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JOB TITLE PSE - OTC - PUYALLUP
JOB NO. 21239 **SHEET NO.**
CALCULATED BY DL **DATE**
CHECKED BY **DATE**

CS2018 Ver 2020.09.26 www.struware.com

PRCNC20240216

City of Puyallup Building REVIEWED FOR COMPLIANCE
BSnowden
05/17/2024
2:56:22 PM

City of Puyallup
Development & Permitting Services
ISSUED PERMIT

Building	Planning
Engineering	Public Works
Fire	Traffic

STRUCTURAL CALCULATIONS

FOR

PSE - OTC - PUYALLUP

Puyallup, WA

DANIEL DAVIS LINKHART
STATE OF WASHINGTON
41390
STRUCTURAL ENGINEER
PROFESSIONAL ENGINEER
12/7/23
Digitally signed by Daniel D Linkhart
Date: 2023.12.06
DIGITAL SEAL ON PDF FILE

Code:	International Building Code 2018		Risk Category:	II	
Loads:	Floor:	n/a			
	Roof:	23 D / 20 S		Isnow=	1.00
	Wind:	98mph / exp B			
	Seismic:	Ss=127.7 %g / S1=43.9 %g / SDC=D		Ieq=	1.00
Soils:	Basis:	TERRA REPORT 4/6/23			
	Allowable Bearing Stress:		2500	PSF	
	Lateral Soil Loads (Active / At Rest):		35/50	PCF	

Description:

Single story training facility, steel framed with conventional shallow foundations and slab on grade. Lateral system consists of Buckling Restrained Braced Frames. Also small steel, wood, and CMU structures and equipment support in adjacent training yard.

Calculations required to be provided by the Permittee on site for all Inspections

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Code Search

Code: International Building Code 2018

Occupancy:

Occupancy Group = B Business

Risk Category & Importance Factors:

Risk Category =	II
Wind factor =	1.00
Snow factor =	1.00
Seismic factor =	1.00

Type of Construction:

Fire Rating:

Roof =	0.0 hr
Floor =	0.0 hr

Building Geometry:

Roof angle (θ)	1.50 / 12	7.1 deg
Building length	227.0 ft	
Least width	100.0 ft	
Mean Roof Ht (h)	35.0 ft	
Parapet ht above grd	37.0 ft	
Minimum parapet ht	2.0 ft	

Live Loads:

Roof

0 to 200 sf:	20 psf
200 to 600 sf:	24 - 0.02Area, but not less than 12 psf
over 600 sf:	12 psf

Floor:

Typical Floor

Partitions N/A

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Wind Loads : ASCE 7- 16

Ultimate Wind Speed	98 mph
Nominal Wind Speed	75.9 mph
Risk Category	II
Exposure Category	B
Enclosure Classif.	Enclosed Building
Internal pressure	+/-0.18
Directionality (Kd)	0.85
Kh case 1	0.732
Kh case 2	0.732
Type of roof	Monoslope

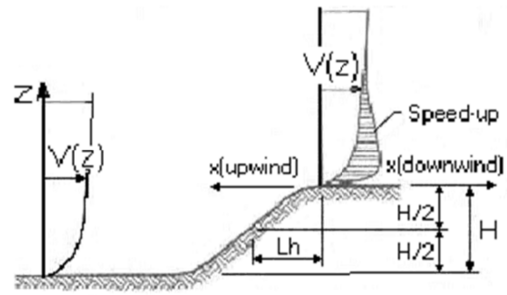
Topographic Factor (Kzt)

Topography	Flat
Hill Height (H)	0.0 ft
Half Hill Length (Lh)	0.0 ft
Actual H/Lh =	0.00
Use H/Lh =	0.00
Modified Lh =	0.0 ft
From top of crest: x =	0.0 ft
Bldg up/down wind?	downwind

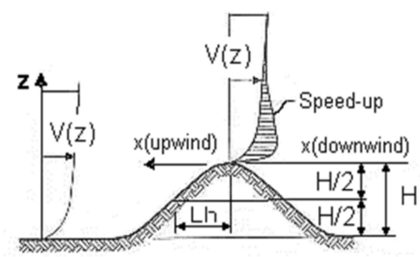
H< 60ft;exp B
∴ Kzt=1.0

H/Lh= 0.00	K_1 = 0.000
x/Lh = 0.00	K_2 = 0.000
z/Lh = 0.00	K_3 = 1.000

At Mean Roof Ht:
$Kzt = (1+K_1K_2K_3)^2 = 1.00$



ESCARPMENT



2D RIDGE or 3D AXISYMMETRICAL HILL

Gust Effect Factor

h =	35.0 ft
B =	100.0 ft
/z (0.6h) =	30.0 ft

Flexible structure if natural frequency < 1 Hz (T > 1 second).
If building h/B>4 then may be flexible and should be investigated.
h/B = 0.35 Rigid structure (low rise bldg)

G = 0.85 Using rigid structure default

Rigid Structure

ē =	0.33
ℓ =	320 ft
z_{min} =	30 ft
c =	0.30
g_Q, g_v =	3.4
L_z =	310.0 ft
Q =	0.85
I_z =	0.30
G =	0.84

Flexible or Dynamically Sensitive Structure

34 ıcy (η_1) =	0.0 Hz				
Damping ratio (β) =	0				
/b =	0.45				
/α =	0.25				
Vz =	63.2				
N_1 =	0.00				
R_n =	0.000				
R_h =	28.282	η =	0.000	h =	35.0 ft
R_B =	28.282	η =	0.000		
R_L =	28.282	η =	0.000		
g_R =	0.000				
R =	0.000				
Gf =	0.000				

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Wind Loads - MWFRS h≤60' (Low-rise Buildings) except for open buildings

Kz = Kh (case 1) =	0.73		Edge Strip (a) =	10.0 ft
Base pressure (qh) =	**15.3 psf**		End Zone (2a) =	20.0 ft
GCpi =	+/-0.18		Zone 2 length =	50.0 ft

Wind Pressure Coefficients

	CASE A			CASE B		
		θ = 7.1 deg				
Surface	GCpf	w/-GCpi	w/+GCpi	GCpf	w/-GCpi	w/+GCpi
1	0.42	0.60	0.24	-0.45	-0.27	-0.63
2	-0.69	-0.51	-0.87	-0.69	-0.51	-0.87
3	-0.39	-0.21	-0.57	-0.37	-0.19	-0.55
4	-0.31	-0.13	-0.49	-0.45	-0.27	-0.63
5				0.40	0.58	0.22
6				-0.29	-0.11	-0.47
1E	0.64	0.82	0.46	-0.48	-0.30	-0.66
2E	-1.07	-0.89	-1.25	-1.07	-0.89	-1.25
3E	-0.55	-0.37	-0.73	-0.53	-0.35	-0.71
4E	-0.46	-0.28	-0.64	-0.48	-0.30	-0.66
5E				0.61	0.79	0.43
6E				-0.43	-0.25	-0.61

Ultimate Wind Surface Pressures (psf)

Surface	Case A w/-GCpi	Case A w/+GCpi	Case B w/-GCpi	Case B w/+GCpi
1	9.2	3.6	-4.1	-9.6
2	-7.8	-13.3	-7.8	-13.3
3	-3.1	-8.7	-2.9	-8.4
4	-2.0	-7.5	-4.1	-9.6
5			8.9	3.4
6			-1.7	-7.2
1E	12.5	7.0	-4.6	-10.1
2E	-13.6	-19.1	-13.6	-19.1
3E	-5.7	-11.2	-5.4	-10.9
4E	-4.3	-9.8	-4.6	-10.1
5E			12.1	6.6
6E			-3.8	-9.3

Parapet

Windward parapet = 23.3 psf (GCpn = +1.5)
Leeward parapet = -15.5 psf (GCpn = -1.0)

Windward roof overhangs = 10.7 psf (upward) add to windward roof pressure

Horizontal MWFRS Simple Diaphragm Pressures (psf)

Transverse direction (normal to L)

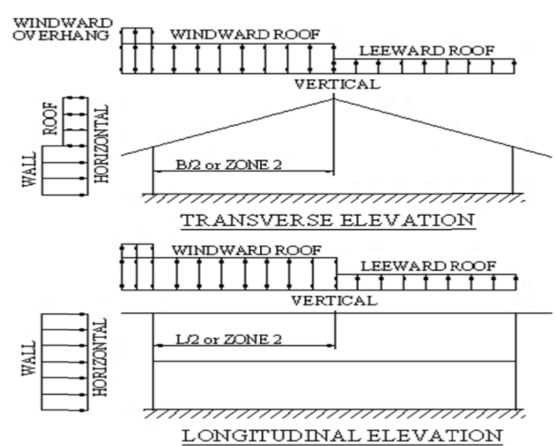
Interior Zone:	Wall	11.1 psf
	Roof	-4.7 psf **
End Zone:	Wall	16.8 psf
	Roof	-7.9 psf **

Longitudinal direction (parallel to L)

Interior Zone:	Wall	10.6 psf
End Zone:	Wall	15.9 psf

** NOTE: Total horiz force shall not be less than that determined by neglecting roof forces (except for MWFRS moment frames).

The code requires the MWFRS be designed for a min ultimate force of 16 psf multiplied by the wall area plus an 8 psf force applied to the vertical projection of the roof.



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Ultimate Wind Pressures

Wind Loads - Components & Cladding : h ≤ 60'

Kh (case 1) =	0.73	h =	35.0 ft
Base pressure (qh) =	**15.3 psf**	a =	10.0 ft
Minimum parapet ht =	2.0 ft	GCpi =	+/-0.18
Roof Angle (θ) =	7.1 deg	qi = qh =	15.3 psf
Type of roof =	Monoslope		

Roof

	GCp +/- Gcpi				Surface Pressure (psf)					User input	
Area	10 sf	20 sf	50 sf	100 sf	10 sf	20 sf	50 sf	100 sf	0 sf	10 sf	160 sf
Negative Zone 1	-1.28	-1.28	-1.28	-1.28	-19.6	-19.6	-19.6	-19.6		-19.6	-19.6
Negative Zone 2	-1.48	-1.45	-1.41	-1.38	-22.6	-22.2	-21.6	-21.1		-22.6	-21.1
Negative Zone 2'	-1.78	-1.75	-1.71	-1.68	-27.2	-26.8	-26.2	-25.7		-27.2	-25.7
Negative Zone 3	-1.98	-1.8	-1.56	-1.38	-30.3	-27.5	-23.9	-21.1		-30.3	-21.1
Negative Zone 3'	-2.78	-2.48	-2.08	-1.78	-42.5	-37.9	-31.8	-27.2		-42.5	-27.2
Positive All Zones	0.48	0.45	0.41	0.38	16.0	16.0	16.0	16.0		16.0	16.0

Parapet

qp = 15.5 psf

Solid Parapet Pressure		Surface Pressure (psf)						User input
		10 sf	20 sf	50 sf	100 sf	200 sf	500 sf	50 sf
CASE A:	Zone 2 :	35.8	34.5	32.7	31.5	30.6	29.5	32.7
	Zone 2' :	40.4	39.1	37.4	36.1	35.3	34.2	37.4
	Zone 3 :	43.5	39.9	35.1	31.5	30.6	29.5	35.1
	Zone 3' :	56.0	50.5	43.2	37.7	36.8	35.8	43.2
CASE B :	Interior zone :	-32.6	-31.0	-28.8	-27.2	-25.5	-23.3	-28.8
	Corner zone :	-37.3	-34.8	-31.6	-29.1	-26.6	-23.3	-31.6

Walls

	GCp +/- GCpi				Surface Pressure at h				User input	
Area	10 sf	100 sf	200 sf	500 sf	10 sf	100 sf	200 sf	500 sf	52 sf	200 sf
Negative Zone 4	-1.28	-1.10	-1.05	-0.98	-19.6	-16.9	-16.1	-16.0	-17.6	-16.1
Negative Zone 5	-1.58	-1.23	-1.12	-0.98	-24.2	-18.8	-17.1	-16.0	-20.3	-17.1
Positive Zone 4 & 5	1.18	1.00	0.95	0.88	18.1	16.0	16.0	16.0	16.1	16.0

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Snow Loads : ASCE 7- 16

Nominal Snow Forces

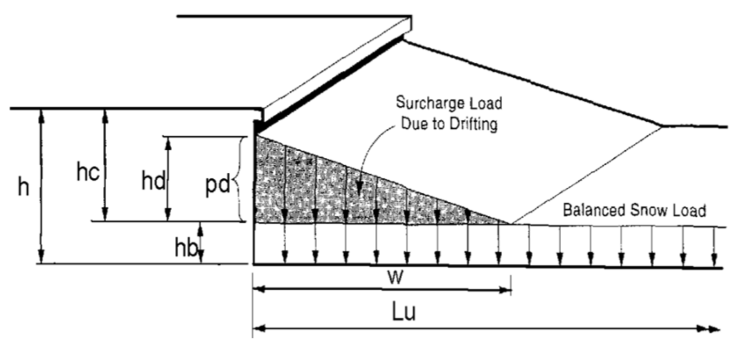
Roof slope		=	7.1 deg
Horiz. eave to ridge dist (W)		=	100.0 ft
Roof length parallel to ridge (L)		=	227.0 ft
Type of Roof			Monoslope
Ground Snow Load	Pg	=	20.0 psf
Risk Category		=	II
Importance Factor	I	=	1.0
Thermal Factor	Ct	=	1.20
Exposure Factor	Ce	=	1.0
Pf = 0.7*Ce*Ct*I*Pg		=	16.8 psf
Unobstructed Slippery Surface			no
Sloped-roof Factor	Cs	=	1.00
Balanced Snow Load		**=**	**16.8 psf**
Rain on Snow Surcharge Angle			2.00 deg
Code Maximum Rain Surcharge			5.0 psf
Rain on Snow Surcharge		=	0.0 psf
Ps plus rain surcharge		=	16.8 psf
Minimum Snow Load	Pm	=	20.0 psf
Uniform Roof Design Snow Load		=	**20.0 psf**

Near ground level surface balanced snow load = **20.0 psf**

NOTE: Alternate spans of continuous beams shall be loaded with half the design roof snow load so as to produce the greatest possible effect - see code for loading diagrams and exceptions for gable roofs..

Windward Snow Drifts 1 - Against walls, parapets, etc

Upwind fetch	lu	=	152.0 ft
Projection height	h	=	3.0 ft
Projection width/length	lp	=	30.0 ft
Snow density	g	=	16.6 pcf
Balanced snow height	hb	=	1.01 ft
	hd	=	2.90 ft
	hc	=	1.99 ft
hc/hb >0.2 = 2.0	**Therefore, design for drift**		
Drift height (hc)		=	1.99 ft
Drift width	w	=	15.90 ft
Surcharge load:	pd = γ*hd	=	**33.0 psf**
Balanced Snow load:		=	16.8 psf
			49.8 psf



Note: If bottom of projection is at least 2 feet above hb then snow drift is not required.

Windward Snow Drifts 2 - Against walls, parapets, etc

Upwind fetch	lu	=	71.0 ft
Projection height	h	=	0.0 ft
Projection width/length	lp	=	0.0 ft
Snow density	g	=	16.6 pcf
Balanced snow height	hb	=	1.01 ft
	hd	=	2.00 ft
	hc	=	-1.01 ft
hc/hb <0.2 = -1.0	**lp <15', drift not req'd**		
Drift height (hc)		=	0.00 ft
Drift width	w	=	-15.81 ft
Surcharge load:	pd = γ*hd	=	**0.0 psf**
Balanced Snow load:		=	16.8 psf
			16.8 psf

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Seismic Loads: IBC 2018 Strength Level Forces

Risk Category : II
Importance Factor (I) : 1.00
Site Class : E

Ss (0.2 sec) = 127.70 %g
S1 (1.0 sec) = 43.90 %g
A site specific ground motion analysis is required for seismically isolated structures or with damping systems

Fa =	1.200	use 1.20	Sms =	1.532	S_{DS} =	1.022	Design Category =	D
Fv =	0.000	use 2.32	Sm1 =	1.018	S_{D1} =	0.679	Design Category =	D

ASCE7 11.4.8 exception 1 applied and Fa taken equal to site class C
Seismic Design Category = **D**

Redundancy Coefficient ρ = 1.30
Number of Stories: 1
Structure Type: All other building system:
Horizontal Struct Irregularities: 1b) Extreme Torsional Irregularity — See ASCE7 Sect 12.3.3.4 & 12.8.4.3
Vertical Structural Irregularities: 4) In-plane Discontinuity in Vertical Lateral-Force-Resisting Elements — See ASCE7 Sect 12.3.3.3 & 12.3.3.4
Flexible Diaphragms: No
Building System: **Building Frame Systems**
Seismic resisting system: **Steel buckling-restrained braced frames**
System Structural Height Limit: **160ft**
Actual Structural Height (hn) = 35.0 ft
See ASCE7 Section 12.2.5 for exceptions and other system limitations

DESIGN COEFFICIENTS AND FACTORS

Response Modification Coefficient (R) = 8
Over-Strength Factor (Ωo) = 2.5
Deflection Amplification Factor (Cd) = 5
S_{DS} = 1.022
S_{D1} = 0.679

Seismic Load Effect (E) = Eh +/-Ev = ρQ_E +/- $0.2S_{DS}D$ = 1.3Qe +/- 0.204D — Q_E = horizontal seismic force
Special Seismic Load Effect (Em) = Emh +/- Ev = $\Omega o\, Q_E$ +/- $0.2S_{DS}D$ = 2.5Qe +/- 0.204D — D = dead load

PERMITTED ANALYTICAL PROCEDURES

Simplified Analysis - Use Equivalent Lateral Force Analysis

Equivalent Lateral-Force Analysis - Permitted

Building period coef. (C_T) =	0.020				Cu = 1.40
Approx fundamental period (Ta) =	$C_T h_n^{x}$ =	0.288	sec	x= 0.75	Tmax = CuTa = 0.403
User calculated fundamental period (T) =			sec		Use T = 0.288
Long Period Transition Period (TL) =	ASCE7 map =	6			
Seismic response coef. (Cs) =	SdsI/R =	0.128			
need not exceed Cs =	Sd1 I /RT =	0.295			
but not less than Cs =	0.044SdsI =	0.045			
USE Cs =		0.128			

Design Base Shear V = 0.128W
See ASCE7 Sect 12.3.3.4 for 25% connection increase

Model & Seismic Response Analysis - Permitted (see code for procedure)

ALLOWABLE STORY DRIFT

Structure Type: All other structures
Allowable story drift Δa = 0.020hsx where hsx is the story height below level x

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Roof Design Loads

Items	Description	Multiple	psf (max)	psf (min)
Roofing	Single ply		1.0	0.7
Decking	1/2" plywood/OSB	x 2.0	3.6	3.0
Insulation	Polystyrene foam roof board	x 8.0	2.0	1.6
Decking	Metal Floor deck - 3", 20ga		2.5	1.5
Framing	Steel roof joists & girders		3.0	2.0
Mech & Elec	Mech. & Elec.	x 1.5	3.0	0.0
Misc.	Misc.	x 2.0	1.0	0.0
Ceiling	Suspended acoustical tile		1.8	1.0
SOLAR ALLOW			5.0	
		Actual Dead Load	○ 22.9	○ 9.8
18 PSF EXCL DECK/FRAMING		Use this DL instead	◉ 23.0	◉ 18.0
		Live Load	20.0	0.0
		Snow Load	20.0	0.0
		Ultimate Wind (zone 2 - 100sf)	16.0	-21.1
ASD Loading		D + Lr	43.0	-
		D + 0.75(0.6*W + Lr)	45.2	-
		0.6*D + 0.6*W	-	-1.9
LRFD Loading		1.2D + 1.6 Lr + 0.5W	67.6	-
		1.2D + 1.0W + 0.5Lr	53.6	-
		0.9D + 1.0W	-	-4.9

Roof Live Load Reduction Roof angle 1.50 / 12 7.1 deg

0 to 200 sf: 20.0 psf
200 to 600 sf: 24 - 0.02Area, but not less than 12 psf
over 600 sf: 12.0 psf

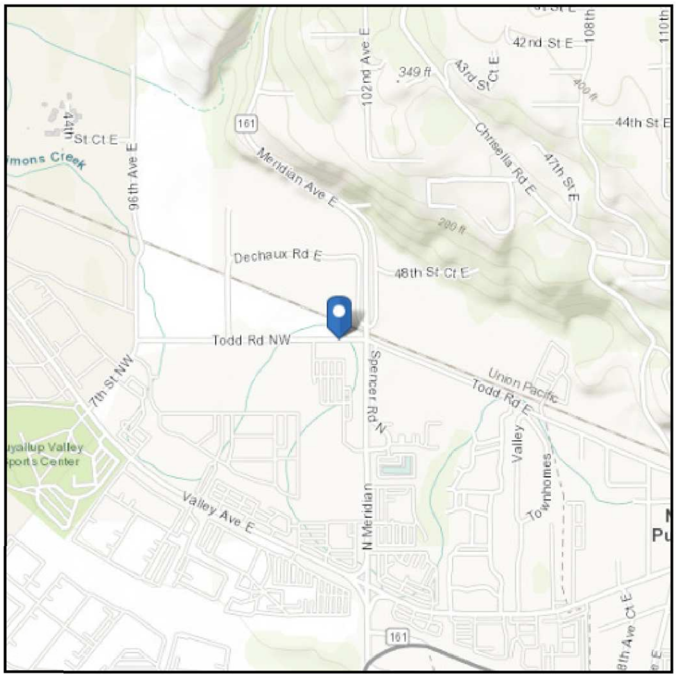
	300 sf	18.0 psf
	400 sf	16.0 psf
	500 sf	14.0 psf
User Input:	450 sf	15.0 psf

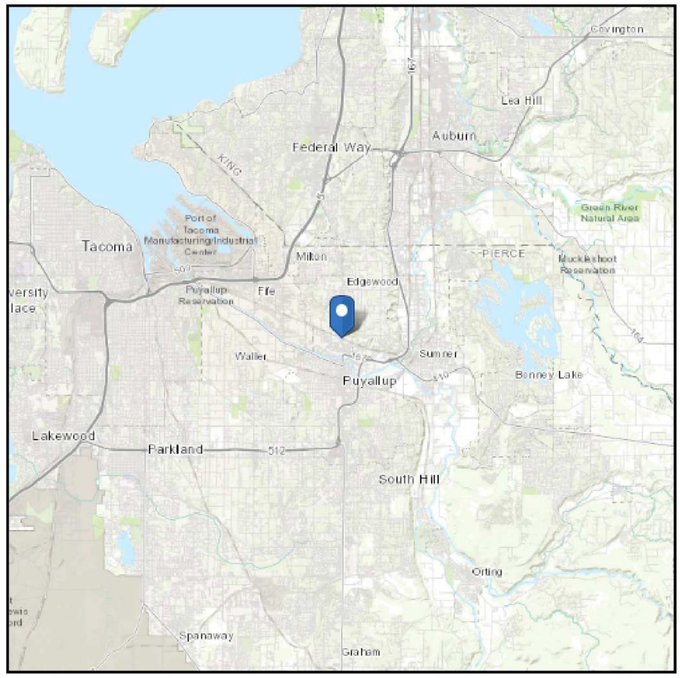
ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

ASCE 7 Hazards Report

Address:
Todd Rd NW
Puyallup, Washington
98371

Standard:	ASCE/SEI 7-16	**Latitude:**	47.212275
Risk Category:	II	**Longitude:**	-122.29492
Soil Class:	E - Soft Clay Soil	**Elevation:**	43.73304627150468 ft (NAVD 88)





Wind

Results:

Wind Speed	98 Vmph
10-year MRI	67 Vmph
25-year MRI	73 Vmph
50-year MRI	78 Vmph
100-year MRI	83 Vmph

Data Source:	ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed:	Tue Jul 11 2023

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Seismic

Site Soil Class: E - Soft Clay Soil

Results:

S_S :	1.278	S_{D1} :	N/A
S_1 :	0.439	T_L :	6
F_a :	N/A	PGA :	0.5
F_v :	N/A	PGA_M :	0.6
S_{MS} :	N/A	F_{PGA} :	1.2
S_{M1} :	N/A	I_e :	1
S_{DS} :	N/A	C_v :	N/A

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Tue Jul 11 2023

Date Source: USGS Seismic Design Maps

AMERICAN SOCIETY OF CIVIL ENGINEERS

Snow

Results:

Ground Snow Load, p_g :	18 lb/ft^2
Mapped Elevation:	43.7 ft
Data Source:	
Date Accessed:	Tue Jul 11 2023

Statutory requirements of the Authority Having Jurisdiction are not included.

Snow load values are mapped to a 0.5 mile resolution. This resolution can create a mismatch between the mapped elevation and the site-specific elevation in topographically complex areas. Engineers should consult the local authority having jurisdiction in locations where the reported ‘elevation’ and ‘mapped elevation’ differ significantly from each other.

Table R301.2(1)
Climatic and Geographical Design Criteria

Ground Snow Load	Wind Design		Seismic Design Category [f]	Subject to Damage from			Winter Design Temp [e]	Ice Shield Underlay [h]	Flood Hazards [g]	Air Freeze Index [i]	Mean Annual Temp [j]
	Speed [d] (mph)	Topographical effects [k]		Weathering [a]	Frost Line Depth [b]	Termites [c]					
20 lbs/ft	85	No	D-1	Moderate	12 inches	Slight to Moderate	17°	No	Puyallup Municipal Code 21.07	250	50°

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600 Dupont St * Suite B
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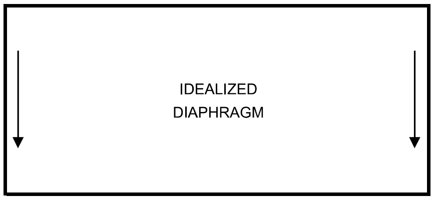
Ph 360-714-8260

PROJECT	PSE OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	12/6/2023
SUBJECT	DIAPHRAM MODELING		

SEMI-RIGID DIAPHRAGM MODELING (PER VULCRAFT EXAMPLE)

DIAPHRAGM NAME: DIA 1 ZONE A - E-W CRIT SPAN



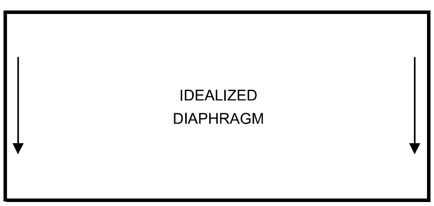
DEPTH 114 FT

WIDTH 125.0 FT

w_LRFD	0.581	K/FT
GOV	SEISMIC	
v_LRFD	0.637	K/FT
v_ASD	0.446	K/FT

JOIST SPCG	10	FT
DECK TYPE	3.0-IN N-DECK	
GAGE	20-GA	
DSN THICKNESS	0.0358	IN
FAST TYPE	5/8" PUDDLE / 1 1/4" TSW	
FAST PATT	24/4	
# SIDELAP FASTS	6	PER SPAN
SIDELAP SPCG	20	IN/O-C
v_ALLOW	494	PLF
SHEAR D/C RATIO	0.90	
CHORD T/C_LRFD	10.0	K
K1	0.167	
K2	1056	
D_B OR D_N	448	
G_PRIME	47.5	K/IN
DELTA-MID	0.21	IN
E_PRIME	**7169**	KSI

DIAPHRAGM NAME: DIA 1 ZONE B - E-W CRIT SPAN



DEPTH 41 FT

WIDTH 86.0 FT

w_LRFD	0.203	K/FT
GOV	SEISMIC	
v_LRFD	0.426	K/FT
v_ASD	0.298	K/FT

JOIST SPCG	10	FT
DECK TYPE	3.0-IN N-DECK	
GAGE	20-GA	
DSN THICKNESS	0.0358	IN
FAST TYPE	5/8" PUDDLE / 1 1/4" TSW	
FAST PATT	24/4	
# SIDELAP FASTS	4	PER SPAN
SIDELAP SPCG	30	IN/O-C
v_ALLOW	380	PLF
SHEAR D/C RATIO	0.78	
CHORD T/C_LRFD	4.6	K
K1	0.234	
K2	1056	
D_B OR D_N	448	
G_PRIME	43.6	K/IN
DELTA-MID	0.11	IN
E_PRIME	**11438**	KSI

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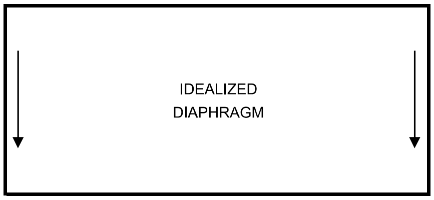
SUBJECT			

SEMI-RIGID DIAPHRAGM MODELING (PER VULCRAFT EXAMPLE)

DIAPHRAGM NAME: DIA 2 - E-W CRIT SPAN



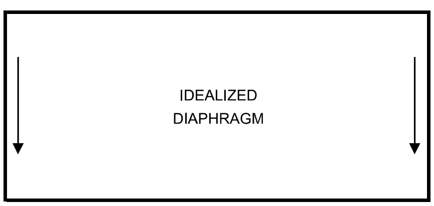
DEPTH: 39 FT

WIDTH: 78.5 FT

w_LRFD	0.255	K/FT
GOV	SEISMIC	
v_LRFD	0.513	K/FT
v_ASD	0.359	K/FT

JOIST SPCG	10	FT
DECK TYPE	3.0-IN N-DECK	
GAGE	20-GA	
DSN THICKNESS	0.0358	IN
FAST TYPE	5/8" PUDDLE / 1 1/4" TSW	
FAST PATT	24/4	
# SIDELAP FASTS	5	PER SPAN
SIDELAP SPCG	24	IN/O-C
v_ALLOW	439	PLF
SHEAR D/C RATIO	0.82	#REF!
CHORD T/C_LRFD	5.0	K
K1	0.195	
K2	1056	
D_B OR D_N	448	
G_PRIME	45.8	K/IN
DELTA-MID	0.11	IN
E_PRIME	**11462**	KSI

DIAPHRAGM NAME: DIA 3 ZONE A - E-W CRIT SPAN



DEPTH: 84.5 FT

WIDTH: 86.5 FT

w_LRFD	0.275	K/FT
GOV	SEISMIC	
v_LRFD	0.282	K/FT
v_ASD	0.197	K/FT

JOIST SPCG	10	FT
DECK TYPE	3.0-IN N-DECK	
GAGE	20-GA	
DSN THICKNESS	0.0358	IN
FAST TYPE	5/8" PUDDLE / 1 1/4" TSW	
FAST PATT	24/4	
# SIDELAP FASTS	4	PER SPAN
SIDELAP SPCG	30	IN/O-C
v_ALLOW	380	PLF
SHEAR D/C RATIO	0.52	
CHORD T/C_LRFD	3.0	K
K1	0.234	
K2	1056	
D_B OR D_N	448	
G_PRIME	43.6	K/IN
DELTA-MID	0.07	IN
E_PRIME	**6340**	KSI

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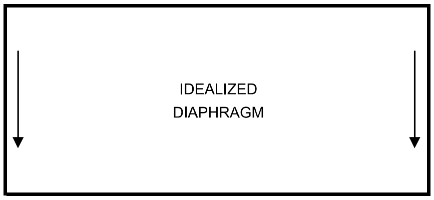
SEMI-RIGID DIAPHRAGM MODELING (PER VULCRAFT EXAMPLE)

DIAPHRAGM NAME: DIA 3 ZONE B - E-W CRIT SPAN



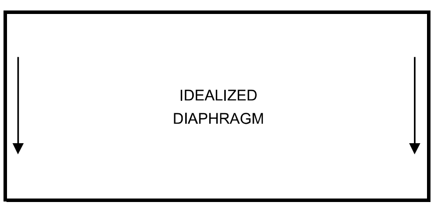
DEPTH 48 FT

WIDTH 80.0 FT

w_LRFD	0.156	K/FT
GOV	SEISMIC	
v_LRFD	0.260	K/FT
v_ASD	0.182	K/FT

JOIST SPCG	10	FT
DECK TYPE	3.0-IN N-DECK	
GAGE	20-GA	
DSN THICKNESS	0.0358	IN
FAST TYPE	5/8" PUDDLE / 1 1/4" TSW	
FAST PATT	24/4	
# SIDELAP FASTS	4	PER SPAN
SIDELAP SPCG	30	IN/O-C
v_ALLOW	380	PLF
SHEAR D/C RATIO	0.48	
CHORD T/C_LRFD	2.6	K
K1	0.234	
K2	1056	
D_B OR D_N	448	
G_PRIME	43.6	K/IN
DELTA-MID	0.06	IN
E_PRIME	**8971**	KSI

DIAPHRAGM NAME: DIA 3 ZONE C - E-W CRIT SPAN



DEPTH 93 FT

WIDTH 53.0 FT

w_LRFD	0.302	K/FT
GOV	SEISMIC	
v_LRFD	0.172	K/FT
v_ASD	0.120	K/FT

JOIST SPCG	10	FT
DECK TYPE	3.0-IN N-DECK	
GAGE	20-GA	
DSN THICKNESS	0.0358	IN
FAST TYPE	5/8" PUDDLE / 1 1/4" TSW	
FAST PATT	24/4	
# SIDELAP FASTS	4	PER SPAN
SIDELAP SPCG	30	IN/O-C
v_ALLOW	380	PLF
SHEAR D/C RATIO	0.32	
CHORD T/C_LRFD	1.1	K
K1	0.234	
K2	1056	
D_B OR D_N	448	
G_PRIME	43.6	K/IN
DELTA-MID	0.03	IN
E_PRIME	**5240**	KSI

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PROJECT			
PROJECT #		PAGE	OF
BY		DATE	12/6/2023
SUBJECT			

SEMI-RIGID DIAPHRAGM MODELING (PER VULCRAFT EXAMPLE)

DIAPHRAGM NAME: DIA 3 ZONE D - E-W CRIT SPAN

IDEALIZED
DIAPHRAGM

DEPTH: 57 FT

WIDTH: 79.0 FT

w_LRFD	0.185	K/FT
GOV	SEISMIC	
v_LRFD	0.256	K/FT
v_ASD	0.179	K/FT

JOIST SPCG	10	FT
DECK TYPE	3.0-IN N-DECK	
GAGE	20-GA	
DSN THICKNESS	0.0358	IN
FAST TYPE	5/8" PUDDLE / 1 1/4" TSW	
FAST PATT	24/4	
# SIDELAP FASTS	4	PER SPAN
SIDELAP SPCG	30	IN/O-C
v_ALLOW	380	PLF
SHEAR D/C RATIO	0.47	
CHORD T/C_LRFD	2.5	K
K1	0.234	
K2	1056	
D_B OR D_N	448	
G_PRIME	43.6	K/IN
DELTA-MID	0.06	IN
E_PRIME	**7668**	KSI

DIAPHRAGM NAME:

IDEALIZED
DIAPHRAGM

DEPTH: 93 FT

WIDTH: 53.0 FT

w_LRFD		K/FT
GOV	SEISMIC	
v_LRFD	0.000	K/FT
v_ASD	0.000	K/FT

JOIST SPCG		FT
DECK TYPE		
GAGE		
DSN THICKNESS	#N/A	IN
FAST TYPE	5/8" PUDDLE / 1 1/4" TSW	
FAST PATT	24/4	
# SIDELAP FASTS	4	PER SPAN
SIDELAP SPCG	0	IN/O-C
v_ALLOW	380	PLF
SHEAR D/C RATIO	0.00	
CHORD T/C_LRFD	0.0	K
K1	0.234	
K2	1056	
D_B OR D_N	448	
G_PRIME	#DIV/0!	K/IN
DELTA-MID	#DIV/0!	IN
E_PRIME	**#DIV/0!**	KSI

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PROJECT	PSE - OTC
PROJECT #	21239
BY	DL
SUBJECT	Diaphragms and Collectors

Overstrength Factor	2.5	for collector /connection forces
WHS Qn	17.2	k/anchor
Phi for WHS	0.65	

DIRECTION	EAST-WEST										
LEVEL	UPPER ROOF					LOWER ROOF					
BRBF NUMBER	A	C	C.2	Ea	Eb	A	B	C	C.2	Eb	Ec
BRBF LENGTH	20	29.2	39	21.7	13.7	0	35.6	29.2	39	0	20
DS L_FAR LENGTH	52	44.9	0	0	0	0	0	0	0	26.4	0
DS L_NEAR LENGTH	43	29.3	0	18.5	25.3	0	26	0	27.4	0	36.8
DS R_FAR LENGTH	0	0	0	0	0	0	0	0	0	0	0
DS R_NEAR LENGTH	0	0	0	0	0	23.2	0	0	56.4	36.8	0
EFF DIAPH DEPTH	115	103.4	39	40.2	39	23.2	61.6	29.2	122.8	63.2	56.8
V_1.0E_LEFT_ELF	48.8	41.4	12.9	0.0	9.4	0	25.4	3.8	0	29.8	16.2
V_1.0E_LEFT_DYN	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0
V_1.0E_RIGHT_ELF	0.0	0.0	0.0	17.1	0	12.9	0	0	26.7	29.8	0
V_1.0E_RIGHT_DYN	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0
ELF SCALE FACTOR	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
V_1.0E_LEFT_ELF_SCALED	48.8	41.4	12.9	0.0	9.4	0.0	25.4	3.8	0.0	29.8	16.2
V_1.0E_LEFT_GOV	48.8	41.4	12.9	0.0	9.4	0.0	25.4	3.8	0.0	29.8	16.2
V_1.0E_RIGHT_ELF_SCALED	0.0	0.0	0.0	17.1	0.0	12.9	0.0	0.0	26.7	29.8	0.0
V_1.0E_RIGHT_GOV	0.0	0.0	0.0	17.1	0.0	12.9	0.0	0.0	26.7	29.8	0.0
v_1.0E_LEFT_DIA	**0.424**	**0.400**	**0.331**	0.000	**0.241**	0.000	**0.412**	**0.130**	0.000	**0.472**	**0.285**
v_0.7E_LEFT_DIA	0.297	0.280	0.232	0.000	0.169	0.000	0.289	0.091	0.000	0.330	0.200
v_1.0E_RIGHT_DIA	0.000	0.000	0.000	**0.425**	0.000	**0.556**	0.000	0.000	**0.217**	**0.472**	0.000
v_0.7E_RIGHT_DIA	0.000	0.000	0.000	0.298	0.000	0.389	0.000	0.000	0.152	0.330	0.000
v_1.0E_TOT TRANSFER	0.424	0.400	0.331	0.425	0.241	0.556	0.412	0.130	0.217	0.943	0.285
P_1.0E_DS L_FAR	22.1	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.9	0.0
P_1.0E_DS L_NEAR	40.3	29.7	0.0	7.9	6.1	0.0	10.7	0.0	6.0	24.9	10.5
P_1.0E_DS R_FAR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P_1.0E_DS R_NEAR	0.0	0.0	0.0	0.0	0.0	12.9	0.0	0.0	12.3	34.7	0.0
P_ΩE_DS L_FAR	**55.2**	**44.9**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**62.2**	0.0
P_ΩE_DS L_NEAR	**100.8**	**74.3**	0.0	**19.7**	**15.2**	0.0	**26.8**	0.0	**14.9**	**62.2**	**26.2**
P_ΩE_DS R_FAR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P_ΩE_DS R_NEAR	0.0	0.0	0.0	0.0	0.0	**32.3**	0.0	0.0	**30.7**	**86.8**	0.0
MAX WHS SPCG (FT OC)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MIN WHS ON BRBF BM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MIN WHS ON DS L_FAR	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MIN WHS ON DS L_NEAR	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MIN WHS ON DS R_FAR	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MIN WHS ON DS R_NEAR	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

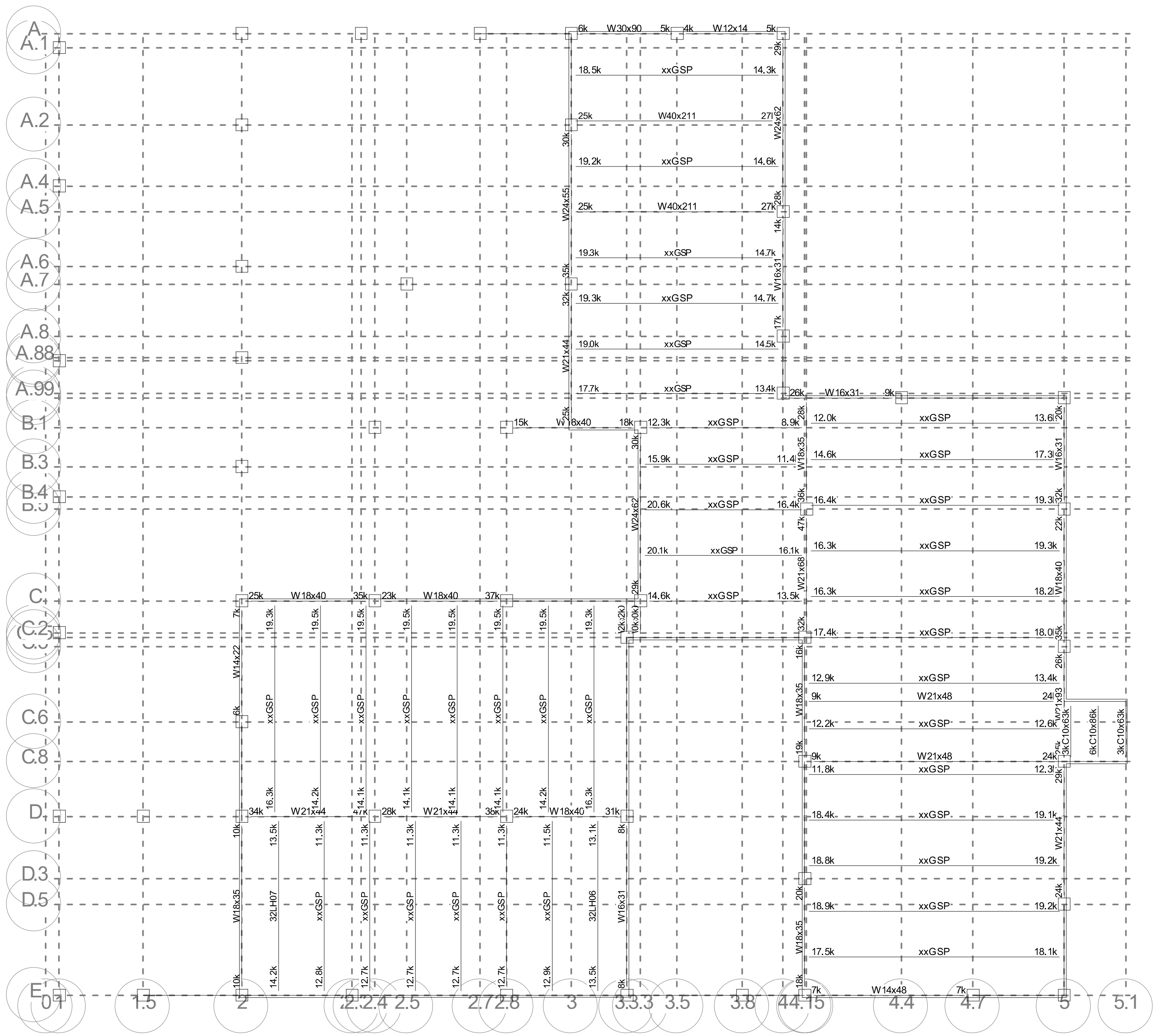
DIRECTION	NORTH-SOUTH										
LEVEL	UPPER ROOF					LOWER ROOF					
BRBF NUMBER	2a	2b	3	3.2	4.1	2b	3	3.2	4	4.1	5
BRBF LENGTH	20	20.8	20	39.5	25.6	20.8	20	39.5	12	25.6	20
DS L_FAR LENGTH	0	29.4	0	0	0	0	0	0	0	0	0
DS L_NEAR LENGTH	0	26.5	35	0	0	26.5	35	0	27.75	27.2	31.3
DS R_FAR LENGTH	20	0	0	0	0	0	0	0	0	0	0
DS R_NEAR LENGTH	31	39.25	0	0	0	39.25	0	39.3	0	0	0
EFF DIAPH DEPTH	71	115.95	55	39.5	25.6	86.55	55	78.8	39.75	52.8	51.3
V_1.0E_LEFT_ELF	0	16.10229	28.4	0	5	4.43963	5.4	0	0	22	0
V_1.0E_LEFT_DYN	0	0	0	0	0	0	0	0	0	0	0
V_1.0E_RIGHT_ELF	31.6	17.29771	0	12	5	10.06037	0	26.2	16.4	0	15.5
V_1.0E_RIGHT_DYN	0	0	0	0	0	0	0	0	0	0	0
ELF SCALE FACTOR	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
V_1.0E_LEFT_ELF_SCALED	0.0	16.1	28.4	0.0	5.0	4.4	5.4	0.0	0.0	22.0	0.0
V_1.0E_LEFT_GOV	0.0	16.1	28.4	0.0	5.0	4.4	5.4	0.0	0.0	22.0	0.0
V_1.0E_RIGHT_ELF_SCALED	31.6	17.3	0.0	12.0	5.0	10.1	0.0	26.2	16.4	0.0	15.5
V_1.0E_RIGHT_GOV	31.6	17.3	0.0	12.0	5.0	10.1	0.0	26.2	16.4	0.0	15.5
v_1.0E_LEFT_DIA	0.000	**0.139**	**0.516**	0.000	**0.195**	**0.051**	**0.098**	0.000	0.000	**0.417**	0.000
v_0.7E_LEFT_DIA	0.000	0.097	0.361	0.000	0.137	0.036	0.069	0.000	0.000	0.292	0.000
v_1.0E_RIGHT_DIA	**0.445**	**0.149**	0.000	**0.304**	**0.195**	**0.116**	0.000	**0.332**	**0.413**	0.000	**0.302**
v_0.7E_RIGHT_DIA	0.312	0.104	0.000	0.213	0.137	0.081	0.000	0.233	0.289	0.000	0.212
v_1.0E_TOT TRANSFER	0.445	0.288	0.516	0.304	0.391	0.168	0.098	0.332	0.413	0.417	0.302
P_1.0E_DS L_FAR	0.0	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P_1.0E_DS L_NEAR	0.0	16.1	18.1	0.0	0.0	4.4	3.4	0.0	11.4	11.3	9.5
P_1.0E_DS R_FAR	8.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P_1.0E_DS R_NEAR	22.7	11.3	0.0	0.0	0.0	6.6	0.0	13.1	0.0	0.0	0.0
P_ΩE_DS L_FAR	0.0	**21.2**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P_ΩE_DS L_NEAR	0.0	**40.3**	**45.2**	0.0	0.0	**11.1**	**8.6**	0.0	**28.6**	**28.3**	**23.6**
P_ΩE_DS R_FAR	**22.3**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P_ΩE_DS R_NEAR	**56.7**	**28.3**	0.0	0.0	0.0	**16.4**	0.0	**32.7**	0.0	0.0	0.0
MAX WHS SPCG (FT OC)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MIN WHS ON BRBF BM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MIN WHS ON DS L_FAR	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MIN WHS ON DS L_NEAR	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MIN WHS ON DS R_FAR	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MIN WHS ON DS R_NEAR	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Floor Map

RAM Steel 23.00.00.92
DataBase: 231115 PSE RSS Corebrace Review
Building Code: IBC

12/01/23 13:06:14
Steel Code: AISC 360-16 LRFD

Floor Type: LOWROOF **Beam Designs**

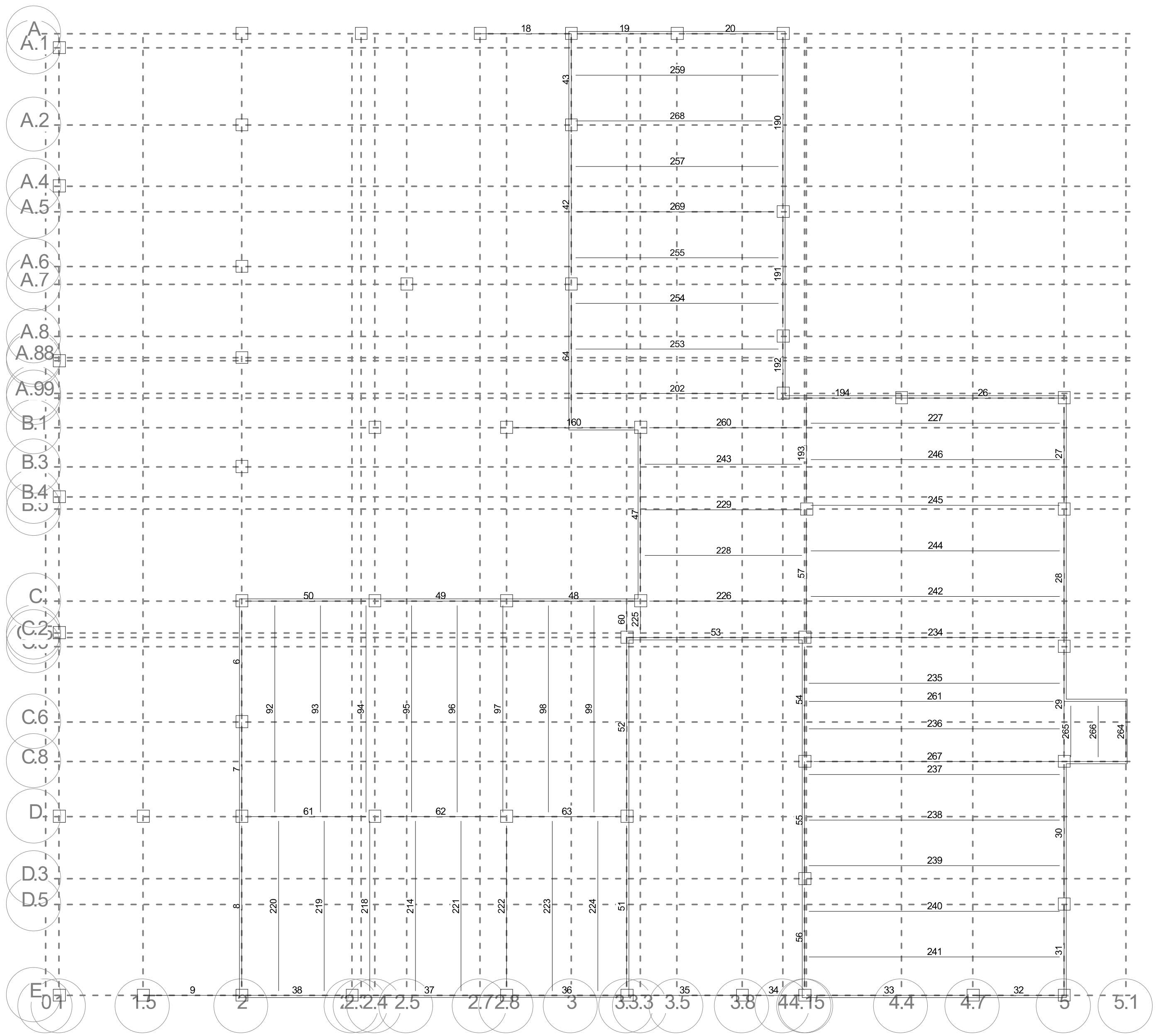


Floor Map

RAM Steel 23.00.00.92
DataBase: 231115 PSE RSS Corebrace Review
Building Code: IBC

12/01/23 13:06:14
Steel Code: AISC 360-16 LRFD

Floor Type: LOWROOF **Beam Numbers**



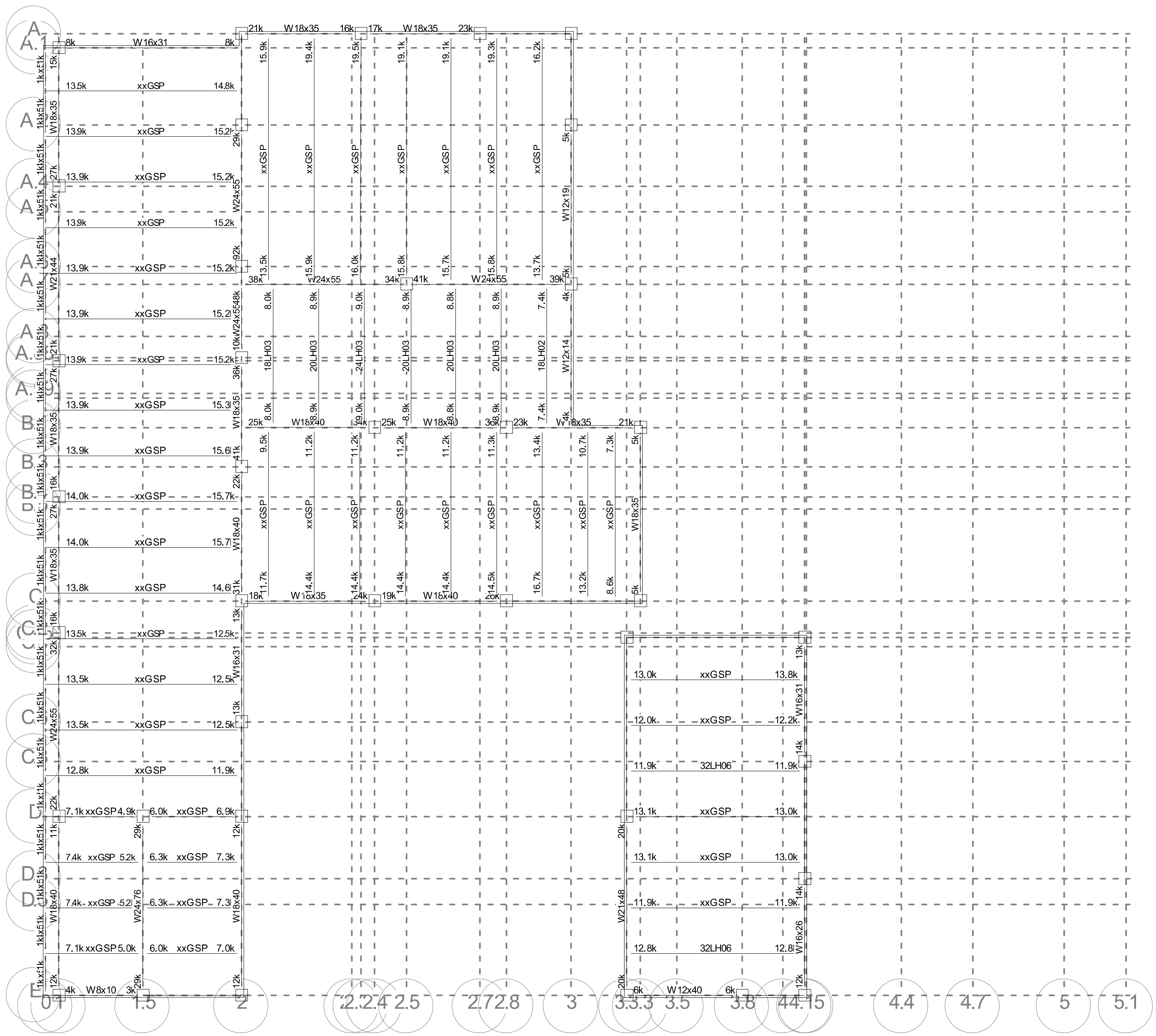
Floor Map

RAM Steel 23.00.00.92
DataBase: 231115 PSE RSS Corebrace Review
Building Code: IBC

12/01/23 13:06:14
Steel Code: AISC 360-16 LRFD

Floor Type: HIGHROOF

Beam Designs



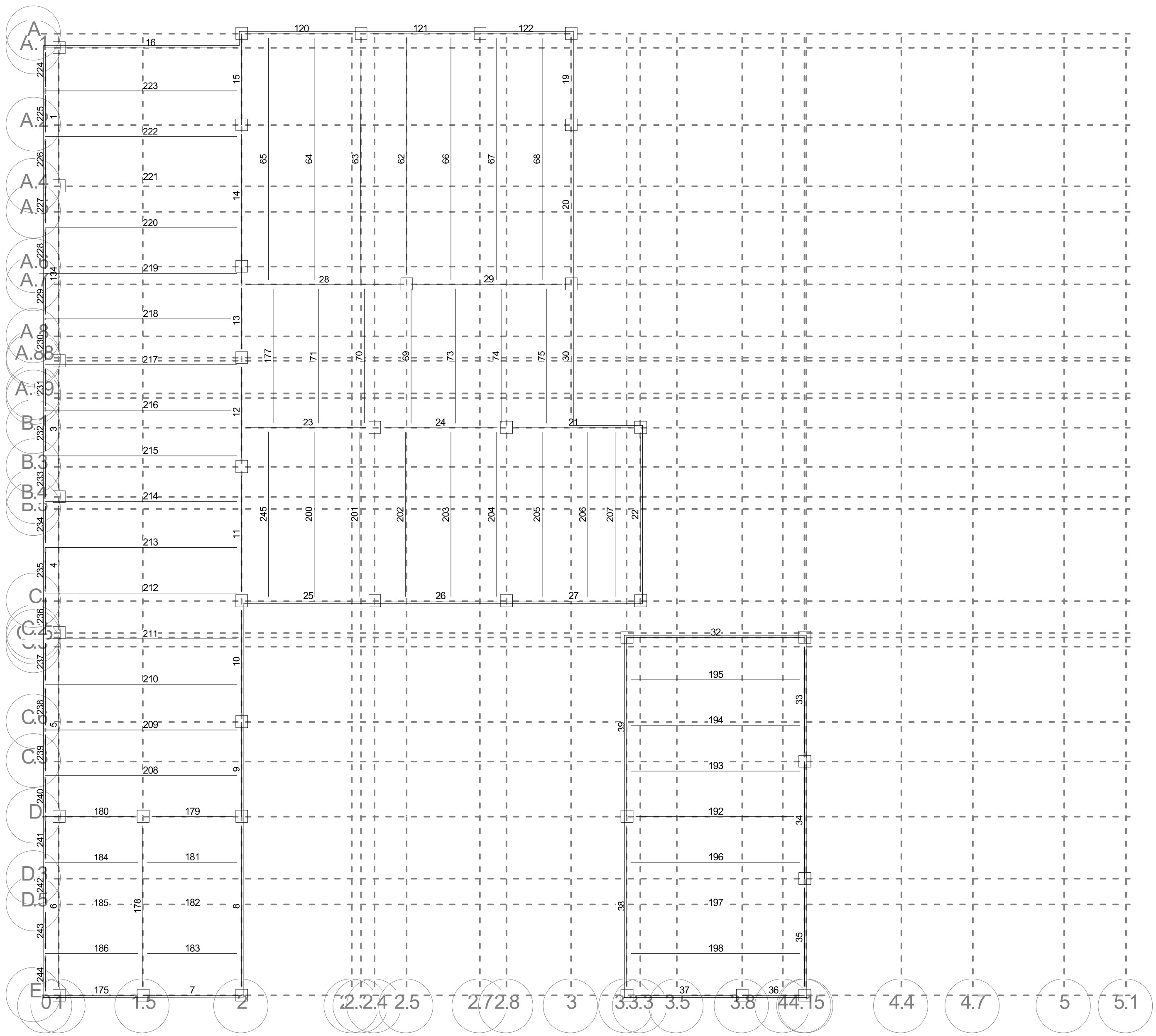
Floor Map

RAM Steel 23.00.00.92
DataBase: 231115 PSE RSS Corebrace Review
Building Code: IBC

12/01/23 13:06:14
Steel Code: AISC 360-16 LRFD

Floor Type: HIGHROOF

Beam Numbers



Beam Summary

RAM Steel 23.00.00.92
DataBase: 231115 PSE RSS Corebrace Review 12/01/23 13:06:14
Building Code: IBC Steel Code: AISC 360-16 LRFD

STEEL BEAM DESIGN SUMMARY:
Demand/Capacity Limits for: Strength: 1.000 Deflection: 1.000

Floor Type: HIGHROOF

Bm #	Length ft	+Mu kip-ft	-Mu kip-ft	ΦMn kip-ft	Fy ksi	Beam Size	Studs
1	30.30	149.9	0.0	186.2	50.0	W18X35	
3	29.80	147.6	0.0	186.2	50.0	W18X35 u	
4	29.80	150.1	0.0	188.1	50.0	W18X35 u	
5	40.25	275.2	0.0	416.1	50.0	W24X55 u	
6	39.25	142.0	0.0	244.1	50.0	W18X40 u	
8	39.25	144.6	0.0	243.6	50.0	W18X40	
10	26.50	105.3	0.0	142.9	50.0	W16X31 u	
11	29.40	196.6	0.0	294.0	50.0	W18X40 u	
12	23.90	244.7	0.0	249.4	50.0	W18X35	
13	16.30	73.9	0.0	502.5	50.0	W24X55 u	
14	3.70	0.0	-200.2				
	31.00	182.0	-200.2	225.8	50.0	W24X55 u	
16	3.00	0.0	-1.7				
	40.04	62.9	-1.7	26.1	50.0	W16X31	
20	34.90	38.7	0.0	92.6	50.0	W12X19 u	
21	29.40	194.2	0.0	241.7	50.0	W18X35	
22	38.00	42.7	0.0	249.4	50.0	W18X35 u	
23	29.16	220.5	0.0	263.2	50.0	W18X40	
24	28.90	215.9	0.0	253.6	50.0	W18X40	
25	29.16	163.2	0.0	209.5	50.0	W18X35	
26	28.90	162.3	0.0	242.7	50.0	W18X40 u	
28	36.16	401.2	0.0	439.9	50.0	W24X55	
29	36.09	399.6	0.0	436.1	50.0	W24X55	
30	31.40	27.1	0.0	65.2	50.0	W12X14	
33	27.20	119.3	0.0	148.3	50.0	W16X31	
35	25.60	104.8	0.0	119.1	50.0	W16X26	
37	25.30	35.6	0.0	213.8	50.0	W12X40 u	
38	39.25	246.2	0.0	374.2	50.0	W21X48	
120	26.16	159.7	0.0	199.8	50.0	W18X35	
121	26.09	166.1	0.0	195.1	50.0	W18X35	
134	38.30	259.0	0.0	295.9	50.0	W21X44	
175	3.00	0.0	-1.7				
	18.40	11.9	-1.7	7.9	36.0	W8X10	
178	39.25	311.7	0.0	750.0	50.0	W24X76	
224	9.40	0.3	0.0	4.6	36.0	C4X5.4	
225	10.00	0.4	0.0	4.5	36.0	C4X5.4	
226	10.00	0.4	0.0	4.5	36.0	C4X5.4	
227	10.00	0.4	0.0	4.5	36.0	C4X5.4	
228	10.00	0.4	0.0	4.5	36.0	C4X5.4	

Beam Summary

RAM Steel 23.00.00.92
DataBase: 231115 PSE RSS Corebrace Review
Building Code: IBC

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Steel Code: AISC 360-16 LRFD

Bm #	Length	+Mu	-Mu	ΦMn	Fy	Beam Size	Studs
229	10.00	0.4	0.0	4.5	36.0	C4X5.4	
230	10.00	0.4	0.0	4.5	36.0	C4X5.4	
231	10.00	0.4	0.0	4.5	36.0	C4X5.4	
232	10.00	0.4	0.0	4.5	36.0	C4X5.4	
233	10.00	0.4	0.0	4.5	36.0	C4X5.4	
234	10.05	0.4	0.0	4.4	36.0	C4X5.4	
235	10.00	0.4	0.0	4.5	36.0	C4X5.4	
236	10.00	0.4	0.0	4.5	36.0	C4X5.4	
237	10.00	0.4	0.0	4.5	36.0	C4X5.4	
238	10.00	0.4	0.0	4.5	36.0	C4X5.4	
239	10.00	0.4	0.0	4.5	36.0	C4X5.4	
240	9.00	0.3	0.0	4.8	36.0	C4X5.4	
241	10.00	0.4	0.0	4.5	36.0	C4X5.4	
242	10.00	0.4	0.0	4.5	36.0	C4X5.4	
243	10.00	0.4	0.0	4.5	36.0	C4X5.4	
244	9.25	0.3	0.0	4.7	36.0	C4X5.4	

Floor Type: LOWROOF

Bm #	Length	+Mu	-Mu	ΦMn	Fy	Beam Size	Studs
	ft	kip-ft	kip-ft	kip-ft	ksi		
6	26.50	38.7	0.0	124.5	50.0	W14X22 u	
8	39.25	91.7	0.0	249.4	50.0	W18X35	
19	23.21	26.2	0.0	1061.2	50.0	W30X90 u	
20	23.25	23.3	0.0	65.2	50.0	W12X14 u	
27	24.40	149.2	0.0	184.5	50.0	W16X31	
28	30.10	216.8	0.0	228.9	50.0	W18X40	
29	25.20	248.1	0.0	828.8	50.0	W21X93 u	
30	31.30	234.8	0.0	282.3	50.0	W21X44	
33	36.90	56.2	0.0	294.0	50.0	W14X48 u	
42	34.90	356.0	0.0	432.2	50.0	W24X55	
47	38.00	361.6	0.0	492.7	50.0	W24X62	
49	28.90	203.2	0.0	231.5	50.0	W18X40	
50	29.16	219.5	0.0	240.3	50.0	W18X40	
51	39.25	76.2	0.0	202.5	50.0	W16X31	
54	27.20	170.2	0.0	249.4	50.0	W18X35	
56	25.60	145.5	0.0	182.7	50.0	W18X35	
57	28.10	290.6	0.0	564.8	50.0	W21X68 u	
60	8.00	3.6	0.0	24.8	50.0	W8X10	
61	29.16	289.5	0.0	292.1	50.0	W21X44	
62	28.90	252.2	0.0	287.6	50.0	W21X44	
63	26.40	227.6	0.0	237.9	50.0	W18X40	
64	31.40	254.3	0.0	300.6	50.0	W21X44	
160	29.40	210.1	0.0	261.7	50.0	W18X40 u	
190	39.03	402.5	0.0	514.9	50.0	W24X62	
191	27.30	134.7	0.0	149.5	50.0	W16X31	

Beam Summary

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Building Code: IBC Steel Code: AISC 360-16 LRFD

Bm #	Length	+Mu	-Mu	ΦMn	Fy	Beam Size	Studs
193	24.40	213.2	0.0	237.4	50.0	W18X35	
194	25.95	126.2	0.0	202.5	50.0	W16X31 u	
225	8.00	0.0	0.0	32.9	50.0	W8X10	
261	56.88	111.1	-90.1	116.0	50.0	W21X48	
	13.62	0.0	-90.1				
264	13.20	9.9	0.0	15.9	36.0	MC10X6.5	
265	13.20	8.9	0.0	15.9	36.0	MC10X6.5	
266	13.20	18.0	0.0	21.4	36.0	MC10X8.4	
267	56.88	111.1	-90.1	116.0	50.0	W21X48	
	13.62	0.0	-90.1				
268	46.46	233.0	0.0	3397.5	50.0	W40X211 u	
269	46.46	233.0	0.0	3397.5	50.0	W40X211 u	

* after Size denotes beam failed stress/capacity criteria.
# after Size denotes beam failed deflection criteria.
u after Size denotes this size has been assigned by the User.

