

ENGINEERING CALCULATION SHEET

P.O. Box 717, Windsor, CA 95492

• (707) 838-1505

• Fax: (707) 838-1970

CUSTOMER _____

LOCATION _____

SHEET NO. COVER

JOB NO. 5275.1.1.25

DATE 12-09-25

BY JFG CHK'D JFG

Pedestrian Trail Bridge
Marin County Open Space District
3501 Civic Center Drive, Suite 260
San Rafael, CA 94903

Contents

Sheets

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Exp: 03-31-27

Dated: 12-09-25

Sheets: 1 - 3

1 - 4

1 - 40

1 - 20

CUSTOMER _____

LOCATION _____

SHEET NO. 1/3

JOB NO. _____

DATE _____

BY _____ CHK'D _____

PEDESTRIAN BRIDGE - DESIGN CRITERIA

CODE: 2022 CBC, ASCE 7-16

VERTICAL LOAD

- STRUCTURAL STEEL INCLUDED IN RISA 3D MODEL
- ALL LUMBER IS REDWOOD, $C = 0.37$ $\therefore .37(62.4) = 24$, SAY $30 \text{ } 1/2$ LUMBER WT

- 3×12 FULL DIMENSIONAL DECKING = 7.5 PSF
- 4×10 WOOD NAILER (CONSTRUCTION) = 6.8 PLF
- 3×6 CONT TOP RAIL = 2.9 PLF
- 2×4 BACKER / BRACE = 3.3 PLF
- 2×2 PICKETS = 5.0 PLF
- 4×6 POST & BRACE = 4.8 PLF
- MISC = 1.5 PSF

LUMBER WT TO EACH GIRDER: $9.0 \text{ PSF} (1.5/2) + 22.8 \text{ PLF} \approx 60 \text{ PLF}$ LIVE LOAD - AASHTO LRFD GUIDE SPECIFICATIONS FOR THE DESIGN OF PEDESTRIAN BRIDGES

- 90 PSF - PEDESTRIAN LIVE LOAD
- 10 KIP VEHICLE LOAD * BRIDGE WIDTH $\leq 7'$ CLEAR
- 1.0 KIP EQUESTRIAN LOAD

GUARDRAIL

- 50 PLF
- 200# FT LOAD

* MAX POST SPACING $6'0'' \text{ OC}$ $\therefore 50(6) = 300\#$ ← DESIGN PT LOAD @ RAIL POST.

STRUCTURAL STEEL OK
LIMIT VEHICLE LOAD
TO 40 KIPS DUE TO
LUMBER DECKING CAPACITY

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 E-mail: Jacob@dlfengineers.com

CUSTOMER _____

LOCATION _____

SHEET NO. _____ 2

JOB NO. _____

DATE _____

BY _____ CHK'D _____

PEDESTRIAN BRIDGE - DESIGN CRITERIA CONTSEISMIC

* STEEL BRIDGE & CONT 3X DECKING
 CONSIDERED RIGID

$$\therefore V = 0.30 SDS W I_e \quad I_e = 1.0$$

$$V = 0.3(2)(W)(1.0) \quad SDS = 2.0$$

$$V = 0.60 W$$

$$\text{LOAD @ STEEL GIRDER} \Rightarrow V = 0.6(60 + 210(25)) = 77 \text{ PLF} + \text{SELF WT}$$

WIND

INCLUDED IN
 RISA MODEL

$$\text{MAX GIRDER DEPTH} = 2'$$

$$\text{NAILER} + \text{DECKING} + \text{GUARDRAIL} \approx 4.1' \text{ SAY } 4.5'$$

$$\begin{matrix} 3\frac{1}{2}'' & 3'' & 42'' \end{matrix}$$

$$\text{USE } C_F = 1.95, A_F = 25' \text{ (ASSUMED)}, 15\% \text{ OPEN}$$

$$W = 31 \text{ PSF } (1-15) = 26.4 \text{ PSF } (6.5') = 172 \text{ PLF}$$

29.4, Design Wind Load on Others Structures

Gnd Elev= 0.00 ft

$K_e =$

1

$$F = q_z G C_f A_f \quad (29.4-1)$$

$$q_z = .00256 K_z K_{zt} K_d K_e V^2 \quad (26.10-1)$$

Ht. z at the centroid of area $A_f = 25$ ft

Exp = C

Exposure coefficient $K_z = 0.95$

Section 26.10.1, from Table 26

Topography factor $K_{zt} = 1.00$

26.8.2, Figure 26.8-1

Directionality factor $K_d = 0.85$

26.6, Table 26.6-1

Building & Structure Risk Category = II, standard

IBC T-1604.5

Wind Speed $V = 95$ MPH

Fig. 26.5-1B, MRI = 700 yrs

$q_z = 18.66$ psf

Gust Effect factor $G = 0.85$

26.11.1

Force coeff $C_f = 1.95$

Figure 29.3-1 through 29.4-4

Design wind pressure, $F/A_f = 30.92$ psf

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CUSTOMER _____

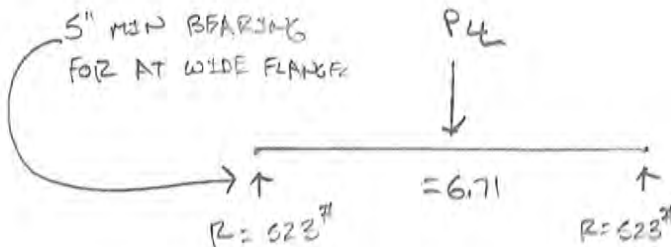
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SHEET NO. _____ 1/4

JOB NO. _____

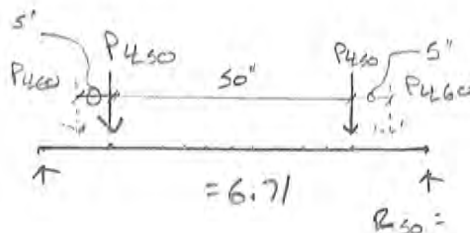
DATE _____

BY _____ CHK'D _____

CHECK LUMBER DECKINGEQUESTRIAN LOAD. P_L = SELF WT $P_L = 1.0 \text{ KIPS}$ ← GOVERNS OVER
90 PSF UNIFORM LOAD∴ 3X12 FULL DIMENSIONAL LUMBER
CONSTRUCTION GRADE. I.R. = 1.03 O.K.VEHICULAR LOADING* BRIDGE $\leq 7'-0"$ CLR ∴ HS DESIGN NOT REQ.

FIND MAX LOAD FOR

50" & 60" WIDE SIDE BY SIDE

 $P_{L50} = 1575^\#$ I.R. = 0.99 $P_{L60} = 2900^\#$ I.R. = 0.99* SIDE BY SIDE & OTHER
OFF ROAD VEHICLES DISTRIBUTE
LOADS TO EACH AXLE MORE
EVEN ± 65% & 35% IN
LEIN OF HS.∴ MAX VEHICLE WT: $\frac{1575^\#(2)}{0.65} = 4847^\#$



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Dec. 5, 2025 13:20

PROJECT

Pedestrian Trail Bridges
Marin County Open Space District
San Rafael, CA 94903
DLF Job #5275.1.1.25
Decking - Equestrian Load

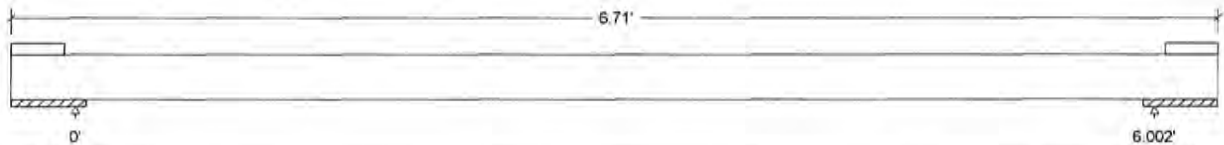
Design Check Calculation Sheet

WoodWorks Sizer 13.2.1

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start End	Magnitude Start End	Unit
Live Load	Live	Point		3.36	1000	lbs
Self-weight	Dead	Full UDL			7.6	plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:						
Dead	23					23
Live	500					500
Factored:						
Total	523					523
Bearing:						
Capacity						
Beam	17085					17085
Des ratio						
Beam	0.03					0.03
Load comb	#2					#2
Length	5.00					5.00
Min req'd	1.50*					1.50*
Cb	1.00					1.00
Cb min	1.00					1.00

*Minimum bearing length setting used: 1-1/2" for end supports

Decking - Equestrian Load

RedWood, Redwood, Construction Gr, 3"x12" actual, 1-ply

Supports: All - Non-wood

Total length: 6.71'; Clear span: 5.877'; Volume = 1.7 cu.ft.

Wet service; Lateral support: top = at supports, bottom = at supports; Oblique angle: 90.0 deg.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	x-x fv = 0	Fv' = 155	psi	fv/Fv' = 0.00
	y-y fv = 22	Fv' = 155	psi	fv/Fv' = 0.14
Bending(+)	x-x fb = 0	Fb' = 825	psi	fb/Fb' = 0.00
	y-y fb = 1023	Fb' = 990	psi	fb/Fb' = 1.03
Live Defl'n	negligible			
Total Defl'n	negligible			

Additional Data:

FACTORS:	F/E (psi)	CD	CM	Ct	CL	CF	CFu	Cr	Cert	Ci	LC#
Fvy'	160	1.00	0.97	1.00	-	-	-	-	1.00	1.00	2
Fby'	825	1.00	1.00	1.00	1.000	1.000	1.20	1.00	1.00	1.00	2
Fcp'	425	-	0.67	1.00	-	-	-	-	1.00	1.00	-
Ey'	900.0 million	0.90	1.00	-	-	-	-	-	1.00	1.00	2
Emin'	466.57 million	0.90	1.00	-	-	-	-	-	1.00	1.00	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D + L
Bending(+): LC #2 = D + L
Deflection: LC #2 = D + L (live)
LC #2 = D + L (total)
Bearing : Support 1 = LC #2 = D + L
Support 2 = LC #2 = D + L

Load Types: L=live

Load combinations: ASD Basic from ASCE 7-16 2.4; all LC's listed in the Analysis report

CALCULATIONS:

V max = 521, V design = 521 (NDS 3.4.3.1(a)) lbs; M(+) = 1535 lbs-ft
EIy = 24300e06 lb-in²
"Live" deflection is due to all non-dead loads (live, wind, snow...)
Total deflection = 2.00 permanent + "live"

Design Notes:

- Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
- Please verify that the default deflection limits are appropriate for your application.
- Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.



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Dec. 5, 2025 13:23

PROJECT

Pedestrian Trail Bridges
Marin County Open Space District
San Rafael, CA 94903
DLF Job #5275.1 1.25
Decking - 50in Wide Vehicle

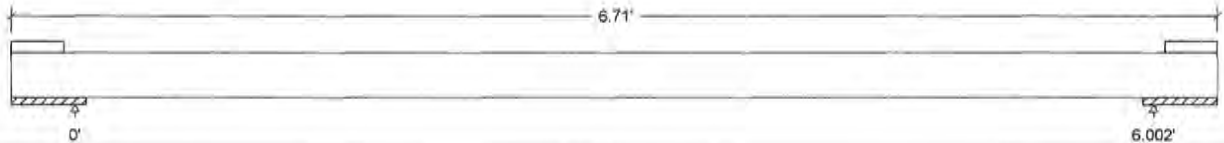
Design Check Calculation Sheet

WoodWorks Sizer 13.2.1

Loads:

Load	Type	Distribution	Pat-tern	Location (ft) Start End	Magnitude Start End	Unit
LL2 50	Live	Point		5.44	1575	lbs
LL1 50	Live	Point		1.28	1575	lbs
Self-weight	Dead	Full UDL			7.6	plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	23		23
Live	1572		1578
Factored:			
Total	1595		1600
Bearing:			
Capacity			
Beam	17085		17085
Des ratio			
Beam	0.09		0.09
Load comb	#2		#2
Length	5.00		5.00
Min req'd	1.50*		1.50*
Cb	1.00		1.00
Cb min	1.00		1.00

*Minimum bearing length setting used: 1-1/2" for end supports

Decking - 50in Wide Vehicle

RedWood, Redwood, Construction Gr, 3"x12" actual, 1-ply

Supports: All - Non-wood

Total length: 6.71'; Clear span: 5.877'; Volume = 1.7 cu.ft.

Wet service; Lateral support: top = at supports, bottom = at supports; Oblique angle: 90.0 deg;

This section PASSES the design code check.

WARNING: This is a custom size not in the WoodWorks materials database. Refer to the online Help.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear x-x	$f_v = 0$	$F_v' = 155$	psi	$f_v/F_v' = 0.00$
y-y	$f_v = 67$	$F_v' = 155$	psi	$f_v/F_v' = 0.43$
Bending(+) x-x	$f_b = 0$	$F_b' = 825$	psi	$f_b/F_b' = 0.00$
y-y	$f_b = 982$	$F_b' = 990$	psi	$f_b/F_b' = 0.99$
Live Defl'n	negligible			
Total Defl'n	negligible			

Additional Data:

FACTORS:	E/E(ksi)	CD	CM	Ct	CL	CF	CFu	Ck	CFrt	Cl	LC#
Fvy'	160	1.00	0.97	1.00	-	-	-	-	1.00	1.00	2
Fby'	825	1.00	1.00	1.00	1.000	1.000	1.20	1.00	1.00	1.00	2
Fcp'	425	-	0.67	1.00	-	-	-	-	1.00	1.00	-
Ey'	900.0 million	0.90	1.00	-	-	-	-	-	1.00	1.00	2
Emin'	466.57 million	0.90	1.00	-	-	-	-	-	1.00	1.00	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D + L
Bending(+): LC #2 = D + L
Deflection: LC #2 = D + L (live)
LC #2 = D + L (total)
Bearing : Support 1 - LC #2 = D + L
Support 2 - LC #2 = D + L

Load Types: L=live

Load combinations: ASD Basic from ASCE 7-16 2.4; all LC's listed in the Analysis report

CALCULATIONS:

V max = 1600, V design = 1600 (NDS 3.4.3.1(a)) lbs; M(+) = 1474 lbs-ft
EIy = 24300e06 lb-in²
"Live" deflection is due to all non-dead loads (live, wind, snow...)
Total deflection = 2.00 permanent + "live"

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.



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Dec. 5, 2025 13:25

PROJECT

Pedestrian Trail Bridges
Marin County Open Space District
San Rafael, CA 94903
DLF Job #5275 1.1.25
Decking - 60in Wide Vehicle

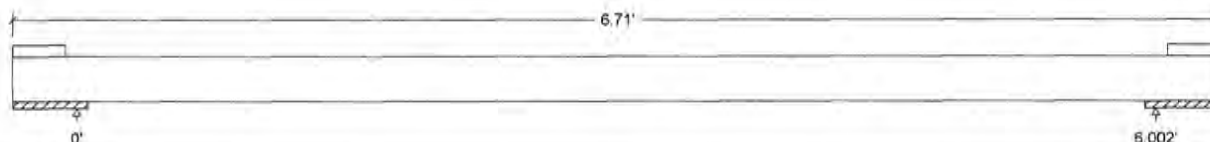
Design Check Calculation Sheet

WoodWorks Sizer 13.2.1

Loads:

Load	Type	Distribution	Pat-tern	Location (ft) Start End	Magnitude Start End	Unit
LL2 50	Live	Point		5.86	2900	lbs
LL1 50	Live	Point		0.86	2900	lbs
Self-weight	Dead	Full UDL			7.6	plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	23		23
Live	2900		2900
Factored:			
Total	2923		2923
Bearing:			
Capacity			
Beam	17085		17085
Des ratio			
Beam	0.17		0.17
Load comb	#2		#2
Length	5.00		5.00
Min req'd	1.50*		1.50*
Cb	1.00		1.00
Cb min	1.00		1.00

*Minimum bearing length setting used: 1-1/2" for end supports

Decking - 60in Wide Vehicle

RedWood, Redwood, Construction Gr, 3"x12" actual, 1-ply

Supports: All - Non-wood

Total length: 6.71'; Clear span: 5.877'; Volume = 1.7 cu.ft.

Wet service; Lateral support: top = at supports, bottom = at supports; Oblique angle: 90.0 deg;

This section PASSES the design code check.

WARNING: This is a custom size not in the WoodWorks materials database. Refer to the online Help.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear x-x	$f_v = 0$	$F_v' = 155$	psi	$F_v/F_v' = 0.00$
y-y	$f_v = 122$	$F_v' = 155$	psi	$F_v/F_v' = 0.78$
Bending(+) x-x	$f_b = 0$	$F_b' = 825$	psi	$F_b/F_b' = 0.00$
y-y	$f_b = 975$	$F_b' = 990$	psi	$F_b/F_b' = 0.99$
Live Defl'n	negligible			
Total Defl'n	negligible			

Additional Data:

FACTORS:	F/EI(ksi)	CB	CM	Ct	CL	CF	Cfu	Cr	Cftb	Ci	LC#
Fvy'	160	1.00	0.97	1.00	-	-	-	-	1.00	1.00	2
Fby'	825	1.00	1.00	1.00	1.000	1.000	1.20	1.00	1.00	1.00	2
Fcp'	425	-	0.67	1.00	-	-	-	-	1.00	1.00	-
Ey'	900.0 million	0.90	1.00	1.00	-	-	-	-	1.00	1.00	2
Emin'	466.57 million	0.90	1.00	1.00	-	-	-	-	1.00	1.00	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D + L

Bending(+): LC #2 = D + L

Deflection: LC #2 = D + L (live)

LC #2 = D + L (total)

Bearing : Support 1 = LC #2 = D + L

Support 2 = LC #2 = D + L

Load Types: L=live

Load combinations: ASD Basic from ASCE 7-16 2.4; all LC's listed in the Analysis report

CALCULATIONS:

V max = 2923, V design = 2923 (NDS 3.4.3.1(a)) lbs; M(+) = 1463 lbs-ft

EIy = 24300e06 lb-in²

"Live" deflection is due to all non-dead loads (live, wind, snow...)

Total deflection = 2.00 permanent + "live"

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.

2. Please verify that the default deflection limits are appropriate for your application.

3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1

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CUSTOMER _____

LOCATION _____

SHEET NO. 1/40

JOB NO. _____

DATE _____

BY _____ CHK'D _____

STRUCTURAL STEEL DESIGN.LOADING

* REFER TO DESIGN BASIS

DEFLECTION.

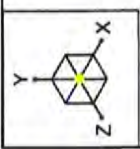
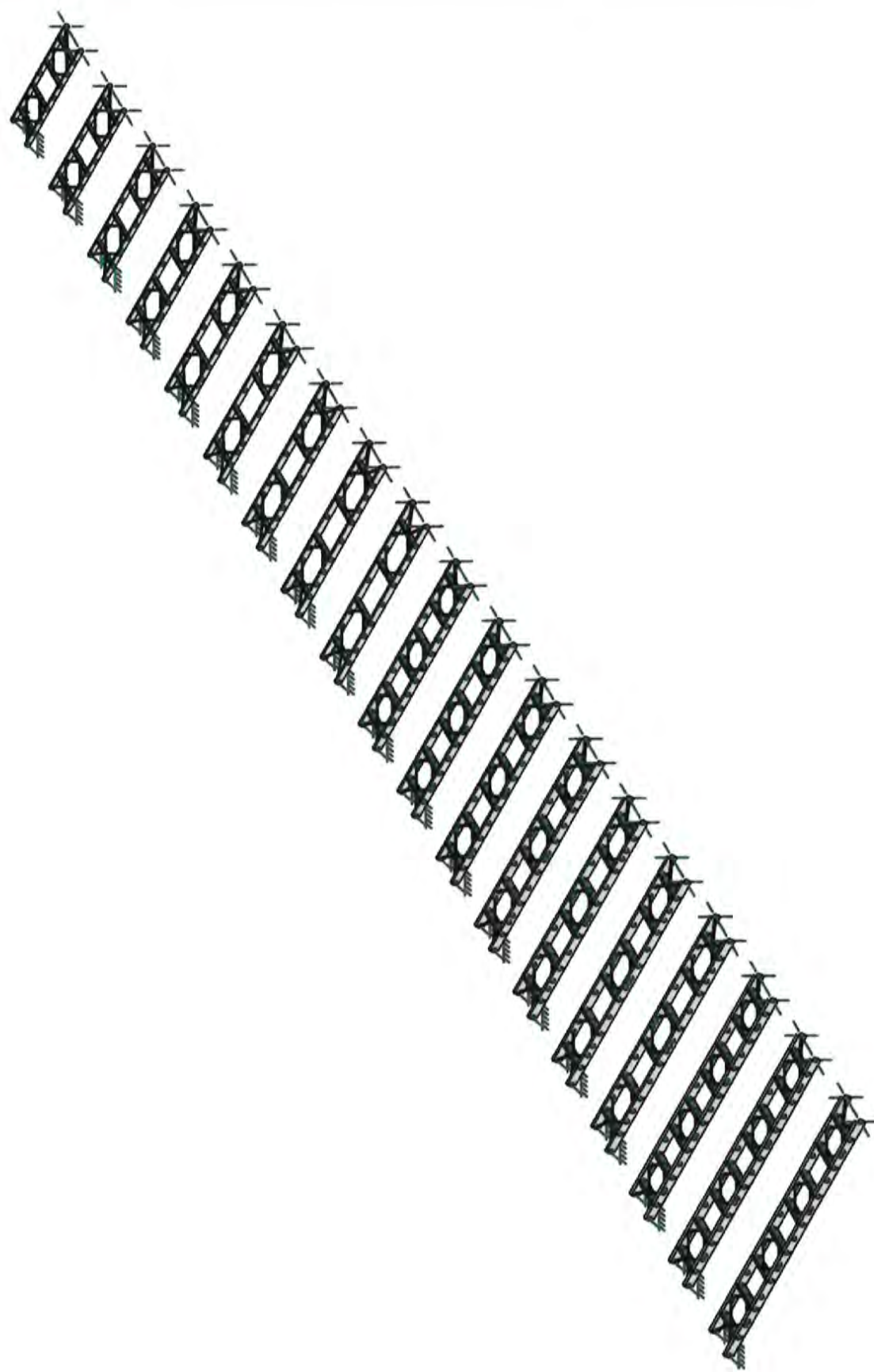
$$\Delta L = 4/360$$

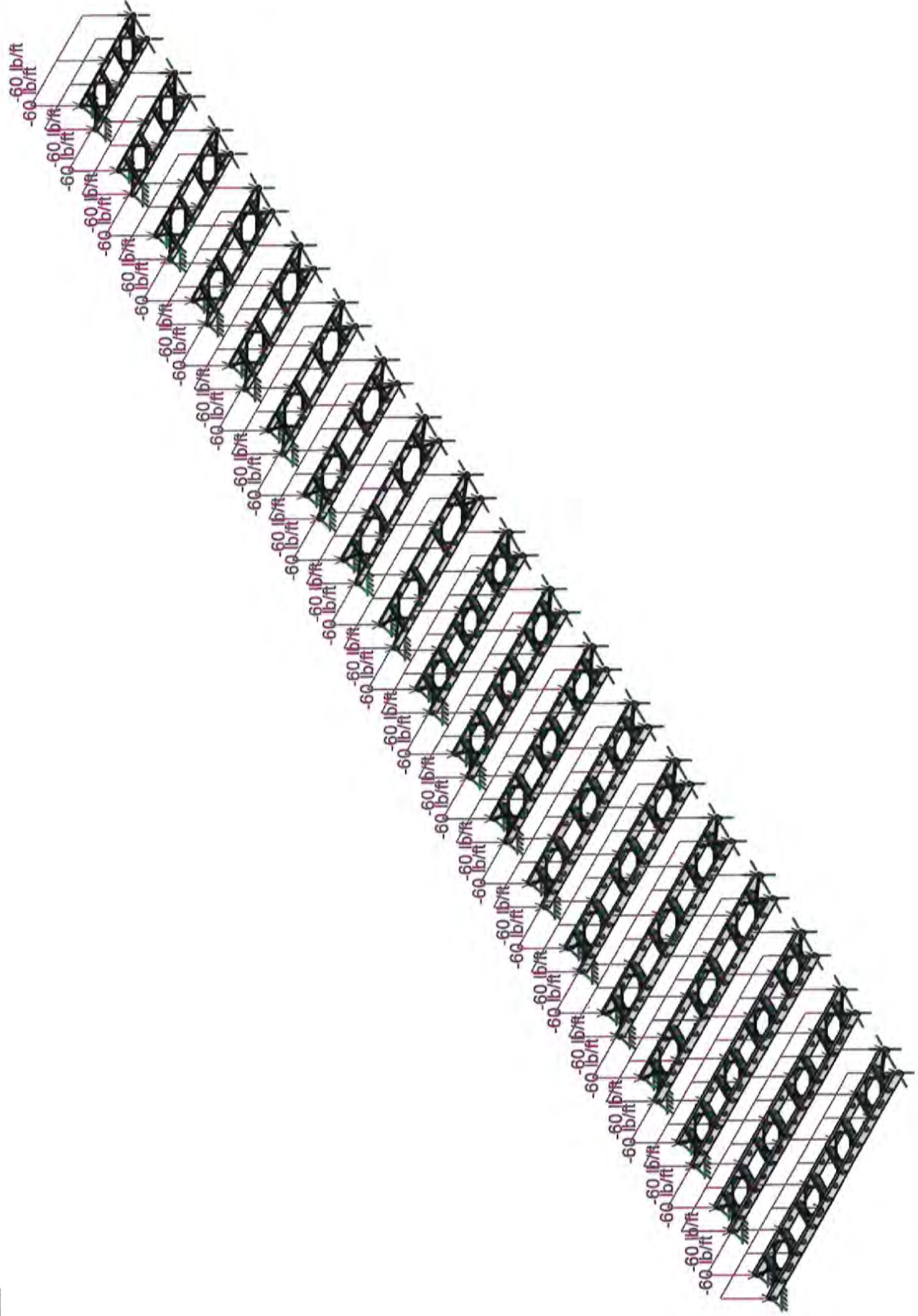
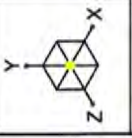
$$\Delta L + 4 = 4/240$$

BEAM DEFLECTION TABLE

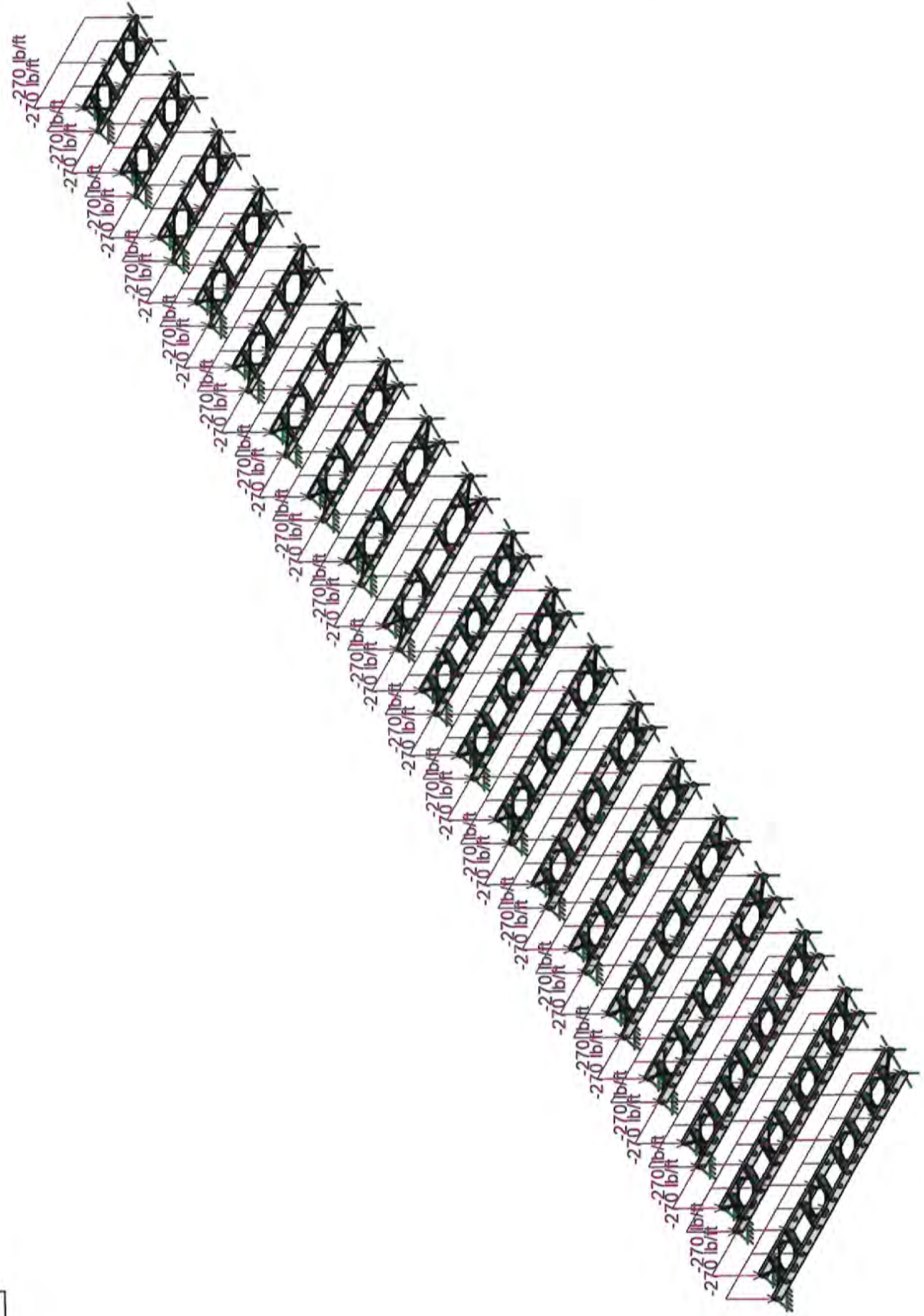
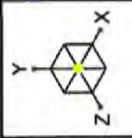
BEAM SIZE	MAX SPAN	$4/360$	$4/240$	ΔL	$\Delta L + 4$	CAMBER	$\frac{\text{CAMBER}}{\Delta L + 4}$
W14 x 22	28'	.93"	1.40"	.71"	1.15"	+2.5"	2.17
W16 x 26	34'	1.13"	1.70"	1.17"	1.60"	+3.0"	1.88
W18 x 35	40'	1.33"	2.00"	1.33"	1.84"	+3.5"	1.90
W21 x 44	46'	1.53"	2.30"	1.40"	2.04"	+4.0"	1.96
W24 x 55	54'	1.80"	2.70"	1.66"	2.49"	4.75"	1.91
W24 x 68	60'	2.00"	3.00"	1.87"	2.92"	5.5'	1.88

POSITIVE
CAMBER
FOR FULL
CASE.

