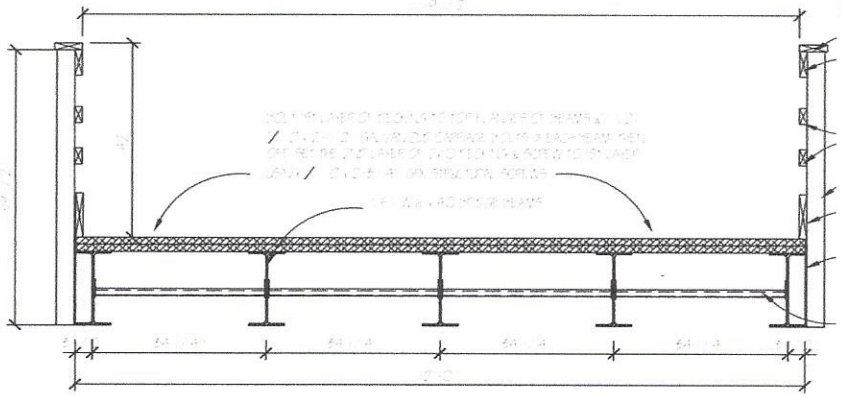
	Length (ft)	Width (ft)
Main Span	**38** ✓	**12**

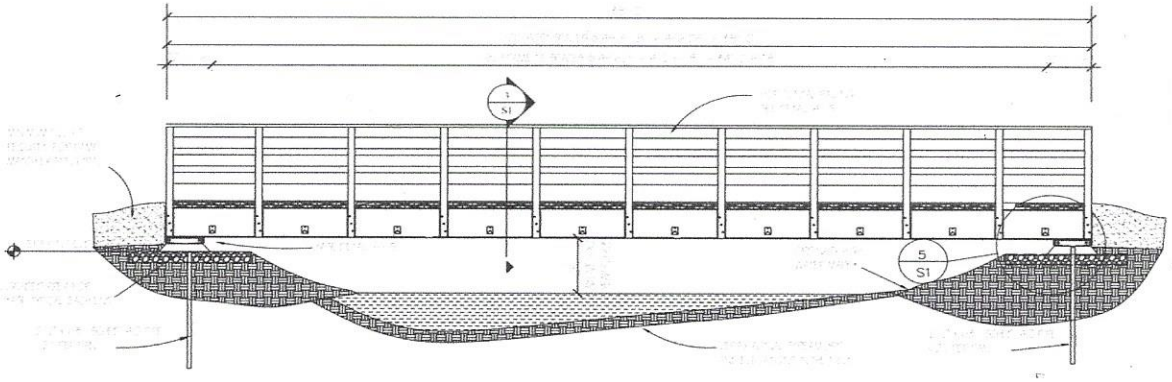
Member		(in)	Length (ft)	Width (ft)	Area (sf)	Number (ea)	Unit Wt. (plf)	Length (ft)	Total Wt. (lbs)
Railing - Posts 4x4		59.50	4.96			22	3.40	109.08	371
Railing - Posts 6x6			5.00			0	8.40	0.00	0
Railing - Toe Kick 2x8			38.00			0	3.02	0.00	0
Railing - Toe Kick 2x10			38.00			2	3.85	76.00	293
Railing - Horz. Rails 2x4			38.00			4	1.46	152.00	222
Railing - Horz. Rails 2x6			38.00			2	2.29	76.00	174
Railing - Horz. Rails 2x8			38.00			0	3.85	0.00	0
Railing - Cap Plate 2x6			38.00			2	2.29	76.00	174
Railing - Spindals 1-1/2 x 1-1/2			38.00			0	0.73	3.38	0
Railing - Cross Bucks 2x6			38.00			0	2.29	0.00	0
Wood Deck - 2x10 Plank		(2) Layers	38.00	12	456	2	3.85	1.00	3,511
Wd Wearing Deck 1x3 RS Oak			38.00	12	456	0	2.93	1.00	0
Wd Wearing Deck 2x6 RS Oak			38.00	12	456	0	4.17	1.00	0
2 x 2 x 1/4 Angle		34.25	2.85			40	3.19	114.17	364
Subtotal Bridge Dead Load									5,109
Bridge Beams	**W16 x 40** ✓		38			5	40.00 ✓	190.00	7,600

Bridge Arched Section Dead Weight **12,709 lbs**

Dead load of bridge (psf)	**27.9 psf**



3/S1 BRIDGE CROSS SECTION
SCALE: 1/2"=1'-0"



2/S1 ELEVATION
SCALE: 1/4" = 1'-0"

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TRAIL BRIDGE - Bridge Deck Calcs

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Watertown
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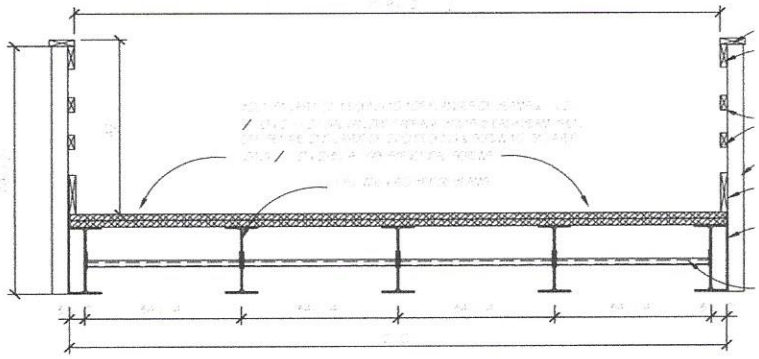
Bridge Deck Design Data:	**Units**	**38' x 12' Bridge**		
Bridge Width	ft	12.00		
Decking Span C to C	in	34.25	✓	
Decking Clear Span	in	27.25		
DL on Deck	psf	10.0		
LL #1 on Deck	psf	60		
LL #2 on Deck	psf	30	✓	
Vehical Weight	lbs	25,000	✓	
VL on Deck	psf	312.5		



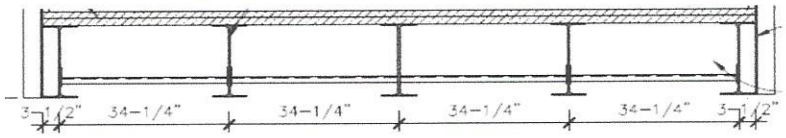
3 / S1 BRIDGE CROSS SECTION
SCALE: 1/2"=1'-0"

