SULLAWAY ENGINEERING
10815 RANCHO BERNARDO RD., SUITE 260, SAN DIEGO, CA 92127
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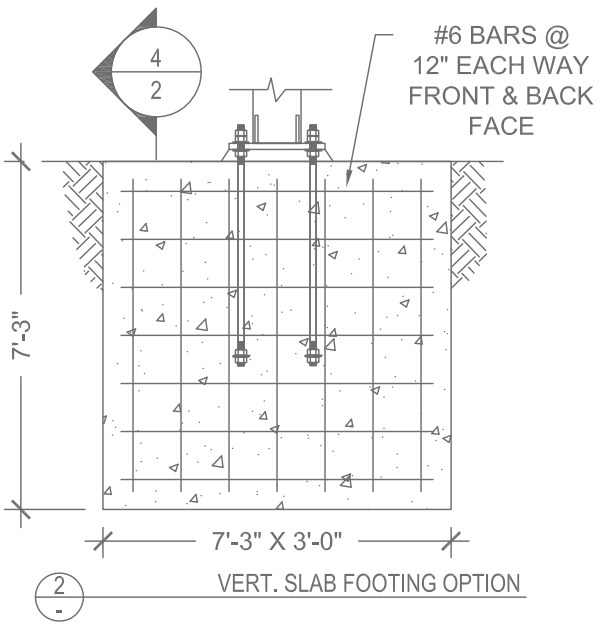
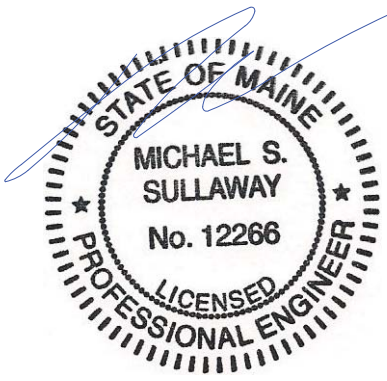
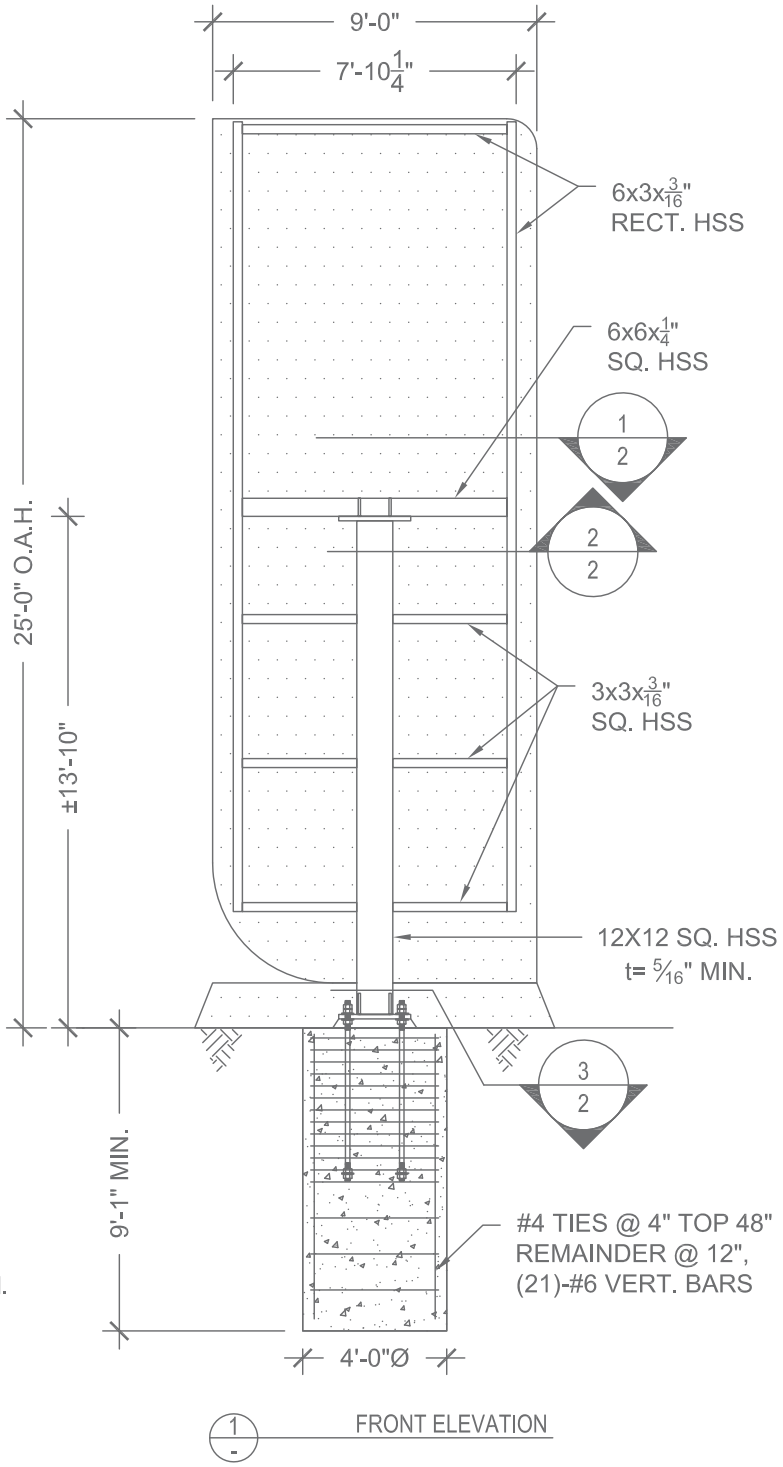
PROJECT:	BERLIN CITY LEXUS OF PORTLAND - 191 RIVERSIDE STREET, PORTLAND, ME	DATE:	9-17-2015
PROJECT #:	9455	ENGINEER:	JS
CLIENT:	ARCHITECTURAL GRAPHICS INC.	PAGES:	



