Structural Engineering Calculations for:

Shree's Truck Stop

410 Gladmar Road
Thorp, Kittias County, WA

88'-0" tall pole sign

Index

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Ben Jones
Digitally signed by Ben Jones
Date: 2020.04.16 08:26:32 -06'00'

YESCO

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Salt Lake City, UT 84104
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BASIS FOR DESIGN

Project: Shree's Truck Stop
Descript: *88'-0" tall pole sign*

BUILDING CODE:

2015 EDITION OF THE INTERNATIONAL BUILDING CODE.

LIVE / SNOW LOADS: NA

GRAVITY / DEAD LOADS:

STEEL FRAME SIGN CABINETS = 15 PSF
PRICE CHANGER SIGN = 40 PSF

LATERAL LOAD PARAMETERS:

RISK CATEGORY = II

WIND:

WIND SPEED, V_{ult} = **110 MPH, 3-SECOND GUST**
WIND EXPOSURE = **C**

SEISMIC: < WIND, WIND GOVERNS

DESIGN SPECTRAL RESPONSE ACCELERATION = S_S = **0.56** S_{DS} = **0.53**
S_1 = **0.23** S_{D1} = **0.31**

SEISMIC DESIGN CATEGORY = **D**
RESPONSE MODIFICATION, R = **3.000**

STEEL:

PLATES (PL) AND SHAPES: *ASTM* A36, Fy = 36 ksi
PIPE STEEL: ASTM A500-GRADE B or API 5L -GRADE X42, Fy = 42 KSI
TUBE STEEL (HSS): *ASTM* A500, GRADE B, Fy = 46 ksi
WELDING: LOW HYDROGEN, E70 SERIES RODS

FOUNDATIONS:

SOIL PARAMETERS:

ALLOWABLE BEARING PRESSURE = 1500 PSF.

FOUNDATION POURED AGAINST NATURAL GRADE OR COMPACTED ENGINEERED FILL.

CONCRETE:

MINIMUM 28 DAY STRENGTH, f'c = **2500** PSI

REINFORCING:

BARS #3 AND SMALLER *ASTM* A615, GRADE 40
BARS #4 AND LARGER *ASTM* A615, GRADE 60
WELDED WIRE FABRIC *ASTM* A185 AND A82
CLEAR COVER AND LAP LENGTHS PER *ACI*

SEISMIC LOADS ON FREESTANDING SIGNS *(Equivalent Lateral Force Procedure)*

Project: Shree's Truck Stop
Descript: 88'-0" tall pole sign
Ref: ASCE 7

Site Classification Characteristics

S_S =	0.563	*g, max earthquake acceleration, T=0.2s (fig 22)*
S_1 =	0.231	*g, max earthquake acceleration, T=1s (fig 22)*
Site Classification:	D	*stiff soil (tbl 20.3-1)*
F_a =	1.400	*acceleration based amplification (tbl 11.4-1)*
F_v =	2.000	*velocity based amplification (tbl 11.4-2)*

Seismic Design Category

$S_{MS} = (F_a)(S_S)$ =	0.788	*g (eq 11.4-1)*
$S_{M1} = (F_v)(S_1)$ =	0.462	*g (eq 11.4-2)*
$S_{DS} = (2\ S_{MS})/3$ =	0.525	*g (eq 11.4-3)*
$S_{D1} = (2\ S_{M1})/3$ =	0.308	*g (eq 11.4-4)*
Seismic Use Group =	I	*(tbl 1.5-1)*
Seismic Importance Factor =	1.00	*(tbl 1.5-2)*
Worst Case Design Category =	D	*(tbl 11.6-1 and 11.6-2)*

Vertical Seismic Load Effects (E_V)

$Ev = 0.2S_{DS}D$ (eq 12.4-4)

Area		S_{DS}	D_x	Evx	Tributary Area	Eq. Area Load
			kips	kips	sf	psf
1	0.2	0.525	6.469	**0.680**	360.00	**1.888**
2	0.2	0.525	25.138	**2.642**	590.33	**4.475**
3	0.2	0.525	0.767	**0.081**	5.00	**16.130**
4	0.2	0.525	5.824	**0.612**	225.00	**2.720**
5	0.2	0.525	5.990	**0.629**	75.83	**8.301**
6	0.2	0.525	17.408	**1.829**	157.50	**11.615**
7						
8						
9						
10						
Σ			61.596	6.473		

Seismic Base Shear

Response Modification Factor, R =	3.000	*(tbl 15.4-2)*
Deflection Amplification Factor, C_d =	3.000	*(tbl 15.4-2)*
Overstrength Factor, Ω =	1.750	*(tbl 15.4-2)*
Seismic Dead Load, W =	61.596	*kips (12.7.2)*
Height of Sign, h_n=	88.000	*ft*
C_t=	0.02	*(tbl 12.8-2)*
x=	0.75	*(tbl 12.8-2)*
Fundamental Period of Vibration, T =	0.575	*(eq 12.8-7)*

Vertical Distribution of Horizontal Seismic Load Effects (E_H)

Distribution Exponent, k = 1.037 *interpolated*

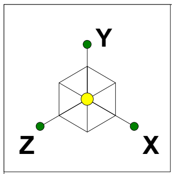
Area	w_x	h_x	$w_x\ h_x^{\ k}$	C_{vx}	$F_x$orE_{HX}	Tributary Area	Eq. Area Load
	kips	ft	*ft-kips*		kips	sf	psf
1	6.469	83.50	637.1	0.16	**1.762**	360.00	**4.893**
2	25.138	72.58	2140.9	0.55	**5.919**	590.33	**10.027**
3	0.767	65.17	58.4	0.01	**0.162**	5.00	**32.317**
4	5.824	60.42	410.1	0.11	**1.134**	225.00	**5.039**
5	5.990	45.83	316.6	0.08	**0.875**	75.83	**11.544**
6	17.408	17.50	339.0	0.09	**0.937**	157.50	**5.950**
7							
8							
9							
10							
Σ	61.596		3902.2		**10.789**		

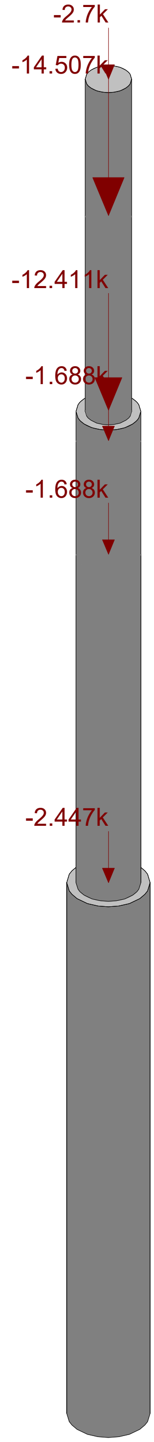
Seismic Response Coefficient:

$C_S = S_{DS}/(R/I)$ =	0.175	*g (eq 12.8-2)*
Maximum C_S ($T<=T_L$) = $S_{D1}/(T\ (R/I))$ =	0.179	*g (eq 12.8-3)*
Maximum C_S ($T>T_L$) = $S_{D1}T_L/(T^2\ (R/I))$ =	NA	*g (eq 12.8-4)*
Minimum C_S =	0.030	*g (eq 15.4-1)*
Where S_1 > 0.6g, Min $C_S = 0.8\ S_1/(R/I)$ =	0.062	*g (eq 15.4-2)*
T_L=	16	*(fig 22-12)*
Applicable C_S =	0.175	*g*

Seismic Base Shear, $V = C_S\ W$ = 10.789 *kips (eq 12.8-1)*

Seismic Moment at grade, $M_{EL,ult}$ = 712.29 *kip-ft* **$M_{EL,ASD}$ = 498.6** *kip-ft* **< Wind load governs design**





< 1.0, ok to use gust effect factor of .85

Frequencies / Participation

Mode Number	Frequency (Hz)	Period (Sec)	Percent Modal Participation X Spectra	Y Spectra	Z Spectra
1	1.013	.987			71.887
2	1.013	.987	71.887		
3	5.596	.179			10.929
Totals :			71.887		82.817

Loads: LC 1, D

YESCO		
Carl Meyers		Apr 15, 2020 at 2:59 PM
		fequency.r3d

WIND LOAD CALCULATIONS USED FOR SIGN COLUMN DESIGN

Project: Shree's Truck Stop
Descript: 88'-0" tall pole sign
Ref: ASCE 7, Chapter 29

Wind Speed, V_{ult}: 110 MPH **Exposure: C**

Velocity Pressure Calculation Table:

$q_h = 0.00256 K_h K_{zt} K_d V^2$ (psf)............ ASCE 7-10 (Eq 29.3-1)

Area #	q_h =	0.00256	K_h	K_{zt}	K_d	V^2
1)	32.44	0.00256	1.232	1.0	0.85	12100
2)	31.71	0.00256	1.204	1.0	0.85	12100
3)	30.55	0.00256	1.160	1.0	0.85	12100
4)	30.35	0.00256	1.153	1.0	0.85	12100
5)	29.57	0.00256	1.123	1.0	0.85	12100
6)	26.72	0.00256	1.015	1.0	0.85	12100

Design Wind Load Calculation Table (Case A & B):

$Q_{ult} = W = q_h G\, C_f$ (psf) >16 psf........ ASCE 7-10 (Eq 29.5-2) & Sec 29.8, C29.3.2

Area #	W (psf)	q_h	G	C_f	s/h	B/s
1)	**49.6**	32.44	0.85	1.80	0.248	1.832
2)	**48.5**	31.71	0.85	1.80	0.248	2.107
3)	**47.8**	30.55	0.85	1.84	0.030	1.250
4)	**47.5**	30.35	0.85	1.84	0.117	4.000
5)	**46.5**	29.57	0.85	1.85	0.382	0.162
6)	**38.4**	26.72	0.85	1.69	1.000	0.129

Design Wind Load Calculation Table (Case C):

$Q_{ult} = W = q_h G\, C_f$ (psf) >16 psf......... ASCE 7-10 (Eq 29.5-2) & Sec 29.8, C29.3.2

Area #	Sign Cabinet Depth, L_r (ft)	$C_{f,\,0\ to\ s}$	$C_{f,\,s\ to\ 2s}$	$C_{f,\,2s\ to\ 3s}$	$C_{f,\,3s\ to\ 10s}$	$W_{0\ to\ s}$ = (psf)	$W_{s\ to\ 2s}$ = (psf)	$W_{2s\ to\ 3s}$= (psf)	$W_{3s\ to\ 10s}$= (psf)
4)		2.90	1.90	1.30	1.10	**74.82**	**49.02**	**33.54**	**28.38**

SIGN COLUMN DESIGN

Project: Shree's Truck Stop
Descript: 88'-0" tall pole sign
Ref: ASCE 7, Chapter 29; AISC Steel Construction Manual, **ASD Design**

Wind Speed, V_{ult}: 110 MPH	Exposure: C	Consider Case B: Yes	Case C: Yes

Areas Subject to Wind Forces — Case B Ecc. Factor: 0.20

Description	*Height (s) (ft)*	*Width (B) (ft)*	*Area (sqft)*	*Centroid (ft)*	*Top (h) (ft)*	*0.6 W(Wind) (psf)*	*Sign Cabinet Weight (psf)*
1) "Shree's" Sign	9.00	40.00	360.00	83.50	88.00	29.78	15
2) Price changer sign	12.83	46.00	590.33	72.58	79.00	29.11	40
3) Column	2.00	2.50	5.00	65.17	66.17	28.67	
4) "Subway" sign	7.50	30.00	225.00	60.42	64.17	28.48	15
5) Column	21.67	3.50	75.83	45.83	56.67	27.90	
6) Column	35.00	4.50	157.50	17.50	35.00	23.03	

Calculation of Design Forces at Critical Heights
Governing Load Combination (ASD): D + 0.6W

y (ft)	$M_{.6W}+M_D$ (k-ft)	$M_{.6W}+M_D$ (k-in)	$V_{.6W}$ (kips)
@ grade	2699.39	32392.6	40.199
35.00	1355.90	16270.8	35.514
66.08	298.42	3581.0	27.976
88.00			

Calc. of Eccentric Dead & Wind Load Moments /Torsion

Sign Area	P_D (kips)	e' (ft)	M_D (kip ft)	$.6T_w$ (kip ft)
1)	5.400			85.762
2)	23.613			158.097
3)				0.072
4)	3.375			38.451
5)				1.481
6)				3.264

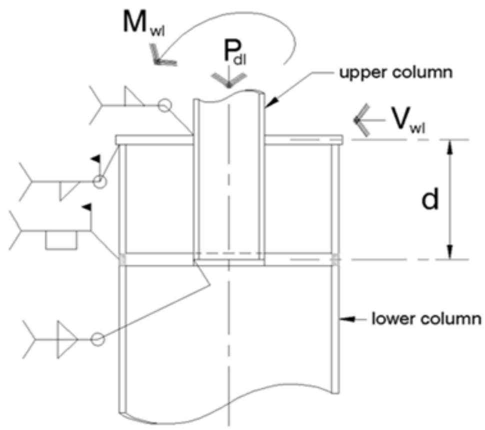
Sign Column Design Table
Pipes (P), Fy =42 ksi   Square (HSS), Fy = 46 ksi

Column Stage	*# of Columns*	*Column Type (P, HSS)*	*Column Size*	*Length (ft)*	*Spacing C to C (ft)*	*Start Elev (ft)*	*End Elev (ft)*	*Sleeve Depth (in)*	*Capacity Check*
1st	1	**P**	**54x0.75**	40.00		-5.00	35.000	*N/A*	**OK**
2nd	1	**P**	**42x0.625**	40.00		26.083	66.083	107	**OK**
3rd	1	**P**	**30x.375**	27.00		61.000	88.000	61	**OK**