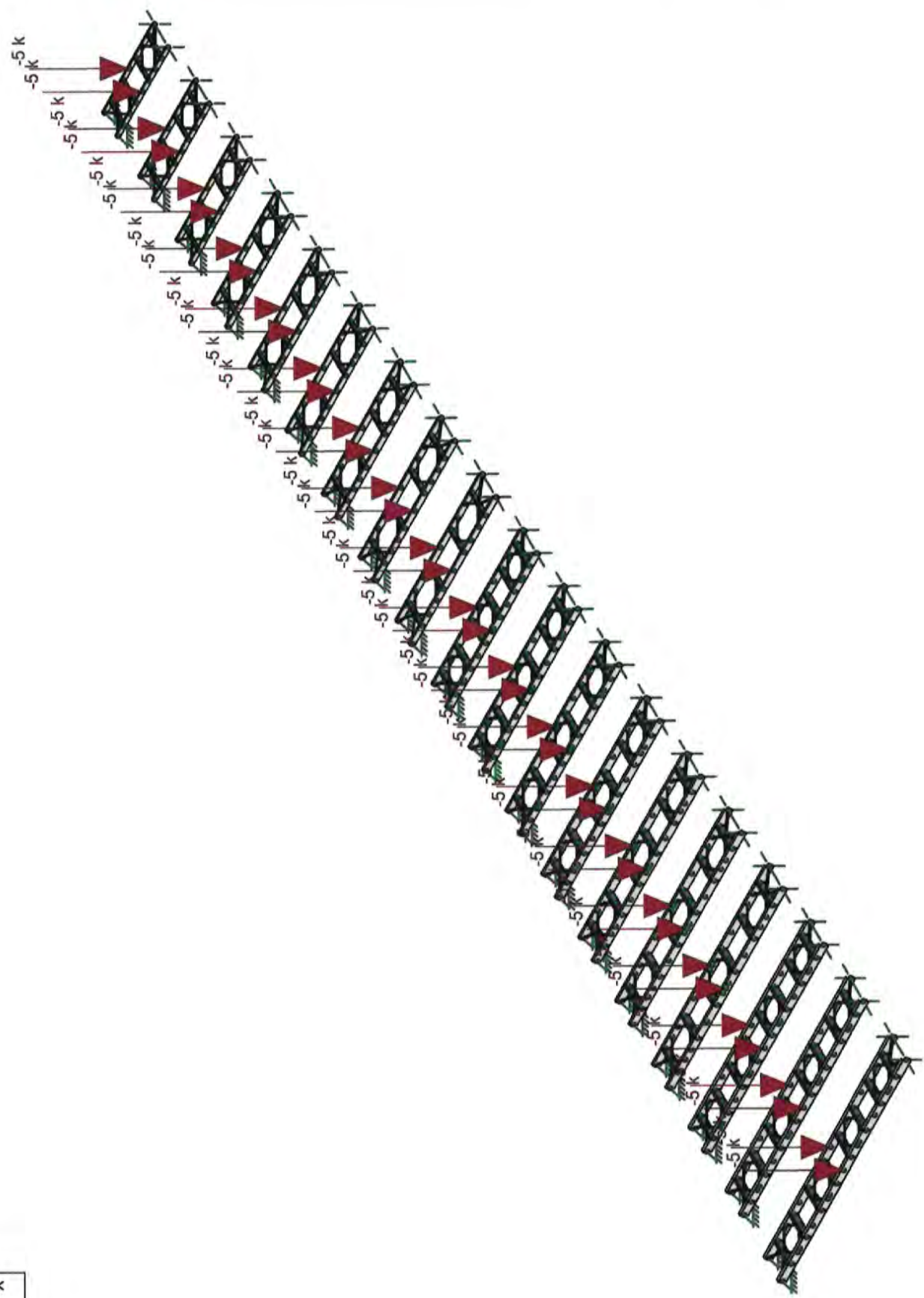
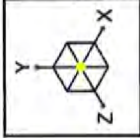




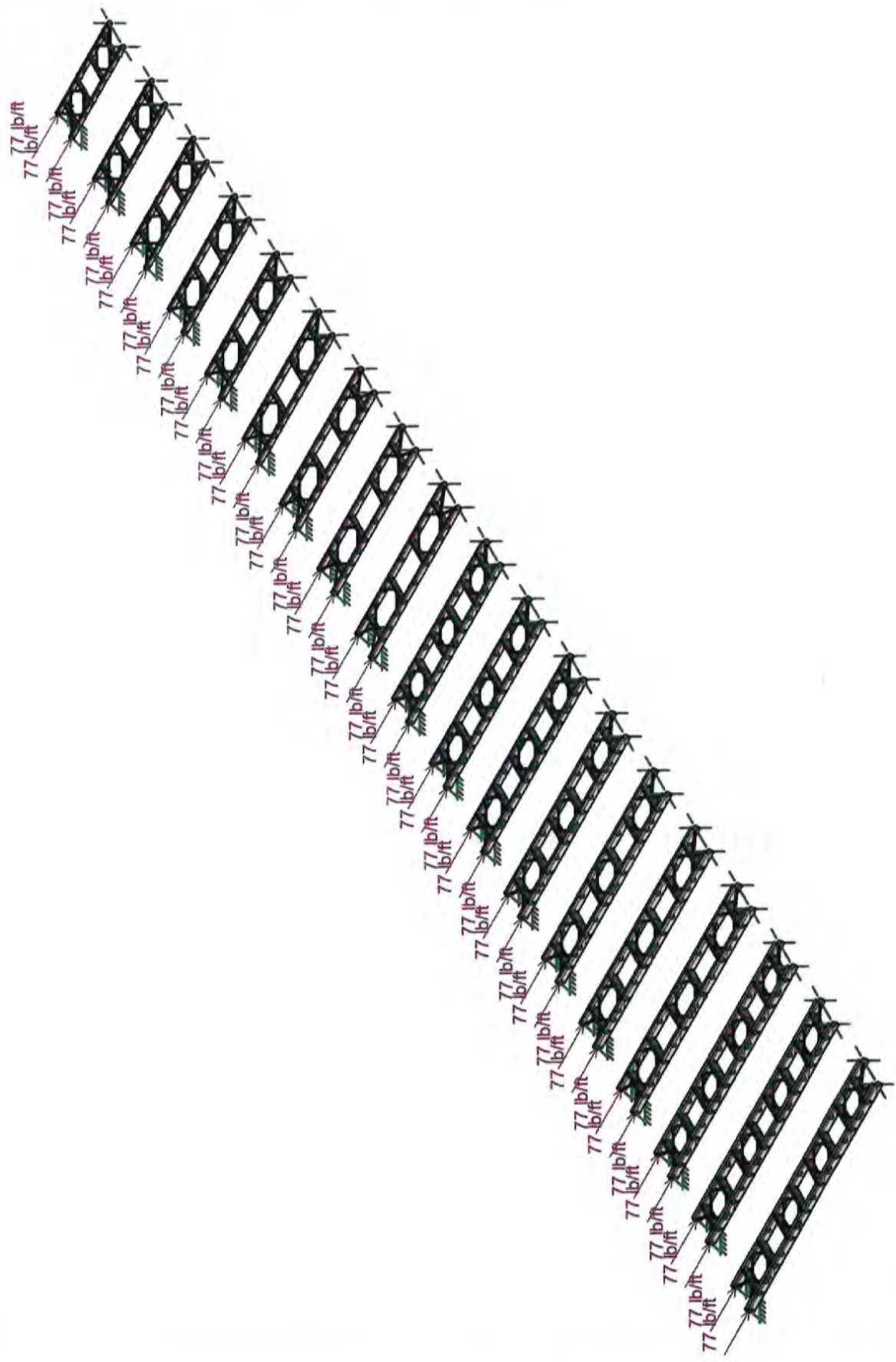
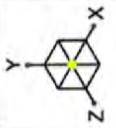
Loads: BLC 1, DL



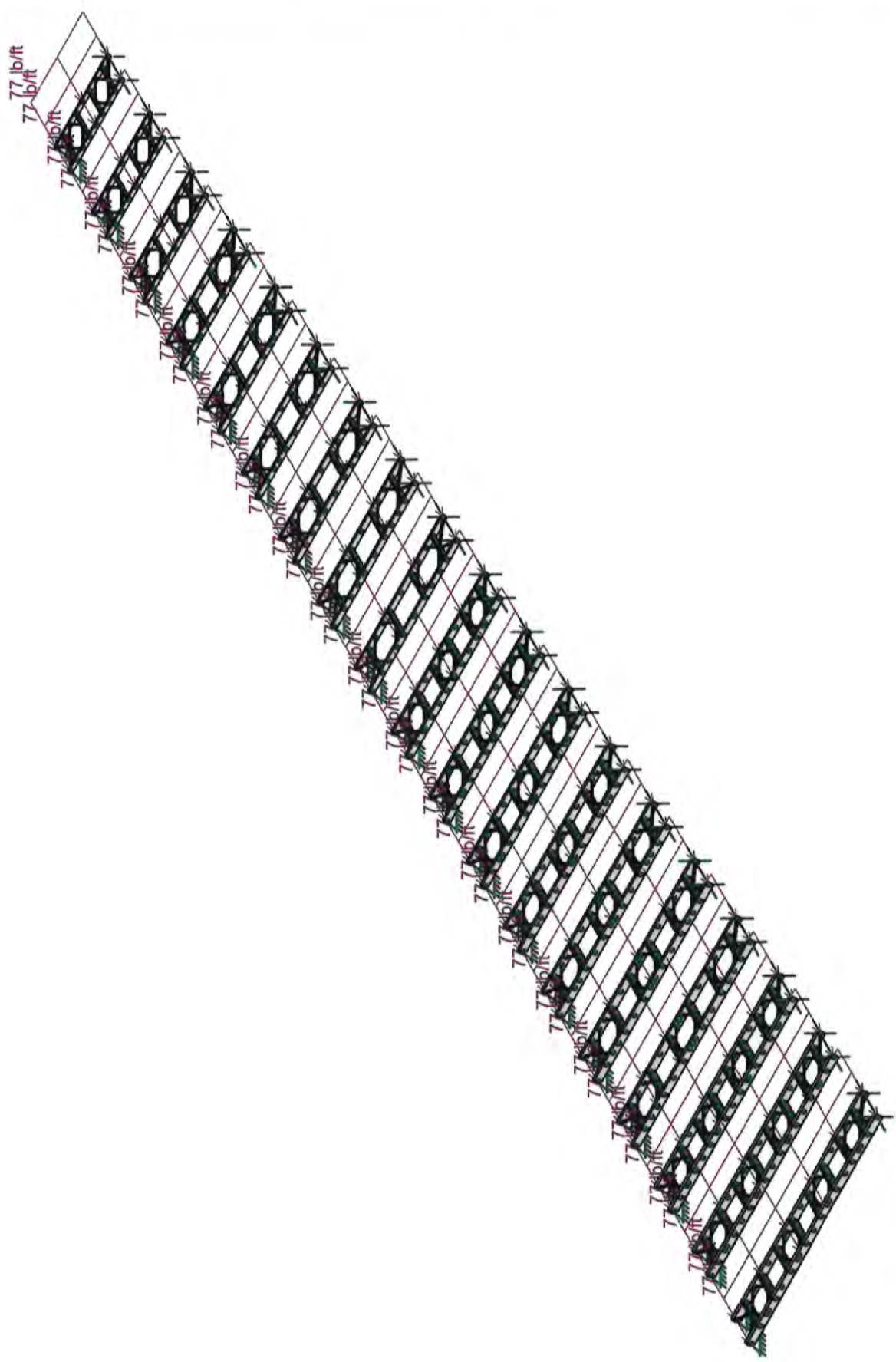
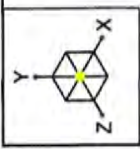
Loads: BLC 2, LL



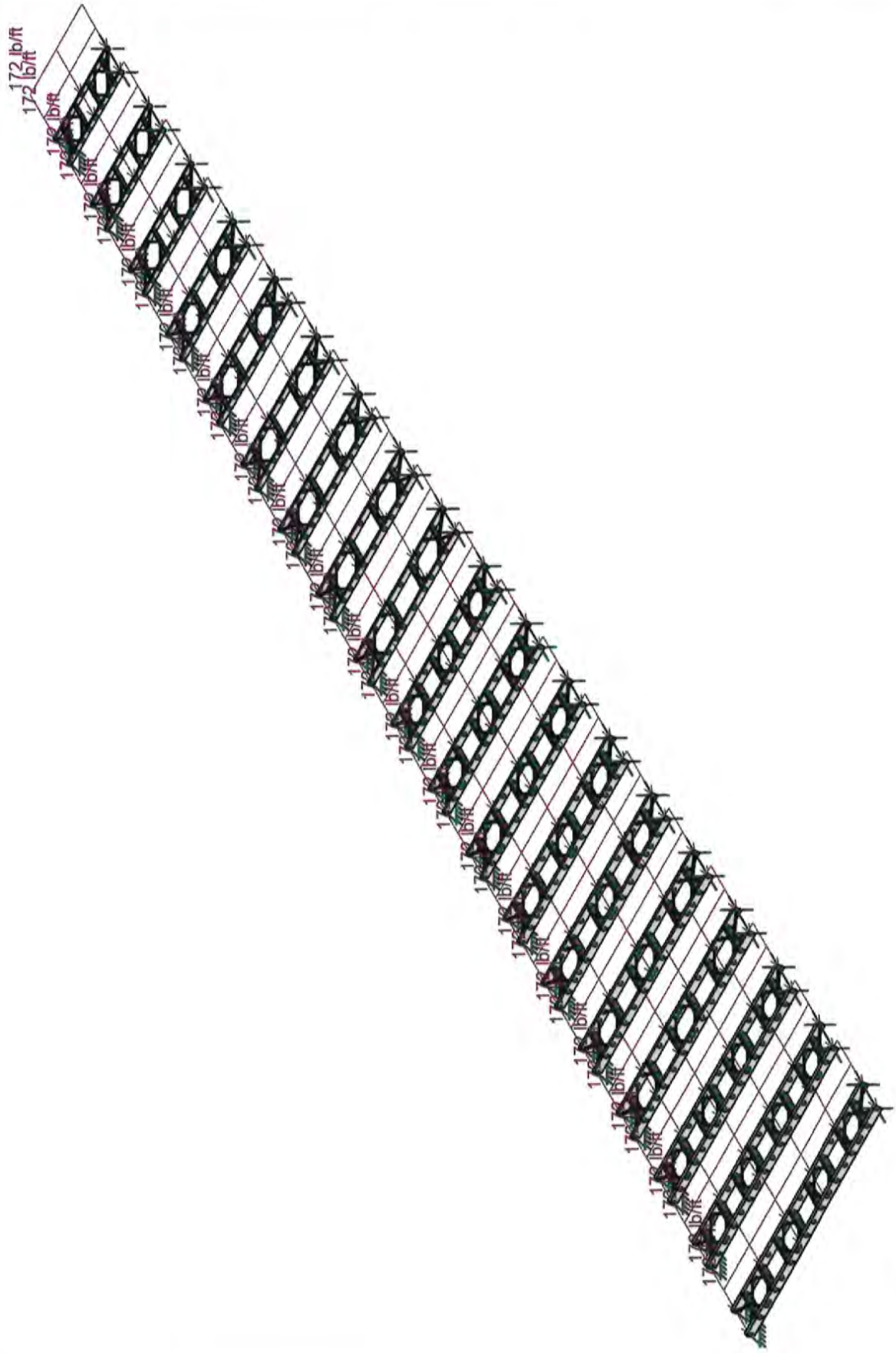
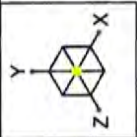
Loads: BLC 8, LL - Vehicle



Loads: BLC 4, EQx



Loads: BLC 6, EQz



Loads: BLC 7, Wind

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	Deflection 1	Yes	Y	DL	1								
2	Deflection 2	Yes	Y	LL	1								
3	Deflection 3	Yes	Y	DL	1	LL	1						
4	Deflection 2	Yes	Y	OL1	1								
5	Deflection 3	Yes	Y	DL	1	OL1	1						
6	ASCE Strength 1	Yes	Y	DL	1.4								
7	ASCE Strength 2 (a)	Yes	Y	DL	1.2	LL	1.6	LLS	1.6				
8	ASCE Strength 2 (a)	Yes	Y	DL	1.2	OL1	1.6	LLS	1.6				
9	ASCE Strength 3 (b) (a)	Yes	Y	DL	1.2	WL	0.5						
10	ASCE Strength 3 (b) (b)	Yes	Y	DL	1.2	WL	-0.5						
11	ASCE Strength 4 (a) (a)	Yes	Y	DL	1.2	WL	1	LL	0.5	LLS	1		
12	ASCE Strength 4 (a) (b)	Yes	Y	DL	1.2	WL	-1	LL	0.5	LLS	1		
13	ASCE Strength 5 (a)	Yes	Y	DL	0.9	WL	1						
14	ASCE Strength 5 (b)	Yes	Y	DL	0.9	WL	-1						
15	ASCE Strength 4 (a) (a)	Yes	Y	DL	1.2	WL	1	OL1	0.5	LLS	1		
16	ASCE Strength 4 (a) (b)	Yes	Y	DL	1.2	WL	-1	OL1	0.5	LLS	1		
17	ASCE Strength 6 (a)	Yes	Y	DL	1.2	Sps*DL	0.2	ELX	1	LL	0.5	LLS	1
18	ASCE Strength 6 (b)	Yes	Y	DL	1.2	Sps*DL	0.2	ELZ	1	LL	0.5	LLS	1
19	ASCE Strength 6 (c)	Yes	Y	DL	1.2	Sps*DL	0.2	ELX	-1	LL	0.5	LLS	1
20	ASCE Strength 6 (d)	Yes	Y	DL	1.2	Sps*DL	0.2	ELZ	-1	LL	0.5	LLS	1
21	ASCE Strength 7 (a)	Yes	Y	DL	0.9	Sps*DL	-0.2	ELX	1				
22	ASCE Strength 7 (b)	Yes	Y	DL	0.9	Sps*DL	-0.2	ELZ	1				
23	ASCE Strength 7 (c)	Yes	Y	DL	0.9	Sps*DL	-0.2	ELX	-1				
24	ASCE Strength 7 (d)	Yes	Y	DL	0.9	Sps*DL	-0.2	ELZ	-1				
25	ASCE Strength 6 (os-a)	Yes	Y	DL	1.2	Sps*DL	0.2	Q*ELX	1	LL	0.5	LLS	1
26	ASCE Strength 6 (os-b)	Yes	Y	DL	1.2	Sps*DL	0.2	Q*ELZ	1	LL	0.5	LLS	1
27	ASCE Strength 6 (os-c)	Yes	Y	DL	1.2	Sps*DL	0.2	Q*ELX	-1	LL	0.5	LLS	1
28	ASCE Strength 6 (os-d)	Yes	Y	DL	1.2	Sps*DL	0.2	Q*ELZ	-1	LL	0.5	LLS	1
29	ASCE Strength 7 (os-a)	Yes	Y	DL	0.9	Sps*DL	-0.2	Q*ELX	1				
30	ASCE Strength 7 (os-b)	Yes	Y	DL	0.9	Sps*DL	-0.2	Q*ELZ	1				
31	ASCE Strength 7 (os-c)	Yes	Y	DL	0.9	Sps*DL	-0.2	Q*ELX	-1				
32	ASCE Strength 7 (os-d)	Yes	Y	DL	0.9	Sps*DL	-0.2	Q*ELZ	-1				
33	ASCE Strength 6 (a)	Yes	Y	DL	1.2	Sps*DL	0.2	ELX	1	OL1	0.5	LLS	1
34	ASCE Strength 6 (b)	Yes	Y	DL	1.2	Sps*DL	0.2	ELZ	1	OL1	0.5	LLS	1
35	ASCE Strength 6 (c)	Yes	Y	DL	1.2	Sps*DL	0.2	ELX	-1	OL1	0.5	LLS	1
36	ASCE Strength 6 (d)	Yes	Y	DL	1.2	Sps*DL	0.2	ELZ	-1	OL1	0.5	LLS	1
37	ASCE Strength 6 (os-a)	Yes	Y	DL	1.2	Sps*DL	0.2	Q*ELX	1	OL1	0.5	LLS	1
38	ASCE Strength 6 (os-b)	Yes	Y	DL	1.2	Sps*DL	0.2	Q*ELZ	1	OL1	0.5	LLS	1
39	ASCE Strength 6 (os-c)	Yes	Y	DL	1.2	Sps*DL	0.2	Q*ELX	-1	OL1	0.5	LLS	1
40	ASCE Strength 6 (os-d)	Yes	Y	DL	1.2	Sps*DL	0.2	Q*ELZ	-1	OL1	0.5	LLS	1

Envelope AISC 16th (360-22): LRFD Steel Code Checks

	Member	Shape	Code Check	Loc[ft]	LC	Shear	Check	Loc[ft]	Dir	LC	phi*	Pnc [k]	phi*	Pnt [k]	phi*	Mn y-y [k-ft]	phi*	Mn z-z [k-ft]	Cb	Eqn
1	M29	W14X22	0.72	14	8	0.08	28	y	7	77.49	292.05	16.46	93.6	1	H1-1b					
2	M30	W14X22	0.72	14	8	0.08	28	y	7	77.49	292.05	16.46	93.6	1	H1-1b					
3	M16	W14X22	0.66	13	8	0.08	26	y	7	80.65	292.05	16.46	93.6	1	H1-1b					
4	M15	W14X22	0.66	13	8	0.08	26	y	7	80.65	292.05	16.46	93.6	1	H1-1b					
5	M71	W16X26	0.66	17	8	0.09	34	y	7	76	345.6	20.55	129.45	1	H1-1b					
6	M72	W16X26	0.66	17	8	0.09	34	y	7	76	345.6	20.55	129.45	1	H1-1b					
7	M58	W16X26	0.61	16	8	0.08	32	y	7	78.44	345.6	20.55	129.45	1	H1-1b					
8	M57	W16X26	0.61	16	8	0.08	32	y	7	78.44	345.6	20.55	129.45	1	H1-1b					
9	M2	W14X22	0.6	12	8	0.07	24	y	7	84.64	292.05	16.46	93.6	1	H1-1b					
10	M1	W14X22	0.6	12	8	0.07	24	y	7	84.64	292.05	16.46	93.6	1	H1-1b					
11	M44	W16X26	0.57	15	8	0.08	30	y	7	81.39	345.6	20.55	129.45	1	H1-1b					
12	M43	W16X26	0.57	15	8	0.08	30	y	7	81.39	345.6	20.55	129.45	1	H1-1b					
13	M133	W18X35	0.55	20	7	0.07	40	y	7	109.27	463.5	30.23	204.47	1	H1-1b					
14	M134	W18X35	0.55	20	7	0.07	40	y	7	109.27	463.5	30.23	204.47	1	H1-1b					
15	M167	W21X44	0.51	23	7	0.06	46	y	7	125.58	585	38.22	298.13	1	H1-1b					
16	M168	W21X44	0.51	23	7	0.06	46	y	7	125.58	585	38.22	298.13	1	H1-1b					
17	M254	W24X55	0.5	27	7	0.06	54	y	7	146.49	729	49.81	430.2	1	H1-1b					
18	M253	W24X55	0.5	27	7	0.06	54	y	7	146.49	729	49.81	430.2	1	H1-1b					
19	M100	W18X35	0.49	19	7	0.07	38	y	7	111.63	463.5	30.23	204.47	1	H1-1b					
20	M99	W18X35	0.49	19	7	0.07	38	y	7	111.63	463.5	30.23	204.47	1	H1-1b					
21	M148	W21X44	0.47	22	7	0.06	44	y	7	127.77	585	38.22	298.13	1	H1-1b					
22	M147	W21X44	0.47	22	7	0.06	44	y	7	127.77	585	38.22	298.13	1	H1-1b					
23	M228	W24X55	0.47	26	7	0.06	52	y	7	148.41	729	49.81	430.2	1	H1-1b					
24	M227	W24X55	0.47	26	7	0.06	52	y	7	148.41	729	49.81	430.2	1	H1-1b					
25	M86	W18X35	0.45	18	8	0.06	36	y	7	114.41	463.5	30.23	204.47	1	H1-1b					
26	M85	W18X35	0.45	18	8	0.06	36	y	7	114.41	463.5	30.23	204.47	1	H1-1b					
27	M331	W24X68	0.44	30	7	0.06	60	y	7	217.59	904.5	91.88	634.36	1	H1-1b					
28	M332	W24X68	0.44	30	7	0.06	60	y	7	217.59	904.5	91.88	634.36	1	H1-1b					
29	M208	W24X55	0.43	25	7	0.06	50	y	7	150.56	729	49.81	430.2	1	H1-1b					
30	M207	W24X55	0.43	25	7	0.06	50	y	7	150.56	729	49.81	430.2	1	H1-1b					
31	M114	W21X44	0.43	21	7	0.06	42	y	7	130.28	585	38.22	298.13	1	H1-1b					
32	M113	W21X44	0.43	21	7	0.06	42	y	7	130.28	585	38.22	298.13	1	H1-1b					
33	M279	W24X68	0.41	29	7	0.06	58	y	7	220.64	904.5	91.88	634.36	1	H1-1b					
34	M280	W24X68	0.41	29	7	0.06	58	y	7	220.64	904.5	91.88	634.36	1	H1-1b					
35	M188	W24X55	0.4	24	7	0.06	48	y	7	152.99	729	49.81	430.2	1	H1-1b					
36	M187	W24X55	0.4	24	7	0.06	48	y	7	152.99	729	49.81	430.2	1	H1-1b					
37	M306	W24X68	0.38	28	7	0.06	56	y	7	224.02	904.5	91.88	634.36	1	H1-1b					
38	M305	W24X68	0.38	28	7	0.06	56	y	7	224.02	904.5	91.88	634.36	1	H1-1b					
39	M339	L4X4X4	0.24	2.23	15	0	4.45	y	34	50.24	86.85	3.87	8	1.14	H2-1					
40	M340	L4X4X4	0.24	2.22	16	0	4.45	y	36	50.26	86.85	3.87	8.01	1.14	H2-1					
41	M287	L4X4X4	0.24	2.23	11	0	4.45	y	34	50.24	86.85	3.87	8	1.14	H2-1					
42	M288	L4X4X4	0.24	2.22	16	0	4.45	y	36	50.26	86.85	3.87	8.01	1.14	H2-1					
43	M314	L4X4X4	0.22	2.23	16	0	4.45	y	36	50.24	86.85	3.87	8	1.14	H2-1					
44	M313	L4X4X4	0.22	2.22	15	0	4.45	y	34	50.26	86.85	3.87	8.01	1.14	H2-1					
45	M392	L4X4X4	0.21	2.23	16	0	4.45	y	20	50.24	86.85	3.87	8	1.14	H2-1					
46	M391	L4X4X4	0.21	2.22	15	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14	H2-1					
47	M446	L4X4X4	0.21	2.8	15	0	5.59	y	18	45.64	86.85	3.87	7.49	1.14	H2-1					
48	M445	L4X4X4	0.21	2.79	16	0	5.59	y	20	45.66	86.85	3.87	7.49	1.14	H2-1					
49	M380	L4X4X4	0.2	2.23	16	0	4.45	y	20	50.24	86.85	3.87	8	1.14	H2-1					
50	M379	L4X4X4	0.2	2.22	15	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14	H2-1					
51	M216	L4X4X4	0.18	2.23	16	0	4.45	y	20	50.24	86.85	3.87	8	1.14	H2-1					
52	M215	L4X4X4	0.18	2.22	15	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14	H2-1					
53	M459	L4X4X4	0.17	2.74	16	0	5.48	y	20	46.12	86.85	3.87	7.54	1.14	H2-1					
54	M460	L4X4X4	0.17	2.74	15	0	5.48	y	18	46.14	86.85	3.87	7.54	1.14	H2-1					
55	M302	L4X4X4	0.17	2.23	15	0	4.45	y	34	50.24	86.85	3.87	8	1.14	H2-1					
56	M301	L4X4X4	0.17	2.22	16	0	4.45	y	36	50.26	86.85	3.87	8.01	1.14	H2-1					
57	M342	L4X4X4	0.17	2.23	16	0	4.45	y	18	50.24	86.85	3.87	8	1.14	H2-1					

Envelope AISC 16th (360-22): LRFD Steel Code Checks (Continued)

