

# SIGN PERMIT APPLICATION

264-7559

SUITE 519785 INSP AREA

SITE ADDRESS: **8908 ELDER CREEK**  
*Elder Creek, @ SWC of 4th Ave, Sacramento CA*

ASSESSOR PARCEL NO. **064-033029**

NAME OF APPLICANT: **PO Box 60700 Sacramento, CA**

LICENSED CONTRACTOR: **Invictus Inc.**

ADDRESS: **PO Box 60700 Sacramento, CA**

ZIP CODE: **95860**

PHONE NO.: **916-924-6300 ext 1**

PERMIT NO.: **9716224**

ZONE: **M-1 ZONE**

SIGN INFORMATION

(A) HEIGHT: **35'** (B) LENGTH: **24'**

(A X B) SIGN AREA: **12 X 24**

POLE SIZE: **24"** FOOTING SIZE: **3'6"**

STREET FRONTAGE (FT): **273'**

OCCUPANCY FRONTAGE (FT): \_\_\_\_\_

OFFICE USE ONLY

ENGINEERING REQUIRED? YES NO APPROVED BY \_\_\_\_\_

DESIGN REVIEW REQUIRED? YES NO APPROVED BY \_\_\_\_\_

SPECIAL PERMIT REQUIRED? YES NO # \_\_\_\_\_

VARIANCE REQUIRED? YES NO # \_\_\_\_\_

LOCATED IN PUD? YES NO WHICH PUD? \_\_\_\_\_

SIGN VALUATION

APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

# CONSTRUCTION LENDING AGENCY

CONSTRUCTION LENDING AGENCY

by affirm under penalty of perjury that there is a construction lending agency for the

ormance of the work for which this permit is issued (Sec. 3097, Civ.C).

License Class \_\_\_\_\_ Lic. Number \_\_\_\_\_

Date \_\_\_\_\_ Contractor \_\_\_\_\_ (Signature)

OWNER - BUILDER DECLARATION

I, as owner of the property, affirm under penalty of perjury that I am exempt from the Contractors License

for the following reason (Sec. 7031.5, Business and Professions Code: Any city or

any which requires a permit to construct, alter, improve, demolish, or repair any

structure, prior to its issuance, also requires the applicant for such permit to file a

statement that he or she is licensed pursuant to the provisions of the Contractors

License Law (Chapter 9 (commencing with Section 7000) of Division 8 of the Business

Professions Code) or that he or she is exempt therefrom and the basis for the

exemption. Any violation of Section 7031.5 by any applicant for a permit

results in the applicant to a civil penalty of not more than five hundred dollars

(9000).

I, as owner of the property, or my employees with wages as their sole

penetration, will do the work, and the structure is not intended or offered for sale

7044. Business and Professions Code: The Contractors License Law does not

apply to an owner of property who builds or improves, and who does such

work himself or herself or through his or her own employees, provided that such

improvements are not intended or offered for sale. If however, the building or

improvement is sold within one year of completion, the owner-builder will have the

burden of proving that he or she did not build or improve for the purpose of sale.

I hereby affirm under penalty of perjury one of the following declarations:

I have and will maintain a certificate of consent to self-insure for

workers compensation as provided for by Section 3700 of the Labor Code

for the performance of work for which the permit is issued.

I have and will maintain workers' compensation insurance as required

by Section 3700 of the Labor Code for the performance of the work for

which this permit is issued. My workers' compensation insurance carrier

and policy number are:

Carrier: **State Farm**

Policy Number: \_\_\_\_\_

This section need not be completed if the permit is for one hundred

dollars (\$100) or less. I certify that in the performance of the work for

which this permit is issued, I shall not employ any person in any manner so

as to become subject to the workers' compensation laws of California and

agree that if I should become subject to the workers' compensation

provisions of Section 3700 of the Labor Code, I shall forthwith comply with

those provisions.

Date: \_\_\_\_\_ Applicant: \_\_\_\_\_

(Signature)

DATE RECEIVED: **12/11/07**

AMOUNT: **2500**

FINAL INSPECTIONS: **8-21-09 MRS**

Signature of Applicant or Agent

Date

City that I have read this application and state that all information is correct. I agree to

obey all city and county ordinances and state laws relating to building construction

and hereby authorize representative of this city to enter upon the abovementioned property

for inspection purposes.

I am exempt under Sec. \_\_\_\_\_ B & P C for this reason: \_\_\_\_\_

Owner: **12/11/07**

(Signature) **Collette Kennedy**

and the City relies on the

representation of the applicant, that the applicant verified all measurements and

drawings shown on the application or accompanying drawings and that the

government to be constructed does not violate any law or private agreement relating

to prohibited locations for such improvements. This building permit does

not authorize any illegal location of any improvement or the violation of any private

agreement relating to location of improvements.

Signature of Applicant or Agent

Date

City that I have read this application and state that all information is correct. I agree to

obey all city and county ordinances and state laws relating to building construction

and hereby authorize representative of this city to enter upon the abovementioned property

for inspection purposes.

I am exempt under Sec. \_\_\_\_\_ B & P C for this reason: \_\_\_\_\_

Owner: **12/11/07**

(Signature) **Collette Kennedy**

CONSTRUCTION LENDING AGENCY

I hereby affirm under penalty of perjury that there is a construction lending agency for the performance of the work for which this permit is issued (Sec. 3097, Civ.C).

Licensee Name \_\_\_\_\_  
 Licensee Address \_\_\_\_\_

LICENSED CONTRACTORS DECLARATION

I hereby affirm under penalty of perjury that I am licensed under provisions of Chapter 1 (commencing with Section 7000) of Division 3 of the Business and Professions Code and my license is in full force and effect.

License Class \_\_\_\_\_ Lic. Number \_\_\_\_\_

Date \_\_\_\_\_ Contractor \_\_\_\_\_ (Signature)

OWNER - BUILDER DECLARATION

I hereby affirm under penalty of perjury that I am exempt from the Contractors License Law for the following reason (Sec. 7031.5, Business and Professions Code: Any city or county which requires a permit to construct, alter, improve, demolish, or repair any structure, prior to its issuance, also requires the applicant for such permit to file a signed statement that he or she is licensed pursuant to the provisions of the Contractors License Law (Chapter 9 (commencing with Section 7000) of Division 8 of the Business and Professions Code) or that he or she is exempt therefrom and the basis for the signed exemption. Any violation of Section 7031.5 by any applicant for a permit subjects the applicant to a civil penalty of not more than five hundred dollars (\$500):

I, as owner of the property, or my employees with wages as their sole compensation, will do the work, and the structure is not intended or offered for sale pursuant to Section 7044, Business and Professions Code: The Contractors License Law does not apply to an owner of property who builds or improves thereon, and who does such work himself or herself or through his or her own employees, provided that such improvements are not intended or offered for sale. If, however, the building or improvement is sold within one year of completion, the owner-builder will have the burden of proving that he or she did not build or improve for the purpose of sale.)

