

PROJECT:	DEER BROOK PLAZA, 1131 NE RICE ROAD, LEE'S SUMMIT, MO
PROJECT #:	38058
CLIENT:	INFINITY SIGN SYSTEMS

3/8" Ø THRU BOLT

2 SADDLE DETAIL, TYP.
MIN. (2) LOCATIONS

STATE OF MISSOURI
MICHAEL F. SULLAWAY
NUMBER
PE-2010022411
PROFESSIONAL ENGINEER

GENERAL NOTES
DESIGN CODE: IBC 2018
DESIGN LOADS: ASCE 7-16
WIND VELOCITY 110 MPH EXPOSURE C
CONCRETE 2500 PSI MINIMUM
PIPE STEEL ASTM A53 GR. B, $F_y = 35$ KSI MIN.
BOLT STEEL ASTM A307, HDG PER ASTM A153, ZP PER ASTM B633
PROVIDE MIN. 3" CLEAR COVER ON ALL STEEL EMBEDDED IN
CONCRETE WHEN CAST AGAINST SOIL

6 STD. PIPE
OD: 6.63"
WALL: 0.280"

12'-0" OAH
10'-1"
1'-4"
5'-11"
6"
2'-0" Ø

1 ELEVATION

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2. DESIGN LOADS: ASCE 7-16
3. WIND VELOCITY 110 MPH EXPOSURE C
4. CONCRETE 2500 PSI MINIMUM
5. PIPE STEEL ASTM A53 GR. B, $F_y = 35$ KSI MIN.
6. BOLT STEEL ASTM A307, HDG PER ASTM A153, ZP PER ASTM B633
7. PROVIDE MIN. 3" CLEAR COVER ON ALL STEEL EMBEDDED IN CONCRETE WHEN CAST AGAINST SOIL
8. LATERAL SOIL BEARING PER IBC CLASS 4 (150 PSF/FT)
9. PROVIDE PROTECTION AGAINST DISSIMILAR METALS
10. ALL DIMENSIONS TO BE VERIFIED PRIOR TO FABRICATION



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V5.5

units; pounds, feet unless noted otherwise

Applied Wind Loads; from ASCE 7-16

$F = q_z * G * C_f * A_f$ with $q_z = 0.00256 K_z K_{zt} K_d V^2$ (29.3.2 & 29.4)
 $C_f = 1.535$ (Fig. 29.3-1) 1.00 0 max. height= 12.000
 $K_{zt} = 1.0$ (26.8.2) (=1.0 unless unusual landscape)
 $K_z =$ from table 28.3-1 Exposure= c
 $K_d = 0.85$ for signs (table 26.6-1)
 $V = 110$ mph
 $G = 0.85$ (26.9) weight= 0.842 kips
 $s/h = 1.000$ $M_{DL} = 0.00$ k-ft
 $B/s = 0.58$

Pole Loads	structure component	height at section c.g	K_z	q_z	pressure $q_z * G * C_f$	A_f	shear	Wind Moment M_w	
	1	0.67	0.85	22.38	29.20	10.22	298	199	
	2	1.46	0.85	22.38	29.20	1.67	49	71	
	3	6.63	0.85	22.38	29.20	69.74	2036	13490	
	4	11.83	0.85	22.38	29.20	2.56	75	883	
					sums:	84.19	2458	14.64	(M_w) k-ft arm= 6.0
					for $s/h=1$, add 10% (asce fig. 29.4-1):	x 1.10		16.11	
					$P_u =$	1.01	kip	$M =$	16.11 k-ft $M = \sqrt{M_{DL}^2 + M_w^2}$
					$M_u = \sqrt{1.2 M_{DL}^2 + 1.0 M_w^2} =$	16.11	k-ft		

Pole Design section; pipe

$M_u \leq \phi M_n$ with $M_n = f_y Z$ $f_y = 35$ ksi $\phi = 0.9$

H	M_u (k-ft)	Z req'd. (in)	Size(in)	t (in)	Z	Use
at grade	16.11	6.14	5	0.258	6.83	6 Std. Pipe, $\phi M_n = 27.8$ k-ft

Footing Design footprint: round

$\omega = 1.3$ IBC 1605.3.2 IBC Table 1806.2, sections 1806.3.4, 1807.3.2 $S = (1.3 \times 2 \times 150 \text{ psf/ft})$
 $P = 1.92$ kip $S_1 = S \times d / 3$ $A = 2.34 \times P / (S_1 \times b)$ $S = 400$
 $S_1 = 791$ $d = 0.5 \times A (1 + (1 + 4.36 \times h/A)^{.5})$ IBC 1807.3.2.1
 $A = 2.83$

footing: 2' - 0" dia.
 5' - 11" deep



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6 Std. Pipe Torsion Capacity

D=	6.63	in					
t=	0.260	in	E=	29	x10e6 psi	F _y =	35 ksi
L=	12.00	ft					
J=	52.94						
C=	15.97	in ³			C=2J/d	J=π/32(d ⁴ -(d-2t) ⁴)	
T _n =F _{cr} C			φ=	0.9		AISC H3	
F _{cr} =1.23E / (sqrt(L/D)(D/t) ^{1.25})			F _{cr} =	133.83	ksi	max;	F _{cr} = 135.44 ksi
F _{cr} =0.6E / ((D/t) ^{1.5})			F _{cr} =	135.44	ksi		
F _{cr} < 0.6F _y			0.6F _y =	21.00	ksi	F _{cr} =	21.00 ksi
T _u =	3.77	k-ft	(29.2psf*84.19ft ² *0.2*(7'-8"), (See Page #2)				
φT _n =	302	k-in	25.15	k-ft	(T _u /φT _n) ² = 0.02		
M _u =	16.11	k-ft	(See Page #2)				
φM _n =	27.80	k-ft	(From AISC Manual)				
			(M _u /φM _n)= 0.58				
M _u /φM _n + (T _u /φT _n) ² = 0.60 OK							



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Check 0.375" Dia. Thru Bolts, A307- Saddle Connection (LRFD): $\phi = 0.75$

Wind Pressure=	P=	29.20 psf	(See Page #2)
Area of signage=	A=	84.19 ft ²	(See Page #2)
Wind Load=	WL=P*A=	2.458 kips	
Dead Load=	DL=1.2*10psf*A=	1.010 kips	
#bolts=	=	2 bolts	
Vu=	Sqrt(WL ² +DL ²)/#bolts=	1.329 kips	
dia.=	=	0.375 in	
Abolt=	=	0.110 in ²	
Fu=	=	60.00 ksi	
Fnv=	0.45*Fu=	27.00 ksi	
$\phi Vn=$	$\phi * Fnv * Abolt=$	2.237 kips	ok