2 - VERT. SLAB FOOTING OPTION



9-17-2015



1 - FRONT ELEVATION

GENERAL NOTES

1. DESIGN CODE: IBC 2009
2. DESIGN LOADS: ASCE 7-05
3. WIND VELOCITY 100 MPH EXPOSURE C
4. SQ./RECT. HSS STEEL ASTM A500 GR. B, Fy = 46 KSI MIN.
5. PLATE STEEL ASTM A36, Fy = 36 KSI MIN.
6. BOLT STEEL ASTM A307
7. ANCHOR ROD STEEL ASTM F1554 GR. 36
8. STEEL REINFORCEMENT ASTM A615 GR. 60
9. CONCRETE 2500 PSI MIN.
10. PROVIDE 3" MIN. CLEAR COVER ON ALL STEEL EMBEDDED IN CONCRETE
11. PROVIDE PROTECTION AGAINST DISSIMILAR METALS
12. LATERAL SOIL BEARING PER IBC CLASS 4 (150 PSF/FT)

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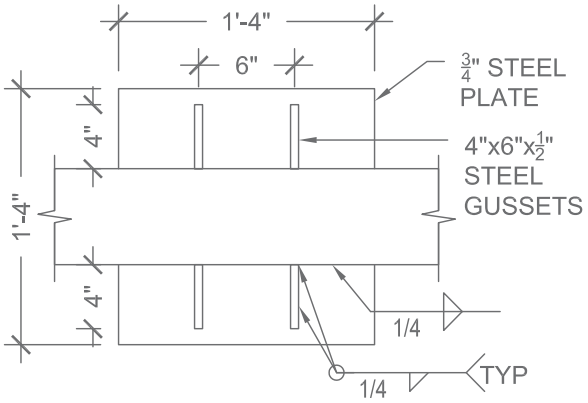
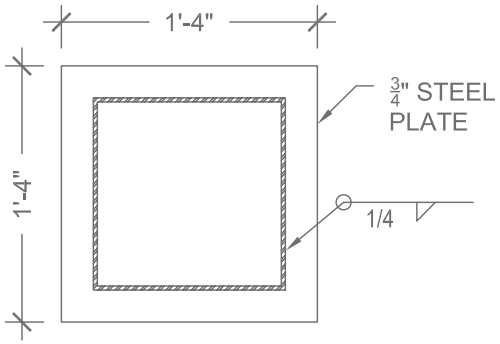
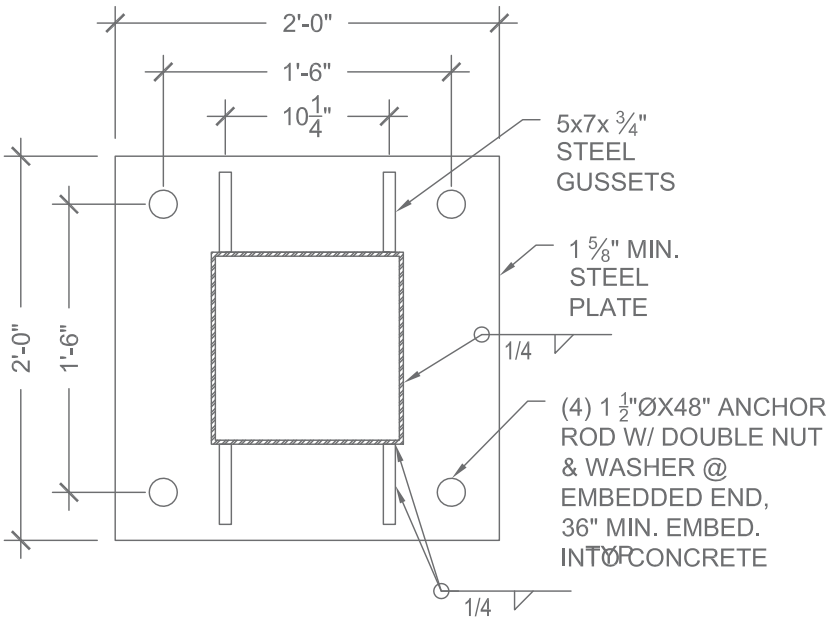