I, as owner of the property, am exclusively contracting with licensed contractors to construct the project (Sec. 7044, Business and Professions Code: The Contractors License Law does not apply to an owner of property who builds or improves thereon, and who does such work himself or herself or through his or her own employees, provided that such improvements are not intended or offered for sale.) I have contracts for such projects with a contractor(s) licensed pursuant to the Contractors License Law.)

I am exempt under Sec. \_\_\_\_\_ B & P C for this person \_\_\_\_\_  
 12/11/97 \_\_\_\_\_ Owner (Signature) *Richard A. Beatty*  
 Issuing this building permit, the applicant represents, and the City relies on the representation of the applicant, that the applicant verified all measurements and conditions shown on the application or accompanying drawings and that the improvement to be constructed does not violate any law or private agreement relating to a restricted or prohibited location for such improvements. This building permit does not authorize any illegal location of any improvement or the violation of any private agreement relating to location of improvements.

I hereby affirm that I have read this application and state that all information is correct. I agree to comply with all city and county ordinances and state laws relating to building construction and hereby authorize representative of this city to enter upon the above-mentioned property for inspection purposes.

Date \_\_\_\_\_ Signature of Applicant or Agent \_\_\_\_\_

SIGN PERMIT APPLICATION 264-7559

SITE ADDRESS **8908 ELDER CREEK** SUITE **519785** INSP AREA  
**Elle Creek, @ S.W. of Elder Hwy, Sacramento, CA**

ASSESSOR PARCEL NO. **064-033029** PERMIT NO. **971622K**

NAME OF APPLICANT **PO Box 60700 Sacramento, CA** ADDRESS **14-1 ZONE**

LICENSED CONTRACTOR **Invictus Inc.** ZIP CODE **95860** PHONE NO. **916-929-6300 ext.**

SIGN INFORMATION

ATTACHED  INTERIOR / ELECT.  SINGLE FACED  (A) HEIGHT **35'**  (B) LENGTH **24'**  
 ILLUMINATED  NON-ILLUMINATED  BILLBOARD / SUBDIVISION  
 INDIVIDUAL LETTERS  PAINTED ON BUILDING  LOGO (A X B) SIGN AREA **12 x 24**  
 METAL  POLE  DOUBLE FACED  
 PLASTIC  MONUMENT  VINYL/GATOR FOAM  
 WOODEN  PROJECTING  RE-FACE  
 POLE SIZE **24"** FOOTING SIZE **3'6"**  
 STREET FRONTAGE (FT) **3.73'**  
 OCCUPANCY FRONTAGE (FT) \_\_\_\_\_  
 OFFICE USE ONLY

**CITY OF SACRAMENTO** **PERMIT SERVICES**  
**BUILDING INSPECTION DIVISION** **264-7619**

WORKERS COMPENSATION DECLARATION

I hereby affirm under penalty of perjury one of the following declarations:  
 I have and will maintain a certificate of consent to self insure for workers' compensation as provided for by Section 3700 of the Labor Code for the performance of work for which the permit is issued.  
 I have and will maintain workers' compensation insurance, as required by Section 3700 of the Labor Code, for the performance of the work for which this permit is issued. My workers' compensation insurance carrier and policy number are:  
 Carrier **State Farm**  
 Policy Number \_\_\_\_\_

This section need not be completed if the permit is for one hundred dollars (\$100) or less. I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner so as to become subject to the workers' compensation laws of California and agree that if I should become subject to the workers' compensation provisions of Section 3700 of the Labor Code, I shall forthwith comply with those provisions.

Date \_\_\_\_\_ Applicant (Signature) \_\_\_\_\_

DESIGN REVIEW REQUIRED?	YES	NO	APPROVED BY	DATE
SPECIAL PERMIT REQUIRED?	YES	NO	DATE	DATE
VARIANCE REQUIRED?	YES	NO	DATE	DATE
LOCATED IN PUD?	YES	NO	WHICH PUD?	
SIGN VALUATION				
A TYPE OF SIGN	PER SQ. FT.	X	SO FT.	DATE
APPROVED BY	DATE			
RECEIVED	DATE			
FINAL INSPECTIONS				
BUILDING INSPECTOR	DATE			
ELECTRICAL INSPECTOR	DATE			
SIGN INSPECTOR	DATE			
RECEIVED	DATE			
SIGN APPLICATION FEE				
SIGN PERMIT FEE				
ELECTRICAL SIGN FEE				
CITY BUSINESS LICENSE				
OTHER				
TOTAL FEES	\$			

THIS PERMIT SHALL EXPIRE BY LIMITATION OF WORK AUTHORIZED IS NOT COMMENCED WITHIN 180 DAYS

CITY OF SACRAMENTO  
BUILDING INSPECTION \* DEPARTMENT OF PLANNING AND DEVELOPMENT  
1231 I STREET \* SACRAMENTO, CA 95814 \* PHONE (916)264-7619

STRUCTURAL TESTS AND INSPECTIONS SCHEDULE

PRIOR TO OBTAINING THE PERMIT, THE PROJECT OWNER SHALL COMPLETE, SIGN AND SUBMIT THIS FORM FOR THE BUILDING INSPECTION DIVISION FOR APPROVAL.

PROJECT NAME: \_\_\_\_\_  
PROJECT ADDRESS: 8908 Elder Creek

PLAN REVIEW # \_\_\_\_\_  
PERMIT NUMBER \_\_\_\_\_

TESTING/INSPECTION AGENCY/IES: \_\_\_\_\_

OWNER'S NAME: \_\_\_\_\_ SIGNATURE: \_\_\_\_\_  
(Please Print)

hereby certifies that the Testing/Inspection agency named above has been engaged to perform structural tests and inspections during construction, as noted below, to satisfy all applicable portions of the Uniform Building Code. J

INSPECTIONS REQUIRED

In accordance with Sections 302 and 306 of the Uniform Building code, special inspections shall be performed on the following items (circled):

Item	Description	Ref. Dwg.*
①	CONCRETE <u><math>f_c' = 3,000</math> psi</u>	<u>1 of 2</u>
2	REINFORCING/PRESTRESS STEEL _____	_____
3	WELDING _____	_____
④	HIGH STRENGTH BOLTING <u>A 325 Bolts</u>	<u>1 of 2, 2 of 2</u>
	STRUCTURAL MASONRY _____	_____
⑤	PILEING <u>DRILLED PIERS</u> CAISSONS <u>3.5' <math>\phi</math> x 13.5' deep</u>	<u>1 of 2</u>
6	SPRAY APPLIED PROOFING _____	_____
7	OTHER _____	_____

\* Referenced drawings listed represent a sample of the item requiring special inspection and are not intended to document all drawings or specifications containing information pertaining to that item.

BID APPROVAL \_\_\_\_\_

Date \_\_\_\_\_

BID # 382102-70

CITY OF SACRAMENTO  
 BUILDING INSPECTION \* DEPARTMENT OF PLANNING AND DEVELOPMENT  
 1231 I STREET \* SACRAMENTO, CA 95814 \* PHONE (916)264-7619

STRUCTURAL TESTS AND INSPECTIONS SCHEDULE

PRIOR TO OBTAINING THE PERMIT, THE PROJECT OWNER SHALL COMPLETE, SIGN AND SUBMIT THIS FORM FOR THE BUILDING INSPECTION DIVISION FOR APPROVAL.