Decking Physical Properties:		Pine	
Deck material		2x10 S4S	
Width (d)		9.250	
Thickness (b)	(2) Layers	3.000	
End Area (A)	in^2	27.750	
Moment of Inertia Ixx	in^4	197.863	
Moment of Inertia Iyy	in^4	20.813	
Section Modulus Sxx	in^3	42.781	
Section Modulus Syy	in^3	13.875	

Wood Stress Adjustment Factors (NDS Table 4A)

Decking Structural Properties: Deck material		MSR Pine 2x10 S4S Allowable	Load Duration C_D	Repetitive Member C_r	Wet Service C_M	Size Factor C_F	Flat Use Factor C_{fu}	Net Factor	Adjusted Allowable Stresses
Bending (Fb)	psi	2,760	1.15	1.15	0.85	1.00	1.00	1.12	3,103
Tension (Ft)	psi	1,925	1.15	1.00	1.00	1.00	1.00	1.15	2,214
Horiz. Shear (Fv)	psi	190	1.60	1.00	0.97	1.00	1.20	1.86	354
Compression (Fcp)	psi	805	1.15	1.00	0.67	1.00	1.00	0.77	620
Compression (FcII)	psi	1,975	1.15	1.00	0.80	1.00	1.00	0.92	1,817
Modulus of Elasticity	psi	2.00E+06	1.00	1.00	0.90	1.00	1.00	0.90	1,800,000

Loading on one plank:



w = (d/12)*(DL+LL#1)	plf	53.96
w = (d/12)*(DL+LL#2)	plf	30.83
w = (d/12)*(DL+LL#2+VL)	plf	271.72
Maximum loading on deck plank =	**plf**	**271.72**

Rearrange deflection equation and solve for maximum deck span based on l/360 deflection:

Lmax = [(Δ*384*EI)/5*w]^.25 in 72.49 **OK** Based upon double deck.

Check decking shear stress:

	Max. Load		Stress		
Uniform	271.72 plf	fv = 1.5*V/A = ((w*l)/2)/A =	41.92 psi	**OK**	Based upon double deck.
Point	7,500 lbs	fv = 1.5*V/A =	270.27 psi	**OK**	Based upon double deck.

Notes: 1. If the VL is from a tracked vehicle, then point load is uniformly distributed over a number of plank.
2. If the VL is from vehicle tires, then the point load is assumbed to be from a large tractor type wheel and distributed over 1-1/2 double plank widths.

Check compressive stress from tire imprint:		Truck Tire		Ag. Tire 152 L.I.		Sno-Cat Track	
Assumed Tire Imprint Area A =	in^2	88.5		283		2,080	
Tire load P = (.6*VL)/2	lbs	7,500		7,500		7,500	
Compressive stress = P/A =	psi	84.75	**OK**	26.50	**OK**	3.61	**OK**

Notes: 1. Tire area data from Goodyear Tire & Rubber Co.
2. Track data from Tucker Snow-Cat Corp.

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TRAIL BRIDGE - Beam Loading Calculations

Project: 38' x 12' Flat Snowmobile Bridge #857
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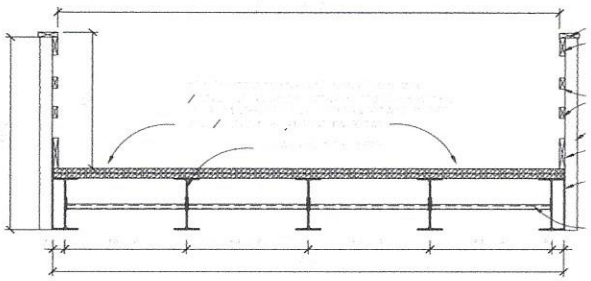
	Bridge Design Data:	(in)	Units	38' x 12' Bridge Beams	
	Beam Nominal Span		ft	38.00	✓
	Beam Clear Span		ft	35.00	
	Beam Spacing	34.25	ft	2.85	
	Number of Beams		ea	5	
	Bearing Pan Width	25.5	ft	2.13	✓
	Bearing Pan Length		ft	13.71	
	Assumed Soil Bearing Capacity		psf	1,500	✓
	Bridge Beam Loading:				
	Dead Load		psf	27.90	
	Live Load #1		psf	60.00	
	Live Load #2		psf	30.00	
	Vehicle Load on 8'x10'		lbs	25,000	✓
	Snow Load		psf	30.00	
	Allowable Deflection L/360		in	1.17	
	Dead Loading on Beams:				
	DL on Inside Beams		plf	79.63	
	DL on Outside Beams		plf	39.82	
	Live Loading on Beams:				
	LL #1 on Inside		plf	171.25	
	LL #2 on Inside		plf	85.63	
	VL on Inside		plf	817.83	
	LL #1 on Outside		plf	85.63	
	LL #2 on Outside		plf	42.81	
	VL on Outside		plf	408.92	
	Snow Load on Beams:				
	SL on Inside Beams		plf	85.63	
	SL on Outside Beams		plf	42.81	



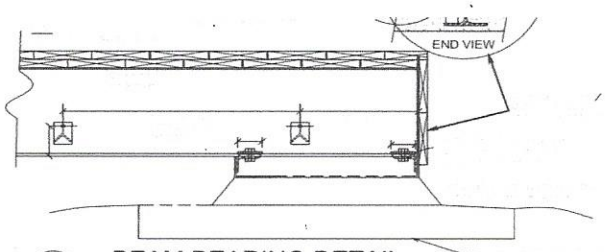
3/S1 BRIDGE CROSS SECTION
SCALE: 1/2"=1'-0"

Zone	Snow Zone	Loading	
Zone 4	Marathon Co. to Bayfield Co.	60	psf
Zone 3	Waushara Co. to Marathon Co.	50	psf
Zone 2	Columbia Co. to Waushara Co.	40	psf
Zone 1	WI/IL Border to Columbia Co.	30	psf

Compute Beam Reactions:

Inside Beams:			
Load condition #1 = DL + .80*(LL#1+ SL)	lbs	5,417	
Load condition #2 = DL +.75*(LL#2+SL+CL)	lbs	8,860	
Outside Beams:			
Load condition #1 = DL + .80*(LL#1+ SL)	lbs	2,709	
Load condition #2 = DL +.75*(LL#2+SL+CL)	lbs	5,040	