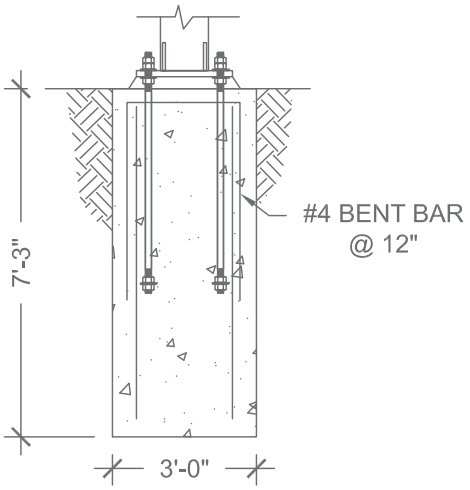
1/1 TOP PLATE DETAIL



2/1 TOP PLATE DETAIL



3/1 BASE PLATE DETAIL



4/1 SECTION

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PROJECT: Berlin City Lexus of Portland — DATE: 9/16/15
PROJ. NO.: 9455 — ENGINEER: AT/JS
CLIENT: ARCHITECTURAL GRAPHICS, INC.

V2.9 building code; IBC 2009 — units; pounds, feet unless noted otherwise

Applied Wind Loads; from ASCE 7-05

$F=q_h*G*C_f*A_s$ with $q_h = 0.00256K_zK_{zt}K_dV^2I$ (ASCE 6.5.10 and 6.5.14)

C_f= 1.597 (ASCE Fig. 6-20) — max. height= 25.0
K_{zt}= 1.0 (unless unusual landscape) — I= 1 for structural category II
K_z= from ASCE table 6-3 — Exposure= c
K_d= 0.85 for signs
V= 100 mph
G= 0.85 (ASCE 6.5.8) — weight= 2.250 kips
s/h= 1.000 — M_{DL}= 0.00 k-ft
B/s= 0.36