PROJECT NAME: \_\_\_\_\_ PLAN REVIEW # \_\_\_\_\_  
 PROJECT ADDRESS: 8908 Elder Creek PERMIT NUMBER \_\_\_\_\_

TESTING/INSPECTION AGENCY/IES: \_\_\_\_\_  
 \_\_\_\_\_

OWNER'S NAME: \_\_\_\_\_ SIGNATURE: \_\_\_\_\_  
 (Please Print)

hereby certifies that the Testing/Inspection agency named above has been engaged to perform structural tests and inspections during construction, as noted below, to satisfy all applicable portions of the Uniform Building Code. J

INSPECTIONS REQUIRED

In accordance with Sections 302 and 306 of the Uniform Building code, special inspections shall be performed on the following items (circled):

Item	Description	Ref. Dwg.*
①	CONCRETE <u><math>f_c' = 3,000</math> psci</u>	<u>1 of 2</u>
2	REINFORCING/PRESTRESS STEEL _____	_____
3	WELDING _____	_____
④	HIGH STRENGTH BOLTING <u>A 325 Bolts</u>	<u>1 of 2, 2 of 2</u>
5	STRUCTURAL MASONRY _____	_____
⑥	PIILING, <u>DRILLED PIERS</u> CAISSONS <u>3.5' <math>\phi</math> X 13.5' deep</u>	<u>1 of 2</u>
7	SPRAY APPLIED PROOFING _____	_____
8	OTHER _____	_____

\* Retrieved drawings listed represent a sample of the item requiring special inspection and are not intended to represent all drawings or specifications containing information pertaining to that item.

RECEIVED APPROVAL \_\_\_\_\_ Date \_\_\_\_\_ BID # 18202-701

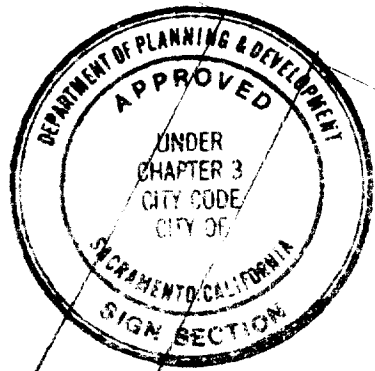
WIDE

10' E. SIDE

10' E. SIDE

EXISTING SIGN TO BE REMOVED

SOUTH WATT



This set of plans and specifications must be kept on the job at all times and it is unlawful to make any changes or alterations from the same without written permission from the City of Sacramento Sign Section.

The approval of this plan and specification SHALL NOT be held to permit or approve the violation of any City Ordinance or State Law.

All electrical work must be U.L. labeled or be of equivalent standards, N.E.C. Sec. 90-6/and comply with chapter 14, Div. 2 of Sacramento City Code.

**EQUIPMENT MUST BE USED AS DESIGN INTENDED  
ALL SIGN INSTALLATIONS ARE SUBJECT TO FIELD INSPECTIONS**

**FILE COPY**

5-19782

PER# 9716189



# Drawing #: 97-102

12' x 24'  
Back to Back  
Centermount  
21' H.A.G.L.  
*(New Build)*

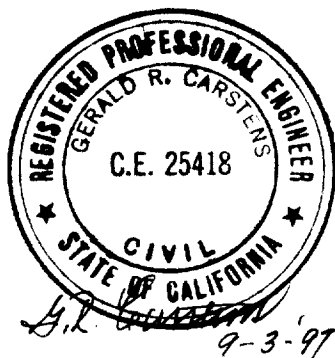
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## Design Wind Load

30 psf w/ 0% eccentricity

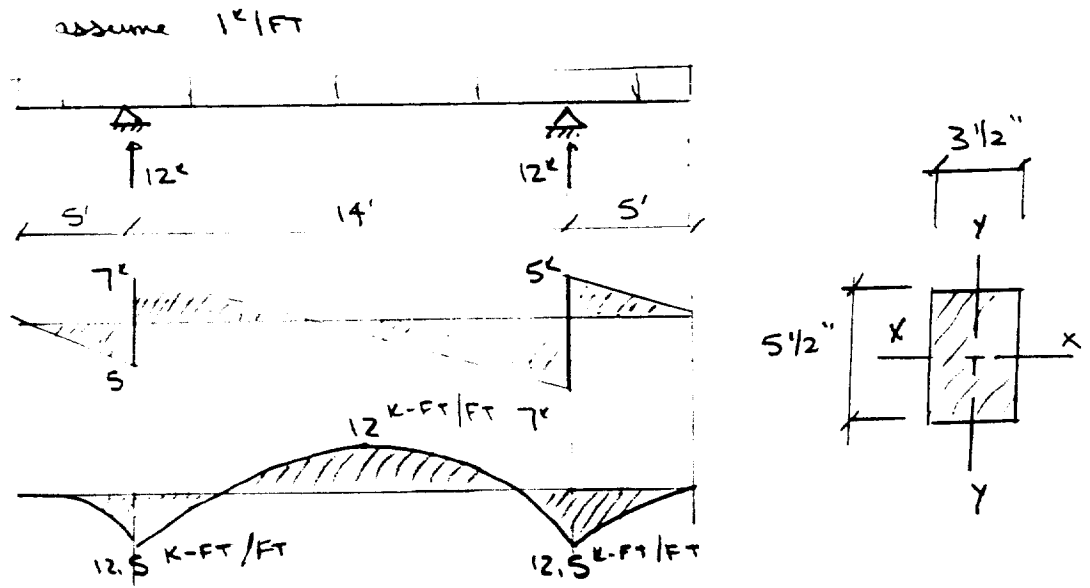
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These structural calculations must be submitted with wet seal dated not over 180 days prior to permit application



Date: August 30, 1997

## STRUNGERS



try 4 stringers  $4 \times 6$  (Nom) NO 2 or BETTER DOUGLAS FIR ( $3\frac{1}{2}'' \times 5\frac{1}{2}''$ )

$$w_{DL} = 30 \text{ psf} (12') / 4 \text{ stringers} = 90 \#/FT = .09 \#/FT$$

$$w_{PL} = [2.5 \text{ psf} (12') / 4 \text{ stringers}] + 4 \#/FT = .0075 \#/FT =$$

$$S_x = 3.5 (5.5)^2 / 6 = 17.65 \text{ in}^3$$

$$S_y = 5.5 (3.5)^2 / 6 = 11.23 \text{ in}^3$$

Minimum  $F_b = 825 \text{ psi}$  (WORST CASE OF DOUGLAS FIRS)