			Load on Pan
	Compute Bridge Support Loading:		
	Loading Condition #1	lbs	21,670
	Loading Condition #2	lbs	36,661
	Loading Condition #3 w/ C.L. over pan	lbs	38,182
	Compute Maximum Soil Bearing Load:		
	From Maximum Loading on Bearing Pan	psf	1,311
			OK ✓



11/S1 BEAM BEARING DETAIL
SCALE: 1"=1'-0"

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TRAIL BRIDGE - Bearing Pan Loading Calculations

Project: 38' x 12' Flat Snowmobile Bridge #857
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Jefferson County, Wisconsin
Client: Custom Manufacturing, Inc.
606 Delco Drive, Clinton, WI

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36" Bearing Pan

Pan Properties:		Soil Properties:		
Fy = (psi)	30,000	Soil Bearing	(psf)	1,500
Fall = (psi)	20,100	Subgrade Modulus	k (pci)	350
E = (psi)	29,000,000	Subgrade Modulus	ko (psi)	8,925
Ixx =(in^4)	59.82	No. Bridge Beams =	5	>>>>>
Sxx =(in^3)	11.09	Beam Spacing (in) =	34.25	
c = (in)	5.395		38' ✓	

Bearing Pan Loading:

		Single End	
Loading Condition #1	lbs	21,670 ✓	From page 4, line 60
Loading Condition #2	lbs	36,661	From page 4, line 62
Loading Condition #3	lbs	38,182	From page 4, line 64

Bearing Pan Sizes

Width (in)	Ixx (in^4)	Iyy (in^4)	Sxx (in^3)	Syy (in^3)	c (in)	
18	58.10	878.24	10.586	22.242	5.488	
24	59.82	1,645.31	11.087	22.115	5.395	<<<<<
30	61.31	2,703.65	11.535	22.013	5.315	
36	62.61	4,058.81	11.938	21.928	5.245	
42	63.76	5,912.05	12.301	21.857	5.183	
48	64.78	7,955.81	12.632	21.796	5.128	

Note: Bearing pan steel plate is 3/16" A1011 CS-B with a minimum Fy = 30,000 psi.

Pan Size:

Width	(in)	25.50	2.13	(ft)
Length	(in)	164.52	13.71	(ft)

Compute Soil fs = 1,311 ✓

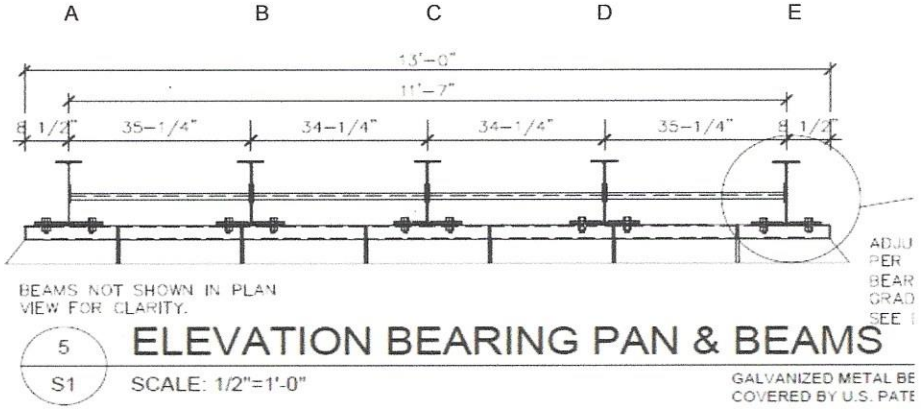
OK

Compute Bearing Pan Stresses:

Compute β = ^4√k/(4EI) = 0.034

Compute βL = 5.54

Maximum beam end reaction P = 9,546 lbs



Single Load on Pan

Bearing Pan Stresses:

Loading on base = P =	(lbs)	9,546
Compute y_{max} = β*P/(2*k) =	(in)	0.018
Compute M_{max} = P/(4*β) =	(lb-in)	70,862
Compute σ_{max} = M_{oc}/I =	(psi)	6,391

OK

Multiple Loads on Pan

Beam Mk	A	B	C	D	E	Units
Load P	4,773	9,546	9,546	9,546	4,773	lbs
Dist. C	-68.5	-34.25	1	34.25	68.5	in
βx =	-2.307	-1.153	0.034	1.153	2.307	
Ax of C	0.008	0.217	1.000	0.217	0.008	Table 7
Cx of C	-0.142	-0.208	1.000	-0.208	-0.142	p.194-196

ymax = β*P/(2*k)*(Axa + Axb + Axc + Axd + Axe) = 0.026 in

Mmax = P/(4*β)*(Cxa + Cxb + Cxc + Cxd + Axe) = 21,344 lb-in

σmax = (Mmax*c)/I = 1,925 psi **OK**

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TRAIL BRIDGE - Wind Load Calculations

Project: 38' x 12' Flat Snowmobile Bridge #857
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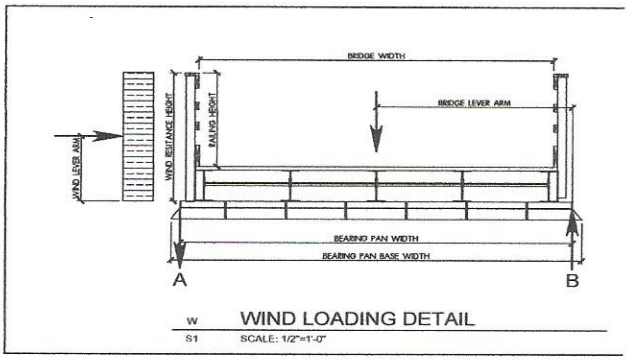
		Sym	Units	38' x 12'	
	Bridge Width	B	ft	12.00	
	Bridge Length	L	ft	38.00	
	Wind Load Calculations:				
	Basic Wind Speed	V	mph	90	
	Wind Directionality	Kd	n/d	1.00	
	Importance Factor	I	n/d	0.87	
	Exposure Factor	Kh	n/d	0.85	
	Topographic Factor	Kzt	n/d	1.00	
20	Gust Factor	Gf	n/d	0.85	
	Enclosure Classification			N.A.	
	Internal Pressure Coeff.	GCpi	n/d	N.A.	
	External Pressure Coeff.	GCp	n/d	N.A.	
				N.A.	
	Compute Velocity Pressure:	qz	psf	**15.33**	
	Compute Wind Exposure:				
	Beam Depth	d1	in	16.00	
	Deck Thickness	d2	in	1.50	
30	Railing Height	h1	in	42.00	
	Wind Resistance Total Ht.	h2	in	59.50	
	Compute Wind Loading:	w	plf	**76.03**	
	Bridge Dead Load = Total Wt. =	Wdl	lbs	12,709	From calc. page 2 line 31.
	Bridge Bearing Pan Width =	B	ft	2.13	
	Bridge Bearing Pan Length =	L	ft	13.71	
	Bridge Bearing Pan Weight =	Wp	lbs	832.3	Bearing pans weight about 28.5 psf
40	**Check Base Overturning:**				
	Bridge Dead Load	.90*Wdl	lbs	12,936	10% reduction in dead load for this calculation
	Bridge DL Lever arm	a	ft	6.86	
	Wind Load Lever arm	h3	ft	2.48	



The railing is assumed to be solid for wind resistance.