	Member	Shape	Code Check	Loc(ft)	LC	Shear Check	Loc(ft)	Dir	LC	phi*	Pnc [k]	phi*	Pnt [k]	phi*	Mn y-y [k-ft]	phi*	Mn z-z [k-ft]	Cb	Eqn
58	M341	L4X4X4	0.17	2.22	15	0	4.45	y	20	50.26	86.85	3.87	8.01	1.14	H2-1				
59	M354	L4X4X4	0.17	2.23	15	0	4.45	y	34	50.24	86.85	3.87	8	1.14	H2-1				
60	M353	L4X4X4	0.17	2.22	12	0	4.45	y	36	50.26	86.85	3.87	8.01	1.14	H2-1				
61	M447	L4X4X4	0.17	2.8	15	0	5.59	y	18	45.64	86.85	3.87	7.49	1.14	H2-1				
62	M448	L4X4X4	0.17	2.79	16	0	5.59	y	20	45.66	86.85	3.87	7.49	1.14	H2-1				
63	M383	L4X4X4	0.17	2.23	16	0	4.45	y	20	50.24	86.85	3.87	8	1.14	H2-1				
64	M384	L4X4X4	0.17	2.22	15	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14	H2-1				
65	M290	L4X4X4	0.17	2.23	16	0	4.45	y	18	50.24	86.85	3.87	8	1.14	H2-1				
66	M196	L4X4X4	0.17	2.23	16	0	4.45	y	20	50.24	86.85	3.87	8	1.14	H2-1				
67	M289	L4X4X4	0.17	2.22	15	0	4.45	y	20	50.26	86.85	3.87	8.01	1.14	H2-1				
68	M195	L4X4X4	0.17	2.22	15	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14	H2-1				
69	M451	L4X4X4	0.17	2.4	15	0	4.8	y	18	48.97	86.85	3.87	7.84	1.14	H2-1				
70	M452	L4X4X4	0.17	2.4	12	0	4.79	y	20	49	86.85	3.87	7.84	1.14	H2-1				
71	M327	L4X4X4	0.16	2.23	16	0	4.45	y	36	50.24	86.85	3.87	8	1.14	H2-1				
72	M328	L4X4X4	0.16	2.22	15	0	4.45	y	34	50.26	86.85	3.87	8.01	1.14	H2-1				
73	M461	L4X4X4	0.16	2.67	12	0	5.35	y	20	46.73	86.85	3.87	7.6	1.14	H2-1				
74	M462	L4X4X4	0.16	2.67	15	0	5.34	y	18	46.75	86.85	3.87	7.6	1.14	H2-1				
75	M315	L4X4X4	0.16	2.23	15	0	4.45	y	20	50.24	86.85	3.87	8	1.14	H2-1				
76	M316	L4X4X4	0.16	2.22	16	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14	H2-1				
77	M371	L4X4X4	0.16	2.23	16	0	4.45	y	20	50.24	86.85	3.87	8	1.14	H2-1				
78	M372	L4X4X4	0.16	2.22	15	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14	H2-1				
79	M453	L4X4X4	0.16	2.35	16	0	4.71	y	20	49.31	86.85	3.87	7.88	1.14	H2-1				
80	M454	L4X4X4	0.16	2.35	15	0	4.7	y	18	49.34	86.85	3.87	7.89	1.14	H2-1				
81	M175	L4X4X4	0.16	2.23	15	0	4.45	y	18	50.24	86.85	3.87	8	1.14	H2-1				
82	M458	L4X4X4	0.16	2.74	16	0	5.48	y	20	46.12	86.85	3.87	7.54	1.14	H2-1				
83	M176	L4X4X4	0.16	2.22	12	0	4.45	y	20	50.26	86.85	3.87	8.01	1.14	H2-1				
84	M457	L4X4X4	0.16	2.74	15	0	5.48	y	18	46.14	86.85	3.87	7.54	1.14	H2-1				
85	M389	L4X4X4	0.15	2.23	11	0	4.45	y	20	50.24	86.85	3.87	8	1.14	H2-1				
86	M390	L4X4X4	0.15	2.22	12	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14	H2-1				
87	M467	L4X4X4	0.15	2.61	16	0	5.23	y	7	47.25	86.85	3.87	7.65	1.14	H2-1				
88	M468	L4X4X4	0.15	2.61	15	0	5.22	y	7	47.27	86.85	3.87	7.65	1.14	H2-1				
89	M338	L4X4X4	0.15	2.23	12	0	4.45	y	18	50.24	86.85	3.87	8	1.14	H2-1				
90	M337	L4X4X4	0.15	2.22	11	0	4.45	y	20	50.26	86.85	3.87	8.01	1.14	H2-1				
91	M286	L4X4X4	0.15	2.23	16	0	4.45	y	18	50.24	86.85	3.87	8	1.14	H2-1				
92	M285	L4X4X4	0.15	2.22	11	0	4.45	y	20	50.26	86.85	3.87	8.01	1.14	H2-1				
93	M223	L4X4X4	0.15	2.23	16	0	4.45	y	20	50.24	86.85	3.87	8	1.14	H2-1				
94	M224	L4X4X4	0.15	2.22	15	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14	H2-1				
95	M464	L4X4X4	0.14	2.67	16	0	5.35	y	20	46.73	86.85	3.87	7.6	1.14	H2-1				
96	M463	L4X4X4	0.14	2.67	15	0	5.34	y	18	46.75	86.85	3.87	7.6	1.14	H2-1				
97	M156	L4X4X4	0.14	2.23	12	0	4.45	y	20	50.24	86.85	3.87	8	1.14	H2-1				
98	M155	L4X4X4	0.14	2.22	15	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14	H2-1				
99	M377	L4X4X4	0.14	2.23	15	0	4.45	y	20	50.24	86.85	3.87	8	1.14	H2-1				
100	M378	L4X4X4	0.14	2.22	12	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14	H2-1				
101	M444	L4X4X4	0.14	2.55	16	0	5.09	y	7	47.81	86.85	3.87	7.71	1.14	H2-1				
102	M443	L4X4X4	0.14	2.54	11	0	5.09	y	7	47.83	86.85	3.87	7.71	1.14	H2-1				
103	M427	L4X4X4	0.14	2.95	15	0	5.91	y	7	44.14	86.85	3.87	7.36	1.14	H2-1				
104	M428	L4X4X4	0.14	2.95	16	0	5.9	y	7	44.17	86.85	3.87	7.36	1.14	H2-1				
105	M311	L4X4X4	0.14	2.23	15	0	4.45	y	20	50.24	86.85	3.87	8	1.14	H2-1				
106	M203	L4X4X4	0.14	2.23	12	0	4.45	y	20	50.24	86.85	3.87	8	1.14	H2-1				
107	M312	L4X4X4	0.14	2.22	16	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14	H2-1				
108	M204	L4X4X4	0.14	2.22	15	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14	H2-1				
109	M466	L4X4X4	0.14	2.61	16	0	5.23	y	7	47.25	86.85	3.87	7.65	1.14	H2-1				
110	M465	L4X4X4	0.14	2.61	15	0	5.22	y	7	47.27	86.85	3.87	7.65	1.14	H2-1				
111	M449	L4X4X4	0.13	2.4	15	0	4.8	y	18	48.97	86.85	3.87	7.84	1.14	H2-1				
112	M450	L4X4X4	0.13	2.4	16	0	4.79	y	20	49	86.85	3.87	7.84	1.14	H2-1				
113	M386	L4X4X4	0.13	2.23	11	0	4.45	y	20	50.24	86.85	3.87	8	1.14	H2-1				
114	M385	L4X4X4	0.13	2.22	16	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14	H2-1				
115	M437	L4X4X4	0.13	2.48	15	0	4.96	y	7	48.34	86.85	3.87	7.77	1.14	H2-1				

Envelope AISC 16th (360-22): LRFD Steel Code Checks (Continued)

Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y-y [k-ft]	phi*Mn z-z [k-ft]	Cb	Eqn
116	M213	L4X4X4	0.13	2.22	11	0	4.45	y	20	50.26	86.85	3.87	8.01	1.14 H2-1
117	M122	L4X4X4	0.13	2.23	16	0	4.45	y	20	50.24	86.85	3.87	8	1.14 H2-1
118	M425	L4X4X4	0.13	2.95	15	0	5.91	y	7	44.14	86.85	3.87	7.36	1.14 H2-1
119	M438	L4X4X4	0.13	2.48	16	0	4.95	y	7	48.37	86.85	3.87	7.77	1.14 H2-1
120	M121	L4X4X4	0.13	2.22	15	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14 H2-1
121	M214	L4X4X4	0.13	2.22	16	0	4.44	y	18	50.29	86.85	3.87	8.01	1.14 H2-1
122	M426	L4X4X4	0.13	2.95	16	0	5.9	y	7	44.17	86.85	3.87	7.36	1.14 H2-1
123	M456	L4X4X4	0.13	2.35	16	0	4.71	y	20	49.31	86.85	3.87	7.88	1.14 H2-1
124	M455	L4X4X4	0.13	2.35	15	0	4.7	y	18	49.34	86.85	3.87	7.89	1.14 H2-1
125	M184	L4X4X4	0.13	2.23	15	0	4.45	y	18	50.24	86.85	3.87	8	1.14 H2-1
126	M183	L4X4X4	0.13	2.22	16	0	4.45	y	20	50.26	86.85	3.87	8.01	1.14 H2-1
127	M421	L4X4X4	0.13	2.85	12	0	5.7	y	7	45.14	86.85	3.87	7.44	1.14 H2-1
128	M442	L4X4X4	0.13	2.55	16	0	5.09	y	7	47.81	86.85	3.87	7.71	1.14 H2-1
129	M422	L4X4X4	0.13	2.85	15	0	5.69	y	7	45.16	86.85	3.87	7.45	1.14 H2-1
130	M441	L4X4X4	0.13	2.54	15	0	5.09	y	7	47.83	86.85	3.87	7.71	1.14 H2-1
131	M374	L4X4X4	0.12	2.23	15	0	4.45	y	20	50.24	86.85	3.87	8	1.14 H2-1
132	M373	L4X4X4	0.12	2.22	16	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14 H2-1
133	M435	L4X4X4	0.12	2.42	16	0	4.84	y	7	48.83	86.85	3.87	7.82	1.14 H2-1
134	M436	L4X4X4	0.12	2.41	15	0	4.83	y	7	48.85	86.85	3.87	7.83	1.14 H2-1
135	M193	L4X4X4	0.12	2.23	15	0	4.45	y	20	50.24	86.85	3.87	8	1.14 H2-1
136	M194	L4X4X4	0.12	2.22	16	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14 H2-1
137	M355	L4X4X4	0.12	2.23	16	0	4.45	y	18	50.24	86.85	3.87	8	1.14 H2-1
138	M303	L4X4X4	0.12	2.23	16	0	4.45	y	18	50.24	86.85	3.87	8	1.14 H2-1
139	M356	L4X4X4	0.12	2.22	11	0	4.45	y	20	50.26	86.85	3.87	8.01	1.14 H2-1
140	M304	L4X4X4	0.12	2.22	15	0	4.45	y	20	50.26	86.85	3.87	8.01	1.14 H2-1
141	M439	L4X4X4	0.12	2.48	15	0	4.96	y	7	48.34	86.85	3.87	7.77	1.14 H2-1
142	M424	L4X4X4	0.12	2.85	16	0	5.7	y	7	45.14	86.85	3.87	7.44	1.14 H2-1
143	M440	L4X4X4	0.12	2.48	16	0	4.95	y	7	48.37	86.85	3.87	7.77	1.14 H2-1
144	M423	L4X4X4	0.12	2.85	15	0	5.69	y	7	45.16	86.85	3.87	7.45	1.14 H2-1
145	M163	L4X4X4	0.12	2.23	16	0	4.45	y	20	50.24	86.85	3.87	8	1.14 H2-1
146	M164	L4X4X4	0.12	2.22	11	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14 H2-1
147	M226	L4X4X4	0.11	2.22	15	0	4.45	y	20	50.26	86.85	3.87	8.01	1.14 H2-1
148	M225	L4X4X4	0.11	2.22	16	0	4.44	y	18	50.29	86.85	3.87	8.01	1.14 H2-1
149	M418	L4X4X4	0.11	2.75	16	0	5.49	y	7	46.08	86.85	3.87	7.53	1.14 H2-1
150	M417	L4X4X4	0.11	2.74	15	0	5.49	y	7	46.11	86.85	3.87	7.53	1.14 H2-1
151	M429	L4X4X4	0.11	2.35	16	0	4.71	y	7	49.31	86.85	3.87	7.88	1.14 H2-1
152	M430	L4X4X4	0.11	2.35	15	0	4.7	y	7	49.34	86.85	3.87	7.89	1.14 H2-1
153	M330	L4X4X4	0.11	2.23	15	0	4.45	y	20	50.24	86.85	3.87	8	1.14 H2-1
154	M329	L4X4X4	0.11	2.22	12	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14 H2-1
155	M434	L4X4X4	0.11	2.42	12	0	4.84	y	7	48.83	86.85	3.87	7.82	1.14 H2-1
156	M433	L4X4X4	0.11	2.41	15	0	4.83	y	7	48.85	86.85	3.87	7.83	1.14 H2-1
157	M174	L4X4X4	0.11	2.23	16	0	4.45	y	18	50.24	86.85	3.87	8	1.14 H2-1
158	M173	L4X4X4	0.11	2.22	15	0	4.45	y	20	50.26	86.85	3.87	8.01	1.14 H2-1
159	M129	L4X4X4	0.11	2.23	12	0	4.45	y	20	50.24	86.85	3.87	8	1.14 H2-1
160	M297	L4X4X4	0.11	2.23	16	0	4.45	y	18	50.24	86.85	3.87	8	1.14 H2-1
161	M130	L4X4X4	0.11	2.22	15	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14 H2-1
162	M298	L4X4X4	0.11	2.22	11	0	4.45	y	20	50.26	86.85	3.87	8.01	1.14 H2-1
163	M140	L4X4X4	0.11	2.23	16	0	4.45	y	36	50.24	86.85	3.87	8	1.14 H2-1
164	M139	L4X4X4	0.11	2.22	15	0	4.45	y	34	50.26	86.85	3.87	8.01	1.14 H2-1
165	M420	L4X4X4	0.11	2.75	16	0	5.49	y	7	46.08	86.85	3.87	7.53	1.14 H2-1
166	M419	L4X4X4	0.11	2.74	15	0	5.49	y	7	46.11	86.85	3.87	7.53	1.14 H2-1
167	M206	L4X4X4	0.11	2.23	15	0	4.45	y	20	50.24	86.85	3.87	8	1.14 H2-1
168	M205	L4X4X4	0.11	2.22	16	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14 H2-1
169	M349	L4X4X4	0.1	2.23	16	0	4.45	y	18	50.24	86.85	3.87	8	1.14 H2-1
170	M350	L4X4X4	0.1	2.22	11	0	4.45	y	20	50.26	86.85	3.87	8.01	1.14 H2-1
171	M365	L4X4X4	0.1	2.23	15	0	4.45	y	20	50.24	86.85	3.87	8	1.14 H2-1
172	M366	L4X4X4	0.1	2.22	16	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14 H2-1
173	M432	L4X4X4	0.1	2.35	16	0	4.71	y	7	49.31	86.85	3.87	7.88	1.14 H2-1

Envelope AISC 16th (360-22): LRFD Steel Code Checks (Continued)

Member	Shape	Code Check	Loc[ft]	LC	Shear	Check	Loc[ft]	Dir	LC	phi*	Pnc [k]	phi*	Pnt [k]	phi*	Mn y-y [k-ft]	phi*	Mn z-z [k-ft]	Cb	Eqn
174	M431	L4X4X4	0.1	2.35	15	0	4.7	y	7	49.34	86.85	3.87		7.89	1.14	H2-1			
175	M415	L4X4X4	0.1	2.65	15	0	5.29	y	7	46.97	86.85	3.87		7.62	1.14	H2-1			
176	M324	L4X4X4	0.1	2.23	15	0	4.45	y	20	50.24	86.85	3.87		8	1.14	H2-1			
177	M323	L4X4X4	0.1	2.22	16	0	4.45	y	18	50.26	86.85	3.87		8.01	1.14	H2-1			
178	M416	L4X4X4	0.1	2.64	16	0	5.28	y	7	47	86.85	3.87		7.62	1.14	H2-1			
179	M153	L4X4X4	0.1	2.22	15	0	4.45	y	36	50.26	86.85	3.87		8.01	1.14	H2-1			
180	M154	L4X4X4	0.1	2.22	12	0	4.44	y	34	50.29	86.85	3.87		8.01	1.14	H2-1			
181	M359	L4X4X4	0.1	2.23	15	0	4.45	y	7	50.24	86.85	3.87		8	1.14	H2-1			
182	M105	L4X4X4	0.1	2.23	15	0	4.45	y	34	50.24	86.85	3.87		8	1.14	H2-1			
183	M145	L4X4X4	0.1	2.23	16	0	4.45	y	36	50.24	86.85	3.87		8	1.14	H2-1			
184	M146	L4X4X4	0.1	2.22	11	0	4.45	y	34	50.26	86.85	3.87		8.01	1.14	H2-1			
185	M106	L4X4X4	0.1	2.22	16	0	4.45	y	36	50.26	86.85	3.87		8.01	1.14	H2-1			
186	M360	L4X4X4	0.1	2.22	16	0	4.45	y	7	50.26	86.85	3.87		8.01	1.14	H2-1			
187	M185	L4X4X4	0.1	2.23	12	0	4.45	y	18	50.24	86.85	3.87		8	1.14	H2-1			
188	M186	L4X4X4	0.1	2.22	15	0	4.45	y	20	50.26	86.85	3.87		8.01	1.14	H2-1			
189	M413	L4X4X4	0.1	2.65	15	0	5.29	y	7	46.97	86.85	3.87		7.62	1.14	H2-1			
190	M414	L4X4X4	0.1	2.64	12	0	5.28	y	7	47	86.85	3.87		7.62	1.14	H2-1			
191	M410	L4X4X4	0.09	2.55	16	0	5.09	y	7	47.81	86.85	3.87		7.71	1.14	H2-1			
192	M409	L4X4X4	0.09	2.54	15	0	5.09	y	7	47.83	86.85	3.87		7.71	1.14	H2-1			
193	M217	L4X4X4	0.09	2.23	15	0	4.45	y	7	50.24	86.85	3.87		8	1.14	H2-1			
194	M218	L4X4X4	0.09	2.22	16	0	4.45	y	7	50.26	86.85	3.87		8.01	1.14	H2-1			
195	M119	L4X4X4	0.09	2.23	11	0	4.45	y	36	50.24	86.85	3.87		8	1.14	H2-1			
196	M120	L4X4X4	0.09	2.22	16	0	4.45	y	34	50.26	86.85	3.87		8.01	1.14	H2-1			
197	M141	L4X4X4	0.09	2.23	11	0	4.45	y	7	50.24	86.85	3.87		8	1.14	H2-1			
198	M112	L4X4X4	0.09	2.23	15	0	4.45	y	34	50.24	86.85	3.87		8	1.14	H2-1			
199	M111	L4X4X4	0.09	2.22	16	0	4.45	y	36	50.26	86.85	3.87		8.01	1.14	H2-1			
200	M142	L4X4X4	0.09	2.22	16	0	4.45	y	7	50.26	86.85	3.87		8.01	1.14	H2-1			
201	M166	L4X4X4	0.09	2.22	11	0	4.45	y	36	50.26	86.85	3.87		8.01	1.14	H2-1			
202	M165	L4X4X4	0.09	2.22	16	0	4.44	y	34	50.29	86.85	3.87		8.01	1.14	H2-1			
203	M91	L4X4X4	0.09	2.23	11	0	4.45	y	34	50.24	86.85	3.87		8	1.14	H2-1			
204	M92	L4X4X4	0.09	2.22	16	0	4.45	y	36	50.26	86.85	3.87		8.01	1.14	H2-1			
205	M412	L4X4X4	0.09	2.55	16	0	5.09	y	7	47.81	86.85	3.87		7.71	1.14	H2-1			
206	M411	L4X4X4	0.09	2.54	15	0	5.09	y	7	47.83	86.85	3.87		7.71	1.14	H2-1			
207	M197	L4X4X4	0.08	2.23	15	0	4.45	y	7	50.24	86.85	3.87		8	1.14	H2-1			
208	M198	L4X4X4	0.08	2.22	16	0	4.45	y	7	50.26	86.85	3.87		8.01	1.14	H2-1			
209	M408	L4X4X4	0.08	2.45	16	0	4.9	y	7	48.59	86.85	3.87		7.8	1.14	H2-1			
210	M407	L4X4X4	0.08	2.45	15	0	4.89	y	7	48.61	86.85	3.87		7.8	1.14	H2-1			
211	M132	L4X4X4	0.08	2.23	15	0	4.45	y	36	50.24	86.85	3.87		8	1.14	H2-1			
212	M108	L4X4X4	0.08	2.23	16	0	4.45	y	7	50.24	86.85	3.87		8	1.14	H2-1			
213	M98	L4X4X4	0.08	2.23	15	0	4.45	y	34	50.24	86.85	3.87		8	1.14	H2-1			
214	M131	L4X4X4	0.08	2.22	16	0	4.45	y	34	50.26	86.85	3.87		8.01	1.14	H2-1			
215	M107	L4X4X4	0.08	2.22	15	0	4.45	y	7	50.26	86.85	3.87		8.01	1.14	H2-1			
216	M97	L4X4X4	0.08	2.22	16	0	4.45	y	36	50.26	86.85	3.87		8.01	1.14	H2-1			
217	M178	L4X4X4	0.08	2.22	16	0	4.45	y	7	50.26	86.85	3.87		8.01	1.14	H2-1			
218	M177	L4X4X4	0.08	2.22	15	0	4.44	y	7	50.29	86.85	3.87		8.01	1.14	H2-1			
219	M78	L4X4X4	0.08	2.23	16	0	4.45	y	36	50.24	86.85	3.87		8	1.14	H2-1			
220	M77	L4X4X4	0.08	2.22	15	0	4.45	y	34	50.26	86.85	3.87		8.01	1.14	H2-1			
221	M406	L4X4X4	0.08	2.45	16	0	4.9	y	7	48.59	86.85	3.87		7.8	1.14	H2-1			
222	M405	L4X4X4	0.08	2.45	15	0	4.89	y	7	48.61	86.85	3.87		7.8	1.14	H2-1			
223	M157	L4X4X4	0.07	2.23	11	0	4.45	y	7	50.24	86.85	3.87		8	1.14	H2-1			
224	M158	L4X4X4	0.07	2.22	12	0	4.45	y	7	50.26	86.85	3.87		8.01	1.14	H2-1			
225	M401	L4X4X4	0.07	2.35	15	0	4.71	y	8	49.31	86.85	3.87		7.88	1.14	H2-1			
226	M402	L4X4X4	0.07	2.35	16	0	4.7	y	8	49.34	86.85	3.87		7.89	1.14	H2-1			
227	M83	L4X4X4	0.07	2.23	12	0	4.45	y	36	50.24	86.85	3.87		8	1.14	H2-1			
228	M84	L4X4X4	0.07	2.22	15	0	4.45	y	34	50.26	86.85	3.87		8.01	1.14	H2-1			
229	M94	L4X4X4	0.07	2.23	16	0	4.45	y	7	50.24	86.85	3.87		8	1.14	H2-1			
230	M93	L4X4X4	0.07	2.22	11	0	4.45	y	7	50.26	86.85	3.87		8.01	1.14	H2-1			
231	M123	L4X4X4	0.07	2.23	15	0	4.45	y	8	50.24	86.85	3.87		8	1.14	H2-1			

Envelope AISC 16th (360-22): LRFD Steel Code Checks (Continued)

Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	phi*	Pnc [k]	phi*	Pnt [k]	phi*	Mn y-y [k-ft]	phi*	Mn z-z [k-ft]	Cb	Eqn
232	M124	L4X4X4	0.07	2.22	16	0	4.45	y	8	50.26	86.85	3.87	8.01	1.14	H2-1			
233	M63	L4X4X4	0.07	2.23	15	0	4.45	y	34	50.24	86.85	3.87	8	1.14	H2-1			
234	M64	L4X4X4	0.07	2.22	16	0	4.45	y	36	50.26	86.85	3.87	8.01	1.14	H2-1			
235	M403	L4X4X4	0.07	2.35	15	0	4.71	y	8	49.31	86.85	3.87	7.88	1.14	H2-1			
236	M404	L4X4X4	0.07	2.35	16	0	4.7	y	8	49.34	86.85	3.87	7.89	1.14	H2-1			
237	M343	L4X4X4	0.07	2.23	15	0	4.45	y	18	50.24	86.85	3.87	8	1.14	H2-1			
238	M344	L4X4X4	0.07	2.22	16	0	4.45	y	20	50.26	86.85	3.87	8.01	1.14	H2-1			
239	M144	L4X4X4	0.07	2.23	15	0	4.45	y	7	50.24	86.85	3.87	8	1.14	H2-1			
240	M143	L4X4X4	0.07	2.22	12	0	4.45	y	7	50.26	86.85	3.87	8.01	1.14	H2-1			
241	M291	L4X4X4	0.06	2.23	15	0	4.45	y	18	50.24	86.85	3.87	8	1.14	H2-1			
242	M399	L4X4X4	0.06	2.26	16	0	4.53	y	8	49.98	86.85	3.87	7.97	1.14	H2-1			
243	M292	L4X4X4	0.06	2.22	16	0	4.45	y	20	50.26	86.85	3.87	8.01	1.14	H2-1			
244	M400	L4X4X4	0.06	2.26	15	0	4.52	y	8	50.01	86.85	3.87	7.97	1.14	H2-1			
245	M70	L4X4X4	0.06	2.23	15	0	4.45	y	34	50.24	86.85	3.87	8	1.14	H2-1			
246	M69	L4X4X4	0.06	2.22	16	0	4.45	y	36	50.26	86.85	3.87	8.01	1.14	H2-1			
247	M79	L4X4X4	0.06	2.23	15	0	4.45	y	7	50.24	86.85	3.87	8	1.14	H2-1			
248	M80	L4X4X4	0.06	2.22	12	0	4.45	y	7	50.26	86.85	3.87	8.01	1.14	H2-1			
249	M398	L4X4X4	0.06	2.26	12	0	4.53	y	8	49.98	86.85	3.87	7.97	1.14	H2-1			
250	M368	L4X4X4	0.06	2.23	15	0	4.45	y	20	50.24	86.85	3.87	8	1.14	H2-1			
251	M397	L4X4X4	0.06	2.26	11	0	4.52	y	8	50.01	86.85	3.87	7.97	1.14	H2-1			
252	M367	L4X4X4	0.06	2.22	16	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14	H2-1			
253	M49	L4X4X4	0.06	2.23	15	0	4.45	y	34	50.24	86.85	3.87	8	1.14	H2-1			
254	M50	L4X4X4	0.06	2.22	16	0	4.45	y	36	50.26	86.85	3.87	8.01	1.14	H2-1			
255	M109	L4X4X4	0.06	2.23	16	0	4.45	y	7	50.24	86.85	3.87	8	1.14	H2-1			
256	M110	L4X4X4	0.06	2.22	15	0	4.45	y	7	50.26	86.85	3.87	8.01	1.14	H2-1			
257	M318	L4X4X4	0.06	2.23	16	0	4.45	y	20	50.24	86.85	3.87	8	1.14	H2-1			
258	M317	L4X4X4	0.06	2.22	11	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14	H2-1			
259	M362	L4X4X4	0.06	2.23	15	0	4.45	y	7	50.24	86.85	3.87	8	1.14	H2-1			
260	M361	L4X4X4	0.06	2.22	16	0	4.45	y	7	50.26	86.85	3.87	8.01	1.14	H2-1			
261	M394	L4X4X4	0.06	2.17	12	0	4.35	y	8	50.6	86.85	3.87	8.05	1.14	H2-1			
262	M393	L4X4X4	0.06	2.17	15	0	4.34	y	8	50.63	86.85	3.87	8.06	1.14	H2-1			
263	M56	L4X4X4	0.06	2.23	15	0	4.45	y	34	50.24	86.85	3.87	8	1.14	H2-1			
264	M55	L4X4X4	0.06	2.22	16	0	4.45	y	36	50.26	86.85	3.87	8.01	1.14	H2-1			
265	M66	L4X4X4	0.06	2.23	16	0	4.45	y	8	50.24	86.85	3.87	8	1.14	H2-1			
266	M65	L4X4X4	0.06	2.22	15	0	4.45	y	8	50.26	86.85	3.87	8.01	1.14	H2-1			
267	M220	L4X4X4	0.06	2.23	15	0	4.45	y	7	50.24	86.85	3.87	8	1.14	H2-1			
268	M219	L4X4X4	0.06	2.22	16	0	4.45	y	7	50.26	86.85	3.87	8.01	1.14	H2-1			
269	M396	L4X4X4	0.05	2.17	16	0	4.35	y	8	50.6	86.85	3.87	8.05	1.14	H2-1			
270	M395	L4X4X4	0.05	2.17	15	0	4.34	y	8	50.63	86.85	3.87	8.06	1.14	H2-1			
271	M95	L4X4X4	0.05	2.23	16	0	4.45	y	7	50.24	86.85	3.87	8	1.14	H2-1			
272	M96	L4X4X4	0.05	2.22	15	0	4.45	y	7	50.26	86.85	3.87	8.01	1.14	H2-1			
273	M200	L4X4X4	0.05	2.23	15	0	4.45	y	7	50.24	86.85	3.87	8	1.14	H2-1			
274	M36	L4X4X4	0.05	2.23	16	0	4.45	y	36	50.24	86.85	3.87	8	1.14	H2-1			
275	M199	L4X4X4	0.05	2.22	16	0	4.45	y	7	50.26	86.85	3.87	8.01	1.14	H2-1			
276	M35	L4X4X4	0.05	2.22	15	0	4.45	y	34	50.26	86.85	3.87	8.01	1.14	H2-1			
277	M179	L4X4X4	0.05	2.22	16	0	4.45	y	7	50.26	86.85	3.87	8.01	1.14	H2-1			
278	M180	L4X4X4	0.05	2.22	15	0	4.44	y	7	50.29	86.85	3.87	8.01	1.14	H2-1			
279	M41	L4X4X4	0.05	2.23	16	0	4.45	y	36	50.24	86.85	3.87	8	1.14	H2-1			
280	M42	L4X4X4	0.05	2.22	15	0	4.45	y	34	50.26	86.85	3.87	8.01	1.14	H2-1			
281	M160	L4X4X4	0.05	2.23	11	0	4.45	y	7	50.24	86.85	3.87	8	1.14	H2-1			
282	M159	L4X4X4	0.05	2.22	16	0	4.45	y	7	50.26	86.85	3.87	8.01	1.14	H2-1			
283	M52	L4X4X4	0.05	2.23	16	0	4.45	y	8	50.24	86.85	3.87	8	1.14	H2-1			
284	M82	L4X4X4	0.05	2.23	15	0	4.45	y	7	50.24	86.85	3.87	8	1.14	H2-1			
285	M51	L4X4X4	0.05	2.22	15	0	4.45	y	8	50.26	86.85	3.87	8.01	1.14	H2-1			
286	M81	L4X4X4	0.05	2.22	16	0	4.45	y	7	50.26	86.85	3.87	8.01	1.14	H2-1			
287	M126	L4X4X4	0.05	2.23	15	0	4.45	y	8	50.24	86.85	3.87	8	1.14	H2-1			
288	M125	L4X4X4	0.05	2.22	16	0	4.45	y	8	50.26	86.85	3.87	8.01	1.14	H2-1			
289	M21	L4X4X4	0.05	2.23	15	0	4.45	y	34	50.24	86.85	3.87	8	1.14	H2-1			

Envelope AISC 16th (360-22): LRFD Steel Code Checks (Continued)