$$F_b'_{y-y} = .825 (1.6) (.85) (1.0) (1.3) (1.05) = 1.53 \text{ KSF}$$

$F_b \quad C_D \quad C_M \quad C_t \quad C_F \quad C_{Fu}$

$$F_b'_{x-x} = .825 (.9) (.85) (1.0) (1.3) = .820 \text{ KSF}$$

$$f_{b_{y-y}} = [2.5 (.09)] (12) / 11.23 = 1.2 \text{ KSF}$$

$$f_{b_{x-x}} = [2.5 (.0075)] (12) / 17.65 = .0637 \text{ KSF}$$

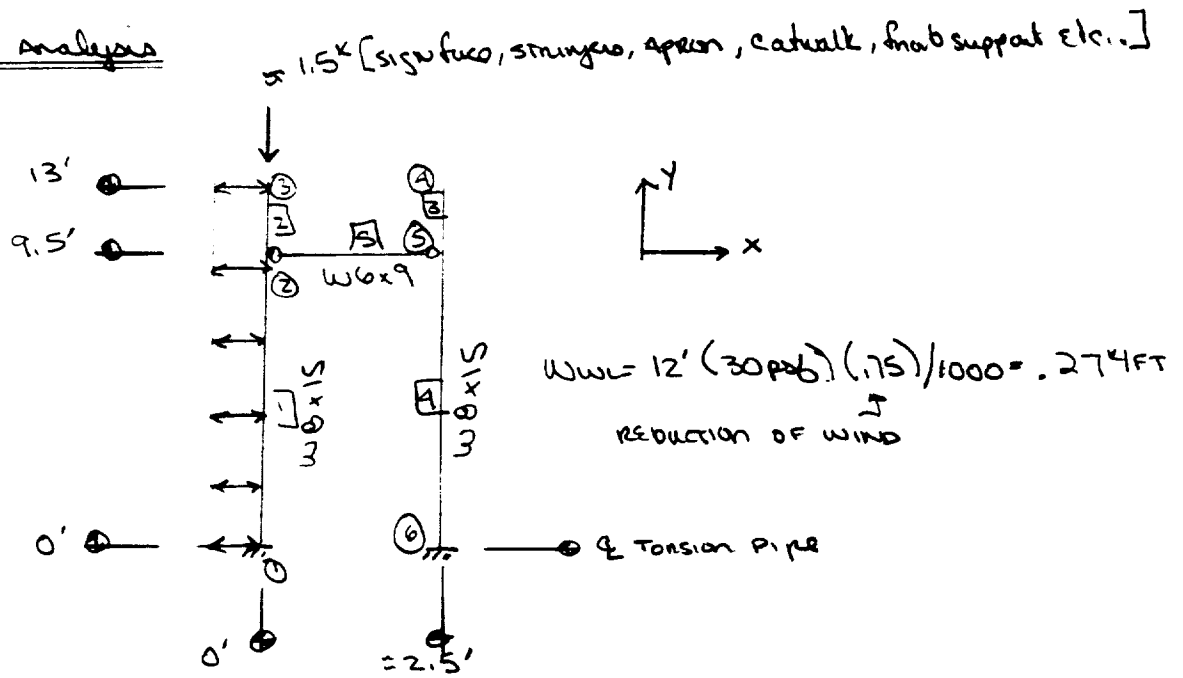
$$\text{RATIO} = \frac{1.2}{1.53} + \frac{.0637}{.82} = .86 < 1.0 \therefore \text{ok}$$

$\therefore$  use  $4 \times 6$  (Nom) NO. 2 OR BETTER DOUGLAS FIR

w/ MIN  $F_b = 825 \text{ psi}$  (4/faces)

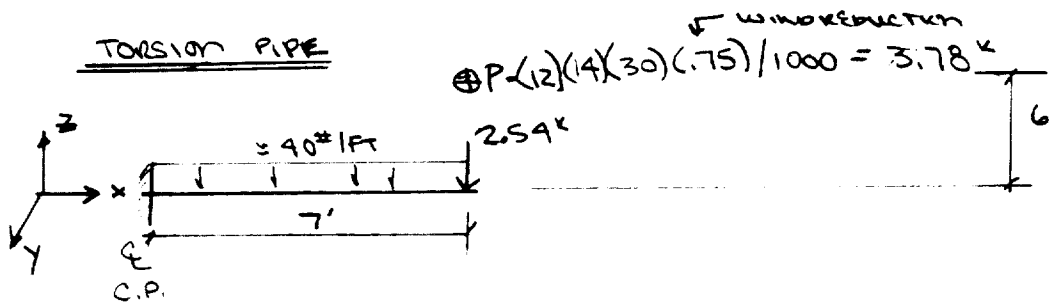


## Frame Analysis



- SEE COMPUTER ANALYSIS -

## TORSION PIPE



$$M_y = [0.4(7)(7/2) + 2.54(7)](12) = 225.12 \text{ k-in}$$

$$M_z = 3.78(7)(12) = 317.5 \text{ k-in}$$

$$M_x = 3.78(6)(12) = 272.16 \text{ k-in}$$

$$I = 137.42 \text{ in}^4$$

$$F_y = 35 \text{ ksi } 10^{3/4} \phi \times .307 \quad S = 25.57 \quad \Delta = 279.84 \quad P/E < 3300/F_y \quad \therefore \text{ok}$$

$$f_{by} = 225.12 / 25.57 = 8.81 \quad 8.91$$

$$f_{bz} = 317.5 / 25.57 = 12.42 \quad 12.56$$

$$f_{bx} = 272.16 (5.375) / 279.84 = 5.32$$

$$\text{RATIO} = \frac{\sqrt{12.42^2 + 8.81^2}}{.6(35)} + \frac{5.32^2}{[.4(35)]^2} = .80 \quad \text{OK}$$

## Check deflection

$$\Delta = 2.54(7 \times 12)^3 / 3(29,000)(137.4) + .0033^{1/4} \text{ in } (7 \times 12)^4 / 8(29,000)(137.4) = .131''$$

$$e / 360 = .23'' > .131'' \quad \therefore \text{ok}$$

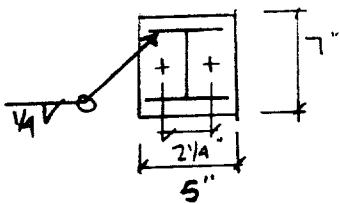
$$\therefore \text{USE } 10^{3/4} \phi \times .307 \quad F_y = 35 \text{ ksi}$$

Frame Analysis of 12x24

=====  
Member Section Forces, LC 1 : Dead + Wind  
=====  
Member Joints I - J Sec Axial Shear Y-Y Shear z-z Torque Moment Y-Y Moment z-z  
-----K-----K-----K-----K-ft-----K-ft-----K-ft-----