Beam Summary

JOIST SELECTION SUMMARY:

Demand/Capacity Limits for: Strength: 1.000 Deflection: 1.000

Floor Type: HIGHROOF

Standard Joists:

Joist #	Length	WDL	WLL	WTL	Joist
69	31.40	205.0	200.0	405.0	20LH03
70	31.40	207.0	202.0	409.0	24LH03
71	31.40	205.0	200.0	405.0	20LH03
73	31.40	202.9	198.0	401.0	20LH03
74	31.40	205.0	197.1	402.1	20LH03
75	31.40	156.7	176.1	332.8	18LH02
177	31.40	173.8	187.2	361.0	18LH03
193	39.00	205.0	207.6	431.9	32LH06
198	39.00	197.3	250.2	457.8	32LH06

Special Joists:

Joist #	Length	+M	-M	Joist Size
62	54.93	156.5	0.0	XXGSP
63	54.93	158.9	0.0	XXGSP
64	54.92	157.7	0.0	XXGSP
65	54.92	132.5	0.0	XXGSP
66	54.93	155.7	0.0	XXGSP
67	54.93	157.1	0.0	XXGSP
68	54.93	134.4	0.0	XXGSP
179	21.64	23.2	0.0	XXGSP
180	21.40	15.7	-2.3	XXGSP
181	21.64	24.5	0.0	XXGSP
182	21.64	24.5	0.0	XXGSP
183	21.64	23.5	0.0	XXGSP
184	21.40	16.5	-2.4	XXGSP
185	21.40	16.5	-2.4	XXGSP
186	21.40	15.9	-2.3	XXGSP
192	39.00	89.3	0.0	XXGSP
194	39.00	78.7	0.0	XXGSP
195	39.00	87.0	0.0	XXGSP
196	39.00	89.4	0.0	XXGSP
197	39.00	78.1	0.0	XXGSP
200	38.00	77.6	0.0	XXGSP
201	38.00	77.7	0.0	XXGSP
202	38.00	77.7	0.0	XXGSP
203	38.00	77.7	0.0	XXGSP
204	38.00	79.1	0.0	XXGSP
205	38.00	99.8	0.0	XXGSP
206	38.00	76.5	0.0	XXGSP

Beam Summary

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Joist #	Length	+M	-M	Joist Size
207	38.00	48.0	0.0	XXGSP
208	43.04	77.2	-2.3	XXGSP
209	43.04	81.3	-2.4	XXGSP
210	43.04	81.3	-2.4	XXGSP
211	43.04	81.3	-2.4	XXGSP
212	43.04	84.8	-2.4	XXGSP
213	43.04	86.9	-2.4	XXGSP
214	43.04	86.9	-2.4	XXGSP
215	43.04	86.6	-2.4	XXGSP
216	43.04	86.2	-2.4	XXGSP
217	43.04	86.1	-2.4	XXGSP
218	43.04	86.1	-2.4	XXGSP
219	43.04	86.1	-2.4	XXGSP
220	43.04	86.1	-2.4	XXGSP
221	43.04	86.1	-2.4	XXGSP
222	43.04	86.1	-2.4	XXGSP
223	43.04	83.5	-2.4	XXGSP
245	38.01	65.0	0.0	XXGSP

Floor Type: LOWROOF

Standard Joists:

Joist #	Length	WDL	WLL	WTL	Joist
220	39.25	185.1	292.1	496.3	32LH07
224	39.25	168.1	290.6	471.6	32LH06

Special Joists:

Joist #	Length	+M	-M	Joist Size
92	47.25	134.6	0.0	XXGSP
93	47.25	123.9	0.0	XXGSP
94	47.25	123.0	0.0	XXGSP
95	47.25	123.0	0.0	XXGSP
96	47.25	123.0	0.0	XXGSP
97	47.25	123.0	0.0	XXGSP
98	47.25	123.9	0.0	XXGSP
99	47.25	134.4	0.0	XXGSP
202	46.46	114.1	0.0	XXGSP
214	39.25	79.2	0.0	XXGSP
218	39.25	79.2	0.0	XXGSP
219	39.25	79.5	0.0	XXGSP
221	39.25	79.2	0.0	XXGSP
222	39.25	79.2	0.0	XXGSP
223	39.25	80.4	0.0	XXGSP
226	36.40	86.5	0.0	XXGSP
227	56.48	120.5	0.0	XXGSP

Beam Summary

Joist #	Length	+M	-M	Joist Size
228	36.40	113.5	0.0	XXGSP
229	36.40	116.3	0.0	XXGSP
234	56.48	159.0	0.0	XXGSP
235	56.88	119.0	0.0	XXGSP
236	56.88	112.2	0.0	XXGSP
237	56.88	108.8	0.0	XXGSP
238	56.88	170.0	0.0	XXGSP
239	56.88	171.5	0.0	XXGSP
240	56.88	171.9	0.0	XXGSP
241	56.88	162.3	0.0	XXGSP
242	56.48	158.9	0.0	XXGSP
243	36.40	80.0	0.0	XXGSP
244	56.48	167.1	0.0	XXGSP
245	56.48	167.2	0.0	XXGSP
246	56.48	149.5	0.0	XXGSP
253	46.46	118.0	0.0	XXGSP
254	46.46	119.9	0.0	XXGSP
255	46.46	120.2	0.0	XXGSP
257	46.46	119.6	0.0	XXGSP
259	46.46	117.0	0.0	XXGSP
260	36.40	60.8	0.0	XXGSP

* after Size denotes joist is inadequate.
u after Size denotes this size has been assigned by the User.

Gravity Column Design Summary

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DataBase: 231115 PSE RSS Corebrace Review
Building Code: IBC

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Steel Code: AISC360-16 LRFD

DEMAND/CAPACITY LIMIT FOR STRENGTH : 0.950

Column Line 1-E

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	14.9	0.0	0.0	1	0.42 Eq Axial	0.0	46	HSS5X5X3/16
LOWROOF	15.1	0.0	0.0	1	0.42 Eq Axial	0.0	46	HSS5X5X3/16

Column Line 1-D

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	39.1	0.0	0.0	1	0.62 Eq Axial	0.0	46	HSS6X6X3/16
LOWROOF	39.4	0.0	0.0	1	0.62 Eq Axial	0.0	46	HSS6X6X3/16

Column Line 1-C.2

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	47.5	0.0	7.6	1	0.63 Eq H1-1a	0.0	46	HSS6X6X5/16
LOWROOF	47.9	0.0	5.5	1	0.60 Eq H1-1a	0.0	46	HSS6X6X5/16

Column Line 1-B.4

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	41.4	0.0	5.1	1	0.63 Eq H1-1a	0.0	46	HSS6X6X1/4
LOWROOF	41.8	0.0	3.7	1	0.60 Eq H1-1a	0.0	46	HSS6X6X1/4

Column Line 1-A.9

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	47.3	0.0	2.7	1	0.54 Eq H1-1a	0.0	46	HSS6X6X5/16
LOWROOF	47.8	0.0	1.9	1	0.53 Eq H1-1a	0.0	46	HSS6X6X5/16

Column Line 1-A.4

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	47.4	0.0	-2.9	1	0.65 Eq H1-1a	0.0	46	HSS6X6X1/4
LOWROOF	47.7	0.0	-2.1	1	0.64 Eq H1-1a	0.0	46	HSS6X6X1/4

Column Line 1-A.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	21.9	0.0	0.0	1	0.61 Eq Axial	0.0	46	HSS5X5X3/16
LOWROOF	22.1	0.0	0.0	1	0.62 Eq Axial	0.0	46	HSS5X5X3/16

Column Line 1.5-D

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	31.3	0.5	9.3	1	0.61 Eq H1-1a	0.0	46	HSS6X6X1/4
LOWROOF	31.7	0.3	6.8	1	0.55 Eq H1-1a	0.0	46	HSS6X6X1/4

Gravity Column Design Summary

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Column Line 2-C

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	53.8	8.1	-11.8	10	0.60 Eq H1-1a	0.0	46	HSS6X6X5/16
LOWROOF	92.3	3.1	0.8	1	0.66 Eq H1-1a	0.0	46	HSS6X6X5/16

Column Line 2-B.3

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	62.8	0.0	-9.2	1	0.71 Eq H1-1a	0.0	46	HSS6X6X3/8
LOWROOF	63.3	0.0	-6.7	1	0.67 Eq H1-1a	0.0	46	HSS6X6X3/8

Column Line 2-A.88

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	45.3	0.0	12.6	1	0.85 Eq H1-1a	0.0	46	HSS6X6X1/4
LOWROOF	45.7	0.0	9.2	1	0.77 Eq H1-1a	0.0	46	HSS6X6X1/4

Column Line 2-A.6

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	92.0	0.0	0.0	1	0.94 Eq Axial	0.0	46	HSS6X6X5/16
LOWROOF	92.4	0.0	0.0	1	0.95 Eq Axial	0.0	46	HSS6X6X5/16

Column Line 2.35-A

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	52.1	0.5	10.8	1	0.90 Eq H1-1a	0.0	46	HSS6X6X1/4
LOWROOF	52.5	0.4	7.9	1	0.84 Eq H1-1a	0.0	46	HSS6X6X1/4

Column Line 2.4-D

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
LOWROOF	59.0	-16.2	0.0	12	0.68 Eq H1-1a	0.0	46	HSS6X6X5/16

Column Line 2.4-C

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	42.0	-9.3	0.0	3	0.28 Eq H1-1b	0.0	46	HSS6X6X5/16
LOWROOF	99.6	-1.7	0.0	1	0.66 Eq H1-1a	0.0	46	HSS6X6X5/16

Column Line 2.4-B.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	57.6	-4.7	0.0	1	0.68 Eq H1-1a	0.0	46	HSS6X6X5/16
LOWROOF	58.0	-3.4	0.0	1	0.66 Eq H1-1a	0.0	46	HSS6X6X5/16

Column Line 2.5-A.7

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	89.6	4.2	-8.9	1	0.82 Eq H1-1a	0.0	46	HSS6X6X1/2
LOWROOF	90.3	3.1	-6.5	1	0.78 Eq H1-1a	0.0	46	HSS6X6X1/2

Gravity Column Design Summary

RAM Steel 23.00.00.92
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Building Code: IBC

Steel Code: AISC360-16 LRFD

Column Line 2.8-D

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
LOWROOF	57.9	-12.8	5.1	12	0.71 Eq H1-1a	0.0	46	HSS6X6X5/16

Column Line 2.8-B.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	57.1	-6.9	0.0	1	0.51 Eq H1-1a	0.0	46	HSS6X6X1/2
LOWROOF	72.6	2.4	0.0	1	0.56 Eq H1-1a	0.0	46	HSS6X6X1/2

Column Line 3-A.7

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	46.5	-17.6	-7.8	4	0.55 Eq H1-1b	0.0	46	HSS6X6X3/8
LOWROOF	111.7	0.0	-0.1	1	0.61 Eq H1-1a	0.0	46	HSS6X6X3/8

Column Line 3.2-E

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	25.2	-5.1	-8.9	1	0.59 Eq H1-1b	0.0	46	HSS6X6X3/16
LOWROOF								Frame

Column Line 3.3-B.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
HIGHROOF	24.0	-8.9	8.8	1	0.52 Eq H1-1b	0.0	46	HSS6X6X1/4
LOWROOF	80.1	-0.6	3.4	1	0.71 Eq H1-1a	0.0	46	HSS6X6X1/4

Column Line 3.5-A

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
LOWROOF	5.9	0.0	0.0	1	0.13 Eq Axial	0.0	46	HSS5X5X3/16

Column Line 4-A.5

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
LOWROOF	47.8	-8.4	-8.4	10	0.76 Eq H1-1a	0.0	46	HSS6X6X1/4

Column Line 4-A

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
LOWROOF	29.1	-1.9	11.3	1	0.53 Eq H1-1a	0.0	46	HSS6X6X1/4

Column Line 4.15-B.5

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
LOWROOF	55.8	0.0	12.1	6	0.58 Eq H1-1a	0.0	46	HSS6X6X5/16

Column Line 5-C.8

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size

Gravity Column Design Summary

LOWROOF	76.5	0.0	0.0	1	0.59 Eq Axial	0.0	46	HSS6X6X1/4

Column Line 5-C.3

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
LOWROOF	43.0	0.0	-12.2	10	0.61 Eq H1-1a	0.0	46	HSS6X6X1/4

Column Line 5-B.5

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
LOWROOF	39.8	0.0	-10.8	10	0.56 Eq H1-1a	0.0	46	HSS6X6X1/4

Base Plate Design Summary

RAM Steel 23.00.00.92
DataBase: 231115 PSE RSS Corebrace Review 12/06/23 20:48:09
Building Code: IBC Steel Code: AISC360-16 LRFD

BASE PLATES:

Design Code: AISC360-16 LRFD

Plate Fy (ksi)	36.000
Minimum Dimension From Face of Column to Edge of Plate (in)	3.000
Minimum Dimension From Side of Column to Edge of Plate (in)	3.000
Increment of Plate Dimensions (in)	0.250
Increment of Plate Thickness (in)	0.125
Minimum Footing Dimension Parallel to Web (ft)	4.00
Minimum Footing Dimension Perpendicular to Web (ft)	4.00
Keep Base Plate Square:	Y

Column Line	Column Size	Fy (ksi)	N (in)	B (in)	tp (in)
1-E	HSS5X5X3/16	36	11.00	11.00	0.375
1-D	HSS6X6X3/16	36	12.00	12.00	0.500
1-C.2	HSS6X6X5/16	36	12.00	12.00	0.500
1-B.4	HSS6X6X1/4	36	12.00	12.00	0.500
1-A.9	HSS6X6X5/16	36	12.00	12.00	0.500
1-A.4	HSS6X6X1/4	36	12.00	12.00	0.500
1-A.1	HSS5X5X3/16	36	11.00	11.00	0.375
1.5-D	HSS6X6X1/4	36	12.00	12.00	0.375
2-C	HSS6X6X5/16	36	12.00	12.00	0.750
2-B.3	HSS6X6X3/8	36	12.00	12.00	0.625
2-A.88	HSS6X6X1/4	36	12.00	12.00	0.500
2-A.6	HSS6X6X5/16	36	12.00	12.00	0.750
2.35-A	HSS6X6X1/4	36	12.00	12.00	0.500
2.4-D	HSS6X6X5/16	36	12.00	12.00	0.625
2.4-C	HSS6X6X5/16	36	12.00	12.00	0.750
2.4-B.1	HSS6X6X5/16	36	12.00	12.00	0.500
2.5-A.7	HSS6X6X1/2	36	12.00	12.00	0.625
2.8-D	HSS6X6X5/16	36	12.00	12.00	0.625
2.8-B.1	HSS6X6X1/2	36	12.00	12.00	0.625
3-A.7	HSS6X6X3/8	36	12.00	12.00	0.750
3.3-B.1	HSS6X6X1/4	36	12.00	12.00	0.625
3.5-A	HSS5X5X3/16	36	11.00	11.00	0.250
4-A.5	HSS6X6X1/4	36	12.00	12.00	0.500
4-A	HSS6X6X1/4	36	12.00	12.00	0.375
4.15-B.5	HSS6X6X5/16	36	12.00	12.00	0.625
5-C.8	HSS6X6X1/4	36	12.00	12.00	0.625
5-C.3	HSS6X6X1/4	36	12.00	12.00	0.625
5-B.5	HSS6X6X1/4	36	12.00	12.00	0.500

Loads and Applied Forces

RAM Frame 23.00.00.92
DataBase: 231115 PSE RSS Corebrace Review 12/06/23 20:49:30

LOAD CASE: SEIS_ELF

Seismic ASCE 7-16 Equivalent Lateral Force
Importance Factor: 1.00 TL: 6.00 s
Site Class D: Stiff Soil
Ss: 1.277 g S1: 0.439 g
Use Specified: SDs: 1.022 g SD1: 0.679 g
Risk Category: II Seismic Design Category: D
Provisions for: Force
Ground Level: Base

Dir	Eccent	R	Ta Equation	Building Period-T
X	+ And -	8.00	Std,Ct=0.030,x=0.75	Calculated
Y	+ And -	8.00	Std,Ct=0.030,x=0.75	Calculated

Dir	Ta	Cu	T	T - used	Cs Eq12.8-2	Cs - used	k
X	0.320	1.400	0.646	0.448	0.128	0.128	1.000

Dir	Ta	Cu	T	T - used	Cs Eq12.8-2	Cs - used	k
Y	0.320	1.400	0.538	0.448	0.128	0.128	1.000

Exception 2 per Section 11.4.8 is applied for site class D with S1 > 0.2

Total Building Weight (kips) = 1332.32

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X_+E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	82.31	0.00	57.57	156.63
HIGHROOF	2	23.50	18.91	0.00	147.12	51.24
LOWROOF	1	17.00	68.99	0.00	143.82	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	82.309	0.000
HIGHROOF	2	18.906	0.000
LOWROOF	1	68.988	0.000
		170.20	0.00

APPLIED STORY FORCES

Type: EQ_ASCE716_X_+E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	101.22	0.00

LOWROOF	17.00	68.99	0.00
		170.20	0.00

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	82.31	0.00	57.57	93.08
HIGHROOF	2	23.50	18.91	0.00	147.12	27.39
LOWROOF	1	17.00	68.99	0.00	143.82	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	82.309	0.000
HIGHROOF	2	18.906	0.000
LOWROOF	1	68.988	0.000
		170.20	0.00

APPLIED STORY FORCES

Type: EQ_ASCE716_X_-E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	101.22	0.00
LOWROOF	17.00	68.99	0.00
		170.20	0.00

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_Y_+E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	0.00	82.31	77.29	124.85
HIGHROOF	2	23.50	0.00	18.91	153.12	39.32
LOWROOF	1	17.00	0.00	68.99	173.02	83.75

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	0.000	82.309
HIGHROOF	2	0.000	18.906

Loads and Applied Forces

LOWROOF	1	0.000	68.988
		0.00	170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	0.00	101.22
LOWROOF	17.00	0.00	68.99
		0.00	170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
HIGHROOF	1	23.50	0.00	82.31	37.84	124.85
HIGHROOF	2	23.50	0.00	18.91	141.12	39.32
LOWROOF	1	17.00	0.00	68.99	114.61	83.75

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	0.000	82.309
HIGHROOF	2	0.000	18.906
LOWROOF	1	0.000	68.988
		0.00	170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	0.00	101.22
LOWROOF	17.00	0.00	68.99
		0.00	170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X_+E_0.3Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft

Loads and Applied Forces

HIGHROOF	1	23.50	82.31	24.69	77.29	156.63
HIGHROOF	2	23.50	18.91	5.67	153.12	51.24
LOWROOF	1	17.00	68.99	20.70	173.02	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	82.309	24.693
HIGHROOF	2	18.906	5.672
LOWROOF	1	68.988	20.696
		170.20	51.06

APPLIED STORY FORCES

Type: EQ_ASCE716_X_+E_0.3Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	101.22	30.36
LOWROOF	17.00	68.99	20.70
		170.20	51.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X_+E_-0.3Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
HIGHROOF	1	23.50	82.31	-24.69	77.29	156.63
HIGHROOF	2	23.50	18.91	-5.67	153.12	51.24
LOWROOF	1	17.00	68.99	-20.70	173.02	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	82.309	-24.693
HIGHROOF	2	18.906	-5.672
LOWROOF	1	68.988	-20.696
		170.20	-51.06

APPLIED STORY FORCES

Type: EQ_ASCE716_X_+E_-0.3Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	101.22	-30.36

Loads and Applied Forces

LOWROOF	17.00	68.99	-20.70
		170.20	-51.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_-X_+E_0.3Y_+E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	-82.31	24.69	77.29	156.63
HIGHROOF	2	23.50	-18.91	5.67	153.12	51.24
LOWROOF	1	17.00	-68.99	20.70	173.02	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	-82.309	24.693
HIGHROOF	2	-18.906	5.672
LOWROOF	1	-68.988	20.696
		-170.20	51.06

APPLIED STORY FORCES

Type: EQ_ASCE716_-X_+E_0.3Y_+E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	-101.22	30.36
LOWROOF	17.00	-68.99	20.70
		-170.20	51.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_-X_+E_-0.3Y_+E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	-82.31	-24.69	77.29	156.63
HIGHROOF	2	23.50	-18.91	-5.67	153.12	51.24
LOWROOF	1	17.00	-68.99	-20.70	173.02	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	-82.309	-24.693
HIGHROOF	2	-18.906	-5.672

Loads and Applied Forces

LOWROOF	1	-68.988	-20.696
		-170.20	-51.06

APPLIED STORY FORCES

Type: EQ_ASCE716_-X_+E_-0.3Y_+E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	-101.22	-30.36
LOWROOF	17.00	-68.99	-20.70
		-170.20	-51.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_0.3X_+E_Y_+E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	24.69	82.31	77.29	156.63
HIGHROOF	2	23.50	5.67	18.91	153.12	51.24
LOWROOF	1	17.00	20.70	68.99	173.02	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	24.693	82.309
HIGHROOF	2	5.672	18.906
LOWROOF	1	20.696	68.988
		51.06	170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_0.3X_+E_Y_+E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	30.36	101.22
LOWROOF	17.00	20.70	68.99
		51.06	170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_0.3X_+E_-Y_+E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft

Loads and Applied Forces

HIGHROOF	1	23.50	24.69	-82.31	77.29	156.63
HIGHROOF	2	23.50	5.67	-18.91	153.12	51.24
LOWROOF	1	17.00	20.70	-68.99	173.02	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	24.693	-82.309
HIGHROOF	2	5.672	-18.906
LOWROOF	1	20.696	-68.988
		51.06	-170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_0.3X_+E_-Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	30.36	-101.22
LOWROOF	17.00	20.70	-68.99
		51.06	-170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_-0.3X_+E_Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
HIGHROOF	1	23.50	-24.69	82.31	77.29	156.63
HIGHROOF	2	23.50	-5.67	18.91	153.12	51.24
LOWROOF	1	17.00	-20.70	68.99	173.02	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	-24.693	82.309
HIGHROOF	2	-5.672	18.906
LOWROOF	1	-20.696	68.988
		-51.06	170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_-0.3X_+E_Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	-30.36	101.22

LOWROOF	17.00	-20.70	68.99
		-51.06	170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_-0.3X_+E_-Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
HIGHROOF	1	23.50	-24.69	-82.31	77.29	156.63
HIGHROOF	2	23.50	-5.67	-18.91	153.12	51.24
LOWROOF	1	17.00	-20.70	-68.99	173.02	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	-24.693	-82.309
HIGHROOF	2	-5.672	-18.906
LOWROOF	1	-20.696	-68.988
		-51.06	-170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_-0.3X_+E_-Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	-30.36	-101.22
LOWROOF	17.00	-20.70	-68.99
		-51.06	-170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X_+E_0.3Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
HIGHROOF	1	23.50	82.31	24.69	37.84	156.63
HIGHROOF	2	23.50	18.91	5.67	141.12	51.24
LOWROOF	1	17.00	68.99	20.70	114.61	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	82.309	24.693
HIGHROOF	2	18.906	5.672

Loads and Applied Forces

LOWROOF	1	68.988	20.696
		170.20	51.06

APPLIED STORY FORCES

Type: EQ_ASCE716_X_+E_0.3Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	101.22	30.36
LOWROOF	17.00	68.99	20.70
		170.20	51.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X_+E_-0.3Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
HIGHROOF	1	23.50	82.31	-24.69	37.84	156.63
HIGHROOF	2	23.50	18.91	-5.67	141.12	51.24
LOWROOF	1	17.00	68.99	-20.70	114.61	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	82.309	-24.693
HIGHROOF	2	18.906	-5.672
LOWROOF	1	68.988	-20.696
		170.20	-51.06

APPLIED STORY FORCES

Type: EQ_ASCE716_X_+E_-0.3Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	101.22	-30.36
LOWROOF	17.00	68.99	-20.70
		170.20	-51.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_-X_+E_0.3Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft

Loads and Applied Forces

HIGHROOF	1	23.50	-82.31	24.69	37.84	156.63
HIGHROOF	2	23.50	-18.91	5.67	141.12	51.24
LOWROOF	1	17.00	-68.99	20.70	114.61	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	-82.309	24.693
HIGHROOF	2	-18.906	5.672
LOWROOF	1	-68.988	20.696
		-170.20	51.06

APPLIED STORY FORCES

Type: EQ_ASCE716_-X_+E_0.3Y_-E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	-101.22	30.36
LOWROOF	17.00	-68.99	20.70
		-170.20	51.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_-X_+E_-0.3Y_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	-82.31	-24.69	37.84	156.63
HIGHROOF	2	23.50	-18.91	-5.67	141.12	51.24
LOWROOF	1	17.00	-68.99	-20.70	114.61	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	-82.309	-24.693
HIGHROOF	2	-18.906	-5.672
LOWROOF	1	-68.988	-20.696
		-170.20	-51.06

APPLIED STORY FORCES

Type: EQ_ASCE716_-X_+E_-0.3Y_-E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	-101.22	-30.36

Loads and Applied Forces

LOWROOF	17.00	-68.99	-20.70
		-170.20	-51.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_0.3X_+E_Y_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	24.69	82.31	37.84	156.63
HIGHROOF	2	23.50	5.67	18.91	141.12	51.24
LOWROOF	1	17.00	20.70	68.99	114.61	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	24.693	82.309
HIGHROOF	2	5.672	18.906
LOWROOF	1	20.696	68.988
		51.06	170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_0.3X_+E_Y_-E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	30.36	101.22
LOWROOF	17.00	20.70	68.99
		51.06	170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_0.3X_+E_-Y_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	24.69	-82.31	37.84	156.63
HIGHROOF	2	23.50	5.67	-18.91	141.12	51.24
LOWROOF	1	17.00	20.70	-68.99	114.61	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	24.693	-82.309
HIGHROOF	2	5.672	-18.906

Loads and Applied Forces

LOWROOF	1	20.696	-68.988
		51.06	-170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_0.3X_+E_-Y_-E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	30.36	-101.22
LOWROOF	17.00	20.70	-68.99
		51.06	-170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_-0.3X_+E_Y_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	-24.69	82.31	37.84	156.63
HIGHROOF	2	23.50	-5.67	18.91	141.12	51.24
LOWROOF	1	17.00	-20.70	68.99	114.61	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	-24.693	82.309
HIGHROOF	2	-5.672	18.906
LOWROOF	1	-20.696	68.988
		-51.06	170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_-0.3X_+E_Y_-E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	-30.36	101.22
LOWROOF	17.00	-20.70	68.99
		-51.06	170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_-0.3X_+E_-Y_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft

Loads and Applied Forces

HIGHROOF	1	23.50	-24.69	-82.31	37.84	156.63
HIGHROOF	2	23.50	-5.67	-18.91	141.12	51.24
LOWROOF	1	17.00	-20.70	-68.99	114.61	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	-24.693	-82.309
HIGHROOF	2	-5.672	-18.906
LOWROOF	1	-20.696	-68.988
		-51.06	-170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_-0.3X_+E_-Y_-E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	-30.36	-101.22
LOWROOF	17.00	-20.70	-68.99
		-51.06	-170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X_-E_0.3Y_+E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	82.31	24.69	77.29	93.08
HIGHROOF	2	23.50	18.91	5.67	153.12	27.39
LOWROOF	1	17.00	68.99	20.70	173.02	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	82.309	24.693
HIGHROOF	2	18.906	5.672
LOWROOF	1	68.988	20.696
		170.20	51.06

APPLIED STORY FORCES

Type: EQ_ASCE716_X_-E_0.3Y_+E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	101.22	30.36

Loads and Applied Forces

LOWROOF	17.00	68.99	20.70
		170.20	51.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X_-E_-0.3Y_+E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	82.31	-24.69	77.29	93.08
HIGHROOF	2	23.50	18.91	-5.67	153.12	27.39
LOWROOF	1	17.00	68.99	-20.70	173.02	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	82.309	-24.693
HIGHROOF	2	18.906	-5.672
LOWROOF	1	68.988	-20.696
		170.20	-51.06

APPLIED STORY FORCES

Type: EQ_ASCE716_X_-E_-0.3Y_+E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	101.22	-30.36
LOWROOF	17.00	68.99	-20.70
		170.20	-51.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_-X_-E_0.3Y_+E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	-82.31	24.69	77.29	93.08
HIGHROOF	2	23.50	-18.91	5.67	153.12	27.39
LOWROOF	1	17.00	-68.99	20.70	173.02	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	-82.309	24.693
HIGHROOF	2	-18.906	5.672

Loads and Applied Forces

LOWROOF	1	-68.988	20.696
		-170.20	51.06

APPLIED STORY FORCES

Type: EQ_ASCE716_-X_-E_0.3Y_+E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	-101.22	30.36
LOWROOF	17.00	-68.99	20.70
		-170.20	51.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_-X_-E_-0.3Y_+E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	-82.31	-24.69	77.29	93.08
HIGHROOF	2	23.50	-18.91	-5.67	153.12	27.39
LOWROOF	1	17.00	-68.99	-20.70	173.02	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	-82.309	-24.693
HIGHROOF	2	-18.906	-5.672
LOWROOF	1	-68.988	-20.696
		-170.20	-51.06

APPLIED STORY FORCES

Type: EQ_ASCE716_-X_-E_-0.3Y_+E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	-101.22	-30.36
LOWROOF	17.00	-68.99	-20.70
		-170.20	-51.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_0.3X_-E_Y_+E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft

Loads and Applied Forces

HIGHROOF	1	23.50	24.69	82.31	77.29	93.08
HIGHROOF	2	23.50	5.67	18.91	153.12	27.39
LOWROOF	1	17.00	20.70	68.99	173.02	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	24.693	82.309
HIGHROOF	2	5.672	18.906
LOWROOF	1	20.696	68.988
		51.06	170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_0.3X_-E_Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	30.36	101.22
LOWROOF	17.00	20.70	68.99
		51.06	170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_0.3X_-E_-Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
HIGHROOF	1	23.50	24.69	-82.31	77.29	93.08
HIGHROOF	2	23.50	5.67	-18.91	153.12	27.39
LOWROOF	1	17.00	20.70	-68.99	173.02	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	24.693	-82.309
HIGHROOF	2	5.672	-18.906
LOWROOF	1	20.696	-68.988
		51.06	-170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_0.3X_-E_-Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	30.36	-101.22

LOWROOF	17.00	20.70	-68.99
		51.06	-170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_-0.3X_-E_Y_+E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	-24.69	82.31	77.29	93.08
HIGHROOF	2	23.50	-5.67	18.91	153.12	27.39
LOWROOF	1	17.00	-20.70	68.99	173.02	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	-24.693	82.309
HIGHROOF	2	-5.672	18.906
LOWROOF	1	-20.696	68.988
		-51.06	170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_-0.3X_-E_Y_+E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	-30.36	101.22
LOWROOF	17.00	-20.70	68.99
		-51.06	170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_-0.3X_-E_-Y_+E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	-24.69	-82.31	77.29	93.08
HIGHROOF	2	23.50	-5.67	-18.91	153.12	27.39
LOWROOF	1	17.00	-20.70	-68.99	173.02	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	-24.693	-82.309
HIGHROOF	2	-5.672	-18.906

Loads and Applied Forces

LOWROOF	1	-20.696	-68.988
		-51.06	-170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_-0.3X_-E_-Y_+E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	-30.36	-101.22
LOWROOF	17.00	-20.70	-68.99
		-51.06	-170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X_-E_0.3Y_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	82.31	24.69	37.84	93.08
HIGHROOF	2	23.50	18.91	5.67	141.12	27.39
LOWROOF	1	17.00	68.99	20.70	114.61	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	82.309	24.693
HIGHROOF	2	18.906	5.672
LOWROOF	1	68.988	20.696
		170.20	51.06

APPLIED STORY FORCES

Type: EQ_ASCE716_X_-E_0.3Y_-E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	101.22	30.36
LOWROOF	17.00	68.99	20.70
		170.20	51.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X_-E_-0.3Y_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft

Loads and Applied Forces

HIGHROOF	1	23.50	82.31	-24.69	37.84	93.08
HIGHROOF	2	23.50	18.91	-5.67	141.12	27.39
LOWROOF	1	17.00	68.99	-20.70	114.61	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	82.309	-24.693
HIGHROOF	2	18.906	-5.672
LOWROOF	1	68.988	-20.696
		170.20	-51.06

APPLIED STORY FORCES

Type: EQ_ASCE716_X_-E_-0.3Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	101.22	-30.36
LOWROOF	17.00	68.99	-20.70
		170.20	-51.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_-X_-E_0.3Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
HIGHROOF	1	23.50	-82.31	24.69	37.84	93.08
HIGHROOF	2	23.50	-18.91	5.67	141.12	27.39
LOWROOF	1	17.00	-68.99	20.70	114.61	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	-82.309	24.693
HIGHROOF	2	-18.906	5.672
LOWROOF	1	-68.988	20.696
		-170.20	51.06

APPLIED STORY FORCES

Type: EQ_ASCE716_-X_-E_0.3Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	-101.22	30.36

Loads and Applied Forces

LOWROOF	17.00	-68.99	20.70
		-170.20	51.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_-X_-E_-0.3Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
HIGHROOF	1	23.50	-82.31	-24.69	37.84	93.08
HIGHROOF	2	23.50	-18.91	-5.67	141.12	27.39
LOWROOF	1	17.00	-68.99	-20.70	114.61	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	-82.309	-24.693
HIGHROOF	2	-18.906	-5.672
LOWROOF	1	-68.988	-20.696
		-170.20	-51.06

APPLIED STORY FORCES

Type: EQ_ASCE716_-X_-E_-0.3Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	-101.22	-30.36
LOWROOF	17.00	-68.99	-20.70
		-170.20	-51.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_0.3X_-E_Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
HIGHROOF	1	23.50	24.69	82.31	37.84	93.08
HIGHROOF	2	23.50	5.67	18.91	141.12	27.39
LOWROOF	1	17.00	20.70	68.99	114.61	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	24.693	82.309
HIGHROOF	2	5.672	18.906

LOWROOF	1	20.696	68.988
		51.06	170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_0.3X_-E_Y_-E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	30.36	101.22
LOWROOF	17.00	20.70	68.99
		51.06	170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_0.3X_-E_-Y_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	24.69	-82.31	37.84	93.08
HIGHROOF	2	23.50	5.67	-18.91	141.12	27.39
LOWROOF	1	17.00	20.70	-68.99	114.61	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	24.693	-82.309
HIGHROOF	2	5.672	-18.906
LOWROOF	1	20.696	-68.988
		51.06	-170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_0.3X_-E_-Y_-E_F

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	30.36	-101.22
LOWROOF	17.00	20.70	-68.99
		51.06	-170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_-0.3X_-E_Y_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft

HIGHROOF	1	23.50	-24.69	82.31	37.84	93.08
HIGHROOF	2	23.50	-5.67	18.91	141.12	27.39
LOWROOF	1	17.00	-20.70	68.99	114.61	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	-24.693	82.309
HIGHROOF	2	-5.672	18.906
LOWROOF	1	-20.696	68.988
		-51.06	170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_-0.3X_-E_Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	-30.36	101.22
LOWROOF	17.00	-20.70	68.99
		-51.06	170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_-0.3X_-E_-Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
HIGHROOF	1	23.50	-24.69	-82.31	37.84	93.08
HIGHROOF	2	23.50	-5.67	-18.91	141.12	27.39
LOWROOF	1	17.00	-20.70	-68.99	114.61	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	-24.693	-82.309
HIGHROOF	2	-5.672	-18.906
LOWROOF	1	-20.696	-68.988
		-51.06	-170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_-0.3X_-E_-Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	-30.36	-101.22

Loads and Applied Forces

LOWROOF	17.00	-20.70	-68.99
		-51.06	-170.20

Loads and Applied Forces

LOAD CASE: EQ_DRIFT

Seismic ASCE 7-16 Equivalent Lateral Force
Importance Factor: 1.00 TL: 6.00 s
Site Class D: Stiff Soil
Ss: 1.277 g S1: 0.439 g
Use Specified: SDs: 1.022 g SD1: 0.679 g
Risk Category: II Seismic Design Category: D
Provisions for: Drift
Ground Level: Base

Dir	Eccent	R	Ta Equation	Building Period-T
X	+ And -	8.00	Std,Ct=0.030,x=0.75	Calculated
Y	+ And -	8.00	Std,Ct=0.030,x=0.75	Calculated

Dir	Ta	Cu	T	T - used	Cs Eq12.8-2	Cs - used	k
X	0.320	1.400	0.646	0.646	0.128	0.128	1.073

Dir	Ta	Cu	T	T - used	Cs Eq12.8-2	Cs - used	k
Y	0.320	1.400	0.538	0.538	0.128	0.128	1.019

Exception 2 per Section 11.4.8 is applied for site class D with S1 > 0.2

Total Building Weight (kips) = 1332.32

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X_+E_Drft

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
HIGHROOF	1	23.50	83.10	0.00	57.57	156.63
HIGHROOF	2	23.50	19.09	0.00	147.12	51.24
LOWROOF	1	17.00	68.02	0.00	143.82	115.53

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	83.097	0.000
HIGHROOF	2	19.087	0.000
LOWROOF	1	68.020	0.000
		170.20	0.00

APPLIED STORY FORCES

Type: EQ_ASCE716_X_+E_Drft

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	102.18	0.00

LOWROOF	17.00	68.02	0.00
		170.20	0.00

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X_-E_Drft

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	83.10	0.00	57.57	93.08
HIGHROOF	2	23.50	19.09	0.00	147.12	27.39
LOWROOF	1	17.00	68.02	0.00	143.82	51.98

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	83.097	0.000
HIGHROOF	2	19.087	0.000
LOWROOF	1	68.020	0.000
		170.20	0.00

APPLIED STORY FORCES

Type: EQ_ASCE716_X_-E_Drft

Level	Ht ft	Fx kips	Fy kips
HIGHROOF	23.50	102.18	0.00
LOWROOF	17.00	68.02	0.00
		170.20	0.00

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_Y_+E_Drft

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
HIGHROOF	1	23.50	0.00	82.52	77.29	124.85
HIGHROOF	2	23.50	0.00	18.95	153.12	39.32
LOWROOF	1	17.00	0.00	68.73	173.02	83.75

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx kips	Sum Fy kips
HIGHROOF	1	0.000	82.516
HIGHROOF	2	0.000	18.954

Loads and Applied Forces

LOWROOF	1	0.000	68.734
		0.00	170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_Y_+E_Drft

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	0.00	101.47
LOWROOF	17.00	0.00	68.73
		0.00	170.20

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_Y_-E_Drft

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
HIGHROOF	1	23.50	0.00	82.52	37.84	124.85
HIGHROOF	2	23.50	0.00	18.95	141.12	39.32
LOWROOF	1	17.00	0.00	68.73	114.61	83.75

Applied Loads for Pseudo-Flexible or Semirigid Diaphragms:

Story	Diaph #	Sum Fx	Sum Fy
		kips	kips
HIGHROOF	1	0.000	82.516
HIGHROOF	2	0.000	18.954
LOWROOF	1	0.000	68.734
		0.00	170.20

APPLIED STORY FORCES

Type: EQ_ASCE716_Y_-E_Drft

Level	Ht	Fx	Fy
	ft	kips	kips
HIGHROOF	23.50	0.00	101.47
LOWROOF	17.00	0.00	68.73
		0.00	170.20

Loads and Applied Forces

LOAD MULTIPLIERS FOR ECCENTRIC LOADING ON SEMIRIGID DIAPHRAGM:SEISMIC AND RESPONSE SPECTRA LOAD CASES

Story : HIGHROOF **Diaph. #: 1**

Loading Direction	Top Region	Bottom Region	Left Region	Right Region
+X	1.68	0.29	---	---
-X	0.31	1.72	---	---
+Y	---	---	0.44	1.65
-Y	---	---	1.56	0.34

Story : HIGHROOF **Diaph. #: 2**

Loading Direction	Top Region	Bottom Region	Left Region	Right Region
+X	1.58	0.47	---	---
-X	0.42	1.53	---	---
+Y	---	---	0.50	1.50
-Y	---	---	1.50	0.50

Story : LOWROOF **Diaph. #: 1**

Loading Direction	Top Region	Bottom Region	Left Region	Right Region
+X	1.74	0.41	---	---
-X	0.27	1.57	---	---
+Y	---	---	0.30	1.63
-Y	---	---	1.74	0.33

Criteria, Mass and Exposure Data

RAM Frame 23.00.00.92
DataBase: 231115 PSE RSS Corebrace Review 12/06/23 20:49:30

CRITERIA:

Rigid End Zones: Ignore Effects
Member Force Output: At Face of Joint
P-Delta: No
Ground Level: Base
Mesh Criteria :
Max. Distance Between Nodes on Mesh Line (ft) : 4.00
Merge Node Tolerance (in) : 0.0100
Geometry Tolerance (in) : 0.0050
Walls Out-of-plane Stiffness Not Included in Analysis.
Sign considered for Dynamic Load Case Results.
Rigid Links Included at Fixed Beam-to-Wall Locations
Eigenvalue Analysis : Eigen Vectors (Subspace Iteration)

DIAPHRAGM DATA:

Story	Diaph #	Diaph Type
HIGHROOF	1	Semirigid
	2	Semirigid
LOWROOF	1	Semirigid

Disconnect Internal Nodes of Beams: Yes
Disconnect Nodes outside Slab Boundary: Yes

Semirigid Diaphragm Parameters:
Use Beams for Exterior Boundary
Calculate Diaphragm Mass
Hard Node Density Factor: 1.00

STORY MASS DATA:

Includes Self Mass of:
Columns (Half mass of columns above and below)
Walls (Half mass of walls above and below)

Calculated Values:

Story	Diaph #	Weight kips	Mass k-s2/ft	MMI ft-k-s2	Xm ft	Ym ft	EccX ft	EccY ft
HIGHROOF	1	557.85	17.32	76620	57.57	124.85	19.73	31.77
	2	128.14	3.98	3247	147.12	39.32	6.00	11.92
LOWROOF	1	640.23	19.88	118551	144.66	83.40	29.21	31.77
	None	6.11	0.19	1503	55.68	120.43	--	--

Story	Diaph #	Combine
HIGHROOF	1	None
	2	None
LOWROOF	1	None
	None	1-LOWROOF

Combined/Merged Values:

Criteria, Mass and Exposure Data

Story	Diaph #	Weight kips	Mass k-s2/ft	MMI ft-k-s2	Xm ft	Ym ft	EccX ft	EccY ft
HIGHROOF	1	557.8	17.32	76620	57.57	124.85	19.73	31.77
	2	128.1	3.98	3247	147.12	39.32	6.00	11.92
LOWROOF	1	646.3	20.07	121798	143.82	83.75	29.21	31.77

Distributed Mass Values for Pseudo-Flexible or Meshed Diaphragms:

Story	Diaph #	Total Weight kips	Total Mass k-s2/ft
HIGHROOF	1	549.12	17.053
HIGHROOF	2	125.12	3.886
LOWROOF	1	639.02	19.845

WIND EXPOSURE DATA:

Calculated Values:

Story	Diaph #	Building Extents (ft) Min X	Max X	Min Y	Max Y	Expose	Parapet ft
HIGHROOF	1	-0.50	131.00	-0.50	211.33	Full	4.00
	2	127.00	167.00	-0.50	79.00	Full	4.00
LOWROOF	1	42.54	237.25	-0.50	211.33	Full	0.00

STORY GRAVITY LOADS DATA:

Includes Weight of:

Columns
Walls

Live Load Reduction (Calculated)

Reducible : 0.00 %
Storage : 0.00 %

Calculated Values:

Story	Diaph #	Dead kips	Xc ft	Yc ft	Live kips	Xc ft	Yc ft
HIGHROOF	1	392.06	52.84	125.38	19.66	43.04	39.47
	2	67.43	147.16	39.13	3.75	149.85	42.59
LOWROOF	1	452.70	141.67	80.45	35.34	149.46	148.95
	None	8.83	55.68	120.43	0.00	0.00	0.00

Story	Diaph #	Snow kips	Xc ft	Yc ft	Combine
HIGHROOF	1	467.32	54.65	127.75	None
	2	81.44	147.00	39.25	None
LOWROOF	1	624.05	138.75	82.30	None
	None	0.00	0.00	0.00	1-LOWROOF

User Specified Values:

Criteria, Mass and Exposure Data

Story	Diaph #	Dead	Xc	Yc	Live	Xc	Yc
		kips	ft	ft	kips	ft	ft
HIGHROOF	1	392.06	52.84	125.38	19.66	43.04	39.47
	2	67.43	147.16	39.13	3.75	149.85	42.59
LOWROOF	1	461.53	140.03	81.21	35.34	149.46	148.95

Story	Diaph #	Snow	Xc	Yc
		kips	ft	ft
HIGHROOF	1	467.3	54.65	127.75
	2	81.4	147.00	39.25
LOWROOF	1	624.1	138.75	82.30

COREBRACE BUCKLING RESTRAINED BRACE (BRB) LUG SCHEDULE

COREBRACE
SUPERIOR SEISMIC PERFORMANCE

NOTES:

1. CORE MATERIAL SHALL BE ASTM Gr A36 SELECTED TO PROVIDE A MINIMUM TENSILE YIELD STRENGTH OF 38 ksi AND A MAXIMUM TENSILE YIELD STRENGTH OF 46 ksi.
2. BRB SUPPLIER SHALL DESIGN BRACE CONNECTIONS IN ACCORDANCE WITH AISC 341-16.
3. BRB SUPPLIER SHALL PROVIDE TEST RESULTS FOR SIMILAR BRACES IN ACCORDANCE WITH AISC 341-16.
4. BRB SUPPLIER SHALL PROVIDE TESTED OVERSTRENGTH FACTORS FOR COMPRESSION STRENGTH ADJUSTMENT (β) AND STRAIN HARDENING (ω) WITHIN THE VALUES SHOWN IN THE TABLE BELOW AND SHALL CONSIDER LENGTH EFFECTS FOR BRACES LONGER THAN 35'. OVERSTRENGTH FACTORS TO BE DETERMINED AT THE GREATER OF 2x DESIGN STORY DRIFT AND 2% STORY DRIFT PER AISC 341-16.
5. BOLTS TO CONFORM TO ASTM F3125 GrA490/F2280 SC OR ASTM F3148 TNA WITH CLASS A FAYING SURFACE
6. FOR GUSSET GEOMETRY NOTATIONS, SEE DETAIL CUTS ON XXX SERIES SHEETS.
7. GUSSET AND WELD SIZES SHOWN ARE APPROXIMATE VALUES. FINAL VALUES TO BE COORDINATED WITH COREBRACE.
8. STIFFNESS MODIFICATION FACTORS (Kf) ARE DESIGN VALUES. ACTUAL VALUES TO BE WITHIN ±10%. ACTUAL STIFFNESS WP TO WP (Keff) CALCULATED AS: Keff = (Kf·Asc·E) / Lwp
WHERE Lwp IS THE WP TO WP LENGTH AND Asc IS THE SPECIFIED CORE AREA.
9. MINIMUM STROKE TO OCCUR AT EACH END OF BRACE IN TENSION AND COMPRESSION DIRECTIONS. CORE EXTENSION TO REMAIN STABLE OVER 2X THIS LENGTH.

EOR-ID #	Line	Grids #	Lvls #	Qty #	Core Area in²	Stiffness Modification Factor (Kf)	β	ω	Minimum Stroke in	d_b in	n_i #	n_o #	Casing Shape t or p	Casing Profile	Casing H in	Casing W in
BRB-2.00	4.1	D.3 to D	2	1	2.00	1.84	1.18	1.38	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	4.1	D to C.6	2	1	2.00	1.84	1.18	1.38	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	4.1	D.3 to D	1	1	2.00	1.28	1.11	1.34	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	4.1	D to C.6	1	1	2.00	1.28	1.11	1.34	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	5	E to D.5	1	1	2.00	1.23	1.11	1.32	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	C	2.8 to 3	2	1	2.00	2.00	1.15	1.37	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	C	3 to 3.2	2	1	2.00	2.00	1.15	1.37	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	C	2.8 to 3	1	1	2.00	1.27	1.11	1.33	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	C	3 to 3.2	1	1	2.00	1.27	1.11	1.33	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	C.25	3.2 to 3.8	2	1	2.00	1.81	1.11	1.32	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	C.25	3.8 to 4.1	2	1	2.00	1.81	1.11	1.32	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	C.25	3.2 to 3.8	1	1	2.00	1.22	1.11	1.32	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	C.25	3.8 to 4.1	1	1	2.00	1.22	1.11	1.32	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	E	4.7 to 5	1	1	2.00	1.21	1.11	1.32	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	E	3.8 to 4.1	2	1	2.00	1.58	1.13	1.36	3.00	1 1/8	2	0	t	□	8	8
BRB-3.00	E	4.1 to 3.8	1	1	3.00	1.26	1.17	1.24	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	4	.8 to A.9	1	1	2.00	1.27	1.11	1.33	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	B	4.5 to 4.7	1	1	2.00	1.22	1.11	1.33	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	B	4.7 to 5	1	1	2.00	1.22	1.11	1.33	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	2	D to C.6	2	1	2.00	1.80	1.11	1.31	3.00	1 1/8	2	0	t	□	8	8
BRB-3.00	2	C.6 to D	1	1	3.00	1.19	1.17	1.19	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	3.2	D to C.6	2	1	2.00	1.96	1.11	1.33	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	3.2	.6 to C.2	2	1	2.00	1.96	1.11	1.33	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	3.2	D to C.6	1	1	2.00	1.22	1.11	1.32	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	3.2	.6 to C.2	1	1	2.00	1.22	1.11	1.32	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	E	1.5 to 2	2	1	2.00	1.64	1.18	1.38	3.00	1 1/8	2	0	t	□	8	8
BRB-2.50	2	A.2 to A	1	1	2.50	1.16	1.11	1.31	3.00	1 1/8	2	0	t	□	8	8
BRB-2.50	A	2.7 to 3	2	1	2.50	1.57	1.11	1.31	3.00	1 1/8	2	0	t	□	8	8
BRB-3.50	A	3 to 2.7	1	1	3.50	1.21	1.17	1.20	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	3	A to A.2	2	1	2.00	1.83	1.11	1.33	3.00	1 1/8	2	0	t	□	8	8
BRB-2.00	3	A.2 to A	1	1	2.00	1.27	1.11	1.33	3.00	1 1/8	2	0	t	□	8	8

Gusset Info at Lower End of BRB

EOR-ID #	Line	Grids #	t_g in	t_{rg} in	W_{rg} in	W_b in	L_{wb} in	W_{bz} in	z in	W_c in	L_{wc} in	L_{gb} in	L_{gc} in	Stiff or Cont Plates Beam	Stiff or Cont Plates Bm @ z	Stiff or Cont Plates Column	Gusset Edge Stiff Plates Thickness	Gusset Edge Stiff Plates Width	Doubler Plates Bm t_{Dblr}	Doubler Plates Bm L_{Dblr}	Doubler Plates Bm W_{Dblr}	Doubler Plates Col t_{Dblr}
BRB-2.00	4.1	D.3 to D	3/4	0	-	1/4	33	-	-	-	-	34	13	0.50"	-	-	-	-	-	-	-	-
BRB-2.00	4.1	D to C.6	3/4	0	-	1/4	33	-	-	-	-	34	13	0.50"	-	-	-	-	-	-	-	-
BRB-2.00	4.1	D.3 to D	3/4	0	-	1/4	10	-	-	1/4	15	12	17	-	-	-	-	-	-	-	-	-
BRB-2.00	4.1	D to C.6	3/4	0	-	1/4	10	-	-	1/4	15	12	17	-	-	-	-	-	-	-	-	-
BRB-2.00	5	E to D.5	3/4	0	-	1/4	10	-	-	1/4	11	12	13	-	-	-	-	-	-	-	-	-
BRB-2.00	C	2.8 to 3	3/4	0	-	1/4	42	-	-	-	-	43	13	0.50"	-	-	0.50"	7.50"	-	-	-	-
BRB-2.00	C	3 to 3.2	3/4	0	-	1/4	42	-	-	-	-	43	13	0.50"	-	-	0.50"	7.50"	-	-	-	-
BRB-2.00	C	2.8 to 3	3/4	0	-	1/4	10	-	-	1/4	14	12	16	-	-	-	-	-	-	-	-	-
BRB-2.00	C	3 to 3.2	3/4	0	-	1/4	10	-	-	1/4	14	12	16	-	-	-	-	-	-	-	-	-
BRB-2.00	C.25	3.2 to 3.8	3/4	0	-	1/4	51	-	-	-	-	53	17	0.50"	-	-	0.50"	7.00"	-	-	-	-
BRB-2.00	C.25	3.8 to 4.1	3/4	0	-	1/4	51	-	-	-	-	53	17	0.50"	-	-	0.50"	7.00"	-	-	-	-
BRB-2.00	C.25	3.2 to 3.8	3/4	0	-	1/4	10	-	-	1/4	12	12	14	-	-	-	-	-	-	-	-	-
BRB-2.00	C.25	3.8 to 4.1	3/4	0	-	1/4	10	-	-	1/4	12	12	14	-	-	-	-	-	-	-	-	-
BRB-2.00	E	4.7 to 5	3/4	0	-	1/4	10	-	-	1/4	11	12	13	-	-	-	-	-	-	-	-	-
BRB-2.00	E	3.8 to 4.1	3/4	0	-	5/16	24	-	-	1/4	11	26	13	-	-	-	-	-	-	-	-	-
BRB-3.00	E	4.1 to 3.8	3/4	0	-	1/4	10	-	-	5/16	15	12	17	-	-	-	-	-	-	-	-	-
BRB-2.00	4	.8 to A.9	3/4	0	-	1/4	10	-	-	1/4	15	12	17	-	-	-	-	-	-	-	-	-
BRB-2.00	B	4.5 to 4.7	3/4	0	-	1/4	10	-	-	1/4	12	12	14	-	-	-	-	-	-	-	-	-
BRB-2.00	B	4.7 to 5	3/4	0	-	1/4	10	-	-	1/4	12	12	14	-	-	-	-	-	-	-	-	-
BRB-2.00	2	D to C.6	1	0	-	5/16	49	-	-	5/16	13	51	15	-	-	-	0.63"	6.00"	-	-	-	-
BRB-3.00	2	C.6 to D	1	0	-	5/16	11	-	-	5/16	12	13	14	-	-	-	-	-	-	-	-	-
BRB-2.00	3.2	D to C.6	1	0	-	5/16	53	-	-	-	-	54	18	0.50"	-	-	0.63"	8.00"	-	-	-	-
BRB-2.00	3.2	.6 to C.2	1	0	-	5/16	53	-	-	-	-	54	18	0.50"	-	-	0.63"	8.00"	-	-	-	-
BRB-2.00	3.2	D to C.6	3/4	0	-	1/4	10	-	-	1/4	11	12	13	-	-	-	-	-	-	-	-	-
BRB-2.00	3.2	.6 to C.2	3/4	0	-	5/16	11	-	-	1/4	11	15	13	-	-	CP	-	-	-	-	-	-
BRB-2.00	E	1.5 to 2	3/4	0	-	1/4	17	-	-	1/4	10	19	12	-	-	-	-	-	-	-	-	-
BRB-2.50	2	A.2 to A	3/4	0	-	1/4	10	-	-	1/4	15	12	17	-	-	-	-	-	-	-	-	-
BRB-2.50	A	2.7 to 3	1	0	-	5/16	42	-	-	5/16	13	44	15	-	-	-	0.63"	6.00"	-	-	-	-
BRB-3.50	A	3 to 2.7	1	0	-	3/8	11	-	-	3/8	11	13	13	-	-	-	-	-	-	-	-	-
BRB-2.00	3	A to A.2	1	0	-	5/16	62	-	-	5/16	15	64	17	-	-	-	0.75"	6.00"	-	-	-	-
BRB-2.00	3	A.2 to A	1	0	-	5/16	16	-	-	5/16	16	20	18	-	-	CP	-	-	-	-	-	-

Gusset Info at Upper End of BRB

EOR-ID #	Line	Grids #	t_g in	t_{rg} in	W_{rg} in	W_b in	L_{wb} in	W_{bz} in	z in	W_c in	L_{wc} in	L_{gb} in	L_{gc} in	Stiff or Cont Plates Beam	Stiff or Cont Plates Bm @ z	Stiff or Cont Plates Column	Gusset Edge Stiff Plates Thickness	Gusset Edge Stiff Plates Width	Doubler Plates Bm t_{Dblr}	Doubler Plates Bm L_{Dblr}	Doubler Plates Bm W_{Dblr}	Doubler Plates Col t_{Dblr}
BRB-2.00	4.1	D.3 to D	3/4	0	-	5/16	28	-	-	1/4	10	30	12	-	-	-	-	-	-	-	-	-
BRB-2.00	4.1	D to C.6	3/4	0	-	5/16	28	-	-	1/4	10	30	12	-	-	-	-	-	-	-	-	-
BRB-2.00	4.1	D.3 to D	3/4	0	-	1/4	17	-	-	-	-	18	12	0.50"	-	-	-	-	-	-	-	-
BRB-2.00	4.1	D to C.6	3/4	0	-	1/4	17	-	-	-	-	18	12	0.50"	-	-	-	-	-	-	-	-
BRB-2.00	5	E to D.5	3/4	0	-	1/4	21	-	-	1/4	10	25	12	-	-	CP	-	-	-	-	-	-
BRB-2.00	C	2.8 to 3	3/4	0	-	5/16	34	-	-	1/4	9	36	11	-	-	-	0.63"	6.00"	-	-	-	-
BRB-2.00	C	3 to 3.2	3/4	0	-	5/16	34	-	-	1/4	9	36	11	-	-	-	0.63"	6.00"	-	-	-	-
BRB-2.00	C	2.8 to 3	3/4	0	-	1/4	19	-	-	-	-	20	12	0.50"	-	-	-	-	-	-	-	-
BRB-2.00	C	3 to 3.2	3/4	0	-	1/4	19	-	-	-	-	20	12	0.50"	-	-	-	-	-	-	-	-
BRB-2.00	C.25	3.2 to 3.8	3/4	0	-	5/16	44	-	-	1/4	13	46	15	-	-	-	0.50"	6.00"	-	-	-	-
BRB-2.00	C.25	3.8 to 4.1	3/4	0	-	5/16	44	-	-	1/4	13	46	15	-	-	-	0.50"	6.00"	-	-	-	-
BRB-2.00	C.25	3.2 to 3.8	3/4	0	-	1/4	22	-	-	-	-	23	12	0.50"	-	-	-	-	-	-	-	-
BRB-2.00	C.25	3.8 to 4.1	3/4	0	-	1/4	22	-	-	-	-	23	12	0.50"	-	-	-	-	-	-	-	-
BRB-2.00	E	4.7 to 5	3/4	0	-	5/16	16	-	-	1/4	10	18	12	-	-	-	-	-	-	-	-	-
BRB-2.00	E	3.8 to 4.1	3/4	0	-	5/16	21	-	-	1/4	10	23	12	-	-	-	-	-	-	-	-	-
BRB-3.00	E	4.1 to 3.8	3/4	0	-	5/16	12	-	-	5/16	11	14	13	-	-	-	-	-	-	-	-	-
BRB-2.00	4	.8 to A.9	3/4	0	-	5/16	12	-	-	1/4	10	14	12	-	-	-	-	-	-	-	-	-
BRB-2.00	B	4.5 to 4.7	3/4	0	-	1/4	19	-	-	-	-	20	12	0.50"	-	-	-	-	-	-	-	-
BRB-2.00	B	4.7 to 5	3/4	0	-	1/4	19	-	-	-	-	20	12	0.50"	-	-	-	-	-	-	-	-
BRB-2.00	2	D to C.6	1	0	-	5/16	47	-	-	5/16	10	49	12	-	-	-	0.63"	6.00"	-	-	-	-
BRB-3.00	2	C.6 to D	1	0	-	5/16	16	-	-	5/16	10	18	12	-	-	-	-	-	-	-	-	-
BRB-2.00	3.2	D to C.6	1	0	-	5/16	53	-	-	5/16	9	55	11	-	-	-	0.63"	6.00"	-	-	-	-
BRB-2.00	3.2	.6 to C.2	1	0	-	5/16	53	-	-	5/16	13	58	15	-	-	CP	0.63"	8.00"	-	-	-	-
BRB-2.00	3.2	D to C.6	3/4	0	-	1/4	21	-	-	-	-	22	12	0.50"	-	-	-	-	-	-	-	-
BRB-2.00	3.2	.6 to C.2	3/4	0	-	1/4	21	-	-	-	-	22	12	0.50"	-	-	-	-	-	-	-	-
BRB-2.00	E	1.5 to 2	3/4	0	-	5/16	20	-	-	1/4	10	22	12	-	-	-	-	-	-	-	-	-
BRB-2.50	2	A.2 to A	3/4	0	-	5/16	12	-	-	1/4	11	14	13	-	-	-	-	-	-	-	-	-
BRB-2.50	A	2.7 to 3	1	0	-	5/16	32	-	-	5/16	10	34	12	-	-	-	0.63"	6.00"	-	-	-	-
BRB-3.50	A	3 to 2.7	1	0	-	5/16	17	-	-	5/16	10	19	12	-	-	-	-	-	-	-	-	-
BRB-2.00	3	A to A.2	1	0	-	5/16	33	-	-	5/16	13	38	15	-	-	CP	0.63"	8.00"	-	-	-	-
BRB-2.00	3	A.2 to A	1	0	-	5/16	24	-	-	5/16	10	26	12	-	-	-	-	-	-	-	-	-

Table of Symbols

- W_b = Minimum size of beam weld
- L_{wb} = Minimum length of beam weld
- t_g = Thickness of gusset
- d_b = Bolt diameter (A490 SC)
- W_c = Minimum size of column weld
- L_{wc} = Minimum length of column weld
- n_o = Number of bolts in outside row each end
- n_i = Number of bolts in inside row each end *(total bolts per brace = 4*(n_i +n_o))*
- **Shape** p = pipe, t = tube (square/rect)
- **W** = Casing Width or Diameter
- **H** = Casing Height or Diameter
- L_{gc} = Approximate height of gusset (not for detailing)
- L_{gb} = Approximate width of gusset (not for detailing) (At V or Chev, equal to 1/2 gusset width)
- t_{rg} = Thickness of gusset reinforcing pad (repad), where occurs
- W_{rg} = Minimum size of repad weld to gusset
- W_{bz} = Minimum Size of Weld in 'z' region at each end of gusset (V or Chev)
- **z** = Length of 'z' region at each end of gusset (V or Chev only)

Stiffener Notes:

1. *May Double Count Stiffeners.*
2. *Indicated Thickness Each Side of Column.*
3. *Weld Stiffeners to Flange, Web & Gusset with 5/16" fillet welds for stiffener* t ≤ 1.25", 7/16" for t ≤ 2.0", UNO on the drawings.
4. CP = Cont Plate & Guss Support Plate
5. ** = Stiffener PL Req'd Per Detail (Chev or V Location)
6. *Material Grade to Match Beam and Column Grade.*
7. *Gusset Edge - See Details for Configuration.*

Doubler Plate Notes:

1. *Indicated Thickness on 1 Side of Web Only.*
2. *Alternately, May Use ½ of the Indicated Thickness on Both Sides.*
3. *Doublers to be full-height, UNO. Where multiple doublers are called out at the same location. use the largest size called for.*
4. *Weld (4) Sides with Filled Welds Equal to ¾*DP thickness (3/16" minimum).*
5. *Material Grade to Match Beam and Column Grade.*

CoreBrace (CB) Engineering Information
Proj Name: PSE Operational Training Center
Location: Puyallup, WA

CoreBrace
SUPERIOR SEISMIC PERFORMANCE

Bolted Lug Connection

Increment for Suggested Values --> 0.05

These are the beam reactions (Rub) and Connection Capacities (Vconn) we are assuming for now. Please confirm or provide more accurate values.