Member	Shape	Code Check	Loc[ft]	LC	Shear	Check	Loc[ft]	Dir	LC	phi*	Pnc [k]	phi*	Pnt [k]	phi*	Mn y-y [k-ft]	phi*	Mn z-z [k-ft]	Cb	Eqn
290	M22	L4X4X4	0.05	2.22	16	0	4.45	y	36	50.26	86.85	3.87			8.01	1.14	H2-1		
291	M67	L4X4X4	0.04	2.23	16	0	4.45	y	8	50.24	86.85	3.87			8	1.14	H2-1		
292	M28	L4X4X4	0.04	2.23	11	0	4.45	y	34	50.24	86.85	3.87			8	1.14	H2-1		
293	M68	L4X4X4	0.04	2.22	15	0	4.45	y	8	50.26	86.85	3.87			8.01	1.14	H2-1		
294	M27	L4X4X4	0.04	2.22	16	0	4.45	y	36	50.26	86.85	3.87			8.01	1.14	H2-1		
295	M37	L4X4X4	0.04	2.23	15	0	4.45	y	8	50.24	86.85	3.87			8	1.14	H2-1		
296	M38	L4X4X4	0.04	2.22	16	0	4.45	y	8	50.26	86.85	3.87			8.01	1.14	H2-1		
297	M7	L4X4X4	0.04	2.17	11	0	4.35	y	34	50.6	86.85	3.87			8.05	1.14	H2-1		
298	M8	L4X4X4	0.04	2.17	16	0	4.34	y	36	50.63	86.85	3.87			8.06	1.14	H2-1		
299	M53	L4X4X4	0.04	2.23	16	0	4.45	y	8	50.24	86.85	3.87			8	1.14	H2-1		
300	M54	L4X4X4	0.04	2.22	15	0	4.45	y	8	50.26	86.85	3.87			8.01	1.14	H2-1		
301	M14	L4X4X4	0.04	2.17	15	0	4.35	y	34	50.6	86.85	3.87			8.05	1.14	H2-1		
302	M13	L4X4X4	0.04	2.17	16	0	4.34	y	36	50.63	86.85	3.87			8.06	1.14	H2-1		
303	M24	L4X4X4	0.04	2.23	16	0	4.45	y	8	50.24	86.85	3.87			8	1.14	H2-1		
304	M23	L4X4X4	0.04	2.22	11	0	4.45	y	8	50.26	86.85	3.87			8.01	1.14	H2-1		
305	M40	L4X4X4	0.03	2.23	15	0	4.45	y	8	50.24	86.85	3.87			8	1.14	H2-1		
306	M39	L4X4X4	0.03	2.22	16	0	4.45	y	8	50.26	86.85	3.87			8.01	1.14	H2-1		
307	M10	L4X4X4	0.03	2.17	16	0	4.35	y	8	50.6	86.85	3.87			8.05	1.14	H2-1		
308	M9	L4X4X4	0.03	2.17	15	0	4.34	y	8	50.63	86.85	3.87			8.06	1.14	H2-1		
309	M25	L4X4X4	0.03	2.23	16	0	4.45	y	8	50.24	86.85	3.87			8	1.14	H2-1		
310	M26	L4X4X4	0.03	2.22	15	0	4.45	y	8	50.26	86.85	3.87			8.01	1.14	H2-1		
311	M11	L4X4X4	0.03	2.17	16	0	4.35	y	8	50.6	86.85	3.87			8.05	1.14	H2-1		
312	M12	L4X4X4	0.03	2.17	15	0	4.34	y	8	50.63	86.85	3.87			8.06	1.14	H2-1		
313	M334	W21X44	0.02	3.14	16	0	6.29	y	18	408.7	585	38.22			357.75	1.16	H1-1b*		
314	M282	W21X44	0.02	3.14	16	0	6.29	y	18	408.7	585	38.22			357.75	1.16	H1-1b*		
315	M308	W21X44	0.02	6.29	15	0	0	y	20	408.7	585	38.22			357.75	1.16	H1-1b*		
316	M388	W21X44	0.02	6.29	15	0	0	y	18	408.7	585	38.22			357.75	1.16	H1-1b*		
317	M376	W21X44	0.02	6.29	15	0	0	y	18	408.7	585	38.22			357.75	1.16	H1-1b*		
318	M170	W18X35	0.02	3.15	12	0	6.29	y	20	321.7	463.5	30.23			249.38	1.17	H1-1b*		
319	M136	W14X22	0.02	3.15	16	0	6.29	y	20	186.81	292.05	16.46			124.5	1.18	H1-1b*		
320	M210	W21X44	0.02	6.29	15	0	0	y	18	408.7	585	38.22			357.75	1.16	H1-1b*		
321	M74	W12X19	0.02	3.14	16	0	6.29	y	20	135.23	250.65	11.18			84.27	1.19	H1-1b*		
322	M150	W18X35	0.02	6.29	15	0	0	y	18	321.7	463.5	30.23			249.38	1.17	H1-1b*		
323	M299	W21X44	0.01	3.14	16	0	6.29	y	18	408.7	585	38.22			357.75	1.16	H1-1b*		
324	M335	W21X44	0.01	3.14	15	0	6.29	y	18	408.7	585	38.22			357.75	1.16	H1-1b*		
325	M283	W21X44	0.01	3.14	15	0	6.29	y	18	408.7	585	38.22			357.75	1.16	H1-1b*		
326	M351	W21X44	0.01	3.14	16	0	6.29	y	18	408.7	585	38.22			357.75	1.16	H1-1b*		
327	M381	W21X44	0.01	6.29	15	0	0	y	18	408.7	585	38.22			357.75	1.16	H1-1b*		
328	M190	W21X44	0.01	6.29	13	0	0	y	18	408.7	585	38.22			357.75	1.16	H1-1b*		
329	M102	W14X22	0.01	6.29	15	0	0	y	18	186.81	292.05	16.46			124.5	1.18	H1-1b*		
330	M116	W18X35	0.01	6.29	15	0	0	y	18	321.7	463.5	30.23			249.38	1.17	H1-1b*		
331	M325	W21X44	0.01	6.29	15	0	0	y	20	408.7	585	38.22			357.75	1.16	H1-1b*		
332	M60	W12X19	0.01	6.29	15	0	0	y	18	135.23	250.65	11.18			84.28	1.19	H1-1b*		
333	M309	W21X44	0.01	6.29	16	0	0	y	20	408.7	585	38.22			357.75	1.16	H1-1b*		
334	M181	W18X35	0.01	3.15	16	0	6.29	y	20	321.7	463.5	30.23			249.38	1.17	H1-1b*		
335	M369	W21X44	0.01	6.29	15	0	0	y	18	408.7	585	38.22			357.75	1.16	H1-1b*		
336	M348	L4X4X4	0.01	2.23	36	0	4.45	y	18	50.24	86.85	3.87			8	1.14	H2-1		
337	M347	L4X4X4	0.01	2.22	18	0	4.45	y	20	50.26	86.85	3.87			8.01	1.14	H2-1		
338	M32	W10X15	0.01	3.14	16	0	6.29	y	36	105.1	198.45	8.63			54.87	1.2	H1-1b*		
339	M88	W14X22	0.01	6.29	15	0	0	y	18	186.81	292.05	16.46			124.5	1.18	H1-1b*		
340	M161	W18X35	0.01	6.29	13	0	0	y	18	321.7	463.5	30.23			249.38	1.17	H1-1b*		
341	M221	W21X44	0.01	6.29	15	0	0	y	18	408.7	585	38.22			357.75	1.16	H1-1b*		
342	M137	W14X22	0.01	3.15	16	0	6.29	y	20	186.81	292.05	16.46			124.5	1.18	H1-1b*		
343	M75	W12X19	0.01	3.14	16	0	6.29	y	20	135.23	250.65	11.18			84.28	1.19	H1-1b*		
344	M46	W12X19	0.01	6.29	15	0	0	y	34	135.23	250.65	11.18			84.29	1.19	H1-1b*		
345	M201	W21X44	0.01	6.29	15	0	0	y	18	408.7	585	38.22			357.75	1.16	H1-1b*		
346	M127	W18X35	0.01	6.29	15	0	0	y	18	321.7	463.5	30.23			249.38	1.17	H1-1b*		
347	M18	W10X15	0.01	6.29	15	0	0	y	34	105.1	198.45	8.63			54.88	1.2	H1-1b*		

Envelope AISC 16th (360-22): LRFD Steel Code Checks (Continued)

	Member	Shape	Code Check	Loc[ft]	LC	Shear	Check	Loc[ft]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y-y [k-ft]	phi*Mn z-z [k-ft]	Cb	Eqn
348	M103	W14X22	0.01	6.29	15	0	0	y	18	186.81	292.05	16.46	124.5	1.18	H1-1b*	
349	M61	W12X19	0.01	6.29	15	0	0	y	18	135.23	250.65	11.18	84.29	1.19	H1-1b*	
350	M321	L4X4X4	0.01	2.23	18	0	4.45	y	20	50.24	86.85	3.87	8	1.14	H2-1	
351	M322	L4X4X4	0.01	2.22	36	0	4.45	y	18	50.26	86.85	3.87	8.01	1.14	H2-1	
352	M296	L4X4X4	0.01	2.23	36	0	4.45	y	18	50.24	86.85	3.87	8	1.14	H2-1	
353	M295	L4X4X4	0.01	2.22	18	0	4.45	y	20	50.26	86.85	3.87	8.01	1.14	H2-1	
354	M33	W10X15	0.01	3.14	16	0	6.29	y	36	105.1	198.45	8.63	54.88	1.2	H1-1b*	
355	M4	W10X15	0.01	3.08	16	0	0	y	34	105.1	198.45	8.63	54.84	1.2	H1-1b*	
356	M89	W14X22	0.01	6.29	15	0	0	y	18	186.81	292.05	16.46	124.5	1.18	H1-1b*	
357	M294	W21X44	0.01	3.14	15	0	6.29	y	18	408.7	585	38.22	357.75	1.16	H1-1b*	
358	M47	W12X19	0.01	6.29	15	0	0	y	34	135.23	250.65	11.18	84.29	1.19	H1-1b*	
359	M363	W21X44	0.01	6.29	16	0	0	y	20	408.7	585	38.22	357.75	1.16	H1-1b*	
360	M346	W21X44	0.01	3.14	15	0	6.29	y	18	408.7	585	38.22	357.75	1.16	H1-1b*	
361	M19	W10X15	0.01	6.29	15	0	0	y	34	105.1	198.45	8.63	54.88	1.2	H1-1b*	
362	M320	W21X44	0.01	6.29	16	0	0	y	20	408.7	585	38.22	357.75	1.16	H1-1b*	
363	M171	W18X35	0.01	3.15	13	0	6.29	y	18	321.7	463.5	30.23	249.38	1.17	H1-1b*	
364	M357	W21X44	0.01	6.29	16	0	0	y	20	408.7	585	38.22	357.75	1.16	H1-1b*	
365	M151	W18X35	0.01	6.29	16	0	0	y	20	321.7	463.5	30.23	249.38	1.17	H1-1b*	
366	M211	W21X44	0.01	6.29	16	0	0	y	20	408.7	585	38.22	357.75	1.16	H1-1b*	
367	M5	W10X15	0.01	3.08	16	0	0	y	34	105.1	198.45	8.63	54.84	1.2	H1-1b*	
368	M117	W18X35	0.01	6.29	16	0	0	y	20	321.7	463.5	30.23	249.38	1.17	H1-1b*	
369	M191	W21X44	0.01	6.29	16	0	0	y	20	408.7	585	38.22	357.75	1.16	H1-1b*	
370	M31	W10X15	0.01	3.14	33	0	6.29	y	18	105.1	198.45	8.63	56.31	1.23	H1-1b	
371	M17	W10X15	0.01	3.15	17	0	0	y	20	105.1	198.45	8.63	56.27	1.23	H1-1b	
372	M3	W10X15	0.01	3.15	17	0	0	y	36	105.1	198.45	8.63	56.2	1.23	H1-1b	
373	M20	W10X15	0.01	3.15	18	0	0	y	20	105.1	198.45	8.63	56.28	1.23	H1-1b	
374	M6	W10X15	0.01	3.15	18	0	0	y	36	105.1	198.45	8.63	56.21	1.23	H1-1b	
375	M34	W10X15	0.01	3.14	20	0	6.29	y	18	105.1	198.45	8.63	56.32	1.23	H1-1b	
376	M73	W12X19	0.01	3.14	33	0	6.29	y	18	135.23	250.65	11.18	86.6	1.22	H1-1b	
377	M59	W12X19	0.01	3.15	33	0	0	y	20	135.23	250.65	11.18	86.54	1.22	H1-1b	
378	M45	W12X19	0.01	3.14	33	0	0	y	20	135.23	250.65	11.18	86.47	1.22	H1-1b	
379	M336	W21X44	0.01	6.29	15	0	6.29	y	20	408.7	585	38.22	357.75	1.16	H1-1b*	
380	M172	W18X35	0.01	3.15	15	0	6.29	y	18	321.7	463.5	30.23	249.38	1.17	H1-1b*	
381	M135	W14X22	0.01	3.15	33	0	6.29	y	18	186.81	292.05	16.46	124.5	1.22	H1-1b	
382	M284	W21X44	0.01	6.29	15	0	6.29	y	20	408.7	585	38.22	357.75	1.16	H1-1b*	
383	M101	W14X22	0.01	3.15	33	0	0	y	20	186.81	292.05	16.46	124.5	1.22	H1-1b	
384	M152	W18X35	0.01	6.29	12	0	0	y	20	321.7	463.5	30.23	249.38	1.17	H1-1b*	
385	M364	W21X44	0.01	6.29	16	0	0	y	20	408.7	585	38.22	357.75	1.16	H1-1b*	
386	M87	W14X22	0	3.15	33	0	0	y	20	186.81	292.05	16.46	124.5	1.22	H1-1b	
387	M118	W18X35	0	6.29	16	0	0	y	20	321.7	463.5	30.23	249.38	1.17	H1-1b*	
388	M76	W12X19	0	3.14	17	0	6.29	y	18	135.23	250.65	11.18	86.64	1.22	H1-1b	
389	M358	W21X44	0	6.29	16	0	0	y	20	408.7	585	38.22	357.75	1.16	H1-1b*	
390	M62	W12X19	0	3.15	17	0	0	y	20	135.23	250.65	11.18	86.58	1.22	H1-1b	
391	M48	W12X19	0	3.14	17	0	0	y	20	135.23	250.65	11.18	86.51	1.22	H1-1b	
392	M310	W21X44	0	3.08	16	0	0	y	18	408.7	585	38.22	357.75	1.16	H1-1b*	
393	M212	W21X44	0	6.29	16	0	0	y	20	408.7	585	38.22	357.75	1.16	H1-1b*	
394	M192	W21X44	0	6.29	16	0	0	y	20	408.7	585	38.22	357.75	1.16	H1-1b*	
395	M169	W18X35	0	3.15	33	0	6.29	y	18	321.7	463.5	30.23	249.38	1.19	H1-1b	
396	M387	W21X44	0	3.15	33	0	0	y	20	408.7	585	38.22	357.75	1.19	H1-1b	
397	M149	W18X35	0	3.14	33	0	0	y	20	321.7	463.5	30.23	249.38	1.19	H1-1b	
398	M138	W14X22	0	3.15	17	0	6.29	y	18	186.81	292.05	16.46	124.5	1.22	H1-1b	
399	M104	W14X22	0	3.15	17	0	0	y	20	186.81	292.05	16.46	124.5	1.22	H1-1b	
400	M90	W14X22	0	3.15	17	0	0	y	20	186.81	292.05	16.46	124.5	1.22	H1-1b	
401	M375	W21X44	0	3.15	33	0	0	y	20	408.7	585	38.22	357.75	1.19	H1-1b	
402	M115	W18X35	0	3.14	33	0	0	y	20	321.7	463.5	30.23	249.38	1.19	H1-1b	
403	M209	W21X44	0	3.14	33	0	0	y	20	408.7	585	38.22	357.75	1.19	H1-1b	
404	M333	W21X44	0	3.14	33	0	6.29	y	18	408.7	585	38.22	357.75	1.19	H1-1b	
405	M189	W21X44	0	3.14	33	0	0	y	20	408.7	585	38.22	357.75	1.19	H1-1b	

Envelope AISC 16th (360-22): LRFD Steel Code Checks (Continued)

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	phi*	Pnc [k]	phi*	Pnt [k]	phi*	Mn y-y [k-ft]	phi*	Mn z-z [k-ft]	Cb	Eqn
406	M281	W21X44	0	3.14	33	0	6.29	y	18	408.7	585	38.22	357.75	1.18	H1-1b				
407	M307	W21X44	0	3.15	33	0	0	y	20	408.7	585	38.22	357.75	1.18	H1-1b				
408	M182	W18X35	0	3.15	17	0	6.29	y	18	321.7	463.5	30.23	249.38	1.2	H1-1b				
409	M162	W18X35	0	3.14	17	0	0	y	20	321.7	463.5	30.23	249.38	1.19	H1-1b				
410	M128	W18X35	0	3.14	17	0	0	y	20	321.7	463.5	30.23	249.38	1.19	H1-1b				
411	M352	W21X44	0	3.14	17	0	6.29	y	18	408.7	585	38.22	357.75	1.19	H1-1b				
412	M300	W21X44	0	3.14	17	0	6.29	y	18	408.7	585	38.22	357.75	1.19	H1-1b				
413	M326	W21X44	0	3.15	17	0	0	y	20	408.7	585	38.22	357.75	1.19	H1-1b				
414	M202	W21X44	0	3.14	17	0	0	y	20	408.7	585	38.22	357.75	1.19	H1-1b				
415	M222	W21X44	0	3.14	17	0	0	y	20	408.7	585	38.22	357.75	1.19	H1-1b				
416	M370	W21X44	0	3.15	17	0	0	y	20	408.7	585	38.22	357.75	1.19	H1-1b				
417	M382	W21X44	0	3.15	17	0	0	y	20	408.7	585	38.22	357.75	1.19	H1-1b				
418	M345	W21X44	0	1.97	35	0	6.29	y	20	408.7	585	38.22	357.75	1.16	H1-1b				
419	M293	W21X44	0	1.97	35	0	6.29	y	20	408.7	585	38.22	357.75	1.16	H1-1b				
420	M319	W21X44	0	4.32	35	0	0	y	18	408.7	585	38.22	357.75	1.16	H1-1b				

Detail Report: M29

Load Combination: Envelope

Code check: 0.716 (LC 8)

Input Data



Shape:	W14X22	I Node:	N45
Member Type:	Beam	J Node:	N46
Length (ft):	28	I Release:	Fixed
Material Type:	Hot Rolled Steel	J Release:	Fixed
Design Rule:	Typical	I Offset:	N/A
Internal Sections:	97	J Offset:	N/A
Design Code:	AISC 16th (360-22): LRFD	T/C Only:	Both Way

Material Properties

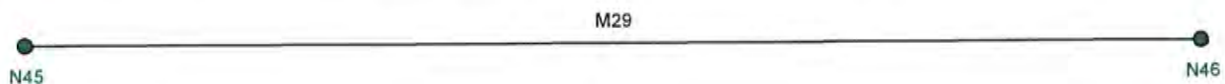
Material:	A588	Therm. Coeff. (/°E5 F):	0.65	F _u (ksi):	70
E (ksi):	29000	Density (k/ft ³):	0.49	R _t :	1.1
G (ksi):	11154	F _y (ksi):	50		
Nu:	0.3	R _y :	1.1		

Shape Properties

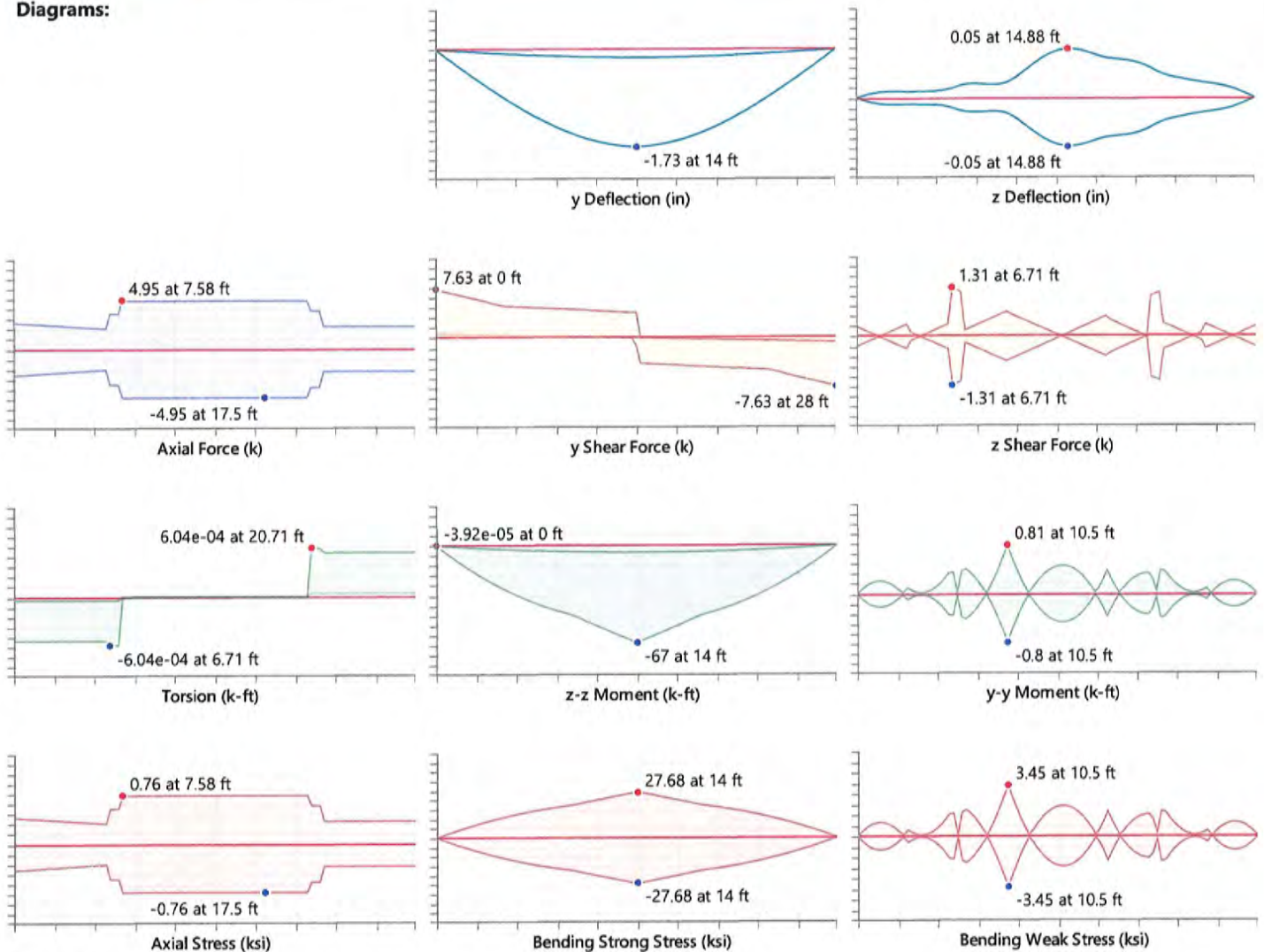
d (in):	13.7	Area (in ²):	6.49	r _T (in):	1.23
b _f (in):	5	Z _{yy} (in ³):	4.39	J (in ⁴):	0.208
t _f (in):	0.335	Z _{zz} (in ³):	33.2	k _{det} (in):	1.062
t _w (in):	0.23	C _w (in ⁶):	314	k _{des} (in):	0.735
I _{yy} (in ⁴):	7	W _{no} (in ²):	16.7		
I _{zz} (in ⁴):	199	S _w (in ⁴):	7		

Design Properties

L _{b y-y} (ft):	8	K _{y-y} :	1	Seismic DR:	None
L _{b z-z} (ft):	28	K _{z-z} :	1	Max Defl Ratio:	L/194
L _{comp top} :	L _{byy}	y sway:	No	Max Defl Location:	14
L _{comp bot} (ft):	28	z sway:	No	Span:	1
L _{torque} (ft):	28	Function:	Lateral	τ _b :	1



Diagrams:



AISC 16th (360-22): LRFD Code Check

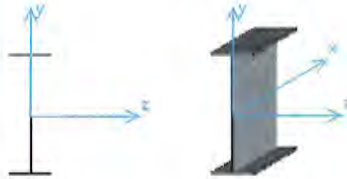
Limit State	Gov. LC	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	8	-	-	-	-
Applied Loading - Shear + Torsion	7	-	-	-	-
Axial Tension Analysis	8	0 k	292.05 k	-	-
Axial Compression Analysis	8	0 k	77.487 k	-	-
Flexural Analysis (Strong Axis)	8	67.002 k-ft	93.6 k-ft	-	-
Flexural Analysis (Weak Axis)	8	0 k-ft	16.462 k-ft	-	-
Shear Analysis (Major Axis y)	7	7.629 k	94.53 k	0.081	PASS
Shear Analysis (Minor Axis z)	7	0.001 k	90.45 k	1.614e-5	PASS
Bending & Axial Interaction Check (UC Bending Max)	8	-	-	0.716	PASS

Detail Report: M71

Load Combination: Envelope

Code check: 0.655 (LC 8)

Input Data



Shape:	W16X26	I Node:	N117
Member Type:	Beam	J Node:	N118
Length (ft):	34	I Release:	Fixed
Material Type:	Hot Rolled Steel	J Release:	Fixed
Design Rule:	Typical	I Offset:	N/A
Internal Sections:	97	J Offset:	N/A
Design Code:	AISC 16th (360-22): LRFD	T/C Only:	Both Way

Material Properties

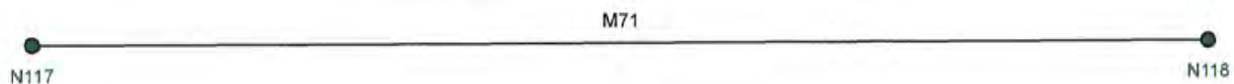
Material:	A588	Therm. Coeff. (/°E5 F):	0.65	F _u (ksi):	70
E (ksi):	29000	Density (k/ft ³):	0.49	R _t :	1.1
G (ksi):	11154	F _y (ksi):	50		
Nu:	0.3	R _y :	1.1		

Shape Properties

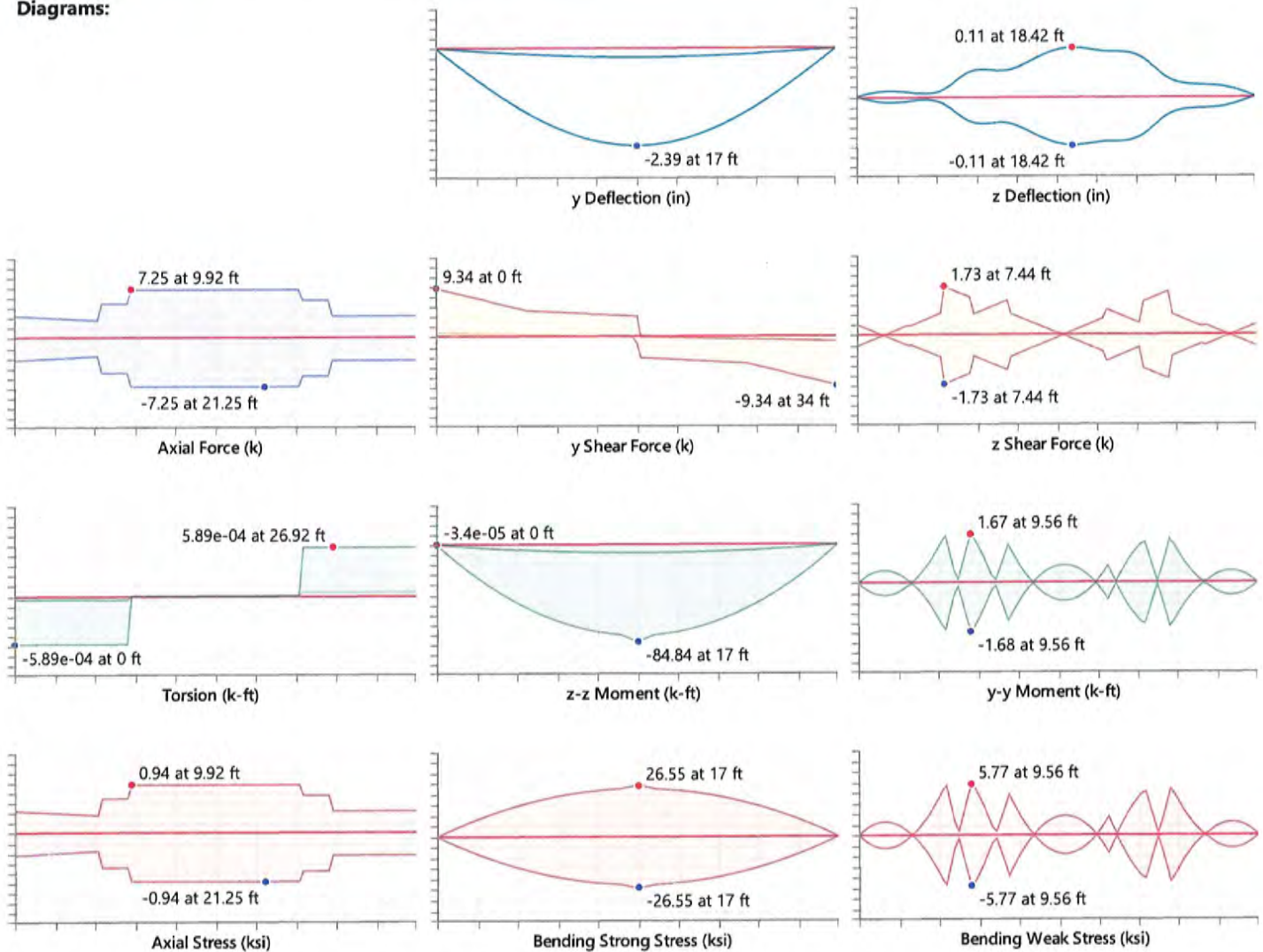
d (in):	15.7	Area (in ²):	7.68	r _T (in):	1.36
b _f (in):	5.5	Z _{yy} (in ³):	5.48	J (in ⁴):	0.262
t _f (in):	0.345	Z _{zz} (in ³):	44.2	k _{det} (in):	1.062
t _w (in):	0.25	C _w (in ⁶):	565	k _{des} (in):	0.747
I _{yy} (in ⁴):	9.59	W _{no} (in ²):	21.1		
I _{zz} (in ⁴):	301	S _w (in ⁴):	10		

Design Properties

L _{b y-y} (ft):	8	K _{y-y} :	1	Seismic DR:	None
L _{b z-z} (ft):	34	K _{z-z} :	1	Max Defl Ratio:	L/171
L _{comp top} :	L _{byy}	y sway:	No	Max Defl Location:	17
L _{comp bot} (ft):	34	z sway:	No	Span:	1
L _{torque} (ft):	34	Function:	Lateral	τ _b :	1



Diagrams:



AISC 16th (360-22): LRFD Code Check

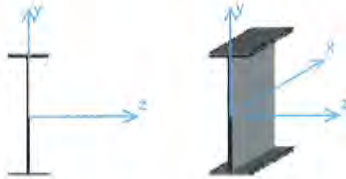
Limit State	Gov. LC	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	8	-	-	-	-
Applied Loading - Shear + Torsion	7	-	-	-	-
Axial Tension Analysis	8	0 k	345.6 k	-	-
Axial Compression Analysis	8	0 k	75.996 k	-	-
Flexural Analysis (Strong Axis)	8	84.837 k-ft	129.451 k-ft	-	-
Flexural Analysis (Weak Axis)	8	0 k-ft	20.55 k-ft	-	-
Shear Analysis (Major Axis y)	7	9.335 k	105.975 k	0.088	PASS
Shear Analysis (Minor Axis z)	7	0.001 k	102.465 k	1.344e-5	PASS
Bending & Axial Interaction Check (UC Bending Max)	8	-	-	0.655	PASS

Detail Report: M133

Load Combination: Envelope

Code check: 0.546 (LC 7)

Input Data



Shape:	W18X35	I Node:	N223
Member Type:	Beam	J Node:	N224
Length (ft):	40	I Release:	Fixed
Material Type:	Hot Rolled Steel	J Release:	Fixed
Design Rule:	Typical	I Offset:	N/A
Internal Sections:	97	J Offset:	N/A
Design Code:	AISC 16th (360-22): LRFD	T/C Only:	Both Way

Material Properties

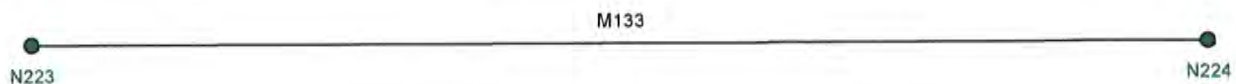
Material:	A588	Therm. Coeff. (/1E5 F):	0.65	F _u (ksi):	70
E (ksi):	29000	Density (k/ft ³):	0.49	R _t :	1.1
G (ksi):	11154	F _y (ksi):	50		
Nu:	0.3	R _y :	1.1		