Member	Joints I - J	Sec	Axial K	Shear Y-Y K	Shear z-z K	Torque K-ft	Moment Y-Y K-ft	Moment z-z K-ft
1	1- 2	1	1.71	2.43	0.00	0.00	0.00	12.52
		2	1.67	1.78	0.00	0.00	0.00	7.52
		3	1.64	1.14	0.00	0.00	0.00	4.04
		4	1.60	0.50	0.00	0.00	0.00	2.09
		5	1.56	-0.14	0.00	0.00	0.00	1.65
2	2- 3	1	1.55	0.95	0.00	0.00	0.00	1.65
		2	1.54	0.71	0.00	0.00	0.00	0.93
		3	1.53	0.47	0.00	0.00	0.00	0.41
		4	1.51	0.24	0.00	0.00	0.00	0.10
		5	1.50	0.00	0.00	0.00	0.00	-0.00
3	4- 5	1	0.00	0.00	0.00	0.00	0.00	0.00
		2	0.01	0.00	0.00	0.00	0.00	0.00
		3	0.03	0.00	0.00	0.00	0.00	0.00
		4	0.04	0.00	0.00	0.00	0.00	0.00
		5	0.05	0.00	0.00	0.00	0.00	0.00
4	5- 6	1	0.06	-1.08	0.00	0.00	0.00	0.00
		2	0.10	-1.08	0.00	0.00	0.00	2.57
		3	0.14	-1.08	0.00	0.00	0.00	5.15
		4	0.17	-1.08	0.00	0.00	0.00	7.72
		5	0.21	-1.08	0.00	0.00	0.00	10.30
5	2- 5	1	1.08	0.01	0.00	0.00	0.00	0.00
		2	1.08	0.01	0.00	0.00	0.00	-0.01
		3	1.08	0.00	0.00	0.00	0.00	-0.01
		4	1.08	-0.01	0.00	0.00	0.00	-0.01
		5	1.08	-0.01	0.00	0.00	0.00	0.00

W6x9 / W8x15 connection

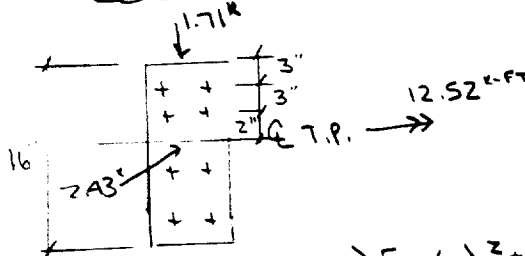


$P_T / \text{BOLT} = 1.08 \text{ k} / 2 \text{ bolts} = .54 \text{ k}$

∴ use 1/2" φ A-325

use 1/4" R for prying action calculation  
- SEE calculation sheet

upright / outrigger connection by 1/2" φ A-325 A = 1.963 in<sup>2</sup>



$I_{xx} = 2(1.963)[2(5)^2 + 2(2)^2] = 22.77 \text{ in}^4$

$f_T = [(12.52(12) + 1.71(8))](5) / 22.77 + \frac{2.43}{8(1.963)} = 37.54 \text{ ksi}$

$f_V = \frac{1.71 \text{ k}}{8(1.963)} = 1.09 \text{ ksi}$

$F_{TALL} = \sqrt{1.09^2 + 4.39(1.08)^2} = 43.99 \text{ ksi} > 37.54 \text{ ksi}$

∴ 1/2" φ A-325

## CROSS BRACING ROD

**DATE**  
02-Sep-97

### SIGN FACE & WINDLOAD PROPERTIES

Sign Face Height	12	(Feet)
Sign Face Length	24	(Feet)
Apron Height	2	(Feet)
Windload	30	(Psf)

Tangential Wind Force (Ptangential) 3.79 (Kips)

(Note: Ptangential is 1/2 of Pnormal by geometry)

$$\theta = \tan^{-1}(\text{Height} / \text{Length})$$

$$\text{Prod} = \text{Ptangential} / \cos(\theta)$$

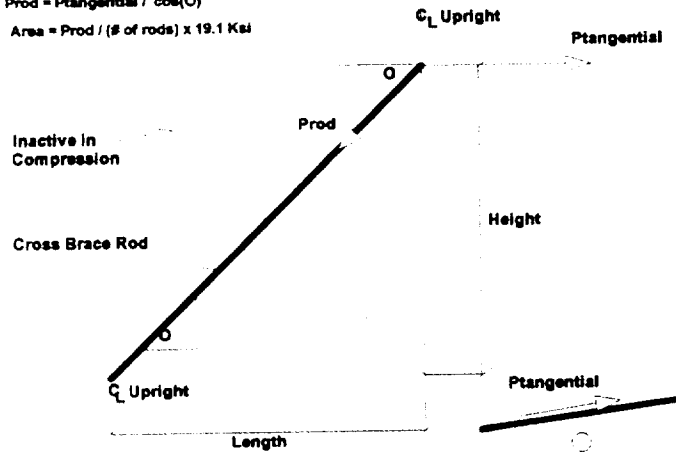
$$\text{Area} = \text{Prod} / (\# \text{ of rods}) \times 19.1 \text{ Ksi}$$

### CROSS BRACE PROPERTIES

Height	9.5	(Feet)
Length	14	(Feet)
# of Rods (Active in Tension only)	1	
theta	34.16	(Degrees)
Tension Force in Rods (Prod)	4.58	(Kips)
Area of a Single Rod Required	0.240	(In <sup>2</sup> )

### CLIP LEG SIZES

Leg perpendicular to Rod	4.42	(Inches)
Leg parallel to Rod	3	(Inches)



### Assumptions

- In lieu of allowable stress being increased by 33% per AISC A5.2, the wind force in the rod is reduced by 25% (i.e. .75 (Wind load)) via equations developed in spreadsheet.
- Maximum tangential wind force is the component of the resultant of wind blowing at a 45 degree angle to the sign face. This maximum tangential wind force component is 1/2 of the normal resultant wind force based on geometry.
- A-36 material used for rods. Allowable tensile stress = .33 (Fu) = .33 (58) = 19.1 ksi per AISC ASD table I-B page 4-3

∴ use 5/8" φ 200

# PRYING-TYPE CONNECTION

**DATE**  
30-Aug-97

*Method of Analysis & Design based on pg. 4-90 of AISC Allowable Stress Design - 9th Edition*

*- calculation of W6x9 to W8x15 connection*

## INPUT PROPERTIES

Actual bolt tensile force (T)	0.54	(Kips)	
Flange width (Bf)	7	(Inches)	
Flange thickness (tf)	0.25	(Inches)	<i>∴ 1/4" R ok 7"x5"</i>
Web thickness (tw)	0.17	(Inches)	
Bolt gage (g)	2.25	(Inches)	
Bolt diameter (d)	0.5	(Inches)	
Actual bolt shear stress (fv)	0	(Ksi)	
Tributary flange length (P)	4	(Inches)	<i>Bending length attributed to 1 bolt</i>

## OUTPUT PROPERTIES

(a)	2.375	(Inches)	
(b)	1.040	(Inches)	
(a')	2.625	(Inches)	
(b')	0.790	(Inches)	
(row)	0.301	(Ratio)	
(d')	0.563	(Inches)	
(delta)	0.859		<i>Ratio of net area at bolt line &amp; gross area at web</i>
Allowable bolt tension stress (Ft)	44.00	(Ksi) →	<i>Per equation in AISC Table J3.3, if different bolts used accomodate for them.</i>
Allowable bolt tension force (Ba)	8.64	(Kips)	

*Flange thickness req'd to:*

develop Ba with no prying (tc)	0.62	(Inches)	
(alpha prime)	4.53		<i>Value for alpha where (req'd) is a min or (Ta1) is a max</i>
(alpha)	Alpha <= 0		<i>Ratio of moment at bolt line to moment at web line</i>