Compute overturning equilibrium about the outter bearing pan edge using
a 10% reduction in the bridge dead load per ASCE-7, Section 2.4 Load Combinations.

	Wind Load Moment (+)	ft-lbs	7,163
	Dead Load Moment (-)	ft-lbs	-88,678
50	Net Moment	ft-lbs	-81,515

Does bridge base resist overturning? **YES**

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TRAIL BRIDGE - Railing Calculations

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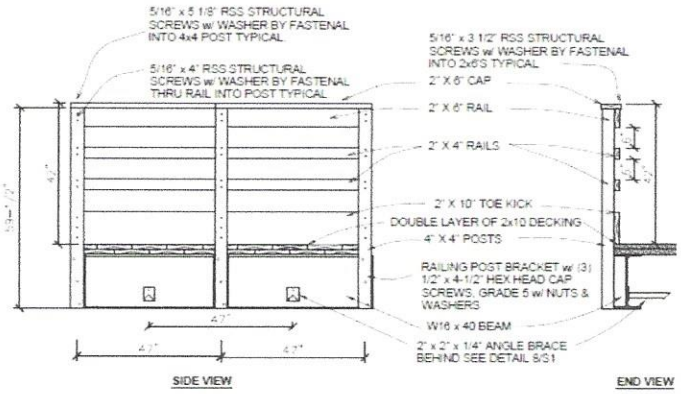
Per the ADA Code, railings must support a 50 plf loading along the railing or 200 lb load at any point. So, the two load conditions for the post are for uniform loading on railing M = wsl or for point load at the post top of M = Pl where l = the post length from bridge deck to top of rail.
The two load conditions for the railing are uniform loading M = wl^2/8 or a point load at mid-span railing M = Pl/4.

Post Length (in)	Post Spacing (in)	Uniform Loading (plf)	Concentrated Loading (lbs)
42.000	45.625	50	200

Rail & Post Material Properties:			MSR Pine 2x4	MSR Pine 4x4
	Bending (Fb)	psi	2,760	2,760
	Tension (Ft)	psi	1,925	1,925
	Horiz. Shear (Fv)	psi	190	190
	Compression (Fcp)	psi	805	805
	Compression (Fcll)	psi	1,975	1,975
	Modulus of Elasticity	psi	2.00E+06	2.00E+06

Decking Physical Properties:			2x4	4x4
	Width (d)	in	3.500	3.500
	Thickness (b)	in	1.500	3.500
	End Area (A)	in^2	5.250	12.250
	Moment of Inertia Ixx	in^4	5.359	12.505
	Moment of Inertia Iyy	in^4	0.984	12.505
	Section Modulus Sxx	in^3	3.063	7.146
	Section Modulus Syy	in^3	1.313	7.146



4 / S1 RAILING ELEVATION & SECTION
SCALE: 1/2"=1'-0"

For the post:	Uniform Load 4x4 Post		Point Load 4x4 Post		
M = wsl =	7,984	M = Pl =	8,400		in-lbs
Sreq=M/Fb=	2.893	OK	3.043	OK	in^3

For the rail:	2x4		2x4		
M = wl^2/8 =	924	M = Pl/4 =	2,106		in-lbs
Sreq = M/Fb =	0.335	OK	0.763	OK	in^3

Clear span dimension of rail.

Computed in the weak direction.

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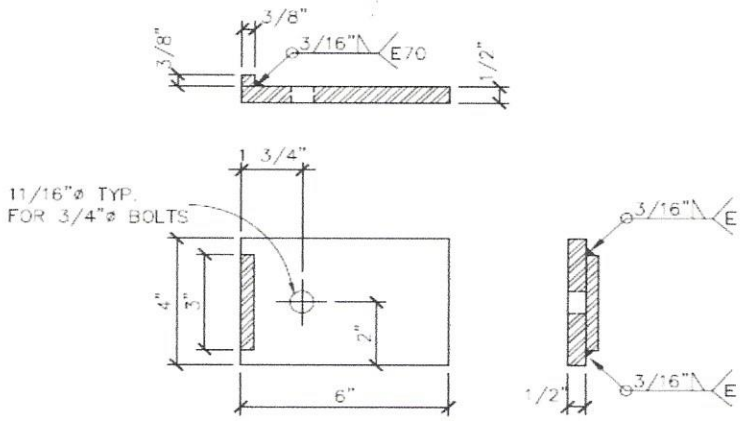
10	Plate Material & Size:			A36		
		Fy	ksi	36		
		Fu	ksi	58		
	Width	wp	in	4.000		
	Depth	dp	in	6.000		
	Thickness	tp	in	0.500	1/2	
	No. Bolts	n	ea	1.000		
	Bolt Size		in	0.625	5/8	
	Dia. Hole	dh	in	0.688	11/16	
	Shear Line	a-b	in	1.75		
20	Tension Line	b-c	in	2.00		
	Number of Beam Clamps used		ea	4		
	Max. Beam Reaction Vx =		kips	8.04	Pg 4 L 50	
	Connection Shear Vx =		kips	6.41		
	Connection Shear Vz =		kips	1.29	Wind Load	
	Connection Tension Vy =		kips	0.00		
	Connection Moment		ft-kips	0.00		
	Compute Net Plate Area:					
30	An = (wp - n*dh*)dp =		in^2	1.656		
	An = .85Ag =		in^2	1.700		
	Design An = Min. =		in^2	1.656		
	Compute Plate Design Strength:					
	ΦTn = Φ*Fy*Ag =		kips	64.80		
	ΦTn = Φ*Fu*Ae =		kips	72.05		
	Allowable plate strength =		kips	64.80		
40	Is the plate strength > Plate Shear?			OK		
	Check Bolt Strength:			SAE J429		
	Bolt Material & Size:			Grade 8		
	Tensile Strength of Bolt (Fu)		ksi	150		
	Min. Yield Strength (Fy)		ksi	130		
		db	in	0.625	5/8	
		Ab	in^2	0.307		
	Design Single Shear Strength =		kips	13.46	Based on threads in the shear plane	
50	Design Double Shear Strength =		kips	26.92		
	Design Tension Strength =		kips	25.89		
	Check Bolts for Shear:					
	Shear Load per Bolt		kips	1.60	No. of Clamps = No. Bolts	
	Shear Stress in Bolt		ksi	5.22		
				OK		
	Check Combined Shear and Tension on Bolt:					
60	Allowable Stresses:					
	AISC Table J3.2	Fnt	ksi	113.0		
	AISC Table J3.2	Fnv	ksi	60.0		
	Interaction Eq. per AISC (J3-3b)					
	F'nt = 1.3*Fnt - (Ω*Fnt/Fnv)*fv <= Fnt			127.23		
	Check Combined Shear & Tension Interaction:					
	1.0 > fx/Fv+fy/Fv+fz/Fv =			0.05		
				OK		
70						