Pole Loads	structure component	height at section c.g.	K_z	q_h	pressure q_h*G*C_f	Area	shear	Wind Moment M_W
	1	6.9165	0.85	18.50	25.10	124.5	3125	21615
	2	14.4165	0.85	18.50	25.10	10.5	264	3801
	3	17.5	0.876	19.06	25.87	45.0	1164	20373
	4	22.5	0.92	20.04	27.19	45.0	1224	27533
					sums:	225.00	5777	73.32 (M_w) k-ft arm= 12.69
					for s/h=1, add 10%: x 1.10			80.65

P_u= 2.700 kip — M= 80.65 k-ft $M=sqrt(M_{DL}^2+M_w^2)$

$M_u=sqrt(1.2M_{DL}^2+1.6M_W^2)$ = 129.05 k-ft

Pole Design — section; tube

$M_u \le \phi M_n$ with $M_n = f_yZ$ — f_y= 46 ksi — ϕ= 0.9

H	M_u(k-ft)	Z req'd. (in)	Size(in)	t (in)	Z	USE
at grade	129.046	37.40	10	0.349	47.2	**12x12x5/16 HSS, ϕMn=169 k-ft**
splice at 13.833 ft	24.046	7.0	5	0.233	7.6	**(2) 6x3x3/16 HSS, ϕMn=19.3 k-ft / tube**

Footing Design — footprint: round

ω= 1.3 (IBC 1605.3.2) — IBC Table 1806.2, sections 1806.3.4, 1807.3.2
P= 7.51 kip — S1 = S x d / 3 — A = 2.34 x P / (S1 x b) — S= 400
S1= 1214 — d =0.5xA (1+ (1+4.36x h/A) ^.5) — IBC 1807.3.2.1
A= 3.62

footing: **4' - 0" dia.**
9' - 1" deep

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V= 100 mph
G= 0.85 (ASCE 6.5.8) weight= 2.250 kips
s/h= 1.000 M_{DL}= 0.00 k-ft
B/s= 0.36

Pole Loads	structure component	height at section c.g.	K_z	q_h	pressure q_h*G*C_f	Area	shear	Wind Moment M_W
	1	6.9165	0.85	18.50	25.10	124.5	3125	21615
	2	14.4165	0.85	18.50	25.10	10.5	264	3801
	3	17.5	0.876	19.06	25.87	45.0	1164	20373
	4	22.5	0.92	20.04	27.19	45.0	1224	27533
					sums:	225.00	5777	73.32 (M_w) k-ft arm= 12.69
					for s/h=1, add 10%:	x 1.10		80.65

P_u= 2.700 kip M= 80.65 k-ft $M=sqrt(M_{DL}^2+M_w^2)$

$M_u=sqrt(1.2M_{DL}^2+1.6M_W^2)$ = 129.05 k-ft

Pole Design section; tube

$M_u \le \phi M_n$ with $M_n = f_yZ$ f_y= 46 ksi ϕ= 0.9

H	M_u(k-ft)	Z req'd. (in)	Size(in)	t (in)	Z	USE
at grade	129.046	37.40	10	0.349	47.2	**12x12x5/16 HSS, ϕMn=169 k-ft**
splice at 13.833 ft	24.046	7.0	5	0.233	7.6	**(2) 6x3x3/16 HSS, ϕMn=19.3 k-ft / tube**

Footing Design footprint: rectangle

ω= 1.3 (IBC 1605.3.2) IBC Table 1806.2, sections 1806.3.4, 1807.3.2
P= 7.51 kip S1 = S x d / 3 A = 2.34 x P / (S1 x b) S= 400
S1= 940 d =0.5xA (1+ (1+4.36x h/A) ^.5) IBC 1807.3.2.1
A= 2.38

footing: **7' - 3" by 3' - 0 "**
7' - 1" deep Alt. vert. slab footing

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building code; IBC 2009 units; pounds, feet unless noted otherwise

Check 1 1/2" dia Threaded Rod w/ double nut & washer, 36" min. embed., F1554 Gr. 36