*T = Applied tension per bolt (exclusive of initial tightening & prying force)*  
Q

## FLANGE BENDING

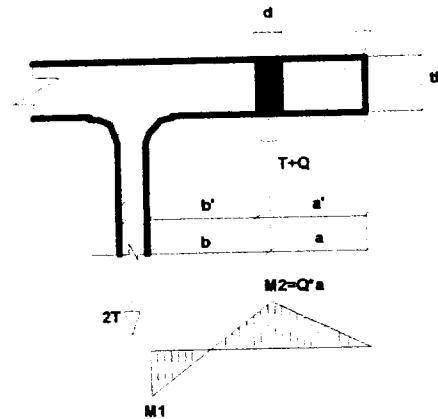
Allowable bolt force on Flanges (Ta1)	2.65	(Kips)
Actual bolt force on Flanges (T)	0.54	(Kips)

**$T \leq Ta1$  (O.K.)**

## TENSION ON BOLTS WITH PRYING ACTION

Prying force (Q)	0.00	(Kips)
Allowable bolt force (Ta2)	8.64	(Kips)
Actual bolt force (T)	0.54	(Kips)

**$T \leq Ta2$  (O.K.)**



## ASSUMPTIONS

- Tributary flange length (P) is a value based on engineering judgement for the particular connection type
- A-36 steel
- Allowable tension stress for A-325 bolts based on bearing-type connection with threads included in shear plane
- Concept of Prying Action:

As the flange gets in elastic range and flange begins to rotate, the tip comes in contact with other material and a couple is somewhat formed. This causes a decrease in the flange stress, but it increases stress in bolt.

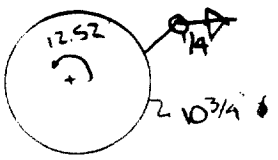
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 Bedford Park, IL 60501-1900

Job : 97-102  
 Page: 2  
 Date: 8/30/97

Frame Analysis of 12x24

===== < Member Stresses, LC 1 : Dead + Wind > =====								
Member	Sec	Shear			Bending			
		Axial	y-y	z-z	y-top	y-bot	z-top	z-bot
		-Ksi-	-Ksi-	-Ksi-	-Ksi-	-Ksi-	-Ksi-	-Ksi-
1	1	0.38	1.47	0.00	-12.69	12.69	0.00	0.00
	2	0.38	1.08	0.00	-7.62	7.62	0.00	0.00
	3	0.37	0.69	0.00	-4.10	4.10	0.00	0.00
	4	0.36	0.30	0.00	-2.11	2.11	0.00	0.00
	5	0.35	-0.08	0.00	-1.68	1.68	0.00	0.00
-----								
2	1	0.35	0.57	0.00	-1.68	1.68	0.00	0.00
	2	0.35	0.43	0.00	-0.94	0.94	0.00	0.00
	3	0.34	0.29	0.00	-0.42	0.42	0.00	0.00
	4	0.34	0.14	0.00	-0.10	0.10	0.00	0.00
	5	0.34	0.00	0.00	0.00	-0.00	0.00	0.00
-----								
3	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	4	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	5	0.01	0.00	0.00	0.00	0.00	0.00	0.00
-----								
4	1	0.01	-0.65	0.00	0.00	0.00	0.00	0.00
	2	0.02	-0.65	0.00	-2.61	2.61	0.00	0.00
	3	0.03	-0.65	0.00	-5.22	5.22	0.00	0.00
	4	0.04	-0.65	0.00	-7.83	7.83	0.00	0.00
	5	0.05	-0.65	0.00	-10.44	10.44	0.00	0.00
-----								
5	1	0.40	0.01	0.00	0.00	0.00	0.00	0.00
	2	0.40	0.01	0.00	0.01	-0.01	0.00	0.00
	3	0.40	0.00	0.00	0.02	-0.02	0.00	0.00
	4	0.40	-0.01	0.00	0.01	-0.01	0.00	0.00
	5	0.40	-0.01	0.00	0.00	0.00	0.00	0.00

upright/outridge connection



$$J = 2\pi(5.375)^3 = 975.7 \text{ (2sides)} = 1951.39 \text{ in}^4$$

$$f_v = 1252(12)(5.375) / 19514 = .91 \text{ in}$$

$$a = \frac{.91}{170(18)} = .03 \text{ } < \text{ } 1/4 \text{ } \therefore \underline{1/4 \text{ } \Delta \text{ a.a. ok}}$$

===== < Member AISC Unity Checks, LC 1 : Dead + Wind > =====													
Member	Joints		Unity		Shear		Fa	Fb		Cb	Cm		ASD Eqn
	I	J	Chk	Loc	Chk	Loc		yy	zz		yy	zz	
-----Ksi-----Ksi-----Ksi-----													
S 1 2 3 4 5	1	2	0.791	ok 1	0.102	1y	8.82	27.00	16.42	1.00	0.60	0.85	H1-2
	2	3	0.087	1	0.040	1y	18.53	27.00	23.76	1.00	0.60	0.85	H1-2
	3	4	0.001	5	0.000	1y	18.53	27.00	23.76	1.00	0.60	0.60	H1-1
	4	5	0.638	5	0.045	1y	8.82	27.00	16.42	1.00	0.60	0.60	H1-2
	5	2	0.021	3	0.001	1y	19.71	27.00	23.76	1.00	0.60	1.00	H1-3

**DEAD LOAD CALCULATIONS PER FRAME**

30-Aug-97

*\*\*Note: If 2 Faces apply, then accomodate for it in the QUANTITY column.  
(TORSION PIPE weight is NOT included!!)*

Tributary Span Length =	12	(Feet)	Frame 'A' + 'B'
Upright Length =	15.5	(Feet)	
Outrigger Length =	1.5	(Feet)	
Rear Catwalk Support Length =	1.33	(Feet)	
Saddle Length =		(Feet)	

<u>Quantity</u>	<u>Description</u>	<u>(#/Ft or psf)</u>	<u>(#)</u>
2	4 x 6 (nom) Douglas Fir (Walkrail)	4	96.00
8	4 x 6 (nom) Douglas Fir (Stringer)	4	384.00
4	4 x 3 x 1/4 (Front C.W. Angle)	5.8	278.40
2	24" Wide (Front C.W. Grating)	3.14	150.72
2	12' Height (Sign Face)	2.5	720.00
2	2' Height (Apron)	2	96.00
2	W6 x 9 (4' LG.) (Fnt C.W. Support)	9	72.00
1	W6 x 9 (Rear C.W. Support)	9	11.97
2	W8 x 15 (Upright)	15	465.00
1	W16 x 26 (Outrigger)	26	39.00
<b>2313.09</b>	<b>Subtotal</b>		
<b>231.31</b>	<b>10% Misc.</b>		
<b>2.54</b>	<b>Total Load (Kips)</b>		