Shape Properties

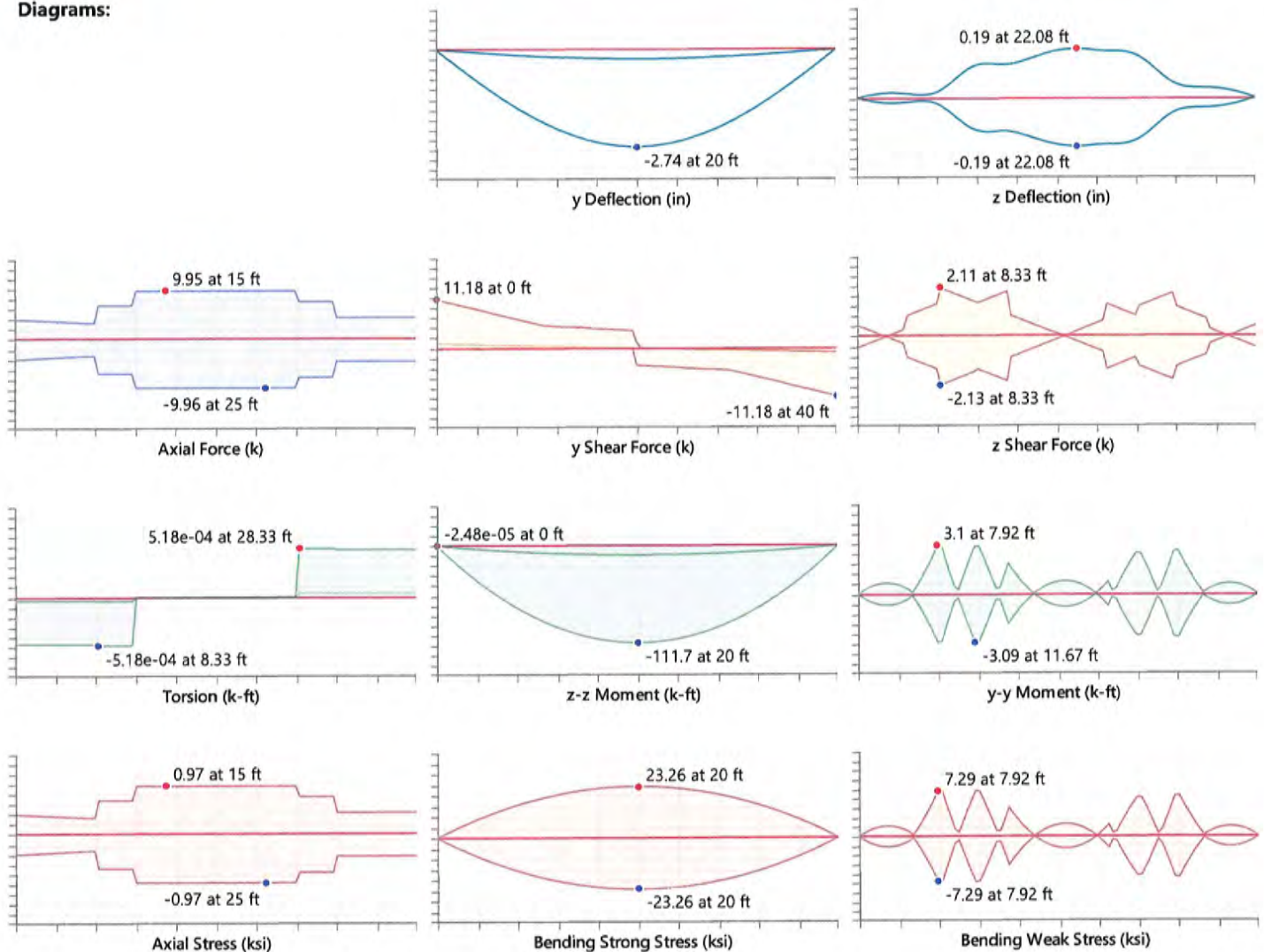
d (in):	17.7	Area (in ²):	10.3	r _T (in):	1.49
b _f (in):	6	Z _{yy} (in ³):	8.06	J (in ⁴):	0.506
t _f (in):	0.425	Z _{zz} (in ³):	66.5	k _{det} (in):	1.125
t _w (in):	0.3	C _w (in ⁶):	1140	k _{des} (in):	0.827
I _{yy} (in ⁴):	15.3	W _{no} (in ²):	25.9		
I _{zz} (in ⁴):	510	S _w (in ⁴):	16.5		

Design Properties

L _{b y-y} (ft):	8	K _{y-y} :	1	Seismic DR:	None
L _{b z-z} (ft):	40	K _{z-z} :	1	Max Defl Ratio:	L/174
L _{comp top} :	L _{byy}	y sway:	No	Max Defl Location:	20
L _{comp bot} (ft):	40	z sway:	No	Span:	1
L _{torque} (ft):	40	Function:	Lateral	τ _b :	1



Diagrams:



AISC 16th (360-22): LRFD Code Check

Limit State	Gov. LC	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	7	-	-	-	-
Applied Loading - Shear + Torsion	7	-	-	-	-
Axial Tension Analysis	7	0 k	463.5 k	-	-
Axial Compression Analysis	7	0 k	109.266 k	-	-
Flexural Analysis (Strong Axis)	7	111.697 k-ft	204.467 k-ft	-	-
Flexural Analysis (Weak Axis)	7	0 k-ft	30.225 k-ft	-	-
Shear Analysis (Major Axis y)	7	11.181 k	159.3 k	0.07	PASS
Shear Analysis (Minor Axis z)	7	0.001 k	137.7 k	7.644e-6	PASS
Bending & Axial Interaction Check (UC Bending Max)	7	-	-	0.546	PASS

Detail Report: M167

Load Combination: Envelope

Code check: 0.514 (LC 7)

Input Data



Shape:	W21X44	I Node:	N281
Member Type:	Beam	J Node:	N282
Length (ft):	46	I Release:	Fixed
Material Type:	Hot Rolled Steel	J Release:	Fixed
Design Rule:	Typical	I Offset:	N/A
Internal Sections:	97	J Offset:	N/A
Design Code:	AISC 16th (360-22): LRFD	T/C Only:	Both Way

Material Properties

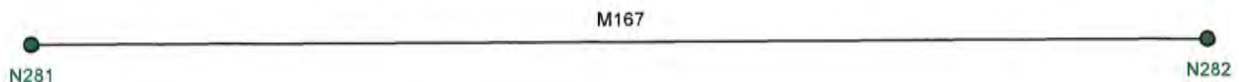
Material:	A588	Therm. Coeff. (/1E5 F):	0.65	F _u (ksi):	70
E (ksi):	29000	Density (k/ft ³):	0.49	R _t :	1.1
G (ksi):	11154	F _y (ksi):	50		
Nu:	0.3	R _y :	1.1		

Shape Properties

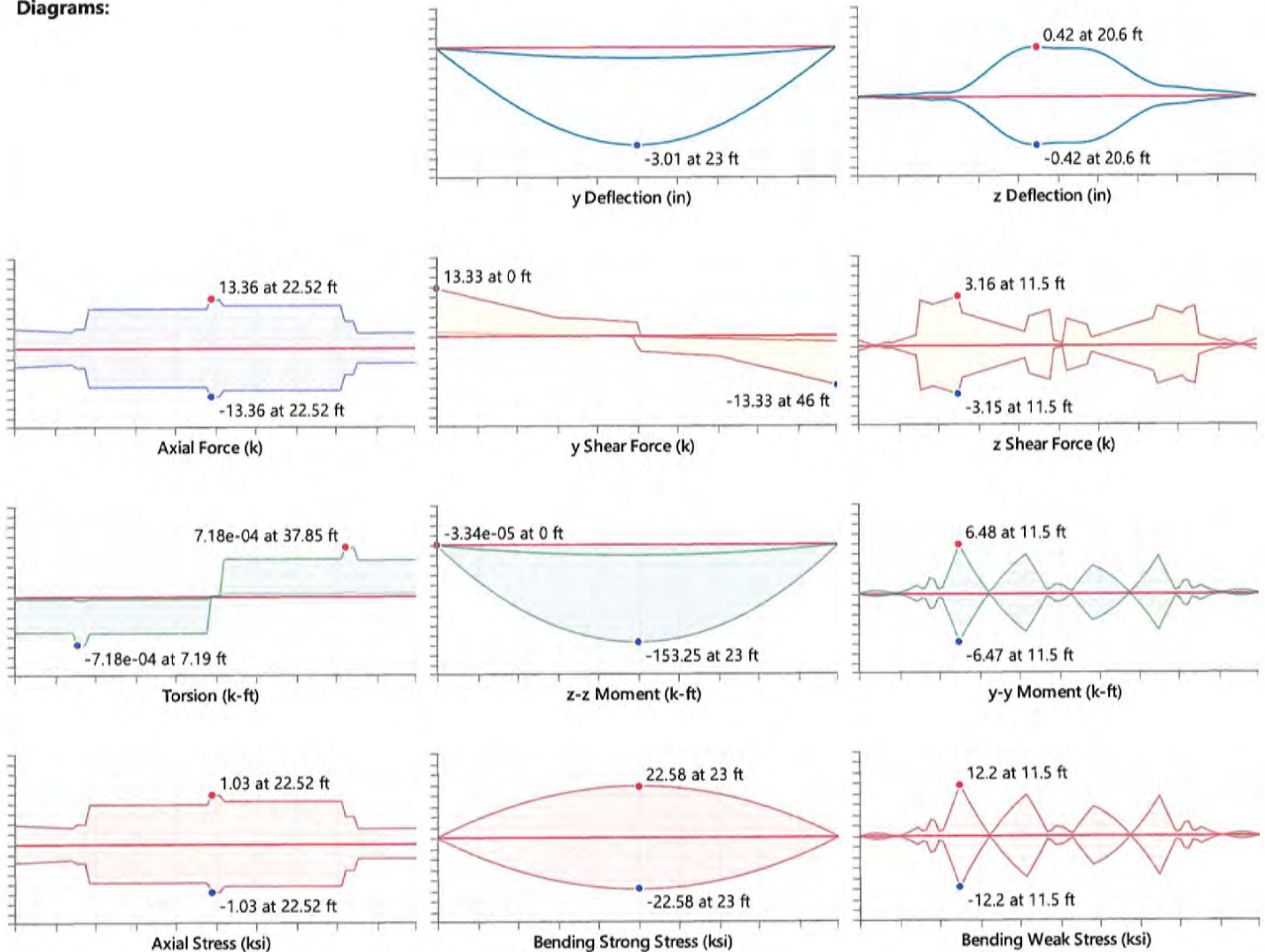
d (in):	20.7	Area (in ²):	13	r _T (in):	1.57
b _f (in):	6.5	Z _{yy} (in ³):	10.2	J (in ⁴):	0.77
t _f (in):	0.45	Z _{zz} (in ³):	95.4	k _{det} (in):	1.125
t _w (in):	0.35	C _w (in ⁶):	2110	k _{des} (in):	0.95
I _{yy} (in ⁴):	20.7	W _{no} (in ²):	32.9		
I _{zz} (in ⁴):	843	S _w (in ⁴):	24.1		

Design Properties

L _{b y-y} (ft):	8	K _{y-y} :	1	Seismic DR:	None
L _{b z-z} (ft):	46	K _{z-z} :	1	Max Defl Ratio:	L/183
L _{comp top} :	L _{byy}	y sway:	No	Max Defl Location:	23
L _{comp bot} (ft):	46	z sway:	No	Span:	1
L _{torque} (ft):	46	Function:	Lateral	τ _b :	1



Diagrams:



AISC 16th (360-22): LRFD Code Check

Limit State	Gov. LC	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	7	-	-	-	-
Applied Loading - Shear + Torsion	7	-	-	-	-
Axial Tension Analysis	7	0 k	585 k	-	-
Axial Compression Analysis	7	0 k	125.58 k	-	-
Flexural Analysis (Strong Axis)	7	153.251 k-ft	298.131 k-ft	-	-
Flexural Analysis (Weak Axis)	7	0 k-ft	38.215 k-ft	-	-
Shear Analysis (Major Axis y)	7	13.335 k	217.35 k	0.061	PASS
Shear Analysis (Minor Axis z)	7	0.000953 k	157.95 k	6.033e-6	PASS
Bending & Axial Interaction Check (UC Bending Max)	7	-	-	0.514	PASS

24

Detail Report: M254

Load Combination: Envelope

Code check: 0.502 (LC 7)

Input Data



Shape:	W24X55	I Node:	N429
Member Type:	Beam	J Node:	N430
Length (ft):	54	I Release:	Fixed
Material Type:	Hot Rolled Steel	J Release:	Fixed
Design Rule:	Typical	I Offset:	N/A
Internal Sections:	97	J Offset:	N/A
Design Code:	AISC 16th (360-22): LRFD	T/C Only:	Both Way

Material Properties

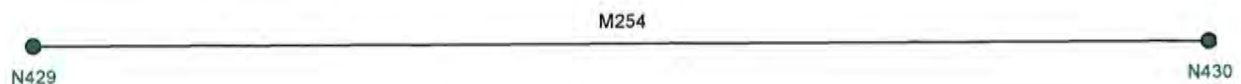
Material:	A588	Therm. Coeff. (/1E5 F):	0.65	F _u (ksi):	70
E (ksi):	29000	Density (k/ft ³):	0.49	R _t :	1.1
G (ksi):	11154	F _y (ksi):	50		
Nu:	0.3	R _y :	1.1		

Shape Properties

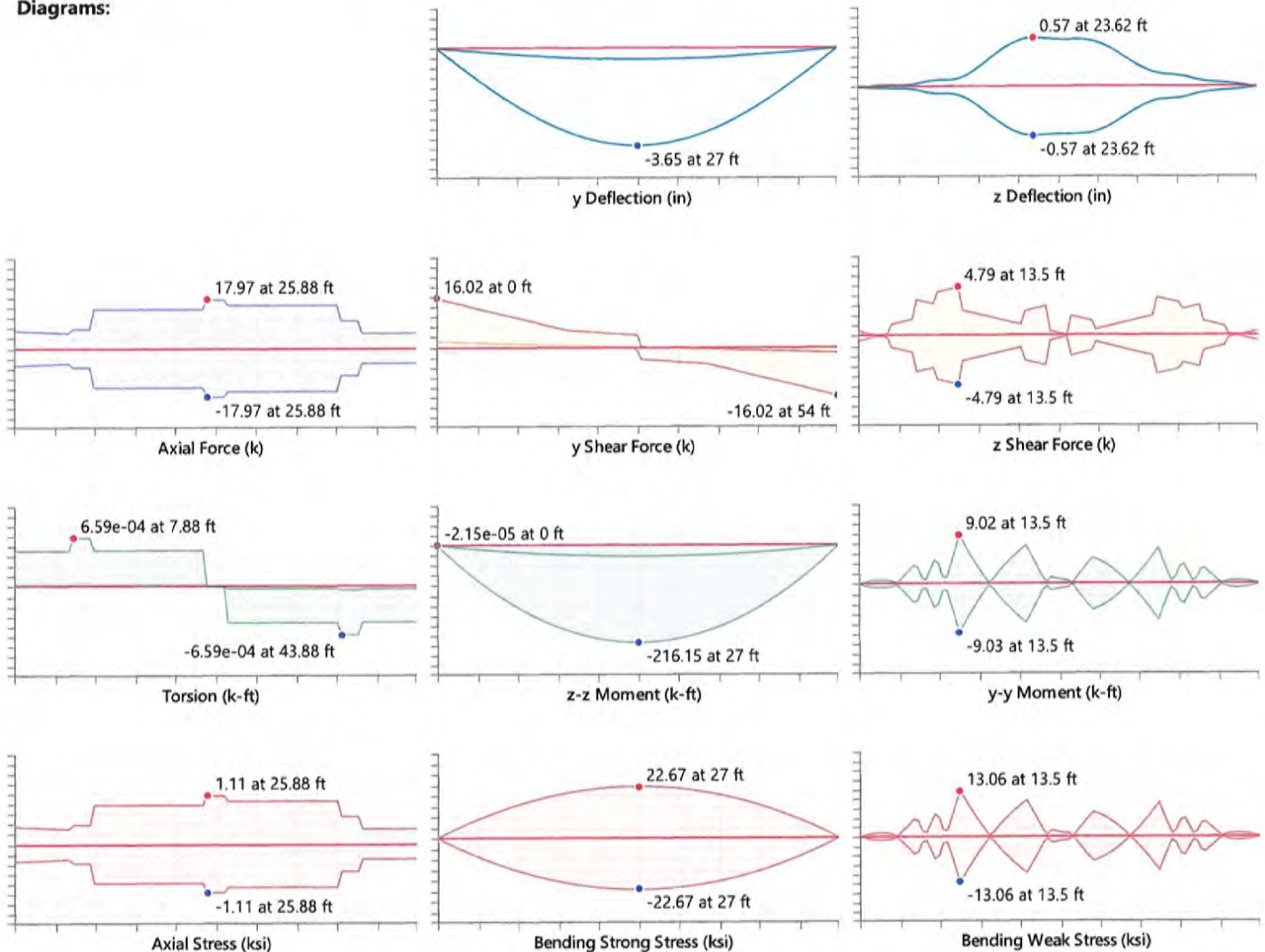
d (in):	23.6	Area (in ²):	16.2	r _T (in):	1.68
b _f (in):	7.01	Z _{yy} (in ³):	13.3	J (in ⁴):	1.18
t _f (in):	0.505	Z _{zz} (in ³):	134	k _{det} (in):	1.438
t _w (in):	0.395	C _w (in ⁶):	3870	k _{des} (in):	1.01
I _{yy} (in ⁴):	29.1	W _{no} (in ²):	40.5		
I _{zz} (in ⁴):	1350	S _w (in ⁴):	35.8		

Design Properties

L _{b y-y} (ft):	8	K _{y-y} :	1	Seismic DR:	None
L _{b z-z} (ft):	54	K _{z-z} :	1	Max Defl Ratio:	L/177
L _{comp top} :	L _{byy}	y sway:	No	Max Defl Location:	27
L _{comp bot} (ft):	54	z sway:	No	Span:	1
L _{torque} (ft):	54	Function:	Lateral	τ _b :	1



Diagrams:



AISC 16th (360-22): LRFD Code Check

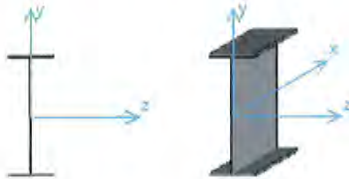
Limit State	Gov. LC	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	7	-	-	-	-
Applied Loading - Shear + Torsion	7	-	-	-	-
Axial Tension Analysis	7	0 k	729 k	-	-
Axial Compression Analysis	7	0 k	146.49 k	-	-
Flexural Analysis (Strong Axis)	7	216.153 k-ft	430.199 k-ft	-	-
Flexural Analysis (Weak Axis)	7	0 k-ft	49.815 k-ft	-	-
Shear Analysis (Major Axis y)	7	16.022 k	251.694 k	0.064	PASS
Shear Analysis (Minor Axis z)	7	0.0007539 k	191.163 k	3.944e-6	PASS
Bending & Axial Interaction Check (UC Bending Max)	7	-	-	0.502	PASS

Detail Report: M331

Load Combination: Envelope

Code check: 0.436 (LC 7)

Input Data



Shape:	W24X68	I Node:	N559
Member Type:	Beam	J Node:	N560
Length (ft):	60	I Release:	Fixed
Material Type:	Hot Rolled Steel	J Release:	Fixed
Design Rule:	Typical	I Offset:	N/A
Internal Sections:	97	J Offset:	N/A
Design Code:	AISC 16th (360-22): LRFD	T/C Only:	Both Way

Material Properties

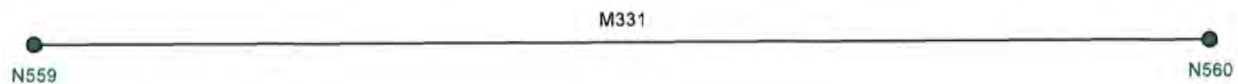
Material:	A588	Therm. Coeff. (/1E5 F):	0.65	F _u (ksi):	70
E (ksi):	29000	Density (k/ft ³):	0.49	R _c :	1.1
G (ksi):	11154	F _y (ksi):	50		
Nu:	0.3	R _y :	1.1		

Shape Properties

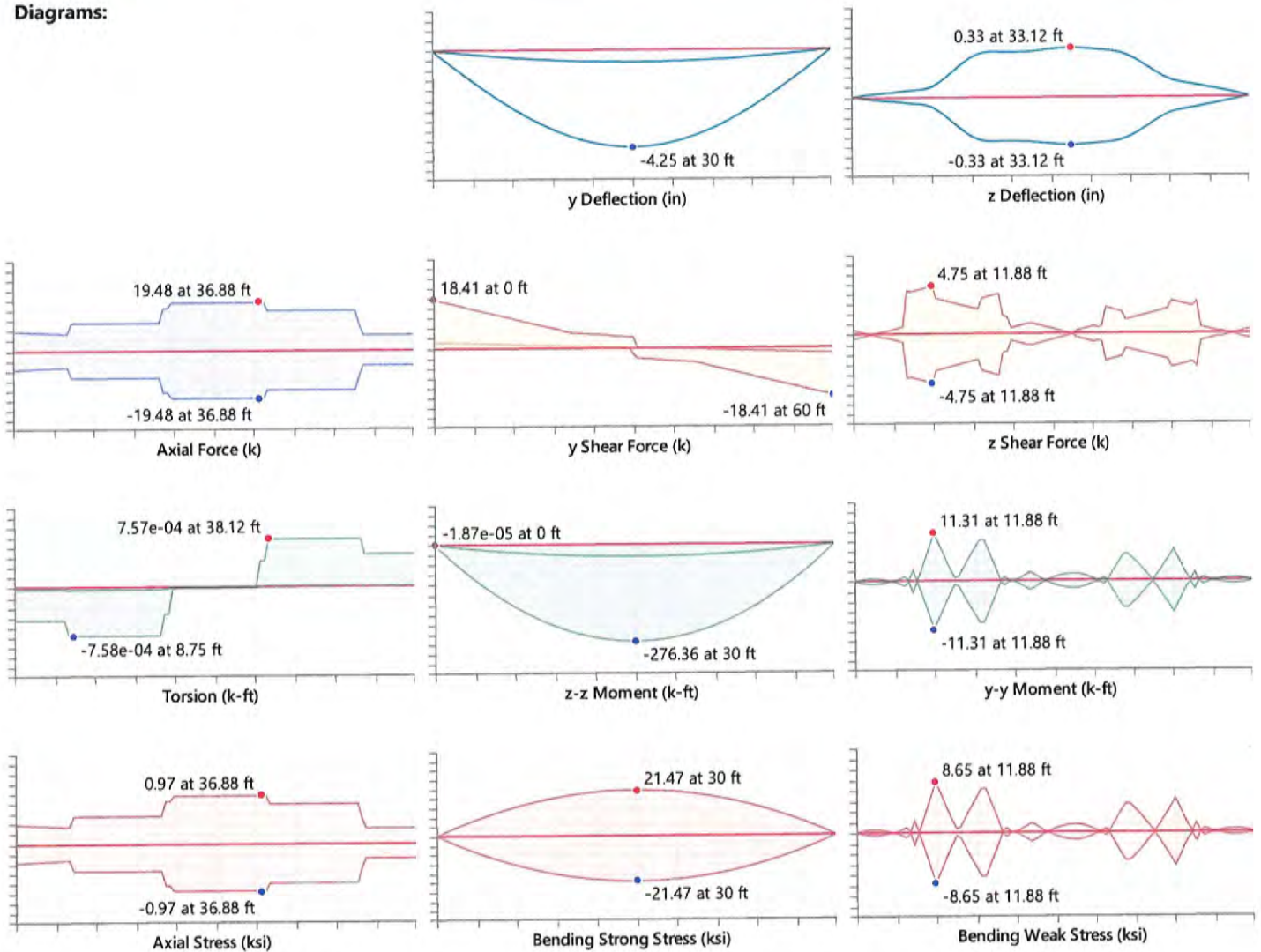
d (in):	23.7	Area (in ²):	20.1	r _T (in):	2.26
b _f (in):	8.97	Z _{yy} (in ³):	24.5	J (in ⁴):	1.87
t _f (in):	0.585	Z _{zz} (in ³):	177	k _{det} (in):	1.875
t _w (in):	0.415	C _w (in ⁶):	9430	k _{des} (in):	1.09
I _{yy} (in ⁴):	70.4	W _{no} (in ²):	51.8		
I _{zz} (in ⁴):	1830	S _w (in ⁴):	68		

Design Properties

L _{b y-y} (ft):	8	K _{y-y} :	1	Seismic DR:	None
L _{b z-z} (ft):	60	K _{z-z} :	1	Max Defl Ratio:	L/169
L _{comp top} :	L _{byy}	y sway:	No	Max Defl Location:	30
L _{comp bot} (ft):	60	z sway:	No	Span:	1
L _{torque} (ft):	60	Function:	Lateral	τ _b :	1

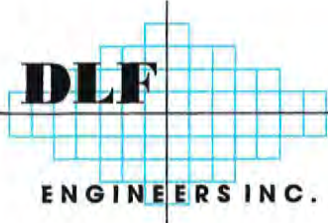


Diagrams:



AISC 16th (360-22): LRFD Code Check

Limit State	Gov. LC	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	7	-	-	-	-
Applied Loading - Shear + Torsion	7	-	-	-	-
Axial Tension Analysis	7	0 k	904.5 k	-	-
Axial Compression Analysis	7	0 k	217.591 k	-	-
Flexural Analysis (Strong Axis)	7	276.362 k-ft	634.359 k-ft	-	-
Flexural Analysis (Weak Axis)	7	0 k-ft	91.875 k-ft	-	-
Shear Analysis (Major Axis y)	7	18.412 k	295.065 k	0.062	PASS
Shear Analysis (Minor Axis z)	7	0.0007994 k	283.362 k	2.821e-6	PASS
Bending & Axial Interaction Check (UC Bending Max)	7	-	-	0.436	PASS



CUSTOMER _____

LOCATION _____

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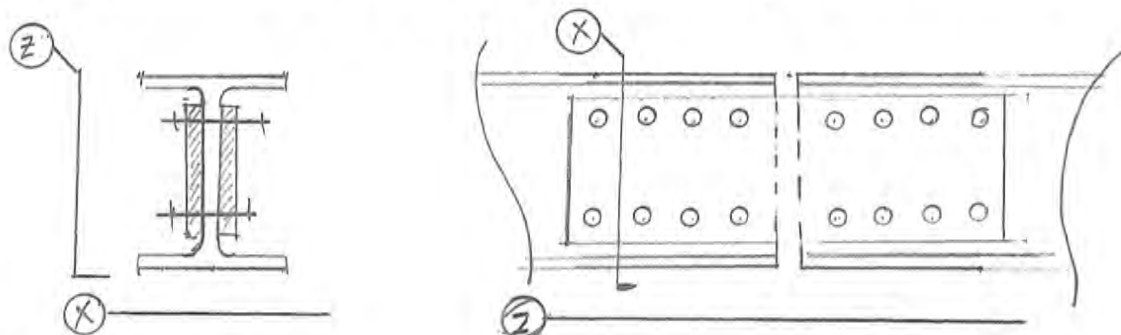
JOB NO. _____

DATE _____

BY _____ CHK'D _____

GIRDER SPLICE CHECK.

* DESIGN SPICE FOR MAX MOMENT @ MID SPAN.



BOLT SHEAR CAPACITY

1"Ø BOLT A325-X 6.F. 40 KIPS SINGLE SHEAR
80.1 KIPS DBL SHEAR

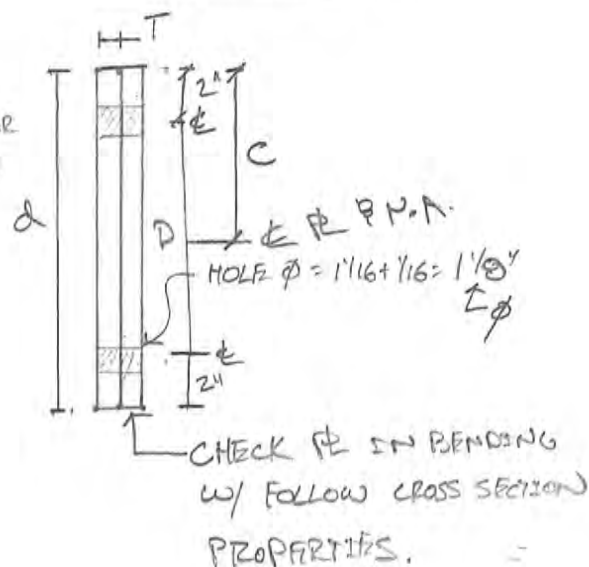
BOLT BEARING

BEAM SIZE	WEBS ↑	1.5L _C T F _u .75	3.08T F _u .75
W14x22	.23"	33.7K -	33.7K -
W16x26	.25"	36.6K -	36.6K -
W18x35	.30"	43.9K -	43.9K -
W21x44	.35"	51.2K -	51.2K -
W24x55	.395"	57.8K -	57.8K -
W24x68	.415"	60.7K -	60.7K -

* L_C = 2.0"

F_u = 65 KSI ← CONSERVATIVE A388 STEEL F_u = 70 KSI ONLY

D = 1.011"



$$I_{PERT} = I_g - I$$

$$I_g = \frac{1}{12}(ZT)(d)^3$$

$$I = [(ZT)(\phi)](Z)(C)^2$$

$$S_{PERT} = \frac{I_{PERT}}{C}$$

DLF

ENGINEERS INC.

ENGINEERING CALCULATION SHEET

P.O Box 717, Windsor, CA 95492 • (707) 838-1505 • Fax # (707) 838-1970

E-mail: Jacob@dlfengineers.com

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DATE _____

BY _____ CHK'D _____

GIRDER SPLICE CONT.