	M_r with P-Δ (kip ft)	*M_n/Ω (kip ft)*	*V_r (kips)*	*V_n/Ω (kips)*	*T_r (kip ft)*	*T_n/Ω (kip ft)*	*PR (kips)*	*P_n/Ω (kips)*	*Combined Forces AISC 360. H1-1or H3-6*
1st	2726.380	3823.547	40.199	881.24	287.1	3914.37	61.596	1360.1	0.74
2nd	1369.461	1943.8	35.514	570.6	283.1	1969.61	46.653	1196.8	0.72
3rd	301.400	583.0	27.976	245.1	243.9	605.65	32.220	700.0	0.83

SLEEVE JOINT FOR PIPE COLUMNS

Project: Shree's Truck Stop
Descript: 88'-0" tall pole sign
Ref: AISC, 14th edition (ASD)



Loads: (at top of joint)

Axial force due to dead load, P_{dl}=	46.65	*kips*
Bending moment due to wind load, $M_{.6w}$=	16,270.83	*kip-in*
Shear due to wind load, $V_{.6w}$=	35.51	*kips*
Torsion, T=	3,406.34	*kip-in*

Geometry:

Outside diameter of upper pipe column=	42.000	*in*
Outside diameter of lower pipe column=	54.000	*in*
Plate separation distance-depth of sl. joint (d)=	107.00	*in, c. to c.*
Fillet weld leg size between upper column and plates=	0.3125	*in*
Fillet weld leg size between top plate and lower column=	0.3125	*in*
Plate thickness=	1.0000	*in*

Analysis:

TOP WELD

Axial load from upper pipe to plates=	46.65	*kips from P_{dl} / each of 1 circ welds*	
Throat area of one circumferential weld=	29.15	*in^2*	
Actual shear stress in each fillet weld due to axial load=	1.60	*ksi*	
J=	*13438.55*	in^4	
Tau=	*5.40*	ksi	
Total stress =	7.00	ksi	<.6Fxx/Ω=21 ksi
	OK		

BOTTOM WELD

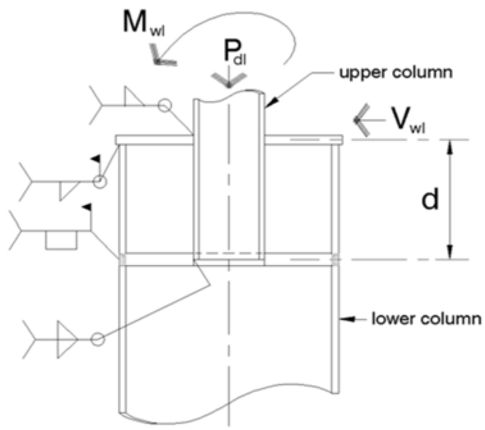
Horizontal force between top plate and lower pipe, F_{top}=	187.58	*kips from M_{wl} and V_{wl}*	
Throat area of circumferential fillet weld=	37.48	*in^2*	
Actual shear stress in weld=	5.00	*ksi*	
J=	*28283.53*	in^4	
Tau=	*3.29*	ksi	
Total stress =	8.29	ksi	<.6Fxx/Ω=21 ksi
	OK		

TOP PLATE DESIGN

Line load at circumference of upper pipe=	0.35	*kips/in*
Annular width of top plate=	6.00	*in*
Maximum bending moment on top plate due to P_{dl}=	2.12	*kip-in / in*
Section modulus of top plate at inner ring=	0.17	*in^3 / in*
Maximum bending stress on top plate=	12.73	*ksi*
Allowable bending stress of flat plate=	27.00	*ksi, A36 steel*
Compression stress on plate segment due to F_{top}=	4.47	*ksi*
kL/r of plate segment=	6.00	
Cc=	126.10	
Allowable axial stress=	21.35	*ki\si*
Axial stress + bending stress interaction=	**0.68**	*<1.0 - OK*

SLEEVE JOINT FOR PIPE COLUMNS

Project: Shree's Truck Stop
Descript: 88'-0" tall pole sign
Ref: AISC, 14th edition (ASD)



Loads: (at top of joint)

Axial force due to dead load, P_{dl}=	38.06	*kips*
Bending moment due to wind load, $M_{.6w}$=	3,580.99	*kip-in*
Shear due to wind load, $V_{.6w}$=	27.98	*kips*
Torsion, T=	282.38	*kip-in*

Geometry:

Outside diameter of upper pipe column=	30.000	*in*
Outside diameter of lower pipe column=	42.000	*in*
Plate separation distance-depth of sl. joint (d)=	61.00	*in, c. to c.*
Fillet weld leg size between upper column and plates=	0.3125	*in*
Fillet weld leg size between top plate and lower column=	0.3125	*in*
Plate thickness=	1.0000	*in*

Analysis:

TOP WELD

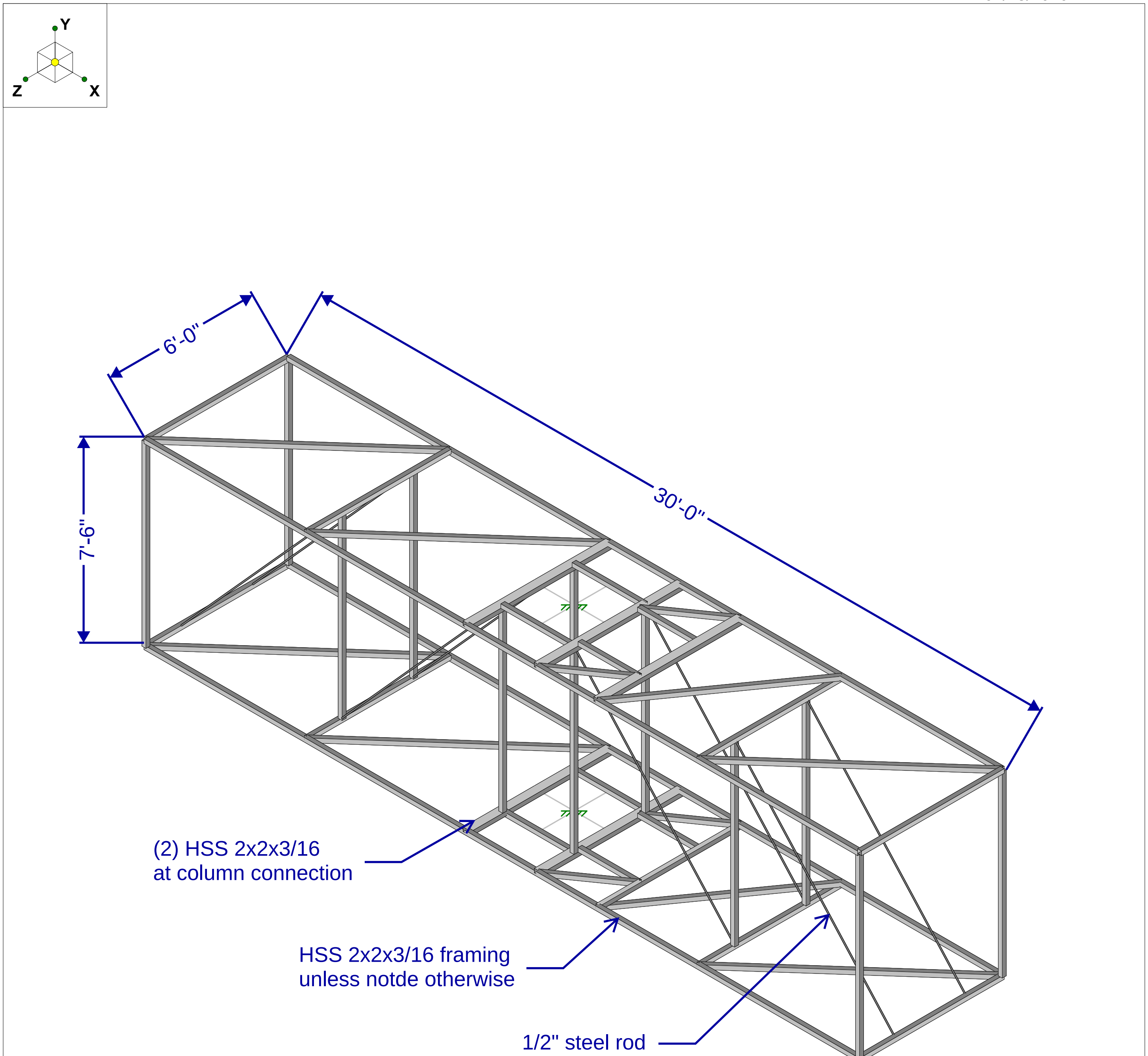
Axial load from upper pipe to plates=	38.06	*kips from P_{dl} / each of 1 circ welds*	
Throat area of one circumferential weld=	20.82	*in^2*	
Actual shear stress in each fillet weld due to axial load=	1.83	*ksi*	
J=	*4984.11*	in^4	
Tau=	*0.87*	ksi	
Total stress =	**2.70**	ksi	<.6Fxx/Ω=21 ksi
	OK		

BOTTOM WELD

Horizontal force between top plate and lower pipe, F_{top}=	86.68	*kips from M_{wl} and V_{wl}*	
Throat area of circumferential fillet weld=	29.15	*in^2*	
Actual shear stress in weld=	2.97	*ksi*	
J=	*13438.55*	in^4	
Tau=	*0.45*	ksi	
Total stress =	**3.42**	ksi	<.6Fxx/Ω=21 ksi
	OK		

TOP PLATE DESIGN

Line load at circumference of upper pipe=	0.40	*kips/in*
Annular width of top plate=	6.00	*in*
Maximum bending moment on top plate due to P_{dl}=	2.42	*kip-in / in*
Section modulus of top plate at inner ring=	0.17	*in^3 / in*
Maximum bending stress on top plate=	14.54	*ksi*
Allowable bending stress of flat plate=	27.00	*ksi, A36 steel*
Compression stress on plate segment due to F_{top}=	2.89	*ksi*
kL/r of plate segment=	6.00	
Cc=	126.10	
Allowable axial stress=	21.35	*ki\si*
Axial stress + bending stress interaction=	**0.67**	*<1.0 - OK*



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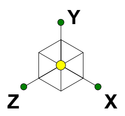
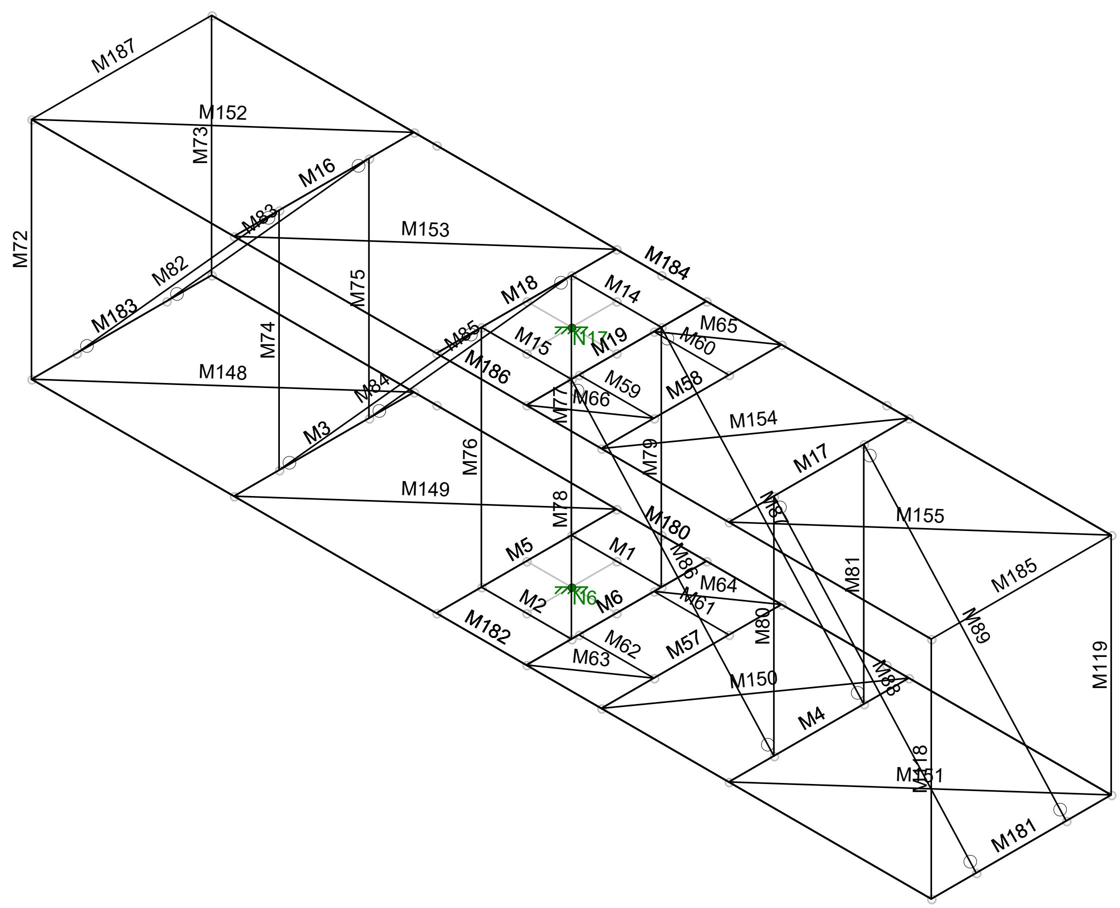
		Apr 15, 2020 at 3:04 PM
		Subway Cabinet.r3d