Location and Quantity							Frame and Brace Geometry									Stiffness					Yield & Adjusted Brace Strength										Component Forces					Assumed Bm Rxn and Conn Capacity				Shear Demand Capacity Ratios				Material Usage (per BRB)			Casing					
CB-ID	EOR-ID	Line	Grids	Lvls	Mark	Qty	H_{WP}	W_{WP}	L_{wp}	θ_{CB}	F_{ysc_min}	F_{ysc_max}	A_{sc}	L_{ysc}	YLR	K_{eff}	K_{LWP}	KF	KF	β	EOR	CB	ω	EOR	CB	βω	EOR	CB	P_{uc}	P_{ut}	P_{ub}	$P_{uc,h}$	$P_{uc,v}$	$P_{ut,h}$	$P_{ut,v}$	$R_{ub,b}$	$V_{Conn,b}$[1]	$R_{ub,t}$	$V_{Conn,t}$[1]	Bottom		Top		Plate	HSS	Conc	HSS	Profile	Approx	h_{HSS}	w_{HSS}	t_{HSS}
#	#		#	#	#	#	in	in	in	rad	ksi	ksi	in^2	in	(L_{ysc}/L_{wp})	k/in	k/in	(K_{eff}/K_{LWP})	Sugg		β	EOR		ω	EOR		βω	EOR	kips	kips	kips	kips	kips	kips	kips	kips	kips	kips	kips	Bm	Col	Bm	Col	lbs	lbs	lbs	Type		Size	in	in	in
CB-2.00	BRB-2.00	4.1	D.3 to D	2	-	1	79.75	153.88	173.31	0.478	38.0	46.0	2.00	72.98	0.42	615	335	1.84	1.85	1.18	1.16	1.02	1.38	1.34	1.03	1.63	1.55	1.05	150	127	11	133	69	113	58	-	-	30	125	0.56	-	-	0.16	179	193	403	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	4.1	D to C.6	2	-	1	79.75	153.88	173.31	0.478	38.0	46.0	2.00	72.98	0.42	615	335	1.84	1.85	1.18	1.16	1.02	1.38	1.34	1.03	1.63	1.55	1.05	150	127	11	133	69	113	58	-	-	30	125	0.56	-	-	0.16	179	193	403	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	4.1	D.3 to D	1	-	1	188.50	153.88	243.33	0.886	38.0	46.0	2.00	171.95	0.71	306	238	1.28	1.30	1.11	1.11	1.00	1.34	1.22	1.10	1.49	1.35	1.10	137	123	11	87	106	78	96	30	0	-	-	-	0.31	0.75	-	235	406	848	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	4.1	D to C.6	1	-	1	188.50	153.88	243.33	0.886	38.0	46.0	2.00	171.95	0.71	306	238	1.28	1.30	1.11	1.11	1.00	1.34	1.22	1.10	1.49	1.35	1.10	137	123	11	87	106	78	96	30	0	-	-	-	0.31	0.75	-	235	406	848	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	5	E to D.5	1	-	1	174.50	240.00	296.73	0.629	38.0	46.0	2.00	222.65	0.75	241	195	1.23	1.25	1.11	1.10	1.01	1.32	1.20	1.10	1.47	1.32	1.11	135	121	8	109	79	98	71	30	0	30	159	-	0.34	0.37	-	264	515	1076	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	C	2.8 to 3	2	-	1	71.50	175.25	189.27	0.387	38.0	46.0	2.00	74.92	0.40	614	306	2.00	2.00	1.15	1.14	1.01	1.37	1.29	1.06	1.58	1.47	1.07	145	126	7	134	55	117	48	-	-	30	125	0.43	-	-	0.13	226	195	407	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	C	3 to 3.2	2	-	1	71.50	175.25	189.27	0.387	38.0	46.0	2.00	74.92	0.40	614	306	2.00	2.00	1.15	1.14	1.01	1.37	1.29	1.06	1.58	1.47	1.07	145	126	7	134	55	117	48	-	-	30	125	0.43	-	-	0.13	226	195	407	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	C	2.8 to 3	1	-	1	195.00	175.25	262.18	0.839	38.0	46.0	2.00	189.40	0.72	280	221	1.27	1.25	1.11	1.11	1.00	1.33	1.22	1.09	1.48	1.35	1.09	136	122	10	91	101	82	91	30	0	-	-	-	0.31	0.67	-	245	443	926	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	C	3 to 3.2	1	-	1	195.00	175.25	262.18	0.839	38.0	46.0	2.00	189.40	0.72	280	221	1.27	1.25	1.11	1.11	1.00	1.33	1.22	1.09	1.48	1.35	1.09	136	122	10	91	101	82	91	30	0	-	-	-	0.31	0.67	-	245	443	926	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	C.25	3.2 to 3.8	2	-	1	75.00	233.75	245.49	0.310	38.0	46.0	2.00	113.91	0.46	428	236	1.81	1.80	1.11	1.09	1.02	1.32	1.18	1.12	1.47	1.29	1.14	135	121	4	128	41	116	37	-	-	30	125	0.36	-	-	0.10	249	278	582	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	C.25	3.8 to 4.1	2	-	1	75.00	233.75	245.49	0.310	38.0	46.0	2.00	113.91	0.46	428	236	1.81	1.80	1.11	1.09	1.02	1.32	1.18	1.12	1.47	1.29	1.14	135	121	4	128	41	116	37	-	-	30	125	0.36	-	-	0.10	249	278	582	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	C.25	3.2 to 3.8	1	-	1	198.00	233.75	306.34	0.703	38.0	46.0	2.00	233.68	0.76	231	189	1.22	1.20	1.11	1.10	1.01	1.32	1.20	1.10	1.47	1.32	1.11	135	121	9	103	87	93	78	30	0	-	-	-	0.33	0.69	-	270	538	1125	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	C.25	3.8 to 4.1	1	-	1	198.00	233.75	306.34	0.703	38.0	46.0	2.00	233.68	0.76	231	189	1.22	1.20	1.11	1.10	1.01	1.32	1.20	1.10	1.47	1.32	1.11	135	121	9	103	87	93	78	30	0	-	-	-	0.33	0.69	-	270	538	1125	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	E	4.7 to 5	1	-	1	186.50	240.00	303.94	0.661	38.0	46.0	2.00	234.63	0.77	230	191	1.21	1.20	1.11	1.10	1.01	1.32	1.20	1.10	1.47	1.32	1.11	135	121	8	106	83	96	75	30	0	30	90	-	0.34	-	0.22	271	540	1129	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	E	3.8 to 4.1	2	-	1	90.25	164.25	187.41	0.502	38.0	46.0	2.00	98.99	0.53	489	309	1.58	1.60	1.13	1.13	1.00	1.36	1.27	1.07	1.54	1.44	1.07	141	125	8	124	68	110	60	30	90	30	90	-	0.18	-	0.19	194	249	520	t	□	t8x1/4	8	8.00	0.2500
CB-3.00	BRB-3.00	E	4.1 to 3.8	1	-	1	181.50	164.25	244.79	0.835	38.0	46.0	3.00	173.57	0.71	448	355	1.26	1.25	1.17	1.11	1.05	1.24	1.22	1.02	1.45	1.35	1.07	200	171	22	134	148	115	127	30	0	30	96	-	0.42	-	0.36	308	412	843	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	4	A.8 to A.99	1	-	1	190.75	150.00	242.66	0.904	38.0	46.0	2.00	173.28	0.71	304	239	1.27	1.25	1.11	1.10	1.01	1.33	1.21	1.10	1.48	1.33	1.11	136	122	11	84	107	76	96	30	0	30	105	-	0.30	-	0.24	236	409	854	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	B	4.5 to 4.7	1	-	1	186.00	213.50	283.16	0.717	38.0	46.0	2.00	214.51	0.76	250	205	1.22	1.20	1.11	1.10	1.01	1.33	1.21	1.10	1.48	1.33	1.11	136	122	9	102	89	92	80	30	0	-	-	-	0.33	0.57	-	260	497	1039	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	B	4.7 to 5	1	-	1	186.00	213.50	283.16	0.717	38.0	46.0	2.00	214.51	0.76	250	205	1.22	1.20	1.11	1.10	1.01	1.33	1.21	1.10	1.48	1.33	1.11	136	122	9	102	89	92	80	30	0	-	-	-	0.33	0.57	-	260	497	1039	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	2	D to C.6	2	-	1	71.75	249.50	259.61	0.280	38.0	46.0	2.00	122.15	0.47	402	223	1.80	1.80	1.11	1.08	1.03	1.31	1.15	1.14	1.45	1.24	1.17	134	121	4	129	37	116	33	30	120	30	166	-	0.10	-	0.09	253	296	619	t	□	t8x1/4	8	8.00	0.2500
CB-3.00	BRB-3.00	2	C.6 to D	1	-	1	196.75	249.50	317.74	0.668	38.0	46.0	3.00	246.87	0.78	325	274	1.19	1.20	1.17	1.10	1.06	1.19	1.19	1.00	1.39	1.31	1.06	192	164	17	151	119	129	102	30	0	30	120	-	0.48	-	0.31	370	702	1122	t	□	t8x5/16	8	8.00	0.3125
CB-2.00	BRB-2.00	3.2	D to C.6	2	-	1	72.75	235.50	246.48	0.300	38.0	46.0	2.00	102.59	0.42	462	235	1.96	1.95	1.11	1.09	1.02	1.33	1.19	1.12	1.48	1.30	1.14	136	122	4	130	40	117	36	-	-	30	219	0.46	-	-	0.08	242	254	531	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	3.2	C.6 to C.25	2	-	1	72.75	235.50	246.48	0.300	38.0	46.0	2.00	102.59	0.42	462	235	1.96	1.95	1.11	1.09	1.02	1.33	1.19	1.12	1.48	1.30	1.14	136	122	4	130	40	117	36	-	-	30	282	0.46	-	0.16	-	242	254	531	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	3.2	D to C.6	1	-	1	183.25	235.50	298.40	0.661	38.0	46.0	2.00	227.62	0.76	237	194	1.22	1.20	1.11	1.10	1.01	1.32	1.20	1.10	1.47	1.32	1.11	135	121	8	106	83	96	75	30	0	-	-	-	0.34	0.90	-	267	525	1098	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	3.2	C.6 to C.25	1	-	1	183.25	235.50	298.40	0.661	38.0	46.0	2.00	227.62	0.76	237	194	1.22	1.20	1.11	1.10	1.01	1.32	1.20	1.10	1.47	1.32	1.11	135	121	8	106	83	96	75	30	0	-	-	-	-	0.90	-	267	525	1098	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	E	1.5 to 2	2	-	1	97.00	128.63	161.10	0.646	38.0	46.0	2.00	79.34	0.49	591	360	1.64	1.65	1.18	1.07	1.10	1.38	1.14	1.21	1.63	1.22	1.33	150	127	14	120	90	101	76	30	79	30	125	0.75	0.24	-	0.20	183	207	432	t	□	t8x1/4	8	8.00	0.2500
CB-2.50	BRB-2.50	2	A.2 to A	1	-	1	270.50	240.00	361.62	0.845	38.0	46.0	2.50	293.06	0.81	232	200	1.16	1.15	1.11	1.10	1.01	1.31	1.20	1.09	1.45	1.32	1.10	167	151	12	111	125	100	113	30	0	30	90	-	0.38	-	0.31	357	822	1328	t	□	t8x5/16	8	8.00	0.3125
CB-2.50	BRB-2.50	A	2.7 to 3	2	-	1	87.00	240.00	255.28	0.348	38.0	46.0	2.50	140.89	0.55	445	284	1.57	1.55	1.11	1.09	1.02	1.31	1.18	1.11	1.45	1.29	1.13	167	151	6	157	57	142	51	30	120	30	120	-	0.15	-	0.17	298	337	696	t	□	t8x1/4	8	8.00	0.2500
CB-3.50	BRB-3.50	A	3 to 2.7	1	-	1	181.50	240.00	300.90	0.647	38.0	46.0	3.50	228.24	0.76	407	337	1.21	1.20	1.17	1.10	1.06	1.20	1.20	1.00	1.40	1.32	1.06	226	193	20	180	136	154	117	30	0	30	120	-	0.57	-	0.36	399	657	1031	t	□	t8x5/16	8	8.00	0.3125
CB-2.00	BRB-2.00	3	A to A.2	2	-	1	82.25	240.00	253.70	0.330	38.0	46.0	2.00	116.52	0.46	418	229	1.83	1.85	1.11	1.09	1.02	1.33	1.19	1.12	1.48	1.30	1.14	136	122	4	128	44	116	40	30	248	30	79	-	0.07	0.53	-	250	284	593	t	□	t8x1/4	8	8.00	0.2500
CB-2.00	BRB-2.00	3	A.2 to A	1	-	1	197.25	240.00	310.66	0.688	38.0	46.0	2.00	224.83	0.72	238	187	1.27	1.25	1.11	1.10	1.01	1.33	1.21	1.10	1.48	1.33	1.11	136	122	9	105	86	95	78	30	0	30	248	-	-	-	0.15	265	519	1085	t	□	t8x1/4	8	8.00	0.2500
Shade Changes: #####																																																				
			Total ->			31												Min -->	1.15	1.18	1.16	1.10	1.38	1.34	1.21	1.63	1.55	1.33																								
																		Max -->	2.00																																	

Table of Symbols

A_{sc} = Cross sectional area of core at yield section
β = Maximum cpmressive force to Tension force ratio
ω = Maximum Tension force to yield force ratio
H_{wp} = Height between frame workpoints
W_{wp} = Width between frame workpoints

L_{wp} = Length of resulting diagonal
K_{eff} = Effective CB stiffness WP to WP incl elastic regions
K_{LWP} = CB stiffness using Asc from WP to WP
Δ_{by} = Deformation of CB at first yield
C_d = Deflection amplification factor

SSD = Specified Story Drift (1% min unless NLRHA)
Δ_{bCd} = Amplified Deformation of CB at Expected Drift (Δby x Cd)
Δ_{bSSD} = Deformation of CB at SSD
Δ_m = Expected Brace Deformation
β = Compression Str Adjustment Factor

$P_{uc,h}$ = Horizontal component of compressive adjusted brace strength
$P_{uc,v}$ = Vertical component of compressive adjusted brace strength
$P_{ut,h}$ = Horizontal component of tensile adjusted brace strength
$P_{ut,v}$ = Vertical component of tensile adjusted brace strength
$Pd_{,h}$ = Horizontal component of demand on brace

The Above Reactions and Capacities to be Verified by EOR

Note 1: The full shear capacity of the beam web should be developed in the connection whenever possible.

$R_{ub,b}$ = Assumed beam rxn (w/out BRB Rxn) at beam at bott of BRB
$V_{Conn,b}$ = Assumed bm-to-col conn shear capacity at beam at bott of BRB
$R_{ub,t}$ = Assumed beam rxn (w/out BRB Rxn) at beam at top of BRB
$V_{Conn,t}$ = Assumed bm-to-col conn shear capacity at beam at top of BRB

Shear Demand Capacity Checks

Note 1: These checks help eliminate doubler plates on bms and cols.

Bm = Check of BRB rxn at beam (V_{ub}) from braces on both sides of column + assumed beam rxn (R_{ub}) against full beam shear capacity (ϕV_{nb}). Locatons in RED should consider beam with higher shear capacity.
Col = Similar to Bm check but considers H_{uc} & no Bm rxn.

Code Check Summary

RAM Frame 23.00.00.92
DataBase: 231115 PSE RSS Corebrace Review 12/06/23 20:53:20
Building Code: IBC Steel Code: AISC360-16 LRFD

CRITERIA:

Rigid End Zones:	Ignore Effects
Member Force Output:	At Face of Joint
P-Delta:	No
Ground Level:	Base

Mesh Criteria :

Max. Distance Between Nodes on Mesh Line (ft) : 4.00
Merge Node Tolerance (in) : 0.0100
Geometry Tolerance (in) : 0.0050

Walls Out-of-plane Stiffness Not Included in Analysis.
Sign considered for Dynamic Load Case Results.
Rigid Links Included at Fixed Beam-to-Wall Locations
Eigenvalue Analysis : Eigen Vectors (Subspace Iteration)

LOAD COMBINATION CRITERIA:

Snow Factor f2	Use Reduced Factor (f2 = 0.2) on Snow in Combination with Seismic
Live Load factor f1 (0.5 or 1.0)	0.500
Sds (for Ev)	1.022
RhoX	1.300
RhoY	1.300

LOAD CASE DEFINITIONS:

D	DeadLoad	RAMUSER
Lp	PosLiveLoad	RAMUSER
Sp	PosSnowLoad	RAMUSER
Sn	NegSnowLoad	RAMUSER
E1	SEIS_ELF	EQ_ASCE716_X_+E_F
E2	SEIS_ELF	EQ_ASCE716_X_-E_F
E3	SEIS_ELF	EQ_ASCE716_Y_+E_F
E4	SEIS_ELF	EQ_ASCE716_Y_-E_F
E5	SEIS_ELF	EQ_ASCE716_X_+E_0.3Y_+E_F
E6	SEIS_ELF	EQ_ASCE716_X_+E_-0.3Y_+E_F
E7	SEIS_ELF	EQ_ASCE716_-X_+E_0.3Y_+E_F
E8	SEIS_ELF	EQ_ASCE716_-X_+E_-0.3Y_+E_F
E9	SEIS_ELF	EQ_ASCE716_0.3X_+E_Y_+E_F
E10	SEIS_ELF	EQ_ASCE716_0.3X_+E_-Y_+E_F
E11	SEIS_ELF	EQ_ASCE716_-0.3X_+E_Y_+E_F
E12	SEIS_ELF	EQ_ASCE716_-0.3X_+E_-Y_+E_F
E13	SEIS_ELF	EQ_ASCE716_X_+E_0.3Y_-E_F
E14	SEIS_ELF	EQ_ASCE716_X_+E_-0.3Y_-E_F
E15	SEIS_ELF	EQ_ASCE716_-X_+E_0.3Y_-E_F
E16	SEIS_ELF	EQ_ASCE716_-X_+E_-0.3Y_-E_F
E17	SEIS_ELF	EQ_ASCE716_0.3X_+E_Y_-E_F
E18	SEIS_ELF	EQ_ASCE716_0.3X_+E_-Y_-E_F
E19	SEIS_ELF	EQ_ASCE716_-0.3X_+E_Y_-E_F
E20	SEIS_ELF	EQ_ASCE716_-0.3X_+E_-Y_-E_F

Code Check Summary

E21	SEIS_ELF	EQ_ASCE716_X_-E_0.3Y_+E_F
E22	SEIS_ELF	EQ_ASCE716_X_-E_-0.3Y_+E_F
E23	SEIS_ELF	EQ_ASCE716_-X_-E_0.3Y_+E_F
E24	SEIS_ELF	EQ_ASCE716_-X_-E_-0.3Y_+E_F
E25	SEIS_ELF	EQ_ASCE716_0.3X_-E_Y_+E_F
E26	SEIS_ELF	EQ_ASCE716_0.3X_-E_-Y_+E_F
E27	SEIS_ELF	EQ_ASCE716_-0.3X_-E_Y_+E_F
E28	SEIS_ELF	EQ_ASCE716_-0.3X_-E_-Y_+E_F
E29	SEIS_ELF	EQ_ASCE716_X_-E_0.3Y_-E_F
E30	SEIS_ELF	EQ_ASCE716_X_-E_-0.3Y_-E_F
E31	SEIS_ELF	EQ_ASCE716_-X_-E_0.3Y_-E_F
E32	SEIS_ELF	EQ_ASCE716_-X_-E_-0.3Y_-E_F
E33	SEIS_ELF	EQ_ASCE716_0.3X_-E_Y_-E_F
E34	SEIS_ELF	EQ_ASCE716_0.3X_-E_-Y_-E_F
E35	SEIS_ELF	EQ_ASCE716_-0.3X_-E_Y_-E_F
E36	SEIS_ELF	EQ_ASCE716_-0.3X_-E_-Y_-E_F
E37	EQ_DRIFT	EQ_ASCE716_X_+E_Drft
E38	EQ_DRIFT	EQ_ASCE716_X_-E_Drft
E39	EQ_DRIFT	EQ_ASCE716_Y_+E_Drft
E40	EQ_DRIFT	EQ_ASCE716_Y_-E_Drft

LOAD COMBINATIONS: IBC 2018 / ASCE 7-16 LRFD

1	*	1.400 D
2	*	1.200 D + 1.600 Lp + 0.500 Sp
3	*	1.200 D + 1.600 Lp
4	*	1.200 D + 0.500 Lp + 1.600 Sp
5	*	1.200 D + 1.600 Sp
6	*	1.200 D + 1.600 Sn
7	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E1
8	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E2
9	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E3
10	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E4
11	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E5
12	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E6
13	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E7
14	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E8
15	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E9
16	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E10
17	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E11
18	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E12
19	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E13
20	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E14
21	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E15
22	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E16
23	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E17
24	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E18

Code Check Summary

25	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E19
26	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E20
27	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E21
28	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E22
29	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E23
30	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E24
31	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E25
32	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E26
33	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E27
34	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E28
35	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E29
36	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E30
37	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E31
38	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E32
39	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E33
40	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E34
41	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E35
42	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E36
43	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E37
44	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E38
45	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E39
46	*	1.404 D + 0.500 Lp + 0.200 Sp + 1.300 E40
47	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E1
48	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E2
49	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E3
50	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E4
51	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E5
52	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E6
53	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E7
54	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E8
55	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E9
56	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E10
57	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E11
58	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E12
59	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E13
60	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E14
61	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E15
62	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E16
63	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E17
64	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E18
65	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E19
66	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E20
67	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E21
68	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E22
69	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E23
70	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E24

Code Check Summary

71	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E25
72	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E26
73	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E27
74	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E28
75	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E29
76	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E30
77	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E31
78	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E32
79	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E33
80	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E34
81	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E35
82	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E36
83	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E37
84	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E38
85	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E39
86	*	1.404 D + 0.500 Lp + 0.200 Sp - 1.300 E40
87	*	1.404 D + 0.500 Lp + 1.300 E1
88	*	1.404 D + 0.500 Lp + 1.300 E2
89	*	1.404 D + 0.500 Lp + 1.300 E3
90	*	1.404 D + 0.500 Lp + 1.300 E4
91	*	1.404 D + 0.500 Lp + 1.300 E5
92	*	1.404 D + 0.500 Lp + 1.300 E6
93	*	1.404 D + 0.500 Lp + 1.300 E7
94	*	1.404 D + 0.500 Lp + 1.300 E8
95	*	1.404 D + 0.500 Lp + 1.300 E9
96	*	1.404 D + 0.500 Lp + 1.300 E10
97	*	1.404 D + 0.500 Lp + 1.300 E11
98	*	1.404 D + 0.500 Lp + 1.300 E12
99	*	1.404 D + 0.500 Lp + 1.300 E13
100	*	1.404 D + 0.500 Lp + 1.300 E14
101	*	1.404 D + 0.500 Lp + 1.300 E15
102	*	1.404 D + 0.500 Lp + 1.300 E16
103	*	1.404 D + 0.500 Lp + 1.300 E17
104	*	1.404 D + 0.500 Lp + 1.300 E18
105	*	1.404 D + 0.500 Lp + 1.300 E19
106	*	1.404 D + 0.500 Lp + 1.300 E20
107	*	1.404 D + 0.500 Lp + 1.300 E21
108	*	1.404 D + 0.500 Lp + 1.300 E22
109	*	1.404 D + 0.500 Lp + 1.300 E23
110	*	1.404 D + 0.500 Lp + 1.300 E24
111	*	1.404 D + 0.500 Lp + 1.300 E25
112	*	1.404 D + 0.500 Lp + 1.300 E26
113	*	1.404 D + 0.500 Lp + 1.300 E27
114	*	1.404 D + 0.500 Lp + 1.300 E28
115	*	1.404 D + 0.500 Lp + 1.300 E29
116	*	1.404 D + 0.500 Lp + 1.300 E30

Code Check Summary

117	*	1.404 D + 0.500 Lp + 1.300 E31
118	*	1.404 D + 0.500 Lp + 1.300 E32
119	*	1.404 D + 0.500 Lp + 1.300 E33
120	*	1.404 D + 0.500 Lp + 1.300 E34
121	*	1.404 D + 0.500 Lp + 1.300 E35
122	*	1.404 D + 0.500 Lp + 1.300 E36
123	*	1.404 D + 0.500 Lp + 1.300 E37
124	*	1.404 D + 0.500 Lp + 1.300 E38
125	*	1.404 D + 0.500 Lp + 1.300 E39
126	*	1.404 D + 0.500 Lp + 1.300 E40
127	*	1.404 D + 0.500 Lp - 1.300 E1
128	*	1.404 D + 0.500 Lp - 1.300 E2
129	*	1.404 D + 0.500 Lp - 1.300 E3
130	*	1.404 D + 0.500 Lp - 1.300 E4
131	*	1.404 D + 0.500 Lp - 1.300 E5
132	*	1.404 D + 0.500 Lp - 1.300 E6
133	*	1.404 D + 0.500 Lp - 1.300 E7
134	*	1.404 D + 0.500 Lp - 1.300 E8
135	*	1.404 D + 0.500 Lp - 1.300 E9
136	*	1.404 D + 0.500 Lp - 1.300 E10
137	*	1.404 D + 0.500 Lp - 1.300 E11
138	*	1.404 D + 0.500 Lp - 1.300 E12
139	*	1.404 D + 0.500 Lp - 1.300 E13
140	*	1.404 D + 0.500 Lp - 1.300 E14
141	*	1.404 D + 0.500 Lp - 1.300 E15
142	*	1.404 D + 0.500 Lp - 1.300 E16
143	*	1.404 D + 0.500 Lp - 1.300 E17
144	*	1.404 D + 0.500 Lp - 1.300 E18
145	*	1.404 D + 0.500 Lp - 1.300 E19
146	*	1.404 D + 0.500 Lp - 1.300 E20
147	*	1.404 D + 0.500 Lp - 1.300 E21
148	*	1.404 D + 0.500 Lp - 1.300 E22
149	*	1.404 D + 0.500 Lp - 1.300 E23
150	*	1.404 D + 0.500 Lp - 1.300 E24
151	*	1.404 D + 0.500 Lp - 1.300 E25
152	*	1.404 D + 0.500 Lp - 1.300 E26
153	*	1.404 D + 0.500 Lp - 1.300 E27
154	*	1.404 D + 0.500 Lp - 1.300 E28
155	*	1.404 D + 0.500 Lp - 1.300 E29
156	*	1.404 D + 0.500 Lp - 1.300 E30
157	*	1.404 D + 0.500 Lp - 1.300 E31
158	*	1.404 D + 0.500 Lp - 1.300 E32
159	*	1.404 D + 0.500 Lp - 1.300 E33
160	*	1.404 D + 0.500 Lp - 1.300 E34
161	*	1.404 D + 0.500 Lp - 1.300 E35
162	*	1.404 D + 0.500 Lp - 1.300 E36

Code Check Summary

163	*	1.404 D + 0.500 Lp - 1.300 E37
164	*	1.404 D + 0.500 Lp - 1.300 E38
165	*	1.404 D + 0.500 Lp - 1.300 E39
166	*	1.404 D + 0.500 Lp - 1.300 E40
167	*	1.404 D + 0.200 Sp + 1.300 E1
168	*	1.404 D + 0.200 Sp + 1.300 E2
169	*	1.404 D + 0.200 Sp + 1.300 E3
170	*	1.404 D + 0.200 Sp + 1.300 E4
171	*	1.404 D + 0.200 Sp + 1.300 E5
172	*	1.404 D + 0.200 Sp + 1.300 E6
173	*	1.404 D + 0.200 Sp + 1.300 E7
174	*	1.404 D + 0.200 Sp + 1.300 E8
175	*	1.404 D + 0.200 Sp + 1.300 E9
176	*	1.404 D + 0.200 Sp + 1.300 E10
177	*	1.404 D + 0.200 Sp + 1.300 E11
178	*	1.404 D + 0.200 Sp + 1.300 E12
179	*	1.404 D + 0.200 Sp + 1.300 E13
180	*	1.404 D + 0.200 Sp + 1.300 E14
181	*	1.404 D + 0.200 Sp + 1.300 E15
182	*	1.404 D + 0.200 Sp + 1.300 E16
183	*	1.404 D + 0.200 Sp + 1.300 E17
184	*	1.404 D + 0.200 Sp + 1.300 E18
185	*	1.404 D + 0.200 Sp + 1.300 E19
186	*	1.404 D + 0.200 Sp + 1.300 E20
187	*	1.404 D + 0.200 Sp + 1.300 E21
188	*	1.404 D + 0.200 Sp + 1.300 E22
189	*	1.404 D + 0.200 Sp + 1.300 E23
190	*	1.404 D + 0.200 Sp + 1.300 E24
191	*	1.404 D + 0.200 Sp + 1.300 E25
192	*	1.404 D + 0.200 Sp + 1.300 E26
193	*	1.404 D + 0.200 Sp + 1.300 E27
194	*	1.404 D + 0.200 Sp + 1.300 E28
195	*	1.404 D + 0.200 Sp + 1.300 E29
196	*	1.404 D + 0.200 Sp + 1.300 E30
197	*	1.404 D + 0.200 Sp + 1.300 E31
198	*	1.404 D + 0.200 Sp + 1.300 E32
199	*	1.404 D + 0.200 Sp + 1.300 E33
200	*	1.404 D + 0.200 Sp + 1.300 E34
201	*	1.404 D + 0.200 Sp + 1.300 E35
202	*	1.404 D + 0.200 Sp + 1.300 E36
203	*	1.404 D + 0.200 Sp + 1.300 E37
204	*	1.404 D + 0.200 Sp + 1.300 E38
205	*	1.404 D + 0.200 Sp + 1.300 E39
206	*	1.404 D + 0.200 Sp + 1.300 E40
207	*	1.404 D + 0.200 Sp - 1.300 E1
208	*	1.404 D + 0.200 Sp - 1.300 E2

Code Check Summary

209	*	1.404 D + 0.200 Sp - 1.300 E3
210	*	1.404 D + 0.200 Sp - 1.300 E4
211	*	1.404 D + 0.200 Sp - 1.300 E5
212	*	1.404 D + 0.200 Sp - 1.300 E6
213	*	1.404 D + 0.200 Sp - 1.300 E7
214	*	1.404 D + 0.200 Sp - 1.300 E8
215	*	1.404 D + 0.200 Sp - 1.300 E9
216	*	1.404 D + 0.200 Sp - 1.300 E10
217	*	1.404 D + 0.200 Sp - 1.300 E11
218	*	1.404 D + 0.200 Sp - 1.300 E12
219	*	1.404 D + 0.200 Sp - 1.300 E13
220	*	1.404 D + 0.200 Sp - 1.300 E14
221	*	1.404 D + 0.200 Sp - 1.300 E15
222	*	1.404 D + 0.200 Sp - 1.300 E16
223	*	1.404 D + 0.200 Sp - 1.300 E17
224	*	1.404 D + 0.200 Sp - 1.300 E18
225	*	1.404 D + 0.200 Sp - 1.300 E19
226	*	1.404 D + 0.200 Sp - 1.300 E20
227	*	1.404 D + 0.200 Sp - 1.300 E21
228	*	1.404 D + 0.200 Sp - 1.300 E22
229	*	1.404 D + 0.200 Sp - 1.300 E23
230	*	1.404 D + 0.200 Sp - 1.300 E24
231	*	1.404 D + 0.200 Sp - 1.300 E25
232	*	1.404 D + 0.200 Sp - 1.300 E26
233	*	1.404 D + 0.200 Sp - 1.300 E27
234	*	1.404 D + 0.200 Sp - 1.300 E28
235	*	1.404 D + 0.200 Sp - 1.300 E29
236	*	1.404 D + 0.200 Sp - 1.300 E30
237	*	1.404 D + 0.200 Sp - 1.300 E31
238	*	1.404 D + 0.200 Sp - 1.300 E32
239	*	1.404 D + 0.200 Sp - 1.300 E33
240	*	1.404 D + 0.200 Sp - 1.300 E34
241	*	1.404 D + 0.200 Sp - 1.300 E35
242	*	1.404 D + 0.200 Sp - 1.300 E36
243	*	1.404 D + 0.200 Sp - 1.300 E37
244	*	1.404 D + 0.200 Sp - 1.300 E38
245	*	1.404 D + 0.200 Sp - 1.300 E39
246	*	1.404 D + 0.200 Sp - 1.300 E40
247	*	1.404 D + 0.200 Sn + 1.300 E1
248	*	1.404 D + 0.200 Sn + 1.300 E2
249	*	1.404 D + 0.200 Sn + 1.300 E3
250	*	1.404 D + 0.200 Sn + 1.300 E4
251	*	1.404 D + 0.200 Sn + 1.300 E5
252	*	1.404 D + 0.200 Sn + 1.300 E6
253	*	1.404 D + 0.200 Sn + 1.300 E7
254	*	1.404 D + 0.200 Sn + 1.300 E8

Code Check Summary

255	*	1.404 D + 0.200 Sn + 1.300 E9
256	*	1.404 D + 0.200 Sn + 1.300 E10
257	*	1.404 D + 0.200 Sn + 1.300 E11
258	*	1.404 D + 0.200 Sn + 1.300 E12
259	*	1.404 D + 0.200 Sn + 1.300 E13
260	*	1.404 D + 0.200 Sn + 1.300 E14
261	*	1.404 D + 0.200 Sn + 1.300 E15
262	*	1.404 D + 0.200 Sn + 1.300 E16
263	*	1.404 D + 0.200 Sn + 1.300 E17
264	*	1.404 D + 0.200 Sn + 1.300 E18
265	*	1.404 D + 0.200 Sn + 1.300 E19
266	*	1.404 D + 0.200 Sn + 1.300 E20
267	*	1.404 D + 0.200 Sn + 1.300 E21
268	*	1.404 D + 0.200 Sn + 1.300 E22
269	*	1.404 D + 0.200 Sn + 1.300 E23
270	*	1.404 D + 0.200 Sn + 1.300 E24
271	*	1.404 D + 0.200 Sn + 1.300 E25
272	*	1.404 D + 0.200 Sn + 1.300 E26
273	*	1.404 D + 0.200 Sn + 1.300 E27
274	*	1.404 D + 0.200 Sn + 1.300 E28
275	*	1.404 D + 0.200 Sn + 1.300 E29
276	*	1.404 D + 0.200 Sn + 1.300 E30
277	*	1.404 D + 0.200 Sn + 1.300 E31
278	*	1.404 D + 0.200 Sn + 1.300 E32
279	*	1.404 D + 0.200 Sn + 1.300 E33
280	*	1.404 D + 0.200 Sn + 1.300 E34
281	*	1.404 D + 0.200 Sn + 1.300 E35
282	*	1.404 D + 0.200 Sn + 1.300 E36
283	*	1.404 D + 0.200 Sn + 1.300 E37
284	*	1.404 D + 0.200 Sn + 1.300 E38
285	*	1.404 D + 0.200 Sn + 1.300 E39
286	*	1.404 D + 0.200 Sn + 1.300 E40
287	*	1.404 D + 0.200 Sn - 1.300 E1
288	*	1.404 D + 0.200 Sn - 1.300 E2
289	*	1.404 D + 0.200 Sn - 1.300 E3
290	*	1.404 D + 0.200 Sn - 1.300 E4
291	*	1.404 D + 0.200 Sn - 1.300 E5
292	*	1.404 D + 0.200 Sn - 1.300 E6
293	*	1.404 D + 0.200 Sn - 1.300 E7
294	*	1.404 D + 0.200 Sn - 1.300 E8
295	*	1.404 D + 0.200 Sn - 1.300 E9
296	*	1.404 D + 0.200 Sn - 1.300 E10
297	*	1.404 D + 0.200 Sn - 1.300 E11
298	*	1.404 D + 0.200 Sn - 1.300 E12
299	*	1.404 D + 0.200 Sn - 1.300 E13
300	*	1.404 D + 0.200 Sn - 1.300 E14

Code Check Summary

301	*	1.404 D + 0.200 Sn - 1.300 E15
302	*	1.404 D + 0.200 Sn - 1.300 E16
303	*	1.404 D + 0.200 Sn - 1.300 E17
304	*	1.404 D + 0.200 Sn - 1.300 E18
305	*	1.404 D + 0.200 Sn - 1.300 E19
306	*	1.404 D + 0.200 Sn - 1.300 E20
307	*	1.404 D + 0.200 Sn - 1.300 E21
308	*	1.404 D + 0.200 Sn - 1.300 E22
309	*	1.404 D + 0.200 Sn - 1.300 E23
310	*	1.404 D + 0.200 Sn - 1.300 E24
311	*	1.404 D + 0.200 Sn - 1.300 E25
312	*	1.404 D + 0.200 Sn - 1.300 E26
313	*	1.404 D + 0.200 Sn - 1.300 E27
314	*	1.404 D + 0.200 Sn - 1.300 E28
315	*	1.404 D + 0.200 Sn - 1.300 E29
316	*	1.404 D + 0.200 Sn - 1.300 E30
317	*	1.404 D + 0.200 Sn - 1.300 E31
318	*	1.404 D + 0.200 Sn - 1.300 E32
319	*	1.404 D + 0.200 Sn - 1.300 E33
320	*	1.404 D + 0.200 Sn - 1.300 E34
321	*	1.404 D + 0.200 Sn - 1.300 E35
322	*	1.404 D + 0.200 Sn - 1.300 E36
323	*	1.404 D + 0.200 Sn - 1.300 E37
324	*	1.404 D + 0.200 Sn - 1.300 E38
325	*	1.404 D + 0.200 Sn - 1.300 E39
326	*	1.404 D + 0.200 Sn - 1.300 E40
327	*	1.404 D + 1.300 E1
328	*	1.404 D + 1.300 E2
329	*	1.404 D + 1.300 E3
330	*	1.404 D + 1.300 E4
331	*	1.404 D + 1.300 E5
332	*	1.404 D + 1.300 E6
333	*	1.404 D + 1.300 E7
334	*	1.404 D + 1.300 E8
335	*	1.404 D + 1.300 E9
336	*	1.404 D + 1.300 E10
337	*	1.404 D + 1.300 E11
338	*	1.404 D + 1.300 E12
339	*	1.404 D + 1.300 E13
340	*	1.404 D + 1.300 E14
341	*	1.404 D + 1.300 E15
342	*	1.404 D + 1.300 E16
343	*	1.404 D + 1.300 E17
344	*	1.404 D + 1.300 E18
345	*	1.404 D + 1.300 E19
346	*	1.404 D + 1.300 E20

Code Check Summary

347	*	1.404 D + 1.300 E21
348	*	1.404 D + 1.300 E22
349	*	1.404 D + 1.300 E23
350	*	1.404 D + 1.300 E24
351	*	1.404 D + 1.300 E25
352	*	1.404 D + 1.300 E26
353	*	1.404 D + 1.300 E27
354	*	1.404 D + 1.300 E28
355	*	1.404 D + 1.300 E29
356	*	1.404 D + 1.300 E30
357	*	1.404 D + 1.300 E31
358	*	1.404 D + 1.300 E32
359	*	1.404 D + 1.300 E33
360	*	1.404 D + 1.300 E34
361	*	1.404 D + 1.300 E35
362	*	1.404 D + 1.300 E36
363	*	1.404 D + 1.300 E37
364	*	1.404 D + 1.300 E38
365	*	1.404 D + 1.300 E39
366	*	1.404 D + 1.300 E40
367	*	1.404 D - 1.300 E1
368	*	1.404 D - 1.300 E2
369	*	1.404 D - 1.300 E3
370	*	1.404 D - 1.300 E4
371	*	1.404 D - 1.300 E5
372	*	1.404 D - 1.300 E6
373	*	1.404 D - 1.300 E7
374	*	1.404 D - 1.300 E8
375	*	1.404 D - 1.300 E9
376	*	1.404 D - 1.300 E10
377	*	1.404 D - 1.300 E11
378	*	1.404 D - 1.300 E12
379	*	1.404 D - 1.300 E13
380	*	1.404 D - 1.300 E14
381	*	1.404 D - 1.300 E15
382	*	1.404 D - 1.300 E16
383	*	1.404 D - 1.300 E17
384	*	1.404 D - 1.300 E18
385	*	1.404 D - 1.300 E19
386	*	1.404 D - 1.300 E20
387	*	1.404 D - 1.300 E21
388	*	1.404 D - 1.300 E22
389	*	1.404 D - 1.300 E23
390	*	1.404 D - 1.300 E24
391	*	1.404 D - 1.300 E25
392	*	1.404 D - 1.300 E26

Code Check Summary

393	*	1.404 D - 1.300 E27
394	*	1.404 D - 1.300 E28
395	*	1.404 D - 1.300 E29
396	*	1.404 D - 1.300 E30
397	*	1.404 D - 1.300 E31
398	*	1.404 D - 1.300 E32
399	*	1.404 D - 1.300 E33
400	*	1.404 D - 1.300 E34
401	*	1.404 D - 1.300 E35
402	*	1.404 D - 1.300 E36
403	*	1.404 D - 1.300 E37
404	*	1.404 D - 1.300 E38
405	*	1.404 D - 1.300 E39
406	*	1.404 D - 1.300 E40
407	*	0.696 D + 1.300 E1
408	*	0.696 D + 1.300 E2
409	*	0.696 D + 1.300 E3
410	*	0.696 D + 1.300 E4
411	*	0.696 D + 1.300 E5
412	*	0.696 D + 1.300 E6
413	*	0.696 D + 1.300 E7
414	*	0.696 D + 1.300 E8
415	*	0.696 D + 1.300 E9
416	*	0.696 D + 1.300 E10
417	*	0.696 D + 1.300 E11
418	*	0.696 D + 1.300 E12
419	*	0.696 D + 1.300 E13
420	*	0.696 D + 1.300 E14
421	*	0.696 D + 1.300 E15
422	*	0.696 D + 1.300 E16
423	*	0.696 D + 1.300 E17
424	*	0.696 D + 1.300 E18
425	*	0.696 D + 1.300 E19
426	*	0.696 D + 1.300 E20
427	*	0.696 D + 1.300 E21
428	*	0.696 D + 1.300 E22
429	*	0.696 D + 1.300 E23
430	*	0.696 D + 1.300 E24
431	*	0.696 D + 1.300 E25
432	*	0.696 D + 1.300 E26
433	*	0.696 D + 1.300 E27
434	*	0.696 D + 1.300 E28
435	*	0.696 D + 1.300 E29
436	*	0.696 D + 1.300 E30
437	*	0.696 D + 1.300 E31
438	*	0.696 D + 1.300 E32

Code Check Summary

439	*	0.696 D + 1.300 E33
440	*	0.696 D + 1.300 E34
441	*	0.696 D + 1.300 E35
442	*	0.696 D + 1.300 E36
443	*	0.696 D + 1.300 E37
444	*	0.696 D + 1.300 E38
445	*	0.696 D + 1.300 E39
446	*	0.696 D + 1.300 E40
447	*	0.696 D - 1.300 E1
448	*	0.696 D - 1.300 E2
449	*	0.696 D - 1.300 E3
450	*	0.696 D - 1.300 E4
451	*	0.696 D - 1.300 E5
452	*	0.696 D - 1.300 E6
453	*	0.696 D - 1.300 E7
454	*	0.696 D - 1.300 E8
455	*	0.696 D - 1.300 E9
456	*	0.696 D - 1.300 E10
457	*	0.696 D - 1.300 E11
458	*	0.696 D - 1.300 E12
459	*	0.696 D - 1.300 E13
460	*	0.696 D - 1.300 E14
461	*	0.696 D - 1.300 E15
462	*	0.696 D - 1.300 E16
463	*	0.696 D - 1.300 E17
464	*	0.696 D - 1.300 E18
465	*	0.696 D - 1.300 E19
466	*	0.696 D - 1.300 E20
467	*	0.696 D - 1.300 E21
468	*	0.696 D - 1.300 E22
469	*	0.696 D - 1.300 E23
470	*	0.696 D - 1.300 E24
471	*	0.696 D - 1.300 E25
472	*	0.696 D - 1.300 E26
473	*	0.696 D - 1.300 E27
474	*	0.696 D - 1.300 E28
475	*	0.696 D - 1.300 E29
476	*	0.696 D - 1.300 E30
477	*	0.696 D - 1.300 E31
478	*	0.696 D - 1.300 E32
479	*	0.696 D - 1.300 E33
480	*	0.696 D - 1.300 E34
481	*	0.696 D - 1.300 E35
482	*	0.696 D - 1.300 E36
483	*	0.696 D - 1.300 E37
484	*	0.696 D - 1.300 E38

Code Check Summary

485 * 0.696 D - 1.300 E39
486 * 0.696 D - 1.300 E40

* = Load combination currently selected to use

Frame #0:

Level: LOWROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
44	48.62	0.00	0.00	0.00	0.00	4	0.49 Axial	46	HSS6X6X3/16
51	40.73	0.00	0.00	-0.00	-0.00	4	0.49 Axial	46	HSS5X5X1/4
52	37.85	0.00	0.00	-0.00	0.00	4	0.45 Axial	46	HSS5X5X1/4

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
35	43.63	0.00	0.00	-0.00	-0.00	36	0.34 Axial	50	W14X48
36	0.00	114.86	0.00	-15.47	-0.00	4	0.46 H1-1b	50	W18X35
37	0.00	189.41	0.00	22.96	-0.00	4	0.53 H1-1b	50	W21X44
38	0.00	103.72	0.00	-14.59	-0.00	4	0.51 H1-1b	50	W16X31

Frame #2:

Level: HIGHROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
15	66.20	0.00	0.00	-0.00	0.00	40	0.42 H1-1a	46	HSS6X6X5/8
16	35.18	0.00	0.00	0.00	0.00	4	0.22 Axial	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
15	0.00	88.83	-0.00	-14.69	0.00	4	0.42 H1-3a(H1-1b)	50	W12X40

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
28	-64.06	0.00	0.00	0.00	0.00	40	0.75 Axial	38	CoreBRB_2.50

Level: LOWROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
2	35.99	0.00	0.00	0.00	0.00	4	0.23 Axial	46	HSS6X6X5/8
7	67.15	0.00	0.00	-0.00	0.00	40	0.43 H1-1a	46	HSS6X6X5/8

Frame #3:

Code Check Summary

Level: HIGHROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
27	20.88	-0.03	-5.17	0.03	-0.80	36	0.09 H1-1b	46	HSS6X6X5/8
28	16.30	0.21	-6.94	0.03	-1.07	27	0.11 H1-1b	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
9	0.00	71.22	-0.00	-16.82	0.00	4	0.18 H1-3a(H1-1b)	50	W16X57

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
29	-49.01	0.00	0.00	0.00	0.00	40	0.72 Axial	38	CoreBRB_2.00

Level: LOWROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
16	74.43	0.00	-0.00	-0.01	0.31	4	0.28 H1-1a	46	HSS6X6X5/8
53	87.81	0.53	-2.47	-0.01	0.41	23	0.36 H1-1a	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
7	0.00	23.50	0.00	-4.53	0.00	4	0.11 H1-3a(H1-1b)	50	W12X40

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
36	88.71	0.00	0.00	0.00	0.00	40	0.86 Axial	38	CoreBRB_3.00

Frame #4:

Level: HIGHROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
2	3.86	-0.07	-4.55	-0.01	-0.70	32	0.06 H1-1b	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
19	38.29	6.46	-2.29	-3.03	0.00	31	0.11 H1-1b	50	W12X40

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
40	-43.70	0.00	0.00	0.00	0.00	31	0.64 Axial	38	CoreBRB_2.00

Code Check Summary

Level: LOWROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
23	78.81	-0.33	-2.63	0.00	0.26	34	0.33 H1-1a	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
43	6.42	44.88	14.24	28.52	0.00	12	0.08 H1-1b	50	W24X131

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
46	53.71	0.00	0.00	0.00	0.00	31	0.79 Axial	38	CoreBRB_2.00

Frame #5:

Level: HIGHROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
34	49.36	0.00	0.00	0.04	0.78	4	0.11 Axial	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
39	0.00	240.83	0.00	-19.45	0.00	4	0.29 H1-1b	50	W21X93

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
31	-9.92	0.00	0.00	0.00	0.00	32	0.15 Axial	38	CoreBRB_2.00
32	-9.48	0.00	0.00	0.00	0.00	33	0.14 Axial	38	CoreBRB_2.00

Level: LOWROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
43	97.42	-0.00	0.00	-0.01	-0.30	4	0.36 H1-1a	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
52	0.00	84.04	-0.00	8.57	0.00	4	0.29 H1-3a(H1-1b)	50	W14X48

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
38	30.34	0.00	0.00	0.00	0.00	40	0.44 Axial	38	CoreBRB_2.00
39	30.46	0.00	0.00	0.00	0.00	41	0.45 Axial	38	CoreBRB_2.00

Frame #6:

Code Check Summary

Level: LOWROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
57	44.41	0.00	0.00	-0.00	0.00	4	0.17 Axial	46	HSS6X6X5/8
58	45.01	0.00	0.00	-0.00	0.00	177	0.17 Axial	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
192	0.00	-24.92	0.00	-24.93	0.00	4	0.18 Shear	50	W14X48

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
40	37.42	0.00	0.00	0.00	0.00	16	0.55 Axial	38	CoreBRB_2.00

Frame #7:

Level: HIGHROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
32	31.75	0.00	0.00	0.19	-0.19	4	0.07 Axial	46	HSS6X6X5/8
33	33.15	0.00	0.00	-0.08	0.33	4	0.07 Axial	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
34	0.00	114.41	0.00	-19.53	0.00	4	0.29 H1-1b	50	W16X57

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
33	-9.24	0.00	0.00	0.00	0.00	42	0.14 Axial	38	CoreBRB_2.00
34	-9.57	0.00	0.00	0.00	0.00	39	0.14 Axial	38	CoreBRB_2.00

Level: LOWROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
39	79.27	0.00	0.00	-0.07	0.07	4	0.30 H1-1a	46	HSS6X6X5/8
40	83.56	0.00	0.00	0.03	-0.13	4	0.31 H1-1a	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
55	0.00	163.46	0.00	27.18	0.00	4	0.45 H1-1b	50	W16X57

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
41	35.34	0.00	0.00	0.00	0.00	34	0.52 Axial	38	CoreBRB_2.00
42	35.13	0.00	0.00	0.00	0.00	31	0.51 Axial	38	CoreBRB_2.00

Code Check Summary

Frame #8:

Level: LOWROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
33	49.76	0.00	0.00	0.00	-0.00	4	0.19 Axial	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
31	0.00	101.85	-0.00	-25.66	0.00	4	0.26 H1-3a(H1-1b)	50	W16X57

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
43	-29.21	0.00	0.00	0.00	0.00	16	0.43 Axial	38	CoreBRB_2.00

Frame #21:

Level: HIGHROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
1	22.45	0.00	0.00	0.01	-0.08	31	0.05 Axial	46	HSS6X6X5/8
39	43.46	-0.20	-0.86	-0.02	-0.13	22	0.29 H1-1a	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
122	0.00	93.20	0.00	21.03	0.00	4	0.24 H1-1b	50	W16X57

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
39	-70.58	0.00	0.00	0.00	0.00	22	0.83 Axial	38	CoreBRB_2.50

Level: LOWROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
3	44.41	-0.20	-0.86	0.01	0.05	22	0.30 H1-1a	46	HSS6X6X5/8
4	114.68	0.40	0.22	0.01	0.03	19	0.44 H1-1a	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
18	1.62	0.00	2.85	0.00	-0.82	11	0.05 H1-1b	50	W12X40

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
45	111.16	0.00	0.00	0.00	0.00	22	0.93 Axial	38	CoreBRB_3.50

Frame #22:

Code Check Summary

Level: LOWROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
30	13.44	0.00	0.00	-0.00	0.00	4	0.05 Axial	46	HSS6X6X5/8
31	24.50	0.00	0.00	0.00	-0.00	4	0.09 Axial	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
26	0.00	37.56	0.00	-4.41	0.00	4	0.18 H1-3a(H1-1b)	50	W12X40

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
33	22.74	0.00	0.00	0.00	0.00	13	0.33 Axial	38	CoreBRB_2.00
34	22.74	0.00	0.00	0.00	0.00	12	0.33 Axial	38	CoreBRB_2.00

Frame #23:

Level: HIGHROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
5	19.17	-0.51	-18.65	0.08	2.88	12	0.26 H1-1b	46	HSS6X6X5/8
6	21.32	0.17	12.68	0.03	1.95	17	0.18 H1-1b	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
27	0.00	162.09	0.00	-18.71	0.00	4	0.42 H1-1b	50	W16X57

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
25	-32.55	0.00	0.00	0.00	0.00	30	0.48 Axial	38	CoreBRB_2.00
26	-29.58	0.00	0.00	0.00	0.00	27	0.43 Axial	38	CoreBRB_2.00

Level: LOWROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
46	46.42	-0.51	-18.61	-0.03	-1.09	12	0.33 H1-1b	46	HSS6X6X5/8
47	101.96	0.00	0.00	-0.01	-0.75	4	0.38 H1-1a	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
48	0.00	198.25	0.00	-21.87	-0.00	4	0.42 H1-1b	50	W18X65

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
31	44.48	0.00	0.00	0.00	0.00	30	0.65 Axial	38	CoreBRB_2.00

Code Check Summary

Brace	Pu	Mux	Muy	Vux	Vuy	LC	Interact.	Fy	Size
32	45.90	0.00	0.00	0.00	0.00	27	0.67 Axial	38	CoreBRB_2.00

Frame #24:

Level: HIGHROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
35	28.36	0.00	0.00	-0.19	-0.07	4	0.06 Axial	46	HSS6X6X5/8
36	12.08	0.43	3.86	0.06	0.60	16	0.07 H1-1b	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
32	0.00	84.54	0.00	-8.60	0.00	4	0.21 H1-3a(H1-1b)	50	W16X57

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
23	-9.34	0.00	0.00	0.00	0.00	13	0.14 Axial	38	CoreBRB_2.00
24	-9.39	0.00	0.00	0.00	0.00	12	0.14 Axial	38	CoreBRB_2.00

Level: LOWROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
41	95.76	-0.02	0.00	0.02	-0.23	4	0.36 H1-1a	46	HSS6X6X5/8
42	48.07	0.00	0.00	0.07	0.03	4	0.18 Axial	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
53	0.00	-7.05	-0.00	47.60	0.00	4	0.22 Shear	50	W16X57

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
29	32.58	0.00	0.00	0.00	0.00	30	0.48 Axial	38	CoreBRB_2.00
30	32.61	0.00	0.00	0.00	0.00	27	0.48 Axial	38	CoreBRB_2.00

Frame #25:

Level: HIGHROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
26	8.13	1.94	2.60	0.30	0.40	29	0.07 H1-1b	46	HSS6X6X5/8
40	26.93	0.00	0.00	0.34	-0.01	4	0.17 Axial	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
7	15.96	9.92	-1.09	-3.65	0.00	37	0.05 H1-1b	50	W16X57

Code Check Summary

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
37	-26.51	0.00	0.00	0.00	0.00	37	0.39 Axial	38	CoreBRB_2.00

Level: LOWROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
15	38.46	0.00	0.00	-0.11	-0.15	4	0.14 Axial	46	HSS6X6X5/8
60	27.74	0.00	0.00	-0.13	0.00	4	0.18 Axial	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
9	0.45	0.00	-0.20	0.00	-0.15	30	0.00 H1-1b	50	W12X40

Frame #26:

Level: HIGHROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
30	10.87	5.67	0.00	0.87	0.00	37	0.05 H1-1b	46	HSS8X8X5/8
31	7.59	0.38	3.25	0.06	0.50	34	0.05 H1-1b	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
36	0.00	10.39	-0.00	3.04	0.00	4	0.05 H1-1b	50	W12X40

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
41	-15.81	0.00	0.00	0.00	0.00	30	0.23 Axial	38	CoreBRB_2.00

Level: LOWROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
38	93.36	-1.61	-0.83	-0.02	-0.19	36	0.38 H1-1a	46	HSS6X6X5/8
45	12.20	5.67	0.01	-0.33	-0.00	37	0.05 H1-1b	46	HSS8X8X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
34	42.43	0.00	0.00	0.00	0.82	36	0.13 Axial	50	W12X40

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
47	84.97	0.00	0.00	0.00	0.00	37	0.83 Axial	38	CoreBRB_3.00

Frame #27:

Code Check Summary

Level: LOWROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
34	27.67	0.00	0.00	0.00	0.00	16	0.10 Axial	46	HSS6X6X5/8
37	24.56	0.00	0.00	-0.00	0.00	37	0.09 Axial	46	HSS6X6X5/8

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
32	0.00	17.35	-0.00	-3.79	0.00	4	0.08 H1-3a(H1-1b)	50	W12X40

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
28	-29.19	0.00	0.00	0.00	0.00	37	0.43 Axial	38	CoreBRB_2.00

Seismic Provisions Member Code Check Summary

Frame #2:

Story:HIGHROOF Column: 15 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Column: 16 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Beam: 15 Type: Buckling Restrained Braced Frame
Size:W12X40 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Brace: 28 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.50 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:LOWROOF Column: 2 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Column: 7 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Seismic Provisions Member Code Check Summary

Frame #3:

Story:HIGHROOF Column: 27 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Column: 28 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Beam: 9 Type: Buckling Restrained Braced Frame
Size:W16X57 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Brace: 29 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:LOWROOF Column: 16 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Column: 53 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Beam: 7 Type: Buckling Restrained Braced Frame
Size:W12X40 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.

Seismic Provisions Member Code Check Summary

F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Brace: 36 Type: Buckling Restrained Braced Frame
Size:CoreBRB_3.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Seismic Provisions Member Code Check Summary

Frame #4:

Story:HIGHROOF Column: 2 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Beam: 19 Type: Buckling Restrained Braced Frame
Size:W12X40 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Brace: 40 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:LOWROOF Column: 23 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Beam: 43 Type: Buckling Restrained Braced Frame
Size:W24X131 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Brace: 46 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Seismic Provisions Member Code Check Summary

Frame #5:

Story:HIGHROOF Column: 34 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Beam: 39 Type: Buckling Restrained Braced Frame
Size:W21X93 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Brace: 31 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:HIGHROOF Brace: 32 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:LOWROOF Column: 43 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Beam: 52 Type: Buckling Restrained Braced Frame - Chevron
Size:W14X48 Fy (ksi): 50.00
F4.4a V- and Inverted V- Braced Frames --- Additional Check Required
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Brace: 38 Type: Buckling Restrained Braced Frame - Chevron
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength

Seismic Provisions Member Code Check Summary

F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:LOWROOF Brace: 39 Type: Buckling Restrained Braced Frame - Chevron
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Seismic Provisions Member Code Check Summary

Frame #6:

Story:LOWROOF Column: 57 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Column: 58 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Beam:192 Type: Buckling Restrained Braced Frame
Size:W14X48 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Brace: 40 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Seismic Provisions Member Code Check Summary

Frame #7:

Story:HIGHROOF Column: 32 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Column: 33 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Beam: 34 Type: Buckling Restrained Braced Frame
Size:W16X57 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Brace: 33 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:HIGHROOF Brace: 34 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:LOWROOF Column: 39 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Column: 40 Type: Buckling Restrained Braced Frame

Seismic Provisions Member Code Check Summary

Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Beam: 55 Type: Buckling Restrained Braced Frame - Chevron
Size:W16X57 Fy (ksi): 50.00
F4.4a V- and Inverted V- Braced Frames --- Additional Check Required
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Brace: 41 Type: Buckling Restrained Braced Frame - Chevron
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:LOWROOF Brace: 42 Type: Buckling Restrained Braced Frame - Chevron
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Seismic Provisions Member Code Check Summary

Frame #8:

Story:LOWROOF Column: 33 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Beam: 31 Type: Buckling Restrained Braced Frame
Size:W16X57 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Brace: 43 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Seismic Provisions Member Code Check Summary

Frame #21:

Story:HIGHROOF Column: 1 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Column: 39 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Beam:122 Type: Buckling Restrained Braced Frame
Size:W16X57 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Brace: 39 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.50 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:LOWROOF Column: 3 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Column: 4 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Beam: 18 Type: Buckling Restrained Braced Frame
Size:W12X40 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.

Seismic Provisions Member Code Check Summary

F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Brace: 45 Type: Buckling Restrained Braced Frame
Size:CoreBRB_3.50 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Seismic Provisions Member Code Check Summary

Frame #22:

Story:LOWROOF Column: 30 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Column: 31 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Beam: 26 Type: Buckling Restrained Braced Frame - Chevron
Size:W12X40 Fy (ksi): 50.00
F4.4a V- and Inverted V- Braced Frames --- Additional Check Required
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Brace: 33 Type: Buckling Restrained Braced Frame - Chevron
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:LOWROOF Brace: 34 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Seismic Provisions Member Code Check Summary

Frame #23:

Story:HIGHROOF Column: 5 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Column: 6 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Beam: 27 Type: Buckling Restrained Braced Frame
Size:W16X57 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Brace: 25 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:HIGHROOF Brace: 26 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:LOWROOF Column: 46 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Column: 47 Type: Buckling Restrained Braced Frame

Seismic Provisions Member Code Check Summary

Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Beam: 48 Type: Buckling Restrained Braced Frame - Chevron
Size:W18X65 Fy (ksi): 50.00
F4.4a V- and Inverted V- Braced Frames --- Additional Check Required
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Brace: 31 Type: Buckling Restrained Braced Frame - Chevron
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:LOWROOF Brace: 32 Type: Buckling Restrained Braced Frame - Chevron
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Seismic Provisions Member Code Check Summary

Frame #24:

Story:HIGHROOF Column: 35 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Column: 36 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Beam: 32 Type: Buckling Restrained Braced Frame
Size:W16X57 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Brace: 23 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:HIGHROOF Brace: 24 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:LOWROOF Column: 41 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Column: 42 Type: Buckling Restrained Braced Frame

Seismic Provisions Member Code Check Summary

Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Beam: 53 Type: Buckling Restrained Braced Frame - Chevron
Size:W16X57 Fy (ksi): 50.00
F4.4a V- and Inverted V- Braced Frames --- Additional Check Required
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Brace: 29 Type: Buckling Restrained Braced Frame - Chevron
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:LOWROOF Brace: 30 Type: Buckling Restrained Braced Frame - Chevron
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Seismic Provisions Member Code Check Summary

Frame #25:

Story:HIGHROOF Column: 26 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Column: 40 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Beam: 7 Type: Buckling Restrained Braced Frame
Size:W16X57 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Brace: 37 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:LOWROOF Column: 15 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Column: 60 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Beam: 9 Type: Buckling Restrained Braced Frame
Size:W12X40 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.