BOLT BEARING

BEAM SIZE	M _{max} K-ft	D IN	T-C _{max} /d IN	Φ _R N KIPS	BOLTS REQ
W14x22	67	6	134	33.7/Bolt	3.98
W16x26	85	8	127.5	36.6/Bolt	3.49
W18x35	112	10	134.4	43.9/Bolt	3.07
W21x44	154	13	142.2	51.2/Bolt	2.78
W24x55	217	16	162.8	57.8/Bolt	2.82
W24x68	277	16	207.8	60.7/Bolt	3.43

USE (4)
BOLTS TYP
EACH
CORRECTION

Φ_R BENDING - MAX Φ_R STRESS = 50 KSI (C.9) = 45 KSI = .90

BEAM SIZE	M _{max} K-ft	T IN	d IN	I _g IN ⁴	I _x IN ⁴	I _{net} IN ⁴	C IN	S _{net} IN ³	Φ _R N K-ft Spec. 9.5
W14x22	67	.75	10	125.0	30.4	94.6	5	18.9	71.0 ✓
W16x26	85	.75	12	216.0	54.0	162.0	6	27.0	101.3 ✓
W18x35	112	.75	14	343.0	84.4	258.0	7	36.9	138.5 ✓
W21x44	154	.75	17	614.1	142.6	471.5	8.5	55.5	208.0 ✓
W24x55	217	.75	20	1000.0	216.0	784.0	10	78.4	294.0 ✓
W24x68	277	1	20	1333.3	288.0	1045.3	10	104.5	392.0 ✓

Envelope Node Reactions

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N559	max	10.17	14	18.43	7	5.68	14	0	36	0	36	0	36
2		min	-10.17	11	2.24	24	-5.69	13	0	1	0	1	0	1
3	N560	max	0	36	18.43	7	4.62	16	0	36	0	36	0	36
4		min	0	1	2.25	24	-4.62	11	0	1	0	1	0	1
5	N562	max	0	36	18.43	7	4.63	16	0	36	0	36	0	36
6		min	0	1	2.25	22	-4.63	11	0	1	0	1	0	1
7	N561	max	10.17	13	18.43	7	5.71	16	0	36	0	36	0	36
8		min	-10.17	12	2.24	22	-5.7	11	0	1	0	1	0	1
9	N471	max	8.9	14	17.84	7	5.46	14	0	36	0	36	0	36
10		min	-8.9	11	2.18	24	-5.47	11	0	1	0	1	0	1
11	N472	max	0	36	17.84	7	4.5	16	0	36	0	36	0	36
12		min	0	1	2.19	24	-4.5	11	0	1	0	1	0	1
13	N473	max	8.9	15	17.84	7	5.48	16	0	36	0	36	0	36
14		min	-8.9	14	2.18	22	-5.47	15	0	1	0	1	0	1
15	N474	max	0	36	17.84	7	4.51	16	0	36	0	36	0	36
16		min	0	1	2.19	22	-4.51	11	0	1	0	1	0	1
17	N518	max	0	36	17.26	7	4.35	16	0	36	0	36	0	36
18		min	0	1	2.13	22	-4.35	11	0	1	0	1	0	1
19	N517	max	8.13	15	17.26	7	5.27	16	0	36	0	36	0	36
20		min	-8.13	12	2.12	22	-5.26	11	0	1	0	1	0	1
21	N516	max	0	36	17.26	7	4.36	16	0	36	0	36	0	36
22		min	0	1	2.13	24	-4.37	11	0	1	0	1	0	1
23	N515	max	8.13	16	17.26	7	5.28	16	0	36	0	36	0	36
24		min	-8.13	11	2.12	24	-5.28	11	0	1	0	1	0	1
25	N429	max	6.59	23	16.04	7	4.9	12	0	36	0	36	0	36
26		min	-6.59	17	1.8	22	-4.89	13	0	1	0	1	0	1
27	N430	max	0	36	16.04	7	4.38	16	0	36	0	36	0	36
28		min	0	1	1.8	22	-4.37	11	0	1	0	1	0	1
29	N427	max	6.59	35	16.04	7	4.91	16	0	36	0	36	0	36
30		min	-6.59	17	1.8	24	-4.92	13	0	1	0	1	0	1
31	N428	max	0	36	16.04	7	4.39	16	0	36	0	36	0	36
32		min	0	1	1.8	24	-4.39	11	0	1	0	1	0	1
33	N385	max	6.37	35	15.47	7	4.72	16	0	36	0	36	0	36
34		min	-6.37	17	1.75	22	-4.71	11	0	1	0	1	0	1
35	N386	max	0	36	15.47	7	4.22	16	0	36	0	36	0	36
36		min	0	1	1.75	22	-4.22	11	0	1	0	1	0	1
37	N384	max	0	36	15.47	7	4.23	14	0	36	0	36	0	36
38		min	0	1	1.75	24	-4.23	11	0	1	0	1	0	1
39	N383	max	6.37	35	15.47	7	4.72	14	0	36	0	36	0	36
40		min	-6.37	21	1.75	24	-4.73	13	0	1	0	1	0	1
41	N352	max	0	36	14.9	7	4.06	16	0	36	0	36	0	36
42		min	0	1	1.69	22	-4.06	11	0	1	0	1	0	1
43	N351	max	6.15	23	14.9	7	4.53	16	0	36	0	36	0	36
44		min	-6.15	17	1.69	22	-4.53	11	0	1	0	1	0	1
45	N350	max	0	36	14.9	7	4.07	16	0	36	0	36	0	36
46		min	0	1	1.69	24	-4.07	11	0	1	0	1	0	1
47	N349	max	6.15	23	14.9	7	4.54	16	0	36	0	36	0	36
48		min	-6.15	21	1.69	24	-4.54	11	0	1	0	1	0	1
49	N318	max	0	36	14.33	7	3.9	16	0	36	0	36	0	36
50		min	0	1	1.64	22	-3.9	15	0	1	0	1	0	1
51	N317	max	5.93	19	14.33	7	4.35	16	0	36	0	36	0	36
52		min	-5.93	21	1.64	22	-4.34	13	0	1	0	1	0	1
53	N316	max	0	36	14.33	7	3.91	16	0	36	0	36	0	36
54		min	0	1	1.64	24	-3.91	11	0	1	0	1	0	1
55	N315	max	5.93	35	14.33	7	4.35	16	0	36	0	36	0	36
56		min	-5.93	21	1.64	24	-4.36	11	0	1	0	1	0	1
57	N282	max	0	36	13.35	7	3.75	16	0	36	0	36	0	36

33

Envelope Node Reactions (Continued)

Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
58		min	0	1		1.41	24	-3.75	11	0	1	0	1
59	N281	max	5.3	35		13.35	7	4.15	12	0	36	0	36
60		min	-5.3	17		1.41	24	-4.15	11	0	1	0	1
61	N284	max	0	36		13.35	7	3.76	16	0	36	0	36
62		min	0	1		1.41	22	-3.76	13	0	1	0	1
63	N283	max	5.3	35		13.35	7	4.16	14	0	36	0	36
64		min	-5.3	17		1.41	22	-4.16	11	0	1	0	1
65	N250	max	0	36		12.8	7	3.59	16	0	36	0	36
66		min	0	1		1.36	22	-3.59	15	0	1	0	1
67	N249	max	5.1	35		12.8	7	3.97	14	0	36	0	36
68		min	-5.1	33		1.36	22	-3.96	13	0	1	0	1
69	N247	max	5.1	35		12.8	7	3.97	14	0	36	0	36
70		min	-5.1	17		1.36	24	-3.98	13	0	1	0	1
71	N248	max	0	36		12.8	7	3.6	14	0	36	0	36
72		min	0	1		1.36	24	-3.6	11	0	1	0	1
73	N192	max	0	36		12.24	7	3.44	16	0	36	0	36
74		min	0	1		1.31	22	-3.43	11	0	1	0	1
75	N191	max	4.89	35		12.24	7	3.78	16	0	36	0	36
76		min	-4.89	17		1.31	22	-3.78	11	0	1	0	1
77	N190	max	0	36		12.24	7	3.44	16	0	36	0	36
78		min	0	1		1.31	24	-3.44	11	0	1	0	1
79	N189	max	4.89	35		12.24	7	3.79	16	0	36	0	36
80		min	-4.89	17		1.31	24	-3.79	13	0	1	0	1
81	N223	max	4.2	35		11.2	7	3.54	16	0	36	0	36
82		min	-4.2	17		1.06	24	-3.55	11	0	1	0	1
83	N224	max	0	36		11.2	7	3.31	16	0	36	0	36
84		min	0	1		1.06	24	-3.32	13	0	1	0	1
85	N225	max	4.2	35		11.2	7	3.57	16	0	36	0	36
86		min	-4.2	17		1.06	22	-3.56	11	0	1	0	1
87	N226	max	0	36		11.2	7	3.33	12	0	36	0	36
88		min	0	1		1.06	22	-3.33	11	0	1	0	1
89	N168	max	0	36		10.66	7	3.16	14	0	36	0	36
90		min	0	1		1.01	22	-3.15	11	0	1	0	1
91	N167	max	4.01	35		10.66	7	3.37	14	0	36	0	36
92		min	-4.01	17		1.01	22	-3.37	13	0	1	0	1
93	N165	max	4.01	23		10.66	7	3.38	16	0	36	0	36
94		min	-4.01	17		1.01	24	-3.39	11	0	1	0	1
95	N166	max	0	36		10.66	7	3.16	14	0	36	0	36
96		min	0	1		1.01	24	-3.17	13	0	1	0	1
97	N143	max	3.81	35		10.11	7	3.2	16	0	36	0	36
98		min	-3.81	21		0.97	22	-3.19	11	0	1	0	1
99	N144	max	0	36		10.11	7	2.99	16	0	36	0	36
100		min	0	1		0.97	22	-2.99	11	0	1	0	1
101	N141	max	3.81	23		10.11	7	3.2	16	0	36	0	36
102		min	-3.81	17		0.97	24	-3.21	11	0	1	0	1
103	N142	max	0	36		10.11	7	3	16	0	36	0	36
104		min	0	1		0.97	24	-3	11	0	1	0	1
105	N118	max	0	36		9.36	7	2.83	12	0	36	0	36
106		min	0	1		0.83	24	-2.83	13	0	1	0	1
107	N117	max	3.41	35		9.36	7	3	16	0	36	0	36
108		min	-3.41	17		0.83	24	-3.01	11	0	1	0	1
109	N119	max	3.41	35		9.36	7	3.02	14	0	36	0	36
110		min	-3.41	17		0.83	22	-3.01	11	0	1	0	1
111	N120	max	0	36		9.36	7	2.84	16	0	36	0	36
112		min	0	1		0.83	22	-2.84	13	0	1	0	1
113	N96	max	0	36		8.82	7	2.67	14	0	36	0	36
114		min	0	1		0.79	22	-2.67	11	0	1	0	1
115	N95	max	3.22	35		8.82	7	2.83	14	0	36	0	36

Envelope Node Reactions (Continued)

Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
116		min	-3.22	21		0.79	22	-2.83	11	0	1	0	1
117	N93	max	3.22	35		8.82	7	2.84	16	0	36	0	36
118		min	-3.22	17		0.79	24	-2.84	11	0	1	0	1
119	N94	max	0	36		8.82	7	2.68	14	0	36	0	36
120		min	0	1		0.79	24	-2.68	11	0	1	0	1
121	N72	max	0	36		8.28	7	2.5	14	0	36	0	36
122		min	0	1		0.75	22	-2.5	11	0	1	0	1
123	N71	max	3.03	35		8.28	7	2.65	16	0	36	0	36
124		min	-3.03	17		0.75	22	-2.65	11	0	1	0	1
125	N70	max	0	36		8.28	7	2.51	16	0	36	0	36
126		min	0	1		0.75	24	-2.51	13	0	1	0	1
127	N69	max	3.03	23		8.28	7	2.66	16	0	36	0	36
128		min	-3.03	17		0.75	24	-2.66	11	0	1	0	1
129	N46	max	0	36		7.65	7	2.34	16	0	36	0	36
130		min	0	1		0.66	24	-2.35	13	0	1	0	1
131	N45	max	2.75	35		7.65	7	2.46	16	0	36	0	36
132		min	-2.75	17		0.66	24	-2.46	11	0	1	0	1
133	N47	max	2.75	35		7.65	7	2.47	16	0	36	0	36
134		min	-2.75	17		0.66	22	-2.47	11	0	1	0	1
135	N48	max	0	36		7.65	7	2.35	14	0	36	0	36
136		min	0	1		0.66	22	-2.35	11	0	1	0	1
137	N23	max	2.57	35		7.12	7	2.29	16	0	36	0	36
138		min	-2.57	17		0.62	22	-2.28	13	0	1	0	1
139	N24	max	0	36		7.12	7	2.18	16	0	36	0	36
140		min	0	1		0.62	22	-2.18	13	0	1	0	1
141	N21	max	2.57	35		7.12	7	2.29	16	0	36	0	36
142		min	-2.57	17		0.62	24	-2.29	11	0	1	0	1
143	N22	max	0	36		7.12	7	2.19	16	0	36	0	36
144		min	0	1		0.62	24	-2.19	11	0	1	0	1
145	N3	max	2.38	35		6.58	7	2.11	16	0	36	0	36
146		min	-2.38	21		0.58	22	-2.11	11	0	1	0	1
147	N4	max	0	36		6.58	7	2.01	16	0	36	0	36
148		min	0	1		0.58	22	-2.01	11	0	1	0	1
149	N1	max	2.38	35		6.58	7	2.11	16	0	36	0	36
150		min	-2.38	21		0.58	24	-2.12	11	0	1	0	1
151	N2	max	0	36		6.58	7	2.02	16	0	36	0	36
152		min	0	1		0.58	24	-2.02	11	0	1	0	1
153	Totals:	max	185.58	35		929.75	7	274.51	16				
154		min	-185.58	21		100.12	24	-274.51	11				

CUSTOMER _____

LOCATION _____

SHEET NO. _____

JOB NO. _____

DATE _____

BY _____ CHK'D _____

SECONDARY FRAMING MEMBERS

L4x4x1/4 TO WIDE FLANGE

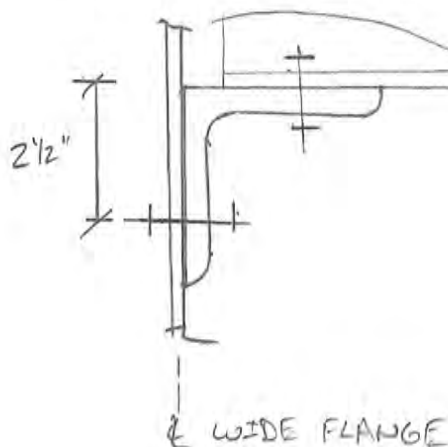
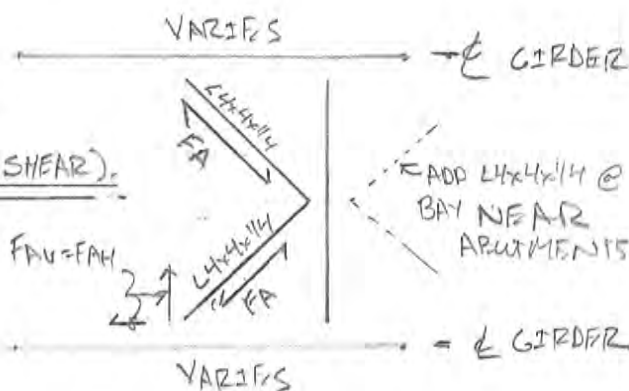
MAX AXIAL LOAD: 12.0K @ 60' BRIDGE SPAN

∴ USE 3/4"Ø A325 G.F. 17.9K (SINGLE SHEAR)

L4x4 ANGLE CLIP

AXIAL LOAD @ 60' SPAN = 12.0K

AXIAL LOAD @ 40' SPAN = 4.2K



$$F_{AV} = \sqrt{2}/2 (12) = 8.50 \text{ KIPS}$$

$$F_{AV} = \sqrt{2}/2 (4.2) = 2.97 \text{ KIPS}$$

ANGLE CLIP @ 60' SPAN

$$M_{MAX} = 8.5 \text{ K} (2.5) = 21.25 \text{ K-IN}$$

$$Z_x = bd^2/4 = \frac{(7.75 \times .5)^2}{4} = .484 \text{ IN}^3$$

$$\phi M_n = 0.9 (50 \text{ KSI}) (.484 \text{ IN}^3) = 21.78 \text{ K-IN} \quad 21.25 \text{ K-IN}$$

∴ USE L4x4x1/2

WIDE FLANGE TO WIDE FLANGE

* USE SAME CLIP ANGLE
AS L4x4x1/4 TO WIDE FLANGE.

ANGLE CLIP @ 40' SPAN

$$M_{MAX} = 2.97 (2.5) = 7.5 \text{ K-IN}$$

$$Z_x = bd^2/4 = \frac{(7.75 \times .375)^2}{4} = .0272 \text{ IN}^3$$

$$\phi M_n = (0.9 \times 50) (.0272) = 12.24 \text{ K-IN} \quad 7.5 \text{ K-IN}$$

∴ USE L4x4x3/8

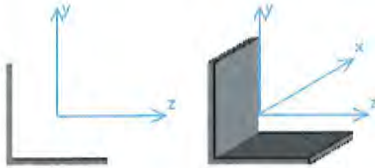
Detail Report: M141 ← MAX "BRACE" LOAD AT 40' SPAN

Load Combination: Envelope

Code check: 0.088 (LC 11)

Input Data

Shape:	L4X4X4	I Node:	N241
Member Type:	HBrace	J Node:	N235
Length (ft):	4.455	I Release:	BenPIN
Material Type:	Hot Rolled Steel	J Release:	BenPIN
Design Rule:	Typical	I Offset:	N/A
Internal Sections:	97	J Offset:	N/A
Design Code:	AISC 16th (360-22): LRFD	T/C Only:	Both Way



Material Properties

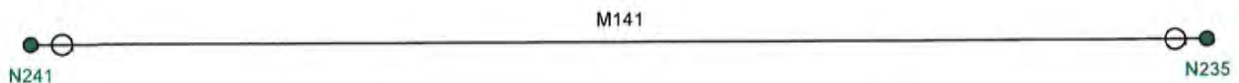
Material:	A588	Therm. Coeff. (/1E5 F):	0.65	F _u (ksi):	70
E (ksi):	29000	Density (k/ft ³):	0.49	R _t :	1.1
G (ksi):	11154	F _y (ksi):	50		
Nu:	0.3	R _y :	1.1		

Shape Properties

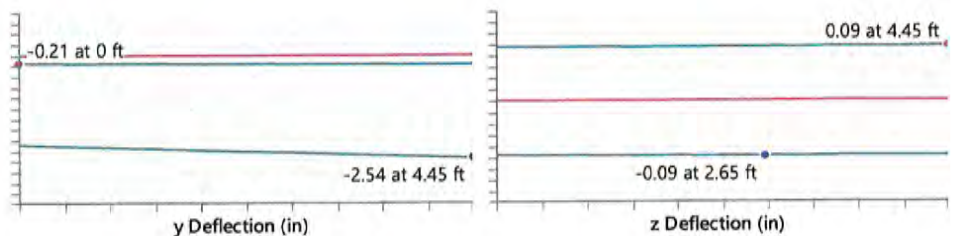
d (in):	4	Area (in ²):	1.93	J (in ⁴):	0.044
b _f (in):	4	I _{yy} (in ⁴):	3	r _z (in):	0.783
t (in):	0.25	I _{zz} (in ⁴):	3	k [*] (in ⁴):	0.625

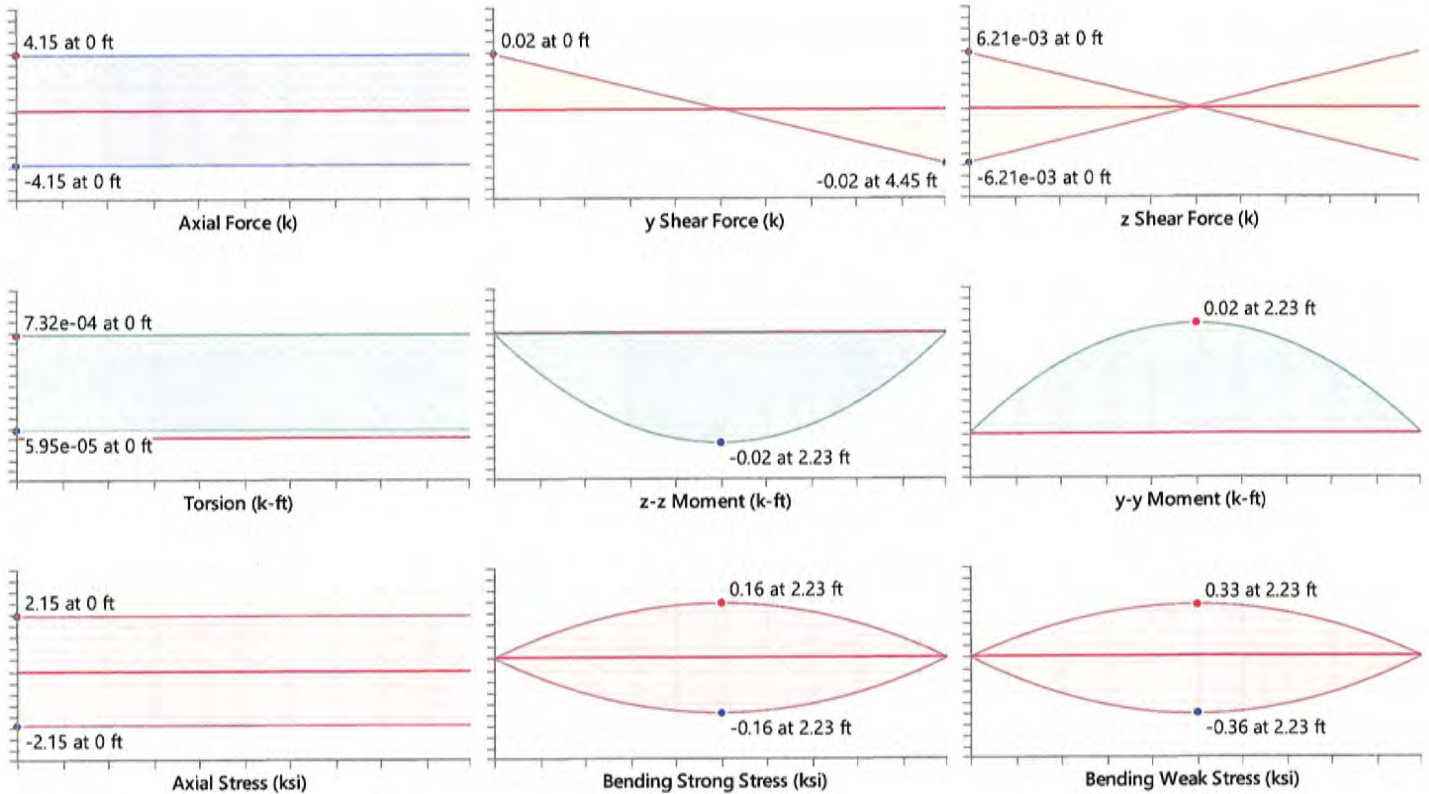
Design Properties

L _{b y-y} (ft):	4.455	K _{y-y} :	1	Seismic DR:	None
L _{b z-z} (ft):	4.455	K _{z-z} :	1	Max Defl Ratio:	L/10000
L _{comp top} :	L _{byy}	y sway:	No	Max Defl Location:	0
L _{comp bot} (ft):	4.455	z sway:	No	Span:	N/A
L _{torque} (ft):	4.455	Function:	Lateral	τ _b :	1



Diagrams:





AISC 16th (360-22): LRFD Code Check

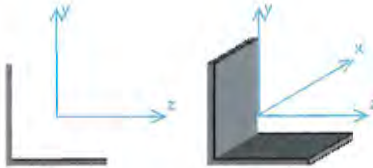
Limit State	Gov. LC	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	11	-	-	-	-
Applied Loading - Shear + Torsion	7	-	-	-	-
Axial Tension Analysis	11	0 k	86.85 k	-	-
Axial Compression Analysis	11	4.152 k	50.238 k	-	-
Flexural Analysis (Strong Axis)	11	0.014 k-ft	8.002 k-ft	-	-
Flexural Analysis (Weak Axis)	-	0.014 k-ft	3.865 k-ft	-	-
Shear Analysis (Major Axis y)	7	0.059 k	27 k	0.002	PASS
Shear Analysis (Minor Axis z)	7	0.042 k	27 k	0.002	PASS
Bending & Axial Interaction Check (UC Bending Max)	11	-	-	0.088	PASS

Detail Report: M339 ← MAX "BRACE" LOAD AT 60' SPAN.

Load Combination: Envelope

Code check: 0.242 (LC 15)

Input Data



Shape:	L4X4X4	I Node:	N577
Member Type:	HBrace	J Node:	N571
Length (ft):	4.455	I Release:	BenPIN
Material Type:	Hot Rolled Steel	J Release:	BenPIN
Design Rule:	Typical	I Offset:	N/A
Internal Sections:	97	J Offset:	N/A
Design Code:	AISC 16th (360-22): LRFD	T/C Only:	Both Way

Material Properties

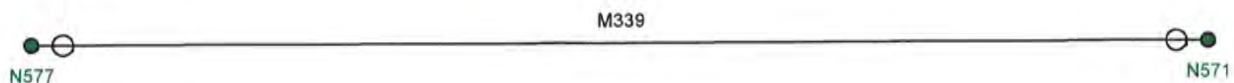
Material:	A588	Therm. Coeff. (/°F):	0.65	F _u (ksi):	70
E (ksi):	29000	Density (k/ft ³):	0.49	R _t :	1.1
G (ksi):	11154	F _y (ksi):	50		
Nu:	0.3	R _y :	1.1		

Shape Properties

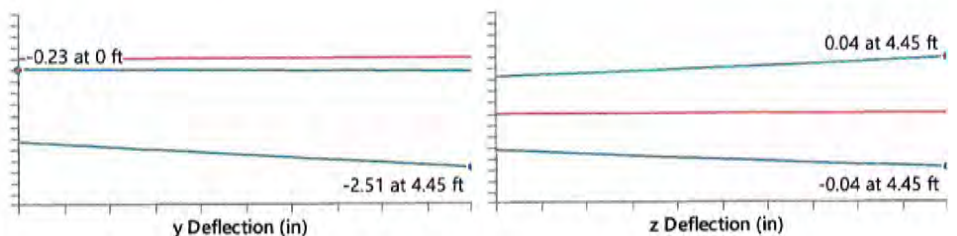
d (in):	4	Area (in ²):	1.93	J (in ⁴):	0.044
b _f (in):	4	I _{yy} (in ⁴):	3	r _z (in):	0.783
t (in):	0.25	I _{zz} (in ⁴):	3	k [*] (in ⁴):	0.625

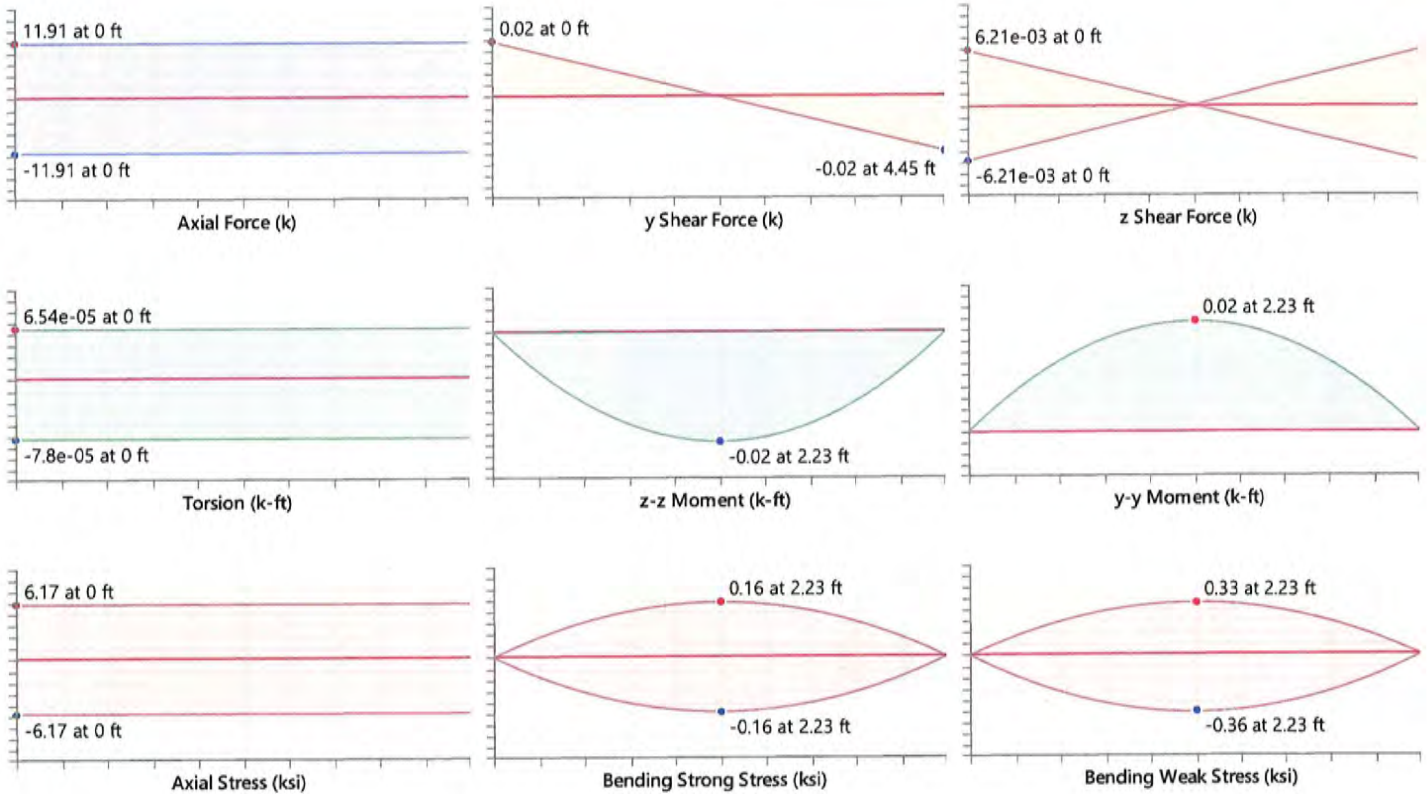
Design Properties

L _{b y-y} (ft):	4.455	K _{y-y} :	1	Seismic DR:	None
L _{b z-z} (ft):	4.455	K _{z-z} :	1	Max Defl Ratio:	L/1806
L _{comp top} :	L _{byy}	y sway:	No	Max Defl Location:	4.455
L _{comp bot} (ft):	4.455	z sway:	No	Span:	N/A
L _{torque} (ft):	4.455	Function:	Lateral	τ _b :	1



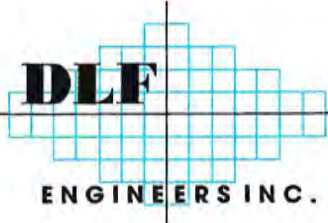
Diagrams:





AISC 16th (360-22): LRFD Code Check

Limit State	Gov. LC	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	15	-	-	-	-
Applied Loading - Shear + Torsion	34	-	-	-	-
Axial Tension Analysis	15	0 k	86.85 k	-	-
Axial Compression Analysis	15	11.906 k	50.238 k	-	-
Flexural Analysis (Strong Axis)	15	0.014 k-ft	8.002 k-ft	-	-
Flexural Analysis (Weak Axis)	-	0.014 k-ft	3.865 k-ft	-	-
Shear Analysis (Major Axis y)	34	0.028 k	27 k	0.001	PASS
Shear Analysis (Minor Axis z)	34	0.01 k	27 k	0.0003862	PASS
Bending & Axial Interaction Check (UC Bending Max)	15	-	-	0.242	PASS



CUSTOMER _____

LOCATION _____

SHEET NO. _____

JOB NO. _____

DATE _____

BY _____ CHK'D _____

BRIDGE BEARING

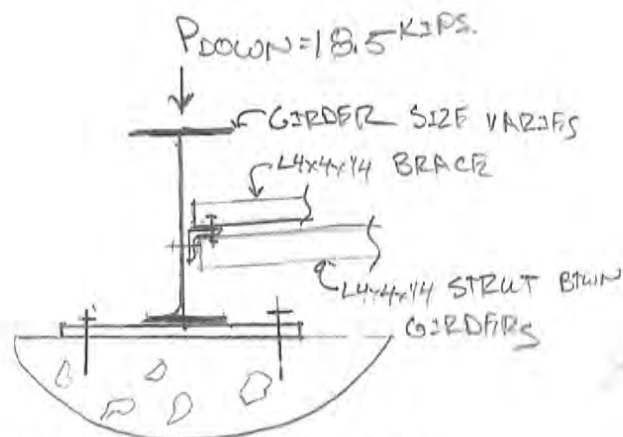
$$P_{MAX} = 18.5 \text{ KIPS}$$

$$\begin{aligned} \text{MAX SHEAR} &= 10.2^K \text{ LONG.} \\ &5.8^K \text{ TRANS.} \end{aligned}$$

* PROVIDE $1\frac{5}{16}'' \phi \times 2''$ LONG
SLOTTED HOLE @ ONE END

$$\text{FOR THERMAL EXP.} \approx 0.0000073(60')(12)(100) = 0.53''$$

MAX BRIDGE LENGTH MAX AT



CHECK BEARING UNDER GIRDER

$$\text{MIN FLANGE WIDTH} = 5''$$

$$\text{BEARING AREA} = 5''(6'') = 30 \text{ in}^2$$

$$\text{BEARING} = \frac{18500^{\#}}{30 \text{ in}^2} = 616 \text{ PSI} \approx \text{OK BY INSPECTION}$$

ANCHOR BOLT SHEAR

$$V_{MAX} = 10.2/2 = 5.1^K / \text{BOLT}$$

USE $3/4'' \phi$ FISS4 GR 105 AB'S

* ANCHOR EMBEDMENT

FOUNDATION BY OTHERS

CUSTOMER _____

LOCATION _____

SHEET NO. 1/20

JOB NO. _____

DATE _____

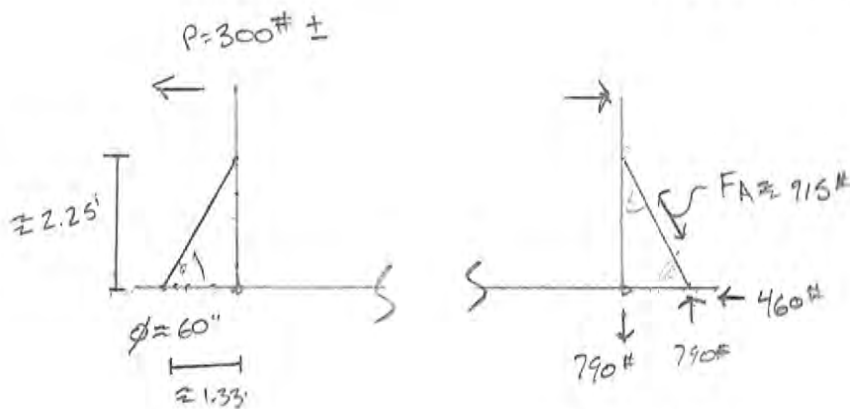
BY _____ CHK'D _____

GUARDRAILCONT 3x6 TOP RAIL

* MAX SPAN 6'0" O.K BY INSPECTION.