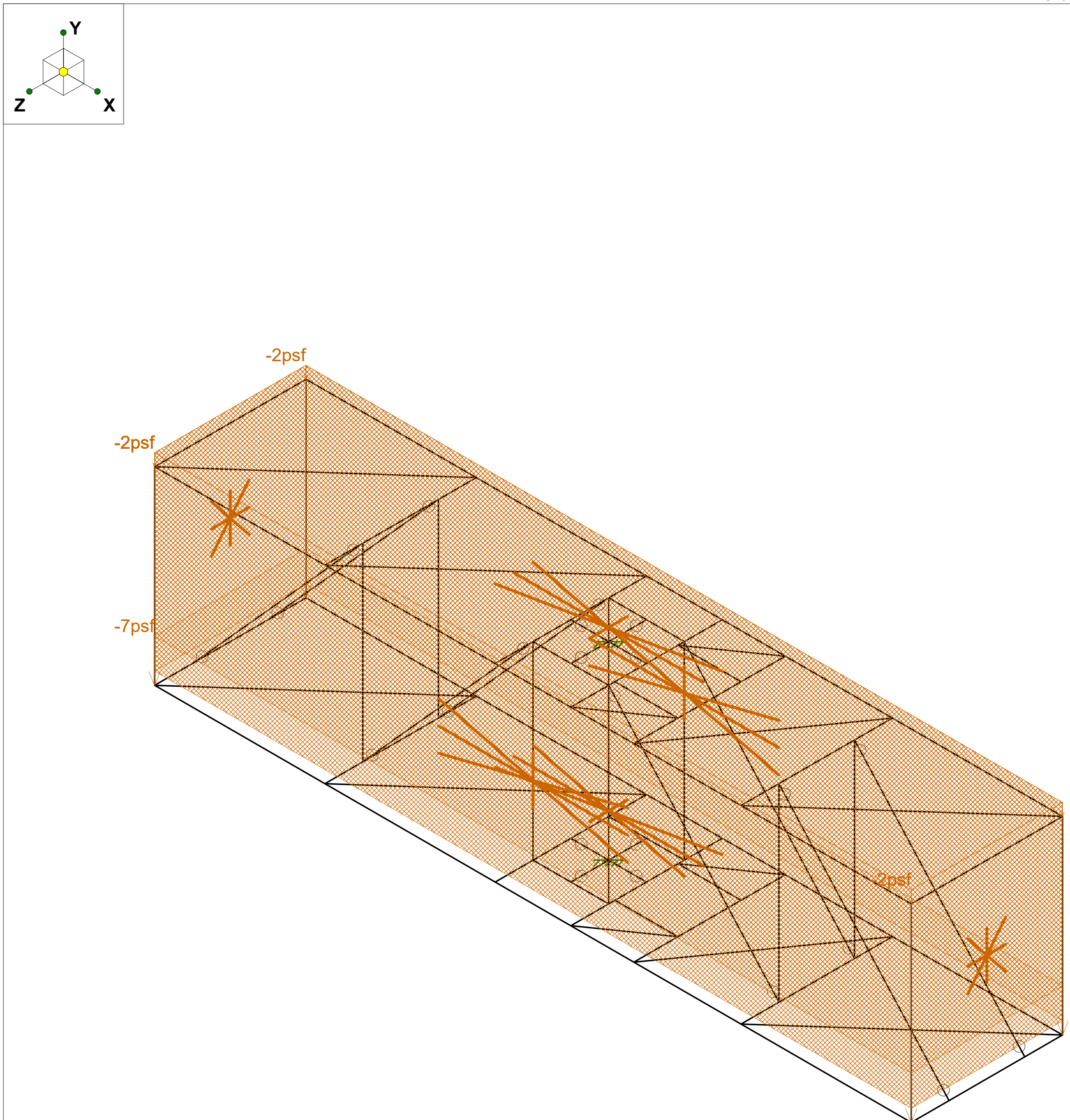




Subway Cabinet

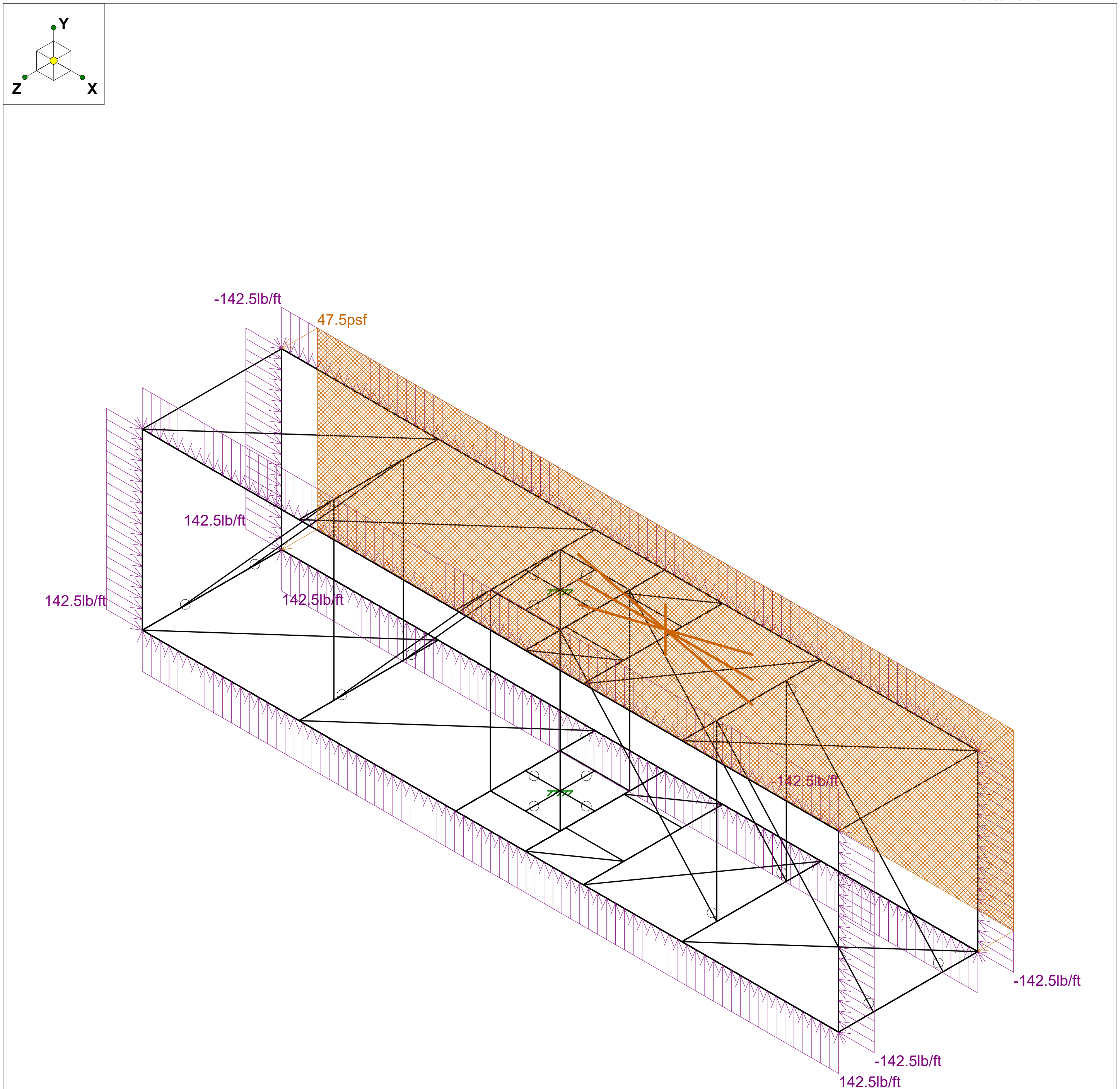
Apr 15, 2020 at 3:06 PM

Subway Cabinet.r3d



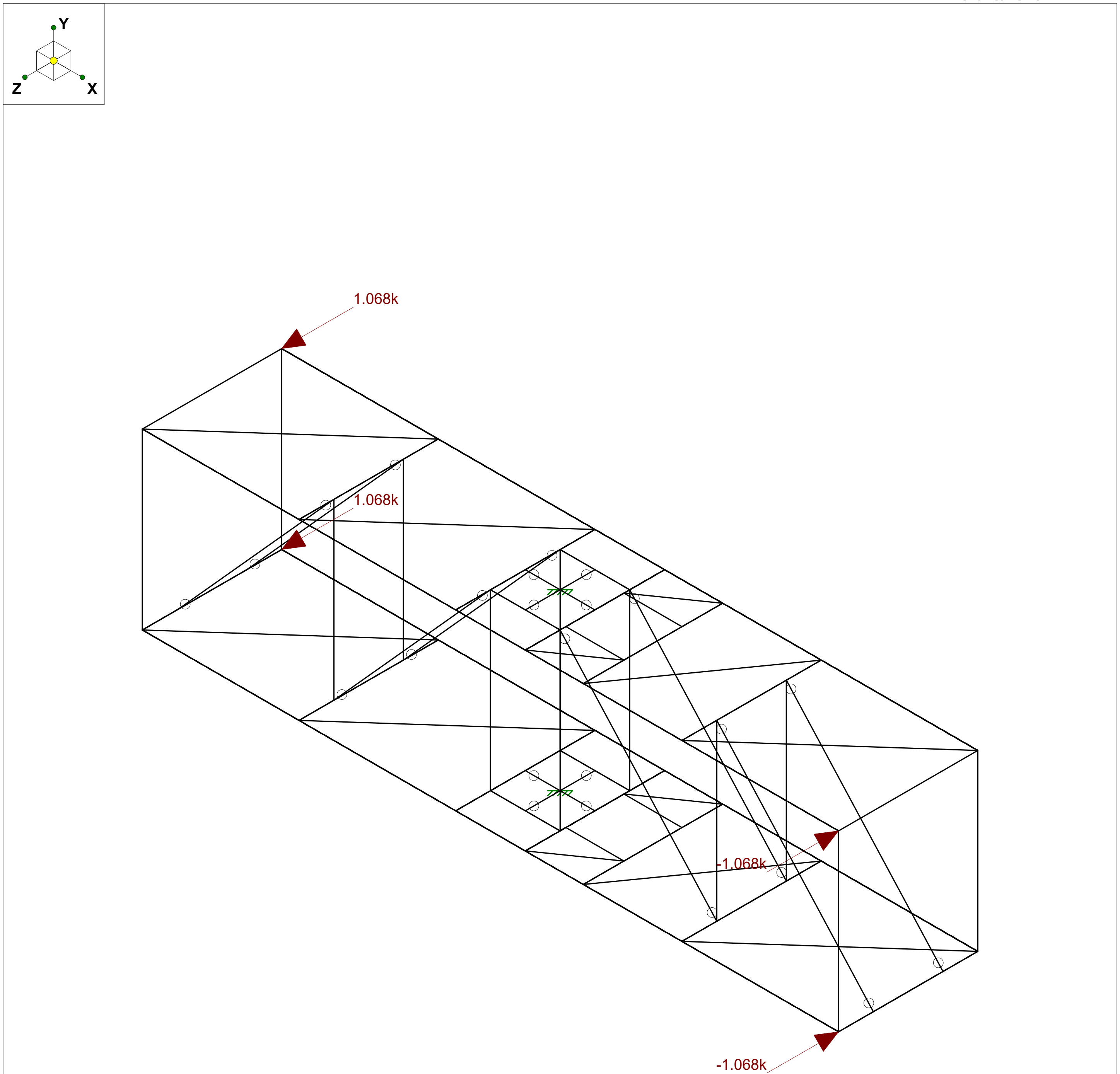
Loads: BLC 1, Dead

	Subway Cabinet	SK - 1
		Apr 15, 2020 at 3:46 PM
		Subway Cabinet.r3d



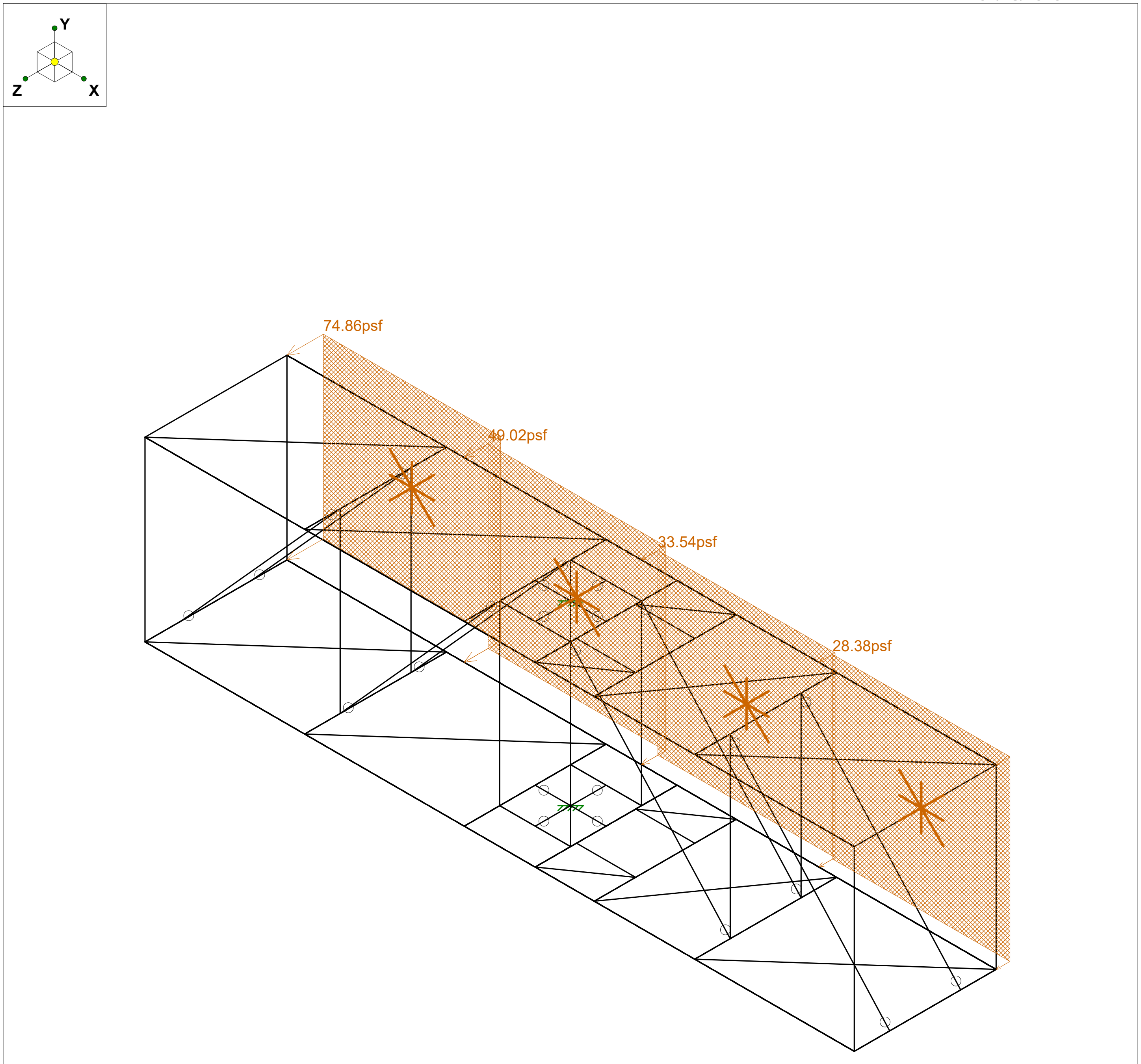
Loads: WL - Wind Load

	Subway Cabinet	
		Apr 15, 2020 at 3:08 PM
		Subway Cabinet.r3d



Loads: BLC 3, Wind(B)