Seismic Provisions Member Code Check Summary

F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Seismic Provisions Member Code Check Summary

Frame #26:

Story:HIGHROOF Column: 30 Type: Buckling Restrained Braced Frame
Size:HSS8X8X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Column: 31 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Beam: 36 Type: Buckling Restrained Braced Frame
Size:W12X40 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:HIGHROOF Brace: 41 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Story:LOWROOF Column: 38 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Column: 45 Type: Buckling Restrained Braced Frame
Size:HSS8X8X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Beam: 34 Type: Buckling Restrained Braced Frame
Size:W12X40 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.

Seismic Provisions Member Code Check Summary

F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Brace: 47 Type: Buckling Restrained Braced Frame
Size:CoreBRB_3.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Seismic Provisions Member Code Check Summary

Frame #27:

Story:LOWROOF Column: 34 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Column: 37 Type: Buckling Restrained Braced Frame
Size:HSS6X6X5/8 Fy (ksi): 46.00
D1.4a Required Strength --- OK
D2.5b Column Splices - Required Strength
F4.6d Column Splices
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Beam: 32 Type: Buckling Restrained Braced Frame
Size:W12X40 Fy (ksi): 50.00
F4.3 Non-V and Non-Inverted V-Braced Frame - Unbalanced Forces Design Required.
F4.5a Basic Requirements (D1.1 Moderately Ductile) --- OK

Story:LOWROOF Brace: 28 Type: Buckling Restrained Braced Frame
Size:CoreBRB_2.00 Fymin (ksi): 38.00 Fymax (ksi): 46.00
F4.2a Adjusted Brace Strength
F4.5 Bracing Members --- OK
F4.5b(2) Available Strength - Steel Core --- OK
F4.5b(3) Conformance Demonstration
F4.6c(1) --- Required Strength
F4.6c(2) --- Gusset Plates

Spread Footing Design Summary

RAM Foundation v23.00.00.92
DataBase: 231115 PSE RSS Corebrace Review
Building Code: IBC

Date: 12/06/23 21:00:23
Design Code: ACI318-19

Grid	Orientation Col/Foot	Dimensions (ft) Length	Width	Thick	f'c/fy ksi	Bottom Reinforcement Parallel to Length	Parallel to Width	Top Reinforcement Parallel to Length	Parallel to Width
(1 - E)	0.00/ 0.00	4.00	4.00	1.50	3.50/60.00	7-#6	7-#6	None	None
(1 - D)	0.00/ 0.00	4.00	4.00	1.50	3.50/60.00	7-#6	7-#6	None	None
(1 - A.4)	0.00/ 0.00	4.00	4.00	1.50	3.50/60.00	7-#6	7-#6	None	None
(1 - A.1)	0.00/ 0.00	4.00	4.00	1.50	3.50/60.00	7-#6	7-#6	None	None
(2 - B.3)	0.00/ 0.00	5.00	5.00	1.50	3.50/60.00	6-#6	6-#6	None	None
(2 - A.88)	0.00/ 0.00	4.00	4.00	1.50	3.50/60.00	7-#6	7-#6	None	None
(2 - A.6)	0.00/ 0.00	6.00	6.00	1.50	3.50/60.00	6-#6	6-#6	None	None
(2.3 - E)	0.00/ 0.00	4.00	4.00	1.50	3.50/60.00	7-#6	7-#6	None	None
(2.4 - D)	0.00/ 0.00	5.00	5.00	1.50	3.50/60.00	6-#6	6-#6	None	None
(2.4 - C)	0.00/ 0.00	6.00	6.00	1.50	3.50/60.00	6-#6	6-#6	None	None
(2.4 - B.1)	0.00/ 0.00	5.00	5.00	1.50	3.50/60.00	6-#6	6-#6	None	None
(2.5 - A.7)	0.00/ 0.00	6.00	6.00	1.50	3.50/60.00	6-#6	6-#6	None	None
(2.8 - E)	0.00/ 0.00	4.00	4.00	1.50	3.50/60.00	7-#6	7-#6	None	None
(2.8 - D)	0.00/ 0.00	5.00	5.00	1.50	3.50/60.00	6-#6	6-#6	None	None
(2.8 - B.1)	0.00/ 0.00	5.00	5.00	1.50	3.50/60.00	6-#6	6-#6	None	None
(3 - A.7)	0.00/ 0.00	6.00	6.00	1.50	3.50/60.00	6-#6	6-#6	None	None
(3.3 - B.1)	0.00/ 0.00	5.00	5.00	1.50	3.50/60.00	6-#6	6-#6	None	None
(4.15 - B.5)	0.00/ 0.00	5.00	5.00	1.50	3.50/60.00	6-#6	6-#6	None	None
(5 - C.3)	0.00/ 0.00	5.00	5.00	1.00	3.50/60.00	4-#6	4-#6	None	None
(5 - B.5)	0.00/ 0.00	4.00	4.00	1.00	3.50/60.00	5-#6	5-#6	None	None
(3.2 - E)	0.00/ 0.00	4.00	4.00	1.00	3.50/60.00	5-#6	5-#6	None	None
(1 - C.2)	0.00/ 0.00	4.00	4.00	1.50	3.50/60.00	7-#6	7-#6	None	None
(2 - C)	0.00/ 0.00	6.00	6.00	1.50	3.50/60.00	6-#6	6-#6	None	None
(1 - A.9)	0.00/ 0.00	4.00	4.00	1.50	3.50/60.00	7-#6	7-#6	None	None
(1 - B.4)	0.00/ 0.00	4.00	4.00	1.50	3.50/60.00	7-#6	7-#6	None	None
(5 - C.8)	0.00/ 0.00	5.00	5.00	1.00	3.50/60.00	4-#6	4-#6	None	None
(4 - A.5)	0.00/ 0.00	4.00	4.00	1.00	3.50/60.00	5-#6	5-#6	None	None
(4 - A)	0.00/ 0.00	4.00	4.00	1.00	3.50/60.00	5-#6	5-#6	None	None
(2 - E)	0.00/ 0.00	4.00	4.00	1.50	3.50/60.00	7-#6	7-#6	None	None
(1.5 - E)	0.00/ 0.00	4.00	4.00	1.50	3.50/60.00	7-#6	7-#6	None	None

Spread Footing Design Summary

(1.5 - D)	0.00/ 0.00	4.00	4.00	1.50	3.50/60.00	7-#6	7-#6	None	None

Note: Number between () in reinforcement is quantity of bars in center strip of rectangular footing

Continuous Foundation Design

RAM Foundation v23.00.00.92
DataBase: 231115 PSE RSS Corebrace Review
Building Code: IBC

Date: 12/06/23 21:00:23
Design Code: ACI318-19

FOOTING DESIGN - AS BEAM

Footing # 66
Length (ft): 44.03
Width (ft): 6.00
Thickness (ft): 4.00
Footing Orientation (deg): 90.00º
Concrete f'c (ksi): 4.50 fct (ksi): CODE Density (pcf): 150.00 Ec (ksi): 4066.84
Reinf. fy (ksi): 60.00
Uplift Safety Factor 2.7(1232)

LOADS

Surcharge (ksf) Dead Load: 0.00 Live Load: 0.00

REINFORCEMENT

Top Longitudinal Flexure Reinforcement:

Bar Depth (in) 45.63

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Top Bars
1	0.00/12.00	H/S	5-#6
2	12.00/32.00	S/S	5-#6
3	32.00/44.03	S/H	5-#6

Bottom Longitudinal Flexure Reinforcement:

Bar Depth (in) 44.63

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Bot. Bars
1	0.00/23.00	H/S	6-#6
2	23.00/44.03	S/H	6-#6

Longitudinal Shear Reinforcement:

Number of Shear bar legs: 2

Seg. Num.	Segment Start/End (ft)	Spacing (in)	Quantity
1	0.00/ 7.82	Not Applic.	None
2	16.18/22.00	Not Applic.	None
3	22.00/27.85	Not Applic.	None
4	36.21/44.03	Not Applic.	None

Cover (in) Top 2.00 Bottom 3.00 Side 3.00

SUPPORTED MEMBERS

Columns:

Location	Loc. Along Footing (ft):	Size	Column Orientation	Base Plate (LxW) (in):	% Rigid
(3 - A.2)	12.00	HSS6X6X5/8	0.00	16.00x16.00	50
(3 - A)	32.03	HSS6X6X5/8	90.00	16.00x16.00	50

Brace

Loc. Along	Brace

Continuous Foundation Design

Location	Footing (ft):	Orientation
(115.29, 210.83)	32.03	0.00

CONCRETE CAPACITY

	Longitudinal	Ld Co #	Loc. (ft)	Transvers	Ld Co #	Loc. (ft)
Req. Max Shear (kip)	44.52	225	36.21			
Provided Shear (kip)	323.30		36.21			
Req. Max Pos. Moment (kip-ft)	343.86	585	12.46	0.00	-1	0.00
Provided Pos. Moment (kip-ft)	526.73		12.46	0.00		0.00
Req. Max Neg. Moment (kip-ft)	-221.40	345	32.49	-0.00	-1	0.00
Provided Neg. Moment (kip-ft)	-449.31		32.49	-0.00		0.00
Req. Max Punching Shear (kip)	110.58	65	32.03			
Provided Punching Shear (kip)	1983.08		32.03			

SOIL CAPACITY

Allowable Soil Bearing Capacity (ksf)	3.3	
Soil Subgrade Modulus (ksf / ft)	172.8	
Max Unfactored Soil Bearing (ksf)	1.2	Ld Co # 712
Max Average Unfactored Soil Bearing (ksf)	1.1	

Continuous Foundation Design

FOOTING DESIGN - AS BEAM

Footing # 67
Length (ft): 36.40
Width (ft): 4.00
Thickness (ft): 4.00
Footing Orientation (deg): 0.00º
Concrete f'c (ksi): 4.50 fct (ksi): CODE Density (pcf): 150.00 Ec (ksi): 4066.84
Reinf. fy (ksi): 60.00

LOADS

Surcharge (ksf) Dead Load: 0.00 Live Load: 0.00

REINFORCEMENT

Top Longitudinal Flexure Reinforcement:

Bar Depth (in) 45.63

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Top Bars
1	0.00/ 3.00	H/S	4-#6
2	3.00/33.00	S/S	6-#6
3	33.00/36.40	S/H	4-#6

Bottom Longitudinal Flexure Reinforcement:

Bar Depth (in) 44.63

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Bot. Bars
1	0.00/ 6.00	H/S	4-#6
2	6.00/36.40	S/H	4-#6

Longitudinal Shear Reinforcement:

Number of Shear bar legs: 2

Seg. Num.	Segment Start/End (ft)	Spacing (in)	Quantity
1	7.68/18.00	Not Applic.	None
2	18.00/28.72	Not Applic.	None

Cover (in) Top 2.00 Bottom 3.00 Side 3.00

SUPPORTED MEMBERS

Columns:

Location	Loc. Along Footing (ft):	Size	Column Orientation	Base Plate (LxW) (in):	% Rigid
(2.8 - C)	3.50	HSS6X6X5/8	0.00	16.00x16.00	50
(3.3 - C)	32.90	HSS6X6X5/8	0.00	16.00x16.00	50

Brace

Location	Loc. Along Footing (ft):	Brace Orientation
(101.10, 86.50)	3.50	0.00
(130.50, 86.50)	32.90	0.00

Continuous Foundation Design

CONCRETE CAPACITY

	Longitudinal	Ld Co #	Loc. (ft)	Transvers	Ld Co #	Loc. (ft)
Req. Max Shear (kip)	45.88	6	7.68			
Provided Shear (kip)	215.53		7.68			
Req. Max Pos. Moment (kip-ft)	246.16	593	25.00	0.00	-1	0.00
Provided Pos. Moment (kip-ft)	351.15		25.00	0.00		0.00
Req. Max Neg. Moment (kip-ft)	-293.50	6	19.00	-0.00	-1	0.00
Provided Neg. Moment (kip-ft)	-536.90		19.00	-0.00		0.00
Req. Max Punching Shear (kip)	0.00	-1	0.00			
Provided Punching Shear (kip)	0.00		0.00			

SOIL CAPACITY

Allowable Soil Bearing Capacity (ksf)	3.3	
Soil Subgrade Modulus (ksf / ft)	172.8	
Max Unfactored Soil Bearing (ksf)	2.9	Ld Co # 760
Max Average Unfactored Soil Bearing (ksf)	2.0	

Continuous Foundation Design

FOOTING DESIGN - AS BEAM

Footing # 68
Length (ft): 48.00
Width (ft): 3.00
Thickness (ft): 2.00
Footing Orientation (deg): 0.00º
Concrete f'c (ksi): 4.50 fct (ksi): CODE Density (pcf): 150.00 Ec (ksi): 4066.84
Reinf. fy (ksi): 60.00

LOADS

Surcharge (ksf)	Dead Load:	0.00	Live Load:	0.00

REINFORCEMENT

Top Longitudinal Flexure Reinforcement:

Bar Depth (in) 21.13

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Top Bars
1	0.00/ 4.00	H/S	4-#6
2	4.00/43.00	S/S	4-#6
3	43.00/48.00	S/H	4-#6

Bottom Longitudinal Flexure Reinforcement:

Bar Depth (in) 20.13

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Bot. Bars
1	0.00/23.00	H/S	6-#6
2	23.00/48.00	S/H	6-#6

Longitudinal Shear Reinforcement:

Number of Shear bar legs: 2

Seg. Num.	Segment Start/End (ft)	Spacing (in)	Quantity
1	0.00/ 2.36	Not Applic.	None
2	6.64/23.00	Not Applic.	None
3	23.00/40.00	Not Applic.	None
4	40.00/41.36	#4@ 9.00	1
5	45.64/48.00	#4@ 9.00	3

Cover (in) Top 2.00 Bottom 3.00 Side 3.00

SUPPORTED MEMBERS

Columns:

Location	Loc. Along Footing (ft):	Size	Column Orientation	Base Plate (LxW) (in):	% Rigid
(3.2 - C.25)	4.50	HSS6X6X5/8	0.00	16.00x16.00	50
(4.1 - C.25)	43.50	HSS6X6X5/8	0.00	16.00x16.00	50

Brace

Loc. Along	Brace

Continuous Foundation Design

Location	Footing (ft):	Orientation
(127.50, 78.50)	4.50	0.00
(127.50, 78.50)	4.50	0.00

CONCRETE CAPACITY

	Longitudinal	Ld Co #	Loc. (ft)	Transvers	Ld Co #	Loc. (ft)
Req. Max Shear (kip)	35.56	6	41.36			
Provided Shear (kip)	113.15		41.36			
Req. Max Pos. Moment (kip-ft)	202.92	599	26.00	0.00	-1	0.00
Provided Pos. Moment (kip-ft)	232.25		26.00	0.00		0.00
Req. Max Neg. Moment (kip-ft)	-45.93	6	32.00	-0.00	-1	0.00
Provided Neg. Moment (kip-ft)	-164.27		32.00	-0.00		0.00
Req. Max Punching Shear (kip)	95.76	6	43.50			
Provided Punching Shear (kip)	496.53		43.50			

SOIL CAPACITY

Allowable Soil Bearing Capacity (ksf)	3.3	
Soil Subgrade Modulus (ksf / ft)	172.8	
Max Unfactored Soil Bearing (ksf)	2.3	Ld Co # 653
Max Average Unfactored Soil Bearing (ksf)	1.3	

Continuous Foundation Design

FOOTING DESIGN - AS BEAM

Footing # 69
Length (ft): 48.25
Width (ft): 3.00
Thickness (ft): 2.00
Footing Orientation (deg): 90.00º
Concrete f'c (ksi): 4.50 fct (ksi): CODE Density (pcf): 150.00 Ec (ksi): 4066.84
Reinf. fy (ksi): 60.00

LOADS

Surcharge (ksf) Dead Load: 0.00 Live Load: 0.00

REINFORCEMENT

Top Longitudinal Flexure Reinforcement:

Bar Depth (in) 21.13

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Top Bars
1	0.00/ 4.00	H/S	4-#6
2	4.00/44.00	S/S	4-#6
3	44.00/48.25	S/H	4-#6

Bottom Longitudinal Flexure Reinforcement:

Bar Depth (in) 20.13

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Bot. Bars
1	0.00/ 8.00	H/S	5-#6
2	8.00/48.25	S/H	6-#6

Longitudinal Shear Reinforcement:

Number of Shear bar legs: 2

Seg. Num.	Segment Start/End (ft)	Spacing (in)	Quantity
1	0.00/ 2.36	#4@ 9.00	4
2	6.64/ 8.00	#4@ 9.00	2
3	8.00/25.00	Not Applic.	None
4	25.00/41.61	Not Applic.	None
5	45.89/48.25	Not Applic.	None

Cover (in) Top 2.00 Bottom 3.00 Side 3.00

SUPPORTED MEMBERS

Columns:

Location	Loc. Along Footing (ft):	Size	Column Orientation	Base Plate (LxW) (in):	% Rigid
(3.2 - D)	4.50	HSS6X6X5/8	0.00	16.00x16.00	50
(3.2 - C.25)	43.75	HSS6X6X5/8	90.00	16.00x16.00	50

Brace

	Loc. Along	Brace

Continuous Foundation Design

Location	Footing (ft):	Orientation
(127.50, 39.25)	4.50	0.00
(127.50, 78.50)	43.75	0.00
(127.50, 78.50)	43.75	0.00

CONCRETE CAPACITY

	Longitudinal	Ld Co #	Loc. (ft)	Transvers	Ld Co #	Loc. (ft)
Req. Max Shear (kip)	36.12	6	2.36			
Provided Shear (kip)	113.15		2.36			
Req. Max Pos. Moment (kip-ft)	155.87	603	26.00	0.00	-1	0.00
Provided Pos. Moment (kip-ft)	232.25		26.00	0.00		0.00
Req. Max Neg. Moment (kip-ft)	-46.97	6	14.00	-0.00	-1	0.00
Provided Neg. Moment (kip-ft)	-164.27		14.00	-0.00		0.00
Req. Max Punching Shear (kip)	97.42	6	4.50			
Provided Punching Shear (kip)	496.53		4.50			

SOIL CAPACITY

Allowable Soil Bearing Capacity (ksf)	3.3	
Soil Subgrade Modulus (ksf / ft)	172.8	
Max Unfactored Soil Bearing (ksf)	2.7	Ld Co # 770
Max Average Unfactored Soil Bearing (ksf)	1.4	

Continuous Foundation Design

FOOTING DESIGN - AS BEAM

Footing # 70
Length (ft): 33.70
Width (ft): 3.00
Thickness (ft): 2.00
Footing Orientation (deg): 90.00º
Concrete f'c (ksi): 4.50 fct (ksi): CODE Density (pcf): 150.00 Ec (ksi): 4066.84
Reinf. fy (ksi): 60.00

LOADS

Surcharge (ksf) Dead Load: 0.00 Live Load: 0.00

REINFORCEMENT

Top Longitudinal Flexure Reinforcement:

Bar Depth (in) 21.13

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Top Bars
1	0.00/ 4.00	H/S	4-#6
2	4.00/30.00	S/S	4-#6
3	30.00/33.70	S/H	4-#6

Bottom Longitudinal Flexure Reinforcement:

Bar Depth (in) 20.13

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Bot. Bars
1	0.00/18.00	H/S	4-#6
2	18.00/33.70	S/H	4-#6

Longitudinal Shear Reinforcement:

Number of Shear bar legs: 2

Seg. Num.	Segment Start/End (ft)	Spacing (in)	Quantity
1	0.00/ 1.95	Not Applic.	None
2	6.05/16.00	#4@ 9.00	14
3	16.00/26.59	Not Applic.	None
4	26.59/27.59	#4@ 9.00	1
5	31.69/33.64	Not Applic.	None

Cover (in) Top 2.00 Bottom 3.00 Side 3.00

SUPPORTED MEMBERS

Columns:

Location	Loc. Along Footing (ft):	Size	Column Orientation	Base Plate (LxW) (in):	% Rigid
(4.1 - D.3)	4.00	HSS6X6X5/8	0.00	16.00x16.00	50
(4.1 - C.8)	29.70	HSS6X6X5/8	0.00	16.00x16.00	50

Brace

Loc. Along	Brace

Continuous Foundation Design

Location	Footing (ft):	Orientation
(166.50, 25.60)	4.00	0.00
(166.50, 51.30)	29.70	0.00

CONCRETE CAPACITY

	Longitudinal	Ld Co #	Loc. (ft)	Transvers	Ld Co #	Loc. (ft)
Req. Max Shear (kip)	32.32	6	27.56			
Provided Shear (kip)	113.15		27.56			
Req. Max Pos. Moment (kip-ft)	84.01	6	30.16	0.00	-1	0.00
Provided Pos. Moment (kip-ft)	156.35		30.16	0.00		0.00
Req. Max Neg. Moment (kip-ft)	-76.26	6	18.00	-0.00	-1	0.00
Provided Neg. Moment (kip-ft)	-164.27		18.00	-0.00		0.00
Req. Max Punching Shear (kip)	83.56	6	29.70			
Provided Punching Shear (kip)	496.53		29.70			

SOIL CAPACITY

Allowable Soil Bearing Capacity (ksf)	3.3	
Soil Subgrade Modulus (ksf / ft)	172.8	
Max Unfactored Soil Bearing (ksf)	2.9	Ld Co # 761
Max Average Unfactored Soil Bearing (ksf)	1.9	

Continuous Foundation Design

FOOTING DESIGN - AS BEAM

Footing # 73
Length (ft): 32.00
Width (ft): 3.00
Thickness (ft): 2.00
Footing Orientation (deg): 90.00º
Concrete f'c (ksi): 4.50 fct (ksi): CODE Density (pcf): 150.00 Ec (ksi): 4066.84
Reinf. fy (ksi): 60.00

LOADS

Surcharge (ksf) Dead Load: 0.00 Live Load: 0.00

REINFORCEMENT

Top Longitudinal Flexure Reinforcement:

Bar Depth (in) 21.63

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Top Bars
1	0.00/ 5.00	H/S	4-#6
2	5.00/25.00	S/S	4-#6
3	25.00/32.00	S/H	4-#6

Bottom Longitudinal Flexure Reinforcement:

Bar Depth (in) 20.63

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Bot. Bars
1	0.00/ 8.00	H/S	4-#6
2	8.00/32.00	S/H	4-#6

Longitudinal Shear Reinforcement:

Number of Shear bar legs: 2

Seg. Num.	Segment Start/End (ft)	Spacing (in)	Quantity
1	0.00/ 3.41	Not Applic.	None
2	7.59/15.00	Not Applic.	None
3	15.00/23.41	Not Applic.	None
4	27.59/31.00	Not Applic.	None

Cover (in) Top 2.00 Bottom 3.00 Side 3.00

SUPPORTED MEMBERS

Columns:

Location	Loc. Along Footing (ft):	Size	Column Orientation	Base Plate (LxW) (in):	% Rigid
(5 - E)	6.00	HSS6X6X5/8	90.00	16.00x16.00	50
(5 - D.5)	26.00	HSS6X6X5/8	0.00	16.00x16.00	50

Brace

	Loc. Along	Brace

Continuous Foundation Design

Location	Footing (ft):	Orientation
(223.38, 0.00)	6.00	0.00
(223.38, 20.00)	26.00	0.00

CONCRETE CAPACITY

	Longitudinal	Ld Co #	Loc. (ft)	Transvers	Ld Co #	Loc. (ft)
Req. Max Shear (kip)	25.25	596	28.18			
Provided Shear (kip)	74.71		28.18			
Req. Max Pos. Moment (kip-ft)	114.55	596	26.46	0.00	-1	0.00
Provided Pos. Moment (kip-ft)	160.31		26.46	0.00		0.00
Req. Max Neg. Moment (kip-ft)	-25.41	6	14.00	-0.00	-1	0.00
Provided Neg. Moment (kip-ft)	-168.23		14.00	-0.00		0.00
Req. Max Punching Shear (kip)	54.59	20	26.00			
Provided Punching Shear (kip)	517.21		26.00			

SOIL CAPACITY

Allowable Soil Bearing Capacity (ksf)	3.3	
Soil Subgrade Modulus (ksf / ft)	172.8	
Max Unfactored Soil Bearing (ksf)	1.3	Ld Co # 747
Max Average Unfactored Soil Bearing (ksf)	1.0	

Continuous Foundation Design

FOOTING DESIGN - AS BEAM

Footing # 74
Length (ft): 31.03
Width (ft): 4.00
Thickness (ft): 4.00
Footing Orientation (deg): 90.00º
Concrete f'c (ksi): 4.50 fct (ksi): CODE Density (pcf): 150.00 Ec (ksi): 4066.84
Reinf. fy (ksi): 60.00

LOADS

Surcharge (ksf) Dead Load: 0.00 Live Load: 0.00

REINFORCEMENT

Top Longitudinal Flexure Reinforcement:

Bar Depth (in) 45.63

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Top Bars
1	0.00/ 5.00	H/S	4-#6
2	5.00/26.00	S/S	4-#6
3	26.00/31.03	S/H	4-#6

Bottom Longitudinal Flexure Reinforcement:

Bar Depth (in) 44.63

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Bot. Bars
1	0.00/17.00	H/S	6-#6
2	17.00/31.03	S/H	6-#6

Longitudinal Shear Reinforcement:

Number of Shear bar legs: 2

Seg. Num.	Segment Start/End (ft)	Spacing (in)	Quantity
1	0.00/ 1.32	Not Applic.	None
2	9.68/16.00	Not Applic.	None
3	16.00/21.35	Not Applic.	None
4	29.71/31.03	Not Applic.	None

Cover (in) Top 2.00 Bottom 3.00 Side 3.00

SUPPORTED MEMBERS

Columns:

Location	Loc. Along Footing (ft):	Size	Column Orientation	Base Plate (LxW) (in):	% Rigid
(2 - A.2)	5.50	HSS6X6X5/8	0.00	16.00x16.00	50
(2 - A)	25.53	HSS6X6X5/8	0.00	16.00x16.00	50

Brace

	Loc. Along	Brace

Continuous Foundation Design

Location	Footing (ft):	Orientation
(43.04, 210.83)	25.53	0.00

CONCRETE CAPACITY

	Longitudinal	Ld Co #	Loc. (ft)	Transvers	Ld Co #	Loc. (ft)
Req. Max Shear (kip)	64.32	603	1.32			
Provided Shear (kip)	215.53		1.32			
Req. Max Pos. Moment (kip-ft)	360.31	603	12.00	0.00	-1	0.00
Provided Pos. Moment (kip-ft)	525.02		12.00	0.00		0.00
Req. Max Neg. Moment (kip-ft)	-142.43	44	21.35	-0.00	-1	0.00
Provided Neg. Moment (kip-ft)	-359.07		21.35	-0.00		0.00
Req. Max Punching Shear (kip)	0.00	-1	0.00			
Provided Punching Shear (kip)	0.00		0.00			

SOIL CAPACITY

Allowable Soil Bearing Capacity (ksf)	3.3	
Soil Subgrade Modulus (ksf / ft)	172.8	
Max Unfactored Soil Bearing (ksf)	2.3	Ld Co # 1251
Max Average Unfactored Soil Bearing (ksf)	1.6	

Continuous Foundation Design

FOOTING DESIGN - AS BEAM

Footing # ______ 75
Length (ft): ______ 37.75
Width (ft): ______ 4.00
Thickness (ft): ______ 4.00
Footing Orientation (deg): ______ 90.00º
Concrete f'c (ksi): 4.50 fct (ksi): CODE Density (pcf): 150.00 Ec (ksi): 4066.84
Reinf. fy (ksi): 60.00

LOADS

Surcharge (ksf) Dead Load: 0.00 Live Load: 0.00

REINFORCEMENT

Top Longitudinal Flexure Reinforcement:

Bar Depth (in) ______ 45.63

Seg. Num.	**Spacing Start/End (ft)**	**Bar End Condition Start/End**	**Top Bars**
1	0.00/ 8.00	H/S	4-#6
2	8.00/29.00	S/S	4-#6
3	29.00/37.75	S/H	4-#6

Bottom Longitudinal Flexure Reinforcement:

Bar Depth (in) ______ 44.50

Seg. Num.	**Spacing Start/End (ft)**	**Bar End Condition Start/End**	**Bot. Bars**
1	0.00/10.00	H/S	6-#8
2	10.00/37.75	S/H	5-#8

Longitudinal Shear Reinforcement:

Number of Shear bar legs: ______ 2

Seg. Num.	**Segment Start/End (ft)**	**Spacing (in)**	**Quantity**
1	0.00/ 4.33	Not Applic.	None
2	12.67/19.00	Not Applic.	None
3	19.00/25.08	Not Applic.	None
4	33.42/37.75	Not Applic.	None

Cover (in) Top ______ 2.00 Bottom ______ 3.00 Side ______ 3.00

SUPPORTED MEMBERS

Columns:

Location	**Loc. Along Footing (ft):**	**Size**	**Column Orientation**	**Base Plate (LxW) (in):**	**% Rigid**
(2 - D)	8.50	HSS6X6X5/8	0.00	16.00x16.00	50
(2 - C.6)	29.25	HSS6X6X5/8	0.00	16.00x16.00	50

Brace

	Loc. Along	**Brace**

Continuous Foundation Design

Location	Footing (ft):	Orientation
(43.04, 39.25)	8.50	0.00

CONCRETE CAPACITY

	Longitudinal	Ld Co #	Loc. (ft)	Transvers	Ld Co #	Loc. (ft)
Req. Max Shear (kip)	83.54	603	2.00			
Provided Shear (kip)	214.93		2.00			
Req. Max Pos. Moment (kip-ft)	622.47	603	8.04	0.00	-1	0.00
Provided Pos. Moment (kip-ft)	932.66		8.04	0.00		0.00
Req. Max Neg. Moment (kip-ft)	-120.21	363	12.67	-0.00	-1	0.00
Provided Neg. Moment (kip-ft)	-359.07		12.67	-0.00		0.00
Req. Max Punching Shear (kip)	0.00	-1	0.00			
Provided Punching Shear (kip)	0.00		0.00			

SOIL CAPACITY

Allowable Soil Bearing Capacity (ksf)	3.3	
Soil Subgrade Modulus (ksf / ft)	172.8	
Max Unfactored Soil Bearing (ksf)	2.5	Ld Co # 1250
Max Average Unfactored Soil Bearing (ksf)	1.6	

Continuous Foundation Design

FOOTING DESIGN - AS BEAM

Footing # 76
Length (ft): 38.68
Width (ft): 3.00
Thickness (ft): 2.00
Footing Orientation (deg): 0.00º
Concrete f'c (ksi): 4.50 fct (ksi): CODE Density (pcf): 150.00 Ec (ksi): 4066.84
Reinf. fy (ksi): 60.00

LOADS

Surcharge (ksf) Dead Load: 0.00 Live Load: 0.00

REINFORCEMENT

Top Longitudinal Flexure Reinforcement:

Bar Depth (in) 21.63

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Top Bars
1	0.00/37.00	H/S	4-#6
2	37.00/38.68	S/H	4-#6

Bottom Longitudinal Flexure Reinforcement:

Bar Depth (in) 20.63

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Bot. Bars
1	0.00/20.00	H/S	4-#6
2	20.00/38.68	S/H	4-#6

Longitudinal Shear Reinforcement:

Number of Shear bar legs: 2

Seg. Num.	Segment Start/End (ft)	Spacing (in)	Quantity
1	3.68/19.00	Not Applic.	None
2	19.00/35.00	Not Applic.	None

Cover (in) Top 2.00 Bottom 3.00 Side 3.00

SUPPORTED MEMBERS

Columns:

Location	Loc. Along Footing (ft):	Size	Column Orientation	Base Plate (LxW) (in):	% Rigid
(4.4 - B)	1.50	HSS6X6X5/8	0.00	16.00x16.00	50
(5 - B)	37.18	HSS6X6X5/8	0.00	16.00x16.00	50

Brace

Location	Loc. Along Footing (ft):	Brace Orientation
(187.70, 131.00)	1.50	0.00
(223.38, 131.00)	37.18	0.00

Continuous Foundation Design

CONCRETE CAPACITY

	Longitudinal	Ld Co #	Loc. (ft)	Transvers	Ld Co #	Loc. (ft)
Req. Max Shear (kip)	13.02	575	35.00			
Provided Shear (kip)	74.71		35.00			
Req. Max Pos. Moment (kip-ft)	100.48	575	14.00	0.00	-1	0.00
Provided Pos. Moment (kip-ft)	160.31		14.00	0.00		0.00
Req. Max Neg. Moment (kip-ft)	-65.89	175	32.00	-0.00	-1	0.00
Provided Neg. Moment (kip-ft)	-168.23		32.00	-0.00		0.00
Req. Max Punching Shear (kip)	35.15	15	37.18			
Provided Punching Shear (kip)	517.21		37.18			

SOIL CAPACITY

Allowable Soil Bearing Capacity (ksf)	3.3	
Soil Subgrade Modulus (ksf / ft)	172.8	
Max Unfactored Soil Bearing (ksf)	2.1	Ld Co # 742
Max Average Unfactored Soil Bearing (ksf)	1.1	

Continuous Foundation Design

FOOTING DESIGN - AS BEAM

Footing #: 77
Length (ft): 79.58
Width (ft): 3.00
Thickness (ft): 2.00
Footing Orientation (deg): 0.00º
Concrete f'c (ksi): 4.50 fct (ksi): CODE Density (pcf): 150.00 Ec (ksi): 4066.84
Reinf. fy (ksi): 60.00

LOADS

Surcharge (ksf) Dead Load: 0.00 Live Load: 0.00

REINFORCEMENT

Top Longitudinal Flexure Reinforcement:

Bar Depth (in): 21.13

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Top Bars
1	0.00/ 4.00	H/S	4-#6
2	4.00/18.00	S/S	7-#6
3	18.00/55.00	S/S	7-#6
4	55.00/75.00	S/S	4-#6
5	75.00/79.58	S/H	4-#6

Bottom Longitudinal Flexure Reinforcement:

Bar Depth (in): 20.00

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Bot. Bars
1	0.00/ 6.00	H/S	4-#8
2	6.00/49.00	S/S	13-#8
3	49.00/65.00	S/S	4-#8
4	65.00/79.58	S/H	4-#8

Longitudinal Shear Reinforcement:

Number of Shear bar legs: 2

Seg. Num.	Segment Start/End (ft)	Spacing (in)	Quantity
1	0.00/ 2.33	#4@ 9.00	4
2	6.67/11.00	#4@ 9.00	6
3	11.00/16.08	#4@ 9.00	7
4	20.33/31.00	#4@ 9.00	15
5	31.00/42.00	Not Applic.	None
6	42.00/52.98	Not Applic.	None
7	57.23/65.00	Not Applic.	None
8	65.00/72.96	Not Applic.	None
9	77.21/79.58	Not Applic.	None

Cover (in) Top 2.00 Bottom 3.00 Side 3.00

Continuous Foundation Design

SUPPORTED MEMBERS

Columns:

Location	Loc. Along Footing (ft):	Size	Column Orientation	Base Plate (LxW) (in):	% Rigid
(3.8 - E)	4.50	HSS8X8X5/8	0.00	16.00x16.00	50
(4.1 - E)	18.20	HSS6X6X5/8	0.00	16.00x16.00	50
(4.7 - E)	55.10	HSS6X6X5/8	0.00	16.00x16.00	50
(5 - E)	75.08	HSS6X6X5/8	0.00	16.00x16.00	50

Brace

Location	Loc. Along Footing (ft):	Brace Orientation
(152.80, 0.00)	4.50	0.00
(223.38, 0.00)	75.08	0.00

CONCRETE CAPACITY

	Longitudinal	Ld Co #	Loc. (ft)	Transvers	Ld Co #	Loc. (ft)
Req. Max Shear (kip)	57.56	80	25.00			
Provided Shear (kip)	112.45		25.00			
Req. Max Pos. Moment (kip-ft)	786.70	640	18.66	0.00	-1	0.00
Provided Pos. Moment (kip-ft)	820.90		18.66	0.00		0.00
Req. Max Neg. Moment (kip-ft)	-281.29	639	18.66	-0.00	-1	0.00
Provided Neg. Moment (kip-ft)	-283.49		18.66	-0.00		0.00
Req. Max Punching Shear (kip)	95.69	40	4.50			
Provided Punching Shear (kip)	504.78		4.50			

SOIL CAPACITY

Allowable Soil Bearing Capacity (ksf)	3.3	
Soil Subgrade Modulus (ksf / ft)	172.8	
Max Unfactored Soil Bearing (ksf)	3.0	Ld Co # 1286
Max Average Unfactored Soil Bearing (ksf)	1.1	

Continuous Foundation Design

FOOTING DESIGN - AS BEAM

Footing # ________ 81
Length (ft): ________ 75.30
Width (ft): ________ 3.00
Thickness (ft): ________ 3.00
Footing Orientation (deg): _ 0.00º
Concrete f'c (ksi): 4.50 fct (ksi): CODE Density (pcf): 150.00 Ec (ksi): 4066.84
Reinf. fy (ksi): 60.00
Uplift Safety Factor ________ 74.0(124
4)

LOADS

Surcharge (ksf) Dead Load: 0.00 Live Load: 0.00

REINFORCEMENT

Top Longitudinal Flexure Reinforcement:

Bar Depth (in) ________ 33.13

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Top Bars
1	0.00/ 3.00	H/S	4-#6
2	3.00/29.00	S/S	10-#6
3	29.00/49.00	S/S	8-#6
4	49.00/72.00	S/S	8-#6
5	72.00/75.30	S/H	4-#6

Bottom Longitudinal Flexure Reinforcement:

Bar Depth (in) ________ 32.13

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Bot. Bars
1	0.00/ 6.00	H/S	4-#6
2	6.00/39.00	S/S	14-#6
3	39.00/60.00	S/S	7-#6
4	60.00/75.30	S/H	4-#6

Longitudinal Shear Reinforcement:

Number of Shear bar legs: ________ 2

Seg. Num.	Segment Start/End (ft)	Spacing (in)	Quantity
1	6.09/15.00	Not Applic.	None
2	15.00/24.00	#4@12.00	9
3	24.00/25.95	#4@12.00	1
4	32.23/39.00	Not Applic.	None
5	39.00/45.95	Not Applic.	None
6	52.23/61.00	Not Applic.	None
7	61.00/69.27	Not Applic.	None

Cover (in) Top ____ 2.00 Bottom __ 3.00 Side ____ 3.00

Continuous Foundation Design

SUPPORTED MEMBERS

Columns:

Location	Loc. Along Footing (ft):	Size	Column Orientation	Base Plate (LxW) (in):	% Rigid
(2.35 - A)	3.00	HSS6X6X1/4	0.00	12.00x12.00	50
(2.7 - A)	29.09	HSS6X6X5/8	0.00	16.00x16.00	50
(3 - A)	49.09	HSS6X6X5/8	0.00	16.00x16.00	50
(3.5 - A)	72.30	HSS5X5X3/16	0.00	12.00x12.00	50

Brace

Location	Loc. Along Footing (ft):	Brace Orientation
(95.29, 210.83)	29.09	0.00
(115.29, 210.83)	49.09	0.00

CONCRETE CAPACITY

	Longitudinal	Ld Co #	Loc. (ft)	Transvers	Ld Co #	Loc. (ft)
Req. Max Shear (kip)	60.91	185	25.95			
Provided Shear (kip)	164.56		25.95			
Req. Max Pos. Moment (kip-ft)	827.09	585	28.63	0.00	-1	0.00
Provided Pos. Moment (kip-ft)	853.30		28.63	0.00		0.00
Req. Max Neg. Moment (kip-ft)	-517.44	582	28.63	-0.00	-1	0.00
Provided Neg. Moment (kip-ft)	-595.27		28.63	-0.00		0.00
Req. Max Punching Shear (kip)	0.00	-1	0.00			
Provided Punching Shear (kip)	0.00		0.00			

SOIL CAPACITY

Allowable Soil Bearing Capacity (ksf)	3.3	
Soil Subgrade Modulus (ksf / ft)	172.8	
Max Unfactored Soil Bearing (ksf)	1.9	Ld Co # 792
Max Average Unfactored Soil Bearing (ksf)	1.3	

Continuous Foundation Design

FOOTING DESIGN - AS BEAM

Footing # 82
Length (ft): 24.50
Width (ft): 3.00
Thickness (ft): 2.00
Footing Orientation (deg): 90.00º
Concrete f'c (ksi): 4.50 fct (ksi): CODE Density (pcf): 150.00 Ec (ksi): 4066.84
Reinf. fy (ksi): 60.00

LOADS

Surcharge (ksf) Dead Load: 0.00 Live Load: 0.00

REINFORCEMENT

Top Longitudinal Flexure Reinforcement:

Bar Depth (in) 21.63

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Top Bars
1	0.00/ 6.00	H/S	4-#6
2	6.00/18.00	S/S	4-#6
3	18.00/24.50	S/H	4-#6

Bottom Longitudinal Flexure Reinforcement:

Bar Depth (in) 20.63

Seg. Num.	Spacing Start/End (ft)	Bar End Condition Start/End	Bot. Bars
1	0.00/10.00	H/S	6-#6
2	10.00/24.50	S/H	5-#6

Longitudinal Shear Reinforcement:

Number of Shear bar legs: 2

Seg. Num.	Segment Start/End (ft)	Spacing (in)	Quantity
1	0.00/ 3.82	Not Applic.	None
2	8.18/12.00	Not Applic.	None
3	12.00/16.32	Not Applic.	None
4	20.68/24.50	Not Applic.	None

Cover (in) Top 2.00 Bottom 3.00 Side 3.00

SUPPORTED MEMBERS

Columns:

Location	Loc. Along Footing (ft):	Size	Column Orientation	Base Plate (LxW) (in):	% Rigid
(4 - A.99)	6.00	HSS6X6X5/8	0.00	16.00x16.00	50
(4 - A.8)	18.50	HSS6X6X5/8	0.00	16.00x16.00	50

Brace

	Loc. Along	Brace

Continuous Foundation Design

Location	Footing (ft):	Orientation
(161.75, 132.00)	6.00	0.00

CONCRETE CAPACITY

	Longitudinal	Ld Co #	Loc. (ft)	Transvers	Ld Co #	Loc. (ft)
Req. Max Shear (kip)	31.32	579	1.00			
Provided Shear (kip)	74.71		1.00			
Req. Max Pos. Moment (kip-ft)	158.23	579	5.54	0.00	-1	0.00
Provided Pos. Moment (kip-ft)	238.19		5.54	0.00		0.00
Req. Max Neg. Moment (kip-ft)	-21.55	357	18.04	-0.00	-1	0.00
Provided Neg. Moment (kip-ft)	-168.23		18.04	-0.00		0.00
Req. Max Punching Shear (kip)	61.43	19	6.00			
Provided Punching Shear (kip)	517.21		6.00			

SOIL CAPACITY

Allowable Soil Bearing Capacity (ksf)	3.3	
Soil Subgrade Modulus (ksf / ft)	172.8	
Max Unfactored Soil Bearing (ksf)	1.9	Ld Co # 1226
Max Average Unfactored Soil Bearing (ksf)	1.3	

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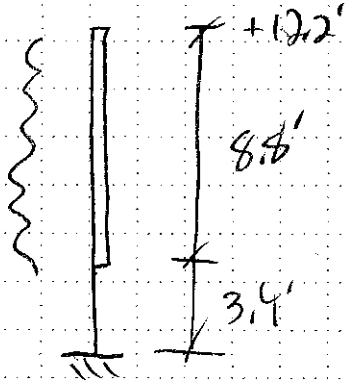
MECH SCREENS

LOW RF (4.2)



V_U = 337 PLF

M_U = 8.8 × 38.3 × (3.4 + 4.4)
= 2.63k'/LF

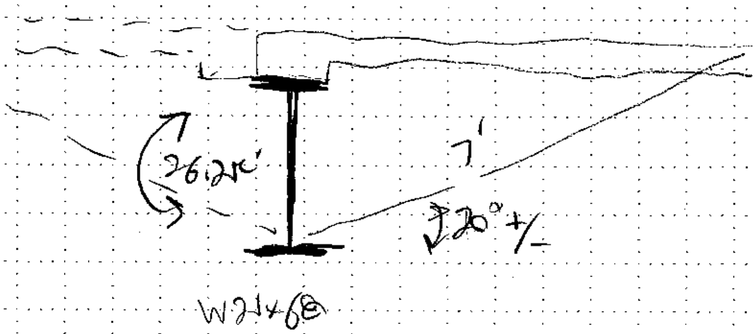
8' o/c
V_U = 2.7k
M_U = 21.1k'

10' o/c V_U = 3.4k
M_U = 26.3k'

6" SCH 40 PIPE ϕM_n = 27.8k' > 26.3 ok ✓

W21×68 PER RAM EL D/C = 0.88

R_x @ BFBB = 26.2k' MAX
R_x @ END PLATES = 15.5k' MAX



(2) BFBB FA SUPPORT

$T/C = \dfrac{26.2}{7 \times 2 (\cos 20)} = 7.0k$

SIM TYP BFBB

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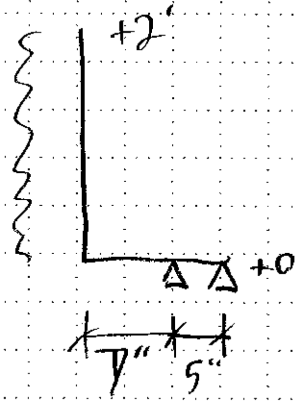
PARAPET STANCHIONS

SAY 10' o/c



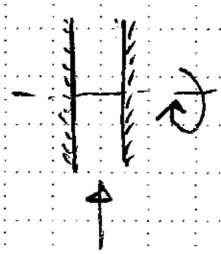
$W_{1.0W} = 10'(83.6\text{ PSF}) = 836\text{ PLF}$

↳ C4x4.5 OK PER RAM

$\frac{D}{C} = 0.41 \quad \Delta_C = 0.1"$

WELD CHECK

$M = 1.67k' \times 12 = 20.1k" \quad V = 1.67k$



(2) $\frac{1}{4} \times 5"$

$f_{MAX} = \dfrac{4.24(1.67)(12)}{\frac{1}{4}(5)^2} = 13.6\text{ ksi}$ OK ✓

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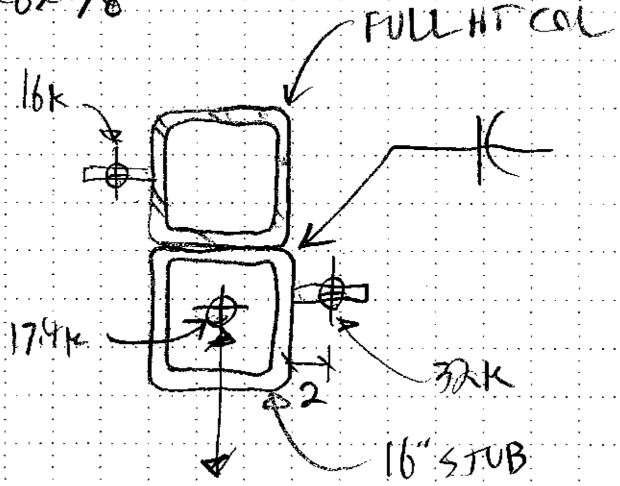
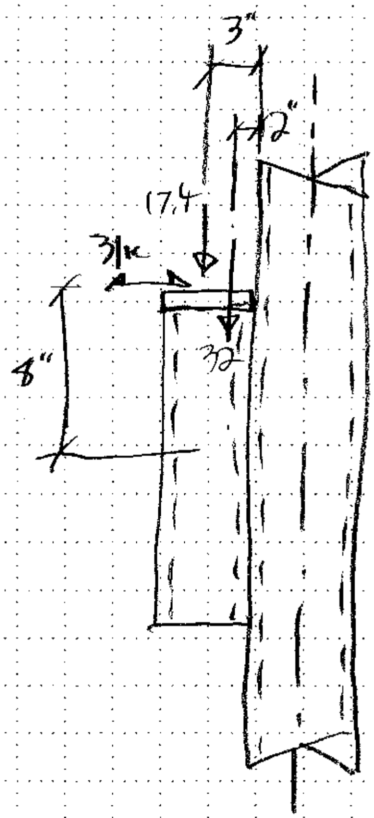
CONN C1 & 41

6x6x5/8





RIGHT SIDE WELD 31k THROUGH CAP PL ONLY

$\downarrow 17.4+32=49.4k$

$M_{OP} = 17.4(3)+32(2) = 116.2k''$ $e_1 = \frac{116.2}{49.4} = 2.35''$

CAP PL $\frac{1}{2}$ x 6 OK PER EXCEL

$l_{w(REQ)} = \frac{31}{5(1.378)} = 4.5''$ OK ✓ w/ $\frac{5}{16}''$

$M_{IP} = 32(5) = 160k''$ $e_2 = \frac{160}{49.4} = 3.24''$

$a_1 = \frac{2.35}{16} = 0.147$

$a_2 = \frac{3.24}{16} = 0.202$ $k2 = \frac{6}{16} = 0.375$

– IN PLANE OF 2 WELDS

$C = 3.47$

– OOP $k1 = 0$ $C = 3.67$

$\Sigma D_{MIN} = \frac{49.4}{0.75(3.47)(16)} + \frac{49.4}{0.75(3.67)(16)} = 2.3 \rightarrow \frac{5}{16}$ OK FOR $\frac{5}{8}$ WALL

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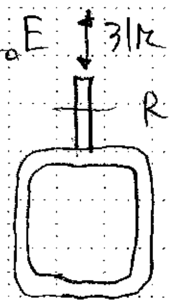
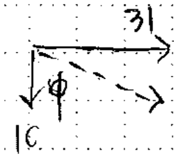
↳ C.1 & 4.1 CONT'D

WEST $\Omega_0 E$ 31k

$R_{VU} = 10K$





$R_U = 32.6K$

$\phi = 72°$

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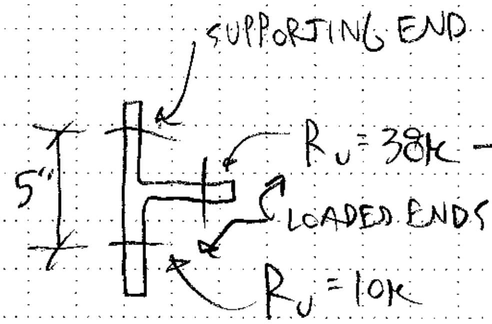
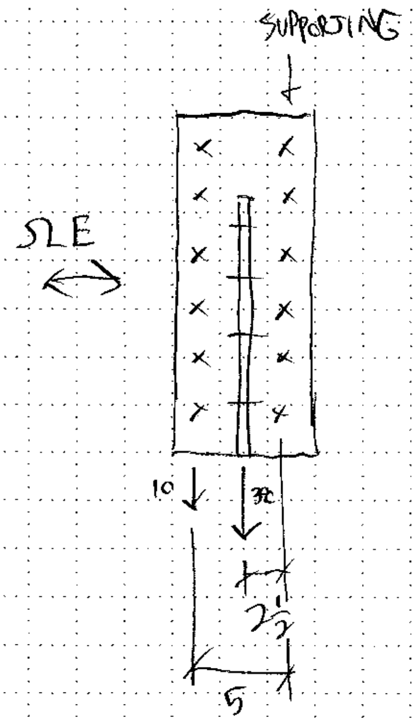
BM CONN GRID 2 & A.7



$R_u = 38k$ → SIMPLE SHR CONN (4) $\frac{3}{4}$"ϕ A325-N

$\phi V_n = 52.2k$ ✓



$\Sigma R_u = 48k$

$\Sigma M_u = 38(2.5) + 10(5) = 145k''$

$e = 145/48 = 3.02''$

$C = 4.984 \quad C' = 25.1$

$P_{u(max)} = 4.984(17.9k) = 89k > 48$ ok ✓

$\Omega P_E = 22.3k$ ok w/ ADD'L CAPACITY ABOVE

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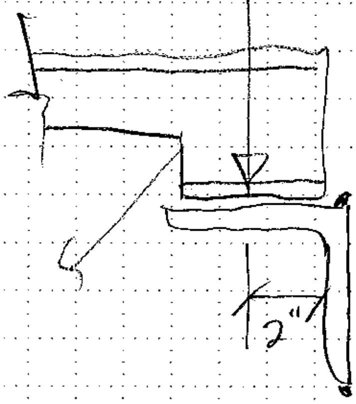
GRID 2 QW55 BRG AJ BMS

$R_u = 15.7k$

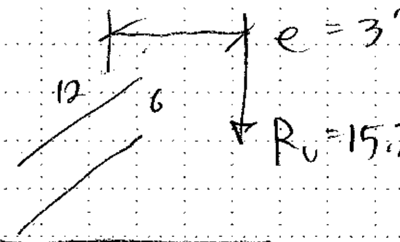


$M_u = 15.7k(2") = 31.4k"$

SAY 12" WIDE ANGLE

$$t_{req} = \sqrt{\frac{6(31.4)}{12(36\times 0.9)}} = 0.696" \rightarrow 6\times6\times\tfrac{3}{4}$$

WELD



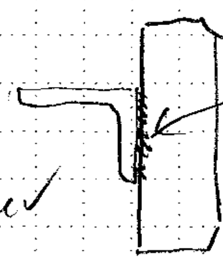
$R_u = 15.7k$ TRY $\frac{5}{16}\times 12$ WELDS

$$\text{MAX } f_v = \frac{15.7}{\frac{5}{16}(12)(6+\frac{5}{16})}\sqrt{2(3)^2+\frac{(6+5/16)^2}{2}} = 4.1 \text{ ksi ok ✓}$$

.654

1.32k

IF WELDED TO STIFFENERS



(1) $\frac{5}{16}\times 5$ EA STIFFR

$$f_v = \frac{4.24(15.7)(3)}{\frac{5}{16}(5)^2} = 25.6 \text{ ksi ok ✓}$$

< 31.5

		b_f	e	M_u	M_u/h	
TORSION TO BM	W24x55	7"	9.75"	153k"	6.38k	ok w/ TYP BFBB
RESISTED BY	W18x35	6"	8.75"	137k"	7.63k	
BFBB	W18x40	6"	8.75"	137k"	7.63k	

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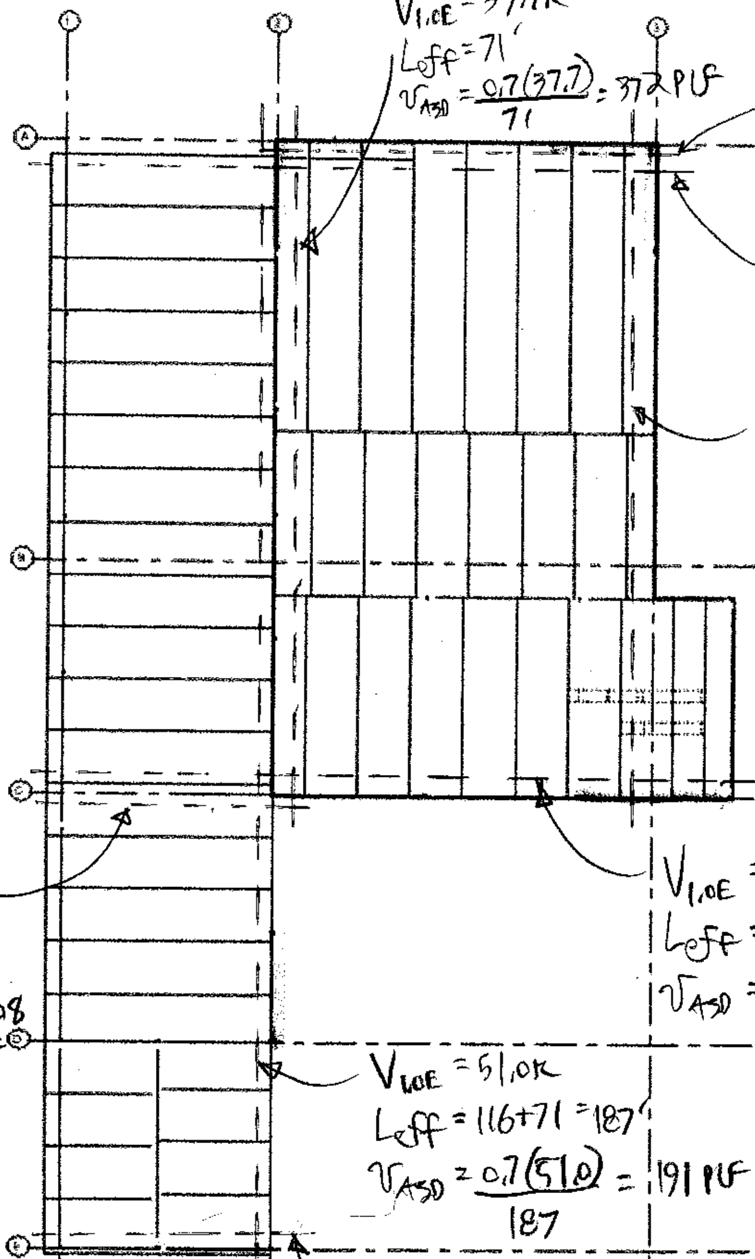
UPPER ROOF - DIA 1

$V_{1.0E} = 37.7k$
$L_{eff} = 71'$
$v_{ASD} = \frac{0.7(37.7)}{71} = 372 PLF$

$L_{eff} = 72'$
$v_{ASD} = 0.7(44.6)/72 = 434 PLF$



$V_{1.0E} = 44.6k$
$L_{eff} = 112'$
$v_{ASD} = 0.7(44.6)/112 = 279 PLF$

$V_{1.0E} = 19.5k$
$L_{eff} = 55'$
$v_{ASD} = \frac{0.7(19.5)}{55} = 249 PLF$

$V_{1.0E} = 11.6k$
$L_{eff} = 16'$
$v_{ASD} = \frac{0.7(11.6)}{16} = 508 PLF$

$V_{1.0E} = 30.4k$
$L_{eff} = 103.4$
$v_{ASD} = \frac{0.7(30.4)}{103.4} = 206 PLF$

$V_{1.0E} = 51.0k$
$L_{eff} = 116+71 = 187'$
$v_{ASD} = \frac{0.7(51.0)}{187} = 191 PLF$

$V_{1.0E} = 18.3k$
$L_{eff} = 21.7k$
$v_{ASD} = \frac{0.7(18.3)}{21.7} = 619 PLF$ ← MAX THIS DIA

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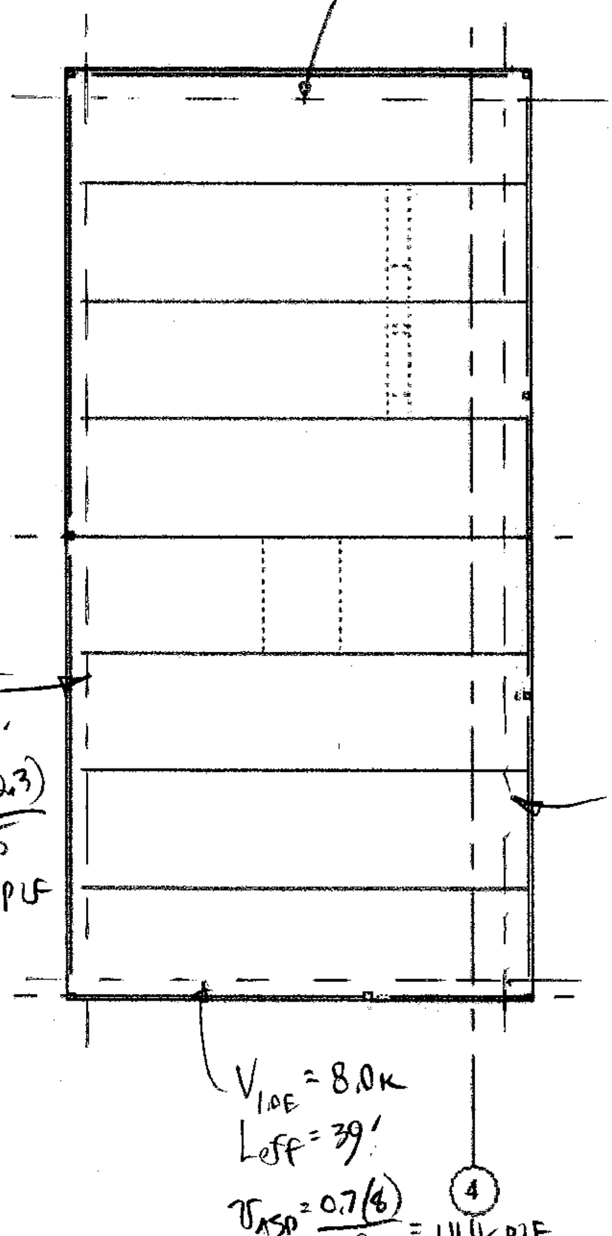
UPPER ROOF - DIA 2



$V_{1.0E} = 11.0k$
$L_{eff} = 39'$ $v_{ASD} = \frac{0.7(11)}{39} = 198 PLF$

$V_{1.0E} = 12.3k$
$L_{eff} = 39.5'$
$v_{ASD} = \frac{0.7(12.3)}{39.5} = 218 PLF$

$V_{1.0E} = 9.2k$
$L_{eff} = 25.6'$
$v_{ASD} = \frac{0.7(9.2)}{25.6} = 252 PLF$

MAX THIS DIA

$V_{1.0E} = 8.0k$
$L_{eff} = 39'$
$v_{ASD} = \frac{0.7(8)}{39} = 144 PLF$

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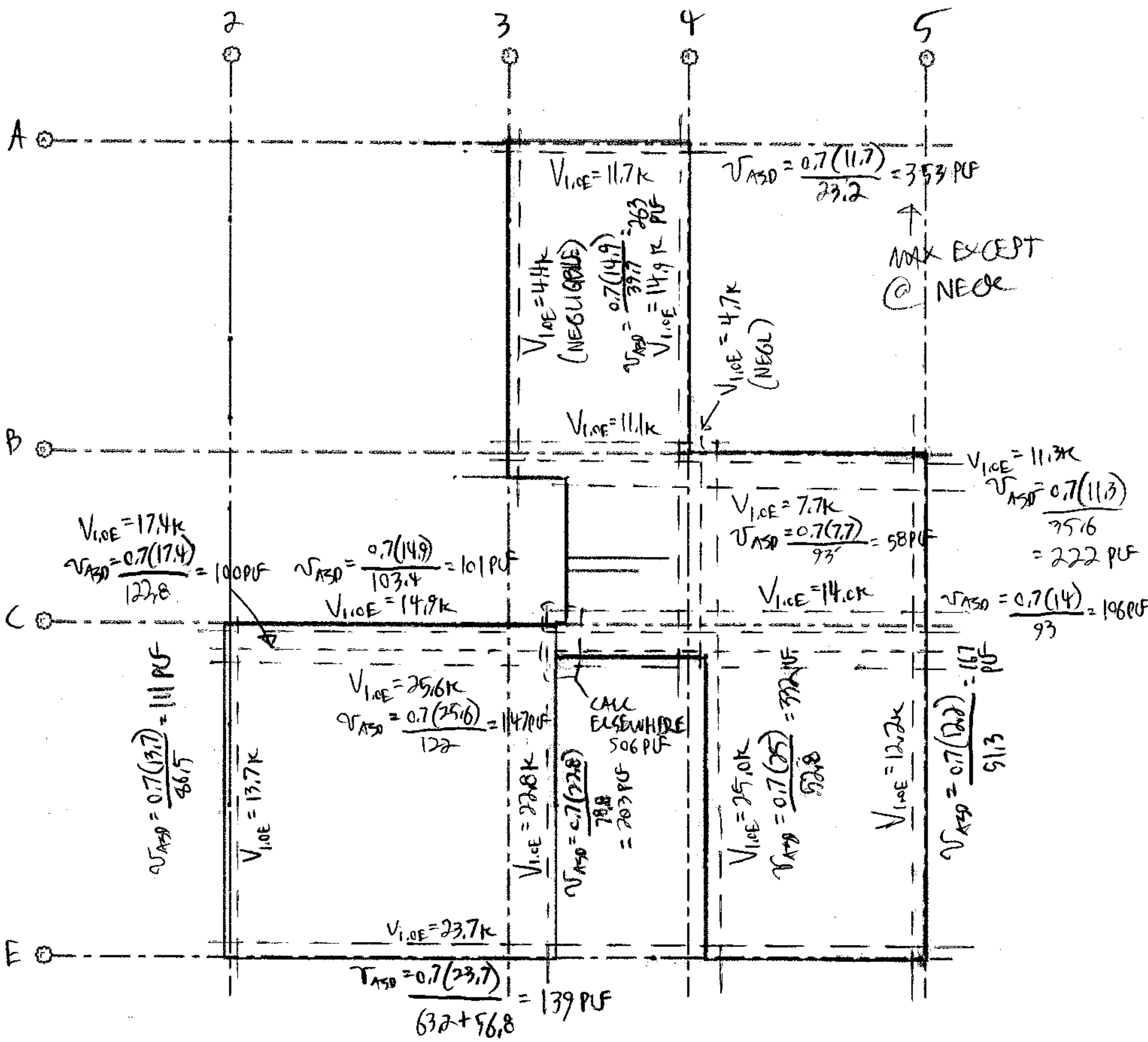

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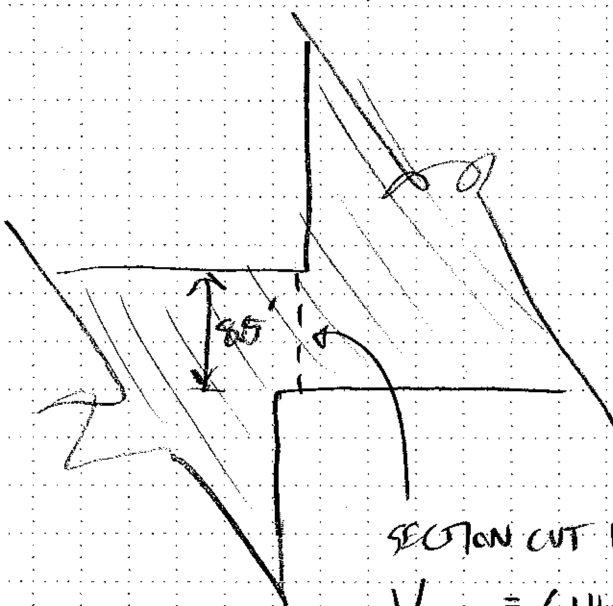
DIAPHRAGM NECK



SECTION CUT PER RSS

$V_{1.0E} = 6.14K$

$v_{ASD} = 0.7(6.14)/8.5' = 0.506\ KLF$

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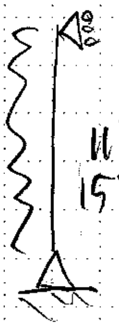
CONTROL HOUSE

OUT-OF-PLANE WALL



11' @ EAVE
15' @ GABLE

$\omega_{1.0W} = 24.8$ PSF

$\omega_{1.0E} = 0.409(84 \text{ PSF}) = 34.4$ PSF ← GOVS

$\omega_{0.7E} = 24$ PSF

CONNS TO TOP $\omega_{1.0E} = 0.515(84) = 44$ PSF

$\omega_{0.7E} = 30$ PSF

$R_{TOP(ASD)} = \left(\frac{15}{2}\right)(30) = 225$ PLF

IN-PLANE $V_{1.0E} = 13.9$k OR $13.9/2 = 6.95$k/WALL

$v_{1.0E} = 6.95/14.6' = 0.476$ KLF

$v_{0.7E} = 333$ PLF

TITEN HD $\frac{5}{8}$" ϕ x $4\frac{1}{2}$" EMBED IN T/CMU

$V_{ALL} = 550$# ⊥ TO EDGE, 1500# ∥ TO EDGE

LOADS NOT CONCURRENT, GOV BY ⊥ CONDN

MAX SPCG = 550/225 = 2.4' → 24" O/C

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↳ CONTROL HOUSE, CONT'D

CHECK ANCHOR IN SILL CAPACITY

$\frac{5}{8}$"φ IN HF $Z_\perp = 1.6(420) = 672\#$ IN $1\frac{1}{2}$" MEMBER
> 550 OK ✓

OUT-OF-PLANE SILL TO FMG

A35Z $V_a = 575\#$ TO HF ∴ SPC @ $\frac{575}{225} = 2.5 \rightarrow 24"$ o/c

#8d $\frac{15}{32}$" PLY TO FMG $V_a = 1.6 \times 54\# = 86\#$ EA

$\# REQ'D = \frac{2'(225 PLF)}{86} = 5.2 \rightarrow (6)$ MIN 8d

IN-PLANE SILL TO BLKG

LTP4Z $V_a = 615\# \rightarrow 24"$ o/c OK ✓

TRUSS UPLIFT $P = 0.6\left(2 \times \frac{17.6}{2}\right)(60 - 15) = 370\#$
↳ 413 OK ✓

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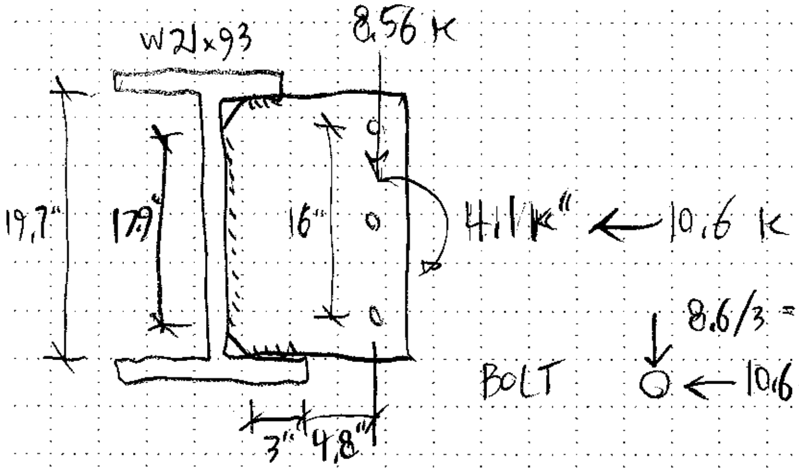
CANOPY CONNS

ASD LOADS FROM RAM EL.