GUARD RAIL POST

* SEE FOLLOWING FOR RISA CALCS.

LOADINGREACTIONSCHECK POST TO DRAINX INSTALLER

TMAX = 790#

ABU46 G.F. 2,265#

INSTALL W/ (2) 1/2" Ø BOLTS

5/8" Ø LAG G.F. 285# (6.37)

3" (285): 855# ✓ O.K.

BOLT CHECK

3/4" Ø BOLT G.F. $Z_u = 1250\#$
 $Z_L = 400\#$ } FOR 4x TO 4x CONNECTION
 $1250\# \geq 790\#$ O.K ✓

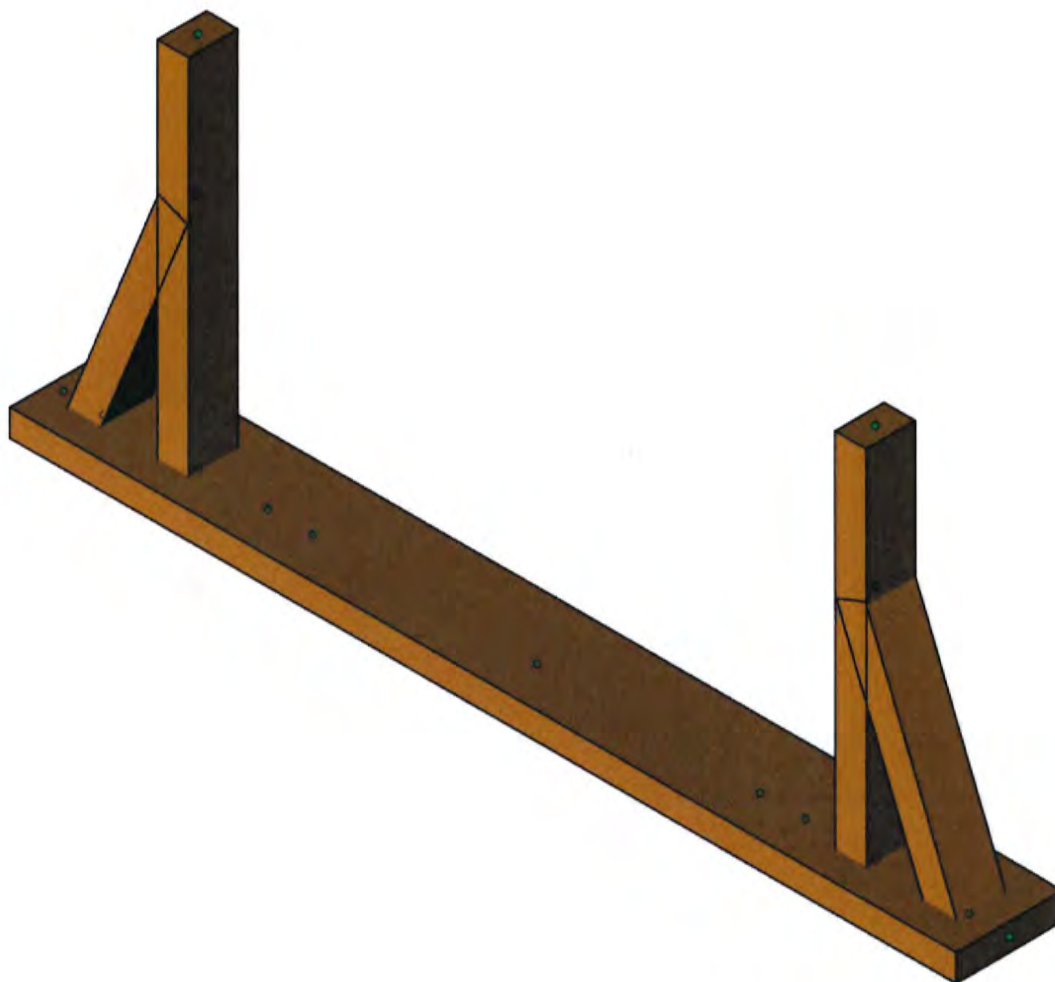
* F_{CL} FOR CG REDWOOD = 425 PSI∴ PROVIDE MIN 2" Ø WASHER $425(2.62 \text{ in}^2) = 1113\# \geq 790\#$

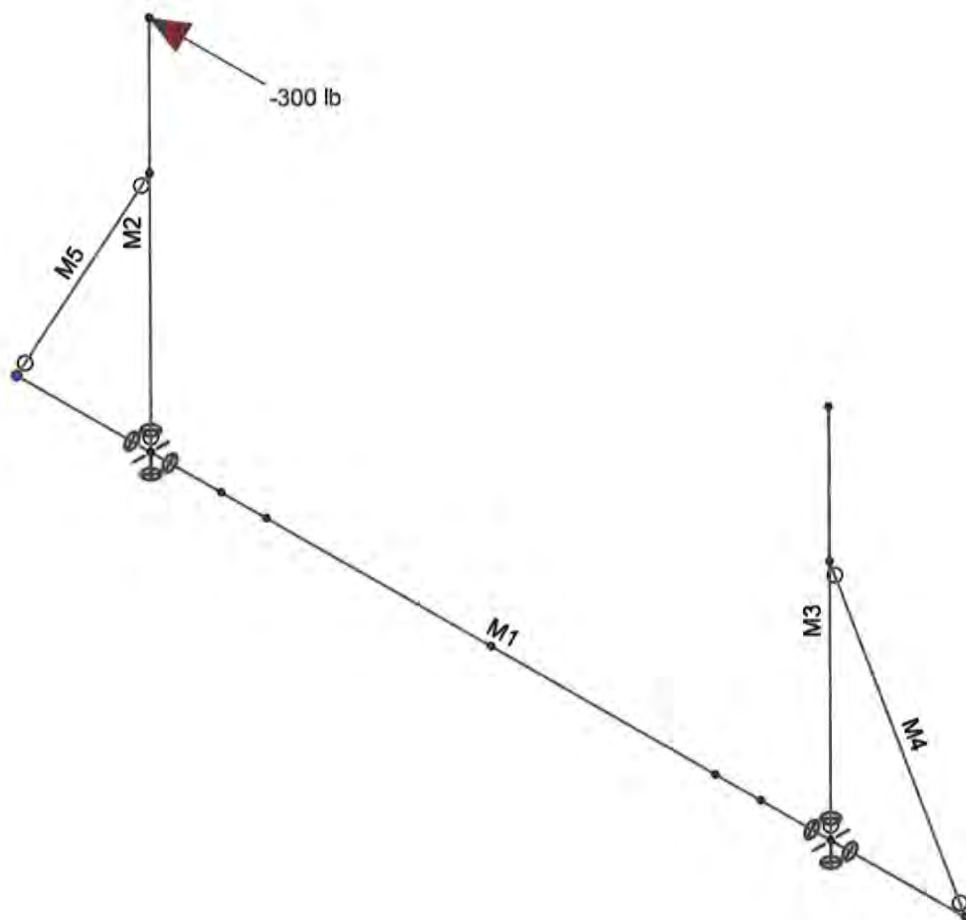
$$A = [2^2 - (13/16)^2] \pi / 4 = 2.62 \text{ in}^2$$

∴ USE 3/4" Ø HDG NB

W/ 2" Ø WASHER TYP

AT GUARDRAIL POST. TO BRACE





Loads: LC 5, DL + Guardrail (Case 1)

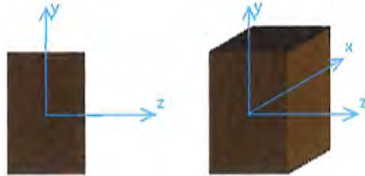
Member Wood Code Checks

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Fc' [psi]	Ft' [psi]	Fb1' [psi]	Fb2' [psi]	Fv' [psi]	RB	CL	CP	Eqn
1	5	M1	3X12FS	0.85	1.29	0.22	1.2	z	371.63	475	814.24	825	160	10.06	0.99	0.4	3.9-3
2	5	M2	3.5X5.5FS	0.44	2.22	0.15	3.5	z	868.08	617.5	1069.62	1072.5	160	4.34	1	0.85	3.9-1
3	5	M3	3.5X5.5FS	0	0	0	3.5	z	868.08	617.5	1069.62	1072.5	160	4.34	1	0.85	3.6.3
4	5	M4	3.5X5.5FS	0	1.13	0	2.57	z	946.5	617.5	1070.41	1072.5	160	3.72	1	0.93	3.9-1
5	5	M5	3.5X5.5FS	0.05	2.57	0	2.57	z	946.5	617.5	1070.41	1072.5	160	3.72	1	0.93	3.6.3

Detail Report: M2

Load Combination: LC 5: DL + Guardrail
 (Case 1)

Code check: 0.440 (axial/bending)



Input Data

Shape:	3.5X5.5FS (nominal)	I Node:	N1
Member Type:	Column	J Node:	N5
Length (ft):	3.5	I Release:	BenPIN
Material Type:	Wood	J Release:	Fixed
Design Rule:	Typical	I Offset:	N/A
Internal Sections:	97	J Offset:	N/A
Design Code:	AWC NDS-18 / AWC SPDWS-21 ASD	T/C Only:	Both Way

Material Properties

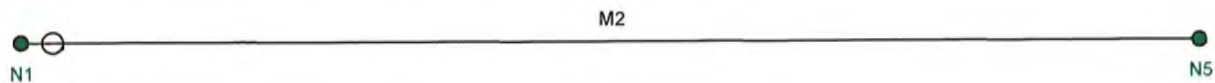
Material:	RedWood Construction Grade	Grade:	na	Nu:	0.3
Type:	Custom	Cm:	No	Alpha (1e ⁵⁰ -1):	0.3
Database:	N/A	Ci:	No	Density (lb/ft ³):	30
Species:	Redwood Construction Grade	Emod:	1		

Shape Properties

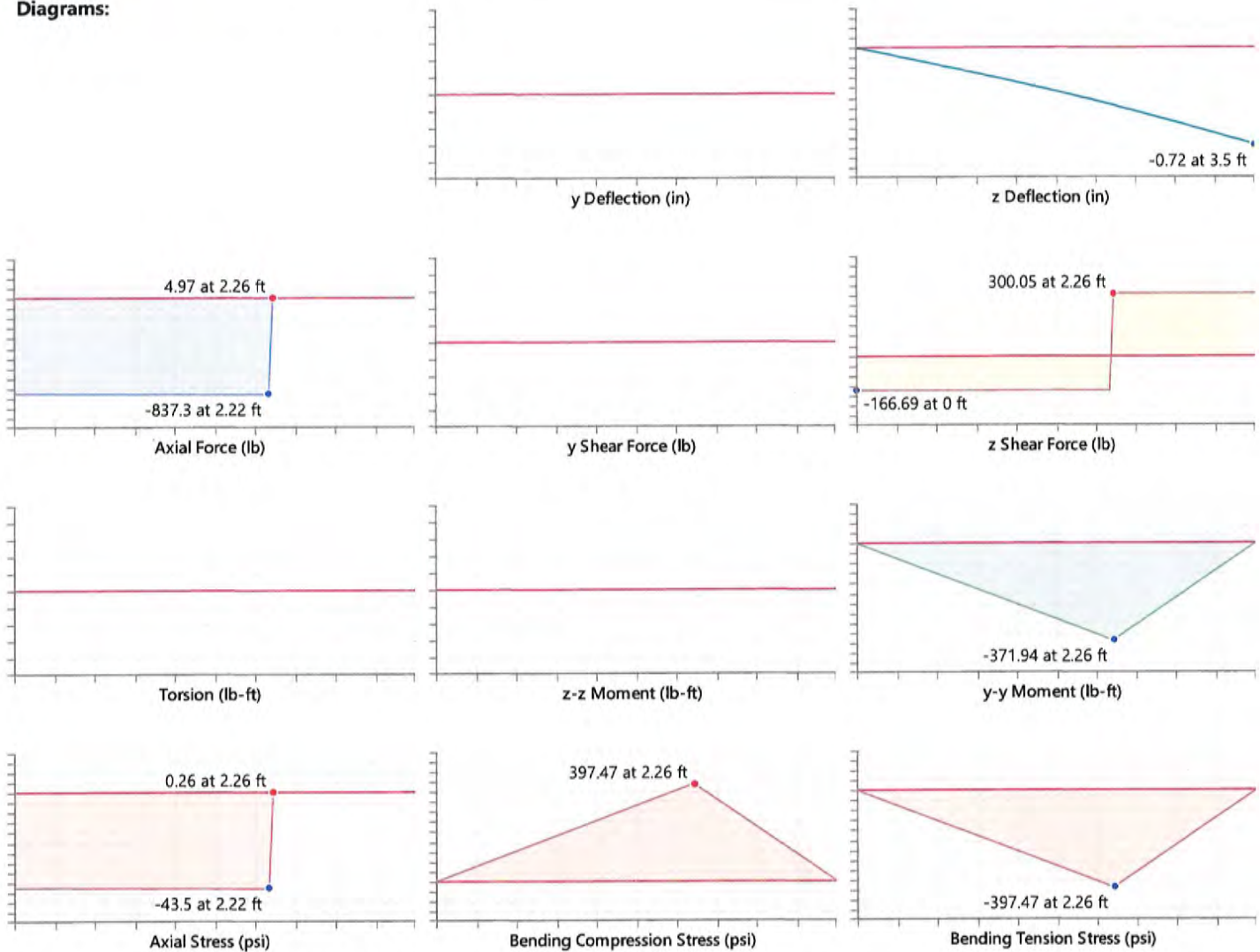
F _b (psi):	825	E (psi):	9e+5	b (actual) (in):	3.5
F _t (psi):	475	Emod:	1	d (actual) (in):	5.5
F _v (psi):	160	COV _E (Table F1):	0.25		
F _c (psi):	925	E _{min} (psi):	3.288e+5		

Design Properties

le2 (ft):	3.5	y sway:	No	C _{fu} :	1
le1 (ft):	3.5	z sway:	No	C _p :	0.853
le-bend top:	Lbyy	C _D :	1	Max Defl Ratio:	L/58
le-bend bot (ft):	3.5	R _B :	4.342	Max Defl Location:	3.5
K _{y-y} :	1	C _t :	0.997	Span:	N/A
K _{z-z} :	1	C _r :	1		



Diagrams:



AWC NDS-18 / AWC SPDWS-21 ASD Code Check

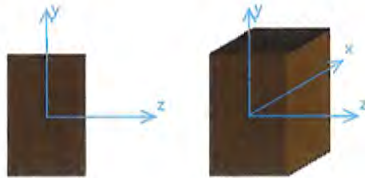
Limit State	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	-	-	-	-
Applied Loading - Shear + Torsion	-	-	-	-
Axial Compression Analysis	0 psi	868.084 psi	-	-
Axial Tension Analysis	-43.496 psi	617.5 psi	-	-
Flexural Analysis, Fb1'	0 psi	1069.619 psi	-	-
Flexural Analysis, Fb2'	396.168 psi	1072.5 psi	-	-
Bending & Axial Compression Analysis	-	-	0.369	PASS
Bending & Axial Tension Analysis	-	-	0.44	PASS
Shear Analysis	23.38 psi	160 psi	0.146	PASS

Detail Report: M5

Load Combination: LC 5: DL + Guardrail
 (Case 1)

Code check: 0.053 (axial/bending)

Input Data



Shape:	3.5X5.5FS (nominal)	I Node:	N10
Member Type:	VBrace	J Node:	N4
Length (ft):	2.574	I Release:	BenPIN
Material Type:	Wood	J Release:	BenPIN
Design Rule:	Typical	I Offset:	N/A
Internal Sections:	97	J Offset:	N/A
Design Code:	AWC NDS-18 / AWC SPDWS-21 ASD	T/C Only:	Both Way

Material Properties

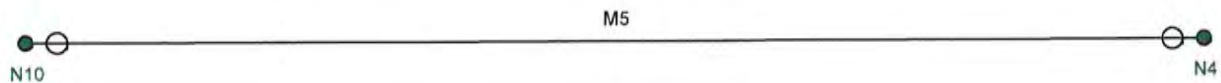
Material:	RedWood Construction Grade	Grade:	na	Nu:	0.3
Type:	Custom	Cm:	No	Alpha (1e ⁵⁰ -1):	0.3
Database:	N/A	Cl:	No	Density (lb/ft ³):	30
Species:	Redwood Construction Grade	Emod:	1		

Shape Properties

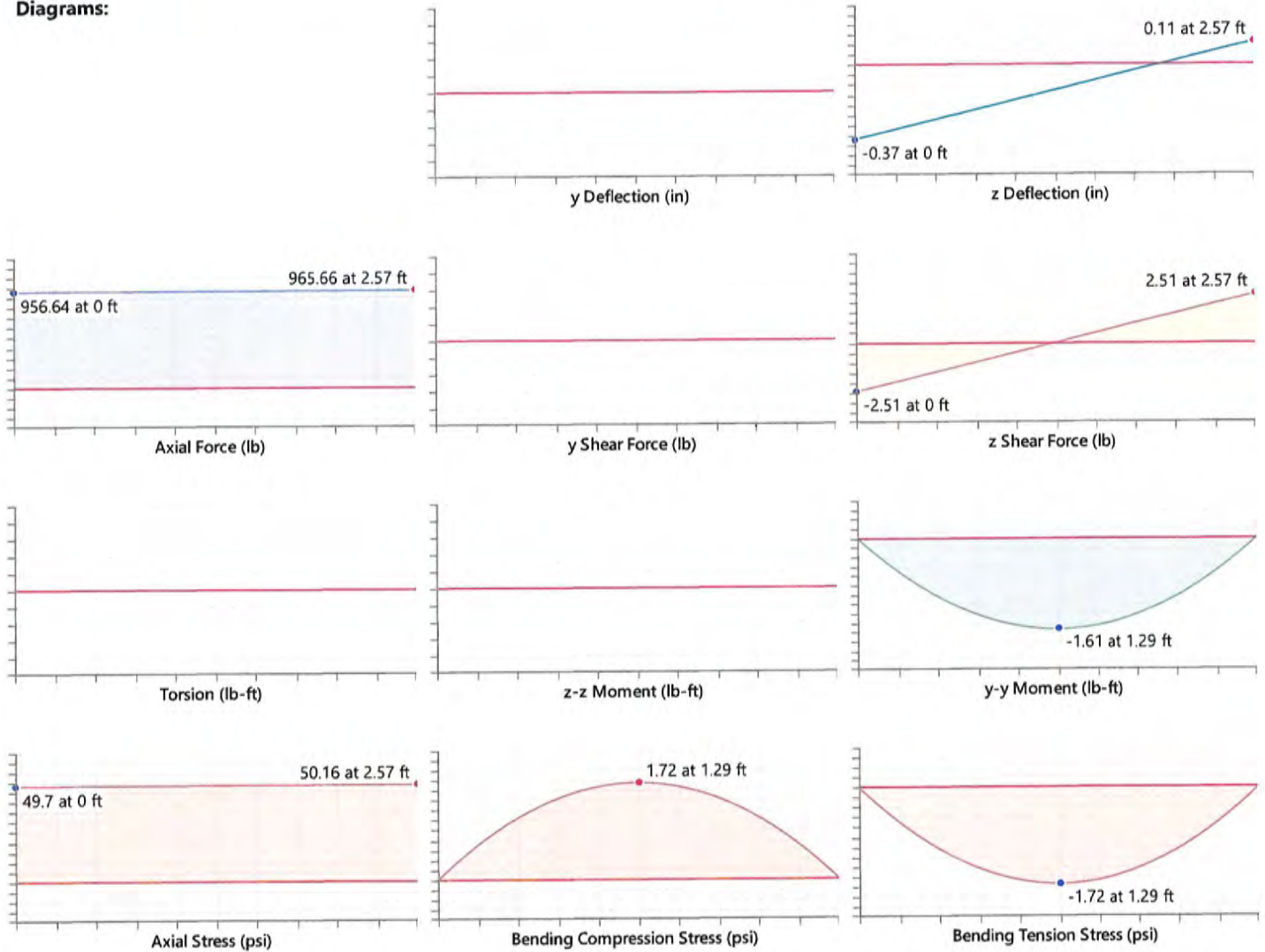
F _b (psi):	825	E (psi):	9e+5	b (actual) (in):	3.5
F _t (psi):	475	Emod:	1	d (actual) (in):	5.5
F _v (psi):	160	COV _E (Table F1):	0.25		
F _c (psi):	925	E _{min} (psi):	3.288e+5		

Design Properties

le2 (ft):	2.574	y sway:	No	C _{fu} :	1
le1 (ft):	2.574	z sway:	No	C _p :	0.93
le-bend top:	Lbyy	C _p :	1	Max Defl Ratio:	L/10000
le-bend bot (ft):	2.574	R _B :	3.724	Max Defl Location:	0
K _{y-y} :	1	C _t :	0.998	Span:	N/A
K _{z-z} :	1	C _r :	1		



Diagrams:



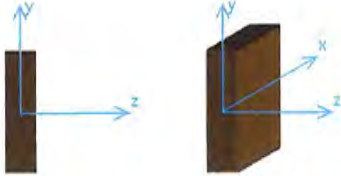
AWC NDS-18 / AWC SPDWS-21 ASD Code Check

Limit State	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	-	-	-	-
Applied Loading - Shear + Torsion	-	-	-	-
Axial Compression Analysis	50.164 psi	946.505 psi	-	-
Axial Tension Analysis	0 psi	617.5 psi	-	-
Flexural Analysis, Fb1'	0 psi	1070.408 psi	-	-
Flexural Analysis, Fb2'	0 psi	1072.5 psi	-	-
Bending & Axial Compression Analysis	-	-	0.053	PASS
Bending & Axial Tension Analysis	-	-	0.002	PASS
Shear Analysis	0.195 psi	160 psi	0.001	PASS

Detail Report: M1

Load Combination: LC 5: DL + Guardrail
 (Case 1)

Code check: 0.853 (axial/bending)



Input Data

Shape:	3X12FS (nominal)	I Node:	N4
Member Type:	Beam	J Node:	N3
Length (ft):	8.83	I Release:	Fixed
Material Type:	Wood	J Release:	Fixed
Design Rule:	Typical	I Offset:	N/A
Internal Sections:	97	J Offset:	N/A
Design Code:	AWC NDS-18 / AWC SPDWS-21 ASD	T/C Only:	Both Way

Material Properties

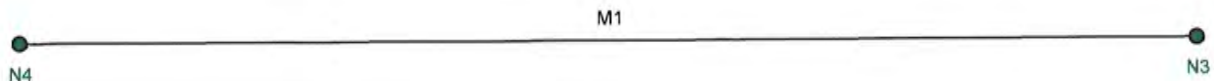
Material:	RedWood Construction Grade	Grade:	na	Nu:	0.3
Type:	Custom	Cm:	No	Alpha ($1e^{-5} F^{-1}$):	0.3
Database:	N/A	Cl:	No	Density (lb/ft ³):	30
Species:	Redwood Construction Grade	Emod:	1		

Shape Properties

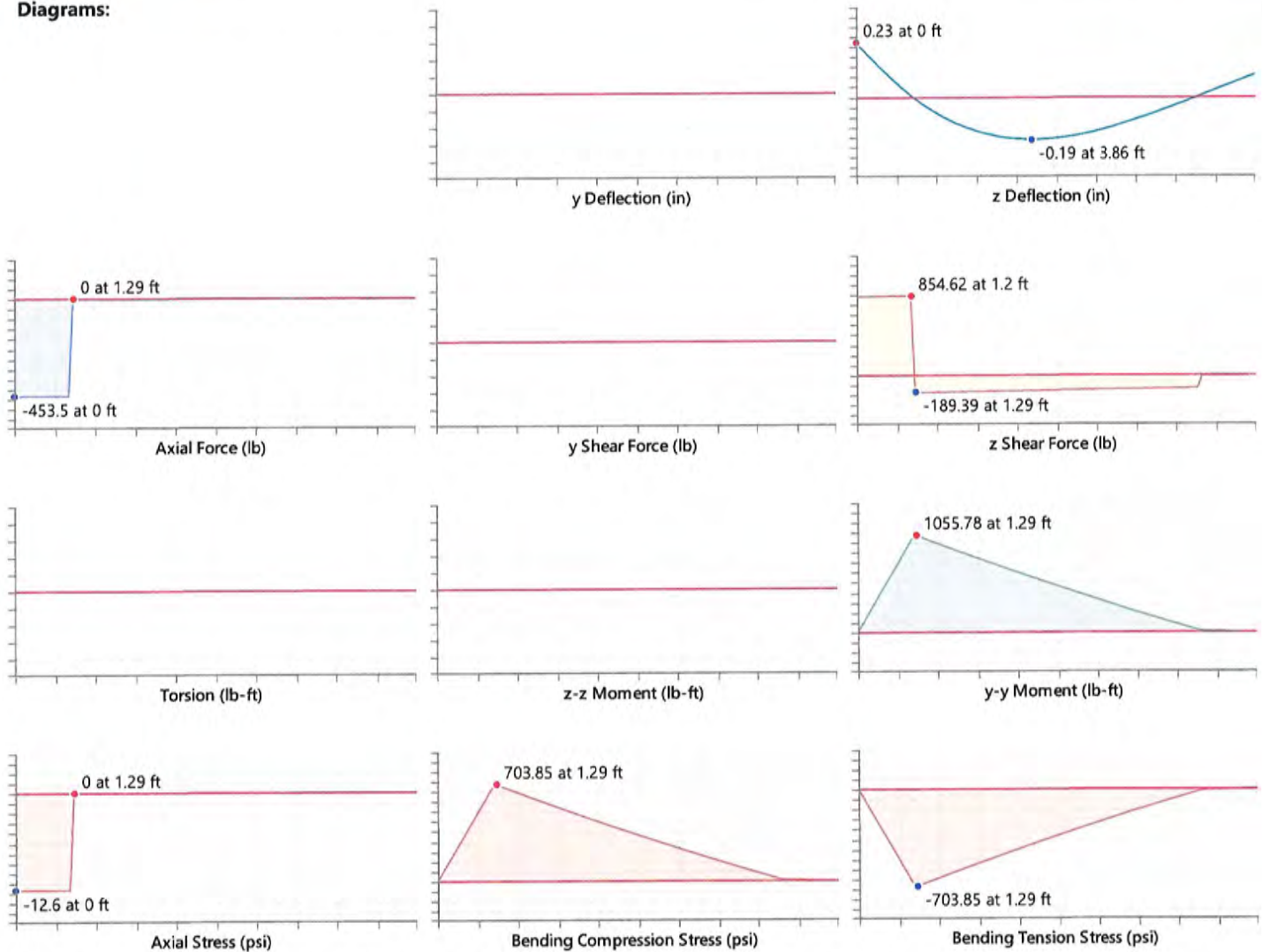
F _b (psi):	825	E (psi):	9e+5	b (actual) (in):	3
F _t (psi):	475	Emod:	1	d (actual) (in):	12
F _v (psi):	160	COV _E (Table F1):	0.25		
F _c (psi):	925	E _{min} (psi):	3.288e+5		

Design Properties

le ₂ (ft):	6.33	y sway:	No	C _{ru} :	1
le ₁ (ft):	6.33	z sway:	No	C _p :	0.402
le-bend top (ft):	6.33	C _D :	1	Max Defl Ratio:	L/10000
le-bend bot (ft):	6.33	R _B :	10.064	Max Defl Location:	0
K _{y-y} :	1	C _L :	0.987	Span:	N/A
K _{z-z} :	1	C _r :	1		