	Subway Cabinet	Apr 15, 2020 at 3:07 PM
		Subway Cabinet.r3d



Loads: BLC 4, Wind(C)

	Subway Cabinet	Apr 15, 2020 at 3:07 PM
		Subway Cabinet.r3d

Company :
Designer :
Job Number :
Model Name : Subway Cabinet

Apr 15, 2020
3:11 PM
Checked By:_____

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E...	Density[k/ft...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A500 Gr.B Rect	29000	11154	.3	.65	.527	46	1.4	58	1.3

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rul...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Chords signs	HSS2X2X3	Beam	SquareTube	A500 Gr.B Rect	Typical	1.19	.641	.641	1.09
2	Frame webs	HSS2X2X3	Beam	SquareTube	A500 Gr.B Rect	Typical	1.19	.641	.641	1.09
3	Bracing	1/2" Rod	Column	None	A36 Gr.36	Typical	.1963	.003	.003	.006
4	Socket	HSS4X2X3	Beam	SquareTube	A500 Gr.B Rect	Typical	1.89	1.22	3.66	3.08

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Dead	DL		-1					6	
2	Wind	WL							1	
3	Wind(B)	None				4				
4	Wind(C)	None							4	
5	Face Pretension	DL						8		
6	Face Wind Tension	WL						8		
7	Wind(C)2	None								
8		None							4	
9	BLC 1 Transient Area...	None						408		
10	BLC 2 Transient Area...	None						72		
11	BLC 4 Transient Area...	None						48		

Load Combinations

	Description	So..	P...	S...	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac...
1	D	Yes	Y		DL	1																
2	D+.6W	Yes	Y		DL	1	WL	.6														
3	D+.6W+.6W(B)	Yes	Y		DL	1	WL	.6	3	.6												
4	D+.6W-.6W(B)	Yes	Y		DL	1	WL	.6	3	-.6												
5	D-.6W+.6W(B)	Yes	Y		DL	1	WL	-.6	3	.6												
6	D-.6W-.6W(B)	Yes	Y		DL	1	WL	-.6	3	-.6												
7	D+.6W(C)	Yes	Y		DL	1	4	.6														
8	D+.6W(C)2	Yes	Y		DL	1	7	.6														

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N6	max	.023	5	5.619	3	3.206	6	.117	3	17.853	6	.195	8
2		min	.011	3	.177	5	-3.197	3	-.076	6	-18.304	3	.177	5
3	N17	max	-.011	3	4.383	5	3.21	5	.098	7	20.846	4	.313	3
4		min	-.023	5	-1.059	3	-3.217	4	-.081	6	-20.391	5	.224	6
5	Totals:	max	0	8	4.56	8	6.412	6						
6		min	0	1	4.56	1	-6.413	2						

Envelope AISC 15th(360-16): ASD Steel Code Checks

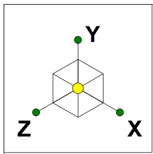
	Member	Shape	Code C...	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om ...	Mnzz/om ...	Cb	Eqn
1	M1	HSS2X2X3	.351	0	4	.055	18	y	4	27.88	32.778	1.829	1.829	1....	H1-1b
2	M2	HSS2X2X3	.336	0	4	.056	18	y	3	27.88	32.778	1.829	1.829	1....	H1-1b

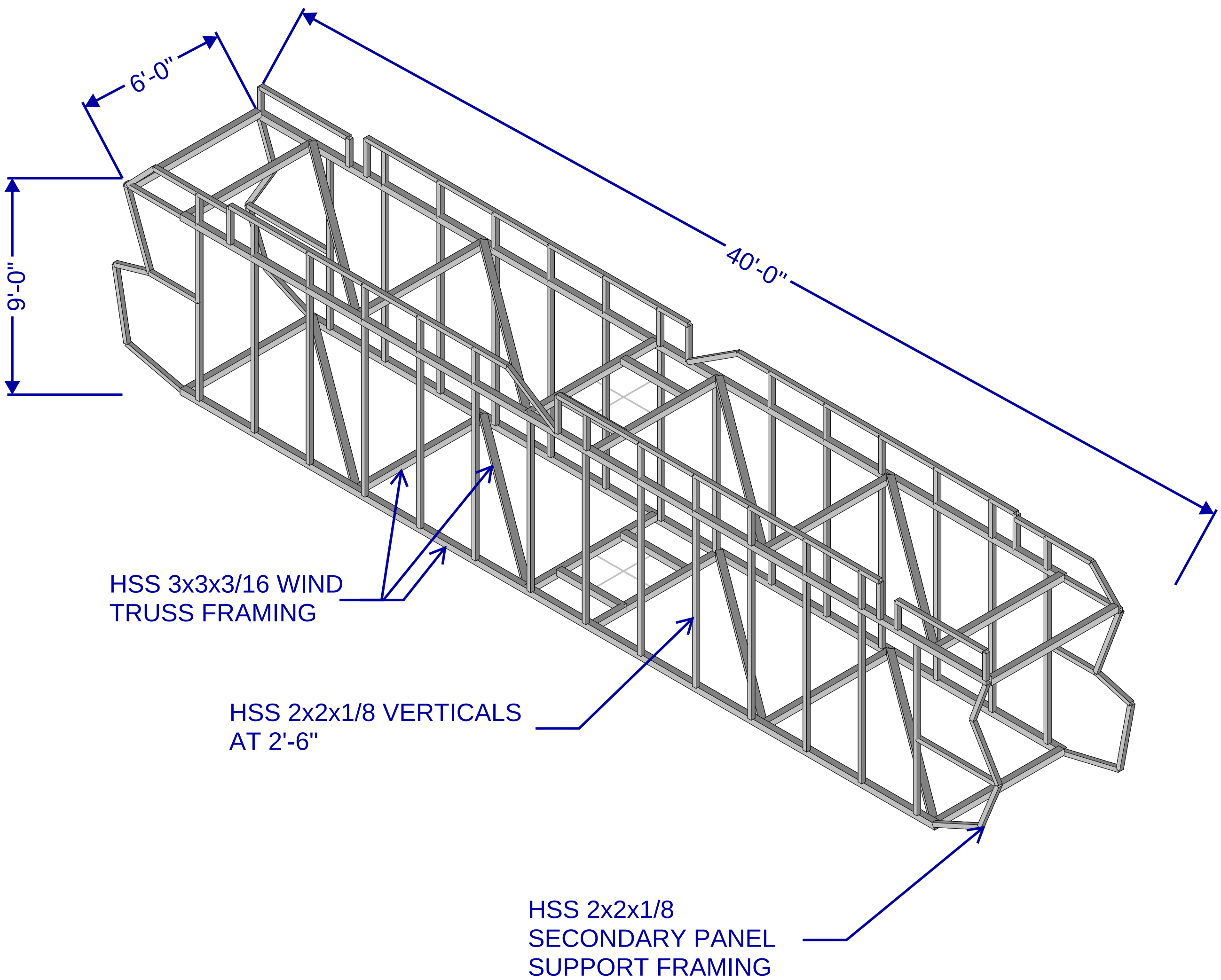
Company	:		Apr 15, 2020
Designer	:		3:11 PM
Job Number	:		Checked By:_____
Model Name	:	Subway Cabinet	

Envelope AISC 15th(360-16): ASD Steel Code Checks (Continued)

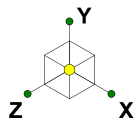
	Member	Shape	Code C...	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om ...	Mnzz/om ...	Cb	Eqn
3	M3	HSS2X2X3	.599	18	3	.112	0	z	5	17.157	32.778	1.829	1.829	1....	H1-1b
4	M4	HSS2X2X3	.614	0	6	.109	54	z	5	17.157	32.778	1.829	1.829	1....	H1-1b
5	M5	HSS4X2X3	.525	54	4	.173	54	z	2	30.331	52.06	3.282	5.371	1....	H1-1b
6	M6	HSS4X2X3	.490	54	4	.177	20.25	z	4	30.331	52.06	3.282	5.371	1....	H1-1b
7	M14	HSS2X2X3	.312	0	4	.047	18	y	6	27.88	32.778	1.829	1.829	1....	H1-1b
8	M15	HSS2X2X3	.322	0	5	.052	18	y	5	27.88	32.778	1.829	1.829	1.7	H1-1b
9	M16	HSS2X2X3	.636	18	3	.127	54	y	4	17.157	32.778	1.829	1.829	1....	H1-1b
10	M17	HSS2X2X3	.529	54	3	.114	18	y	4	17.157	32.778	1.829	1.829	1....	H1-1b
11	M18	HSS4X2X3	.551	54	4	.144	54	z	3	30.331	52.06	3.282	5.371	1....	H1-1b
12	M19	HSS4X2X3	.515	54	4	.262	18	y	3	30.331	52.06	3.282	5.371	1....	H1-1b
13	M72	HSS2X2X3	.371	90	3	.061	90	y	4	11.895	32.778	1.829	1.829	2....	H1-1b
14	M73	HSS2X2X3	.452	0	4	.060	90	y	3	11.895	32.778	1.829	1.829	2....	H1-1b
15	M74	HSS2X2X3	.231	90	3	.049	0	z	3	11.895	32.778	1.829	1.829	1....	H1-1b
16	M75	HSS2X2X3	.221	90	4	.048	0	z	4	11.895	32.778	1.829	1.829	1....	H1-1b
17	M76	HSS2X2X3	.237	90	4	.005	0	z	5	11.895	32.778	1.829	1.829	2....	H1-1b
18	M77	HSS2X2X3	.244	90	3	.005	0	z	4	11.895	32.778	1.829	1.829	2....	H1-1b
19	M78	HSS2X2X3	.251	90	3	.006	0	z	5	11.895	32.778	1.829	1.829	2....	H1-1b
20	M79	HSS2X2X3	.257	90	4	.005	0	y	5	11.895	32.778	1.829	1.829	2....	H1-1b
21	M80	HSS2X2X3	.205	90	4	.046	0	z	5	11.895	32.778	1.829	1.829	2....	H1-1b
22	M81	HSS2X2X3	.203	90	3	.045	0	z	3	11.895	32.778	1.829	1.829	1....	H1-1b
23	M82	1/2" Rod	.103	121.0...	6	.013	0		4	.031	4.233	.034	.034	1....	H1-1b*
24	M83	1/2" Rod	.104	121.0...	7	.015	121.0...		3	.031	4.233	.034	.034	1....	H1-1b*
25	M84	1/2" Rod	.272	121.0...	6	.019	121.0...		4	.031	4.233	.034	.034	1....	H1-1a*
26	M85	1/2" Rod	.265	121.0...	5	.020	121.0...		3	.031	4.233	.034	.034	1....	H1-1a*
27	M86	1/2" Rod	.281	121.0...	5	.018	121.0...		3	.031	4.233	.034	.034	1....	H1-1a*
28	M87	1/2" Rod	.270	121.0...	4	.017	121.0...		4	.031	4.233	.034	.034	1....	H1-1a*
29	M88	1/2" Rod	.087	121.0...	5	.012	121.0...		3	.031	4.233	.034	.034	1....	H1-1b*
30	M89	1/2" Rod	.116	121.0...	4	.012	0		4	.031	4.233	.034	.034	1....	H1-1b*
31	M118	HSS2X2X3	.382	90	4	.059	90	y	3	11.895	32.778	1.829	1.829	2....	H1-1b
32	M119	HSS2X2X3	.446	0	3	.062	90	y	4	11.895	32.778	1.829	1.829	2....	H1-1b
33	M148	HSS2X2X3	.287	108.3...	6	.070	108.3...	y	5	8.203	32.778	1.829	1.829	3....	H1-1b
34	M149	HSS2X2X3	.522	0	6	.071	108.3...	y	3	8.203	32.778	1.829	1.829	3....	H1-1a
35	M150	HSS2X2X3	.282	88.233	4	.066	0	y	3	12.376	32.778	1.829	1.829	1....	H1-1b
36	M151	HSS2X2X3	.206	40.64	4	.072	0	y	5	8.203	32.778	1.829	1.829	1....	H1-1b
37	M152	HSS2X2X3	.210	108.3...	3	.070	108.3...	y	3	8.203	32.778	1.829	1.829	2....	H1-1b
38	M153	HSS2X2X3	.369	108.3...	6	.096	0	y	3	8.203	32.778	1.829	1.829	1.7	H1-1a
39	M154	HSS2X2X3	.274	88.233	4	.085	88.233	y	4	12.376	32.778	1.829	1.829	2....	H1-1b
40	M155	HSS2X2X3	.200	0	4	.066	0	y	3	8.203	32.778	1.829	1.829	2....	H1-1b
41	M180	HSS2X2X3	.569	360	3	.100	0	y	3	14.446	32.778	1.829	1.829	2....	H1-1b
42	M181	HSS2X2X3	.431	0	3	.047	18	y	4	17.157	32.778	1.829	1.829	2....	H1-1b
43	M182	HSS2X2X3	.501	277.5	3	.114	360	y	3	14.446	32.778	1.829	1.829	1....	H1-1a
44	M183	HSS2X2X3	.520	72	7	.044	54	z	3	17.157	32.778	1.829	1.829	3....	H1-1b
45	M184	HSS2X2X3	.540	161.25	4	.121	0	y	4	17.157	32.778	1.829	1.829	2....	H1-1b
46	M185	HSS2X2X3	.168	0	5	.012	0	y	4	17.157	32.778	1.829	1.829	1....	H1-1b
47	M186	HSS2X2X3	.507	198.75	3	.132	360	y	3	14.446	32.778	1.829	1.829	2....	H1-1a
48	M187	HSS2X2X3	.331	72	7	.020	72	y	3	17.157	32.778	1.829	1.829	2....	H1-1b
49	M57	HSS2X2X3	.401	51	5	.073	51	y	5	17.157	32.778	1.829	1.829	2....	H1-1b
50	M58	HSS4X2X3	.411	51	4	.090	51	y	4	30.331	52.06	3.282	5.371	1....	H1-1b
51	M59	HSS2X2X3	.356	0	4	.058	0	z	5	29.294	32.778	1.829	1.829	2....	H1-1b
52	M60	HSS2X2X3	.338	0	4	.058	0	z	5	29.294	32.778	1.829	1.829	2....	H1-1b
53	M61	HSS2X2X3	.286	0	5	.068	0	z	4	29.294	32.778	1.829	1.829	1....	H1-1b
54	M62	HSS2X2X3	.291	0	5	.063	0	z	4	29.294	32.778	1.829	1.829	2....	H1-1b
55	M63	HSS2X2X3	.092	36.62	6	.018	36.62	y	5	27.724	32.778	1.829	1.829	1....	H1-1b
56	M64	HSS2X2X3	.239	36.62	4	.048	0	y	3	27.724	32.778	1.829	1.829	1.7	H1-1b
57	M65	HSS2X2X3	.242	36.62	4	.029	0	z	5	27.724	32.778	1.829	1.829	2....	H1-1b
58	M66	HSS2X2X3	.144	36.62	4	.027	36.62	y	3	27.724	32.778	1.829	1.829	1....	H1-1b