$8.6/3 = 2.9\,K$

BOLT $\leftarrow 10.6/3 + \dfrac{4.1\times 12}{16} = 6.7\,K$ $\Big\}$ $V = (2.9^2 + 6.7^2)^{1/2} = 7.3\,K$

↳ $\frac{3}{4}$" ϕ A325-N

$V_a = 11.9\,K$ OK ✓

WELD CG, ex, 17.9, 3, 3

$CG = \dfrac{17.9(0) + 6(1.5)}{17.9 + 6} = 0.38"$

$K = 3/17.9 = 0.17$

$M_{TOT} = 8.56(7.8) + 4.1(12) = 116\,k"$

$e_x = \dfrac{116}{8.56} = 13.55"$

$a = \dfrac{13.55}{17.9} = 0.76$

↳ $C = 1.20$

$D_{MIN} = \dfrac{2.0(8.56)}{1.2(1)(17.9)} = 0.80$

AXIAL ⟷ 7.52k $D_{MIN} = \dfrac{10.6}{2(6)(.928)} = 0.95$

> (2) $\frac{3}{16}$" OK ✓

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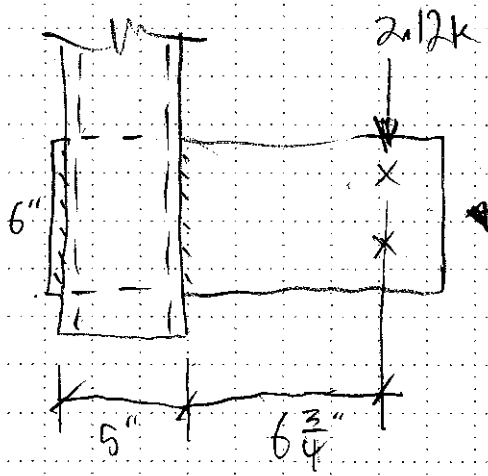
↳ CANOPY CONT'D



$M = 2.12(6.75 + 2.5) = 19.6k"$

$\frac{3}{8}$ PL ($\frac{D}{C} = 0.83$)

$V_{BOLT} = \frac{1}{2}(2.12^2 + 7.5^2)^{\frac{1}{2}} = 3.9k$ EA

↳ (2) $\frac{3}{4}$"ϕ A325-N ok

WELD $v = \frac{1}{2(6")}\left(\frac{19.6k"}{5}\right) + \frac{3.9k(2)}{4(6)} = 0.66$ kli

↳ (2) $\frac{3}{16}$" x 6" ok ✓

CHECK HSS WALL BENDING w/ HSS CONNEX → $\frac{D}{C} = 0.17$ ok ✓

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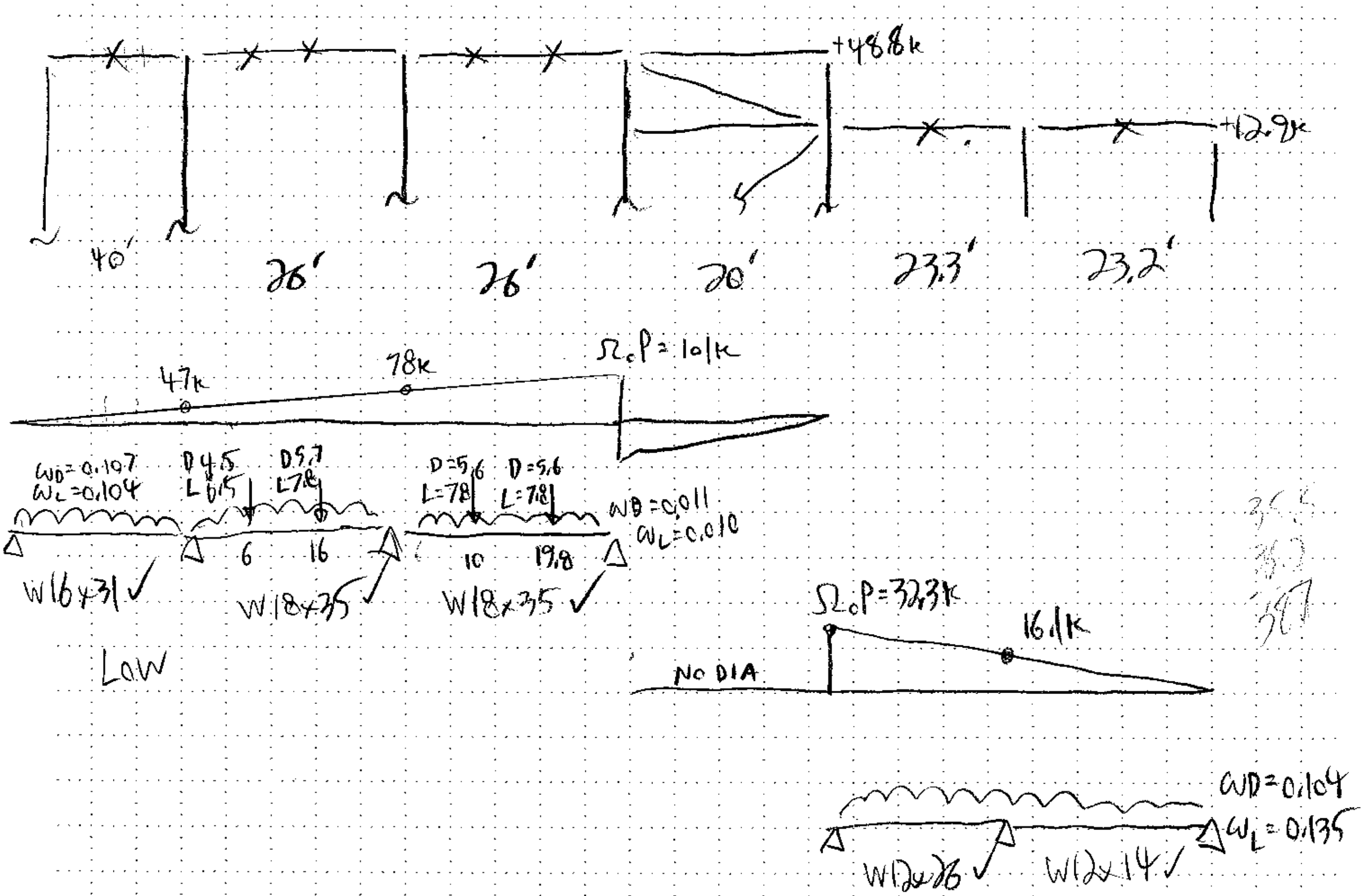
GRID A COLLECTORS



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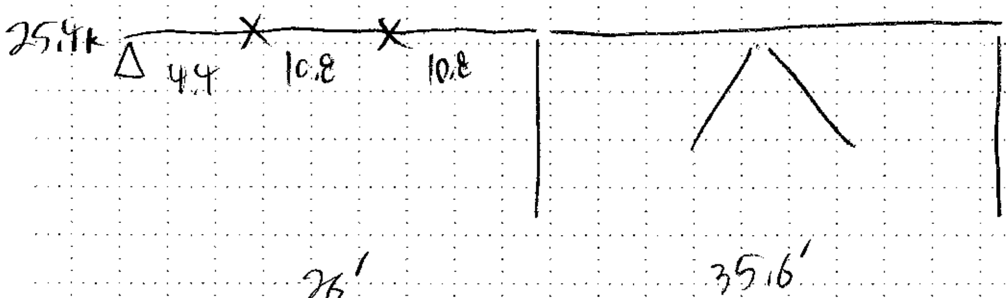
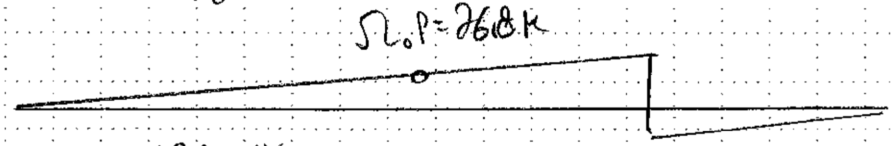
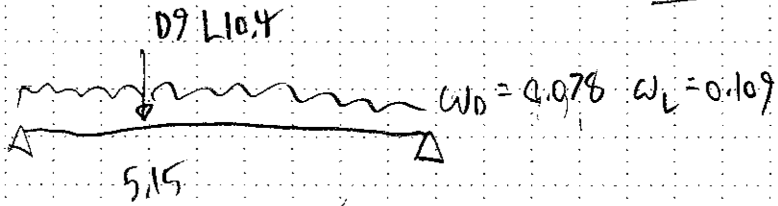
GRID B COLLECTORS







W16x31 ✓

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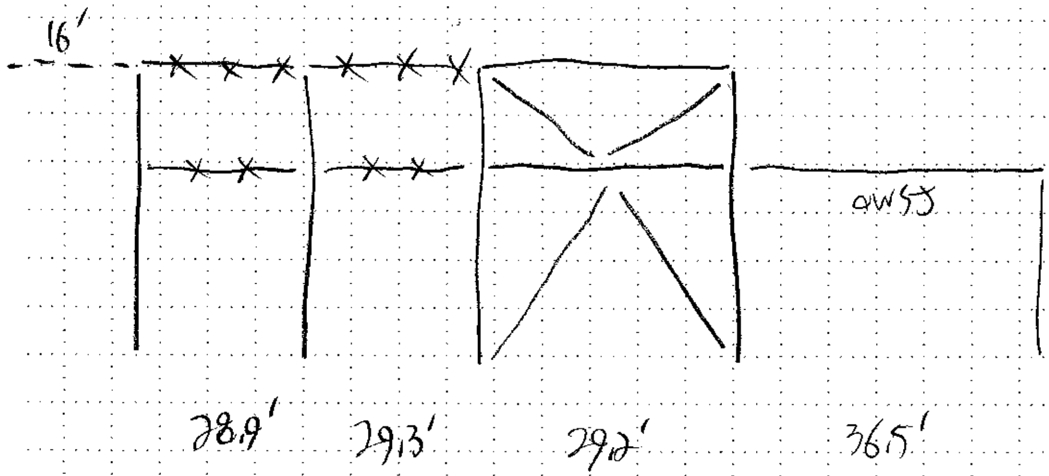
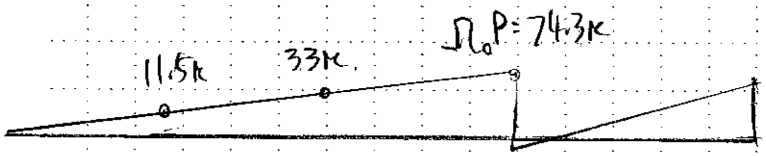
GRID C COLLECTORS



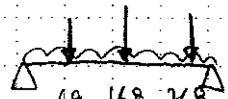
41.4k

3.8k

↑ VERY SMALL DRAG REQ'D @ LOW RF
USE NOMINAL 10k



SIM W18x35 ok



$P_D = 3.9k$ $P_L = 6.1k$
$\omega_D = 0.11$ $\omega_L = 0.01$

W18x40 ✓

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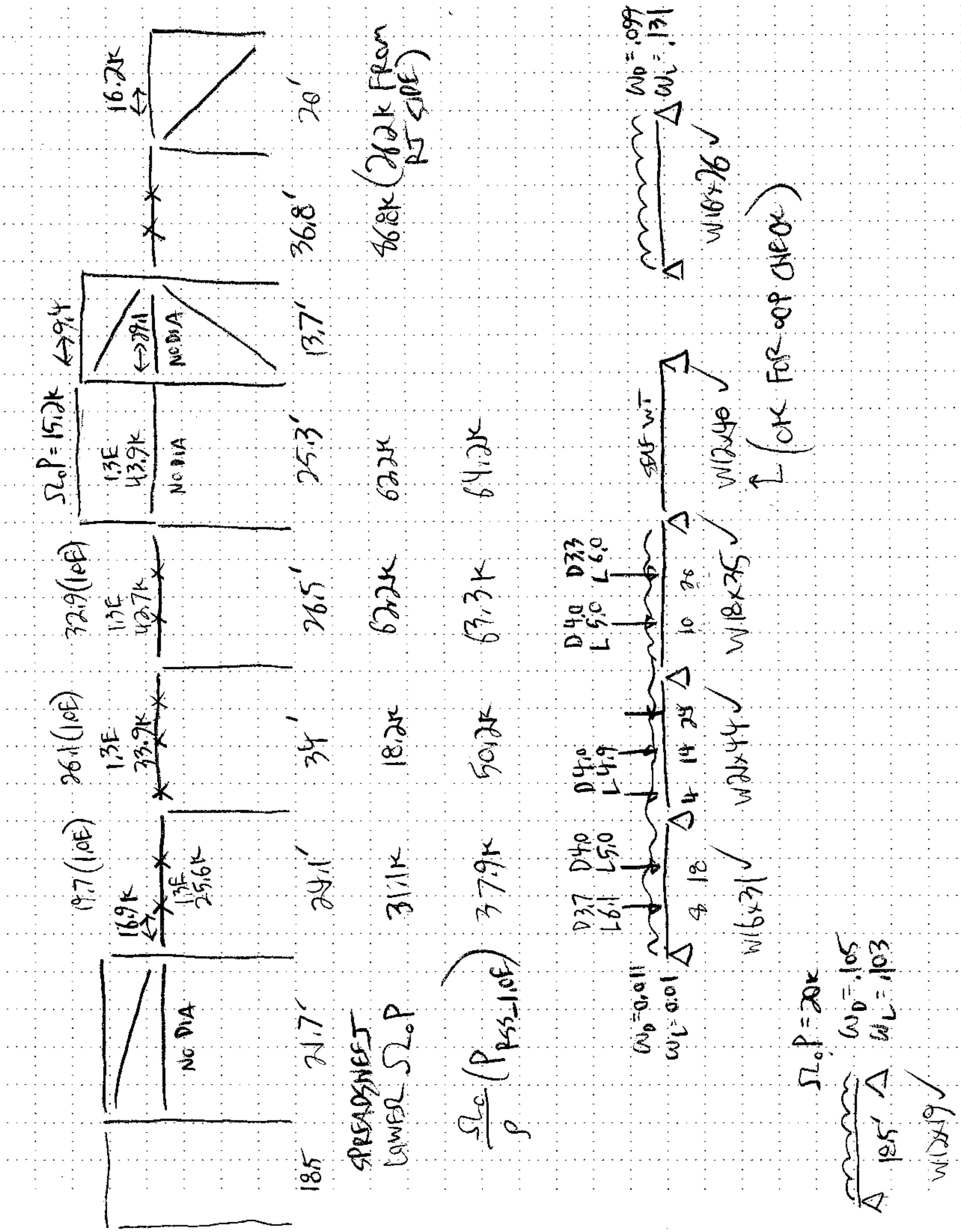
GRID E COLLECTORS



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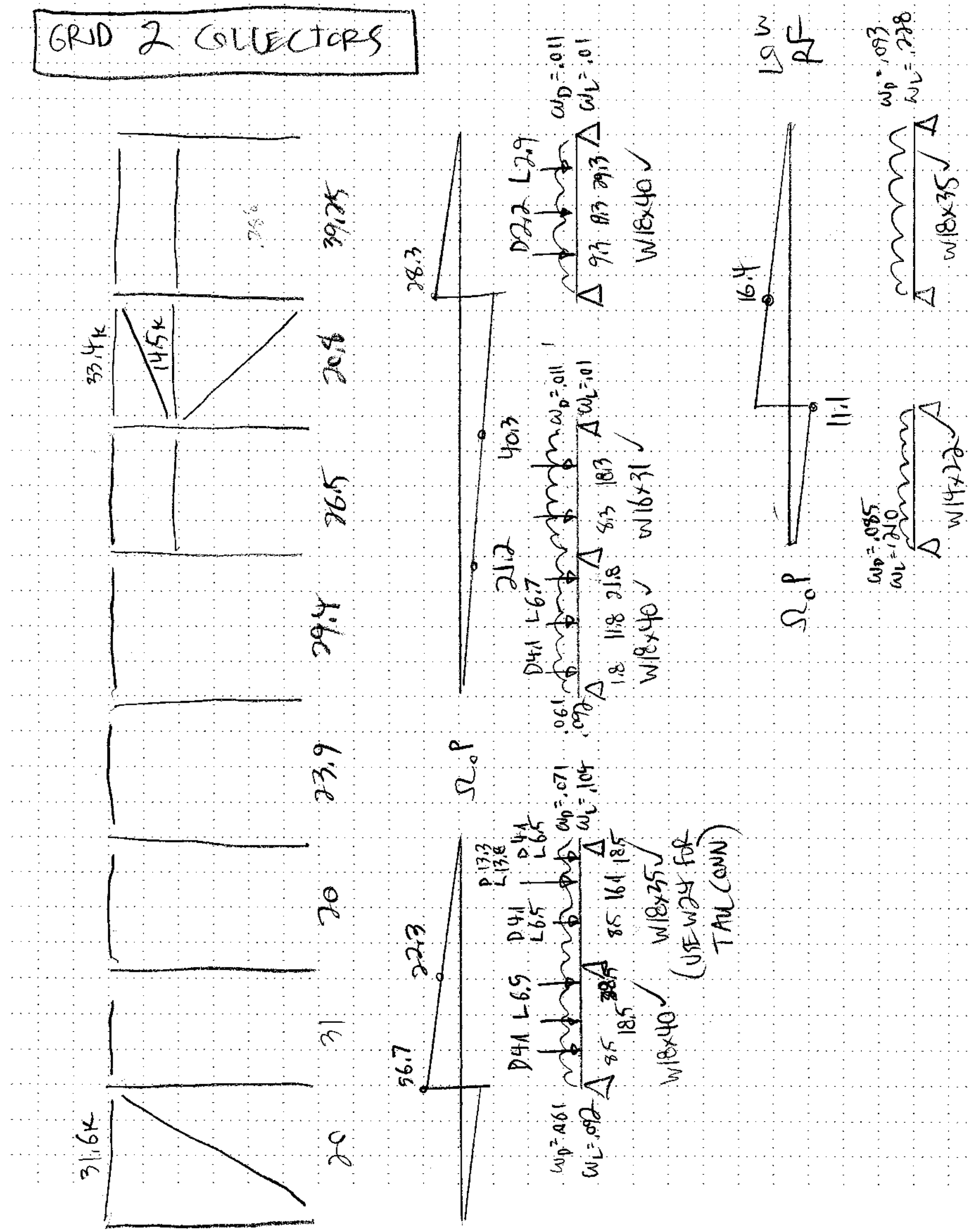
GRID 2 COLLECTORS



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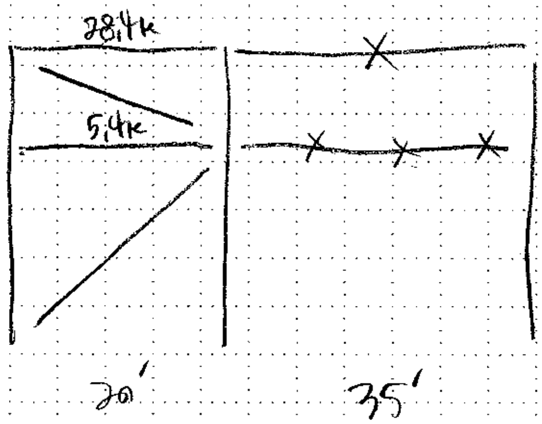
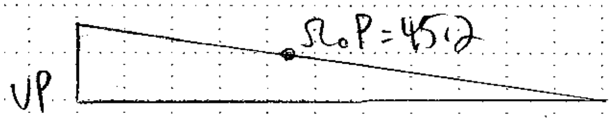
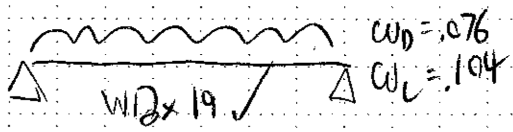
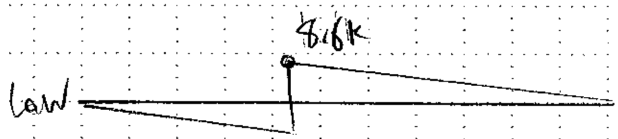
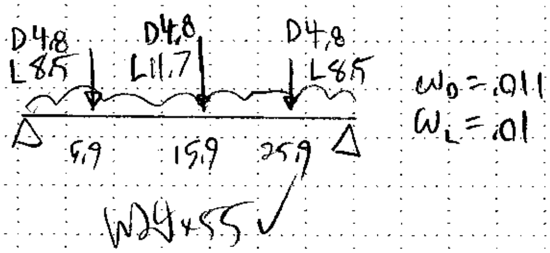
GRID 3 COLLECTORS











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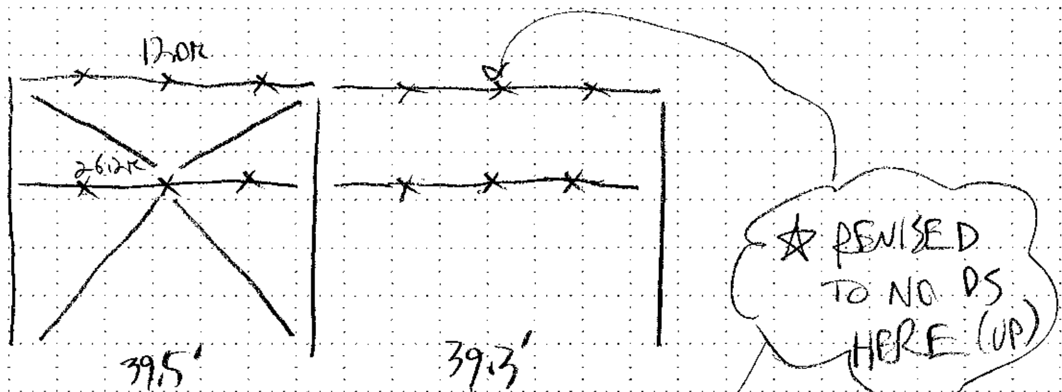
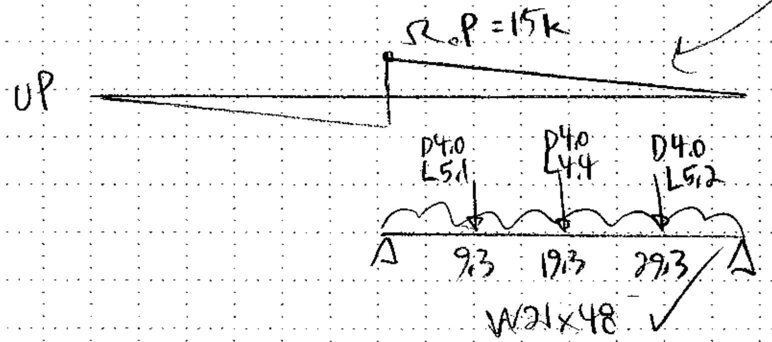
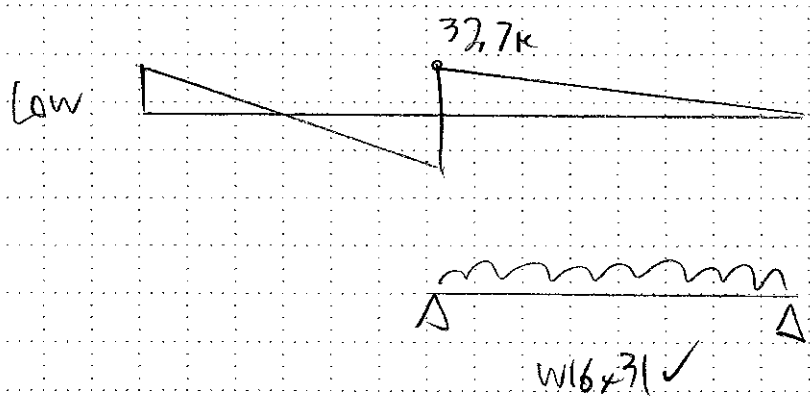
GRID 3.2 COLLECTORS





$W_D = 0.011$
$W_L = 0.010$



$W_D = .076$
$W_L = .190$

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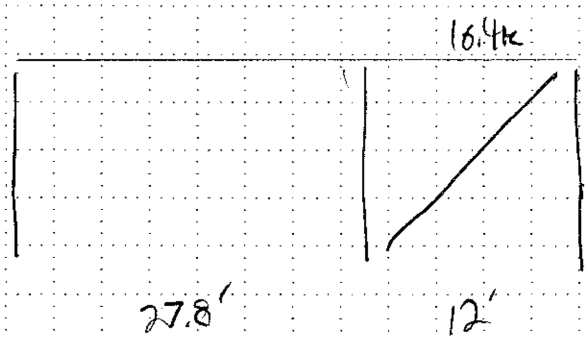
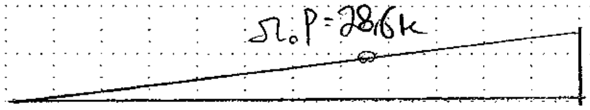
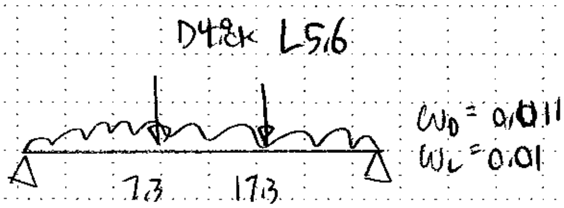
GRID 4 COLLECTORS







W16x31 ✓

(4.1 SEE 3.2, SIM)

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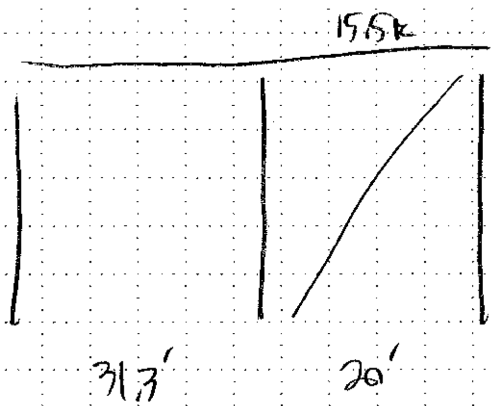
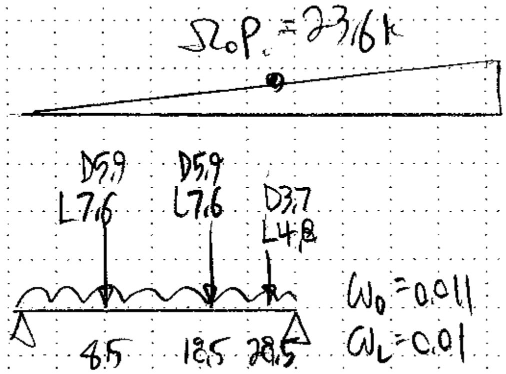
GRID 5 COLLECTORS





W21x44 ✓

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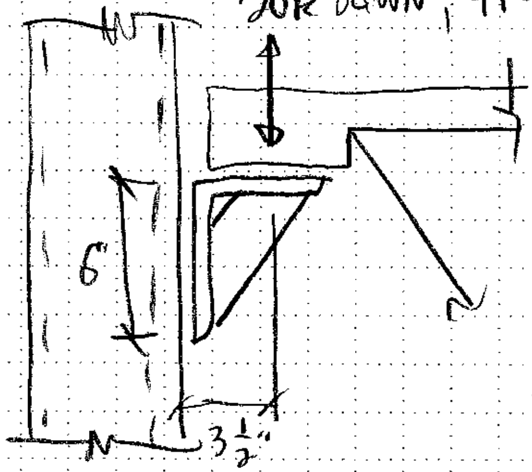
OWSJ BEARING AT CONT COL

V_u
20k DOWN, 4k UP



WELD TO COL

$V_u = 20k$ USE VERT WELDS

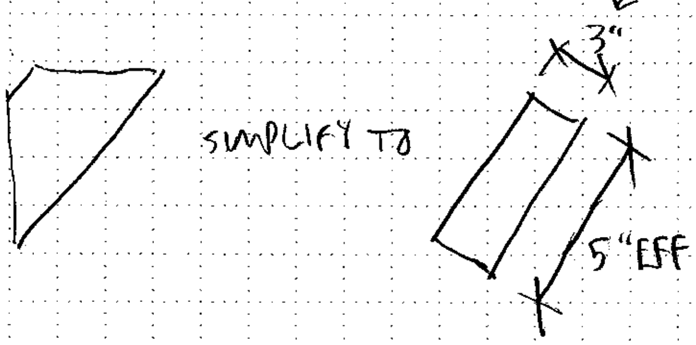
$\phi V_n = (2)(4)(4 \times 1.378) = 44k$ ok ✓

TOP/BOT $V_u = \frac{20k(3.5")}{6"} = 11.7k$

(2) $\frac{1}{4}$" x 2" → 22k ok ✓

$\frac{20}{0.707} = 28.3k / 2$ PLATES

$= 14.2k$ EA



TRY $\frac{1}{4}$" PL

$K = 1.0 \quad r = .289\left(\frac{1}{4}\right) = 0.0723$

$\frac{L_c}{r} = 69.2$

$\phi_c F_{cr} = 24.6$ ksi

$\phi P_n = 0.25 \times 3 \times 24.6 = 18.4k$

> 14.2 ok ✓

WELD $2 \times 3 \times \frac{1}{4}$

$\phi V_n = 6 \times 4 \times 1.378 = 33k$ ok ✓

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BEAM SHEAR PLATES

W14-16 ; V_u = 27k MAX → (3) 3/4"φ A325-N → ϕV_n = 38k
w/ 1/4" PL

W18 ; V_u = 41k MAX → (4) 3/4"φ A325-N → ϕV_n = 52k
w/ 1/4" PL

W21 ; V_u = 47k MAX → SAME AS W18

W24/30 V_u = 41k MAX → USE (5) MIN, ϕV_n = 64k

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UPLIFT @ OWSJ

$$R_{ASD} = 0.6\,(\underset{W}{35} - \underset{D}{12})(58' \times 10')/2 = 4.0k$$

SAY (2) $\frac{1}{4}$" × 2" WELDS (OSHA MIN)

$$V_a = 0.928(4 \times 2 \times 2) = 14.8k \text{ ok} \checkmark$$

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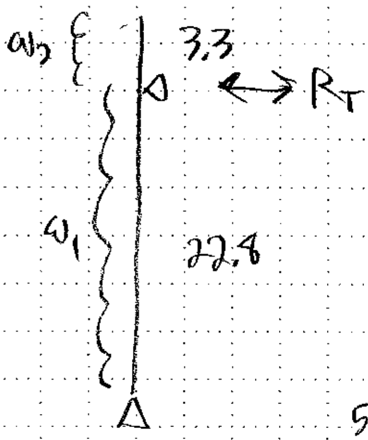
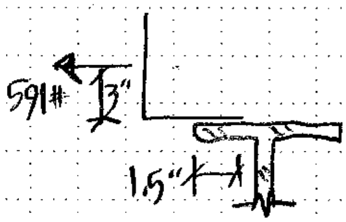
BENT PLATE AT BYPASS STUDS



$\omega_1 = 27$ PSF $\quad \omega_2 = 80$ PSF

$$R_T = \left(\frac{22.8}{2}\right)(27) + (80)(3.3)\left(\frac{24.5}{22.8}\right) = 591 \text{ PLF}$$



$M_{PL} = 591(3) = 1.773\text{k}''$

OR $M_{PL(ASD)} = 0.6(1.773) = 1.064\text{k}''$

SAY 50% PL LENGTH EFFECTIVE

$$t_{req} = \sqrt{\frac{4(1.064)}{(0.5)(2)(36/1.67)}} = 0.19'' \rightarrow \frac{1}{4}'' \text{ PL ok} ✓$$

$$\text{WELD } v = \left(\frac{591}{2} + \frac{1064}{1.5}\right)(2) = 2.01 \text{ klf}$$

$\frac{3}{16}''$ FILLET, .928 k/in/1/16th $\rightarrow \frac{3}{16} \times 2$ ok

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GENERATOR FDN

WT = 2200 kg = 4850# (WET)

FOR ACI RULE OF THUMB, MIN FDN WT = (3)(4850) = 14,55k

PLAN DIMS PER ELEC 19'-10" x 11'-6"

$A_{MAT} = 19.83(11.5) = 228$ SF

MIN THICKNESS = $\dfrac{14.55^{k}}{228_{SF}\left(0.15\right)\frac{k}{cf}}$ = 0.43' → 6" MIN OK ✓

USE 8" FOR ANCHORS

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UPLIFT CHECKS @ FTGS

- GRID (1) $A_{TRIB} = \left(\frac{70'}{2}\right)(23') = 805\ SF$

OVERHANG UPLIFT > 500 SF P = 22.2 PSF

$P_{NET,ASD} = 0.6(22.2)(805) - 0.6(\underbrace{15\ PSF}_{D})(805)$

$- 0.6(\underbrace{3.14\ SF)(6.8')(150}_{CONC\ PIER}) = 1.56K \uparrow$

FTG 4'x4' REQ'D FOR BRG, D = 18" @ TIE BM

$0.6 D_{FTG} = 0.6(4 \times 4 \times 1.5)(150) = 2.16\ K > 1.56$ OK ✓

USE 5'x5' FOR ADD'L OT RESISTANCE
OF CANTILEVERED PIER

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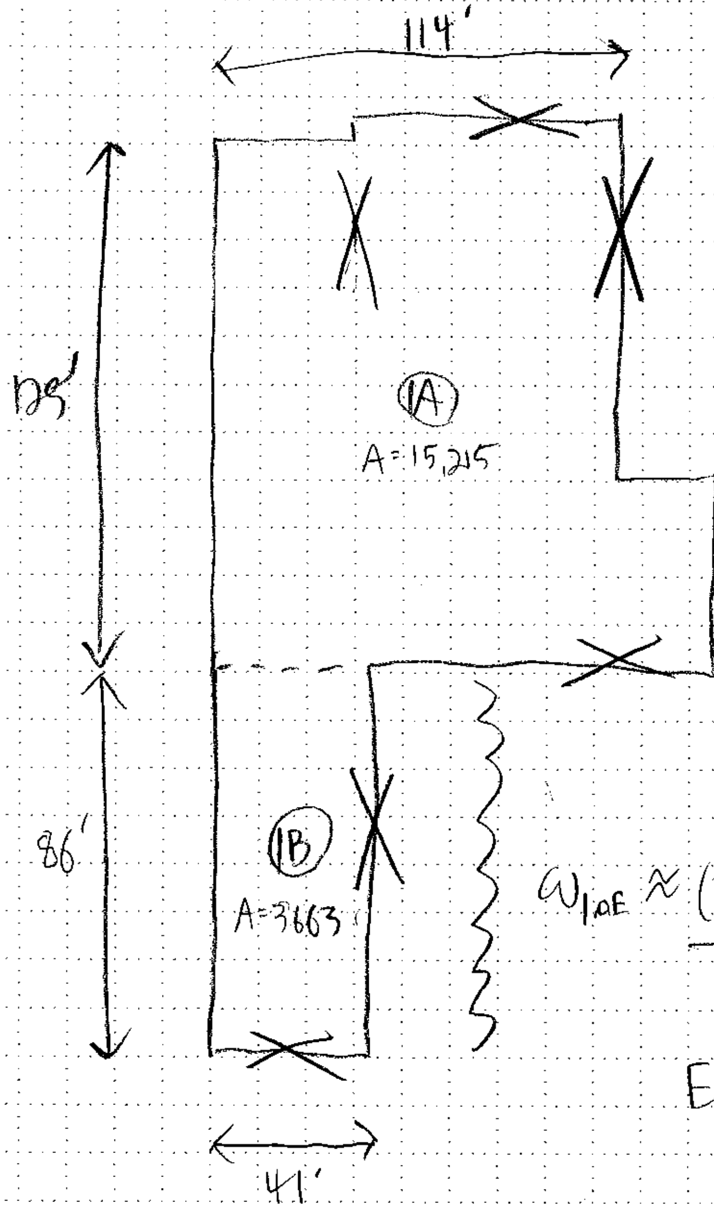
SEMI-RIGID MODELING OF ROOF DECK

DIAPHRAGM 1 (HIGH RF)



$A_{TOT}(1A+1B) = 18878$

$V_{D1A}(RSS) = 90.1k$

$$\omega_{1,0E} \approx \frac{(90.1)\left(\frac{15215}{18878}\right)}{125} = 581\ PLF$$

↳ 3" N-DECK 20-GA

$E' = 7169$

$$\omega_{1,0E} \approx \frac{(90.1)\left(\frac{3663}{18878}\right)}{86} = 203\ PLF$$

$E' = 11438$

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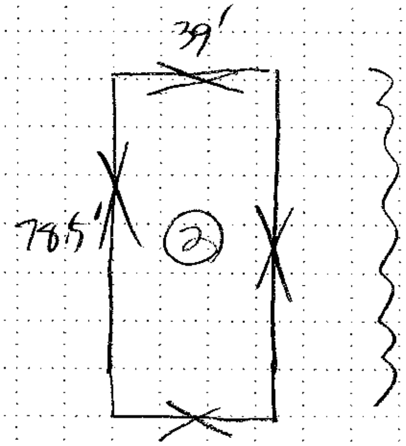
↳ DIAPHRAGMS (CONT'D

DIAPHRAGM 2 (HIGH RF)

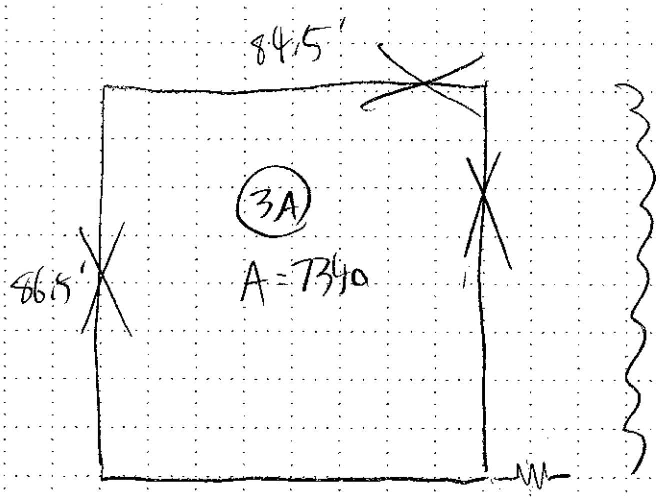


$V_{DIA(RSS)} = 20k$

$w_{1.0E} \approx \frac{20k}{78.5'} = 255 \text{ PLF}$

↳ 3" N-DECK 20-GA
E' = 11482

DIAPHRAGM 3 (LOW RF)



$A_{TOT(TRIB)} = 13{,}100 + 7{,}340$
$= 20{,}440$

$V_{DIA(RSS)} = 66.3k\left(\frac{7340}{20440}\right) = 23.8k$

$w_{1.0E} = \frac{23.8k}{86.5'} = 275 \text{ PLF}$

↳ 3" N-DECK 20-GA
E' = 6340

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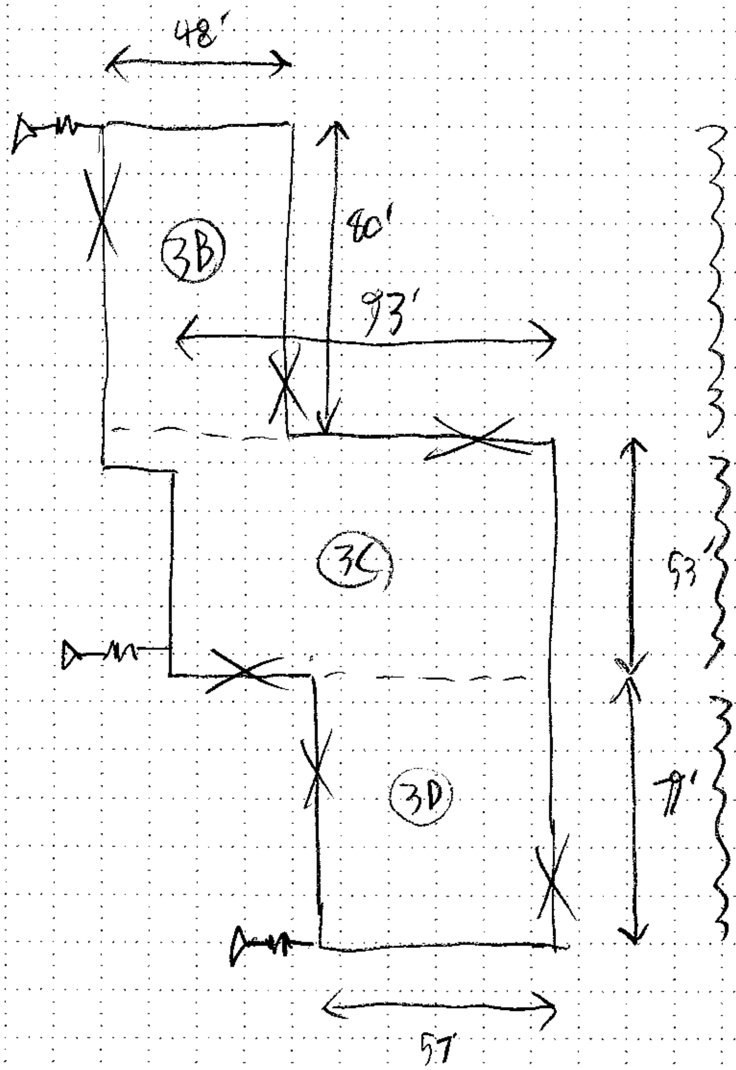
↳ DIA 3 CONT'D



3B

$V = 66.3\left(\frac{80\times 48}{20440}\right) = 12.5k$

$\omega_{1.0E} = \frac{12.5}{80} = 156\ PLF$

↳ $E' = 4971\ ksi$

3C

$V = 66.3\left(\frac{93\times 53}{20440}\right) = 16.0k$

$\omega_{1.0E} = \frac{16}{53} = 302\ PLF$

↳ $E' = 9240\ ksi$

3D

$V = 66.3\left(\frac{79\times 57}{20440}\right) = 14.6k$

$\omega_{1.0E} = \frac{14.6}{79} = 185\ PLF$

↳ $E' = 7664\ ksi$

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$\boxed{\text{TORSIONAL IRREG CHECK}}$

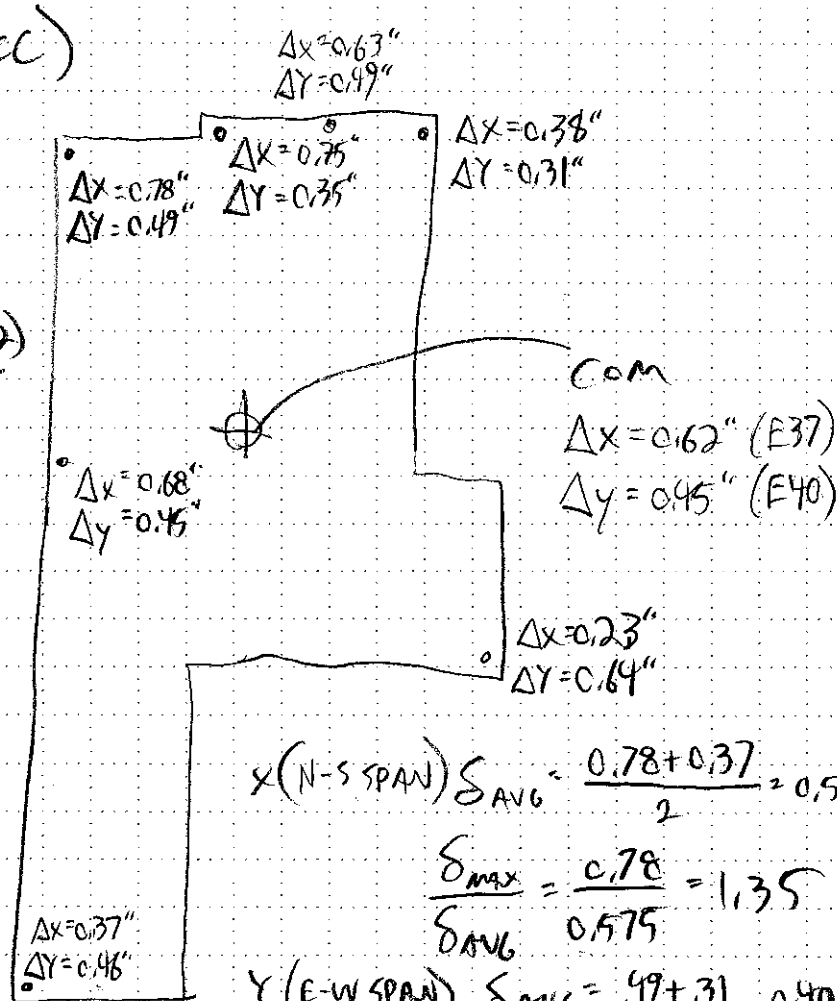
WITH $A_x = 1.0$ (5% ECC)

- UPPER ROOF
  DIA 1

DRIFT → $\delta_{xe\,(ALLOW)} = \dfrac{.02(22\times 12)}{5}$

$= 1.06''$

$\gg 0.62''$ OK ✓



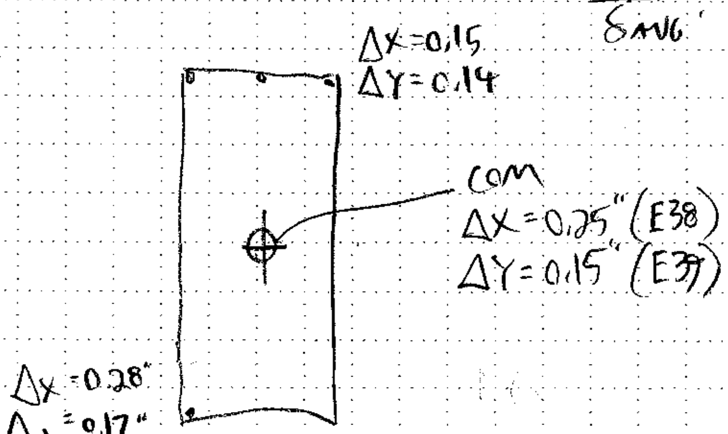
X (N-S SPAN) $\delta_{AVG} = \dfrac{0.78+0.37}{2} = 0.575$

$\dfrac{\delta_{MAX}}{\delta_{AVG}} = \dfrac{0.78}{0.575} = 1.35$

Y (E-W SPAN) $\delta_{AVG} = \dfrac{.49+.31}{2} = 0.40$

$\dfrac{\delta_{MAX}}{\delta_{AVG}} = \dfrac{.49}{.4} = 1.23$

- UPPER RF
  DIA 2



$\delta_{AVG(x)} = \dfrac{.15+.28}{2} = .21$

$\dfrac{\delta_M}{\delta_A} = \dfrac{.28}{.21} = 1.33$

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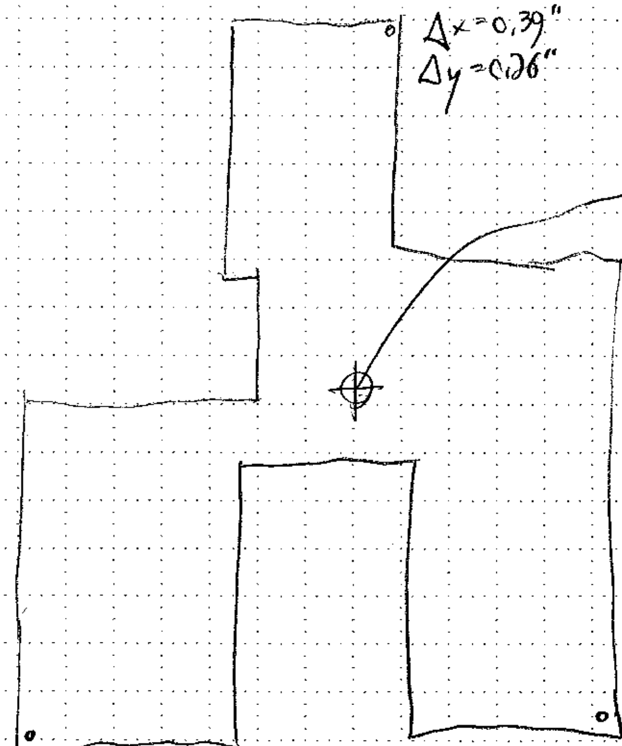
↳ TORSION CHK CONT'D

$\Delta x = 0.39''$
$\Delta y = 0.26''$



COM
$\Delta x = 0.22''$
$\Delta y = 0.19''$

$\Delta x = 0.30''$
$\Delta y = 0.28''$

$\Delta x = 0.09''$
$\Delta y = 0.10''$

$$\delta_{AVG(x)} = \frac{.39 + .09}{2} = 0.24$$

$$\left(\frac{\delta_M}{\delta_A}\right)_x = \frac{0.39}{0.24} = 1.63 \ \text{(EXTR. IRREG)}$$

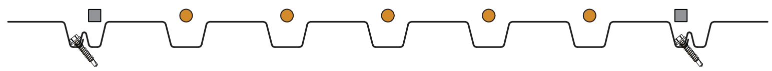
$$\delta_{AVG(y)} = \frac{.28 + .10}{2} = 0.19$$

$$\left(\frac{\delta_M}{\delta_A}\right)_y = \frac{.28}{.19} = 1.47$$

USE $A_x = 3.0$ (CONSERVATIVE)

Type HSB®-36-SS

- **36/7 Weld Pattern at Supports**
- **Sidelaps Connected with #10 Screws**



Allowable Diaphragm Shear Strength, q (plf) and Flexibility Factors, F ((in./lb)x10^6)

DECK GAGE	SIDELAP ATTACHMENT		SPAN (ft-in.) 4'-0"	5'-0"	6'-0"	7'-0"	8'-0"	9'-0"	10'-0"	11'-0"	12'-0"
22	#10 @ 24"	q	460	401	329	306	264	255	230		
		F	7.1+29R	7.6+23R	8.9+19R	9.1+16R	10.1+13R	10+12R	10.9+10R		
	#10 @ 18"	q	509	440	362	334	313	277	269		
		F	6.3+29R	6.9+23R	8+19R	8.3+16R	8.5+14R	9.3+12R	9.3+11R		
	#10 @ 12"	q	558	479	427	390	362	342	328		
		F	5.7+30R	6.4+24R	6.8+19R	7.2+17R	7.5+14R	7.7+13R	7.9+11R		
	#10 @ 8"	q	652	597	525	502	460	451	425		
		F	4.9+30R	5.3+24R	5.8+20R	6+17R	6.3+15R	6.4+13R	6.6+12R		
	#10 @ 6"	q	735	669	623	585	557	538	523		
		F	4.4+30R	4.9+24R	5.2+20R	5.5+17R	5.6+15R	5.8+13R	5.9+12R		
	#10 @ 4"	q	889	829	788	757	734	716	702		
		F	3.8+30R	4.2+24R	4.5+20R	4.7+17R	4.9+15R	5+13R	5.1+12R		
20	#10 @ 24"	q	642	558	460	426	369	353	317	312	286
		F	6.7+18R	7.1+14R	8.1+11R	8.2+10R	9.1+8R	9.1+7R	9.8+6R	9.7+6R	10.3+5R
	#10 @ 18"	q	706	610	503	463	433	381	369	358	329
		F	5.9+18R	6.4+14R	7.3+12R	7.5+10R	7.7+9R	8.4+7R	8.4+7R	8.4+6R	9+5R
	#10 @ 12"	q	770	661	588	536	497	467	446	429	414
		F	5.4+18R	5.9+15R	6.3+12R	6.6+10R	6.8+9R	7+8R	7.1+7R	7.2+6R	7.3+6R
	#10 @ 8"	q	884	812	717	683	626	610	574	569	543
		F	4.7+19R	4.9+15R	5.3+12R	5.4+11R	5.7+9R	5.7+8R	5.9+7R	5.9+7R	6.1+6R
	#10 @ 6"	q	992	901	839	793	755	724	703	686	672
		F	4.2+19R	4.5+15R	4.8+13R	5+11R	5.1+9R	5.2+8R	5.3+8R	5.3+7R	5.4+6R
	#10 @ 4"	q	1193	1110	1053	1011	979	954	934	917	903
		F	3.7+19R	4+15R	4.2+13R	4.3+11R	4.4+10R	4.5+8R	4.6+8R	4.6+7R	4.7+6R
18	#10 @ 24"	q	1085	939	776	716	622	593	530	516	473
		F	5.8+8R	6.1+6R	7+5R	7+4R	7.7+3R	7.7+3R	8.3+2R	8.1+2R	8.7+2R
	#10 @ 18"	q	1178	1018	842	773	721	637	609	588	539
		F	5.2+8R	5.5+7R	6.3+5R	6.4+4R	6.5+4R	7+3R	7.1+3R	7.1+3R	7.5+2R
	#10 @ 12"	q	1266	1098	974	886	820	768	727	695	670
		F	4.7+9R	5.1+7R	5.3+6R	5.5+5R	5.7+4R	5.8+4R	5.9+3R	6+3R	6.1+3R
	#10 @ 8"	q	1437	1312	1167	1112	1018	988	925	911	868
		F	4.1+9R	4.2+7R	4.5+6R	4.6+5R	4.8+4R	4.8+4R	4.9+3R	4.9+3R	5+3R
	#10 @ 6"	q	1600	1447	1342	1265	1206	1160	1123	1091	1066
		F	3.7+9R	3.9+7R	4+6R	4.2+5R	4.2+4R	4.3+4R	4.4+4R	4.4+3R	4.4+3R
	#10 @ 4"	q	1906	1767	1670	1599	1545	1503	1468	1440	1394
		F	3.2+9R	3.4+7R	3.5+6R	3.6+5R	3.6+5R	3.7+4R	3.7+4R	3.8+3R	3.8+3R
16	#10 @ 24"	q	1387	1212	1003	933	811	777	695	678	619
		F	5.2+4R	5.4+3R	6.1+2R	6.1+2R	6.8+1R	6.7+1R	7.2+1R	7.1+1R	7.6+1R
	#10 @ 18"	q	1511	1323	1095	1012	949	839	806	779	711
		F	4.6+5R	4.8+3R	5.5+3R	5.6+2R	5.6+2R	6.1+1R	6.1+1R	6.1+1R	6.5+1R
	#10 @ 12"	q	1633	1428	1280	1170	1087	1023	972	930	896
		F	4.2+5R	4.4+4R	4.7+3R	4.8+2R	4.9+2R	5.1+2R	5.1+2R	5.2+1R	5.3+1R
	#10 @ 8"	q	1869	1721	1538	1475	1364	1330	1248	1231	1172
		F	3.6+5R	3.7+4R	3.9+3R	4+3R	4.1+2R	4.1+2R	4.2+2R	4.2+2R	4.3+2R
	#10 @ 6"	q	2095	1907	1778	1684	1612	1555	1510	1472	1441
		F	3.2+5R	3.4+4R	3.5+3R	3.6+3R	3.6+2R	3.7+2R	3.7+2R	3.8+2R	3.8+2R
	#10 @ 4"	q	2511	2343	2226	2141	2076	2024	1982	1948	1919
		F	2.8+5R	2.9+4R	3+3R	3.1+3R	3.1+3R	3.1+2R	3.2+2R	3.2+2R	3.2+2R

See footnotes on page 28.

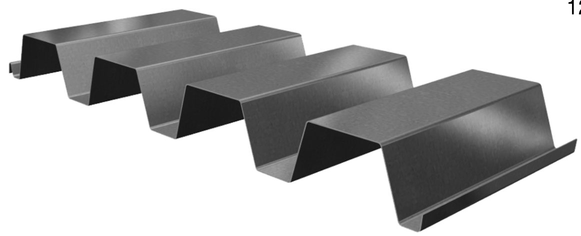
PLN3™ and HSN3™

PLN3™ AC and HSN3™ AC

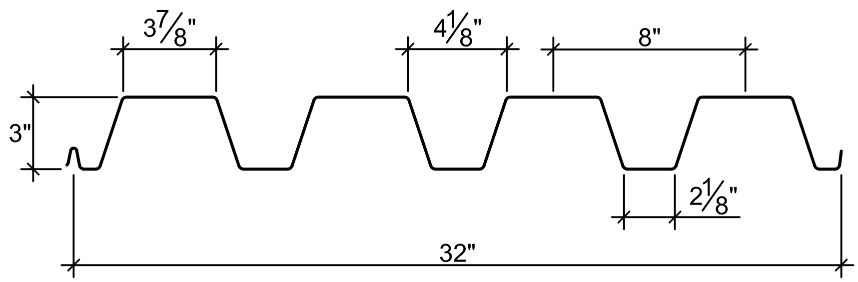
PLN3™ AND HSN3™ DECK CONTENTS

Type PLN3™ or HSN3™

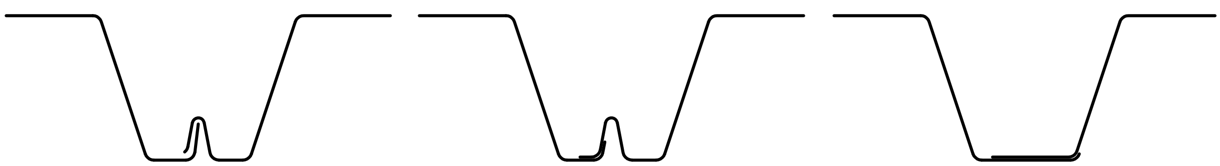
- 3" Deep Roof Deck
- Primer Painted or Galvanized
- PLN3 Deck used with PunchLok II System
- HSN3 Deck used with TSWs, BPs or Screws



Dimensions



PLN3 or HSN3 | HSN3-SS | HSN3-NS



Standard Interlocking Sidelap | Screw Fastened Sidelap | Nested Sidelap

Deck Weight and Section Properties

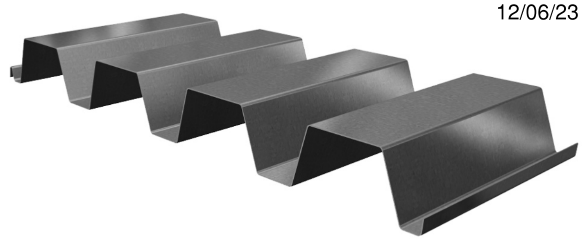
Gage	Weight		I_d for Deflection		Moment		Allowable Reactions per ft of Width (lb) One Flange Loading					Allowable Reactions per ft of Width (lb) Two Flange Loading				
	Galv	Painted	Single Span	Multi Span	$+S_{eff}$	$-S_{eff}$	End Bearing Length			Interior Bearing Length		End Bearing Length			Interior Bearing Length	
	(psf)	(psf)	(in.^{4}/ft)	(in.^{4}/ft)	(in.^{3}/ft)	(in.^{3}/ft)	2"	3"	4"	4"	8"	2"	3"	4"	4"	8"
22	2.0	1.9	0.721	0.785	0.353	0.405	618	711	789	1240	1447	579	648	706	1448	1708
20	2.4	2.3	0.889	0.953	0.452	0.509	870	997	1105	1738	2154	871	971	1056	2066	2597
18	3.1	3.1	1.229	1.273	0.671	0.722	1481	1687	1860	2941	3682	1624	1797	1943	3574	4548
16	3.9	3.8	1.571	1.587	0.883	0.932	2240	2538	2789	4430	5497	2611	2873	3094	5458	6887

Notes:
1. Section properties are based on F_y = 50,000 psi.
2. I_d is for deflection due to uniform loads.
3. S_{eff} (+ or -) is the effective section modulus.
4. Multiply tabulated deck values listed above by the following adjustment factors to obtain acoustical deck section properties:

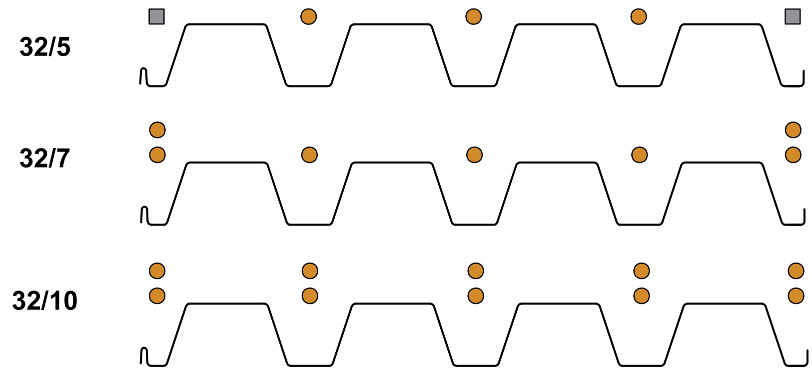
Deck Type	I_d for Deflection		Moment		Allowable Reactions per ft of Width (lb) for One Flange Loading (lb)	
	Single Span	Multi Span	$+S_{eff}$	$-S_{eff}$	End Bearing	Interior Bearing
N3 - Acoustical	0.93	0.94	0.91	0.92	1.00	0.85

5. Allowable (ASD) reactions are based on web crippling, per AISI S100 Section C3.4, where Ω_w = 1.70 for end bearing and 1.75 for interior bearing. Nominal reactions may be determined by multiplying the table values by Ω_w. LRFD reactions may be determined by multiplying nominal reactions by Φ_w = 0.90 for end reactions and 0.85 for interior reactions.