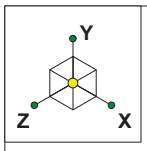
at grade	Mu =	=	129.046	k-ft	
	Vu =	=	10.167	kips	
	s =	=	18.0	in	
	n =	anchors per row =	2		
	T per anchor =	Mu / s / n =	43.02	kips	
	V per anchor =	Vu / n =	5.08343	kips	
Per AISC Table 7-1 & 7-2 (LRFD):					
	ϕ =	=	0.75		
	A(bolt) =	=	1.767	in^2	
	ϕRnt =	33.8ksi * A(bolt) =	59.73	kips	**OK**
	ϕRnv =	20.3ksi * A(bolt) =	35.87	kips	**OK**
Combined Tension & Shear Check:					
	frv =	V per anchor / A(bolt) =	2.88	ksi	
	Fnt =	=	45	ksi	
	Fnv =	=	27	ksi	
	F'nt =	1.3Fnt - Fnt/ϕFnv*frv $\leq$ Fnt =	45	ksi	
	ϕRnt =	ϕF'nt*A(bolt) =	59.6	kips	**OK**

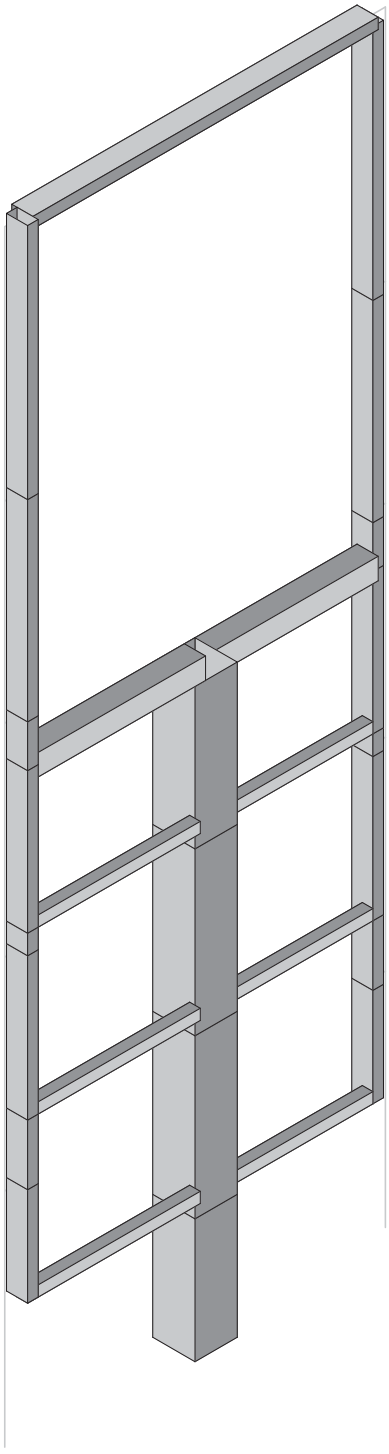
Check 24x24x1-5/8" Steel Base Plate, A36

arm =	=	3.0	in	
Mplate =	T per anchor * arm =	129.05	k-in	
Z =	$bh^2/4 = 6.3125in*(1.5in)^2/4$ =	4.17	in^3	
ϕMn =	ϕ*Fy*Z = 0.9*36ksi*Z =	135.02	k-in	**OK**

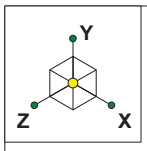
Check 16"x16"x3/4" Steel Plate attached to Torsion Bar, A36