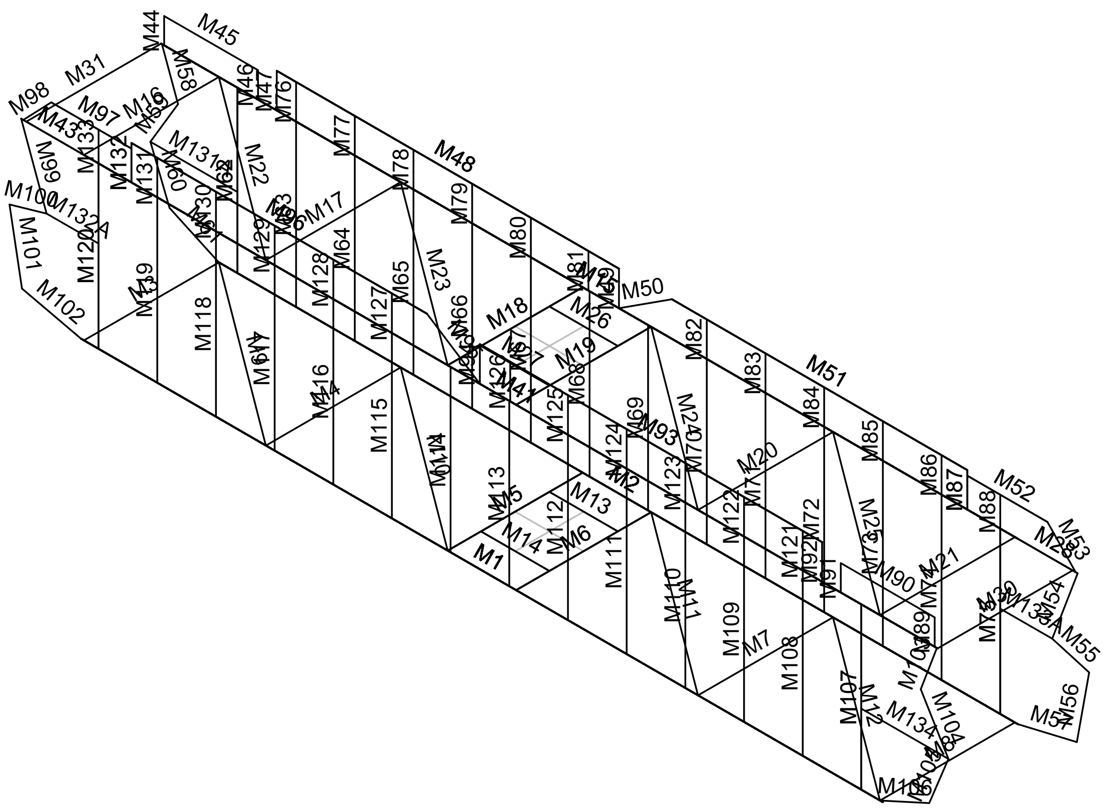
<1.0 OK



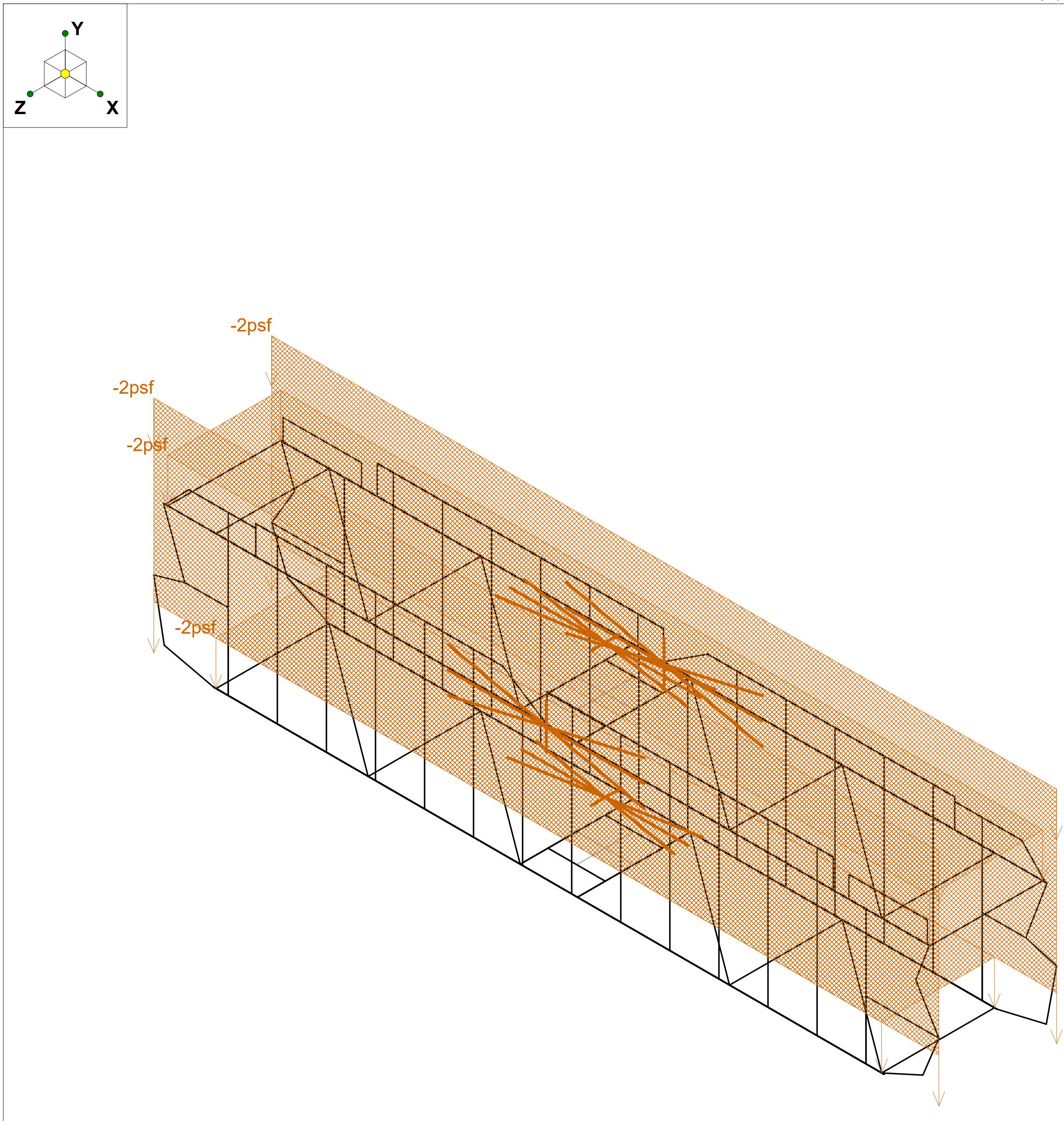


YESCO	Shree's Cabinet	
Carl Meyers		Apr 15, 2020 at 3:30 PM
		Shree's Cabinet.r3d



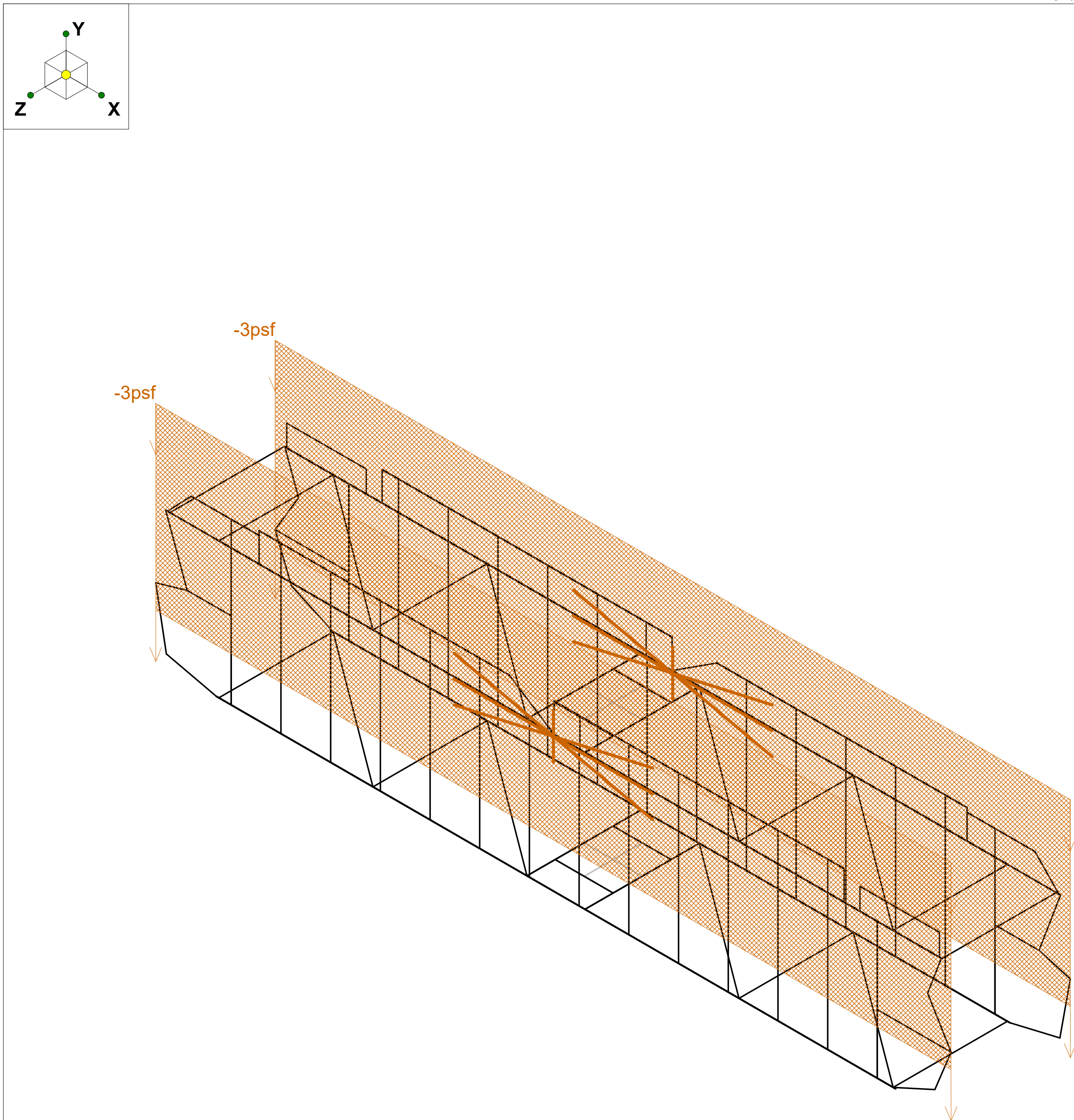


YESCO	Shree's Cabinet	
Carl Meyers		Apr 15, 2020 at 3:30 PM
		Shree's Cabinet.r3d