8 / S1 BEAM CLAMP
SCALE: 3"=1'-0" (24 THUS)

AISC Table J3.2					SAE J429
Bolt Material		A307	A325	A490	Grade 8
Tensile Strength (Fu)	ksi	60	120	150	150
Min. Yield (Fy)	ksi	N/A	92	130	130
Nominal Tensile (Fnt)	ksi	45	90	113	113
Nominal Shear (Fnv)	ksi	24	60	60	60

Find Rupture Shear Strength:

Check Shear Yielding:
Tn = .60*Fy*Avg+Fu*Ant = kips 66.93

Check Shear Fracture:
Tn = .60*Fu*Ans+Fy*Atg = kips 93.64

Design Tn = kips 93.64

Compute Plate Design Strength:
ΦTn = .75*Tn = kips 70.23
OK

JAMES F. HEIDT, PE, LLC
2543 Laundale Drive
Beloit, Wisconsin 53511
Phone: 608-931-7184
E-mail: jheidt2543@aol.com

Project Title: New Snowmobile Bridge #857, Watertown, Jefferso
Engineer:
Project ID: 22-129
Project Descr: 38' x 12' Flat Bridge w/ Vehicle Load = 25,000 lbs.

9/11

Printed: 2 DEC 2022, 12:05PM

Steel Beam

Lic. # : KW-06005984 Licensee :

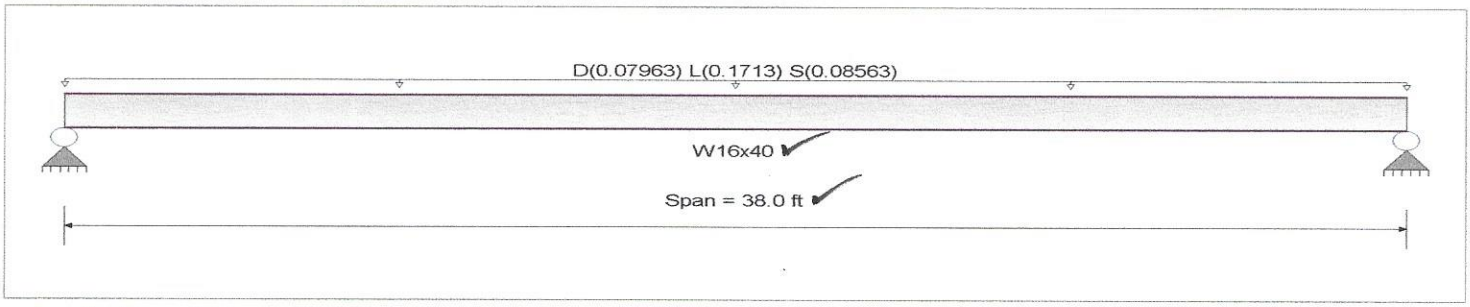
DESCRIPTION: Main 38' Span (35' Clear Span) - LC#1 DL = 27.9 psf, LL = 60 psf, SL = 30 psf

CODE REFERENCES

Calculations per AISC 360-05, IBC 2009, CBC 2010, ASCE 7-05
Load Combination Set : IBC 2009

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.07963, L = 0.1713, S = 0.08563 k/ft, Tributary Width = 1.0 ft, (Load Condition #1)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.270 : 1	Maximum Shear Stress Ratio =	0.053 : 1
Section used for this span	W16x40	Section used for this span	W16x40
Ma : Applied	49.155 k-ft	Va : Applied	5.174 k
Mn / Omega : Allowable	182.136 k-ft	Vn/Omega : Allowable	97.60 k
Load Combination	+D+0.750L+0.750S	Load Combination	+D+0.750L+0.750S
Location of maximum on span	19.000 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.537 in	Ratio =	848 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.854 in	Ratio =	534 >=300
Max Upward Total Deflection	0.000 in	Ratio =	0 <300

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.8544	19.109		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.174	5.174
Overall MINimum	1.513	1.513
D Only	1.513	1.513
+D+L	4.768	4.768
+D+S	3.140	3.140
+D+0.750L+0.750S	5.174	5.174
L Only	3.255	3.255
S Only	1.627	1.627

JAMES F. HEIDT, PE, LLC
2543 Laundale Drive
Beloit, Wisconsin 53511
Phone: 608-931-7184
E-mail: jheidt2543@aol.com

Project Title: New Snowmobile Bridge #857, Watertown, Jefferso
Engineer:
Project ID: 22-129
Project Descr: 38' x 12' Flat Bridge w/ Vehicle Load = 25,000 lbs.