Type PLN3™ or HSN3™



Attachment Patterns to Supports

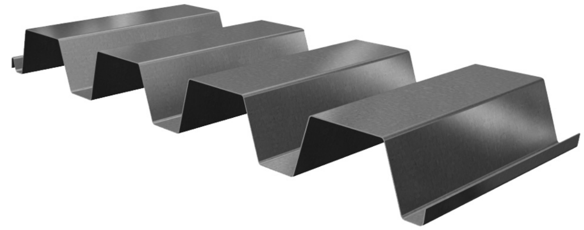


Note: ● indicates location of arc spot weld, power actuated fastener, or screw as indicated in the load tables.
■ indicates location of arc seam weld, power actuated fastener, or screw as indicated in the load tables.

Footnotes for Allowable Uniform Load Tables

1. Stress = Allowable uniform load based on maximum allowable flexural stress in deck.
2. L/360, L240 or L/180 = Uniform load which produces selected deflection in deck.
3. The symbol ♦♦♦ indicates allowable uniform load based on deflection exceeds allowable uniform load based on stress.
4. Nominal uniform loads governed by stress may be determined by multiplying the allowable values in the table by Ω_b = 1.67. LRFD loads may be determined by multiplying nominal loads by Φ_b = 0.95.

Type PLN3™ or HSN3™



Footnotes for Diaphragm Shear Strength and Flexibility Factor Tables

General Notes

1. VSC2 = Verco Sidelap Connection 2; BP = Button Punch; TSW = Top Seam Weld; #10 = #10 Generic Screw. Sidelap connections are not required at support locations.
2. The dimension from the first and last sidelap connection within each span is to be no more than one-half of specified spacing.
3. R is the ratio of vertical span (L_V) of the deck to the length (L_S) of the deck sheet: $R = L_V / L_S$.
4. Interpolation of diaphragm shear strength between adjacent spans or sidelap spacings is permissible. For interpolation of the diaphragm flexibility factor between adjacent spans, use the flexiblity factor for the closest adjacent span length.
5. Diaphragm shear values for side seam fasteners placed at spacings other than those in the table should be determined based on the number of fasteners in each span.
6. For web perforated acoustical deck profiles, modify tabulated q and F values using the following adjustment factors:

Deck Type	R_q	R_F
N3 - Acoustical	0.93	1.07

Note: Adjustment Factor, R_q must be applied only to allowable diaphragm shear strengths governed by panel buckling which are shown in the shaded areas of the diaphragm tables.

Notes Specific to Tables using Welds to Supports

1. The allowable diaphragm shear values in the table utilize a factor of safety, Ω = 3.0 (limited by connections) with the exception of the gray shaded table values, which utilize a factor of safety of Ω = 2.0 (limited by panel buckling).
2. A 1" x 3/8" effective arc seam weld is required at supports adjacent to sidelap and a 1/2" effective diameter arc spot welds are required at supports in interior flutes.

Notes Specific to Tables using Hilti or Pneutek Fasteners to Supports

1. X-EDNK22 = Hilti EDNK22 THQ12 fastener; X-ENP-19 = Hilti X-ENP-19 L15 fastener; K66 = Pneutek K66062 or K66075 fasteners; K64 = Pneutek K64062 fastener; SDK63 = Pneutek SDK63075; SDK61 = Pneutek SDK61075
2. The allowable diaphragm shear values in the table utilize a factor of safety, Ω = 2.5 (limited by connections) with the exception of the shaded table values, which utilize a factor of safety of Ω = 2.0 (limited by panel buckling).

Notes Specific to Tables using Screws to Supports

1. The allowable diaphragm shear values in the table utilize a factor of safety, Ω = 2.5 (limited by connections) with the exception of the shaded table values, which utilize a factor of safety of Ω = 2.0 (limited by panel buckling).
2. Deck is attached with minimum #12 Screws (self drilling, self tapping) to supports. Select appropriate screw based on actual substrate thickness. This table is provided as a guide, proper selection should be verified based on the specific fasteners used.

Support Thickness	Fastener Designation
33 mil (0.0346") to 3/16"	#3 Drill Point
1/8" to 1/4"	#4 Drill Point
1/8" to 1/2"	#5 Drill Point

3. All tabulated diaphragm values shown in this section are for a minimum 0.0385 in. thick support with SDI recognized screws produced by Buildex, Elco, Hilti or Simpson Strong-Tie. If the minimum support thickness can not be met or a screw that is not recognized by SDI is used, modify tabulated q and F values based on actual substrate and thickness using Adjustment Factors listed in this table.

Deck Gage	Factors	Substrate Thickness and Strength									
		20 ga 33 mil (0.0345 in)		18 ga 43 mil (0.0451 in)		16 ga 54 mil (0.0566 in)		14 ga 68 mil (0.0713 in)		≥ 12 ga ≥ 97 mil (0.1017 in)	
		33 ksi	50 ksi	33 ksi	50 ksi	33 ksi	50 ksi	33 ksi	50 ksi	33 ksi	50 ksi
22	R_q	0.44	0.61	0.67	0.78	0.78	0.78	0.78	0.78	0.78	0.78
	R_F	1.28	1.25	1.17	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	R_q	0.34	0.49	0.54	0.74	0.74	0.78	0.78	0.78	0.78	0.78
	R_F	1.31	1.31	1.24	1.19	1.15	1.00	1.00	1.00	1.00	1.00
18	R_q	0.26	0.37	0.38	0.55	0.55	0.78	0.76	0.78	0.78	0.78
	R_F	1.34	1.39	1.30	1.31	1.26	1.18	1.19	1.00	1.00	1.00
16	R_q	0.20	0.30	0.30	0.44	0.43	0.65	0.61	0.78	0.78	0.78
	R_F	1.43	1.66	1.39	1.54	1.33	1.34	1.25	1.00	1.00	1.00

4. Adjustment factors are based on connection strengths determined in accordance with Section E4 of AISI S100. These self drilling, self tapping screws must be compliant with ASTM C1315.
5. Allowable Diaphragm Strength = q • R_q; Flexibility Factor = F • R_F.
6. These adjustment factors are based on the maximum adjustment for the tabulated span lengths and fastener patterns. To calculate a specific condition, use design equations listed at the end of Evaluation Report ER-0217.

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PROJECT: PSE - Puy
PROJECT #: 17142 PAGE: OF:
BY: DL DATE: 12/6/2023
SUBJECT: BRBF Baseplate Anchors & Shearlugs

BRBF BASEPLATE ANCHORS & SHEAR LUGS

STORY HT	15.5	FT (MIN)
COL Fy	46	KSI
CONC f'c	3.5	KSI
LUG WIDTH	18	IN

BF #	COL	BRB Asc	BRACE DIMS RISE	BRACE DIMS RUN	THETA RAD	THETA DEG	COL SPLICE REQ'D STRENGTH (V) COMP	COL SPLICE REQ'D STRENGTH (V) TENS	BRACE FORCE (V)	BRACE FORCE (H)	SUM UPL (V)
1	HSS8X8X5/8	3	16.7	13.7	0.88	51	56	54	205	168	259
1	HSS6X6X5/8	NONE	0	0	#####	#####	208	186	0	0	186
2	HSS6X6X5/8	2	15.7	20	0.67	38	81	75	104	132	179
2	HSS6X6X5/8	NONE	0	0	#####	#####	77	76	0	0	76
3	HSS6X6X5/8	2	17.2	19.5	0.72	41	81	31	111	126	142
4	HSS6X6X5/8	2	16.5	14.6	0.85	48	91	45	126	111	171
5	HSS6X6X5/8	2	15	20	0.64	37	26	10	101	135	111
5	HSS6X6X5/8	NONE	0	0	#####	#####	81	75	0	0	75
6	HSS6X6X5/8	2	16	12.8	0.90	51	100	46	131	105	177
7	HSS6X6X5/8	2	16.7	19.5	0.71	41	82	31	109	128	140
8	HSS6X6X5/8	3	16.8	20.8	0.68	39	68	19	167	206	186
8	HSS6X6X5/8	NONE	0	0	#####	#####	160	138	0	0	138
9	HSS6X6X5/8	2	15.5	17.8	0.72	41	13	10	110	127	120
10	HSS6X6X5/8	2	16.2	12	0.93	53	25	10	135	100	145
10	HSS6X6X5/8	NONE	0	0	#####	#####	105	93	0	0	93
11	HSS6X6X5/8	2	17.2	20	0.71	41	204	180	110	128	290
11	HSS6X6X5/8	NONE	0	0	#####	#####	137	100	0	0	100
12	HSS6X6X5/8	3.5	16.4	20	0.69	39	65	37	182	222	219
13	HSS6X6X5/8	2.5	23.7	20	0.87	50	18	10	162	137	172
13	HSS6X6X5/8	NONE	0	0	#####	#####	127	107	0	0	107
14	HSS6X6X5/8	NONE	0	0	#####	#####	51	23	0	0	23
	HSS6X6X5/8				#####	#####			#DIV/0!	#DIV/0!	#DIV/0!
	HSS6X6X5/8				#####	#####			#DIV/0!	#DIV/0!	#DIV/0!
	HSS6X6X5/8				#####	#####			#DIV/0!	#DIV/0!	#DIV/0!
	HSS6X6X5/8				#####	#####			#DIV/0!	#DIV/0!	#DIV/0!
	HSS6X6X5/8				#####	#####			#DIV/0!	#DIV/0!	#DIV/0!
					#####	#####			#DIV/0!	#DIV/0!	#DIV/0!
					#####	#####			#DIV/0!	#DIV/0!	#DIV/0!
					#####	#####			#DIV/0!	#DIV/0!	#DIV/0!
					#####	#####			#DIV/0!	#DIV/0!	#DIV/0!
					#####	#####			#DIV/0!	#DIV/0!	#DIV/0!
					#####	#####			#DIV/0!	#DIV/0!	#DIV/0!

BF #	COL	UPLIFT ANCHOR RODS CONCENTRIC ABOUT WP #	DIA	GR	phiRn	D/C	EMBEDDED WASHER Aw/ROD	SQ SIDE	COL SHEAR Mpc Fy*Z	Mpc/H	SUM SHEAR (H)	# OF LUGS	EA LUG BRG A REQ'D	GROUT DEPTH (IN)
1	HSS8X8X5/8	6	1	105	331	0.781	2.20	1.76	2056	11	179	2	30	1.5
1	HSS6X6X5/8	4	1	105	221	0.842	2.37	1.81	1067	6	6	0	#DIV/0!	1.5
2	HSS6X6X5/8	4	1	105	221	0.809	2.28	1.78	1067	6	138	2	23	1.5
2	HSS6X6X5/8	4	0.75	105	124	0.611	0.97	1.22	1067	6	6	0	#DIV/0!	1.5
3	HSS6X6X5/8	4	1	105	221	0.644	1.81	1.64	1067	6	132	2	22	1.5
4	HSS6X6X5/8	4	1	105	221	0.774	2.18	1.75	1067	6	117	2	20	1.5
5	HSS6X6X5/8	4	0.75	105	124	0.891	1.41	1.39	1067	6	140	2	24	1.5
5	HSS6X6X5/8	4	0.75	105	124	0.603	0.96	1.21	1067	6	6	0	#DIV/0!	1.5
6	HSS6X6X5/8	4	1	105	221	0.802	2.26	1.77	1067	6	111	2	19	1.5
7	HSS6X6X5/8	4	1	105	221	0.635	1.79	1.64	1067	6	133	2	23	1.5
8	HSS6X6X5/8	4	1	105	221	0.839	2.37	1.80	1067	6	212	2	36	1.5
8	HSS6X6X5/8	4	1	105	221	0.624	1.76	1.63	1067	6	6	0	#DIV/0!	1.5
9	HSS6X6X5/8	4	0.75	105	124	0.968	1.54	1.43	1067	6	133	2	22	1.5
10	HSS6X6X5/8	4	1	105	221	0.657	1.85	1.65	1067	6	106	2	18	1.5
10	HSS6X6X5/8	4	0.75	105	124	0.747	1.19	1.31	1067	6	6	0	#DIV/0!	1.5
11	HSS6X6X5/8	4	1.25	105	346	0.837	3.69	2.25	1067	6	133	2	23	1.5
11	HSS6X6X5/8	4	0.75	105	124	0.804	1.28	1.34	1067	6	6	0	#DIV/0!	1.5
12	HSS6X6X5/8	4	1	105	221	0.99	2.79	1.92	1067	6	227	2	38	1.5
13	HSS6X6X5/8	4	1	105	221	0.778	2.19	1.75	1067	6	142	2	24	1.5
13	HSS6X6X5/8	4	0.75	105	124	0.86	1.36	1.37	1067	6	6	0	#DIV/0!	2.5
14	HSS6X6X5/8	4	0.75	36	58	0.398	0.29	0.90	1067	6	6	0	#DIV/0!	1.5
	HSS6X6X5/8			105	#N/A	#####	#DIV/0!	#DIV/0!	1067	6	#DIV/0!		#DIV/0!	1.5
	HSS6X6X5/8			105	#N/A	#####	#DIV/0!	#DIV/0!	1067	6	#DIV/0!		#DIV/0!	1.5
	HSS6X6X5/8			105	#N/A	#####	#DIV/0!	#DIV/0!	1067	6	#DIV/0!		#DIV/0!	1.5
	HSS6X6X5/8			105	#N/A	#####	#DIV/0!	#DIV/0!	1067	6	#DIV/0!		#DIV/0!	1.5
	HSS6X6X5/8			105	#N/A	#####	#DIV/0!	#DIV/0!	1067	6	#DIV/0!		#DIV/0!	1.5
				105	#N/A	#####	#DIV/0!	#DIV/0!	#N/A	#N/A	#DIV/0!		#DIV/0!	1.5
				105	#N/A	#####	#DIV/0!	#DIV/0!	#N/A	#N/A	#DIV/0!		#DIV/0!	1.5
				105	#N/A	#####	#DIV/0!	#DIV/0!	#N/A	#N/A	#DIV/0!		#DIV/0!	1.5
				105	#N/A	#####	#DIV/0!	#DIV/0!	#N/A	#N/A	#DIV/0!		#DIV/0!	1.5
				105	#N/A	#####	#DIV/0!	#DIV/0!	#N/A	#N/A	#DIV/0!		#DIV/0!	1.5
				105	#N/A	#####	#DIV/0!	#DIV/0!	#N/A	#N/A	#DIV/0!		#DIV/0!	1.5

BF #	COL	BRG DEPTH REQ'D	LUG EMBED REQ'D	LUG Fy	LUG THICK REQ'D	TRIAL FILLET SIZE	LUG WELD D/C	SUM DOWN (V)	VERT BEARING BP EFF DIMS Depth N	Width B	INCR FACTOR	BRG CHK phi*Pn	D/C
1	HSS8X8X5/8	1.7	3.5	50.0	1.25	1/2	0.92	261	20	20	1	773.5	0.34
1	HSS6X6X5/8	#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	208	18	18	1	626.54	0.33
2	HSS6X6X5/8	1.3	3.5	50.0	0.95	1/2	0.85	185	18	18	1	626.54	0.30
2	HSS6X6X5/8	#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	77	18	18	1	626.54	0.12
3	HSS6X6X5/8	1.2	3.5	50.0	0.93	7/16	0.98	192	18	18	1	626.54	0.31
4	HSS6X6X5/8	1.1	3.5	50.0	0.87	7/16	0.91	217	18	18	1	626.54	0.35
5	HSS6X6X5/8	1.3	3.5	50.0	0.95	1/2	0.86	127	18	18	1	626.54	0.20
5	HSS6X6X5/8	#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	81	18	18	1	626.54	0.13
6	HSS6X6X5/8	1.0	3.5	50.0	0.85	7/16	0.87	231	18	18	1	626.54	0.37
7	HSS6X6X5/8	1.3	3.5	50.0	0.93	7/16	0.99	191	18	18	1	626.54	0.31
8	HSS6X6X5/8	2.0	3.5	50.0	1.17	9/16	0.98	235	18	18	1	626.54	0.37
8	HSS6X6X5/8	#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	160	18	18	1	626.54	0.26
9	HSS6X6X5/8	1.2	3.5	50.0	0.93	7/16	0.99	123	18	18	1	626.54	0.20
10	HSS6X6X5/8	1.0	3.5	50.0	0.83	7/16	0.85	160	18	18	1	626.54	0.26
10	HSS6X6X5/8	#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	105	18	18	1	626.54	0.17
11	HSS6X6X5/8	1.3	3.5	50.0	0.93	7/16	0.99	314	18	18	1	626.54	0.50
11	HSS6X6X5/8	#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	137	18	18	1	626.54	0.22
12	HSS6X6X5/8	2.1	3.6	50.0	1.24	5/8	0.91	247	18	18	1	626.54	0.39
13	HSS6X6X5/8	1.3	3.5	50.0	0.96	1/2	0.87	180	18	18	1	626.54	0.29
13	HSS6X6X5/8	#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	127	18	18	1	626.54	0.20
14	HSS6X6X5/8	#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	51	12	12	1	278.46	0.18
	HSS6X6X5/8	#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	#DIV/0!	18	18	1	626.54	#DIV/0!
	HSS6X6X5/8	#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	#DIV/0!	18	18	1	626.54	#DIV/0!
	HSS6X6X5/8	#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	#DIV/0!	18	18	1	626.54	#DIV/0!
	HSS6X6X5/8	#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	#DIV/0!	18	18	1	626.54	#DIV/0!
	HSS6X6X5/8	#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	#DIV/0!	18	18	1	626.54	#DIV/0!
		#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	#DIV/0!	18	18	1	626.54	#DIV/0!
		#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	#DIV/0!	18	18	1	626.54	#DIV/0!
		#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	#DIV/0!	18	18	1	626.54	#DIV/0!
		#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	#DIV/0!	18	18	1	626.54	#DIV/0!
		#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	#DIV/0!	18	18	1	626.54	#DIV/0!
		#DIV/0!	#DIV/0!	50.0	#DIV/0!		#DIV/0!	#DIV/0!				0	#DIV/0!

BF #	COL	COMPRESSION BASEPLATE CHECK Fy BP	d	w	0.95d	0.95w	m	n	X	ambda	mbda*	tmin	Trial t_plate
1	HSS8X8X5/8	50	8.00	8.00	7.6	7.6	6.2	6.2	0.337	0.64	1.281	1.294	1.5
1	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.332	0.634	0.951	1.039	1.25
2	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.295	0.591	0.886	0.979	1.25
2	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.123	0.362	0.543	0.632	1
3	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.307	0.605	0.907	0.999	1.25
4	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.346	0.651	0.976	1.061	1.25
5	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.203	0.476	0.713	0.811	1
5	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.129	0.372	0.558	0.648	1
6	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.369	0.677	1.016	1.096	1.25
7	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.305	0.603	0.904	0.997	1.25
8	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.374	0.683	1.025	1.103	1.25
8	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.255	0.543	0.814	0.911	1.25
9	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.197	0.468	0.702	0.8	1
10	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.256	0.543	0.814	0.912	1.25
10	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.168	0.428	0.642	0.738	1
11	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.501	0.829	1.244	1.276	1.5
11	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.219	0.496	0.745	0.843	1
12	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.394	0.706	1.059	1.132	1.5
13	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	0.287	0.581	0.871	0.966	1.25
13	HSS6X6X5/8	51	6.00	6.00	5.7	5.7	6.15	6.15	0.203	0.476	0.714	0.804	1
14	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	3.15	3.15	0.183	0.45	0.674	0.715	0.75
	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	#####	#####	#####	#####	
	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	#####	#####	#####	#####	
	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	#####	#####	#####	#####	
	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	#####	#####	#####	#####	
	HSS6X6X5/8	50	6.00	6.00	5.7	5.7	6.15	6.15	#####	#####	#####	#####	
		50	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	
		50	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	
		50	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	
		50	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	
		50	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	
		50	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	

BF #	COL	TENSION BASEPLATE CHECK Lcant	anch/lir	Pu/Line	BP wi	Mu/line k-in	Zpl in^3	M/Z	phiFy	D/C
1	HSS8X8X5/8	3	3	129.4	20	388.3	11.25	34.5173	45	0.76705
1	HSS6X6X5/8	3	2	93	18	279	7.031	39.68	45	0.88178
2	HSS6X6X5/8	3	2	89.43	18	268.3	7.031	38.1553	45	0.8479
2	HSS6X6X5/8	3	2	38	18	114	4.5	25.3333	45	0.56296
3	HSS6X6X5/8	3	2	71.13	18	213.4	7.031	30.3481	45	0.6744
4	HSS6X6X5/8	3	2	85.48	18	256.4	7.031	36.4713	45	0.81047
5	HSS6X6X5/8	3	2	55.46	18	166.4	4.5	36.9713	45	0.82159
5	HSS6X6X5/8	3	2	37.5	18	112.5	4.5	25	45	0.55556
6	HSS6X6X5/8	3	2	88.67	18	266	7.031	37.8313	45	0.8407
7	HSS6X6X5/8	3	2	70.2	18	210.6	7.031	29.9526	45	0.66561
8	HSS6X6X5/8	3	2	92.75	18	278.3	7.031	39.5753	45	0.87945
8	HSS6X6X5/8	3	2	69	18	207	7.031	29.44	45	0.65422
9	HSS6X6X5/8	3	2	60.23	18	180.7	4.5	40.1503	45	0.89223
10	HSS6X6X5/8	3	2	72.58	18	217.7	7.031	30.9654	45	0.68812
10	HSS6X6X5/8	3	2	46.5	18	139.5	4.5	31	45	0.68889
11	HSS6X6X5/8	3	2	144.8	18	434.5	10.13	42.9136	45	0.95363
11	HSS6X6X5/8	3	2	50	18	150	4.5	33.3333	45	0.74074
12	HSS6X6X5/8	3	2	109.4	18	328.3	10.13	32.42	45	0.72044
13	HSS6X6X5/8	3	2	85.91	18	257.7	7.031	36.6567	45	0.81459
13	HSS6X6X5/8	3	2	53.5	18	160.5	4.5	35.6667	45.9	0.77705
14	HSS6X6X5/8	2	2	11.5	12	23	1.688	13.6296	45	0.30288
	HSS6X6X5/8			#####	18	#####	0	#DIV/0!	45	#DIV/0!
	HSS6X6X5/8					0	0	#DIV/0!	45	#DIV/0!
	HSS6X6X5/8					0	0	#DIV/0!	45	#DIV/0!
	HSS6X6X5/8					0	0	#DIV/0!	45	#DIV/0!
	HSS6X6X5/8					0	0	#DIV/0!	45	#DIV/0!
						0	0	#DIV/0!	45	#DIV/0!
						0	0	#DIV/0!	45	#DIV/0!
						0	0	#DIV/0!	45	#DIV/0!
						0	0	#DIV/0!	45	#DIV/0!
						0	0	#DIV/0!	45	#DIV/0!
						0	0	#DIV/0!	45	#DIV/0!

NOTES

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PROJECT	PSE - OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	12/6/2023
SUBJECT	BFBB		

BFBB Bottom Flange Beam Brace at Moderately Ductile Beam (AISC Seismic Manual D2a.1 p. 9.1-17)

Beam	W12X40	W14X48	W16X57	W18X65	W21X93	W24X131	
Bm Depth	11.9	13.8	16.4	18.4	21.6	24.5	in
ry	1.94	1.91	1.60	1.69	1.84	2.97	in
Zx	57	78	105	133	221	370	in^3
Max Spacing	**16.20**	**15.95**	**13.36**	**14.11**	**15.36**	**24.80**	ft
Mr	3135	4312	5775	7315	12155	20350	k-in
Pbr	5.27	6.25	7.04	7.95	11.25	16.61	k
Trial Brace	L3-1/2X3-1/2X5/16	L3-1/2X3-1/2X5/16	L3-1/2X3-1/2X5/16	L3-1/2X3-1/2X5/16	L4X4X3/8	L4X4X3/8	
L_br	10.00	10.00	10.00	10.00	10.00	10.00	ft
Connections	Eccentric	Eccentric	Eccentric	Eccentric	Eccentric	Eccentric	
phi x Pn	11.50	11.50	11.50	11.50	11.50	18.90	k
D/C ratio	0.46	0.54	0.61	0.69	0.98	0.88	
Abr	2.10	2.10	2.10	2.10	2.86	2.86	in^2
Bbr	29.27	34.72	39.13	44.17	62.53	92.29	k/in
Amin	0.12	0.14	0.16	0.18	0.26	0.38	in^2
Stiffness D/C	0.06	0.07	0.08	0.09	0.09	0.13	
Min 3/16 Weld Length	1.26	1.50	1.69	1.90	2.70	3.98	in
CHECK	OK	OK	OK	OK	OK	OK	

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CONSULTING ENGINEERS	PROJECT #	21239	PAGE	OF
600 Dupont St * Suite B	BY	DL	DATE	12/6/2023
Bellingham, WA 98225	SUBJECT	CONNECTIONS		
Ph 360-714-8260				

AISC 14TH ED - TABLE K1.2
TRANSVERSE PLATE T- AND CROSS CONNECTIONS, UNDER PLATE AXIAL LOAD

Connection Location: *OWSJ BEARING SEAT AT CONT COLUMN - 8X8X1/4*

B	8	in	
H	8	in	
t	0.233	in	
Bp	5	in	
tp	0.25	in	
Fy	46	ksi	
Fyp	36	ksi	
Ru(LRFD)	11.7	k	
Tens/Comp	Comp	Load to Plate	
T- or Cross-	T	Conn Type	
U	0.5	P+M D/C ratio of HSS	
Beta	0.625		
Bep	1.456		
Qf	0.98		
ϕRn(K1-7)	14.83	k	For all Beta
ϕRn(K1-8)	N/A	k	Only for 0.85B≤Bp≤(B-2t)
ϕRn(K1-9)	N/A	k	Only for Beta = 1.0
ϕRn(K1-10)	N/A	k	Only for Beta = 1.0 and T- and Compression
ϕRn(K1-10)	N/A	k	Only for Beta = 1.0 and Cross- and Compression
Governing ϕRn	14.83	k	
D/C Ratio	0.79	**OK**	

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PROJECT			
PROJECT #		PAGE	OF
BY		DATE	12/6/2023
SUBJECT			

AISC 14TH ED - TABLE K1.2
TRANSVERSE PLATE T- AND CROSS CONNECTIONS, UNDER PLATE AXIAL LOAD

Connection Location: *CONN C.1 & 4.1 WEST SHEAR DRAG PLATE*

B	6	in
H	6	in
t	0.581	in
Lp	6	in
tp	0.375	in
Fy	46	ksi
Fyp	36	ksi
Ru(LRFD)	32.6	k
Br to Ch Angle	72	deg
T- or Cross-	Cross	Conn Type
U	0.25	P+M D/C ratio of HSS

Qf	0.968	
Radians	1.257	
sin(angle)	0.951	
ϕRn(K1-12)	41.72	k

D/C RATIO	0.78

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JOB TITLE	PSE OTC		
	CU-R-05 RTU		
JOB NO.	21239	SHEET NO.	
CALCULATED BY	DL	DATE	
CHECKED BY		DATE	

Wind and Seismic Criteria

Seismic (ASCE 7-16 Chapter 13)

Site Class =	D	[Assumed]
S_{DS} =	1.02g	[USGS Hazard Calculator]
I_p =	1	[ASCE Section 13.1.3]
a_p =	2.5	[ASCE Table 13.6-1]
R_p =	6	[ASCE Table 13.6-1]
Bldg Ht =	22.5 ft	[h]
unit Ht on Bldg =	15 ft	[z]

Seismic Design Force(ASCE 13.3)

Horizontal

$$F_p = \frac{0.4 a_p S_{DS} W_p}{\left(\frac{R_p}{I_p}\right)}\left(1 + 2\frac{z}{h}\right)$$

$$F_{p_{max}} = 1.6 S_{DS} I_P W_p$$

$$F_{p_{min}} = 0.3 S_{DS} I_P W_p$$

F_p =	.40 x Wp	<-------controls
F_{pmax} =	1.64 x Wp	
F_{pmin} =	.31 x Wp	
Design F_{phoriz} =	**.40 x Wp**	

Vertical

F_{pvert} = +/-0.2SdsWp

Design F_{pvert} = .20 x Wp

Wind Loads (ASCE 7-16 Chapter 29 Building Appurtenances)

Wind Speed, V =	98 MPH	
Exposure Cat =	C	[ASCE Section 26.7.3]
K_d =	0.85	[ASCE Table 26.6-1]
K_{zt} =	1	[ASCE Section 26.8]
α =	9.5	[ASCE Table 26.11-1]
z_g =	900	[ASCE Table 26.11-1]
K_z =	0.85	[ASCE Table 26.10-1 Footnote Equations]
Horizontal GC_r =	1.9	[ASCE Section 29.4.1]
Vertical GC_r =	1.5	[ASCE Section 29.4.1]
q_h =	17.7402 psf	[ASCE Eq 26.10-1]

P_{horiz} = 33.7065 psf

P_{vert} = 26.6104 psf

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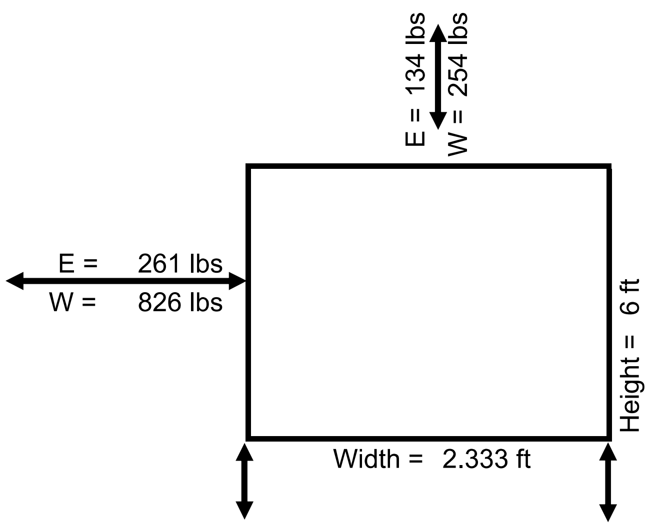
JOB TITLE	PSE OTC		
	CU-R-05 RTU		
JOB NO.	21239	SHEET NO.	
CALCULATED BY	DL	DATE	
CHECKED BY		DATE	

Calculate Unit Overturning and Shear For Wind & Seismic

Unit:	CU-R-05
Weight =	657 lbs
Length =	4.08333 ft
Width =	2.33333 ft
Height =	6 ft

Overturning in Short Direction



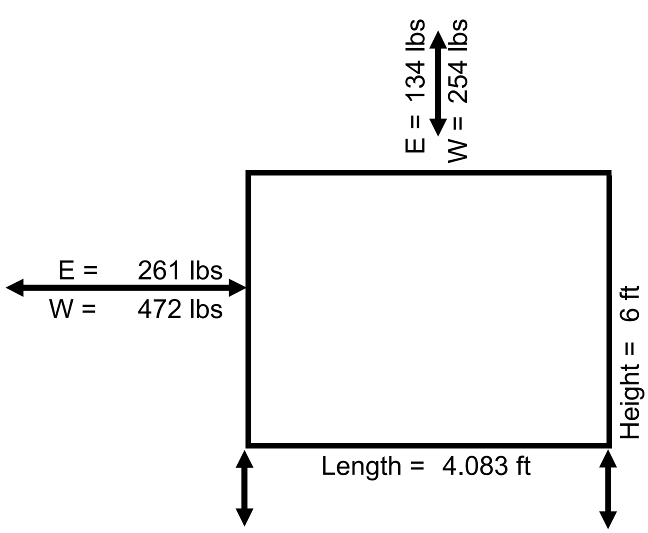
Max/Min Reactions (LRFD)

1.2D+E:	797 lbs
.9D+E:	-107 lbs
1.2D+W:	**1583 lbs**
.9D+W:	**-893 lbs**

Max/Min Reactions (ASD)

D+.7E:	611 lbs
.6D+.7E:	-85 lbs
D+.6W:	**1042 lbs**
.6D+.6W:	**-516 lbs**
1.0D	328.5
1.0E	403
1.0W	1189

Overturning in Long Direction



Max/Min Reactions (LRFD)

1.2D+E:	653 lbs
.9D+E:	37 lbs
1.2D+W:	**868 lbs**
.9D+W:	**-178 lbs**

Max/Min Reactions (ASD)

D+.7E:	510 lbs
.6D+.7E:	16 lbs
D+.6W:	**613 lbs**
.6D+.6W:	**-87 lbs**
1.0D	328.5
1.0E	259
1.0W	473

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JOB TITLE	PSE OTC		
	CU-R-03-4 RTU		
JOB NO.	21239	SHEET NO.	
CALCULATED BY	DL	DATE	
CHECKED BY		DATE	

Wind and Seismic Criteria

Seismic (ASCE 7-16 Chapter 13)

Site Class =	D	[Assumed]
S_{DS} =	1.02g	[USGS Hazard Calculator]
I_p =	1	[ASCE Section 13.1.3]
a_p =	2.5	[ASCE Table 13.6-1]
R_p =	6	[ASCE Table 13.6-1]
Bldg Ht =	22.5 ft	[h]
unit Ht on Bldg =	22.5 ft	[z]

Seismic Design Force(ASCE 13.3)

Horizontal

$$F_p = \frac{0.4 a_p S_{DS} W_p}{\left(\frac{R_p}{I_p}\right)}\left(1 + 2\frac{z}{h}\right)$$

$$F_{p_{max}} = 1.6 S_{DS} I_P W_p$$

$$F_{p_{min}} = 0.3 S_{DS} I_P W_p$$

F_p =	.51 x Wp	<-------controls
F_{pmax} =	1.64 x Wp	
F_{pmin} =	.31 x Wp	
Design F_{phoriz} =	**.51 x Wp**	

Vertical

F_{pvert} =	+/-0.2SdsWp
Design F_{pvert} =	**.20 x Wp**

Wind Loads (ASCE 7-16 Chapter 29 Building Appurtenances)

Wind Speed, V =	98 MPH	
Exposure Cat =	C	[ASCE Section 26.7.3]
K_d =	0.85	[ASCE Table 26.6-1]
K_{zt} =	1	[ASCE Section 26.8]
α =	9.5	[ASCE Table 26.11-1]
z_g =	900	[ASCE Table 26.11-1]
K_z =	0.92	[ASCE Table 26.10-1 Footnote Equations]
Horizontal GC_r =	1.9	[ASCE Section 29.4.1]
Vertical GC_r =	1.5	[ASCE Section 29.4.1]
q_h =	19.3211 psf	[ASCE Eq 26.10-1]

P_{horiz} =	36.71 psf
P_{vert} =	28.9816 psf

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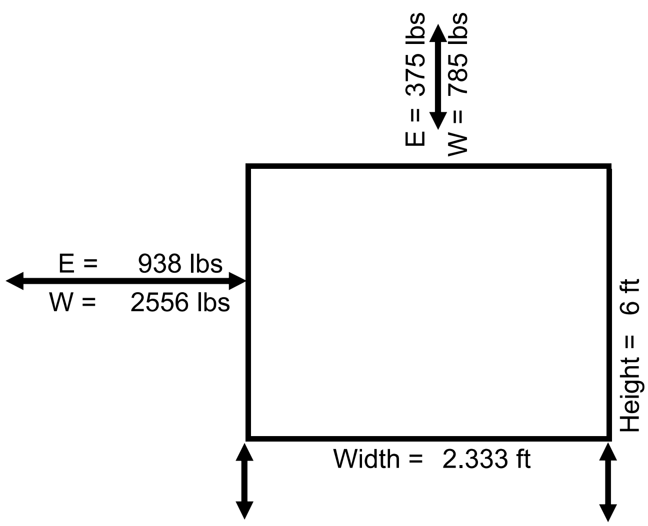
JOB TITLE	PSE OTC		
	CU-R-03-4 RTU		
JOB NO.	21239	**SHEET NO.**	
CALCULATED BY	DL	**DATE**	
CHECKED BY		**DATE**	

Calculate Unit Overturning and Shear For Wind & Seismic

Unit:	CU-R-03-4
Weight =	1836 lbs
Length =	11.6042 ft
Width =	2.33333 ft
Height =	6 ft

Overturning in Short Direction



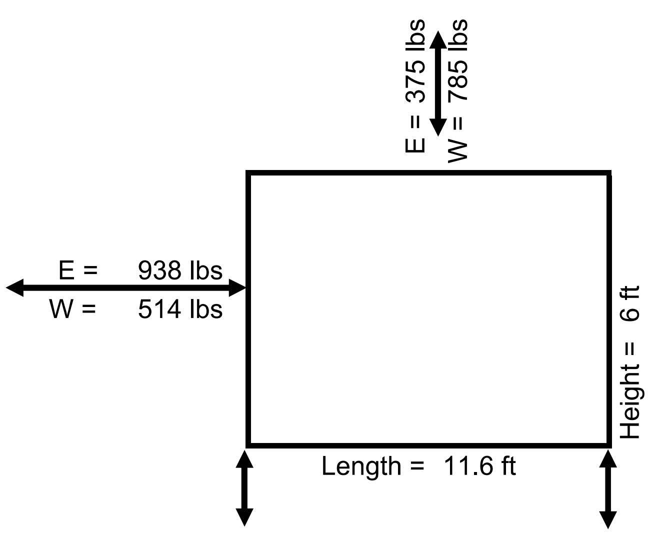
Max/Min Reactions (LRFD)

1.2D+E:	2495 lbs
.9D+E:	-568 lbs
1.2D+W:	**4780 lbs**
.9D+W:	**-2852 lbs**

Max/Min Reactions (ASD)

D+.7E:	1894 lbs
.6D+.7E:	-425 lbs
D+.6W:	**3125 lbs**
.6D+.6W:	**-1656 lbs**
1.0D	918
1.0E	1394
1.0W	3679

Overturning in Long Direction



Max/Min Reactions (LRFD)

1.2D+E:	1532 lbs
.9D+E:	396 lbs
1.2D+W:	**1627 lbs**
.9D+W:	**301 lbs**

Max/Min Reactions (ASD)

D+.7E:	1219 lbs
.6D+.7E:	250 lbs
D+.6W:	**1233 lbs**
.6D+.6W:	**236 lbs**
1.0D	918
1.0E	430
1.0W	525

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JOB TITLE	PSE OTC		
	DOAS RTU		
JOB NO.	21239	SHEET NO.	
CALCULATED BY	DL	DATE	
CHECKED BY		DATE	

Wind and Seismic Criteria

Seismic (ASCE 7-16 Chapter 13)

Site Class =	D	[Assumed]
S_{DS} =	1.02g	[USGS Hazard Calculator]
I_p =	1	[ASCE Section 13.1.3]
a_p =	2.5	[ASCE Table 13.6-1]
R_p =	6	[ASCE Table 13.6-1]
Bldg Ht =	22.5 ft	[h]
unit Ht on Bldg =	15 ft	[z]

Seismic Design Force(ASCE 13.3)

Horizontal

$$F_p = \frac{0.4a_p S_{DS} W_p}{\left(\frac{R_p}{I_p}\right)}\left(1 + 2\frac{z}{h}\right)$$

$$F_{p_{max}} = 1.6 S_{DS} I_P W_p$$

$$F_{p_{min}} = 0.3 S_{DS} I_P W_p$$

F_p =	.40 x Wp	<-------controls
F_{pmax} =	1.64 x Wp	
F_{pmin} =	.31 x Wp	
Design F_{phoriz} =	**.40 x Wp**	

Vertical

F_{pvert} =	+/-0.2SdsWp
Design F_{pvert} =	**.20 x Wp**

Wind Loads (ASCE 7-16 Chapter 29 Building Appurtenances)

Wind Speed, V =	98 MPH	
Exposure Cat =	C	[ASCE Section 26.7.3]
K_d =	0.85	[ASCE Table 26.6-1]
K_{zt} =	1	[ASCE Section 26.8]
α =	9.5	[ASCE Table 26.11-1]
z_g =	900	[ASCE Table 26.11-1]
K_z =	0.85	[ASCE Table 26.10-1 Footnote Equations]
Horizontal GC_r =	1.9	[ASCE Section 29.4.1]
Vertical GC_r =	1.5	[ASCE Section 29.4.1]
q_h =	17.7402 psf	[ASCE Eq 26.10-1]

P_{horiz} =	33.7065 psf
P_{vert} =	26.6104 psf

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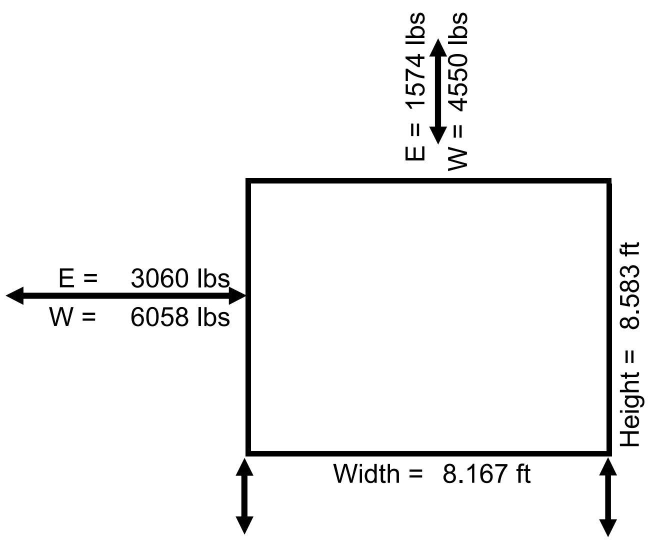
JOB TITLE	PSE OTC		
	DOAS RTU		
JOB NO.	21239	**SHEET NO.**	
CALCULATED BY	DL	**DATE**	
CHECKED BY		**DATE**	

Calculate Unit Overturning and Shear For Wind & Seismic

Unit:	DOAS R-01
Weight =	7700 lbs
Length =	20.9375 ft
Width =	8.16667 ft
Height =	8.58333 ft

Overturning in Short Direction



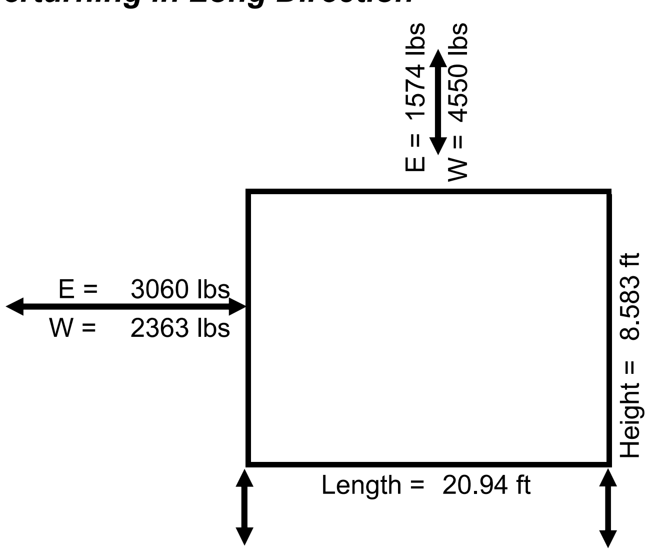
Max/Min Reactions (LRFD)

1.2D+E:	7015 lbs
.9D+E:	1070 lbs
1.2D+W:	**10078 lbs**
.9D+W:	**-1993 lbs**

Max/Min Reactions (ASD)

D+.7E:	5527 lbs
.6D+.7E:	633 lbs
D+.6W:	**7125 lbs**
.6D+.6W:	**-965 lbs**
1.0D	3850
1.0E	2395
1.0W	5458

Overturning in Long Direction



Max/Min Reactions (LRFD)

1.2D+E:	6034 lbs
.9D+E:	2051 lbs
1.2D+W:	**7379 lbs**
.9D+W:	**706 lbs**

Max/Min Reactions (ASD)

D+.7E:	4840 lbs
.6D+.7E:	1320 lbs
D+.6W:	**5506 lbs**
.6D+.6W:	**654 lbs**
1.0D	3850
1.0E	1414
1.0W	2759

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JOB TITLE	PSE OTC		
	DOAS RTU		
JOB NO.	21239	SHEET NO.	
CALCULATED BY	DL	DATE	
CHECKED BY		DATE	

Wind and Seismic Criteria

Seismic (ASCE 7-16 Chapter 13)

Site Class =	D	[Assumed]
S_{DS} =	1.02g	[USGS Hazard Calculator]
I_p =	1	[ASCE Section 13.1.3]
a_p =	2.5	[ASCE Table 13.6-1]
R_p =	6	[ASCE Table 13.6-1]
Bldg Ht =	22.5 ft	[h]
unit Ht on Bldg =	22.5 ft	[z]

Seismic Design Force(ASCE 13.3)

Horizontal

$$F_p = \frac{0.4 a_p S_{DS} W_p}{\left(\frac{R_p}{I_p}\right)}\left(1 + 2\frac{z}{h}\right)$$

$$F_{p_{max}} = 1.6 S_{DS} I_P W_p$$

$$F_{p_{min}} = 0.3 S_{DS} I_P W_p$$

F_p = .51 x Wp <-------controls

F_{pmax} = 1.64 x Wp

F_{pmin} = .31 x Wp

Design F_{phoriz} = .51 x Wp

Vertical

F_{pvert} = +/-0.2SdsWp

Design F_{pvert} = .20 x Wp

Wind Loads (ASCE 7-16 Chapter 29 Building Appurtenances)

Wind Speed, V =	98 MPH	
Exposure Cat =	C	[ASCE Section 26.7.3]
K_d =	0.85	[ASCE Table 26.6-1]
K_{zt} =	1	[ASCE Section 26.8]
α =	9.5	[ASCE Table 26.11-1]
z_g =	900	[ASCE Table 26.11-1]
K_z =	0.92	[ASCE Table 26.10-1 Footnote Equations]
Horizontal GC_r =	1.9	[ASCE Section 29.4.1]
Vertical GC_r =	1.5	[ASCE Section 29.4.1]
q_h =	19.3211 psf	[ASCE Eq 26.10-1]

P_{horiz} = 36.71 psf

P_{vert} = 28.9816 psf

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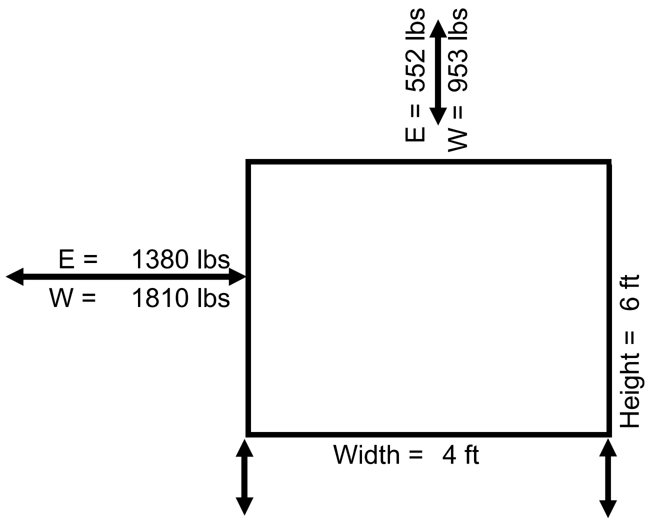
JOB TITLE	PSE OTC		
	DOAS RTU		
JOB NO.	21239	**SHEET NO.**	
CALCULATED BY	DL	**DATE**	
CHECKED BY		**DATE**	

Calculate Unit Overturning and Shear For Wind & Seismic

Unit: DOAS R-01

Weight =	2700 lbs
Length =	8.21667 ft
Width =	4 ft
Height =	6 ft

Overturning in Short Direction



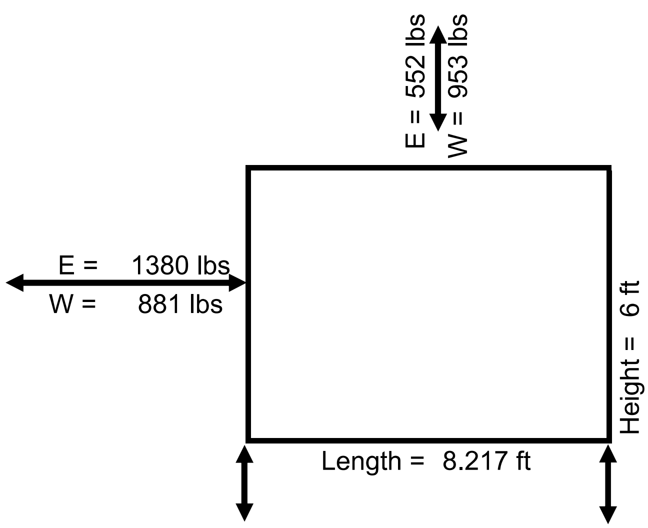
Max/Min Reactions (LRFD)

1.2D+E:	2931 lbs
.9D+E:	-96 lbs
1.2D+W:	**3454 lbs**
.9D+W:	**-619 lbs**

Max/Min Reactions (ASD)

D+.7E:	2268 lbs
.6D+.7E:	-108 lbs
D+.6W:	**2450 lbs**
.6D+.6W:	**-290 lbs**
1.0D	1350
1.0E	1311
1.0W	1834

Overturning in Long Direction



Max/Min Reactions (LRFD)

1.2D+E:	2400 lbs
.9D+E:	435 lbs
1.2D+W:	**2418 lbs**
.9D+W:	**417 lbs**

Max/Min Reactions (ASD)

D+.7E:	**1896 lbs**
.6D+.7E:	**264 lbs**
D+.6W:	1829 lbs
.6D+.6W:	331 lbs
1.0D	1350
1.0E	780
1.0W	798

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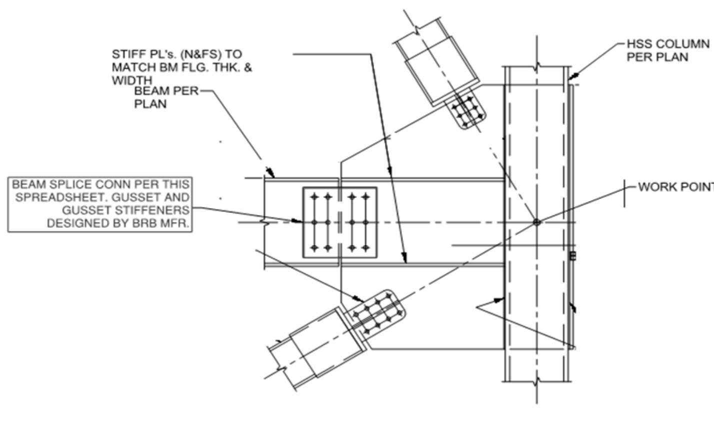
PROJECT	PSE - OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	12/6/2023
SUBJECT	BRBF Bm-Col Connections		

BRBF Beam-to-Extended Gusset Plate Connections

REF: AISC Seismic Design Manual 2nd Ed p. 5-233
To provide .025 rad of rotation for pinned conn per F2.6b

LOCATION BF-1 - LEVEL 1 - 4.1 & E



TYP. BRACE TO COLUMN FLG CONNECTION

Center of Splice to Face of Column	26.5	in	
Vu (gravity)	3	k	
Pu (compression)	43	k	
Beam	W12X40		
Bm Depth	11.9	in	
Min Gap	0.15	in	
Gap Used	1	in	
Center Splice to Center Bolt Group (typ ea side)	4	in	
Vert Rows of Bolts ea side of splice	2		
# Bolts per Row (n)	3		
Horiz distance from bm edge to first bolt row	2	in	
Bolt Type	3/4" A325-N		
φrn (dbl shr) per bolt	35.8	k	
ex (beam-side bolt group)	30.5	in	
C (from Manual T7-7, θ=0, s=3)	0.53		5-235
φRn=Cφrn (beam-side bolt group)	18.8	k	
Check vs. Gravity Vu	OK	0.16	
ex (gusset-side bolt group)	22.5	in	
C (from Manual T7-7, θ=0, s=3)	0.70		5-236
φRn=Cφrn (gusset-side bolt group)	25.1	k	
Check vs. Gravity Vu	OK	0.12	
Avg gusset-to-bm conn length minus 1" snip	25.0	in	5-236
Point from Col Face (grav + seis)	13.0	in	
Ru	43.1	k	
Y	4.0	deg	
ex(grav+seis to gusset-side bolt group)	9.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	3.72		5-237
φRn=Cφrn (gusset-side bolt group)	133.18	k	
Check vs. Ru (grav + seis)	OK	0.32	
ex(grav+seis to beam-side bolt group)	17.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	2.68		5-237
C (to use, if Manual angle too conservative)	2.68		
φRn=Cφrn (gusset-side bolt group)	95.94	k	
Check vs. Ru (grav + seis)	OK	0.45	
Beam Bolt Bearing: Gravity φr	25.9	k/bolt	5-239
φRn=Cφrn	13.6	k	
Check vs. Gravity Vu	OK	0.22	
Beam Bolt Bearing: Gravity + Seis φRn=Cφrn	69.4	k	
Check vs. Ru (grav + seis)	OK	0.62	
Tearout Gravity φrn	27.5	k/bolt	
φRn=Cφrn	14.4	k	
Check vs. Gravity Vu	OK	0.21	
Tearout Gravity + Seis φrn	34.4	k/bolt	5-241
φRn=Cφrn	92.1	k	
Check vs. Ru (grav + seis)	OK	0.47	
Splice Plates - Thickness	0.25	in	
Splice Plates - Height	9.5	in	
Splice Plates - Fy	50	ksi	
Splice Plates - Fu	65		
Lu	5	in	
KL/r	83.1		
φFcr (from Manual T4-22)	27.1	ksi	
φRn=φFcrAg	128.7	k	
Check vs. Ru (grav + seis)	OK	0.33	

Splice Gross Section: Mu(spl)	87	k-in	5-242
Shear φRn	142.5	k	
Check vs. Gravity Vu	OK	0.02	
Flexure φbMn	507.7	k-in	
Check vs. Gravity Mu(spl)	OK	0.17	
Splice Net Section: Shear φRn	100.5	k	5-243
Check vs. Gravity Vu	OK	0.03	
Even or Odd # Bolts per Row	Odd		
Sum Bolt Vert Distances from CL	3.0	in	
Znet	8.7	in^3	
Flexure φbMn	422.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.21	
Center Grav+Seis Center to 1st Row Bm Bolts	16.0	in	
Mu(spl)	48.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.09	5-244
Chk Flex Rupture vs. Mu(spl)	OK	0.11	
C' (from Manual T7-7, θ=0, s=3)	15.8	in	5-245
Mmax	419.0	k-in	
tmax	0.557	in	
Check Σt < tmax	OK	0.90	
OVERALL STATUS	**OK**		

NOTES

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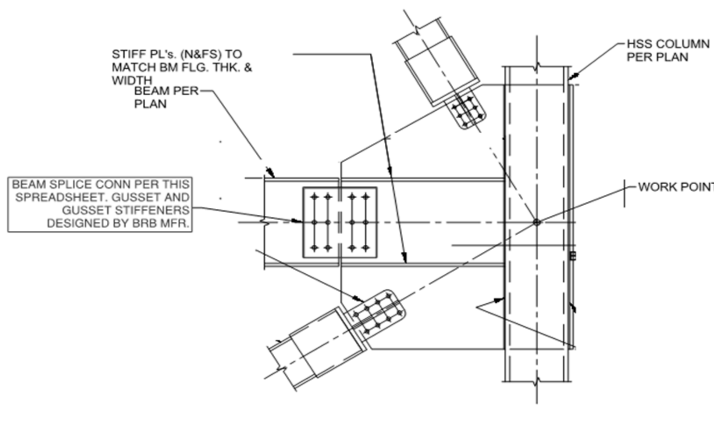
PROJECT	PSE - OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	12/6/2023
SUBJECT	BRBF Bm-Col Connections		

BRBF Beam-to-Extended Gusset Plate Connections

REF: AISC Seismic Design Manual 2nd Ed p. 5-233
To provide .025 rad of rotation for pinned conn per F2.6b

LOCATION: BF-1 - LEVEL 2 - 3.8 & E



TYP. BRACE TO COLUMN FLG CONNECTION

Center of Splice to Face of Column	23.5	in	
Vu (gravity)	3	k	
Pu (compression)	8	k	
Beam	W12X40		
Bm Depth	11.9	in	
Min Gap	0.15	in	
Gap Used	1	in	
Center Splice to Center Bolt Group (typ ea side)	4	in	
Vert Rows of Bolts ea side of splice	2		
# Bolts per Row (n)	3		
Horiz distance from bm edge to first bolt row	2	in	
Bolt Type	3/4" A325-N		
φrn (dbl shr) per bolt	35.8	k	
ex (beam-side bolt group)	27.5	in	
C (from Manual T7-7, θ=0, s=3)	0.57		5-235
φRn=Cφrn (beam-side bolt group)	20.4	k	
Check vs. Gravity Vu	OK	0.15	
ex (gusset-side bolt group)	19.5	in	
C (from Manual T7-7, θ=0, s=3)	0.79		5-236
φRn=Cφrn (gusset-side bolt group)	28.3	k	
Check vs. Gravity Vu	OK	0.11	
Avg gusset-to-bm conn length minus 1" snip	22.0	in	5-236
Point from Col Face (grav + seis)	11.5	in	
Ru	8.5	k	
Y	20.6	deg	
ex(grav+seis to gusset-side bolt group)	8.0	in	
C (from Manual T7-7, θ=90-Y, s=3)	3.99		5-237
φRn=Cφrn (gusset-side bolt group)	142.84	k	
Check vs. Ru (grav + seis)	OK	0.06	
ex(grav+seis to beam-side bolt group)	16.0	in	
C (from Manual T7-7, θ=90-Y, s=3)	2.83		5-237
C (to use, if Manual angle too conservative)	2.83		
φRn=Cφrn (gusset-side bolt group)	101.31	k	
Check vs. Ru (grav + seis)	OK	0.08	
Beam Bolt Bearing: Gravity φr	25.9	k/bolt	5-239
φRn=Cφrn	14.8	k	
Check vs. Gravity Vu	OK	0.20	
Beam Bolt Bearing: Gravity + Seis φRn=Cφrn	73.3	k	
Check vs. Ru (grav + seis)	OK	0.12	
Tearout Gravity φrn	27.5	k/bolt	
φRn=Cφrn	15.7	k	
Check vs. Gravity Vu	OK	0.19	
Tearout Gravity + Seis φrn	34.4	k/bolt	5-241
φRn=Cφrn	97.3	k	
Check vs. Ru (grav + seis)	OK	0.09	
Splice Plates - Thickness	0.25	in	
Splice Plates - Height	9.5	in	
Splice Plates - Fy	50	ksi	
Splice Plates - Fu	65		
Lu	5	in	
KL/r	83.1		
φFcr (from Manual T4-22)	39.3	ksi	
φRn=φFcrAg	186.7	k	
Check vs. Ru (grav + seis)	OK	0.05	

Splice Gross Section: Mu(spl)	78	k-in	5-242
Shear φRn	142.5	k	
Check vs. Gravity Vu	OK	0.02	
Flexure φbMn	507.7	k-in	
Check vs. Gravity Mu(spl)	OK	0.15	
Splice Net Section: Shear φRn	100.5	k	5-243
Check vs. Gravity Vu	OK	0.03	
Even or Odd # Bolts per Row	Odd		
Sum Bolt Vert Distances from CL	3.0	in	
Znet	8.7	in^3	
Flexure φbMn	422.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.18	
Center Grav+Seis Center to 1st Row Bm Bolts	14.5	in	
Mu(spl)	43.5	k-in	
Check vs. Gravity Mu(spl)	OK	0.09	5-244
Chk Flex Rupture vs. Mu(spl)	OK	0.10	
C' (from Manual T7-7, θ=0, s=3)	15.8	in	5-245
Mmax	419.0	k-in	
tmax	0.557	in	
Check Σt < tmax	OK	0.90	

OVERALL STATUS: OK

NOTES

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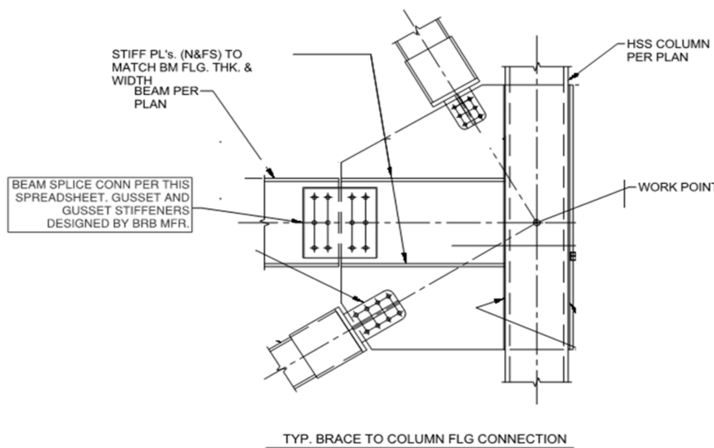
PROJECT	PSE - OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	12/6/2023
SUBJECT	BRBF Bm-Col Connections		

BRBF Beam-to-Extended Gusset Plate Connections

REF: AISC Seismic Design Manual 2nd Ed p. 5-233
To provide .025 rad of rotation for pinned conn per F2.6b