Diagrams:

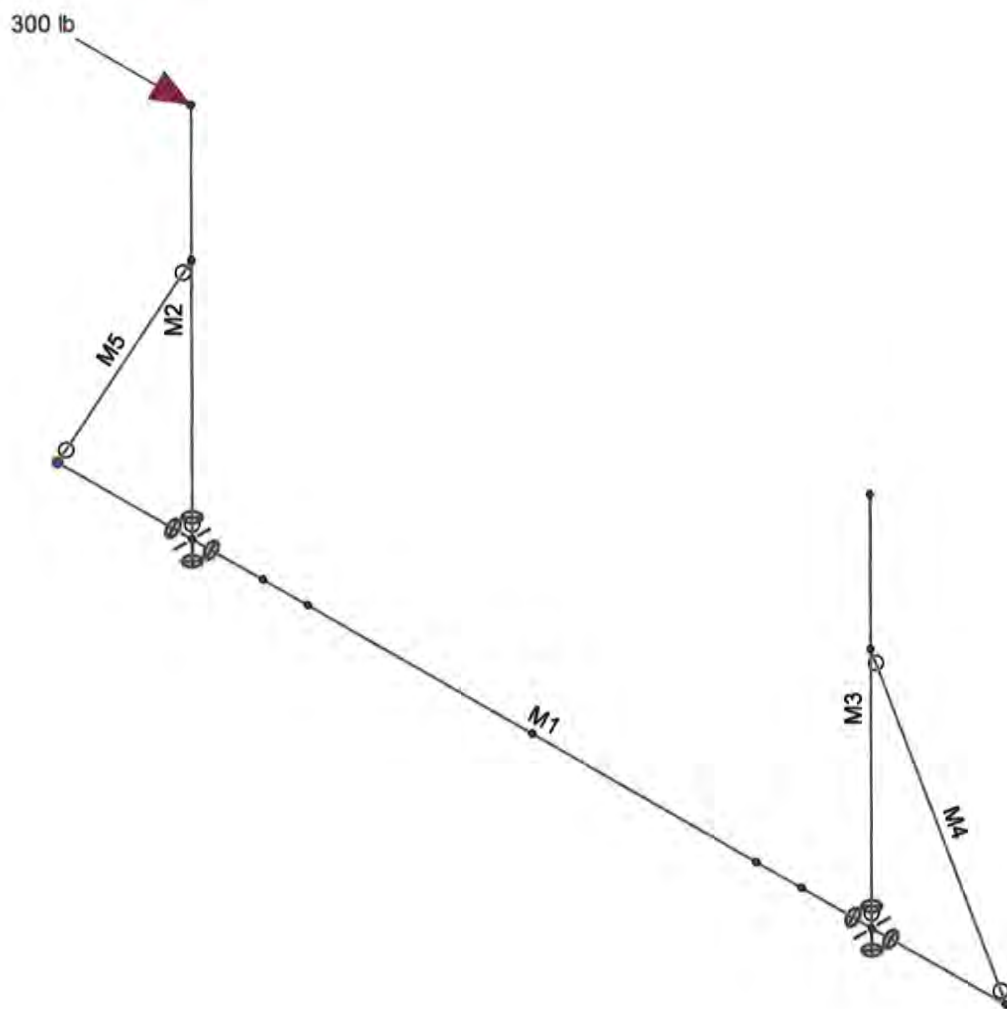


AWC NDS-18 / AWC SPDWS-21 ASD Code Check

Limit State	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	-	-	-	-
Applied Loading - Shear + Torsion	-	-	-	-
Axial Compression Analysis	0 psi	371.632 psi	-	-
Axial Tension Analysis	0 psi	475 psi	-	-
Flexural Analysis, Fb1'	0 psi	814.241 psi	-	-
Flexural Analysis, Fb2'	703.854 psi	825 psi	-	-
Bending & Axial Compression Analysis	-	-	0.853	PASS
Bending & Axial Tension Analysis	-	-	0.853	PASS
Shear Analysis	35.609 psi	160 psi	0.223	PASS

Node Reactions

	LC	Node Label	X [lb]	Y [lb]	Z [lb]	MX [lb-ft]	MY [lb-ft]	MZ [lb-ft]
1	5	N1	300	223.41	0	0	0	0
2	5	N2	0	-108.47	0	0	0	0
3	5	Totals:	300	114.94	0			
4	5	COG (ft):	X: 3.17	Y: 0.63	Z: 0			



Loads: LC 6, DL + Guardrail (Case 2)

Member Wood Code Checks

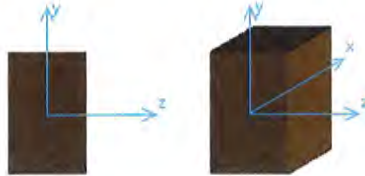
	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Fc' [psi]	Ft' [psi]	Fb1' [psi]	Fb2' [psi]	Fv' [psi]	RB	CL	CP	Eqn
1	6	M1	3X12FS	0.83	1.29	0.22	0	z	371.63	475	814.24	825	160	10.06	0.99	0.4	3.9-3
2	6	M2	3.5X5.5FS	0.38	2.22	0.15	3.5	z	868.08	617.5	1069.62	1072.5	160	4.34	1	0.85	3.9-3
3	6	M3	3.5X5.5FS	0	0	0	3.5	z	868.08	617.5	1069.62	1072.5	160	4.34	1	0.85	3.6.3
4	6	M4	3.5X5.5FS	0	1.13	0	2.57	z	946.5	617.5	1070.41	1072.5	160	3.72	1	0.93	3.9-1
5	6	M5	3.5X5.5FS	0.08	1.13	0	2.57	z	946.5	617.5	1070.41	1072.5	160	3.72	1	0.93	3.9-1

Detail Report: M2

Load Combination: LC 6: DL + Guardrail
(Case 2)

Code check: 0.381 (axial/bending)

Input Data



Shape:	3.5X5.5FS (nominal)	I Node:	N1
Member Type:	Column	J Node:	N5
Length (ft):	3.5	I Release:	BenPIN
Material Type:	Wood	J Release:	Fixed
Design Rule:	Typical	I Offset:	N/A
Internal Sections:	97	J Offset:	N/A
Design Code:	AWC NDS-18 / AWC SPDWS-21 ASD	T/C Only:	Both Way

Material Properties

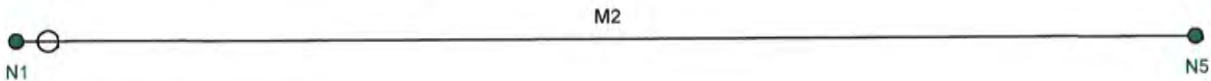
Material:	RedWood Construction Grade	Grade:	na	Nu:	0.3
Type:	Custom	Cm:	No	Alpha ($10^{-5} F^{-1}$):	0.3
Database:	N/A	Ci:	No	Density (lb/ft ³):	30
Species:	Redwood Construction Grade	Emod:	1		

Shape Properties

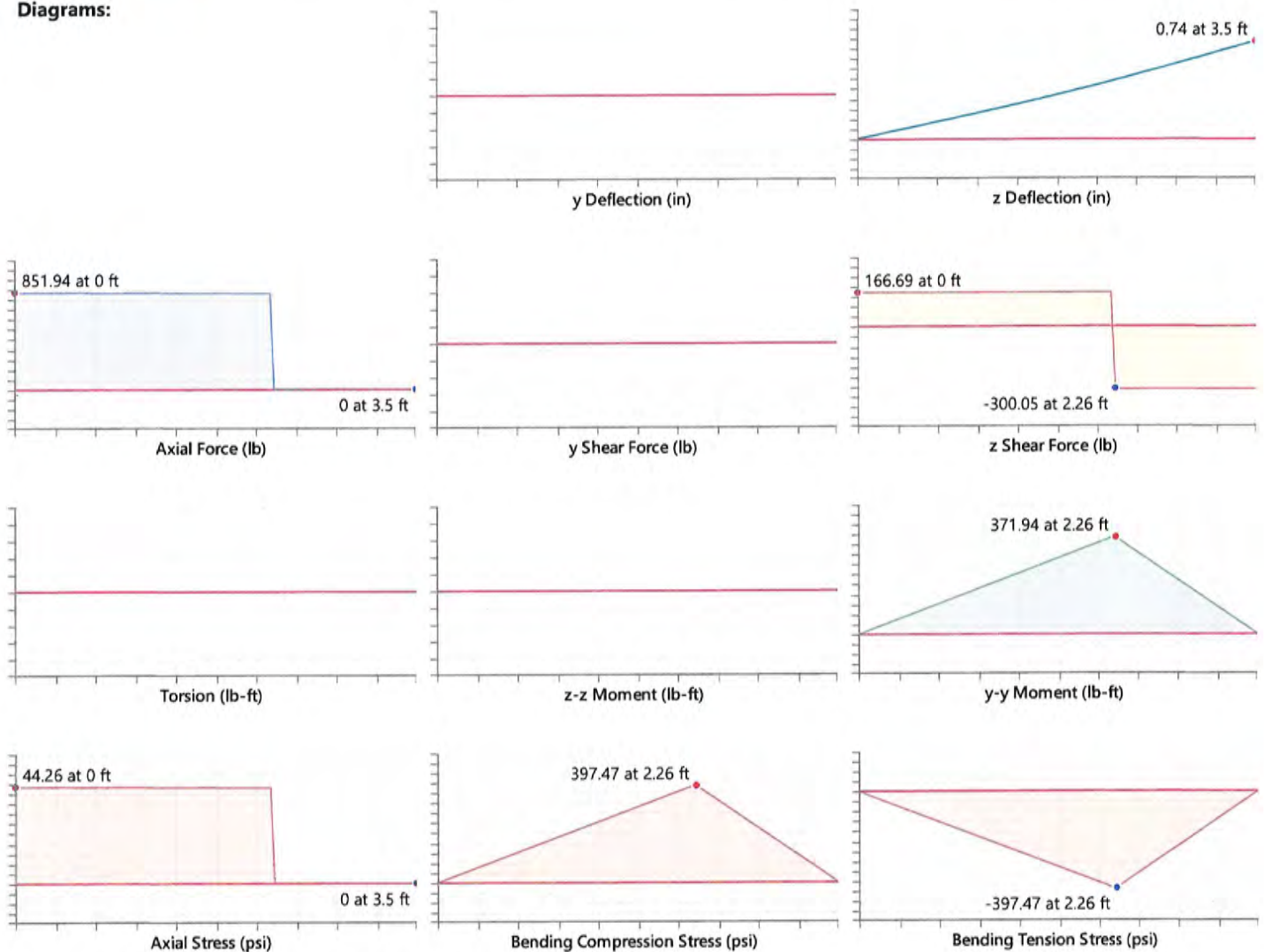
F _b (psi):	825	E (psi):	9e+5	b (actual) (in):	3.5
F _t (psi):	475	Emod:	1	d (actual) (in):	5.5
F _v (psi):	160	COV _E (Table F1):	0.25		
F _c (psi):	925	E _{min} (psi):	3.288e+5		

Design Properties

le2 (ft):	3.5	y sway:	No	C _{fu} :	1
le1 (ft):	3.5	z sway:	No	C _p :	0.853
le-bend top:	Lbyy	C _p :	1	Max Defl Ratio:	L/57
le-bend bot (ft):	3.5	R _g :	4.342	Max Defl Location:	3.5
K _{y-y} :	1	C _i :	0.997	Span:	N/A
K _{z-z} :	1	C _r :	1		



Diagrams:



AWC NDS-18 / AWC SPDWS-21 ASD Code Check

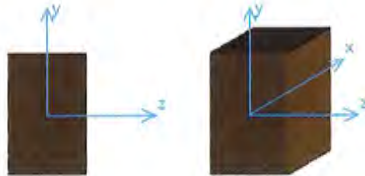
Limit State	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	-	-	-	-
Applied Loading - Shear + Torsion	-	-	-	-
Axial Compression Analysis	43.793 psi	868.084 psi	-	-
Axial Tension Analysis	0 psi	617.5 psi	-	-
Flexural Analysis, Fb1'	0 psi	1069.619 psi	-	-
Flexural Analysis, Fb2'	396.17 psi	1072.5 psi	-	-
Bending & Axial Compression Analysis	-	-	0.381	PASS
Bending & Axial Tension Analysis	-	-	0.369	PASS
Shear Analysis	23.381 psi	160 psi	0.146	PASS

Detail Report: M5

Load Combination: LC 6: DL + Guardrail
 (Case 2)

Code check: 0.082 (axial/bending)

Input Data



Shape:	3.5X5.5FS (nominal)	I Node:	N10
Member Type:	VBrace	J Node:	N4
Length (ft):	2.574	I Release:	BenPIN
Material Type:	Wood	J Release:	BenPIN
Design Rule:	Typical	I Offset:	N/A
Internal Sections:	97	J Offset:	N/A
Design Code:	AWC NDS-18 / AWC SPDWS-21 ASD	T/C Only:	Both Way

Material Properties

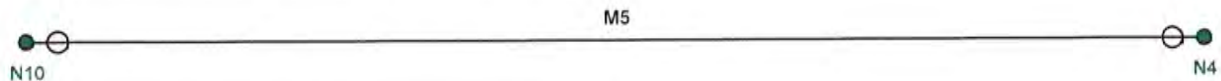
Material:	RedWood Construction Grade	Grade:	na	Nu:	0.3
Type:	Custom	Cm:	No	Alpha ($10^{-5} F^{-1}$):	0.3
Database:	N/A	Ci:	No	Density (lb/ft ³):	30
Species:	Redwood Construction Grade	Emod:	1		

Shape Properties

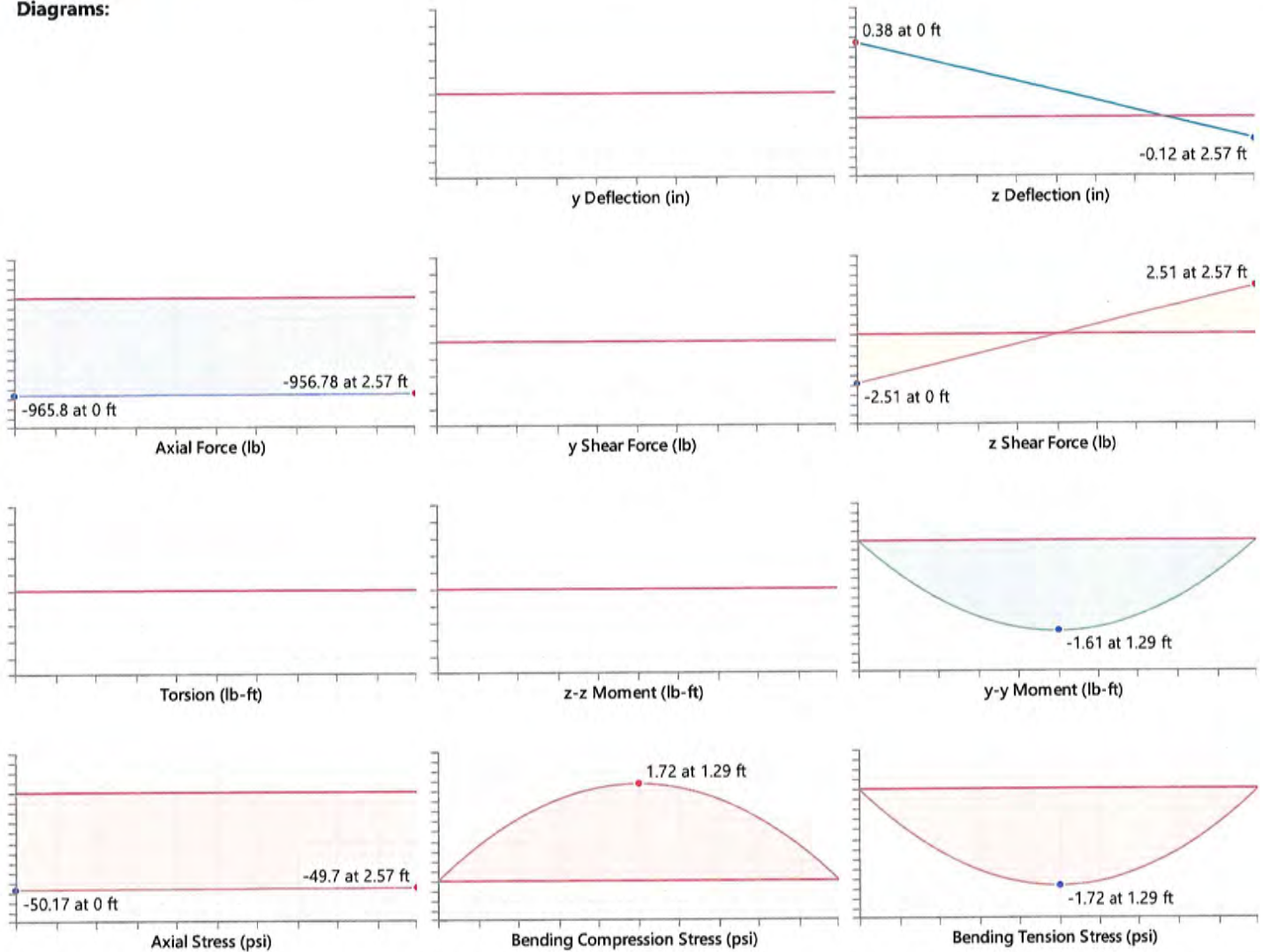
F _b (psi):	825	E (psi):	9e+5	b (actual) (in):	3.5
F _t (psi):	475	Emod:	1	d (actual) (in):	5.5
F _v (psi):	160	COV _E (Table F1):	0.25		
F _c (psi):	925	E _{min} (psi):	3.288e+5		

Design Properties

le2 (ft):	2.574	y sway:	No	C _{fu} :	1
le1 (ft):	2.574	z sway:	No	C _p :	0.93
le-bend top:	Lbyy	C _p :	1	Max Defl Ratio:	L/10000
le-bend bot (ft):	2.574	R _B :	3.724	Max Defl Location:	0
K _{y-y} :	1	C _t :	0.998	Span:	N/A
K _{z-z} :	1	C _r :	1		



Diagrams:



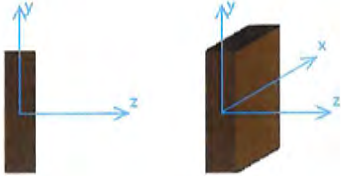
AWC NDS-18 / AWC SPDWS-21 ASD Code Check

Limit State	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	-	-	-	-
Applied Loading - Shear + Torsion	-	-	-	-
Axial Compression Analysis	0 psi	946.505 psi	-	-
Axial Tension Analysis	-49.966 psi	617.5 psi	-	-
Flexural Analysis, Fb1'	0 psi	1070.408 psi	-	-
Flexural Analysis, Fb2'	1.697 psi	1072.5 psi	-	-
Bending & Axial Compression Analysis	-	-	0.002	PASS
Bending & Axial Tension Analysis	-	-	0.082	PASS
Shear Analysis	0.195 psi	160 psi	0.001	PASS

Detail Report: M1

Load Combination: LC 6: DL + Guardrail
(Case 2)

Code check: 0.835 (axial/bending)



Input Data

Shape:	3X12FS (nominal)	I Node:	N4
Member Type:	Beam	J Node:	N3
Length (ft):	8.83	I Release:	Fixed
Material Type:	Wood	J Release:	Fixed
Design Rule:	Typical	I Offset:	N/A
Internal Sections:	97	J Offset:	N/A
Design Code:	AWC NDS-18 / AWC SPDWS-21 ASD	T/C Only:	Both Way

Material Properties

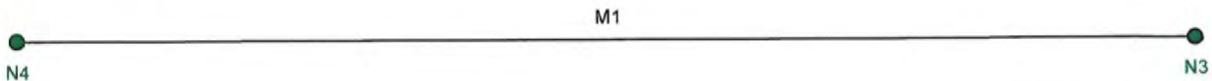
Material:	RedWood Construction Grade	Grade:	na	Nu:	0.3
Type:	Custom	Cm:	No	Alpha ($1e^{50} F^{-1}$):	0.3
Database:	N/A	Ci:	No	Density (lb/ft ³):	30
Species:	Redwood Construction Grade	Emod:	1		

Shape Properties

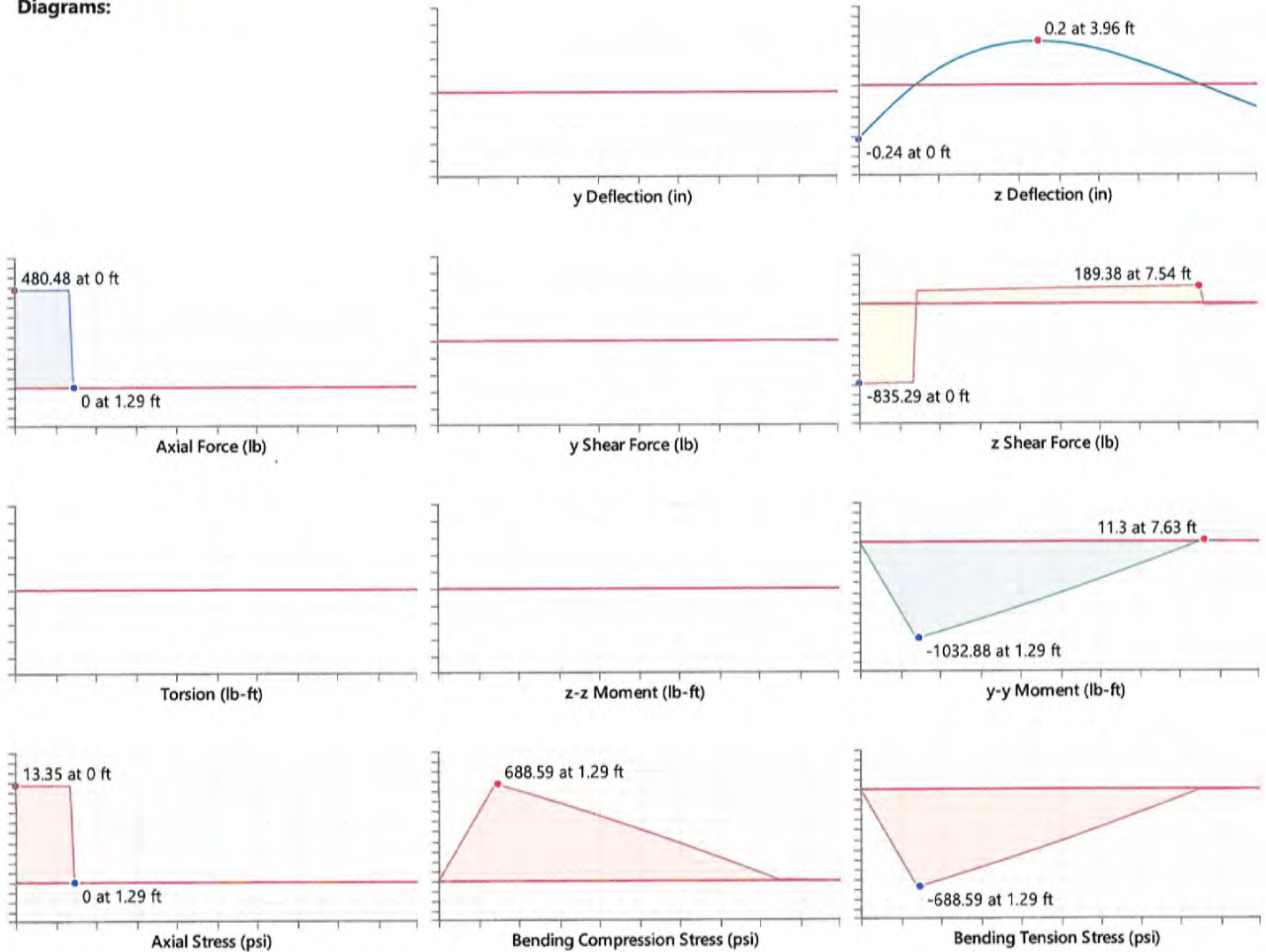
F _b (psi):	825	E (psi):	9e+5	b (actual) (in):	3
F _t (psi):	475	Emod:	1	d (actual) (in):	12
F _v (psi):	160	COV _E (Table F1):	0.25		
F _c (psi):	925	E _{min} (psi):	3.288e+5		

Design Properties

le2 (ft):	6.33	y sway:	No	C _{tu} :	1
le1 (ft):	6.33	z sway:	No	C _p :	0.402
le-bend top (ft):	6.33	C _p :	1	Max Defl Ratio:	L/10000
le-bend bot (ft):	6.33	R _B :	10.064	Max Defl Location:	0
K _{y-y} :	1	C _L :	0.987	Span:	N/A
K _{z-z} :	1	C _r :	1		



Diagrams:



AWC NDS-18 / AWC SPDWS-21 ASD Code Check

Limit State	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	-	-	-	-
Applied Loading - Shear + Torsion	-	-	-	-
Axial Compression Analysis	0 psi	371.632 psi	-	-
Axial Tension Analysis	0 psi	475 psi	-	-
Flexural Analysis, Fb1'	0 psi	814.241 psi	-	-
Flexural Analysis, Fb2'	688.588 psi	825 psi	-	-
Bending & Axial Compression Analysis	-	-	0.835	PASS
Bending & Axial Tension Analysis	-	-	0.835	PASS
Shear Analysis	34.804 psi	160 psi	0.218	PASS

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Node Reactions

	LC	Node Label	X [lb]	Y [lb]	Z [lb]	MX [lb-ft]	MY [lb-ft]	MZ [lb-ft]
1	6	N1	-300	-108.46	0	0	0	0
2	6	N2	0	223.4	0	0	0	0
3	6	Totals:	-300	114.94	0			
4	6	COG (ft):	X: 3.17	Y: 0.63	Z: 0			

NCHRP 20-07 TASK 244

LRFD GUIDE SPECIFICATIONS FOR THE
DESIGN OF PEDESTRIAN BRIDGES

FINAL DRAFT

- Increasing the lateral resistance of the superstructure

2—PHILOSOPHY

Pedestrian bridges shall be designed for specified limit states to achieve the objectives of safety, serviceability, including comfort of the pedestrian user (vibration), and constructability with due regard to issues of inspectability, economy, and aesthetics, as specified in the *AASHTO LRFD*. These Guide Specifications are based on the LRFD philosophy. Mixing provisions from specifications other than those referenced herein, even if LRFD based, should be avoided.

3—LOADS

3.1—PEDESTRIAN LOADING (PL)

Pedestrian bridges shall be designed for a uniform pedestrian loading of 90 psf. This loading shall be patterned to produce the maximum load effects. Consideration of dynamic load allowance is not required with this loading.

C3.1

This article modifies the pedestrian loading provisions of the Fourth Edition of *AASHTO LRFD*, through the 2009 Interim. The previous edition of these Guide Specifications used a base nominal loading of 85 psf, reducible to 65 psf based on influence area for the pedestrian load. With the LFD load factors, this results in factored loads of $2.17(85) = 184$ psf and $2.17(65) = 141$ psf. The Fourth Edition of *AASHTO LRFD* specified a constant 85 psf regardless of influence area. Multiplying by the load factor, this results in $1.75(85) = 149$ psf. This falls within the range of the previous factored loading, albeit toward the lower end.

European codes appear to start with a higher nominal load (approx 105 psf), but then allow reductions based on loaded length. Additionally, the load factor applied is 1.5, resulting in a maximum factored load of $(1.5)105 = 158$ psf. For a long loaded length, this load can be reduced to as low as 50 psf, resulting in a factored load of $(1.5)50 = 75$ psf. The effect of resistance factors has not been accounted for in the above discussion of the European codes. There are, however, warnings to the designer that a reduction in the load based on loaded length may not be appropriate for structures likely to see significant crowd loadings, such as bridges near stadiums.

Consideration might be given to the maximum credible pedestrian loading. There is a physical limit on how much load can be applied to a bridge from the static weight of pedestrians. It appears that this load is around 150 psf, based on work done by Nowak (2000) from where Figures C1 through C3 were taken. Although there does not appear to be any available information relating to the probabilistic distribution of pedestrian live loading, knowing the maximum credible load helps to define the limits of the upper tail of the distribution of load. The use of a 90 psf nominal live load in

3.2—VEHICLE LOAD (LL)

Where vehicular access is not prevented by permanent physical methods, pedestrian bridges shall be designed for a maintenance vehicle load specified in Figure 1 and Table 1 for the Strength I Load Combination unless otherwise specified by the Owner. A single truck shall be placed to produce the maximum load effects and shall not be placed in combinations with the pedestrian load. The dynamic load allowance need not be considered for this loading.

Table 3.2-1—Design Vehicle

Clear Deck Width	Design Vehicle
7 to 10 feet	H5
Over 10 feet	H10

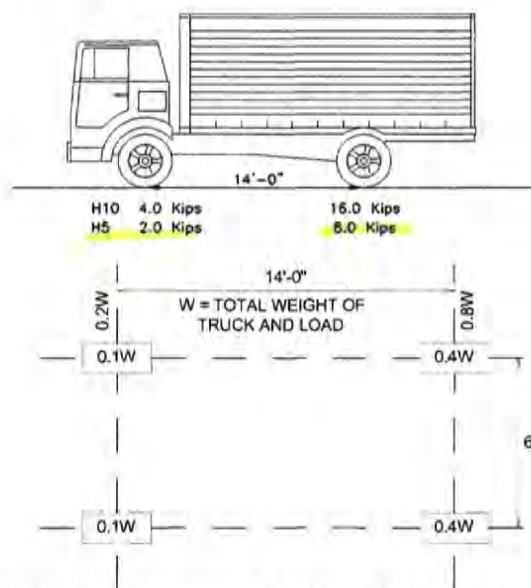


Figure 3.2-1—Maintenance Vehicle Configurations.

3.3—EQUESTRIAN LOAD (LL)

Decks intended to carry equestrian loading shall be designed for a patch load of 1.00 kips over a square area measuring 4.0 inches on a side.

C3.2

The vehicle loading specified are equivalent to the H-trucks shown in Article 3.6.1.6 of AASHTO LRFD 2009 Interim and contained in previous versions of the AASHTO Standard Specifications for Highway Bridges.

BRIDGES ARE $\leq 7'-0"$ CHZ.
VEHICLES LIMITED TO
SIDE BY SIDE & SIMILAR.
 $\therefore$ CHECK STEEL GIRDERS
FOR $10^{1/2}$ 5.0K @ CENTER
SPAN.

LIMIT VEHICLE WT-
BASED ON 3x12 DECKING.
USE AXLE DIST: .65W & .35W

0.175W	0.325W
0.175W	0.325W
0.35W	0.65W

C3.3

The equestrian load is a live load and intended to ensure adequate punching shear capacity of pedestrian bridge decks where horses are expected. The loading was derived from hoof pressure measurements reported in Roland et. al. (2005). The worst loading occurs during a canter where the loading on one hoof approaches 100% of the total weight of the horse. The total factored load of 1.75 kips is approximately the maximum credible weight of a draft horse. This loading is expected to control only deck design.