### Column pipe $\leftarrow$ wind direction

$$P_{\text{col}} = 14(24)(30)(.75) / 1000 = 7.56 \text{ k}$$

$$P_{\text{col}} = 2(2)(21)(30)(.75) / 1000 = .95 \text{ k}$$

$$M = [7.56(7+21) + .95(21/2)](12) = 2660 \text{ k-in}$$

$$\text{dy } 24" \phi \times .3125 \quad F_y = 35 \text{ ksi} \quad D/t < 3300/F_y \quad \therefore F_b = .66(F_y)$$

$$S = 135.94 \text{ in}^3$$

$$f_b = 2660 / 135.94 = 19.56 \text{ ksi} < 23.1 \text{ ksi} \quad \therefore \underline{\underline{\text{ok}}}$$

use 24"  $\phi$  x .3125

### FOUNDATION LOAD

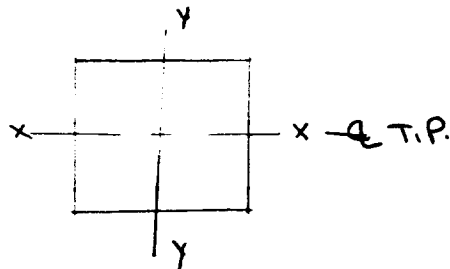
$$M = 2660(1.33) = 3537.8 \text{ k-in}$$

### HEAD CONNECTION LOADS

$$P_y = 7.56 \text{ k}$$

$$M_x = 7.56 [14/2 - 1 + 1](12)$$

$$= 635 \text{ k-in}$$





# HEAD CONNECTION BOLT ANALYSIS

(X-X Axis is Parallel with Torsion Pipe)

DATE  
30-Aug-97

**BOLT**

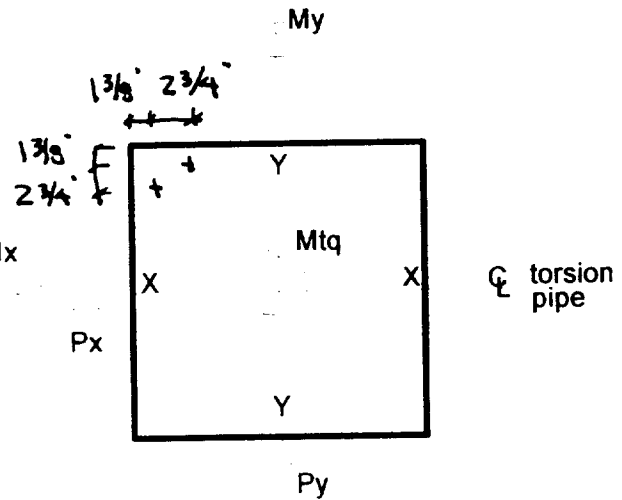
Diameter 0.625 (Inches)  
Area 0.3068 (Inches<sup>2</sup>)  
Number 8

**COLUMN PIPE**

Diameter 24 (Inches)

**BOLT DISTANCES FROM CENTERLINE OF HEAD PLATE (Enter 0 if no bolt)**  
IMPORTANT: X-X Axis is parallel with Torsion Pipe

	X-Direction (In)	Y-Direction (In)	Dist to C.P.
Bolt #1	11.625	8.875	2.63
Bolt #2	8.875	11.625	2.63
Bolt #3	0	0	
Bolt #4	0	0	
Bolt #5	0	0	
Bolt #6	0	0	
Head Plate	25	25	



**LOADS**

Px (Kips)  
Py 7.56 (Kips)  
Mx 635 (Kip-In)  
My (Kip-In)  
Mtq (Kip-In)

**PROPERTIES**

I<sub>x-x</sub> 262.50 (Inches<sup>4</sup>)  
I<sub>y-y</sub> 262.50 (Inches<sup>4</sup>)  
J 525.00 (Inches<sup>4</sup>)

**SHEAR / TENSILE STRESSES & TENSILE FORCES**

	Tensile Stress			Tensile Force	Shear Stress		
	ft(x) (Ksi)	ft(y) (Ksi)	ft(combined) (Ksi)	Pt(combined) (Kips)	fv(x) (Ksi)	fv(y) (Ksi)	fv(resultant) (Ksi)
Bolt #1	21.47	0.00	21.47	6.59	0.00	3.08	3.08
Bolt #2	28.12	0.00	28.12	8.63	0.00	3.08	3.08
Bolt #3							
Bolt #4							
Bolt #5							
Bolt #6							

**BEARING TYPE CONNECTION WITH STANDARD HOLE SIZE**

Choose one: 1

- (1) = A-325-N (Threads included) F<sub>v</sub> = 21 Ksi
- (2) = A-325-X (Threads excluded) F<sub>v</sub> = 30 Ksi
- (3) = A-490-N (Threads included) F<sub>v</sub> = 28 Ksi
- (4) = A-490-X (Threads excluded) F<sub>v</sub> = 40 Ksi

∴ 5/8" φ A-325

**ACTUAL & ALLOWABLE STRESSES**

	fv	Fv	ft	Ft	Stress Ratio	Equation
	(Ksi)	(Ksi)	(Ksi)	(Ksi)		
Bolt #1	3.08	21	21.47	43.52	0.493	F <sub>t</sub> = [(44 <sup>2</sup> ) - 4.39*(3.08 <sup>2</sup> )] <sup>0.5</sup>
Bolt #2	3.08	21	28.12	43.52	0.646	F <sub>t</sub> = [(44 <sup>2</sup> ) - 4.39*(3.08 <sup>2</sup> )] <sup>0.5</sup>
Bolt #3						F <sub>t</sub> = [(44 <sup>2</sup> ) - 4.39*(0.00 <sup>2</sup> )] <sup>0.5</sup>
Bolt #4						F <sub>t</sub> = [(44 <sup>2</sup> ) - 4.39*(0.00 <sup>2</sup> )] <sup>0.5</sup>
Bolt #5						F <sub>t</sub> = [(44 <sup>2</sup> ) - 4.39*(0.00 <sup>2</sup> )] <sup>0.5</sup>
Bolt #6						F <sub>t</sub> = [(44 <sup>2</sup> ) - 4.39*(0.00 <sup>2</sup> )] <sup>0.5</sup>

Note: If Ft & Stress Ratio reads "ERR", then try a higher strength bolt

**ASSUMPTIONS**

- Bolt # 1 is designated as the critical bolt
- No gap exists between connection materials
- In lieu of stresses being increased by 33% per AISC A5.2, the loads are input with the following factored equation: 1.0(D.L.) + .75 (W.L.)
- A zero (0) has to be present in bolt location table.
- If a zero is present in the X-Direction column of the table then it is assumed that no bolt exists
- Bolts are designed with the envelope approach which may be conservative (i.e. direction of loads is not accounted for).