Printed: 2 DEC 2022, 11:44AM

10/11

Steel Beam

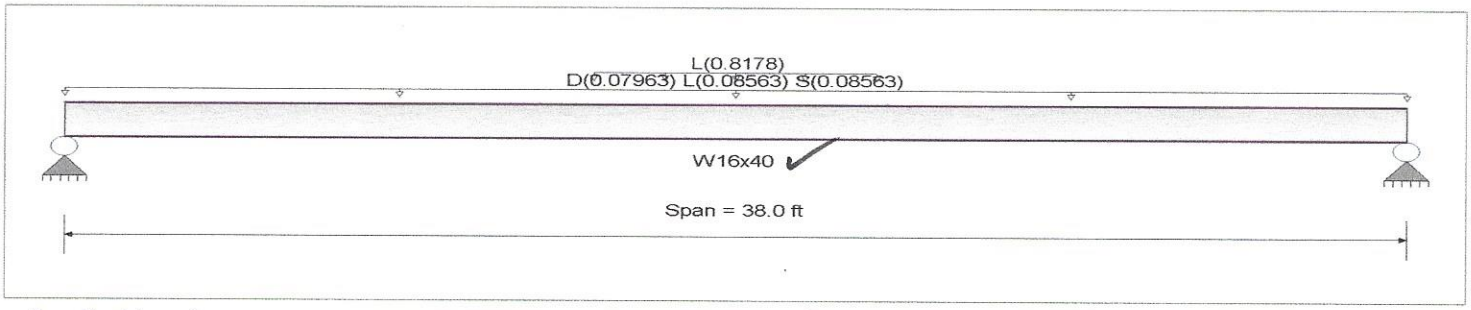
DESCRIPTION: Main 38' Span (35' Clear Span) - LC#2 DL = 27.9 psf, LL=30 psf, SL = 30 psf, VL = 25,000 lb.

CODE REFERENCES

Calculations per AISC 360-05, IBC 2009, CBC 2010, ASCE 7-05
Load Combination Set : IBC 2009

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.07963, L = 0.08563, S = 0.08563 k/ft, Tributary Width = 1.0 ft, (Load Condition #2)

Uniform Load : L = 0.8178 k/ft, Extent = 15.0 -->> 23.0 ft, Tributary Width = 1.0 ft, (Vehical Load = 25,000 lbs)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.469 : 1	Maximum Shear Stress Ratio =	0.066 : 1
Section used for this span	W16x40	Section used for this span	W16x40
Ma : Applied	85.440 k-ft	Va : Applied	6.411 k
Mn / Omega : Allowable	182.136 k-ft	Vn/Omega : Allowable	97.60 k
Load Combination	+D+L	Load Combination	+D+L
Location of maximum on span	19.000 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	1.113 in	Ratio =	409 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	1.364 in	Ratio =	334 >=300
Max Upward Total Deflection	0.000 in	Ratio =	0 <300

Overall Maximum Deflections

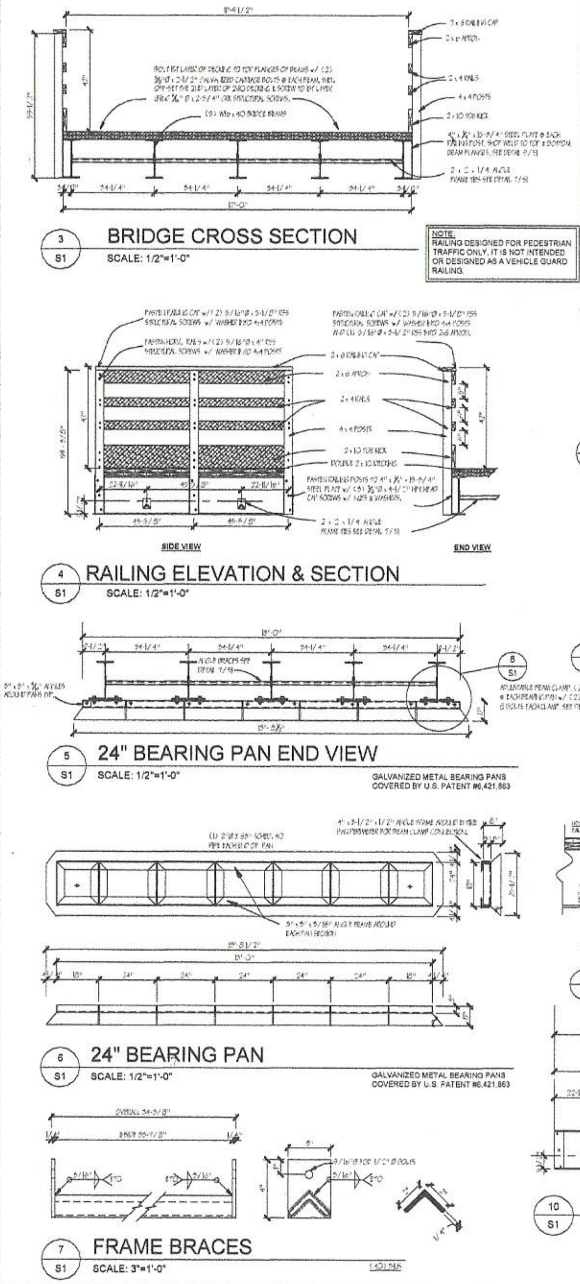
Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	1.3644	19.109		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	6.411	6.411
Overall MINimum	1.513	1.513
+D+L	6.411	6.411
+D+S	3.140	3.140
+D+0.750L+0.750S	6.407	6.407
D Only	1.513	1.513
L Only	4.898	4.898
S Only	1.627	1.627

38' x 12' SNOWMOBILE BRIDGE #857
JEFFERSON COUNTY, WI



3 S1 BRIDGE CROSS SECTION
SCALE: 1/2"=1'-0"

NOTE:
RAILING DESIGNED FOR PEDESTRIAN TRAFFIC ONLY, IT IS NOT INTENDED OR DESIGNED AS A VEHICLE GUARD RAILING.