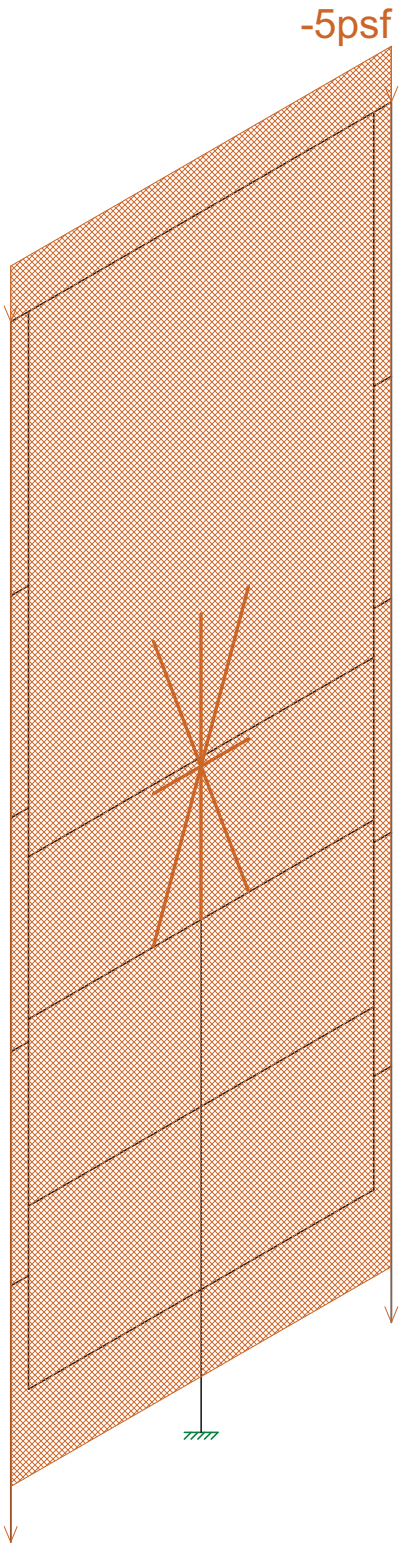
at 13'-10"	Mu =	=	24.05	k-ft	
	Vu =	=	2.65	kips	
	s =	=	14	in	
	T per gusset =	Mu / s / 2 =	10.305	kips	
	arm =	=	1.25	in	
	Mplate =	T per gusset * arm =	12.88	k-in	
	Z =	$bh^2/4 = 3in*(0.75in)^2/4$ =	0.422	in^3	
	ϕMn =	ϕ*Fy*Z = 0.9*36ksi*Z =	13.67	k-in	**OK**