# HEAD CONNECTION PLATE TO COLUMN PIPE WELD ANALYSIS

(X-X Axis is Parallel with Torsion Pipe)

DATE  
30-Aug-97

## COLUMN PIPE

Diameter      **24**      (Inches)

## LOADS

Px		(Kips)
Py	7.56	(Kips)
Mx	635	(Kip-In)
My		(Kip-In)
Mtq		(Kip-In)

## WELD PROPERTIES

NOTE: Properties based on Leg of weld being 1"

Area	75.4	(In <sup>2</sup> / In)
Section Modulus (S)	452.4	(In <sup>3</sup> / In)
Polar Moment of Inertia (J)	10857.3	(In <sup>4</sup> / In)

## STRESSES

NOTE: Stresses based on Leg of weld being 1"

Tensile Stress (ft)	1.40	(Kips / In)
Shear Stress (fv)	0.20	(Kips / In)
Resultant Stress (R)	1.42	(Kips / In)

## EQUATIONS

$$\begin{aligned} & [(635.0)^2 + (0.0)^2]^{.5} / 452.4 \\ & [2 * [(0.0)^2 + (7.6)^2]^{.5} / 75.4] + [(0.0 * 12) / 10857.3] \\ & [(1.40)^2 + (0.20)^2]^{.5} \end{aligned}$$

## WELD LEG SIZE (a)

a      0.11      (Inches)      1.42 / (.707 \* 18)      ∴ 1/4" Δ a.a.

## ASSUMPTIONS

- E60xx Electrodes
- Shear on circular section = 2 \* Force / Area
- Weld of gussets to head plate is not accounted for
- In lieu of stresses being increased by 33% per AISC A5.2, the loads are input with the following factored equation: 1.0(D.L.) + .75 (W.L.)
- Weld is designed with the envelope approach which may be conservative (i.e. direction of loads is not accounted for).

### Bottom gussets

$M = 6.59^k + 8.63^k (2.63'') = 40^{k-in}$   
 try 1/2" x 8" R  
 $S = .5(8)^2/6 = 5.33$   
 $f_b = 40/5.33 = 7.5^{k/in}$  !.ok

### check horizontal weld

$f_T = \frac{6.59^k + 8.63^k}{2s_{10} + s(6'' \text{ long})} = 1.52^{k/in}$

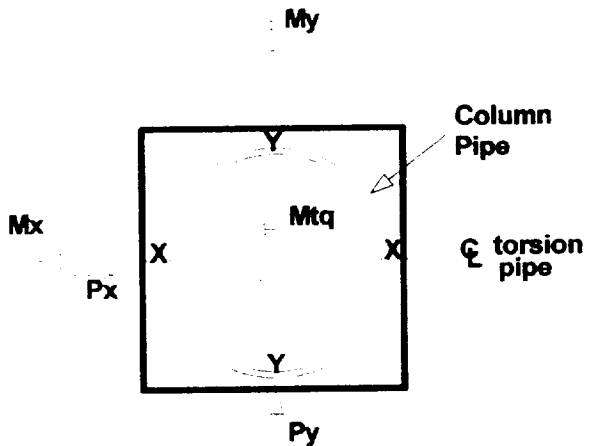
$a = \frac{1.52}{1.707(18)} = .119'' < .25''$

∴ use 1/2" x 8" gusset w/ 1/4" Δ a.a.

### HEAD R thickness

$2.63'' = d, \quad d_1 = 2.63'' \quad d_2 = 1.7''$   
 $P_1 d_1^3 = P_2 d_2^3$   
 $P_1 = \frac{1.7^3}{2.63^3} P_2 = .27 P_2$   
 $P_1 + P_2 = 8.63^k$   
 $1.27 P_2 = 8.63 \Rightarrow P_2 = 6.8^k$   
 $\therefore P_1 = 1.83^k$   
 $M_1 = \frac{1.83^k (2.63 - \frac{.53}{2})}{2} = 2.66^{k-in}$   
 $M_2 = \frac{6.8^k (1.7 - \frac{.53}{2})}{2} = 4.88^{k-in} \rightarrow \text{governs}$

try 3/4" R  
 $S = 2.56(7.5)^2/6 = .24$   
 $f_b = 4.88/.24 = 20.33^{k/in} < 27^{k/in}$  !.ok  
 ∴ use 3/4" x 26" x 26"

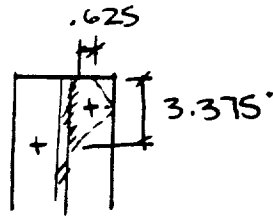


## HEAD CONNECTION (CONT)

check top gussets

- try W16x31 connecting riggers

$$t_f = .44 \text{ in}$$



$$M = PR/2 = 8.63 \text{ k} (.625) / 2 = 2.69 \text{ k-in}$$

$$S = 3.375 (.44)^2 / 6 = .109 \text{ in}^3$$

$$f_b = 2.69 / .109 = 24.6 \text{ ksi} < 27 \text{ ksi} \quad \therefore \text{ok}$$

$\therefore$  use W16x31 (no top gussets req'd)

**Laterally Loaded Footing with Nonconstrained Condition**  
 (Foundation Design based on Equations From the Uniform Building Code)

30-Aug-97

**SIGN CONFIGURATION**

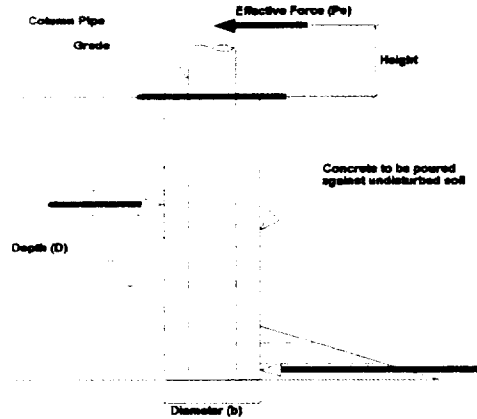
Sign Face Height	12	(Feet)
Apron Height	2	(Feet)
H.a.g.l	21	(Feet)

**FOOTING**

Diameter (b)	3.5	(Feet)
--------------	-----	--------

**WORKING LOADS (i.e. 1.0(D.L.) + 1.0(W.L.))**

Live Load Moment	3537.8	(Kip-In)
Dead Load Moment		(Kip-In)
Effective Force (Pe)	10.5	(Kips)
Height from Grade to Pe (H)	28	(Feet)



**ALLOWABLE LATERAL BEARING SOIL PRESSURE CALCULATION TO DETERMINE DEPTH**

Soil pressure	0.18	(ksf per ft of depth)	
Trial Depth	13.2	(Feet)	<i>IMPORTANT: After iterations are complete this value is to be as close to actual depth value (d) but not greater than.</i>
Effective Depth	4.40	(Feet)	<i>Based on 1/3 the depth of embedment, but not to exceed 12'.</i>

Allowable Stress Increase Factors

2 = allowance for 1/2" deflection @ grade

1.33 = Allowable stress increase factor per 1603.5 (Choose 1 or 2 for increase)

(1=Yes or 2=No)=> 1

Allowable Soil Pressure (S1)	1.76	(ksf)	$S1 = 2 \times 4.40 \times 1.33 \times 0.180$
A	4.01		$A = (2.34 \times 10.5) / (1.76 \times 3.5)$
Depth (d)	13.2	(Feet)	$d = (4.01 / 2) \times [1 + \{1 + (4.36 \times 28.0 / 4.01)\}^{0.5}]$
	O.K.		

∴ USE 3'-6" φ x 13'-6" depth