4 S1 RAILING ELEVATION & SECTION
SCALE: 1/2"=1'-0"

5 S1 24" BEARING PAN END VIEW
SCALE: 1/2"=1'-0"

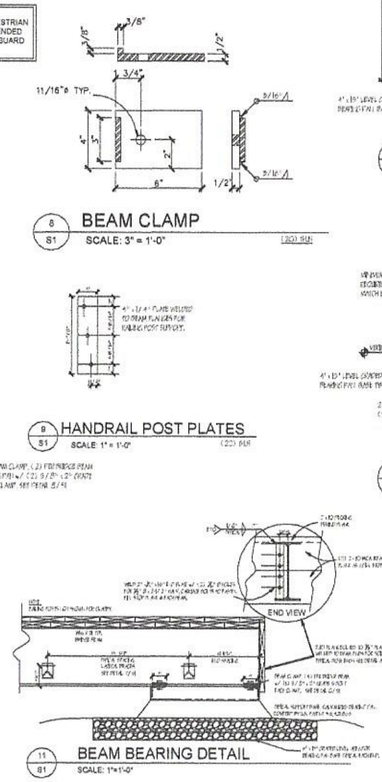
GALVANIZED METAL BEARING PANS COVERED BY U.S. PATENT #6,421,863

6 S1 24" BEARING PAN
SCALE: 1/2"=1'-0"

GALVANIZED METAL BEARING PANS COVERED BY U.S. PATENT #6,421,863

7 S1 FRAME BRACES
SCALE: 3"=1'-0"

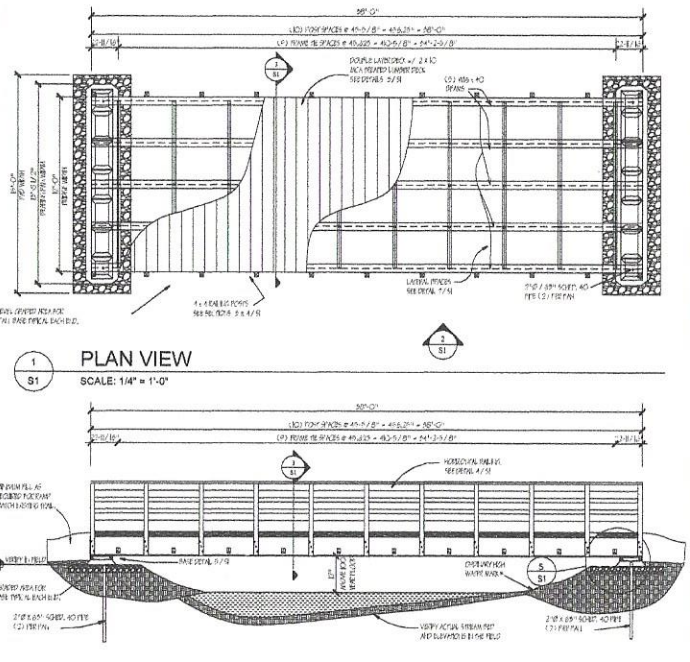
NOTES:
1. FINAL BRIDGE CENTERLINE LOCATION & FOUNDATION ELEVATIONS ARE TO BE LOCATED BY OTHERS AND VERIFIED IN THE FIELD WITH JEFFERSON COUNTY PRIOR TO STARTING BRIDGE ERECTION.
2. THE CONTRACTOR SHALL PROVIDE 10' WIDE FILTER FABRIC & STONE RIP-RAP BANK PROTECTION @ SIDES & FRONT OF ABUTMENTS PER WIS. DOT SPECIFICATIONS SECTION 606 OR AS APPROVED BY JEFFERSON COUNTY.
3. ALL ASPECTS OF CONSTRUCTION FOR THIS BRIDGE SHALL MEET THE WISCONSIN DNR REQUIREMENTS FOR STRUCTURES IN A FLOOD WAY. THE BRIDGE ELEVATION SHALL BE SET FOR A MINIMUM CLEARANCE OF 5'-0" ABOVE THE ORDINARY HIGH WATER MARK, OR 1'-0" ABOVE THE 100 YEAR FLOOD ELEVATION, OR AS DIRECTED BY JEFFERSON COUNTY TO COMPLY WITH WISCONSIN DNR REQUIREMENTS.



8 S1 BEAM CLAMP
SCALE: 3" = 1'-0"

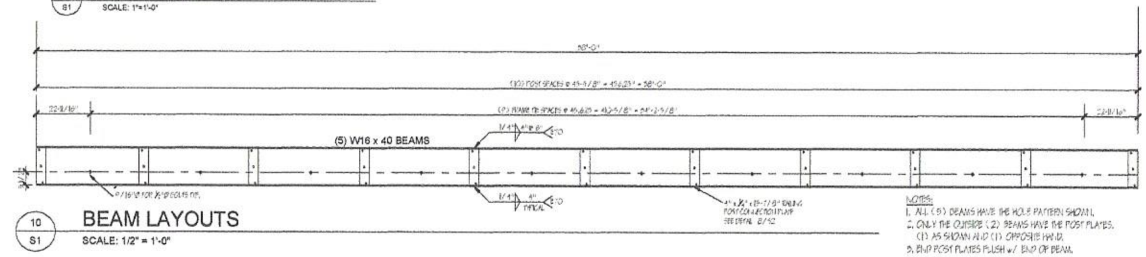
9 S1 HANDRAIL POST PLATES
SCALE: 1" = 1'-0"

11 S1 BEAM BEARING DETAIL
SCALE: 1"=1'-0"



1 S1 PLAN VIEW
SCALE: 1/4" = 1'-0"

2 S1 ELEVATION
SCALE: 1/4" = 1'-0"



(5) W16 x 40 BEAMS

10 S1 BEAM LAYOUTS
SCALE: 1/2" = 1'-0"

NOTES:
1. ALL (5) BEAMS HAVE THE HOLE PATTERN SHOWN.
2. ONLY THE OUTSIDE (2) BEAMS HAVE THE POST PLATES. (1) AS SHOWN AND (1) OPPOSITE HAND.
3. END POST PLATES FLUSH w/ END OF BEAM.

NO.	DESCRIPTION	DATE	BY
01	FOR FABRICATORS REVIEW OF RAILING & FRAME TIE LAYOUT.	12/02/22	JFH
02	FOR FABRICATION & CONSTRUCTION	12/02/22	JFH

NOTES

GENERAL NOTES:

1. THIS BRIDGE IS DESIGNED ON THE BASIS OF THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES'S *BRIDGE GUIDELINES FOR NEW AND REPLACEMENT SNOWMOBILE AND ALL-TERRAIN VEHICLE BRIDGES*, PUBLICATION PUB-CF-003 DATED 2014, WITH THE FOLLOWING:

DESIGN LOADS:

DEAD LOAD ON DECKING	=	3.8 PSF
DEAD LOAD SUPPORTED BY BRIDGE	=	24.2 PSF
LIVE LOAD #1 ON ENTIRE DECK	=	60.0 PSF
LIVE LOAD #2 ON ENTIRE DECK	=	30.0 PSF
SNOW LOAD	=	60.0 PSF
WIND LOAD	=	90.0 MPH
VEHICLE LOAD	=	25,000.0 LBS

LOAD COMBINATIONS:
LC#1 = DL + .50 (LL#1 + SL)
LC#2 = DL + .75 (LL#2 + SL + VL)

2. THE ENGINEER IS NOT RESPONSIBLE FOR CONSTRUCION MEANS OR METHODS OR FOR SUPERVISION OF CONSTRUCTION.

3. ALL DIMENSIONS ARE TO BE CROSS CHECKED WITH EXISTING FIELD DIMENSIONS AND APPROVED SHOP DRAWINGS FOR THE VARIOUS MATERIALS AND BUILDING COMPONENTS. ALL DIMENSIONAL DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER.