LOCATION BF-2 - LEVEL 1 - 4.7 & E



TYP. BRACE TO COLUMN FLG CONNECTION

Center of Splice to Face of Column	18.5	in	
Vu (gravity)	4	k	
Pu (compression)	14	k	
Beam	W12X40		
Bm Depth	11.9	in	
Min Gap	0.15	in	
Gap Used	1	in	
Center Splice to Center Bolt Group (typ ea side)	4	in	
Vert Rows of Bolts ea side of splice	2		
# Bolts per Row (n)	3		
Horiz distance from bm edge to first bolt row	2	in	
Bolt Type	3/4" A325-N		
φrn (dbl shr) per bolt	35.8	k	
ex (beam-side bolt group)	22.5	in	
C (from Manual T7-7, θ=0, s=3)	0.69		5-235
φRn=Cφrn (beam-side bolt group)	24.7	k	
Check vs. Gravity Vu	OK	0.16	
ex (gusset-side bolt group)	14.5	in	
C (from Manual T7-7, θ=0, s=3)	1.03		5-236
φRn=Cφrn (gusset-side bolt group)	36.9	k	
Check vs. Gravity Vu	OK	0.11	
Avg gusset-to-bm conn length minus 1" snip	17.0	in	5-236
Point from Col Face (grav + seis)	9.0	in	
Ru	14.6	k	
Y	15.9	deg	
ex(grav+seis to gusset-side bolt group)	5.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	5.53		5-237
φRn=Cφrn (gusset-side bolt group)	197.97	k	
Check vs. Ru (grav + seis)	OK	0.07	
ex(grav+seis to beam-side bolt group)	13.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	3.12		5-237
C (to use, if Manual angle too conservative)	3.12		
φRn=Cφrn (gusset-side bolt group)	111.70	k	
Check vs. Ru (grav + seis)	OK	0.13	
Beam Bolt Bearing: Gravity φr	25.9	k/bolt	5-239
φRn=Cφrn	17.9	k	
Check vs. Gravity Vu	OK	0.22	
Beam Bolt Bearing: Gravity + Seis φRn=Cφrn	80.8	k	
Check vs. Ru (grav + seis)	OK	0.18	
Tearout Gravity φrn	27.5	k/bolt	
φRn=Cφrn	19.0	k	
Check vs. Gravity Vu	OK	0.21	
Tearout Gravity + Seis φrn	34.4	k/bolt	5-241
φRn=Cφrn	107.3	k	
Check vs. Ru (grav + seis)	OK	0.14	
Splice Plates - Thickness	0.25	in	
Splice Plates - Height	9.5	in	
Splice Plates - Fy	50	ksi	
Splice Plates - Fu	65		
Lu	5	in	
KL/r	83.1		
φFcr (from Manual T4-22)	27.1	ksi	
φRn=φFcrAg	128.7	k	
Check vs. Ru (grav + seis)	OK	0.11	

Splice Gross Section: Mu(spl)	84	k-in	5-242
Shear φRn	142.5	k	
Check vs. Gravity Vu	OK	0.03	
Flexure φbMn	507.7	k-in	
Check vs. Gravity Mu(spl)	OK	0.17	
Splice Net Section: Shear φRn	100.5	k	5-243
Check vs. Gravity Vu	OK	0.04	
Even or Odd # Bolts per Row	Odd		
Sum Bolt Vert Distances from CL	3.0	in	
Znet	8.7	in^3	
Flexure φbMn	422.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.20	
Center Grav+Seis Center to 1st Row Bm Bolts	12.0	in	
Mu(spl)	48.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.09	5-244
Chk Flex Rupture vs. Mu(spl)	OK	0.11	
C' (from Manual T7-7, θ=0, s=3)	15.8	in	5-245
Mmax	419.0	k-in	
tmax	0.557	in	
Check Σt < tmax	OK	0.90	
OVERALL STATUS	**OK**		

NOTES

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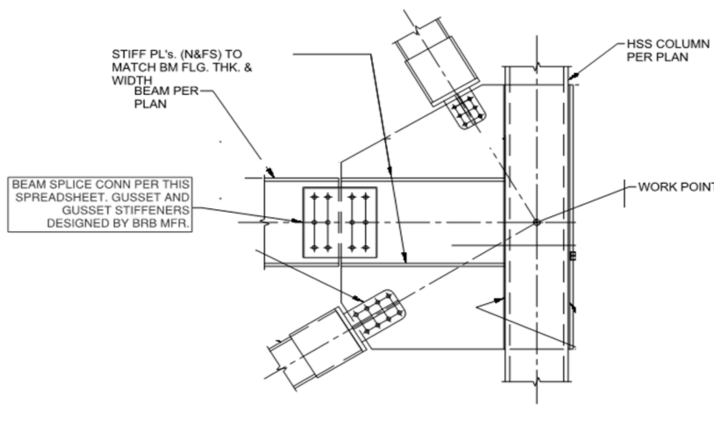
PROJECT	PSE - OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	12/6/2023
SUBJECT	BRBF Bm-Col Connections		

BRBF Beam-to-Extended Gusset Plate Connections

REF: AISC Seismic Design Manual 2nd Ed p. 5-233
To provide .025 rad of rotation for pinned conn per F2.6b

LOCATION: BF-3 - LEVEL 2 - C.2

Center of Splice to Face of Column	46.5	in	
Vu (gravity)	9	k	
Pu (compression)	9	k	
Beam	W16X57		
Bm Depth	16.4	in	
Min Gap	0.21	in	
Gap Used	1	in	
Center Splice to Center Bolt Group (typ ea side)	4	in	
Vert Rows of Bolts ea side of splice	2		
# Bolts per Row (n)	4		
Horiz distance from bm edge to first bolt row	2	in	
Bolt Type	3/4" A325-N		
φrn (dbl shr) per bolt	35.8	k	
ex (beam-side bolt group)	50.5	in	
C (from Manual T7-7, θ=0, s=3)	0.69		5-235
φRn=Cφrn (beam-side bolt group)	24.7	k	
Check vs. Gravity Vu	OK	0.36	
ex (gusset-side bolt group)	42.5	in	
C (from Manual T7-7, θ=0, s=3)	1.03		5-236
φRn=Cφrn (gusset-side bolt group)	36.9	k	
Check vs. Gravity Vu	OK	0.24	
Avg gusset-to-bm conn length minus 1" snip	45.0	in	5-236
Point from Col Face (grav + seis)	23.0	in	
Ru	12.7	k	
Y	45.0	deg	
ex(grav+seis to gusset-side bolt group)	19.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	1.81		5-237
φRn=Cφrn (gusset-side bolt group)	64.80	k	
Check vs. Ru (grav + seis)	OK	0.20	
ex(grav+seis to beam-side bolt group)	27.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	1.31		5-237
C (to use, if Manual angle too conservative)	1.31		
φRn=Cφrn (gusset-side bolt group)	46.90	k	
Check vs. Ru (grav + seis)	OK	0.27	
Beam Bolt Bearing: Gravity φr	37.7	k/bolt	5-239
φRn=Cφrn	26.0	k	
Check vs. Gravity Vu	OK	0.35	
Beam Bolt Bearing: Gravity + Seis φRn=Cφrn	49.4	k	
Check vs. Ru (grav + seis)	OK	0.26	
Tearout Gravity φrn	40.1	k/bolt	
φRn=Cφrn	27.7	k	
Check vs. Gravity Vu	OK	0.33	
Tearout Gravity + Seis φrn	50.1	k/bolt	5-241
φRn=Cφrn	65.6	k	
Check vs. Ru (grav + seis)	OK	0.19	
Splice Plates - Thickness	0.25	in	
Splice Plates - Height	12.5	in	
Splice Plates - Fy	50	ksi	
Splice Plates - Fu	65		
Lu	5	in	
KL/r	83.1		
φFcr (from Manual T4-22)	27.1	ksi	
φRn=φFcrAg	169.4	k	
Check vs. Ru (grav + seis)	OK	0.08	



TYP. BRACE TO COLUMN FLG CONNECTION

Splice Gross Section: Mu(spl)	441	k-in	5-242
Shear φRn	187.5	k	
Check vs. Gravity Vu	OK	0.05	
Flexure φbMn	878.9	k-in	
Check vs. Gravity Mu(spl)	OK	0.50	
Splice Net Section: Shear φRn	131.6	k	5-243
Check vs. Gravity Vu	OK	0.07	
Even or Odd # Bolts per Row	Even		
Sum Bolt Vert Distances from CL	6.0	in	
Znet	14.3	in^3	
Flexure φbMn	696.2	k-in	
Check vs. Gravity Mu(spl)	OK	0.63	
Center Grav+Seis Center to 1st Row Bm Bolts	26.0	in	
Mu(spl)	234.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.27	5-244
Chk Flex Rupture vs. Mu(spl)	OK	0.34	
C' (from Manual T7-7, θ=0, s=3)	26.0	in	5-245
Mmax	689.5	k-in	
tmax	0.530	in	
Check Σt < tmax	OK	0.94	
OVERALL STATUS	**OK**		

NOTES

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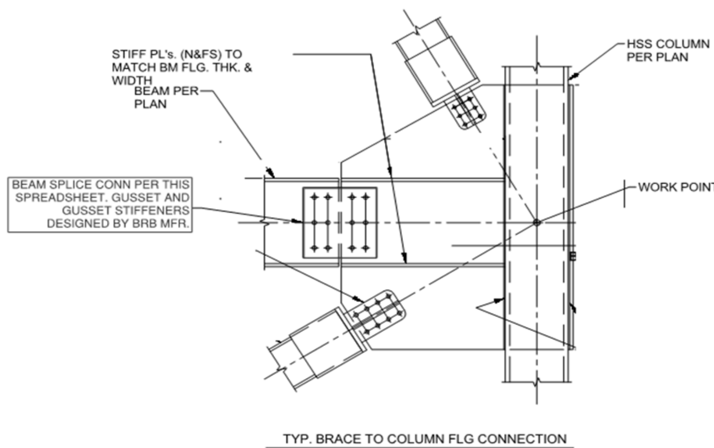
PROJECT	PSE - OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	12/6/2023
SUBJECT	BRBF Bm-Col Connections		

BRBF Beam-to-Extended Gusset Plate Connections

REF: AISC Seismic Design Manual 2nd Ed p. 5-233
To provide .025 rad of rotation for pinned conn per F2.6b

LOCATION BF-4 - LEVEL 2 - C



Center of Splice to Face of Column	36.5	in	
Vu (gravity)	15	k	
Pu (compression)	26	k	
Beam	W16X57		
Bm Depth	16.4	in	
Min Gap	0.21	in	
Gap Used	1	in	
Center Splice to Center Bolt Group (typ ea side)	4	in	
Vert Rows of Bolts ea side of splice	2		
# Bolts per Row (n)	4		
Horiz distance from bm edge to first bolt row	2	in	
Bolt Type	3/4" A325-N		
φrn (dbl shr) per bolt	35.8	k	
ex (beam-side bolt group)	40.5	in	
C (from Manual T7-7, θ=0, s=3)	0.64		5-235
φRn=Cφrn (beam-side bolt group)	22.9	k	
Check vs. Gravity Vu	OK	0.65	
ex (gusset-side bolt group)	32.5	in	
C (from Manual T7-7, θ=0, s=3)	0.79		5-236
φRn=Cφrn (gusset-side bolt group)	28.4	k	
Check vs. Gravity Vu	OK	0.53	
Avg gusset-to-bm conn length minus 1" snip	35.0	in	5-236
Point from Col Face (grav + seis)	18.0	in	
Ru	30.0	k	
Y	30.0	deg	
ex(grav+seis to gusset-side bolt group)	14.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	2.78		5-237
φRn=Cφrn (gusset-side bolt group)	99.52	k	
Check vs. Ru (grav + seis)	OK	0.30	
ex(grav+seis to beam-side bolt group)	22.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	1.88		5-237
C (to use, if Manual angle too conservative)	1.88		
φRn=Cφrn (gusset-side bolt group)	67.30	k	
Check vs. Ru (grav + seis)	OK	0.45	
Beam Bolt Bearing: Gravity φr	37.7	k/bolt	5-239
φRn=Cφrn	24.1	k	
Check vs. Gravity Vu	OK	0.62	
Beam Bolt Bearing: Gravity + Seis φRn=Cφrn	70.9	k	
Check vs. Ru (grav + seis)	OK	0.42	
Tearout Gravity φrn	40.1	k/bolt	
φRn=Cφrn	25.7	k	
Check vs. Gravity Vu	OK	0.58	
Tearout Gravity + Seis φrn	50.1	k/bolt	5-241
φRn=Cφrn	94.2	k	
Check vs. Ru (grav + seis)	OK	0.32	
Splice Plates - Thickness	0.25	in	
Splice Plates - Height	12.5	in	
Splice Plates - Fy	50	ksi	
Splice Plates - Fu	65		
Lu	5	in	
KL/r	83.1		
φFcr (from Manual T4-22)	27.1	ksi	
φRn=φFcrAg	169.4	k	
Check vs. Ru (grav + seis)	OK	0.18	

Splice Gross Section: Mu(spl)	585	k-in	5-242
Shear φRn	187.5	k	
Check vs. Gravity Vu	OK	0.08	
Flexure φbMn	878.9	k-in	
Check vs. Gravity Mu(spl)	OK	0.67	
Splice Net Section: Shear φRn	131.6	k	5-243
Check vs. Gravity Vu	OK	0.11	
Even or Odd # Bolts per Row	Even		
Sum Bolt Vert Distances from CL	6.0	in	
Znet	14.3	in^3	
Flexure φbMn	696.2	k-in	
Check vs. Gravity Mu(spl)	OK	0.84	
Center Grav+Seis Center to 1st Row Bm Bolts	21.0	in	
Mu(spl)	315.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.36	5-244
Chk Flex Rupture vs. Mu(spl)	OK	0.45	
C' (from Manual T7-7, θ=0, s=3)	26.0	in	5-245
Mmax	689.5	k-in	
tmax	0.530	in	
Check Σt < tmax	OK	0.94	

OVERALL STATUS **OK**

NOTES

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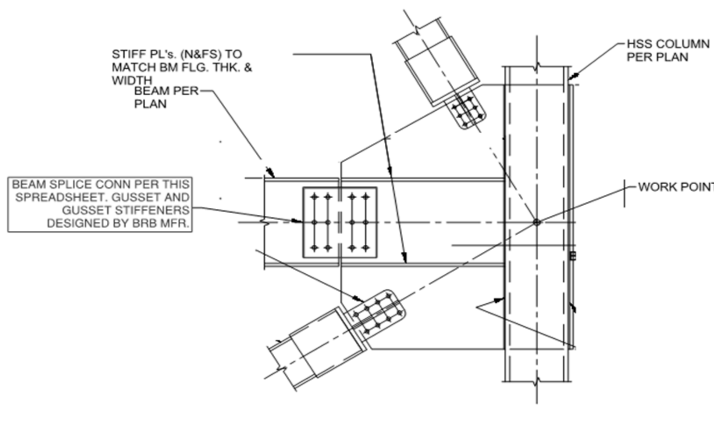
PROJECT	PSE - OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	12/6/2023
SUBJECT	BRBF Bm-Col Connections		

BRBF Beam-to-Extended Gusset Plate Connections

REF: AISC Seismic Design Manual 2nd Ed p. 5-233
To provide .025 rad of rotation for pinned conn per F2.6b

LOCATION BF-5 - LEVEL 1 - 5 & E



TYP. BRACE TO COLUMN FLG CONNECTION

Center of Splice to Face of Column	19.5	in	
Vu (gravity)	26	k	
Pu (compression)	21	k	
Beam	W16X57		
Bm Depth	16.4	in	
Min Gap	0.21	in	
Gap Used	1	in	
Center Splice to Center Bolt Group (typ ea side)	4	in	
Vert Rows of Bolts ea side of splice	2		
# Bolts per Row (n)	4		
Horiz distance from bm edge to first bolt row	2	in	
Bolt Type	3/4" A325-N		
φrn (dbl shr) per bolt	35.8	k	
ex (beam-side bolt group)	23.5	in	
C (from Manual T7-7, θ=0, s=3)	1.09		5-235
φRn=Cφrn (beam-side bolt group)	39.0	k	
Check vs. Gravity Vu	OK	0.67	
ex (gusset-side bolt group)	15.5	in	
C (from Manual T7-7, θ=0, s=3)	1.62		5-236
φRn=Cφrn (gusset-side bolt group)	58.0	k	
Check vs. Gravity Vu	OK	0.45	
Avg gusset-to-bm conn length minus 1" snip	18.0	in	5-236
Point from Col Face (grav + seis)	9.5	in	
Ru	33.4	k	
Y	51.1	deg	
ex(grav+seis to gusset-side bolt group)	6.0	in	
C (from Manual T7-7, θ=90-Y, s=3)	4.41		5-237
φRn=Cφrn (gusset-side bolt group)	157.88	k	
Check vs. Ru (grav + seis)	OK	0.21	
ex(grav+seis to beam-side bolt group)	14.0	in	
C (from Manual T7-7, θ=90-Y, s=3)	2.24		5-237
C (to use, if Manual angle too conservative)	2.24		
φRn=Cφrn (gusset-side bolt group)	80.19	k	
Check vs. Ru (grav + seis)	OK	0.42	
Beam Bolt Bearing: Gravity φr	37.7	k/bolt	5-239
φRn=Cφrn	41.1	k	
Check vs. Gravity Vu	OK	0.63	
Beam Bolt Bearing: Gravity + Seis φRn=Cφrn	84.5	k	
Check vs. Ru (grav + seis)	OK	0.40	
Tearout Gravity φrn	40.1	k/bolt	
φRn=Cφrn	43.7	k	
Check vs. Gravity Vu	OK	0.60	
Tearout Gravity + Seis φrn	50.1	k/bolt	5-241
φRn=Cφrn	112.3	k	
Check vs. Ru (grav + seis)	OK	0.30	
Splice Plates - Thickness	0.25	in	
Splice Plates - Height	12.5	in	
Splice Plates - Fy	50	ksi	
Splice Plates - Fu	65		
Lu	5	in	
KL/r	83.1		
φFcr (from Manual T4-22)	27.1	ksi	
φRn=φFcrAg	169.4	k	
Check vs. Ru (grav + seis)	OK	0.20	

Splice Gross Section: Mu(spl)	572	k-in	5-242
Shear φRn	187.5	k	
Check vs. Gravity Vu	OK	0.14	
Flexure φbMn	878.9	k-in	
Check vs. Gravity Mu(spl)	OK	0.65	
Splice Net Section: Shear φRn	131.6	k	5-243
Check vs. Gravity Vu	OK	0.20	
Even or Odd # Bolts per Row	Even		
Sum Bolt Vert Distances from CL	6.0	in	
Znet	14.3	in^3	
Flexure φbMn	696.2	k-in	
Check vs. Gravity Mu(spl)	OK	0.82	
Center Grav+Seis Center to 1st Row Bm Bolts	12.5	in	
Mu(spl)	325.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.37	5-244
Chk Flex Rupture vs. Mu(spl)	OK	0.47	
C' (from Manual T7-7, θ=0, s=3)	26.0	in	5-245
Mmax	689.5	k-in	
tmax	0.530	in	
Check Σt < tmax	OK	0.94	
OVERALL STATUS	**OK**		

NOTES

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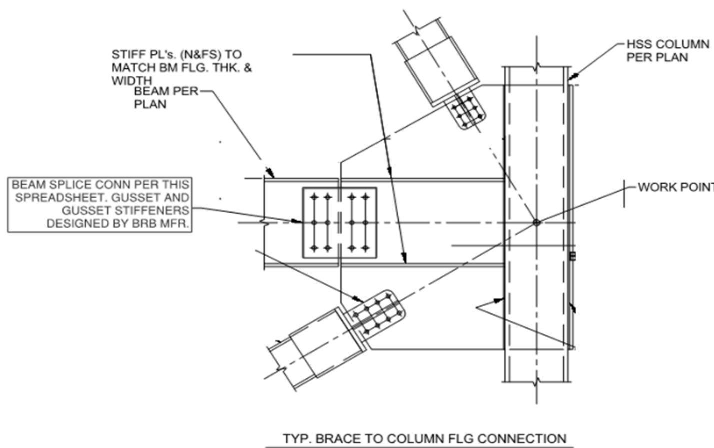
PROJECT	PSE - OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	12/6/2023
SUBJECT	BRBF Bm-Col Connections		

BRBF Beam-to-Extended Gusset Plate Connections

REF: AISC Seismic Design Manual 2nd Ed p. 5-233
To provide .025 rad of rotation for pinned conn per F2.6b

LOCATION BF-6 - LEVEL 2 - 4.2



Center of Splice to Face of Column	26.5	in	
Vu (gravity)	20	k	
Pu (compression)	7	k	
Beam	W16X57		
Bm Depth	16.4	in	
Min Gap	0.21	in	
Gap Used	1	in	
Center Splice to Center Bolt Group (typ ea side)	4	in	
Vert Rows of Bolts ea side of splice	2		
# Bolts per Row (n)	4		
Horiz distance from bm edge to first bolt row	2	in	
Bolt Type	3/4" A325-N		
φrn (dbl shr) per bolt	35.8	k	
ex (beam-side bolt group)	30.5	in	
C (from Manual T7-7, θ=0, s=3)	0.84		5-235
φRn=Cφrn (beam-side bolt group)	30.1	k	
Check vs. Gravity Vu	OK	0.67	
ex (gusset-side bolt group)	22.5	in	
C (from Manual T7-7, θ=0, s=3)	1.14		5-236
φRn=Cφrn (gusset-side bolt group)	40.8	k	
Check vs. Gravity Vu	OK	0.49	
Avg gusset-to-bm conn length minus 1" snip	25.0	in	5-236
Point from Col Face (grav + seis)	13.0	in	
Ru	21.2	k	
Y	70.7	deg	
ex(grav+seis to gusset-side bolt group)	9.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	2.66		5-237
φRn=Cφrn (gusset-side bolt group)	95.23	k	
Check vs. Ru (grav + seis)	OK	0.22	
ex(grav+seis to beam-side bolt group)	17.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	1.53		5-237
C (to use, if Manual angle too conservative)	1.53		
φRn=Cφrn (gusset-side bolt group)	54.77	k	
Check vs. Ru (grav + seis)	OK	0.39	
Beam Bolt Bearing: Gravity φr	37.7	k/bolt	5-239
φRn=Cφrn	31.7	k	
Check vs. Gravity Vu	OK	0.63	
Beam Bolt Bearing: Gravity + Seis φRn=Cφrn	57.7	k	
Check vs. Ru (grav + seis)	OK	0.37	
Tearout Gravity φrn	40.1	k/bolt	
φRn=Cφrn	33.7	k	
Check vs. Gravity Vu	OK	0.59	
Tearout Gravity + Seis φrn	50.1	k/bolt	5-241
φRn=Cφrn	76.7	k	
Check vs. Ru (grav + seis)	OK	0.28	
Splice Plates - Thickness	0.25	in	
Splice Plates - Height	12.5	in	
Splice Plates - Fy	50	ksi	
Splice Plates - Fu	65		
Lu	5	in	
KL/r	83.1		
φFcr (from Manual T4-22)	27.1	ksi	
φRn=φFcrAg	169.4	k	
Check vs. Ru (grav + seis)	OK	0.13	

Splice Gross Section: Mu(spl)	580	k-in	5-242
Shear φRn	187.5	k	
Check vs. Gravity Vu	OK	0.11	
Flexure φbMn	878.9	k-in	
Check vs. Gravity Mu(spl)	OK	0.66	
Splice Net Section: Shear φRn	131.6	k	5-243
Check vs. Gravity Vu	OK	0.15	
Even or Odd # Bolts per Row	Even		
Sum Bolt Vert Distances from CL	6.0	in	
Znet	14.3	in^3	
Flexure φbMn	696.2	k-in	
Check vs. Gravity Mu(spl)	OK	0.83	
Center Grav+Seis Center to 1st Row Bm Bolts	16.0	in	
Mu(spl)	320.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.36	5-244
Chk Flex Rupture vs. Mu(spl)	OK	0.46	
C' (from Manual T7-7, θ=0, s=3)	26.0	in	5-245
Mmax	689.5	k-in	
tmax	0.530	in	
Check Σt < tmax	OK	0.94	
OVERALL STATUS	**OK**		

NOTES

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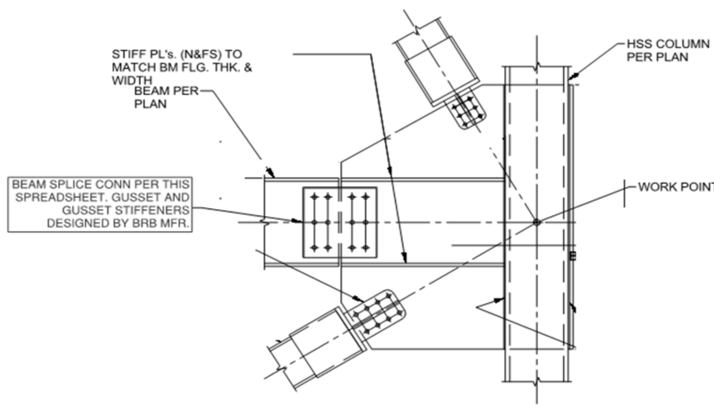
PROJECT	PSE - OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	12/6/2023
SUBJECT	BRBF Bm-Col Connections		

BRBF Beam-to-Extended Gusset Plate Connections

REF: AISC Seismic Design Manual 2nd Ed p. 5-233
To provide .025 rad of rotation for pinned conn per F2.6b

LOCATION BF-7 - LEVEL 2 - 3.2

Center of Splice to Face of Column	55.5	in	
Vu (gravity)	20	k	
Pu (compression)	9	k	
Beam	W21X93		
Bm Depth	21.6	in	
Min Gap	0.27	in	
Gap Used	1	in	
Center Splice to Center Bolt Group (typ ea side)	4	in	
Vert Rows of Bolts ea side of splice	2		
# Bolts per Row (n)	6		
Horiz distance from bm edge to first bolt row	2	in	
Bolt Type	3/4" A325-N		
φrn (dbl shr) per bolt	35.8	k	
ex (beam-side bolt group)	59.5	in	
C (from Manual T7-7, θ=0, s=3)	0.91		5-235
φRn=Cφrn (beam-side bolt group)	32.6	k	
Check vs. Gravity Vu	OK	0.61	
ex (gusset-side bolt group)	51.5	in	
C (from Manual T7-7, θ=0, s=3)	1.05		5-236
φRn=Cφrn (gusset-side bolt group)	37.6	k	
Check vs. Gravity Vu	OK	0.53	
Avg gusset-to-bm conn length minus 1" snip	54.0	in	5-236
Point from Col Face (grav + seis)	27.5	in	
Ru	21.9	k	
Y	65.8	deg	
ex(grav+seis to gusset-side bolt group)	24.0	in	
C (from Manual T7-7, θ=90-Y, s=3)	2.41		5-237
φRn=Cφrn (gusset-side bolt group)	86.28	k	
Check vs. Ru (grav + seis)	OK	0.25	
ex(grav+seis to beam-side bolt group)	32.0	in	
C (from Manual T7-7, θ=90-Y, s=3)	1.83		5-237
C (to use, if Manual angle too conservative)	1.83		
φRn=Cφrn (gusset-side bolt group)	65.51	k	
Check vs. Ru (grav + seis)	OK	0.33	
Beam Bolt Bearing: Gravity φr	50.9	k/bolt	5-239
φRn=Cφrn	46.3	k	
Check vs. Gravity Vu	OK	0.43	
Beam Bolt Bearing: Gravity + Seis φRn=Cφrn	93.1	k	
Check vs. Ru (grav + seis)	OK	0.24	
Tearout Gravity φrn	54.1	k/bolt	
φRn=Cφrn	49.2	k	
Check vs. Gravity Vu	OK	0.41	
Tearout Gravity + Seis φrn	67.6	k/bolt	5-241
φRn=Cφrn	123.7	k	
Check vs. Ru (grav + seis)	OK	0.18	
Splice Plates - Thickness	0.25	in	
Splice Plates - Height	18.5	in	
Splice Plates - Fy	50	ksi	
Splice Plates - Fu	65		
Lu	5	in	
KL/r	83.1		
φFcr (from Manual T4-22)	27.1	ksi	
φRn=φFcrAg	250.7	k	
Check vs. Ru (grav + seis)	OK	0.09	



TYP. BRACE TO COLUMN FLG CONNECTION

Splice Gross Section: Mu(spl)	1160	k-in	5-242
Shear φRn	277.5	k	
Check vs. Gravity Vu	OK	0.07	
Flexure φbMn	1925.2	k-in	
Check vs. Gravity Mu(spl)	OK	0.60	
Splice Net Section: Shear φRn	193.8	k	5-243
Check vs. Gravity Vu	OK	0.10	
Even or Odd # Bolts per Row	Even		
Sum Bolt Vert Distances from CL	13.5	in	
Znet	31.0	in^3	
Flexure φbMn	1509.7	k-in	
Check vs. Gravity Mu(spl)	OK	0.77	
Center Grav+Seis Center to 1st Row Bm Bolts	30.5	in	
Mu(spl)	610.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.32	5-244
Chk Flex Rupture vs. Mu(spl)	OK	0.40	
C' (from Manual T7-7, θ=0, s=3)	54.2	in	5-245
Mmax	1437.4	k-in	
tmax	0.504	in	
Check Σt < tmax	OK	0.99	
OVERALL STATUS	**OK**		

NOTES

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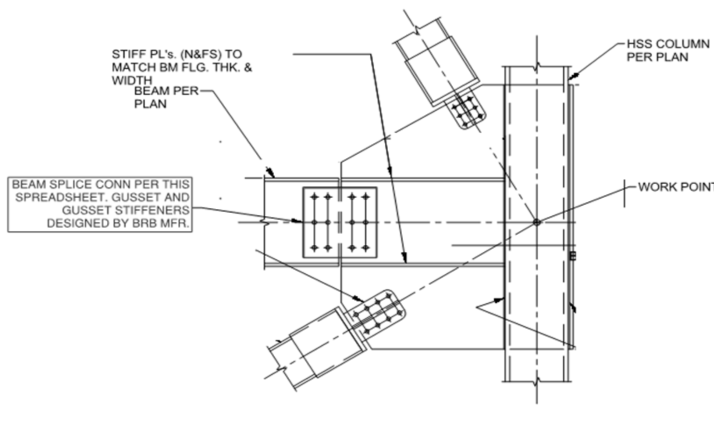
600 Dupont St * Suite B	PROJECT #	21239	PAGE		OF
Bellingham, WA 98225	BY	DL	DATE	12/6/2023	
Ph 360-714-8260	SUBJECT	BRBF Bm-Col Connections			

BRBF Beam-to-Extended Gusset Plate Connections

REF: AISC Seismic Design Manual 2nd Ed p. 5-233

To provide .025 rad of rotation for pinned conn per F2.6b

LOCATION: BF-8 - LEVEL 1 - 2&C.7



TYP. BRACE TO COLUMN FLG CONNECTION

Center of Splice to Face of Column	18.5	in	
Vu (gravity)	5	k	
Pu (compression)	15	k	
Beam	W12X40		
Bm Depth	11.9	in	
Min Gap	0.15	in	
Gap Used	1	in	
Center Splice to Center Bolt Group (typ ea side)	4	in	
Vert Rows of Bolts ea side of splice	2		
# Bolts per Row (n)	3		
Horiz distance from bm edge to first bolt row	2	in	
Bolt Type	3/4" A325-N		
φrn (dbl shr) per bolt	35.8	k	
ex (beam-side bolt group)	22.5	in	
C (from Manual T7-7, θ=0, s=3)	0.69		5-235
φRn=Cφrn (beam-side bolt group)	24.7	k	
Check vs. Gravity Vu	OK	0.20	
ex (gusset-side bolt group)	14.5	in	
C (from Manual T7-7, θ=0, s=3)	1.04		5-236
φRn=Cφrn (gusset-side bolt group)	37.2	k	
Check vs. Gravity Vu	OK	0.13	
Avg gusset-to-bm conn length minus 1" snip	17.0	in	5-236
Point from Col Face (grav + seis)	9.0	in	
Ru	15.8	k	
Y	18.4	deg	
ex(grav+seis to gusset-side bolt group)	5.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	4.71		5-237
φRn=Cφrn (gusset-side bolt group)	168.62	k	
Check vs. Ru (grav + seis)	OK	0.09	
ex(grav+seis to beam-side bolt group)	13.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	2.92		5-237
C (to use, if Manual angle too conservative)	2.92		
φRn=Cφrn (gusset-side bolt group)	104.54	k	
Check vs. Ru (grav + seis)	OK	0.15	
Beam Bolt Bearing: Gravity φr	25.9	k/bolt	5-239
φRn=Cφrn	17.9	k	
Check vs. Gravity Vu	OK	0.28	
Beam Bolt Bearing: Gravity + Seis φRn=Cφrn	75.6	k	
Check vs. Ru (grav + seis)	OK	0.21	
Tearout Gravity φrn	27.5	k/bolt	
φRn=Cφrn	19.0	k	
Check vs. Gravity Vu	OK	0.26	
Tearout Gravity + Seis φrn	34.4	k/bolt	5-241
φRn=Cφrn	100.4	k	
Check vs. Ru (grav + seis)	OK	0.16	
Splice Plates - Thickness	0.25	in	
Splice Plates - Height	9.5	in	
Splice Plates - Fy	50	ksi	
Splice Plates - Fu	65		
Lu	5	in	
KL/r	83.1		
φFcr (from Manual T4-22)	27.1	ksi	
φRn=φFcrAg	128.7	k	
Check vs. Ru (grav + seis)	OK	0.12	

Splice Gross Section: Mu(spl)	105	k-in	5-242
Shear φRn	142.5	k	
Check vs. Gravity Vu	OK	0.04	
Flexure φbMn	507.7	k-in	
Check vs. Gravity Mu(spl)	OK	0.21	
Splice Net Section: Shear φRn	100.5	k	5-243
Check vs. Gravity Vu	OK	0.05	
Even or Odd # Bolts per Row	Odd		
Sum Bolt Vert Distances from CL	3.0	in	
Znet	8.7	in^3	
Flexure φbMn	422.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.25	
Center Grav+Seis Center to 1st Row Bm Bolts	12.0	in	
Mu(spl)	60.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.12	5-244
Chk Flex Rupture vs. Mu(spl)	OK	0.14	
C' (from Manual T7-7, θ=0, s=3)	15.8	in	5-245
Mmax	419.0	k-in	
tmax	0.557	in	
Check Σt < tmax	OK	0.90	

OVERALL STATUS: OK

NOTES

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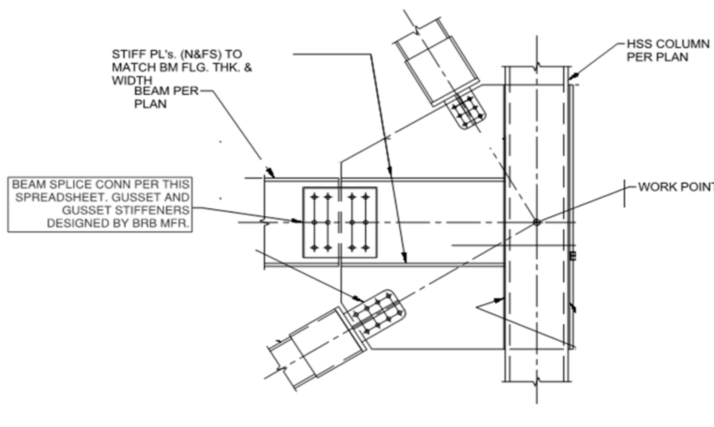
PROJECT	PSE - OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	12/6/2023
SUBJECT	BRBF Bm-Col Connections		

BRBF Beam-to-Extended Gusset Plate Connections

REF: AISC Seismic Design Manual 2nd Ed p. 5-233
To provide .025 rad of rotation for pinned conn per F2.6b

LOCATION BF-8 - LEVEL 2 - 2&D



TYP. BRACE TO COLUMN FLG CONNECTION

Center of Splice to Face of Column	40.5	in	
Vu (gravity)	17	k	
Pu (compression)	32	k	
Beam	W16X57		
Bm Depth	16.4	in	
Min Gap	0.21	in	
Gap Used	1	in	
Center Splice to Center Bolt Group (typ ea side)	4	in	
Vert Rows of Bolts ea side of splice	2		
# Bolts per Row (n)	4		
Horiz distance from bm edge to first bolt row	2	in	
Bolt Type	1" A325-N		
φrn (dbl shr) per bolt	63.6	k	
ex (beam-side bolt group)	44.5	in	
C (from Manual T7-7, θ=0, s=3)	0.58		5-235
φRn=Cφrn (beam-side bolt group)	36.9	k	
Check vs. Gravity Vu	OK	0.46	
ex (gusset-side bolt group)	36.5	in	
C (from Manual T7-7, θ=0, s=3)	0.71		5-236
φRn=Cφrn (gusset-side bolt group)	45.2	k	
Check vs. Gravity Vu	OK	0.38	
Avg gusset-to-bm conn length minus 1" snip	39.0	in	5-236
Point from Col Face (grav + seis)	20.0	in	
Ru	36.2	k	
Y	28.0	deg	
ex(grav+seis to gusset-side bolt group)	16.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	3.01		5-237
φRn=Cφrn (gusset-side bolt group)	191.44	k	
Check vs. Ru (grav + seis)	OK	0.19	
ex(grav+seis to beam-side bolt group)	24.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	2.14		5-237
C (to use, if Manual angle too conservative)	2.14		
φRn=Cφrn (gusset-side bolt group)	136.10	k	
Check vs. Ru (grav + seis)	OK	0.27	
Beam Bolt Bearing: Gravity φr	50.3	k/bolt	5-239
φRn=Cφrn	29.2	k	
Check vs. Gravity Vu	OK	0.58	
Beam Bolt Bearing: Gravity + Seis φRn=Cφrn	107.7	k	
Check vs. Ru (grav + seis)	OK	0.34	
Tearout Gravity φrn	36.9	k/bolt	
φRn=Cφrn	21.4	k	
Check vs. Gravity Vu	OK	0.79	
Tearout Gravity + Seis φrn	46.2	k/bolt	5-241
φRn=Cφrn	98.8	k	
Check vs. Ru (grav + seis)	OK	0.37	
Splice Plates - Thickness	0.375	in	
Splice Plates - Height	12.5	in	
Splice Plates - Fy	50	ksi	
Splice Plates - Fu	65		
Lu	5	in	
KL/r	55.4		
φFcr (from Manual T4-22)	35.8	ksi	
φRn=φFcrAg	335.6	k	
Check vs. Ru (grav + seis)	OK	0.11	

Splice Gross Section: Mu(spl)	731	k-in	5-242
Shear φRn	281.3	k	
Check vs. Gravity Vu	OK	0.06	
Flexure φbMn	1318.4	k-in	
Check vs. Gravity Mu(spl)	OK	0.55	
Splice Net Section: Shear φRn	175.5	k	5-243
Check vs. Gravity Vu	OK	0.10	
Even or Odd # Bolts per Row	Even		
Sum Bolt Vert Distances from CL	6.0	in	
Znet	19.2	in^3	
Flexure φbMn	934.6	k-in	
Check vs. Gravity Mu(spl)	OK	0.78	
Center Grav+Seis Center to 1st Row Bm Bolts	23.0	in	
Mu(spl)	391.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.30	5-244
Chk Flex Rupture vs. Mu(spl)	OK	0.42	
C' (from Manual T7-7, θ=0, s=3)	26.0	in	5-245
Mmax	1224.6	k-in	
tmax	0.940	in	
Check Σt < tmax	OK	0.80	

OVERALL STATUS **OK**

NOTES

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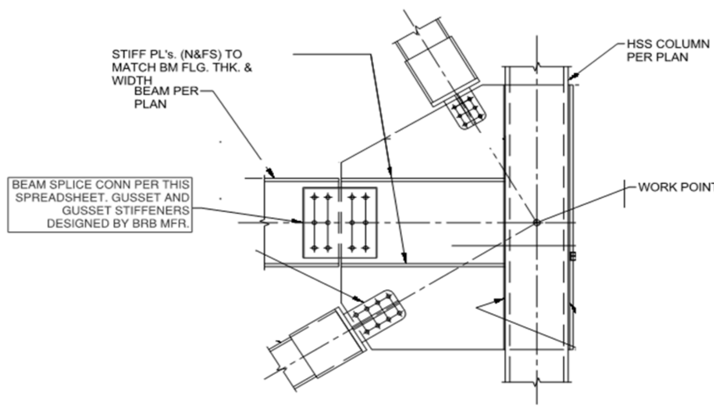
PROJECT	PSE - OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	12/6/2023
SUBJECT	BRBF Bm-Col Connections		

BRBF Beam-to-Extended Gusset Plate Connections

REF: AISC Seismic Design Manual 2nd Ed p. 5-233
To provide .025 rad of rotation for pinned conn per F2.6b

LOCATION BF-10 - LEVEL 1 - 4&B



TYP. BRACE TO COLUMN FLG CONNECTION

Center of Splice to Face of Column	14.5	in	
Vu (gravity)	24	k	
Pu (compression)	16	k	
Beam	W14X48		
Bm Depth	13.8	in	
Min Gap	0.17	in	
Gap Used	1	in	
Center Splice to Center Bolt Group (typ ea side)	4	in	
Vert Rows of Bolts ea side of splice	2		
# Bolts per Row (n)	3		
Horiz distance from bm edge to first bolt row	2	in	
Bolt Type	3/4" A325-N		
φrn (dbl shr) per bolt	35.8	k	
ex (beam-side bolt group)	18.5	in	
C (from Manual T7-7, θ=0, s=3)	0.83		5-235
φRn=Cφrn (beam-side bolt group)	29.7	k	
Check vs. Gravity Vu	OK	0.81	
ex (gusset-side bolt group)	10.5	in	
C (from Manual T7-7, θ=0, s=3)	1.40		5-236
φRn=Cφrn (gusset-side bolt group)	50.1	k	
Check vs. Gravity Vu	OK	0.48	
Avg gusset-to-bm conn length minus 1" snip	13.0	in	5-236
Point from Col Face (grav + seis)	7.0	in	
Ru	28.8	k	
Y	56.3	deg	
ex(grav+seis to gusset-side bolt group)	3.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	3.52		5-237
φRn=Cφrn (gusset-side bolt group)	126.02	k	
Check vs. Ru (grav + seis)	OK	0.23	
ex(grav+seis to beam-side bolt group)	11.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	1.39		5-237
C (to use, if Manual angle too conservative)	1.39		
φRn=Cφrn (gusset-side bolt group)	49.76	k	
Check vs. Ru (grav + seis)	OK	0.58	
Beam Bolt Bearing: Gravity φr	29.8	k/bolt	5-239
φRn=Cφrn	24.8	k	
Check vs. Gravity Vu	OK	0.97	
Beam Bolt Bearing: Gravity + Seis φRn=Cφrn	41.5	k	
Check vs. Ru (grav + seis)	OK	0.70	
Tearout Gravity φrn	31.7	k/bolt	
φRn=Cφrn	26.3	k	
Check vs. Gravity Vu	OK	0.91	
Tearout Gravity + Seis φrn	39.6	k/bolt	5-241
φRn=Cφrn	55.1	k	
Check vs. Ru (grav + seis)	OK	0.52	
Splice Plates - Thickness	0.25	in	
Splice Plates - Height	9.5	in	
Splice Plates - Fy	50	ksi	
Splice Plates - Fu	65		
Lu	5	in	
KL/r	83.1		
φFcr (from Manual T4-22)	27.0	ksi	
φRn=φFcrAg	128.3	k	
Check vs. Ru (grav + seis)	OK	0.22	

Splice Gross Section: Mu(spl)	408	k-in	5-242
Shear φRn	142.5	k	
Check vs. Gravity Vu	OK	0.17	
Flexure φbMn	507.7	k-in	
Check vs. Gravity Mu(spl)	OK	0.80	
Splice Net Section: Shear φRn	100.5	k	5-243
Check vs. Gravity Vu	OK	0.24	
Even or Odd # Bolts per Row	Odd		
Sum Bolt Vert Distances from CL	3.0	in	
Znet	8.7	in^3	
Flexure φbMn	422.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.97	
Center Grav+Seis Center to 1st Row Bm Bolts	10.0	in	
Mu(spl)	240.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.47	5-244
Chk Flex Rupture vs. Mu(spl)	OK	0.57	
C' (from Manual T7-7, θ=0, s=3)	15.8	in	5-245
Mmax	419.0	k-in	
tmax	0.557	in	
Check Σt < tmax	OK	0.90	
OVERALL STATUS	**OK**		

NOTES

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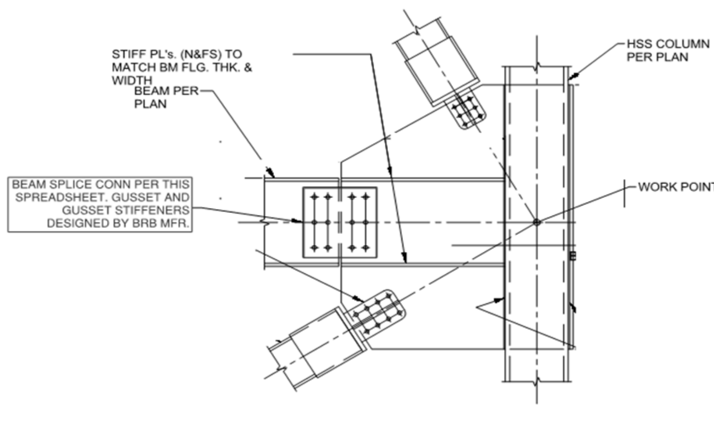
PROJECT	PSE - OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	12/6/2023
SUBJECT	BRBF Bm-Col Connections		

BRBF Beam-to-Extended Gusset Plate Connections

REF: AISC Seismic Design Manual 2nd Ed p. 5-233
To provide .025 rad of rotation for pinned conn per F2.6b

LOCATION BF-11 - LEVEL 1 - 3&A.1



TYP. BRACE TO COLUMN FLG CONNECTION

Center of Splice to Face of Column	17.5	in	
Vu (gravity)	29	k	
Pu (compression)	7	k	
Beam	W24X131		
Bm Depth	24.5	in	
Min Gap	0.31	in	
Gap Used	1	in	
Center Splice to Center Bolt Group (typ ea side)	4	in	
Vert Rows of Bolts ea side of splice	2		
# Bolts per Row (n)	6		
Horiz distance from bm edge to first bolt row	2	in	
Bolt Type	3/4" A325-N		
φrn (dbl shr) per bolt	35.8	k	
ex (beam-side bolt group)	21.5	in	
C (from Manual T7-7, θ=0, s=3)	2.45		5-235
φRn=Cφrn (beam-side bolt group)	87.7	k	
Check vs. Gravity Vu	OK	0.33	
ex (gusset-side bolt group)	13.5	in	
C (from Manual T7-7, θ=0, s=3)	3.78		5-236
φRn=Cφrn (gusset-side bolt group)	135.3	k	
Check vs. Gravity Vu	OK	0.21	
Avg gusset-to-bm conn length minus 1" snip	16.0	in	5-236
Point from Col Face (grav + seis)	8.5	in	
Ru	29.8	k	
Y	76.4	deg	
ex(grav+seis to gusset-side bolt group)	5.0	in	
C (from Manual T7-7, θ=90-Y, s=3)	8.13		5-237
φRn=Cφrn (gusset-side bolt group)	291.05	k	
Check vs. Ru (grav + seis)	OK	0.10	
ex(grav+seis to beam-side bolt group)	13.0	in	
C (from Manual T7-7, θ=90-Y, s=3)	4.01		5-237
C (to use, if Manual angle too conservative)	4.01		
φRn=Cφrn (gusset-side bolt group)	143.56	k	
Check vs. Ru (grav + seis)	OK	0.21	
Beam Bolt Bearing: Gravity φr	53.1	k/bolt	5-239
φRn=Cφrn	130.1	k	
Check vs. Gravity Vu	OK	0.22	
Beam Bolt Bearing: Gravity + Seis φRn=Cφrn	212.9	k	
Check vs. Ru (grav + seis)	OK	0.14	
Tearout Gravity φrn	56.4	k/bolt	
φRn=Cφrn	138.2	k	
Check vs. Gravity Vu	OK	0.21	
Tearout Gravity + Seis φrn	70.5	k/bolt	5-241
φRn=Cφrn	282.7	k	
Check vs. Ru (grav + seis)	OK	0.11	
Splice Plates - Thickness	0.25	in	
Splice Plates - Height	18.5	in	
Splice Plates - Fy	50	ksi	
Splice Plates - Fu	65		
Lu	5	in	
KL/r	83.1		
φFcr (from Manual T4-22)	27.0	ksi	
φRn=φFcrAg	249.8	k	
Check vs. Ru (grav + seis)	OK	0.12	

Splice Gross Section: Mu(spl)	580	k-in	5-242
Shear φRn	277.5	k	
Check vs. Gravity Vu	OK	0.10	
Flexure φbMn	1925.2	k-in	
Check vs. Gravity Mu(spl)	OK	0.30	
Splice Net Section: Shear φRn	193.8	k	5-243
Check vs. Gravity Vu	OK	0.15	
Even or Odd # Bolts per Row	Even		
Sum Bolt Vert Distances from CL	13.5	in	
Znet	31.0	in^3	
Flexure φbMn	1509.7	k-in	
Check vs. Gravity Mu(spl)	OK	0.38	
Center Grav+Seis Center to 1st Row Bm Bolts	11.5	in	
Mu(spl)	333.5	k-in	
Check vs. Gravity Mu(spl)	OK	0.17	5-244
Chk Flex Rupture vs. Mu(spl)	OK	0.22	
C' (from Manual T7-7, θ=0, s=3)	54.2	in	5-245
Mmax	1437.4	k-in	
tmax	0.504	in	
Check Σt < tmax	OK	0.99	
OVERALL STATUS	**OK**		

NOTES

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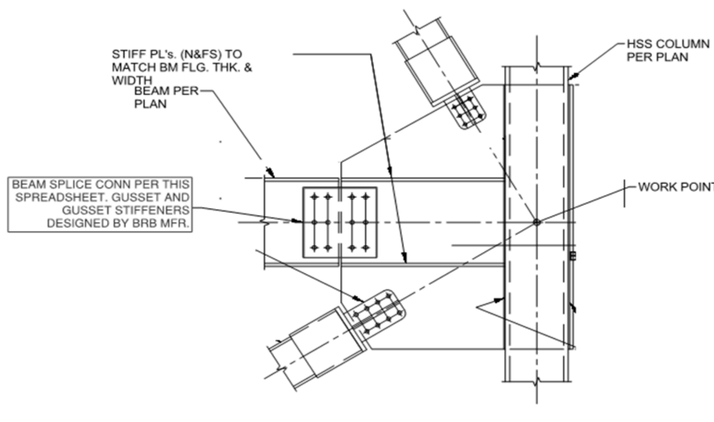
PROJECT	PSE - OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	12/6/2023
SUBJECT	BRBF Bm-Col Connections		

BRBF Beam-to-Extended Gusset Plate Connections

REF: AISC Seismic Design Manual 2nd Ed p. 5-233
To provide .025 rad of rotation for pinned conn per F2.6b

LOCATION BF-11 - LEVEL 2 - 3&A.1



TYP. BRACE TO COLUMN FLG CONNECTION

Center of Splice to Face of Column	37.5	in	
Vu (gravity)	3	k	
Pu (compression)	39	k	
Beam	W12X40		
Bm Depth	11.9	in	
Min Gap	0.15	in	
Gap Used	1	in	
Center Splice to Center Bolt Group (typ ea side)	4	in	
Vert Rows of Bolts ea side of splice	2		
# Bolts per Row (n)	3		
Horiz distance from bm edge to first bolt row	2	in	
Bolt Type	3/4" A325-N		
φrn (dbl shr) per bolt	35.8	k	
ex (beam-side bolt group)	41.5	in	
C (from Manual T7-7, θ=0, s=3)	0.38		5-235
φRn=Cφrn (beam-side bolt group)	13.5	k	
Check vs. Gravity Vu	OK	0.22	
ex (gusset-side bolt group)	33.5	in	
C (from Manual T7-7, θ=0, s=3)	0.47		5-236
φRn=Cφrn (gusset-side bolt group)	16.8	k	
Check vs. Gravity Vu	OK	0.18	
Avg gusset-to-bm conn length minus 1" snip	36.0	in	5-236
Point from Col Face (grav + seis)	18.5	in	
Ru	39.1	k	
Y	4.4	deg	
ex(grav+seis to gusset-side bolt group)	15.0	in	
C (from Manual T7-7, θ=90-Y, s=3)	5.24		5-237
φRn=Cφrn (gusset-side bolt group)	187.59	k	
Check vs. Ru (grav + seis)	OK	0.21	
ex(grav+seis to beam-side bolt group)	23.0	in	
C (from Manual T7-7, θ=90-Y, s=3)	4.69		5-237
C (to use, if Manual angle too conservative)	4.69		
φRn=Cφrn (gusset-side bolt group)	167.90	k	
Check vs. Ru (grav + seis)	OK	0.23	
Beam Bolt Bearing: Gravity φr	25.9	k/bolt	5-239
φRn=Cφrn	9.8	k	
Check vs. Gravity Vu	OK	0.31	
Beam Bolt Bearing: Gravity + Seis φRn=Cφrn	121.4	k	
Check vs. Ru (grav + seis)	OK	0.32	
Tearout Gravity φrn	27.5	k/bolt	
φRn=Cφrn	10.4	k	
Check vs. Gravity Vu	OK	0.29	
Tearout Gravity + Seis φrn	34.4	k/bolt	5-241
φRn=Cφrn	161.2	k	
Check vs. Ru (grav + seis)	OK	0.24	
Splice Plates - Thickness	0.25	in	
Splice Plates - Height	9.5	in	
Splice Plates - Fy	50	ksi	
Splice Plates - Fu	65		
Lu	5	in	
KL/r	83.1		
φFcr (from Manual T4-22)	27.0	ksi	
φRn=φFcrAg	128.3	k	
Check vs. Ru (grav + seis)	OK	0.30	

Splice Gross Section: Mu(spl)	120	k-in	5-242
Shear φRn	142.5	k	
Check vs. Gravity Vu	OK	0.02	
Flexure φbMn	507.7	k-in	
Check vs. Gravity Mu(spl)	OK	0.24	
Splice Net Section: Shear φRn	100.5	k	5-243
Check vs. Gravity Vu	OK	0.03	
Even or Odd # Bolts per Row	Odd		
Sum Bolt Vert Distances from CL	3.0	in	
Znet	8.7	in^3	
Flexure φbMn	422.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.28	
Center Grav+Seis Center to 1st Row Bm Bolts	21.5	in	
Mu(spl)	64.5	k-in	
Check vs. Gravity Mu(spl)	OK	0.13	5-244
Chk Flex Rupture vs. Mu(spl)	OK	0.15	
C' (from Manual T7-7, θ=0, s=3)	15.8	in	5-245
Mmax	419.0	k-in	
tmax	0.557	in	
Check Σt < tmax	OK	0.90	
OVERALL STATUS	**OK**		

NOTES

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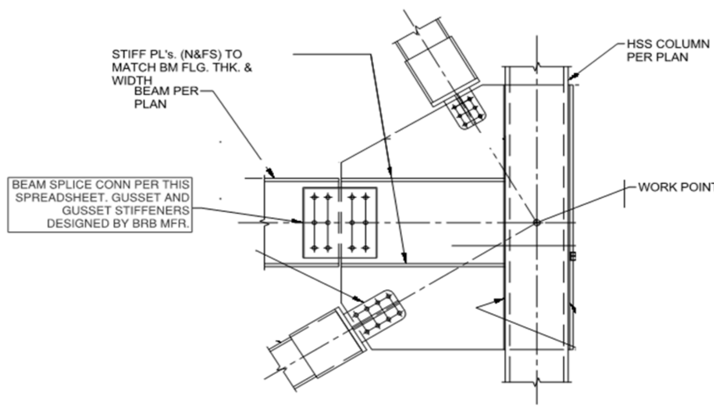
PROJECT	PSE - OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	12/6/2023
SUBJECT	BRBF Bm-Col Connections		

BRBF Beam-to-Extended Gusset Plate Connections

REF: AISC Seismic Design Manual 2nd Ed p. 5-233
To provide .025 rad of rotation for pinned conn per F2.6b

LOCATION: BF-12 - LEVEL 2 - A&3 (LEVEL 1 LOADS NEGLIGIBLE)



TYP. BRACE TO COLUMN FLG CONNECTION

Center of Splice to Face of Column	34.5	in	
Vu (gravity)	21	k	
Pu (compression)	41	k	
Beam	W16X57		
Bm Depth	16.4	in	
Min Gap	0.21	in	
Gap Used	1	in	
Center Splice to Center Bolt Group (typ ea side)	4	in	
Vert Rows of Bolts ea side of splice	2		
# Bolts per Row (n)	4		
Horiz distance from bm edge to first bolt row	2	in	
Bolt Type	1" A325-N		
φrn (dbl shr) per bolt	63.6	k	
ex (beam-side bolt group)	38.5	in	
C (from Manual T7-7, θ=0, s=3)	0.67		5-235
φRn=Cφrn (beam-side bolt group)	42.6	k	
Check vs. Gravity Vu	OK	0.49	
ex (gusset-side bolt group)	30.5	in	
C (from Manual T7-7, θ=0, s=3)	0.84		5-236
φRn=Cφrn (gusset-side bolt group)	53.4	k	
Check vs. Gravity Vu	OK	0.39	
Avg gusset-to-bm conn length minus 1" snip	33.0	in	5-236
Point from Col Face (grav + seis)	17.0	in	
Ru	46.1	k	
Y	27.1	deg	
ex(grav+seis to gusset-side bolt group)	13.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	3.62		5-237
φRn=Cφrn (gusset-side bolt group)	230.23	k	
Check vs. Ru (grav + seis)	OK	0.20	
ex(grav+seis to beam-side bolt group)	21.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	2.46		5-237
C (to use, if Manual angle too conservative)	2.46		
φRn=Cφrn (gusset-side bolt group)	156.46	k	
Check vs. Ru (grav + seis)	OK	0.29	
Beam Bolt Bearing: Gravity φr	50.3	k/bolt	5-239
φRn=Cφrn	33.7	k	
Check vs. Gravity Vu	OK	0.62	
Beam Bolt Bearing: Gravity + Seis φRn=Cφrn	123.8	k	
Check vs. Ru (grav + seis)	OK	0.37	
Tearout Gravity φrn	36.9	k/bolt	
φRn=Cφrn	24.8	k	
Check vs. Gravity Vu	OK	0.85	
Tearout Gravity + Seis φrn	46.2	k/bolt	5-241
φRn=Cφrn	113.6	k	
Check vs. Ru (grav + seis)	OK	0.41	
Splice Plates - Thickness	0.375	in	
Splice Plates - Height	12.5	in	
Splice Plates - Fy	50	ksi	
Splice Plates - Fu	65		
Lu	5	in	
KL/r	55.4		
φFcr (from Manual T4-22)	27.0	ksi	
φRn=φFcrAg	253.1	k	
Check vs. Ru (grav + seis)	OK	0.18	

Splice Gross Section: Mu(spl)	777	k-in	5-242
Shear φRn	281.3	k	
Check vs. Gravity Vu	OK	0.07	
Flexure φbMn	1318.4	k-in	
Check vs. Gravity Mu(spl)	OK	0.59	
Splice Net Section: Shear φRn	175.5	k	5-243
Check vs. Gravity Vu	OK	0.12	
Even or Odd # Bolts per Row	Even		
Sum Bolt Vert Distances from CL	6.0	in	
Znet	19.2	in^3	
Flexure φbMn	934.6	k-in	
Check vs. Gravity Mu(spl)	OK	0.83	
Center Grav+Seis Center to 1st Row Bm Bolts	20.0	in	
Mu(spl)	420.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.32	5-244
Chk Flex Rupture vs. Mu(spl)	OK	0.45	
C' (from Manual T7-7, θ=0, s=3)	26.0	in	5-245
Mmax	1224.6	k-in	
tmax	0.940	in	
Check Σt < tmax	OK	0.80	
OVERALL STATUS	**OK**		

NOTES

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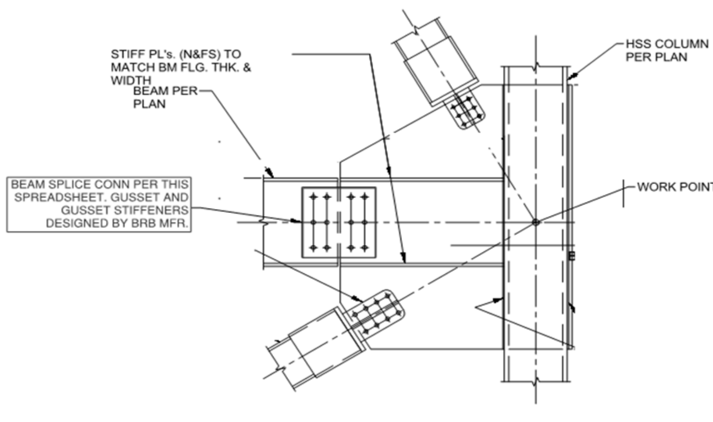
PROJECT	PSE - OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	12/6/2023
SUBJECT	BRBF Bm-Col Connections		

BRBF Beam-to-Extended Gusset Plate Connections

REF: AISC Seismic Design Manual 2nd Ed p. 5-233
To provide .025 rad of rotation for pinned conn per F2.6b

LOCATION BF-13 - LEVEL 2 - 2&A.1



TYP. BRACE TO COLUMN FLG CONNECTION

Center of Splice to Face of Column	14.5	in	
Vu (gravity)	15	k	
Pu (compression)	26	k	
Beam	W12X40		
Bm Depth	11.9	in	
Min Gap	0.15	in	
Gap Used	1	in	
Center Splice to Center Bolt Group (typ ea side)	4	in	
Vert Rows of Bolts ea side of splice	2		
# Bolts per Row (n)	3		
Horiz distance from bm edge to first bolt row	2	in	
Bolt Type	3/4" A325-N		
φrn (dbl shr) per bolt	35.8	k	
ex (beam-side bolt group)	18.5	in	
C (from Manual T7-7, θ=0, s=3)	0.83		5-235
φRn=Cφrn (beam-side bolt group)	29.7	k	
Check vs. Gravity Vu	OK	0.50	
ex (gusset-side bolt group)	10.5	in	
C (from Manual T7-7, θ=0, s=3)	1.40		5-236
φRn=Cφrn (gusset-side bolt group)	50.1	k	
Check vs. Gravity Vu	OK	0.30	
Avg gusset-to-bm conn length minus 1" snip	13.0	in	5-236
Point from Col Face (grav + seis)	7.0	in	
Ru	30.0	k	
Y	30.0	deg	
ex(grav+seis to gusset-side bolt group)	3.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	4.70		5-237
φRn=Cφrn (gusset-side bolt group)	168.26	k	
Check vs. Ru (grav + seis)	OK	0.18	
ex(grav+seis to beam-side bolt group)	11.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	2.33		5-237
C (to use, if Manual angle too conservative)	2.33		
φRn=Cφrn (gusset-side bolt group)	83.41	k	
Check vs. Ru (grav + seis)	OK	0.36	
Beam Bolt Bearing: Gravity φr	25.9	k/bolt	5-239
φRn=Cφrn	21.5	k	
Check vs. Gravity Vu	OK	0.70	
Beam Bolt Bearing: Gravity + Seis φRn=Cφrn	60.3	k	
Check vs. Ru (grav + seis)	OK	0.50	
Tearout Gravity φrn	27.5	k/bolt	
φRn=Cφrn	22.8	k	
Check vs. Gravity Vu	OK	0.66	
Tearout Gravity + Seis φrn	34.4	k/bolt	5-241
φRn=Cφrn	80.1	k	
Check vs. Ru (grav + seis)	OK	0.37	
Splice Plates - Thickness	0.25	in	
Splice Plates - Height	9.5	in	
Splice Plates - Fy	50	ksi	
Splice Plates - Fu	65		
Lu	5	in	
KL/r	83.1		
φFcr (from Manual T4-22)	27.0	ksi	
φRn=φFcrAg	128.3	k	
Check vs. Ru (grav + seis)	OK	0.23	

Splice Gross Section: Mu(spl)	255	k-in	5-242
Shear φRn	142.5	k	
Check vs. Gravity Vu	OK	0.11	
Flexure φbMn	507.7	k-in	
Check vs. Gravity Mu(spl)	OK	0.50	
Splice Net Section: Shear φRn	100.5	k	5-243
Check vs. Gravity Vu	OK	0.15	
Even or Odd # Bolts per Row	Odd		
Sum Bolt Vert Distances from CL	3.0	in	
Znet	8.7	in^3	
Flexure φbMn	422.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.60	
Center Grav+Seis Center to 1st Row Bm Bolts	10.0	in	
Mu(spl)	150.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.30	5-244
Chk Flex Rupture vs. Mu(spl)	OK	0.36	
C' (from Manual T7-7, θ=0, s=3)	15.8	in	5-245
Mmax	419.0	k-in	
tmax	0.557	in	
Check Σt < tmax	OK	0.90	