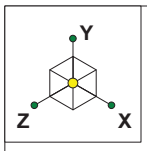


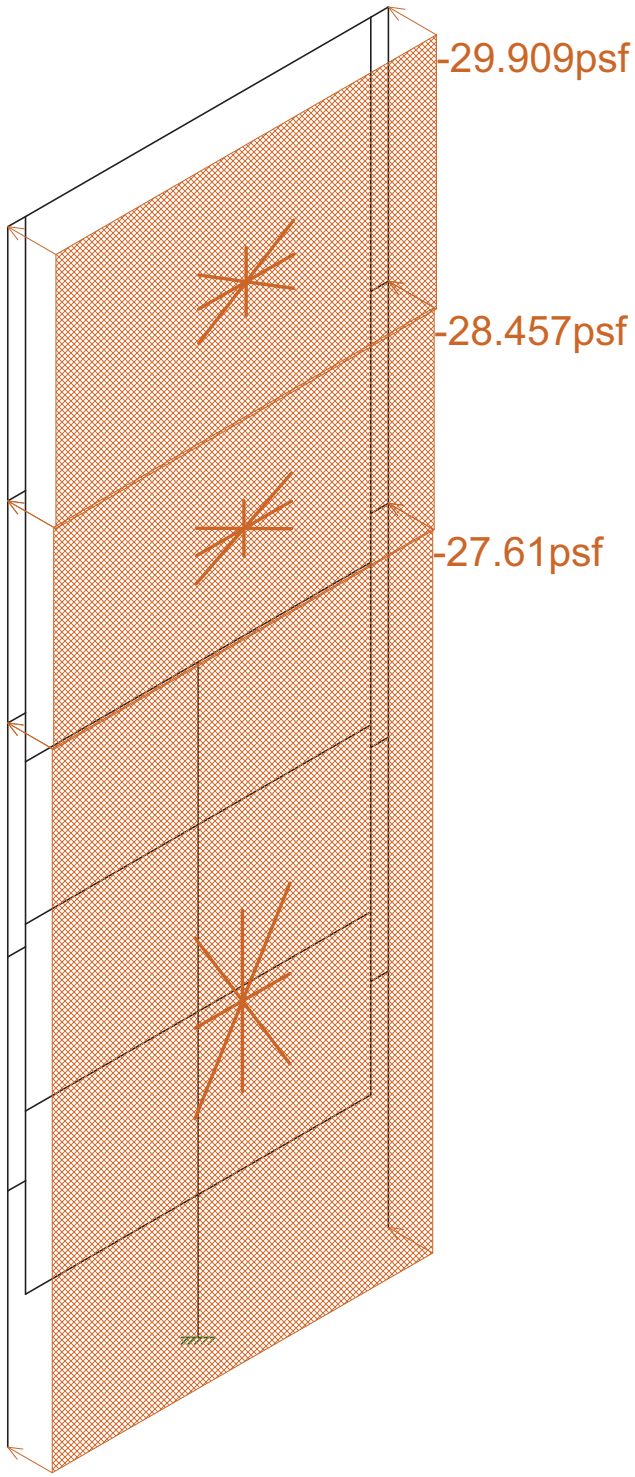
Solution: Envelope





Loads: BLC 1, D
Solution: Envelope





Loads: BLC 2, WL1
Solution: Envelope

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\...	Density[k/ft^3]	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
3	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	.3	.65	.49	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	.3	.65	.49	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	.3	.65	.49	35	1.6	60	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design R...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	12x12x5/16 Upri...	HSS12x12x5	Beam	SquareTube	A500 Gr.B R...	Typical	13.4	304	304	474
2	3x3x3/16 Cross ...	HSS3x3x3	Beam	SquareTube	A500 Gr.B R...	Typical	1.89	2.46	2.46	4.03
3	6x3x3/16 Upright	HSS6x3x3	Beam	SquareTube	A500 Gr.B R...	Typical	2.93	4.55	13.4	11.1
4	6x6x1/4 Torsion ...	HSS6x6x4	Beam	SquareTube	A500 Gr.B R...	Typical	5.24	28.6	28.6	45.6

Basic Load Cases

	BLC Descripti...	Category	X Gra...	Y Gra...	Z Gravity	Joint	Point	Distributed	Area(Member)	Surface(Plate/Wall)
1	D	DL		-1					1	
2	WL1	WL							3	
3	WL2	WL								
4	SL	SL								
5	RLL	RLL								
6	BLC 1 Transi...	None						92		
7	BLC 2 Transi...	None						140		

Load Combinations

	Description	So...	PDelta	SRSS	BLC	Factor	BLC	Factor	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...
1	1.4D	Yes	Y		1	1.4														
2	1.2D+1.6WL1	Yes	Y		1	1.2	2	1.6												
3	0.9D+1.6WL1	Yes	Y		1	.9	2	1.6												

Member Area Loads (BLC 1 : D)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N18	N22	N21	N14	Y	Two Way	-5

Member Area Loads (BLC 2 : WL1)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N24	N17	N13	N23	L	Two Way	-28.457
2	N18	N24	N23	N14	L	Two Way	-29.909
3	N17	N22	N21	N13	L	Two Way	-27.61

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [lb...	LC	MY [l...	LC	MZ [lb-ft]	LC
1	N1	m...	10.181	2	3.613	1	0	3	.002	1	0	1	0	1
2		min	0	1	2.322	3	0	1	.001	3	-.251	2	-130355....	2
3	Totals:	m...	10.181	2	3.613	1	0	3						

Envelope Joint Reactions (Continued)

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [lb...	LC	MY [l...	LC	MZ [lb-ft]	LC
4		min	0	1	2.322	3	0	1						