4. ALL WORK IS TO BE PERFORMED IN A SAFE AND WORKMAN LIKE MANNER IN COMPLIANCE WITH THE FEDERAL OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA) AND ALL STATE OF WISCONSIN AND JEFFERSON COUNTY, WI BUILDING CODES AND ZONING ORDINANCES AS THEY MAY PERTAIN TO THIS PROJECT.

SITE WORK:

1. THE CONTRACTOR IS TO VERIFY ALL CONDITIONS AT THE SITE. PARTICULARLY THE LOCATION OF ANY UNDERGROUND UTILITIES BEFORE EXCAVATION. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER.

2. THE FOUNDATION DESIGN IS BASED UPON AN ASSUMED NET SOIL BEARING CAPACITY OF 1,500 PSF.

3. THE BEARING ELEVATION OF THE BRIDGE SHALL BE SET BY THE BRIDGE OWNER AT AN ELEVATION SUCH THAT THE MINIMUM BOTTOM CHORD ELEVATION OF THE BRIDGE SHALL BE AT LEAST 5.0' ABOVE ORDINARY HIGH WATER MARK, OR AS DETERMINED BY JEFFERSON COUNTY DEPARTMENT OF PUBLIC WORKS OR THE WISCONSIN DNR.

STRUCTURAL STEEL:

1. ALL STRUCTURAL STEEL USED IN THE FABRICATION AND ERECTION OF THIS BRIDGE SHALL MEET ASTM A572/A992 GRADE 50 AND SHALL HAVE A MINIMUM YIELD STRENGTH OF 50,000 PSI.

2. FASTENERS USED IN THE FABRICATION AND ERECTION OF THIS BRIDGE SHALL MEET THE REQUIREMENTS OF THE FOLLOWING SPECIFICATIONS: SAE J429-GRADE 5, SAE J429-GRADE 8 AND ASTM A307-A FOR THEIR RESPECTIVE USES. FASTENERS AND CONNECTORS IN CONTACT WITH TREATED LUMBER SHALL BE HOT-DIP GALVANIZED. DECK SCREWS SHALL BE EVERCOTE #8 x 3" DECK MATE SQUARE DRIVE BY PHILLIPS FASTENER PRODUCTS CO.

3. WELDING, WHEN REQUIRED, SHALL MEET THE REQUIREMENTS OF THE AMERICAN WELDING SOCIETY'S STRUCTURAL WELDING CODE.

4. ALL STRUCTURAL STEEL SHALL BE PRIME PAINTED AFTER FABRICATION WITH A MINIMUM THICKNESS OF 1.4 MIL. OF SHERWIN WILLIAMS TT-P-664 RUST INHIBITING AND LACQUER RESISTANT PRIMER.

5. ALL STRUCTURAL STEEL SHALL BE FINISHED PAINTED AFTER FABRICATION, BUT PRIOR TO ASSEMBLY, WITH TWO (2) COATS OF SHERWIN WILLIAMS INDUSTRIAL ENAMEL VOC-COMPLYING OIL BASED ENAMEL PAINT IN A GLOSS FINISH. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR SURFACE PREPARATION, PRIME PAINTING AND FINISH PAINTING. COLOR TO BE SELECTED BY THE OWNER FROM MANUFACTURER'S STANDARD COLOR CHARTS.

DIMENSION LUMBER:

1. ALL STRUCTURAL DIMENSION LUMBER INSTALLED IN THIS PROJECT SHALL MEET THE REQUIREMENTS OF THE *2001 NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION (2001 NDS)* AND SHALL BE STAMPED WITH A MINIMUM EQUIVALENT GRADE OF 2400 MSR 2.0E06, SOUTHERN PINE OR SPRUCE-PINE-FIR SPECIES.

2. ALL WOOD USED IN THIS BRIDGE SHALL BE MICRONIZED COPPER AZOLE (MCA) PRESERVATIVE TREATED TO A MINIMUM RETENTION OF 0.06 POUNDS PER CUBIC FOOT FOR ABOVE GROUND LUMBER AND 0.15 POUNDS PER CUBIC FOOT FOR LUMBER IN GROUND CONTACT, PER THE CHEMICAL MANUFACTURER'S INSTRUCTIONS.

3. THE MOISTURE CONTENT OF ALL STRUCTURAL FRAMING LUMBER, PLYWOOD AND FABRICATED WOOD PRODUCTS SHALL NOT EXCEED 19% AT THE TIME OF INSTALLATION. JOBSITE STORAGE OF ALL WOOD PRODUCTS SHALL PROTECT WOOD MATERIALS FROM DAMAGE DUE TO THE ELEMENTS. NO WARPED LUMBER SHALL BE USED IN THE CONSTRUCTION OF THE BRIDGE.

4. THE CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY BRACING DURING HANDLING AND ERECTION OF THE BRIDGE.

5. THE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION OF ALL FINAL BRACING, AS SHOWN ON THE SHOP DRAWINGS.

PROJECT: 38' x 12' SNOWMOBILE BRIDGE #857
JEFFERSON COUNTY, WI

CLIENT:
CUSTOM MANUFACTURING INC.
Trail Bridges
Steel Fabricating & Finishing
606 Dekko Drive
P.O. Box 279
Clinton, Wisconsin 53525
Phone: 608-676-2282
Fax: 608-676-2283

JAMES F. HEIDT, PE, LLC
CIVIL & STRUCTURAL ENGINEERING
2543 LAUNDALE DR., BELOIT, WISCONSIN 53511

SEAL: JAMES F. HEIDT, PE
WI. REG.: 15489
EXP. DATE: 07/31/2024

DRAWN: JFH
DATE: 12/01/22
SCALE: AS SHOWN
JOB NO. 23129
SHEET NO. S1

11/11