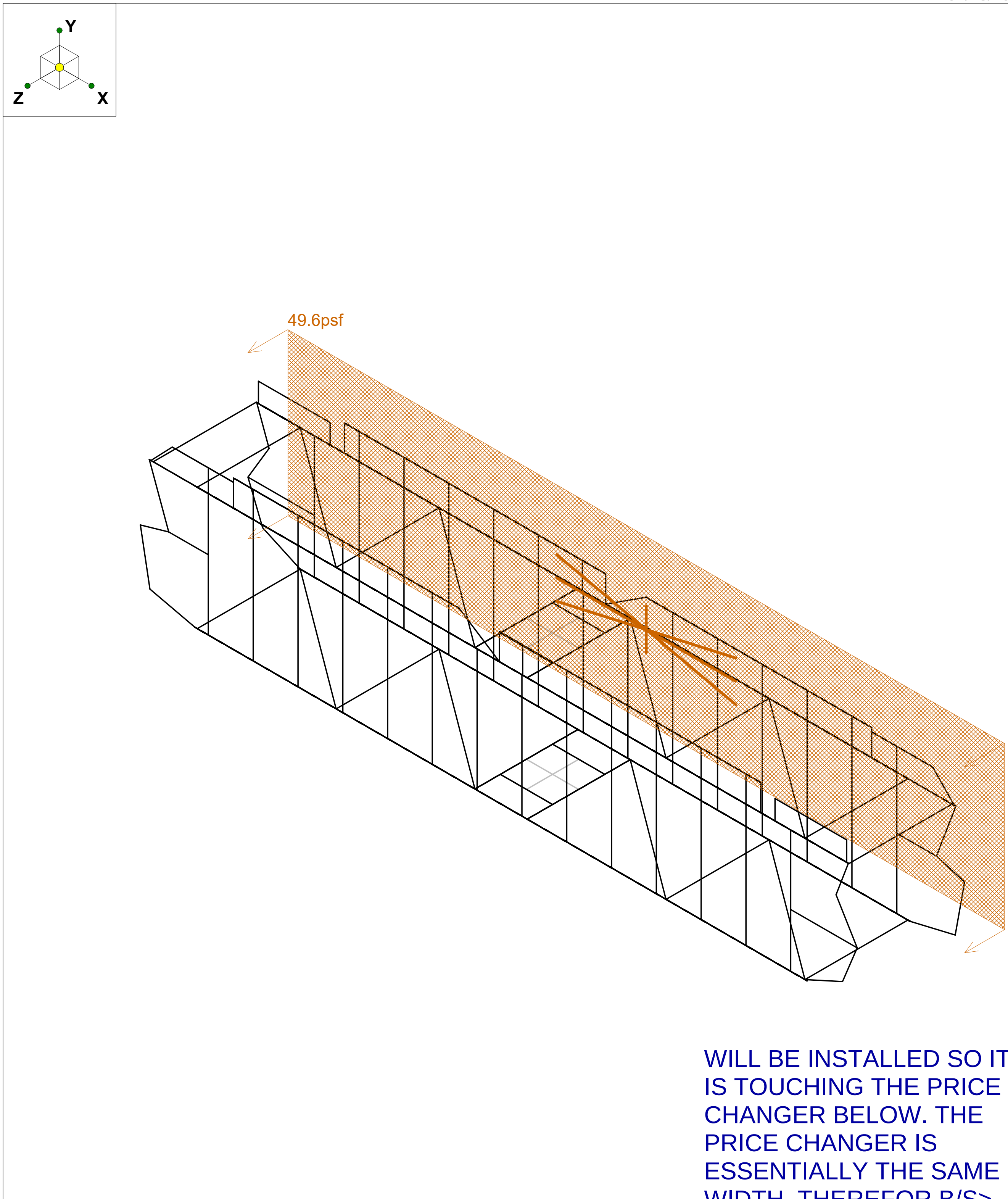
Loads: BLC 2, Skin Weight

YESCO	Shree's Cabinet	
Carl Meyers		Apr 15, 2020 at 3:31 PM
		Shree's Cabinet.r3d



Loads: BLC 3, Letter Weight

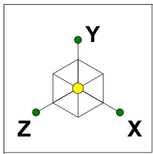
YESCO	Shree's Cabinet	
Carl Meyers		Apr 15, 2020 at 3:31 PM
		Shree's Cabinet.r3d

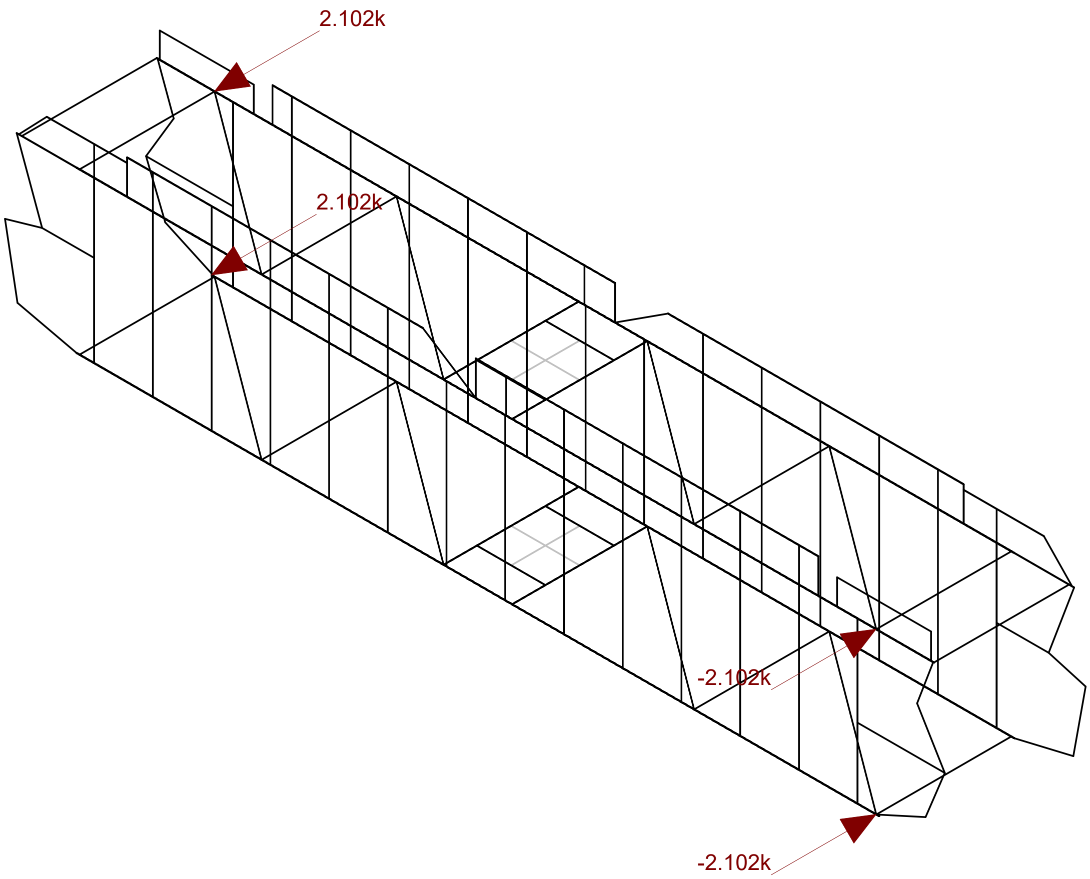


WILL BE INSTALLED SO IT IS TOUCHING THE PRICE CHANGER BELOW. THE PRICE CHANGER IS ESSENTIALLY THE SAME WIDTH, THEREFOR B/S> 2.0, NO CASE C WIND IS REQUIRED.

Loads: BLC 4, Wind (A)

YESCO	Shree's Cabinet	
Carl Meyers		Apr 15, 2020 at 3:31 PM
		Shree's Cabinet.r3d





Loads: BLC 5, Wind (B torsion)

YESCO	Shree's Cabinet	
Carl Meyers		Apr 15, 2020 at 3:31 PM
		Shree's Cabinet.r3d

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E...	Density[k/ft...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A500 Gr.B Rect	29000	11154	.3	.65	.527	46	1.4	58	1.3

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rul...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Cord	HSS3X3X3	Beam	None	A500 Gr.B Rect	Typical	1.89	2.46	2.46	4.03
2	Web	HSS3X3X3	Beam	None	A500 Gr.B Rect	Typical	1.89	2.46	2.46	4.03
3	Socket	HSS3X3X3	Beam	None	A500 Gr.B Rect	Typical	1.89	2.46	2.46	4.03
4	Verts	HSS2X2X2	Column	None	A500 Gr.B Rect	Typical	.84	.486	.486	.796
5	Panel supports	HSS2X2X3	Column	None	A500 Gr.B Rect	Typical	1.19	.641	.641	1.09

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Self Weight	DL								
2	Skin Weight	DL							4	
3	Letter Weight	DL							2	
4	Wind (A)	WL							1	
5	Wind (B torsion)	WL				4				
6	BLC 2 Transient Area...	None						579		
7	BLC 3 Transient Area...	None						465		
8	BLC 4 Transient Area...	None						232		

Load Combinations

	Description	So...	P...	S...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...
1	D	Yes	Y		DL	1																
2	D+.6W	Yes	Y		DL	1	WL	.6														

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N37	max	.024	2	2.631	2	0	1	.484	2	-.63	1	.003	1
2		min	.002	1	2.225	1	-3.865	2	0	1	-43.357	2	-.041	2
3	N42	max	-.002	1	2.211	1	0	1	0	1	.638	1	.003	1
4		min	-.024	2	1.806	2	-6.849	2	-.465	2	-41.459	2	-.091	2
5	Totals:	max	0	2	4.437	2	0	1						
6		min	0	1	4.437	1	-10.714	2						

Envelope AISC 15th(360-16): ASD Steel Code Checks

	Member	Shape	Code C...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om ...	Mnzz/om ...	Cb	Eqn
1	M1	HSS3X3X3	.765	18.507	2	.156	15.66	z	2	52.054	52.06	4.522	4.522	1	H1-1b
2	M2	HSS3X3X3	.723	18.507	2	.223	15.66	z	2	52.054	52.06	4.522	4.522	1	H1-1b
3	M3	HSS3X3X3	.076	5.75	2	.005	0	y	2	40.705	52.06	4.522	4.522	1....	H1-1b
4	M4	HSS3X3X3	.079	5.75	2	.008	5.211	y	1	40.705	52.06	4.522	4.522	1....	H1-1b
5	M5	HSS3X3X3	.674	1.378	2	.321	0	z	2	40.705	52.06	4.522	4.522	1....	H1-1b
6	M6	HSS3X3X3	.753	5.75	2	.331	4.372	z	2	40.705	52.06	4.522	4.522	1....	H1-1b
7	M7	HSS3X3X3	.094	5.75	2	.018	0	y	2	40.705	52.06	4.522	4.522	2....	H1-1b
8	M8	HSS3X3X3	.108	5.75	2	.007	0	y	2	40.705	52.06	4.522	4.522	1....	H1-1b
9	M9	HSS3X3X3	.120	0	2	.014	9.65	y	1	26.033	52.06	4.522	4.522	1....	H1-1b*
10	M10	HSS3X3X3	.225	9.65	2	.021	9.65	y	2	26.033	52.06	4.522	4.522	2....	H1-1b
11	M11	HSS3X3X3	.111	0	2	.015	0	y	2	26.033	52.06	4.522	4.522	2....	H1-1b
12	M12	HSS3X3X3	.049	4.725	2	.014	0	y	1	26.033	52.06	4.522	4.522	1....	H1-1b
13	M13	HSS3X3X3	.422	2.917	2	.079	1.458	z	2	48.866	52.06	4.522	4.522	1....	H1-1b
14	M14	HSS3X3X3	.417	0	2	.075	1.458	z	2	48.866	52.06	4.522	4.522	1....	H1-1b
15	M15	HSS3X3X3	.585	18.25	2	.130	18.25	z	2	52.059	52.06	4.522	4.522	1	H1-1b
16	M16	HSS3X3X3	.061	5.75	2	.007	5.211	y	2	40.705	52.06	4.522	4.522	2....	H1-1b

< 1.0 , OK

Envelope AISC 15th(360-16): ASD Steel Code Checks (Continued)