Envelope AISC 14th(360-10): LRFD Steel Code Checks

	Member	Shape	Code Check	Loc[i...	LC	Shear ...	Loc...	...	...	phi*P...	phi*P...	phi*Mn y-y...	phi*Mn ...	Cb	Eqn
1	M1	HSS12x12x5	.773	0	2	.063	0	y	2	524.0...	554.76	169188.927	169188...	1.099	H1-1b
2	M2	HSS6x6x4	.342	49	2	.068	49	z	2	210.6...	216.9...	38640	38640	2.265	H1-1b
3	M3	HSS6x6x4	.342	0	2	.068	0	z	2	210.6...	216.9...	38640	38640	2.265	H1-1b
4	M4	HSS6x3x3	.102	12	2	.213	0	y	2	120.5...	121.3...	11217.793	19285.5	2.148	H1-1b
5	M5	HSS6x3x3	.102	12	2	.213	0	y	2	120.5...	121.3...	11217.793	19285.5	2.148	H1-1b
6	M6	HSS6x3x3	.107	0	2	.009	0	y	2	80.019	121.3...	11217.793	19285.5	1.694	H1-1b
7	M7	HSS12x12x5	.594	0	2	.066	0	y	2	522.9...	554.76	169188.927	169188...	1.189	H1-1b
8	M8	HSS12x12x5	.357	0	2	.059	0	y	2	522.7...	554.76	169188.927	169188...	1.315	H1-1b
9	M9	HSS6x3x3	.142	27.8...	2	.142	27....	y	2	117.2...	121.3...	11217.793	19285.5	1.477	H1-1b
10	M10	HSS6x3x3	.011	0	2	.008	0	y	3	113.0...	121.3...	11217.793	19285.5	2.981	H1-1b
11	M11	HSS6x3x3	.142	27.8...	2	.142	27....	y	2	117.2...	121.3...	11217.793	19285.5	1.477	H1-1b
12	M12	HSS6x3x3	.011	0	2	.008	0	y	3	113.0...	121.3...	11217.793	19285.5	2.981	H1-1b
13	M13	HSS3x3x3	.221	49	2	.166	0	z	2	69.115	78.246	6796.5	6796.5	2.538	H1-1b
14	M14	HSS3x3x3	.221	0	2	.166	43....	z	2	69.115	78.246	6796.5	6796.5	2.538	H1-1b
15	M15	HSS3x3x3	.170	49	2	.078	49	z	2	69.115	78.246	6796.5	6796.5	2.385	H1-1b
16	M16	HSS3x3x3	.170	0	2	.078	0	z	2	69.115	78.246	6796.5	6796.5	2.385	H1-1b
17	M27A	HSS6x3x3	.017	54.6...	2	.009	54....	y	3	106.5...	121.3...	11217.793	19285.5	2.477	H1-1b
18	M28A	HSS6x3x3	.017	54.6...	2	.009	54....	y	3	106.5...	121.3...	11217.793	19285.5	2.477	H1-1b
19	M29	HSS6x3x3	.017	17.1...	2	.018	0	z	2	119.7...	121.3...	11217.793	19285.5	1.658	H1-1b
20	M30	HSS6x3x3	.017	17.1...	2	.018	0	z	2	119.7...	121.3...	11217.793	19285.5	1.658	H1-1b
21	M31	HSS6x3x3	.023	0	2	.011	0	y	3	99.648	121.3...	11217.793	19285.5	2.558	H1-1b
22	M32	HSS6x3x3	.023	0	2	.011	0	y	3	99.648	121.3...	11217.793	19285.5	2.558	H1-1b
23	M39	HSS12x12x5	.146	0	2	.047	0	y	2	523.5...	554.76	169188.927	169188...	1.694	H1-1b
24	M40	HSS6x3x3	.073	39.9...	2	.042	39....	y	2	113.2...	121.3...	11217.793	19285.5	2.324	H1-1b
25	M41	HSS6x3x3	.073	39.9...	2	.042	39....	y	2	113.2...	121.3...	11217.793	19285.5	2.324	H1-1b
26	M42	HSS3x3x3	.279	49	2	.040	49	z	2	69.115	78.246	6796.5	6796.5	2.305	H1-1b
27	M43	HSS3x3x3	.279	0	2	.040	0	z	2	69.115	78.246	6796.5	6796.5	2.305	H1-1b
28	M46	HSS6x3x3	.042	0	2	.133	0	z	2	121.14	121.3...	11217.793	19285.5	1.247	H1-1b
29	M47	HSS6x3x3	.042	0	2	.133	0	z	2	121.14	121.3...	11217.793	19285.5	1.247	H1-1b