	Member	Shape	Code C...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om ...	Mnzz/om ...	Cb	Eqn
17	M17	HSS3X3X3	.108	5.75	2	.009	5.211	y	1	40.705	52.06	4.522	4.522	2....	H1-1b
18	M18	HSS3X3X3	.657	4.372	2	.324	0	z	2	40.705	52.06	4.522	4.522	1....	H1-1b
19	M19	HSS3X3X3	.647	1.378	2	.359	4.372	z	2	40.705	52.06	4.522	4.522	1....	H1-1b
20	M20	HSS3X3X3	.055	5.75	2	.011	5.211	y	2	40.705	52.06	4.522	4.522	1....	H1-1b
21	M21	HSS3X3X3	.105	5.75	2	.009	5.75	y	2	40.705	52.06	4.522	4.522	1....	H1-1b
22	M22	HSS3X3X3	.155	0	2	.021	9.65	y	2	26.033	52.06	4.522	4.522	1....	H1-1b*
23	M23	HSS3X3X3	.335	9.65	2	.011	9.65	y	2	26.033	52.06	4.522	4.522	2....	H1-1a
24	M24	HSS3X3X3	.130	0	2	.012	0	y	2	26.033	52.06	4.522	4.522	2....	H1-1b
25	M25	HSS3X3X3	.051	9.65	2	.027	0	y	2	26.033	52.06	4.522	4.522	1....	H1-1b
26	M26	HSS3X3X3	.443	2.917	2	.082	1.458	z	2	48.866	52.06	4.522	4.522	1....	H1-1b
27	M27	HSS3X3X3	.408	0	2	.076	1.458	z	2	48.866	52.06	4.522	4.522	1....	H1-1b
28	M28	HSS2X2X3	.251	0	2	.243	2.55	y	2	29.16	32.778	1.829	1.829	2....	H1-1b
29	M30	HSS3X3X3	.080	5.75	2	.010	0	z	2	40.705	52.06	4.522	4.522	1....	H1-1b
30	M31	HSS3X3X3	.080	5.75	2	.008	5.211	y	2	40.705	52.06	4.522	4.522	1....	H1-1b
31	M41	HSS3X3X3	.589	20.531	2	.133	18.25	z	2	51.464	52.06	4.522	4.522	1....	H1-1b
32	M43	HSS2X2X3	.115	0	2	.056	2.55	y	2	29.16	32.778	1.829	1.829	2....	H1-1b
33	M44	HSS2X2X3	.144	0	2	.050	0	y	2	32.094	32.778	1.829	1.829	1....	H1-1b
34	M45	HSS2X2X3	.052	4	2	.017	4	z	2	24.583	32.778	1.829	1.829	3....	H1-1b
35	M46	HSS2X2X3	.161	1.083	2	.068	0	y	2	32.094	32.778	1.829	1.829	1....	H1-1b
36	M47	HSS2X2X3	.059	0	2	.032	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
37	M48	HSS2X2X3	.418	14.583	2	.149	13.368	y	2	3.146	32.778	1.829	1.829	3....	H1-1b
38	M49	HSS2X2X3	.642	1.458	2	.187	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
39	M50	HSS2X2X3	.388	0	2	.073	.028	y	2	28.785	32.778	1.829	1.829	2....	H1-1b
40	M51	HSS2X2X3	.247	12.583	1	.045	1.442	y	2	4.226	32.778	1.829	1.829	2....	H1-1a
41	M52	HSS2X2X3	.227	1.424	2	.044	3.417	y	2	26.572	32.778	1.829	1.829	1....	H1-1b
42	M53	HSS2X2X3	.206	1.729	2	.048	0	y	2	31.062	32.778	1.829	1.829	2....	H1-1b
43	M54	HSS2X2X3	.258	0	2	.045	0	z	2	27.432	32.778	1.829	1.829	2....	H1-1b
44	M55	HSS2X2X3	.197	0	2	.115	1.642	y	2	31.226	32.778	1.829	1.829	1....	H1-1b
45	M56	HSS2X2X3	.148	0	2	.030	0	y	2	28.228	32.778	1.829	1.829	2....	H1-1b
46	M57	HSS2X2X3	.225	2.584	2	.028	2.584	z	2	29.069	32.778	1.829	1.829	1....	H1-1b
47	M58	HSS2X2X3	.306	0	2	.063	0	z	2	30.527	32.778	1.829	1.829	1....	H1-1b
48	M59	HSS2X2X3	.221	2.3	2	.068	2.3	y	2	29.805	32.778	1.829	1.829	2....	H1-1b
49	M60	HSS2X2X3	.140	0	2	.027	2.195	z	2	30.058	32.778	1.829	1.829	2....	H1-1b
50	M61	HSS2X2X3	.252	2.307	2	.042	2.307	z	2	29.787	32.778	1.829	1.829	1....	H1-1b
51	M62	HSS2X2X2	.427	6.833	2	.060	6.833	z	2	10.588	23.138	1.341	1.341	2....	H1-1b
52	M63	HSS2X2X2	.376	6.833	2	.034	6.833	z	2	10.588	23.138	1.341	1.341	2....	H1-1b
53	M64	HSS2X2X2	.430	6.833	2	.039	6.833	z	2	10.588	23.138	1.341	1.341	2....	H1-1b
54	M65	HSS2X2X2	.439	6.833	2	.033	6.833	z	2	10.588	23.138	1.341	1.341	2....	H1-1b
55	M66	HSS2X2X2	.426	0	2	.031	6.833	z	2	10.588	23.138	1.341	1.341	2....	H1-1b
56	M67	HSS2X2X2	.485	0	2	.035	0	z	2	10.588	23.138	1.341	1.341	2....	H1-1b
57	M68	HSS2X2X2	.419	0	2	.034	0	z	2	10.588	23.138	1.341	1.341	2....	H1-1b
58	M69	HSS2X2X2	.376	0	2	.035	0	z	2	10.588	23.138	1.341	1.341	2....	H1-1b
59	M70	HSS2X2X2	.473	0	2	.037	6.833	z	2	10.588	23.138	1.341	1.341	2....	H1-1b
60	M71	HSS2X2X2	.430	6.833	2	.033	6.833	z	2	10.588	23.138	1.341	1.341	2....	H1-1b
61	M72	HSS2X2X2	.441	6.833	2	.035	6.833	z	2	10.588	23.138	1.341	1.341	2....	H1-1b
62	M73	HSS2X2X2	.425	6.833	2	.042	6.833	z	2	10.588	23.138	1.341	1.341	2....	H1-1b
63	M74	HSS2X2X2	.370	6.833	2	.034	6.833	z	2	10.588	23.138	1.341	1.341	2....	H1-1b
64	M75	HSS2X2X2	.465	0	2	.077	6.833	z	2	10.588	23.138	1.341	1.341	2....	H1-1b
65	M76	HSS2X2X3	.091	0	2	.026	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
66	M77	HSS2X2X3	.231	0	2	.063	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
67	M78	HSS2X2X3	.322	0	2	.082	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
68	M79	HSS2X2X3	.266	0	2	.076	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
69	M80	HSS2X2X3	.176	0	2	.053	0	y	1	31.549	32.778	1.829	1.829	2....	H1-1b
70	M81	HSS2X2X3	.438	0	2	.078	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
71	M82	HSS2X2X3	.323	0	2	.065	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
72	M83	HSS2X2X3	.314	0	2	.086	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
73	M84	HSS2X2X3	.312	0	2	.072	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
74	M85	HSS2X2X3	.202	0	2	.055	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
75	M86	HSS2X2X3	.086	0	2	.018	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
76	M87	HSS2X2X3	.079	1.261	1	.124	1.261	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
77	M88	HSS2X2X3	.197	0	2	.069	0	y	2	31.87	32.778	1.829	1.829	2....	H1-1b

< 1.0 OK

Envelope AISC 15th(360-16): ASD Steel Code Checks (Continued)

	Member	Shape	Code C...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om ...	Mnzz/om ...	Cb	Eqn
78	M89	HSS2X2X3	.111	0	2	.027	0	y	2	32.094	32.778	1.829	1.829	1....	H1-1b
79	M90	HSS2X2X3	.026	0	2	.003	0	y	2	24.583	32.778	1.829	1.829	2....	H1-1b
80	M91	HSS2X2X3	.126	1.083	2	.035	0	y	2	32.094	32.778	1.829	1.829	1....	H1-1b
81	M92	HSS2X2X3	.045	0	2	.010	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
82	M93	HSS2X2X3	.343	14.583	2	.122	13.368	y	2	3.146	32.778	1.829	1.829	3....	H1-1b
83	M94	HSS2X2X3	.581	1.458	1	.149	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
84	M95	HSS2X2X3	.396	0	2	.071	.028	y	2	28.785	32.778	1.829	1.829	2....	H1-1b
85	M96	HSS2X2X3	.285	12.583	2	.043	1.442	y	2	4.226	32.778	1.829	1.829	2....	H1-1a
86	M97	HSS2X2X3	.199	1.424	2	.038	3.417	y	2	26.572	32.778	1.829	1.829	1....	H1-1b
87	M98	HSS2X2X3	.197	1.729	2	.048	0	y	2	31.062	32.778	1.829	1.829	2....	H1-1b
88	M99	HSS2X2X3	.099	0	2	.014	0	y	2	27.432	32.778	1.829	1.829	2....	H1-1b
89	M100	HSS2X2X3	.167	0	1	.019	1.642	y	2	31.226	32.778	1.829	1.829	1....	H1-1b
90	M101	HSS2X2X3	.126	2.883	2	.015	0	y	2	28.228	32.778	1.829	1.829	2....	H1-1b
91	M102	HSS2X2X3	.125	0	1	.012	2.584	y	2	29.069	32.778	1.829	1.829	1....	H1-1b
92	M103	HSS2X2X3	.120	0	2	.011	0	y	2	30.527	32.778	1.829	1.829	1....	H1-1b
93	M104	HSS2X2X3	.120	2.3	2	.023	2.3	y	2	29.805	32.778	1.829	1.829	2....	H1-1b
94	M105	HSS2X2X3	.067	2.195	2	.010	0	y	2	30.058	32.778	1.829	1.829	2....	H1-1b
95	M106	HSS2X2X3	.095	2.307	2	.011	0	y	2	29.787	32.778	1.829	1.829	1....	H1-1b
96	M107	HSS2X2X2	.232	6.833	2	.027	0	y	2	10.588	23.138	1.341	1.341	2....	H1-1b
97	M108	HSS2X2X2	.248	6.833	2	.017	0	y	2	10.588	23.138	1.341	1.341	2....	H1-1b
98	M109	HSS2X2X2	.287	6.833	2	.019	0	y	2	10.588	23.138	1.341	1.341	2....	H1-1b
99	M110	HSS2X2X2	.316	6.833	2	.019	0	y	2	10.588	23.138	1.341	1.341	2....	H1-1b
100	M111	HSS2X2X2	.334	6.833	2	.020	0	y	2	10.588	23.138	1.341	1.341	2....	H1-1b
101	M112	HSS2X2X2	.351	0	2	.021	0	y	2	10.588	23.138	1.341	1.341	2....	H1-1b
102	M113	HSS2X2X2	.267	6.833	2	.010	0	y	2	10.588	23.138	1.341	1.341	2....	H1-1b
103	M114	HSS2X2X2	.243	6.833	1	.010	0	y	1	10.588	23.138	1.341	1.341	2....	H1-1b
104	M115	HSS2X2X2	.351	0	1	.018	0	y	2	10.588	23.138	1.341	1.341	2....	H1-1b
105	M116	HSS2X2X2	.305	6.833	2	.019	0	y	2	10.588	23.138	1.341	1.341	2....	H1-1b
106	M117	HSS2X2X2	.281	6.833	2	.018	0	y	1	10.588	23.138	1.341	1.341	2....	H1-1b
107	M118	HSS2X2X2	.251	6.833	2	.015	0	y	1	10.588	23.138	1.341	1.341	2....	H1-1b
108	M119	HSS2X2X2	.223	6.833	2	.013	0	y	1	10.588	23.138	1.341	1.341	2....	H1-1b
109	M120	HSS2X2X2	.315	0	2	.033	0	y	2	10.588	23.138	1.341	1.341	2....	H1-1b
110	M121	HSS2X2X3	.019	1.458	1	.005	0	y	1	31.549	32.778	1.829	1.829	2....	H1-1b
111	M122	HSS2X2X3	.118	0	1	.035	0	y	1	31.549	32.778	1.829	1.829	2....	H1-1b
112	M123	HSS2X2X3	.204	0	1	.059	0	y	1	31.549	32.778	1.829	1.829	2....	H1-1b
113	M124	HSS2X2X3	.236	0	2	.071	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
114	M125	HSS2X2X3	.187	0	2	.056	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
115	M126	HSS2X2X3	.284	0	2	.071	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
116	M127	HSS2X2X3	.248	0	2	.058	0	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
117	M128	HSS2X2X3	.265	0	2	.079	0	y	1	31.549	32.778	1.829	1.829	2....	H1-1b
118	M129	HSS2X2X3	.205	0	1	.059	0	y	1	31.549	32.778	1.829	1.829	2....	H1-1b
119	M130	HSS2X2X3	.124	0	1	.037	0	y	1	31.549	32.778	1.829	1.829	2....	H1-1b
120	M131	HSS2X2X3	.038	1.458	1	.011	0	y	1	31.549	32.778	1.829	1.829	2....	H1-1b
121	M132	HSS2X2X3	.085	1.261	2	.128	1.261	y	2	31.549	32.778	1.829	1.829	2....	H1-1b
122	M133	HSS2X2X3	.148	1.25	2	.050	0	y	2	31.87	32.778	1.829	1.829	2....	H1-1b
123	M131A	HSS2X2X3	.215	0	2	.032	3.708	y	2	25.597	32.778	1.829	1.829	2....	H1-1b
124	M132A	HSS2X2X3	.239	2.213	2	.049	2.005	y	2	30.016	32.778	1.829	1.829	2....	H1-1b
125	M133A	HSS2X2X3	.275	2.213	2	.070	2.213	y	2	30.016	32.778	1.829	1.829	2....	H1-1b
126	M134	HSS2X2X3	.155	3.708	2	.023	3.708	y	2	25.597	32.778	1.829	1.829	2....	H1-1b

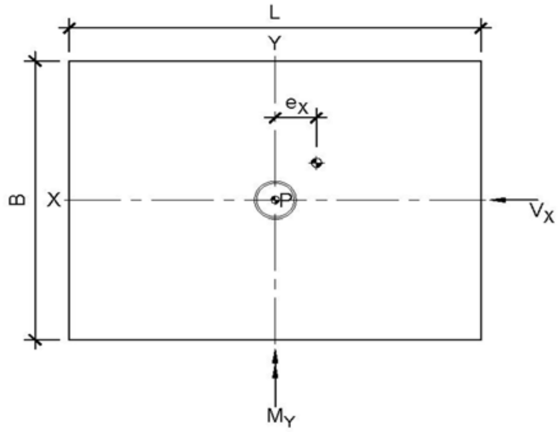
< 1.0, OK

SPREAD FOOTINGS FOR EMBEDDED SIGN COLUMNS (moment about single axis only)

Project: Shree's Truck Stop
Descript: 88'-0" tall pole sign
Ref:

Footing Geometry

# of Footings =	**1**	
Actual Depth of Footing, d =	**5.000**	*ft*
L =	**26.000**	*ft*
B =	**26.000**	*ft*
e_X =	5.31	*ft*



Note: Sign face should be along the y-axis

Forces Transferred to Footing

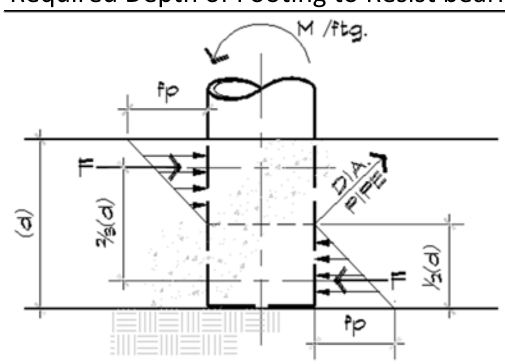
$M_{y(ASD)}$ =	2726.380	k-ft
$V_{X(ASD)}$ =	40.199	*kips*
$P_{(ASD)}$ =	61.596	*kips*
$0.6P_{(ASD)}$ =	36.957	*kips*

Required Depth of Footing to Resist Overturning

Overturning Moment, M_o =	**2927.4**	*k-ft*
Required Stabilizing Moment, $M_s = 1.5M_o$=	**4391.1**	*k-ft*
Concrete Density, ρ =	145	*lb/ft* ^{3}
Weight of Footing =	490.1	*kips*
Required footing depth, d' =	**3.069**	*ft*

d > d', footing depth OK for overturning

Required Depth of Footing to Resist bearing on Concrete



Concrete Strength =	2500	*psi*
Pipe Diameter, d_{pipe} =	54	*in*
Internal Moment =	2826.9	*k-ft*
2/3 (d) =	40.0	*in*
1/2 (d) =	30.0	*in*
F =	868.16	*kips*

Concrete Bearing Capacity (ASD)

Ωc=	2.31	
A_1 =	1620.00	in^2
P_p =	1490.26	*kips*

Pp > F, OK for concrete bearing

Check Footing For Soil Bearing Capacity

Allowable Bearing Pressure:	**1500**	*psf, at grade, Table 1806.2, Class 5*
Allowable Bearing Pressure is:	Net	
$Q_{allowed, gross}$ =	**2225**	*psf*

Kern Check

e_X /L= 0.204 > 1/6

Outside Kern

Soil Bearing Pressure Demand

With Moment about Y Axis Only:

P_{max} = **1840** *psf*

Qallow > Pmax, OK for soil bearing

Use: 2500 psi concrete footing with dimensions of 26 ft perpendicular to sign face by 26 ft parallel to sign face by 5 ft deep

SPREAD FOOTING REINFORCING

Project: Shree's Truck Stop
Descript: 88'-0" tall pole sign
Ref: ACI 318 -14

Material Data, Assumptions and Footing Geometry

Depth of footing / concrete, h =	60	*in*		
Width of strip to analyze, b =	12.00	*in*		
Effective depth of beam, d' =	55.500	*in*	d_t =	55.500
Compressive strength of concrete, f'_c =	2,500	*psi*	β1 =	0.85
Yield Strength of reinforcing, f_y =	60,000	*psi, using Grade 60 deformed bar*		
Number of reinforcing mats, n =	2			
Vertical spacing configuration of mats:	tension bars at bottom of footing			
Cracking Moment , M_{cr} =	225,000	*lb-ft, (24.2.3.5b)*		

Determination of minimum required reinforcing per mat

Req'd area of Steel to meet flexural demand, $A_{s,flex}$ =	0.770	*in^2, section 22.2*	*<<< Governs*
section 9.6 applies:	NO	, Mn > Cracking Moment Mcr	
Req'd min area of steel when $M_n < M_{cr}$, $A_{s(min)}$ =	NA	*in^2, section 9.6.1.2*	
Req'd area of steel for section 9.6.1.2 min. not to apply, $A_{s(min)}'$ =	NA	*in^2, section 9.6.1.3*	
Req'd area of steel to meet temp & shrinkage, $A_{s(min)}''$ =	0.648	*in^2, table 24.4.3.2*	
Maximum allowable spacing, S_{max} =	**18**	*in, section 24.4.3.3*	
Suggested area of tension reinforcing, $A_{s,sug}$ =	0.770	**OK**	
Area of reinforcing provided by single mat, $A_{s,mat}$ =	**0.851**	*in^2 per 12" strip*	
Bar used:	**#8**		
Spacing, each way:	**11**	*in*	
Min. reinf. ratio for temp. and shrinkage, $\rho_{t/s}$ =	0.0018	*, table 24.4.3.2*	
Actual reinf. ratio, $\rho = nA_s/(bd)$ =	0.0024	**>.0018, OK**	

Flexural Capacity Check

Depth of Whitney rectangular stress block, $a=(A_sF_y)/(0.85f'_cb)$ =	2.002	*in*
Depth to neutral axis, $c = a/\beta_1$ =	2.355	*in*
Net tensile strain, ϵ_t =	0.068	> 0.004, OK
	Tension controlled	
Nominal moment capacity of a 12" strip, $M_n=(A_SF_Y)(d-a/2)$ =	231,117	*lb-ft*
Design moment capacity of a 12in strip, ϕMn = 0.9Mn =	**208,005**	*lb-ft*
Actual factored moment on a 12" strip of the footing = M_{uf} =	**189,437**	*lb-ft*
	ΦMn>Mu, OK	

Summary

Use two reinforcing mats of:

#8 bars at 11 in OC perpendicular to sign face &

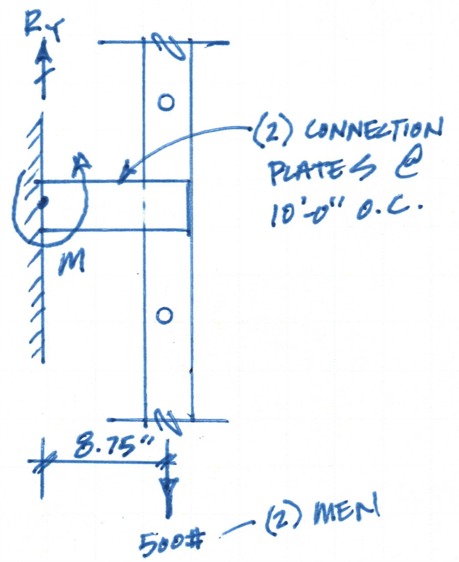
#8 bars at 11 in OC parallel to sign face

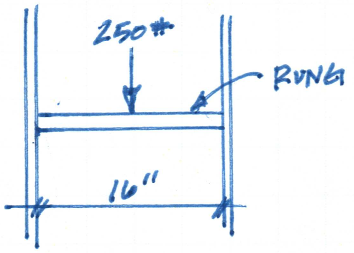
(1) mat at top with 3 in cover & (1) mat at bottom with 3 in cover.

YESCO Engineering
2401 FOOTHILL DR, SALT LAKE CITY, UT 84109
PHONE: 801.464.4600 WWW.YESCO.COM

JOB NAME ______ DATE ______ BY ______
LOCATION ______ SHT ____ OF ____
C:\YESCO AutoCAD Standards\YESCO Standard Blocks\Yesco Title Blocks.dwg

FIXED LADDER DESIGN





- PER OSHA 1917.118(d)(1)(ii) USE FACTOR OF SAFETY OF 4 = F.S.
- REACTIONS @ CONNECTION TO COLUMN

$R_y = (4)(500\#) = 2{,}000\#$

$M = 2{,}000\#\,(13.5") = 27{,}000\#" = 2{,}250\#'$

- (2) CONNECTION PLATES ARE USE ∴

$R_y' = \dfrac{2000}{2} = \underline{1000\#}$

$M' = \dfrac{2250}{2} = 1125\#'$

- TRY: 4" x 3/8" THICK STEEL FOR CONNECTION PLATE:

- $S = \dfrac{4^2(3/8)}{6} = 1\ in^3$
- $Z = \dfrac{4^2(3/8)}{4} = 1.5\ in^3$

$M_n = F_y Z \le 1.6 F_y S_x \Rightarrow 36ksi(1.5) = 54K"$
$= \underline{4{,}500\#'} > M'$ OK

> USE: 4" x 3/8" THICK STEEL PLATE FOR CONNECTION OF LADDER TO COLUMN
> (SEE PAGES THAT FOLLOW FOR WELD DESIGN

- TRY: 1" ϕ STEEL RUNGS

- $S = \dfrac{\pi(1)^3}{32} = 0.0982\ in^3$
- $Z = \dfrac{(1)^3}{6} = 0.167\ in^3$

$M_n = F_y Z \le 1.6 F_y S_x \Rightarrow 1.6(36)(0.0982) = 5.65$
$\underline{471\#'}$

$M = \dfrac{250\#(4)(16/12)}{4} = \underline{333\#'} < M_n$ OK

> USE: 1" ϕ STEEL RUNGS
> (SEE PAGES THAT FOLLOW FOR WELD DESIGN)

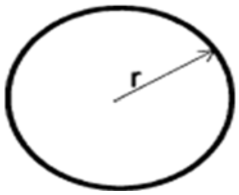
FILLET WELD GROUP DESIGN (ladder rung)

Project: Shree's Truck Stop
Descript: 88'-0" tall pole sign
Ref: ANSI/AISC 360-16, section J2; AISC Steel Construction Manual, 15th Edition, **ASD Design**

Fillet Weld Group Properties

Type 7 Leg Size: **3/16"**

F_{EXX}= **70 ksi**



Dimensions of weld group:

d =
b =
r = 0.5 in
t_w =

Section Properties:

I_{xx} =	0.4	in^4/in
I_{yy} =	0.4	in^4/in
I_p=	0.8	in^4/in
ℓ =	3.142	in
c =	0.707	in
cx =	0.500	in
cy=	0.500	in

Demands on weld group (AISC 15th edition pg 8-12,14)

M_x =	0 k'	$P_{a,x}$=	0 k
M_y=	0 k'	$P_{a,y}$=	0.5 k
M_z =	0 k'	$P_{a,z}$=	0 k

$r_{pa,x} = \frac{P_{a,x}}{l} =$ 0 k/in .... (8-5b)

$r_{pa,y} = \frac{P_{a,y}}{l} =$ 0.16 k/in .... (8-5b)

$r_{pa,z} = \frac{P_{a,z}}{l} =$ 0 k/in .... (8-5b)

$r_{max} = \frac{M_z c_y}{I_p} =$ 0 k/in .... (8-9b)

$r_{max}' = \frac{M_x c_y}{I_{xx}} =$ 0 k/in .... (8-9b sim)

$r_{may} = \frac{M_z c_x}{I_p} =$ 0 k/in .... (8-10b)

$r_{may}' = \frac{M_y c_x}{I_{yy}} =$ 0 k/in .... (8-10b sim)

Worst case demand on one inch of weld in group: (8-11B)

$$r_a = \sqrt{(r_{pax} + r_{max})^2 + (r_{pay} + r_{may})^2 + (r_{max}' + r_{may}' + r_{paz})^2}$$

$r_a =$ **0.16 k/in**

Capacity of one inch of fillet weld (AISC 360 Chapter J)

$\frac{R_n}{\Omega} = \frac{0.6 * F_{EXX}.707\,w}{2}$ = **2.784** *k/in*

$\frac{R_n}{\Omega} > r_a$ **OK**

Use:	**3/16" fillet weld as shown above**
	with 70 ksi electrode filler metal

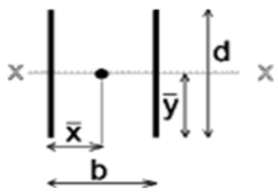
FILLET WELD GROUP DESIGN (ladder connection plate to column)

Project: Shree's Truck Stop
Descript: 88'-0" tall pole sign
Ref: ANSI/AISC 360-16, section J2; AISC Steel Construction Manual, 15th Edition, **ASD Design**

Fillet Weld Group Properties

Type 2 Leg Size: **1/4"**

F_{EXX}= **70 ksi**



Dimensions of weld group:

d = 4 in
b = 0.375 in
r =
t_w =

Section Properties:

I_{xx} =	10.7	in^4/in
I_{yy} =	0.3	in^4/in
I_p=	10.9	in^4/in
ℓ =	8.000	*in*
c =	2.009	*in*
cx =	0.188	*in*
cy=	2.000	*in*

Demands on weld group (AISC 15th edition pg 8-12,14)

M_x =	0.749 k'	$P_{a,x}$=	0 k
M_y=	0 k'	$P_{a,y}$=	1 k
M_z =	0 k'	$P_{a,z}$=	0 k

$r_{pa,x} = \dfrac{P_{a,x}}{l} =$ 0 k/in .... (8-5b)

$r_{pa,y} = \dfrac{P_{a,y}}{l} =$ 0.13 k/in .... (8-5b)

$r_{pa,z} = \dfrac{P_{a,z}}{l} =$ 0 k/in .... (8-5b)

$r_{max} = \dfrac{M_z c_y}{I_p} =$ 0 k/in .... (8-9b)

$r_{max}' = \dfrac{M_x c_y}{I_{xx}} =$ 1.69 k/in .... (8-9b sim)

$r_{may} = \dfrac{M_z c_x}{I_p} =$ 0 k/in .... (8-10b)

$r_{may}' = \dfrac{M_y c_x}{I_{yy}} =$ 0 k/in .... (8-10b sim)

Worst case demand on one inch of weld in group: (8-11B)

$$r_a = \sqrt{(r_{pax} + r_{max})^2 + (r_{pay} + r_{may})^2 + (r_{max}' + r_{may}' + r_{paz})^2}$$

$r_a =$ **1.69 k/in**

Capacity of one inch of fillet weld (AISC 360 Chapter J)

$\dfrac{R_n}{\Omega} = \dfrac{0.6 * F_{EXX}.707\, w}{2}$ = **3.712** *k/in*

$\dfrac{R_n}{\Omega}$ > r_a **OK**

Use:	**1/4" fillet weld as shown above**
	with 70 ksi electrode filler metal