OVERALL STATUS **OK**

NOTES

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PROJECT	PSE - OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	12/6/2023
SUBJECT	BRBF Bm-Col Connections		

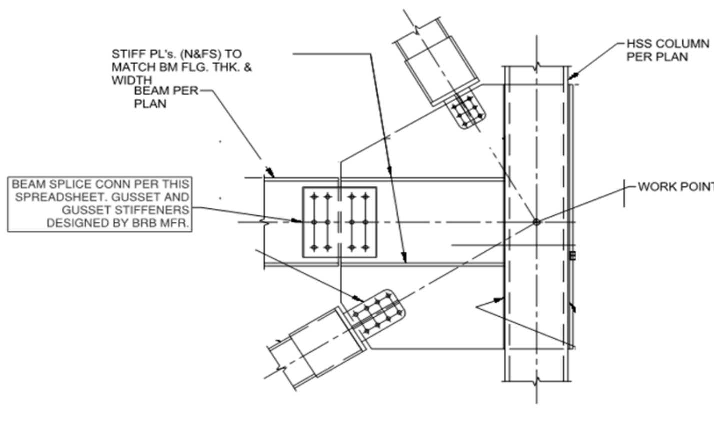
BRBF Beam-to-Extended Gusset Plate Connections

REF: AISC Seismic Design Manual 2nd Ed p. 5-233

To provide .025 rad of rotation for pinned conn per F2.6b

LOCATION BF-14 - LEVEL 2 - E&1.5

Center of Splice to Face of Column	22.5	in	
Vu (gravity)	4	k	
Pu (compression)	16	k	
Beam	W16X57		
Bm Depth	16.4	in	
Min Gap	0.21	in	
Gap Used	1	in	
Center Splice to Center Bolt Group (typ ea side)	4	in	
Vert Rows of Bolts ea side of splice	2		
# Bolts per Row (n)	4		
Horiz distance from bm edge to first bolt row	2	in	
Bolt Type	3/4" A325-N		
φrn (dbl shr) per bolt	35.8	k	
ex (beam-side bolt group)	26.5	in	
C (from Manual T7-7, θ=0, s=3)	0.97		5-235
φRn=Cφrn (beam-side bolt group)	34.7	k	
Check vs. Gravity Vu	OK	0.12	
ex (gusset-side bolt group)	18.5	in	
C (from Manual T7-7, θ=0, s=3)	1.37		5-236
φRn=Cφrn (gusset-side bolt group)	49.0	k	
Check vs. Gravity Vu	OK	0.08	
Avg gusset-to-bm conn length minus 1" snip	21.0	in	5-236
Point from Col Face (grav + seis)	11.0	in	
Ru	16.5	k	
Y	14.0	deg	
ex(grav+seis to gusset-side bolt group)	7.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	6.76		5-237
φRn=Cφrn (gusset-side bolt group)	242.01	k	
Check vs. Ru (grav + seis)	OK	0.07	
ex(grav+seis to beam-side bolt group)	15.5	in	
C (from Manual T7-7, θ=90-Y, s=3)	5.05		5-237
C (to use, if Manual angle too conservative)	5.05		
φRn=Cφrn (gusset-side bolt group)	180.79	k	
Check vs. Ru (grav + seis)	OK	0.09	
Beam Bolt Bearing: Gravity φr	37.7	k/bolt	5-239
φRn=Cφrn	36.6	k	
Check vs. Gravity Vu	OK	0.11	
Beam Bolt Bearing: Gravity + Seis φRn=Cφrn	190.5	k	
Check vs. Ru (grav + seis)	OK	0.09	
Tearout Gravity φrn	40.1	k/bolt	
φRn=Cφrn	38.9	k	
Check vs. Gravity Vu	OK	0.10	
Tearout Gravity + Seis φrn	50.1	k/bolt	5-241
φRn=Cφrn	253.1	k	
Check vs. Ru (grav + seis)	OK	0.07	
Splice Plates - Thickness	0.25	in	
Splice Plates - Height	12.5	in	
Splice Plates - Fy	50	ksi	
Splice Plates - Fu	65		
Lu	5	in	
KL/r	83.1		
φFcr (from Manual T4-22)	27.0	ksi	
φRn=φFcrAg	168.8	k	
Check vs. Ru (grav + seis)	OK	0.10	



TYP. BRACE TO COLUMN FLG CONNECTION

Splice Gross Section: Mu(spl)	100	k-in	5-242
Shear φRn	187.5	k	
Check vs. Gravity Vu	OK	0.02	
Flexure φbMn	878.9	k-in	
Check vs. Gravity Mu(spl)	OK	0.11	
Splice Net Section: Shear φRn	131.6	k	5-243
Check vs. Gravity Vu	OK	0.03	
Even or Odd # Bolts per Row	Even		
Sum Bolt Vert Distances from CL	6.0	in	
Znet	14.3	in^3	
Flexure φbMn	696.2	k-in	
Check vs. Gravity Mu(spl)	OK	0.14	
Center Grav+Seis Center to 1st Row Bm Bolts	14.0	in	
Mu(spl)	56.0	k-in	
Check vs. Gravity Mu(spl)	OK	0.06	5-244
Chk Flex Rupture vs. Mu(spl)	OK	0.08	
C' (from Manual T7-7, θ=0, s=3)	26.0	in	5-245
Mmax	689.5	k-in	
tmax	0.530	in	
Check Σt < tmax	OK	0.94	

OVERALL STATUS **OK**

NOTES

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Load Combinations:

1 ASD	D	L	L2/S	W(E)	1 LRFD	D	L	L2/S	W(E)
ASD1	1.00	0.75	0.75	0.00	LRFD 1	1.40	0.00	0.00	0.00
ASD2	1.00	1.00	0.00	0.00	LRFD 2	1.20	1.60	0.50	1.00
ASD3	1.00	0.00	1.00	0.00	LRFD 3	1.20	0.50	0.50	1.00
ASD4	1.00	0.75	0.75	0.75	LRFD 4	1.20	0.50	0.50	-1.00
ASD5	1.00	0.00	0.00	1.00	LRFD 5	0.90	0.00	0.00	1.00
ASD6	0.60	0.00	0.00	-1.00	LRFD 6	0.90	0.00	0.00	-1.00
Service TL	1.00	1.00	1.00	1.00	ServiceTL	1.00	1.00	1.00	1.00
Service LL	0.00	1.00	1.00	1.00	ServiceLL	0.90	0.00	0.00	1.00

Beam Span 9.0 ft
number: **4PLEX INT BM** Comb 1 ASD
position:
comments:

Deflection: LL 360, TL 240 (L/())

	D	L	L2/S	W(E)
Wmajor	0.356	1.000	0.000	0.000
Wminor	0.000	0.000	0.000	0.000
Axial	0.000	0.000	0.000	0.000

Reactions:	max	min
RLmajor	6.1	1.0
RRmajor	6.1	1.0

EI Req'd: LLmaj 4.9E+05; TLmaj 4.4E+05

4PLEX INT B Qty* 2 Name 2.0E LVL1.75x11.88 — Edge Bracing(x,ft) 1.0 top 9.0 bottom

Wt	9.009 plf	Cd	1.00	CL(pos)	1.00	Imaj(zz)	489 In4	Bracing (y, ft)	9.0	
d	11.9 in	Cr	1.00	CL(neg)	1.00	Imin(yy)	11 In4	Wet Use:	FALSE	
b	3.5 in	Cv	1.00			Repetitive	FALSE (TRUE/FALSE)	Duration	Live	

		Cm	Cmisc		Mode	Value	Control:pt:8	Check		Max
Fb	2600	1.00	1.00	Dimension Adj:	Mmajor	0.0	17.8	0.00	TRUE	0.77
Fv	285	1.00	1.00	b: 0.0	Vmajor	6.1	7.9	0.77	TRUE	0.77
					ΔLlmaj	716	360	0.50	TRUE	
					ΔTlmaj	528	240	0.45	TRUE	

*Members are not connected for composite action in minor axis bending

10/16/2023 C_SCL v2.00 12/5/17r2/8/19 TRUE

2 Support Beam
number: **4PLX ENTRYBM** Length: 11.5 ft Comb 1 ASD
position:
comments:
Support 1: 0.0 ft
Support 2: 10.0 ft

Deflection: LL 360, TL 240 (L/())

Span f EI Req'd:
LLmaj right overhan 1.48E+05
TLmaj center 1.41E+05

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	floor	udl-klf	0	0.0	10.0	0.137	0.100	0.000	0.000	
TRUE		udl-klf	0	3.0	7.0	0.040	0.200	0.000	0.000	
TRUE	RF	udl-klf	0	0.0	10.0	0.113	0.000	0.150	0.000	
TRUE		pt-kip	-1	11.5		1.200	0.400	0.500	3.000	
	Support 1-reaction Fy		-1	0		-1.1	-0.8	-0.9	0.5	-2.4
	Support 2-reaction Fy		-1	10		-2.7	-1.4	-1.5	-3.5	-9.0

4PLX ENTRY Qty* 2 Name 2.0E LVL1.75x11.88 — Edge Bracing(x,ft) 1.0 top 10.0 bottom

Wt	9.009 plf	Cd	1.15	CL(pos)	1.00	Imaj(zz)	489 In4	Bracing (y, ft)	10.0	
d	11.9 in	Cr	1.00	CL(neg)	1.00	Imin(yy)	11 In4	Wet Use:	FALSE	
b	3.5 in	Cv	1.00			Repetitive	FALSE (TRUE/FALSE)	Duration	Snow	

		Cm	Cmisc		Mode	Value	Control:pt:17	Check		Max
Fb	2600	1.00	1.00	Dimension Adj:	Mmajor	0.0	20.5	0.00	TRUE	0.29
				d: 0.0	Mneg	-3.2	-20.5	0.15	TRUE	0.31
Fv	285	1.00	1.00	b: 0.0	Vmajor	4.2	9.1	0.46	TRUE	0.46
					ΔLlmaj	2378	360	0.15	TRUE	
					ΔTlmaj	1668	240	0.14	TRUE	

*Members are not connected for composite action in minor axis bending

10/16/2023 C_SCL v2.00 12/5/17r2/8/19 TRUE

Beam Span 11.5 ft
number: **4PLX GE FLRBM** Comb 1 ASD
position:
comments:
holdown on perp cont memb

Deflection: LL 360, TL 240 (L/())

	D	L	L2/S	W(E)
Wmajor	0.228	0.100	0.060	0.000
Wminor	0.000	0.000	0.000	0.000
Axial	0.000	0.000	0.000	0.000

Reactions:	max	min
RLmajor	2.1	0.8
RRmajor	2.1	0.8

EI Req'd: LLmaj 1.8E+05; TLmaj 2.8E+05

4PLX GE FLR Qty* 1 Name 2.0E LVL1.75x11.88 — Edge Bracing(x,ft) 2.0 top 12.0 bottom

Wt	4.505 plf	Cd	1.15	CL(pos)	0.96	Imaj(zz)	245 In4	Bracing (y, ft)	12.0	
d	11.9 in	Cr	1.00	CL(neg)	0.38	Imin(yy)	5 In4	Wet Use:	FALSE	
b	1.75 in	Cv	1.00			Repetitive	FALSE (TRUE/FALSE)	Duration	Snow	
		Cm	Cmisc			Mode	Value	Control:pt:4	Check	Max

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Fb	2600	1.00	1.00	Dimension Adj:		Mmajor	5.9	9.9	0.60	TRUE	0.60
Fv	285	1.00	1.00	b:	0.0	Vmajor	0.0	4.5	0.00	TRUE	0.45
						ΔLlmaj	980	360	0.37	TRUE	
						ΔTlmaj	426	240	0.56	TRUE	

*Members are not connected for composite action in minor axis bending

10/16/2023 C_SCL v2.00 12/5/17r2/8/19 TRUE

2 Support Beam
number: **BLEACHER GIRDER** Length: 13.0 ft Comb 1 ASD
position:
comments:
Support 1: 1.5 ft
Support 2: 11.5 ft

Deflection: LL 360, TL 240 (L/())
Span f EI Req'd:
LLmaj left overhang 2.11E+05
TLmaj left overhang 2.52E+05

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	13.0	0.010	0.000	0.000	0.000	
TRUE		pt-kip	-1	6.5		0.975	0.000	1.300	0.000	
	Support 1-reaction Fy		-1	1.5		-0.6	0.0	-0.7	0.0	-1.2
	Support 2-reaction Fy		-1	11.5		-0.6	0.0	-0.7	0.0	-1.2

BLEACHER G Qty** 1 Name W8X10 A992 method: ASD

wt	d	h/tw	tw	bf	tf	A
10	7.89	40.5	0.17	3.94	0.205	2.96

Kxx	Kyy	Kzz
1.0	1.0	1.0

YY bracing 5.0 ft
XX bracing(top) 5.0 ft
XX bracing(bottom) 5.0 ft
ZZ Torsional Bracing 5.0 ft Cb 1.00
Fy 50
Fu 65

	S	Z	R	L	I
XX	7.81	8.87	3.22		30.8
YY	1.06	1.66	0.841	60	2.09

		Mode	Value	Control:pt:3	Check		Max
1/Ωb=	0.60	Mn,pos/Ωb	5.8	19.0	0.30	TRUE	0.30
		Mn,neg/Ωb	0.0	-19.0	0.00	TRUE	0.00
1/Ωv=	0.67	Vn*/Ωv	1.1	26.8	0.04	TRUE	0.04
		ΔLlmaj	1527	360	0.24	TRUE	
		ΔTlmaj	851	240	0.28	TRUE	

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

11/1/2023 C_ROLL3 v1.0 11/7/17 TRUE

Beam Span 15.8 ft
number: **BLEACHER PURLIN** Comb 1 ASD
position:
comments:

Deflection: LL 240, TL 240 (L/())

	D	L	L2/S	W(E)
Wmajor	0.065	0.000	0.130	0.000
Wminor	0.000	0.000	0.000	0.000
Axial	0.000	0.000	0.000	0.000

Reactions:	max	min	EI Req'd:	
RLmajor	1.5	0.3	LLmaj	2.3E+05
RRmajor	1.5	0.3	TLmaj	3.4E+05

BLEACHER P Qty 1 Name HSS5x5x0.1875 A500grB(rect) method: ASD

wt	d	w	tw	b/t	h/t	A
11.97	5	5	0.174	25.7	25.7	3.28

Kxx	Kyy
1.0	1.0

YY bracing 15.8 ft
XX bracing(top) 15.8 ft
XX bracing(bottom) 15.8 ft
Cb 1.00
Fy 46
Fu 58

	S	Z	R	L	I
XX	5.03	5.89	1.96	189.6	12.6
YY	5.03	5.89	1.96	189.6	12.6

		Mode	Value	Control:pt:3	Check		Max
1/Ωb=	0.60	Mn,pos/Ωb	6.0	13.5	0.45	TRUE	0.45
		Mn,neg/Ωb	0.0	-13.5	0.00	TRUE	0.00
1/Ωv=	0.67	Vn*/Ωv	0.0	28.6	0.00	TRUE	0.05
		ΔLlmaj	384	240	0.63	TRUE	
		ΔTlmaj	256	240	0.94	TRUE	

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
*assumes web is unstiffened (k=5)

11/1/2023 HSS v2.1 12/6/17 TRUE

2 Support Beam
number: **COL E_3.8 OOP** Length: 23.0 ft Comb 1 LRFD
position:
comments:
Support 1: 0.0 ft
Support 2: 23.0 ft

Deflection: LL 360, TL 240 (L/())
Span f EI Req'd:
LLmaj center 2.06E+06
TLmaj center 1.37E+06

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	WIND	pt-kip	-1	16.0	0.0	0.000	0.000	0.000	4.500	
	Support 1-reaction Fy		-1	0		0.0	0.0	0.0	-1.4	-1.4
	Support 2-reaction Fy		-1	23		0.0	0.0	0.0	-3.1	-3.1
	Axial Load(kip)					2.000	0.000	2.500	0.000	

COL E_3.8 O Qty 1 Name HSS8x8x0.625 A500grB(rect) method: ASD

wt	d	w	tw	b/t	h/t	A
59.32	8	8	0.581	10.8	10.8	16.4

Kxx	Kyy
1.0	1.0

YY bracing 23.0 ft
XX bracing(top) 23.0 ft
XX bracing(bottom) 23.0 ft
Cb 1.00
Fy 46
Fu 58

	S	Z	R	L	I
XX	36.5	44.7	2.99	276	146

		Mode	Value	Control:pt:10	Check		Max
1/Ωb=	0.60	Mn,pos/Ωb	0.0	102.6	0.00	TRUE	0.19

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YY	36.5	44.7	2.99	276	146	Mn,neg/Ωb	-19.7	-102.6	0.19	TRUE	0.19
USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS):	TRUE		1/Ωv=	0.67		Vn*/Ωv	1.4	134.2	0.01	TRUE	0.02
governing kL/r:	92.3		1/Ωc=	0.60		Pn/Ωc	3.7	254.7	0.01	TRUE	0.01
						Interaction (C)	0.20	1.00	0.20	TRUE	
*assumes web is unstiffened (k=5)						ΔLlmaj	741	360	0.49	TRUE	
						ΔTlmaj	741	240	0.32	TRUE	

12/6/2023 HSS v2.1 12/6/17 TRUE

Beam Span 3.3 ft Deflection LL TL
number: **COMP HDR H1** Comb 1 ASD L/() 360 240
position:
comments:

	D	L	L2/S	W(E)
Wmajor	0.128	0.000	0.170	0.000
Wminor	0.000	0.000	0.000	0.000
Axial	0.000	0.000	0.000	0.000

Reactions:	max	min
RLmajor	0.5	0.1
RRmajor	0.5	0.1

EI Req'd: LLmaj 3.9E+03, TLmaj 4.6E+03

COMP HDR H Qty* 2 Name 2x4 HF #2 Edge Bracing(x,ft) 3.3 top 3.3 bottom

Wt	1.957 plf	Cr	1.00	CfBend	1.50	Imaj(zz)	11 In4	Bracing(y,ft)	3.3		
d	3.5 in	Cd	1.15	CfComp	1.15	Imin(yy)	2 In4	Wet Use / Incised:	FALSE	FALSE	
b	3 in	CL(pos)	1.00	CfTens	1.50		Duration	Snow	Repetitive	FALSE	(TRUE/FALSE)

		Cm x Ci	Cmisc			Mode	Value	Control:pt:3	Check		Max
				CL(neg)	1.00 Cfu 1.10						
Fb	850	1.00	1.00	Dimension Adj:		Mmajor	0.4	0.7	0.53	TRUE	0.53
Fv	150	1.00	1.00	b:	0.0	Vmajor	0.0	1.2	0.00	TRUE	0.40
E	1300	1.00	1.00			ΔLlmaj	1273	360	0.28	TRUE	
						ΔTlmaj	728	240	0.33	TRUE	

*Members are not connected for composite action in minor axis bending

11/8/2023 C_SAWN v2.00 11/13/17 TRUE

2 Support Beam Deflection LL TL
number: **DECKBM** Length: 7.0 ft Comb 1 ASD L/() 360 240
position:
comments: Support 1: 0.0 ft Support 2: 7.0 ft

Span f EI Req'd: LLmaj center 6.95E+04, TLmaj center 5.56E+04

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	floor	udl-klf	0	0.0	7.0	0.040	0.200	0.000	0.000	
TRUE		udl-klf	0	3.5	7.0	0.040	0.200	0.000	0.000	
	Support 1-reaction Fy		-1	0		-0.2	-0.9	0.0	0.0	-1.1
	Support 2-reaction Fy		-1	7		-0.2	-1.2	0.0	0.0	-1.5

DECKBM Qty* 1 Name 4x12 HF #2 Edge Bracing(x,ft) 2.0 top 7.0 bottom

Wt	7.337 plf	Cr	1.00	CfBend	1.10	Imaj(zz)	415 In4	Bracing(y,ft)	12.0		
d	11.3 in	Cd	1.00	CfComp	1.00	Imin(yy)	40 In4	Wet Use / Incised:	TRUE	TRUE	
b	3.5 in	CL(pos)	1.00	CfTens	1.00		Duration	Live	Repetitive	FALSE	(TRUE/FALSE)

		Cm x Ci	Cmisc			Mode	Value	Control:pt:14	Check		Max
				CL(neg)	0.98 Cfu 1.10						
Fb	850	0.80	1.00	Dimension Adj:		Mmajor	0.0	4.6	0.00	TRUE	0.48
				d:	0.0	Mneg	0.0	-4.5	0.00	TRUE	0.00
Fv	150	0.78	1.00	b:	0.0	Vmajor	1.5	3.1	0.48	TRUE	0.48
E	1300	0.86	1.00			ΔLlmaj	2392	360	0.15	TRUE	
						ΔTlmaj	1994	240	0.12	TRUE	

*Members are not connected for composite action in minor axis bending

10/16/2023 C_SAWN v2.00 11/13/17 TRUE

Joist Plan Span: 4.0 ft L= 4.0 ft Spacing 1.33 ft Slope: 0.00:12 0.0° Deflection LL TL
number: **DECKJST** Comb 1 ASD L/() 360 240
position:
comments:

	D	L	L2/S	W(E)
w(plan)(ksf):	0.020	0.100	0.000	0.000
w(adj)	0.020	0.100	0.000	0.000

Axial load from slope as: C (T or C)
dead & wind load to be applied to actual instead of plan length: TRUE TRUE/FALSE

Reactions(kip):	max	min
RLmajor	0.32	0.032
RRmajor	0.32	0.032

EI Req'd: LLmaj 5.76E+03, TLmaj 4.61E+03

DECKJST Qty* 1 Name 2x6 HF #2 Edge Bracing(x,ft) 1.0 top 4.0 bottom

Wt	1.537 plf	Cr	1.15	CfBend	1.30	Imaj(zz)	21 In4	Bracing(y,ft)	4.0		
d	5.5 in	Cd	1.00	CfComp	1.10	Imin(yy)	2 In4	Wet Use / Incised:	TRUE	TRUE	
b	1.5 in	CL(pos)	1.00	CfTens	1.30		Duration	Live	Repetitive	TRUE	(TRUE/FALSE)

		Cm x Ci	Cmisc			Mode	Value	Control:pt:8	Check		Max
				CL(neg)	0.96 Cfu 1.15						
Fb	850	0.80	1.00	Dimension Adj:		Mmajor	0.0	0.6	0.00	TRUE	0.50
Fv	150	0.78	1.00	b:	0.0	Vmajor	0.3	0.6	0.50	TRUE	0.50
E	1300	0.86	1.00			ΔLlmaj	1445	360	0.25	TRUE	
						ΔTlmaj	1204	240	0.20	TRUE	

*Members are not connected for composite action in minor axis bending

10/16/2023 C_SAWN v2.00 11/13/17 TRUE

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2 Support Beam
number: **DS_2_A.2** Length: 31.0 ft Comb 3 LRFD alt
position:
comments:
Support 1: 0.0 ft
Support 2: 31.0 ft

Deflection	LL	TL
L/()	360	240

Span f EI Req'd:
LLmaj center 1.49E+07
TLmaj center 1.62E+07

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	31.0	0.061	0.000	0.092	0.000	
TRUE		pt-kip	-1	8.5		4.100	0.000	6.500	0.000	
TRUE		pt-kip	-1	18.5		4.100	0.000	6.500	0.000	
TRUE		pt-kip	-1	28.5		4.100	0.000	6.500	0.000	
	Support 1-reaction Fy		-1	0		-5.9	0.0	-9.3	0.0	-15.2
	Support 2-reaction Fy		-1	31		-8.3	0.0	-13.1	0.0	-21.3
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_2_A.2 Qty** 1 Name W18X40 A992 method: LRFD

wt	d	h/tw	tw	bf	tf	A
40	17.9	50.9	0.315	6.02	0.525	11.8

Kxx	Kyy	Kzz
1.0	1.0	1.0

YY bracing 31.0 ft
XX bracing(top) 10.0 ft
XX bracing(bottom) 10.0 ft
ZZ Torsional Bracing 10.0 ft Cb 1.00

Fy 50
Fu 65

	S	Z	R	L	I
XX	68.4	78.4	7.21		612
YY	6.35	10	1.27	372	19.1

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 94.5
tension hole area deduct.: 0.0 in2

		Mode	Value	Control:pt:2	Check		Max
Øb=	0.90	ØbMn,pos	206.5	220.6	0.94	TRUE	0.94
		ØbMn,neg	0.0	-220.6	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	3.2	169.2	0.02	TRUE	0.18
Øc=	0.90	ØcPn	0.0	248.3	0.00	TRUE	0.23
Øt=	0.90	ØtTn	0.0	531.0	0.00	TRUE	0.11
		Interaction (C)	0.94	1.00	0.94	TRUE	
		ΔLlmaj	430	360	0.84	TRUE	
		ΔTlmaj	263	240	0.91	TRUE	

*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_2_A.6** Length: 20.0 ft Comb 3 LRFD alt
position:
comments:
Support 1: 0.0 ft
Support 2: 20.0 ft

Deflection	LL	TL
L/()	360	240

Span f EI Req'd:
LLmaj center 7.15E+06
TLmaj center 8.52E+06

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	20.0	0.061	0.000	0.092	0.000	
TRUE		pt-kip	-1	8.5		4.100	0.000	6.500	0.000	
TRUE		pt-kip	-1	16.1		###	0.000	###	0.000	
TRUE		pt-kip	-1	18.5		4.100	0.000	6.500	0.000	
	Support 1-reaction Fy		-1	0		-5.9	0.0	-7.8	0.0	-13.7
	Support 2-reaction Fy		-1	20		-16.9	0.0	-20.8	0.0	-37.7
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_2_A.6 Qty** 1 Name W18X35 A992 method: LRFD

wt	d	h/tw	tw	bf	tf	A
35	17.7	53.5	0.3	6	0.425	10.3

Kxx	Kyy	Kzz
1.0	1.0	1.0

YY bracing 20.0 ft
XX bracing(top) 10.0 ft
XX bracing(bottom) 10.0 ft
ZZ Torsional Bracing 10.0 ft Cb 1.00

Fy 50
Fu 65

	S	Z	R	L	I
XX	57.6	66.5	7.04		510
YY	5.12	8.06	1.22	240	15.3

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 98.4
tension hole area deduct.: 0.0 in2

		Mode	Value	Control:pt:2	Check		Max
Øb=	0.90	ØbMn,pos	169.3	180.2	0.94	TRUE	0.94
		ØbMn,neg	0.0	-180.2	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	1.0	159.3	0.01	TRUE	0.34
Øc=	0.90	ØcPn	0.0	199.8	0.00	TRUE	0.11
Øt=	0.90	ØtTn	0.0	463.5	0.00	TRUE	0.05
		Interaction (C)	0.94	1.00	0.94	TRUE	
		ΔLlmaj	744	360	0.48	TRUE	
		ΔTlmaj	417	240	0.58	TRUE	

*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_2_B.8** Length: 29.4 ft Comb 3 LRFD alt
position:
comments:
Support 1: 0.0 ft
Support 2: 29.4 ft

Deflection	LL	TL
L/()	360	240

Span f EI Req'd:
LLmaj center 1.31E+07
TLmaj center 1.41E+07

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valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	29.4	0.061	0.000	0.092	0.000	
TRUE		pt-kip	-1	1.8		4.100	0.000	6.700	0.000	
TRUE		pt-kip	-1	11.8		4.100	0.000	6.700	0.000	
TRUE		pt-kip	-1	21.8		4.100	0.000	6.700	0.000	
	Support 1-reaction Fy		-1	0		-8.3	0.0	-13.4	0.0	-21.6
	Support 2-reaction Fy		-1	29.4		-5.8	0.0	-9.4	0.0	-15.3
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_2_B.8 Qty** 1 Name W18X40 A992 method: LRFD YY bracing 20.0 ft

wt	d	h/tw	tw	bf	tf	A
40	17.9	50.9	0.315	6.02	0.525	11.8

Kxx	Kyy	Kzz
1.0	1.0	1.0

XX bracing(top) 10.0 ft
XX bracing(bottom) 10.0 ft
ZZ Torsional Bracing 10.0 ft Cb 1.00
Fy 50
Fu 65

	S	Z	R	L	I
XX	68.4	78.4	7.21		612
YY	6.35	10	1.27	240	19.1

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 94.5
tension hole area deduct.: 0.0 in2

		Mode	Value	Control:pt:2	Check		Max
Øb=	0.90	ØbMn,pos	189.6	220.6	0.86	TRUE	0.86
		ØbMn,neg	0.0	-220.6	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	3.2	169.2	0.02	TRUE	0.19
Øc=	0.90	ØcPn	0.0	248.3	0.00	TRUE	0.09
Øt=	0.90	ØtTn	0.0	531.0	0.00	TRUE	0.04
		Interaction (C)	0.86	1.00	0.86	TRUE	
		ΔLlmaj	489	360	0.74	TRUE	
		ΔTlmaj	303	240	0.79	TRUE	

*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_2_C.2** Length: 26.5 ft Comb 3 LRFD alt
position:
comments: Support 1: 0.0 ft
Support 2: 26.5 ft

Deflection LL 360 TL 240 (L/())
Span f EI Req'd:
LLmaj center 8.39E+06
TLmaj center 9.06E+06

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	26.5	0.011	0.000	0.010	0.000	
TRUE		pt-kip	-1	8.3		4.100	0.000	6.700	0.000	
TRUE		pt-kip	-1	18.3		4.100	0.000	6.700	0.000	
	Support 1-reaction Fy		-1	0		-4.2	0.0	-6.8	0.0	-11.0
	Support 2-reaction Fy		-1	26.5		-4.3	0.0	-6.9	0.0	-11.1
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_2_C.2 Qty** 1 Name W16X31 A992 method: LRFD YY bracing 26.5 ft

wt	d	h/tw	tw	bf	tf	A
31	15.9	51.6	0.275	5.53	0.44	9.13

Kxx	Kyy	Kzz
1.0	1.0	1.0

XX bracing(top) 10.0 ft
XX bracing(bottom) 10.0 ft
ZZ Torsional Bracing 10.0 ft Cb 1.00
Fy 50
Fu 65

	S	Z	R	L	I
XX	47.2	54	6.41		375
YY	4.49	7.03	1.17	318	12.4

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 102.6
tension hole area deduct.: 0.0 in2

		Mode	Value	Control:pt:2	Check		Max
Øb=	0.90	ØbMn,pos	131.6	142.9	0.92	TRUE	0.92
		ØbMn,neg	0.0	-142.9	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	0.0	131.2	0.00	TRUE	0.12
Øc=	0.90	ØcPn	0.0	170.4	0.00	TRUE	0.24
Øt=	0.90	ØtTn	0.0	410.9	0.00	TRUE	0.10
		Interaction (C)	0.92	1.00	0.92	TRUE	
		ΔLlmaj	467	360	0.77	TRUE	
		ΔTlmaj	288	240	0.83	TRUE	

*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_2_C.2LOW** Length: 26.5 ft Comb 3 LRFD alt
position:
comments: Support 1: 0.0 ft
Support 2: 26.5 ft

Deflection LL 360 TL 240 (L/())
Span f EI Req'd:
LLmaj center 2.64E+06
TLmaj center 2.47E+06

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	26.5	0.085	0.000	0.210	0.000	
	Support 1-reaction Fy		-1	0		-1.1	0.0	-2.8	0.0	-3.9
	Support 2-reaction Fy		-1	26.5		-1.1	0.0	-2.8	0.0	-3.9
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_2_C.2LO Qty** 1 Name W14X22 A992 method: LRFD YY bracing 26.5 ft

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	wt	d	h/tw	tw	bf	tf	A			Kxx	Kyy	Kzz			
	22	13.7	53.3	0.23	5	0.335	6.49			1.0	1.0	1.0	XX bracing(top)	10.0	ft
													XX bracing(bottom)	10.0	ft
								Fy	50				ZZ Torsional Bracing	10.0	ft Cb 1.00

	S	Z	R	L	I			Mode	Value	Control:pt:2	Check		Max
						Fu	65						
XX	29	33.2	5.54		199	Øb=	0.90	ØbMn,pos	38.4	79.3	0.48	TRUE	0.48
YY	2.8	4.39	1.04	318	7			ØbMn,neg	0.0	-79.3	0.00	TRUE	0.00
USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS):	TRUE					Øv=	1.00	ØvVn*	0.0	94.5	0.00	TRUE	0.06
governing kL/r:	115.4					Øc=	0.90	ØcPn	0.0	97.6	0.00	TRUE	0.11
tension hole area deduct.:	0.0 in2					Øt=	0.90	ØtTn	0.0	292.1	0.00	TRUE	0.04
								Interaction (C)	0.48	1.00	0.48	TRUE	
*assumes web is unstiffened (kv=5.34)								ΔLlmaj	788	360	0.46	TRUE	
**quantity of unconnected members								ΔTlmaj	561	240	0.43	TRUE	

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_2_D.5** Length: 39.3 ft Comb 3 LRFD alt
position:
comments:
Support 1: 0.0 ft
Support 2: 39.3 ft

Deflection L/(): LL 360, TL 240

Span f EI Req'd:
LLmaj center 1.18E+07
TLmaj center 1.39E+07

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	39.3	0.011	0.000	0.010	0.000	
TRUE		pt-kip	-1	9.3		2.200	0.000	2.900	0.000	
TRUE		pt-kip	-1	19.3		2.200	0.000	2.900	0.000	
TRUE		pt-kip	-1	29.3		2.200	0.000	2.900	0.000	
	Support 1-reaction Fy		-1	0		-3.6	0.0	-4.6	0.0	-8.2
	Support 2-reaction Fy		-1	39.25		-3.5	0.0	-4.5	0.0	-7.9
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_2_D.5 Qty** 1 Name W18X40 A992 method: LRFD YY bracing 39.3 ft

	wt	d	h/tw	tw	bf	tf	A			Kxx	Kyy	Kzz			
	40	17.9	50.9	0.315	6.02	0.525	11.8			1.0	1.0	1.0	XX bracing(top)	10.0	ft
													XX bracing(bottom)	10.0	ft
								Fy	50				ZZ Torsional Bracing	10.0	ft Cb 1.00

	S	Z	R	L	I			Mode	Value	Control:pt:2	Check		Max
						Fu	65						
XX	68.4	78.4	7.21		612	Øb=	0.90	ØbMn,pos	145.9	220.6	0.66	TRUE	0.66
YY	6.35	10	1.27	471.6	19.1			ØbMn,neg	0.0	-220.6	0.00	TRUE	0.00
USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS):	TRUE					Øv=	1.00	ØvVn*	3.5	169.2	0.02	TRUE	0.07
governing kL/r:	94.5					Øc=	0.90	ØcPn	0.0	248.3	0.00	TRUE	0.11
tension hole area deduct.:	0.0 in2					Øt=	0.90	ØtTn	0.0	531.0	0.00	TRUE	0.05
								Interaction (C)	0.66	1.00	0.66	TRUE	
*assumes web is unstiffened (kv=5.34)								ΔLlmaj	543	360	0.66	TRUE	
**quantity of unconnected members								ΔTlmaj	307	240	0.78	TRUE	

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_2_D.5LOW** Length: 39.3 ft Comb 3 LRFD alt
position:
comments:
Support 1: 0.0 ft
Support 2: 39.3 ft

Deflection L/(): LL 360, TL 240

Span f EI Req'd:
LLmaj center 9.31E+06
TLmaj center 8.73E+06

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	39.3	0.093	0.000	0.228	0.000	
	Support 1-reaction Fy		-1	0		-1.8	0.0	-4.5	0.0	-6.3
	Support 2-reaction Fy		-1	39.25		-1.8	0.0	-4.5	0.0	-6.3
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_2_D.5LO Qty** 1 Name W21X44 A992 method: LRFD YY bracing 39.3 ft

	wt	d	h/tw	tw	bf	tf	A			Kxx	Kyy	Kzz			
	44	20.7	53.6	0.35	6.5	0.45	13			1.0	1.0	1.0	XX bracing(top)	10.0	ft
													XX bracing(bottom)	10.0	ft
								Fy	50				ZZ Torsional Bracing	10.0	ft Cb 1.00

	S	Z	R	L	I			Mode	Value	Control:pt:2	Check		Max
						Fu	65						
XX	81.6	95.4	8.06		843	Øb=	0.90	ØbMn,pos	91.7	264.5	0.35	TRUE	0.35
YY	6.37	10.2	1.26	471.6	20.7			ØbMn,neg	0.0	-264.5	0.00	TRUE	0.00
USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS):	TRUE					Øv=	1.00	ØvVn*	0.0	217.4	0.00	TRUE	0.04
governing kL/r:	95.2					Øc=	0.90	ØcPn	0.0	260.4	0.00	TRUE	0.06
tension hole area deduct.:	0.0 in2					Øt=	0.90	ØtTn	0.0	585.0	0.00	TRUE	0.03

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	Interaction (C)	0.35	1.00	0.35	TRUE
*assumes web is unstiffened (kv=5.34)	ΔLlmaj	946	360	0.38	TRUE
**quantity of unconnected members	ΔTlmaj	672	240	0.36	TRUE

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_3.2_HIGH** Length: 39.3 ft Comb 3 LRFD alt
position:
comments: Support 1: 0.0 ft
Support 2: 39.3 ft

Deflection LL 360, TL 240 (L/())

Span f EI Req'd:
LLmaj center 1.94E+07
TLmaj center 2.37E+07

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	39.3	0.011	0.000	0.010	0.000	
TRUE		pt-kip	-1	9.3		4.000	0.000	5.100	0.000	
TRUE		pt-kip	-1	19.3		4.000	0.000	4.400	0.000	
TRUE		pt-kip	-1	29.3		4.000	0.000	5.200	0.000	
	Support 1-reaction Fy		-1	0		-6.3	0.0	-7.7	0.0	-14.0
	Support 2-reaction Fy		-1	39.3		-6.1	0.0	-7.4	0.0	-13.6
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_3.2_HIG Qty** 1 Name W21X48 A992 method: LRFD YY bracing 39.3 ft

wt	d	h/tw	tw	bf	tf	A
48	20.6	53.6	0.35	8.14	0.43	14.1

Kxx 1.0, Kyy 1.0, Kzz 1.0
XX bracing(top) 10.0 ft
XX bracing(bottom) 10.0 ft
Fy 50 ZZ Torsional Bracing 10.0 ft Cb 1.00
Fu 65

	S	Z	R	L	I
XX	93	107	8.24		959
YY	9.52	14.9	1.66	471.6	38.7

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 72.3
tension hole area deduct.: 0.0 in2

		Mode	Value	Control:pt:2	Check		Max
Øb=	0.90	ØbMn,pos	245.8	340.4	0.72	TRUE	0.72
		ØbMn,neg	0.0	-340.4	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	5.5	216.3	0.03	TRUE	0.09
Øc=	0.90	ØcPn	0.0	337.8	0.00	TRUE	0.04
Øt=	0.90	ØtTn	0.0	634.5	0.00	TRUE	0.02
		Interaction (C)	0.72	1.00	0.72	TRUE	
		ΔLlmaj	517	360	0.70	TRUE	
		ΔTlmaj	282	240	0.85	TRUE	

*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_3.2_LOW** Length: 39.3 ft Comb 3 LRFD alt
position:
comments: Support 1: 0.0 ft
Support 2: 39.3 ft

Deflection LL 360, TL 240 (L/())

Span f EI Req'd:
LLmaj center 7.78E+06
TLmaj center 7.27E+06

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	39.3	0.076	0.000	0.190	0.000	
	Support 1-reaction Fy		-1	0		-1.5	0.0	-3.7	0.0	-5.2
	Support 2-reaction Fy		-1	39.3		-1.5	0.0	-3.7	0.0	-5.2
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_3.2_LOW Qty** 1 Name W16X31 A992 method: LRFD YY bracing 39.3 ft

wt	d	h/tw	tw	bf	tf	A
31	15.9	51.6	0.275	5.53	0.44	9.13

Kxx 1.0, Kyy 1.0, Kzz 1.0
XX bracing(top) 10.0 ft
XX bracing(bottom) 10.0 ft
Fy 50 ZZ Torsional Bracing 10.0 ft Cb 1.00
Fu 65

	S	Z	R	L	I
XX	47.2	54	6.41		375
YY	4.49	7.03	1.17	471.6	12.4

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 102.6
tension hole area deduct.: 0.0 in2

		Mode	Value	Control:pt:2	Check		Max
Øb=	0.90	ØbMn,pos	76.3	142.9	0.53	TRUE	0.53
		ØbMn,neg	0.0	-142.9	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	0.0	131.2	0.00	TRUE	0.06
Øc=	0.90	ØcPn	0.0	170.4	0.00	TRUE	0.19
Øt=	0.90	ØtTn	0.0	410.9	0.00	TRUE	0.08
		Interaction (C)	0.53	1.00	0.53	TRUE	
		ΔLlmaj	503	360	0.72	TRUE	
		ΔTlmaj	359	240	0.67	TRUE	

*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_3_A.2** Length: 35.0 ft Comb 3 LRFD alt
position:
comments: Support 1: 0.0 ft
Support 2: 35.0 ft

Deflection LL 360, TL 240 (L/())

Span f EI Req'd:
LLmaj center 3.01E+06

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TLmaj center 3.47E+06

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	35.0	0.076	0.000	0.104	0.000	
	Support 1-reaction Fy		-1	0		-1.3	0.0	-1.8	0.0	-3.2
	Support 2-reaction Fy		-1	35		-1.3	0.0	-1.8	0.0	-3.2
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_3_A.2 Qty** 1 Name W14X22 A992 method: LRFD

wt	d	h/tw	tw	bf	tf	A
22	13.7	53.3	0.23	5	0.335	6.49

Kxx	Kyy	Kzz
1.0	1.0	1.0

YY bracing 35.0 ft
XX bracing(top) 2.0 ft
XX bracing(bottom) 17.5 ft
ZZ Torsional Bracing 17.5 ft Cb 1.00

Fy 50
Fu 65

	S	Z	R	L	I
XX	29	33.2	5.54		199
YY	2.8	4.39	1.04	420	7

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 75.8
tension hole area deduct.: 0.0 in2

		Mode	Value	Control:pt:3	Check		Max
Øb=	0.90	ØbMn,pos	19.5	124.5	0.18	TRUE	0.32
		ØbMn,neg	0.0	-33.4	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	0.0	94.5	0.00	TRUE	0.05
Øc=	0.90	ØcPn	45.2	96.3	0.47	TRUE	0.47
Øt=	0.90	ØtTn	0.0	292.1	0.00	TRUE	0.15
		Interaction (C)	0.63	1.00	0.63	TRUE	
		ΔLlmaj	690	360	0.52	TRUE	
		ΔTlmaj	399	240	0.60	TRUE	

*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_3_A.2LOW** Length: 35.0 ft Comb 3 LRFD alt
position:
comments:
Support 1: 0.0 ft
Support 2: 35.0 ft

Deflection	LL	TL
L/()	240	240

Span f EI Req'd:
LLmaj center 1.94E+07
TLmaj center 2.88E+07

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	35.0	0.011	0.000	0.010	0.000	
TRUE		pt-kip	-1	5.9		4.800	0.000	8.500	0.000	
TRUE		pt-kip	-1	15.9		4.800	0.000	###	0.000	
TRUE		pt-kip	-1	25.9		4.800	0.000	8.500	0.000	
	Support 1-reaction Fy		-1	0		-8.1	0.0	-15.8	0.0	-23.9
	Support 2-reaction Fy		-1	35		-6.7	0.0	-13.2	0.0	-19.9
	Axial Load(kip)					0.000	0.000	0.000	8.600	

DS_3_A.2LO Qty** 1 Name W24X55 A992 method: LRFD

wt	d	h/tw	tw	bf	tf	A
55	23.6	54.6	0.395	7.01	0.505	16.2

Kxx	Kyy	Kzz
1.0	1.0	1.0

YY bracing 35.0 ft
XX bracing(top) 2.0 ft
XX bracing(bottom) 10.0 ft
ZZ Torsional Bracing 10.0 ft Cb 1.00

Fy 50
Fu 65

	S	Z	R	L	I
XX	114	134	9.11		1350
YY	8.3	13.3	1.34	420	29.1

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 46.1
tension hole area deduct.: 0.0 in2

		Mode	Value	Control:pt:2	Check		Max
Øb=	0.90	ØbMn,pos	344.3	502.5	0.69	TRUE	0.69
		ØbMn,neg	0.0	-385.7	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	9.4	279.7	0.03	TRUE	0.13
Øc=	0.90	ØcPn	0.0	400.1	0.00	TRUE	0.02
Øt=	0.90	ØtTn	0.0	729.0	0.00	TRUE	0.01
		Interaction (C)	0.69	1.00	0.69	TRUE	
		ΔLlmaj	485	240	0.49	TRUE	
		ΔTlmaj	326	240	0.74	TRUE	

*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_4** Length: 27.8 ft Comb 3 LRFD alt
position:
comments:
Support 1: 0.0 ft
Support 2: 27.8 ft

Deflection	LL	TL
L/()	360	240

Span f EI Req'd:
LLmaj center 7.78E+06
TLmaj center 9.65E+06

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	27.8	0.011	0.000	0.010	0.000	
TRUE		pt-kip	-1	7.3		4.800	0.000	5.600	0.000	
TRUE		pt-kip	-1	17.3		4.800	0.000	5.600	0.000	
	Support 1-reaction Fy		-1	0		-5.5	0.0	-6.4	0.0	-11.9
	Support 2-reaction Fy		-1	27.8		-4.4	0.0	-5.1	0.0	-9.5
	Axial Load(kip)					0.000	0.000	0.000	###	

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DS_4 Qty** 1 Name W16X31 A992 method: LRFD

wt	d	h/tw	tw	bf	tf	A
31	15.9	51.6	0.275	5.53	0.44	9.13

Kxx	Kyy	Kzz
1.0	1.0	1.0

YY bracing 27.8 ft
XX bracing(top) 10.0 ft
XX bracing(bottom) 10.0 ft
ZZ Torsional Bracing 10.0 ft Cb 1.00

Fy 50
Fu 65

	S	Z	R	L	I
XX	47.2	54	6.41		375
YY	4.49	7.03	1.17	333.6	12.4

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 102.6
tension hole area deduct.: 0.0 in2

		Mode	Value	Control:pt:2	Check		Max
Øb=	0.90	ØbMn,pos	138.4	142.9	0.97	TRUE	0.97
		ØbMn,neg	0.0	-142.9	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	13.1	131.2	0.10	TRUE	0.13
Øc=	0.90	ØcPn	0.0	170.4	0.00	TRUE	0.17
Øt=	0.90	ØtTn	0.0	410.9	0.00	TRUE	0.07
		Interaction (C)	0.97	1.00	0.97	TRUE	
		ΔLlmaj	503	360	0.72	TRUE	
		ΔTlmaj	270	240	0.89	TRUE	

*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_5** Length: 31.3 ft Comb 3 LRFD alt
position:
comments:
Support 1: 0.0 ft
Support 2: 31.3 ft

Deflection	LL	TL
L/()	360	240

Span f EI Req'd:
LLmaj center 1.51E+07
TLmaj center 1.80E+07

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	31.3	0.011	0.000	0.010	0.000	
TRUE		pt-kip	-1	8.5		5.900	0.000	7.600	0.000	
TRUE		pt-kip	-1	18.5		5.900	0.000	7.600	0.000	
TRUE		pt-kip	-1	28.5		3.700	0.000	4.800	0.000	
	Support 1-reaction Fy		-1	0		-7.2	0.0	-9.2	0.0	-16.4
	Support 2-reaction Fy		-1	31.3		-8.6	0.0	-11.1	0.0	-19.7
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_5 Qty** 1 Name W21X44 A992 method: LRFD

wt	d	h/tw	tw	bf	tf	A
44	20.7	53.6	0.35	6.5	0.45	13

Kxx	Kyy	Kzz
1.0	1.0	1.0

YY bracing 31.3 ft
XX bracing(top) 10.0 ft
XX bracing(bottom) 10.0 ft
ZZ Torsional Bracing 10.0 ft Cb 1.00

Fy 50
Fu 65

	S	Z	R	L	I
XX	81.6	95.4	8.06		843
YY	6.37	10.2	1.26	375.6	20.7

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 95.2
tension hole area deduct.: 0.0 in2

		Mode	Value	Control:pt:2	Check		Max
Øb=	0.90	ØbMn,pos	225.4	264.5	0.85	TRUE	0.85
		ØbMn,neg	0.0	-264.5	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	3.7	217.4	0.02	TRUE	0.13
Øc=	0.90	ØcPn	0.0	260.4	0.00	TRUE	0.09
Øt=	0.90	ØtTn	0.0	585.0	0.00	TRUE	0.04
		Interaction (C)	0.85	1.00	0.85	TRUE	
		ΔLlmaj	582	360	0.62	TRUE	
		ΔTlmaj	327	240	0.73	TRUE	

*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_A.1_1.5** Length: 40.0 ft Comb 3 LRFD alt
position:
comments:
Support 1: 0.0 ft
Support 2: 40.0 ft

Deflection	LL	TL
L/()	360	240

Span f EI Req'd:
LLmaj center 4.49E+06
TLmaj center 6.08E+06

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	40.0	0.107	0.000	0.104	0.000	
	Support 1-reaction Fy		-1	0		-2.1	0.0	-2.1	0.0	-4.2
	Support 2-reaction Fy		-1	40		-2.1	0.0	-2.1	0.0	-4.2
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_A.1_1.5 Qty** 1 Name W16X31 A992 method: LRFD

wt	d	h/tw	tw	bf	tf	A
31	15.9	51.6	0.275	5.53	0.44	9.13

Kxx	Kyy	Kzz
1.0	1.0	1.0

YY bracing 20.0 ft
XX bracing(top) 2.0 ft
XX bracing(bottom) 20.0 ft
ZZ Torsional Bracing 20.0 ft Cb 1.00

Fy 50
Fu 65

	S	Z	R	L	I
XX	47.2	54	6.41		375
YY	4.49	7.03	1.17	240	12.4

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 37.4

		Mode	Value	Control:pt:3	Check		Max
Øb=	0.90	ØbMn,pos	34.2	202.5	0.17	TRUE	0.29
		ØbMn,neg	0.0	-55.3	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	0.0	131.2	0.00	TRUE	0.04
Øc=	0.90	ØcPn	47.0	146.9	0.32	TRUE	0.32

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tension hole area deduct.: 0.0 in2	Øt= 0.90	ØtTn	0.0	410.9	0.00	TRUE	0.11
		Interaction (C)	0.47	1.00	0.47	TRUE	
*assumes web is unstiffened (kv=5.34)		ΔLlmaj	871	360	0.41	TRUE	
**quantity of unconnected members		ΔTlmaj	430	240	0.56	TRUE	

11/22/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_A_2.5** Length: 26.0 ft Comb 3 LRFD alt
position:
comments: Support 1: 0.0 ft Support 2: 26.0 ft

Deflection LL 360, TL 240 — L/()
Span f EI Req'd: LLmaj center 9.16E+06; TLmaj center 1.05E+07

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	26.0	0.011	0.000	0.010	0.000	
TRUE		pt-kip	-1	10.0		5.600	0.000	7.800	0.000	
TRUE		pt-kip	-1	19.8		5.600	0.000	7.800	0.000	
	Support 1-reaction Fy		-1	0		-4.9	0.0	-6.8	0.0	-11.7
	Support 2-reaction Fy		-1	26		-6.6	0.0	-9.1	0.0	-15.6
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_A_2.5 Qty** 1 Name W18X35 A992 method: LRFD YY bracing 26.0 ft

wt	d	h/tw	tw	bf	tf	A
35	17.7	53.5	0.3	6	0.425	10.3

Kxx	Kyy	Kzz
1.0	1.0	1.0

XX bracing(top) 10.0 ft; XX bracing(bottom) 10.0 ft; ZZ Torsional Bracing 10.0 ft; Cb 1.00
Fy 50; Fu 65

	S	Z	R	L	I
XX	57.6	66.5	7.04		510
YY	5.12	8.06	1.22	312	15.3

		Mode	Value	Control:pt:3	Check		Max
	Øb= 0.90	ØbMn,pos	79.9	180.2	0.48	TRUE	0.90
		ØbMn,neg	0.0	-180.2	0.00	TRUE	0.00
USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE	Øv= 1.00	ØvVn*	8.1	159.3	0.05	TRUE	0.14
governing kL/r: 98.4	Øc= 0.90	ØcPn	101.0	199.8	0.51	TRUE	0.51
tension hole area deduct.: 0.0 in2	Øt= 0.90	ØtTn	0.0	463.5	0.00	TRUE	0.22
		Interaction (C)	0.93	1.00	0.93	TRUE	
*assumes web is unstiffened (kv=5.34)		ΔLlmaj	581	360	0.62	TRUE	
**quantity of unconnected members		ΔTlmaj	337	240	0.71	TRUE	

11/22/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_A_3.2** Length: 23.3 ft Comb 3 LRFD alt
position:
comments: Support 1: 0.0 ft Support 2: 23.3 ft

Deflection LL 360, TL 240 — L/()
Span f EI Req'd: LLmaj center 1.15E+06; TLmaj center 1.36E+06

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	23.3	0.104	0.000	0.135	0.000	
	Support 1-reaction Fy		-1	0		-1.2	0.0	-1.6	0.0	-2.8
	Support 2-reaction Fy		-1	23.3		-1.2	0.0	-1.6	0.0	-2.8
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_A_3.2 Qty** 1 Name W12X26 A992 method: LRFD YY bracing 23.3 ft

wt	d	h/tw	tw	bf	tf	A
26	12.2	47.2	0.23	6.49	0.38	7.65

Kxx	Kyy	Kzz
1.0	1.0	1.0

XX bracing(top) 2.0 ft; XX bracing(bottom) 11.7 ft; ZZ Torsional Bracing 11.7 ft; Cb 1.00
Fy 50; Fu 65

	S	Z	R	L	I
XX	33.4	37.2	5.17		204
YY	5.34	8.17	1.51	279.6	17.3

		Mode	Value	Control:pt:3	Check		Max
	Øb= 0.90	ØbMn,pos	11.7	139.5	0.09	TRUE	0.17
		ØbMn,neg	0.0	-105.0	0.00	TRUE	0.00
USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE	Øv= 1.00	ØvVn*	0.0	84.2	0.00	TRUE	0.05
governing kL/r: 54.1	Øc= 0.90	ØcPn	32.3	200.6	0.16	TRUE	0.16
tension hole area deduct.: 0.0 in2	Øt= 0.90	ØtTn	0.0	344.3	0.00	TRUE	0.09
		Interaction (C)	0.17	1.00	0.17	TRUE	
*assumes web is unstiffened (kv=5.34)		ΔLlmaj	1848	360	0.19	TRUE	
**quantity of unconnected members		ΔTlmaj	1044	240	0.23	TRUE	

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_A_3.8** Length: 23.3 ft Comb 3 LRFD alt
position:
comments: Support 1: 0.0 ft Support 2: 23.3 ft

Deflection LL 360, TL 240 — L/()
Span f EI Req'd: LLmaj center 1.15E+06

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TLmaj center 1.36E+06

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	23.3	0.104	0.000	0.135	0.000	
	Support 1-reaction Fy		-1	0		-1.2	0.0	-1.6	0.0	-2.8
	Support 2-reaction Fy		-1	23.3		-1.2	0.0	-1.6	0.0	-2.8
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_A_3.8 Qty** 1 Name W12X14 A992 method: LRFD YY bracing 23.3 ft

wt	d	h/tw	tw	bf	tf	A
14	11.9	54.3	0.2	3.97	0.225	4.16

Kxx	Kyy	Kzz
1.0	1.0	1.0

XX bracing(top) 2.0 ft
XX bracing(bottom) 11.7 ft
ZZ Torsional Bracing 11.7 ft Cb 1.00
Fy 50
Fu 65

	S	Z	R	L	I
XX	14.9	17.4	4.62		88.6
YY	1.19	1.9	0.753	279.6	2.36

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 60.5
tension hole area deduct.: 0.0 in2

		Mode	Value	Control:pt:3	Check		Max
Øb=	0.90	ØbMn,pos	11.7	65.3	0.19	TRUE	0.35
		ØbMn,neg	0.0	-19.4	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	0.0	71.4	0.00	TRUE	0.06
Øc=	0.90	ØcPn	16.1	60.5	0.27	TRUE	0.27
Øt=	0.90	ØtTn	0.0	187.2	0.00	TRUE	0.09
		Interaction (C)	0.43	1.00	0.43	TRUE	
		ΔLlmaj	802	360	0.45	TRUE	
		ΔTlmaj	453	240	0.53	TRUE	

*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_B_4.2** Length: 26.0 ft Comb 3 LRFD alt
position:
comments:
Support 1: 0.0 ft
Support 2: 26.0 ft

Deflection	LL	TL
L/()	360	240

Span f EI Req'd:
LLmaj center 5.57E+06
TLmaj center 6.80E+06

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	26.0	0.078	0.000	0.109	0.000	
TRUE		pt-kip	-1	5.2		9.000	0.000	###	0.000	
	Support 1-reaction Fy		-1	0		-8.2	0.0	-9.8	0.0	-18.0
	Support 2-reaction Fy		-1	26		-2.8	0.0	-3.5	0.0	-6.3
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_B_4.2 Qty** 1 Name W16X31 A992 method: LRFD YY bracing 26.0 ft

wt	d	h/tw	tw	bf	tf	A
31	15.9	51.6	0.275	5.53	0.44	9.13

Kxx	Kyy	Kzz
1.0	1.0	1.0

XX bracing(top) 2.0 ft
XX bracing(bottom) 10.8 ft
ZZ Torsional Bracing 10.8 ft Cb 1.00
Fy 50
Fu 65

	S	Z	R	L	I
XX	47.2	54	6.41		375
YY	4.49	7.03	1.17	312	12.4

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 48.7
tension hole area deduct.: 0.0 in2

		Mode	Value	Control:pt:2	Check		Max
Øb=	0.90	ØbMn,pos	123.0	202.5	0.61	TRUE	0.61
		ØbMn,neg	0.0	-134.8	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	3.7	131.2	0.03	TRUE	0.19
Øc=	0.90	ØcPn	0.0	206.6	0.00	TRUE	0.13
Øt=	0.90	ØtTn	0.0	410.9	0.00	TRUE	0.07
		Interaction (C)	0.61	1.00	0.61	TRUE	
		ΔLlmaj	703	360	0.51	TRUE	
		ΔTlmaj	384	240	0.62	TRUE	

*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_C_2.5** Length: 29.3 ft Comb 3 LRFD alt
position:
comments:
Support 1: 0.0 ft
Support 2: 29.3 ft

Deflection	LL	TL
L/()	360	240

Span f EI Req'd:
LLmaj center 1.07E+07
TLmaj center 1.29E+07

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	29.3	0.110	0.000	0.010	0.000	
TRUE		pt-kip	-1	6.8		3.900	0.000	6.100	0.000	
TRUE		pt-kip	-1	16.8		3.900	0.000	6.100	0.000	
TRUE		pt-kip	-1	26.8		3.900	0.000	6.100	0.000	
	Support 1-reaction Fy		-1	0		-6.6	0.0	-8.0	0.0	-14.6
	Support 2-reaction Fy		-1	29.3		-8.3	0.0	-10.6	0.0	-19.0
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_C_2.5 Qty** 1 Name W18X40 A992 method: LRFD YY bracing 29.3 ft

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wt	d	h/tw	tw	bf	tf	A
40	17.9	50.9	0.315	6.02	0.525	11.8

Kxx	Kyy	Kzz
1.0	1.0	1.0

XX bracing(top) 10.0 ft
XX bracing(bottom) 10.0 ft
ZZ Torsional Bracing 10.0 ft Cb 1.00
Fy 50
Fu 65

	S	Z	R	L	I
XX	68.4	78.4	7.21		612
YY	6.35	10	1.27	351.6	19.1

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 94.5
tension hole area deduct.: 0.0 in2

		Mode	Value	Control:pt:2	Check		Max
Øb=	0.90	ØbMn,pos	173.3	220.6	0.79	TRUE	0.79
		ØbMn,neg	0.0	-220.6	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	4.0	169.2	0.02	TRUE	0.16
Øc=	0.90	ØcPn	0.0	248.3	0.00	TRUE	0.30
Øt=	0.90	ØtTn	0.0	531.0	0.00	TRUE	0.14
		Interaction (C)	0.79	1.00	0.79	TRUE	
		ΔLlmaj	595	360	0.61	TRUE	
		ΔTlmaj	330	240	0.73	TRUE	

*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

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2 Support Beam
number: **DS_E_1.2** Length: 18.5 ft Comb 3 LRFD alt
position:
comments:
Support 1: 0.0 ft
Support 2: 18.5 ft

Deflection	LL	TL
L/()	360	240

Span f EI Req'd:
LLmaj center 4.40E+05
TLmaj center 5.93E+05

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	18.5	0.105	0.000	0.103	0.000	
	Support 1-reaction Fy		-1	0		-1.0	0.0	-1.0	0.0	-1.9
	Support 2-reaction Fy		-1	18.5		-1.0	0.0	-1.0	0.0	-1.9
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_E_1.2 Qty** 1 Name W12X19 A992 method: LRFD YY bracing 18.5 ft

wt	d	h/tw	tw	bf	tf	A
19	12.2	46.2	0.235	4.01	0.35	5.57

Kxx	Kyy	Kzz
1.0	1.0	1.0

XX bracing(top) 2.0 ft
XX bracing(bottom) 18.5 ft
ZZ Torsional Bracing 18.5 ft Cb 1.00
Fy 50
Fu 65

	S	Z	R	L	I
XX	21.3	24.7	4.82		130
YY	1.88	2.98	0.822	222	3.76

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 46.1
tension hole area deduct.: 0.0 in2

		Mode	Value	Control:pt:3	Check		Max
Øb=	0.90	ØbMn,pos	7.2	92.6	0.08	TRUE	0.13
		ØbMn,neg	0.0	-18.4	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	0.0	86.0	0.00	TRUE	0.03
Øc=	0.90	ØcPn	20.0	84.1	0.24	TRUE	0.24
Øt=	0.90	ØtTn	0.0	250.7	0.00	TRUE	0.08
		Interaction (C)	0.31	1.00	0.31	TRUE	
		ΔLlmaj	3083	360	0.12	TRUE	
		ΔTlmaj	1527	240	0.16	TRUE	

*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

11/22/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_E_2.1** Length: 24.1 ft Comb 3 LRFD alt
position:
comments:
Support 1: 0.0 ft
Support 2: 24.1 ft

Deflection	LL	TL
L/()	360	240

Span f EI Req'd:
LLmaj center 5.52E+06
TLmaj center 6.23E+06

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	24.1	0.011	0.000	0.010	0.000	
TRUE		pt-kip	-1	8.0		3.700	0.000	6.100	0.000	
TRUE		pt-kip	-1	18.0		4.000	0.000	5.000	0.000	
	Support 1-reaction Fy		-1	0		-3.6	0.0	-5.5	0.0	-9.1
	Support 2-reaction Fy		-1	24.1		-4.3	0.0	-5.9	0.0	-10.2
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_E_2.1 Qty** 1 Name W16X31 A992 method: LRFD YY bracing 24.1 ft

wt	d	h/tw	tw	bf	tf	A
31	15.9	51.6	0.275	5.53	0.44	9.13

Kxx	Kyy	Kzz
1.0	1.0	1.0

XX bracing(top) 10.0 ft
XX bracing(bottom) 10.0 ft
ZZ Torsional Bracing 10.0 ft Cb 1.00
Fy 50
Fu 65

	S	Z	R	L	I
XX	47.2	54	6.41		375
YY	4.49	7.03	1.17	289.2	12.4

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 102.6
tension hole area deduct.: 0.0 in2

		Mode	Value	Control:pt:2	Check		Max
Øb=	0.90	ØbMn,pos	102.3	142.9	0.72	TRUE	0.72
		ØbMn,neg	0.0	-142.9	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	1.4	131.2	0.01	TRUE	0.11
Øc=	0.90	ØcPn	0.0	170.4	0.00	TRUE	0.22
Øt=	0.90	ØtTn	0.0	410.9	0.00	TRUE	0.09
		Interaction (C)	0.72	1.00	0.72	TRUE	

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*assumes web is unstiffened (kv=5.34)	ΔLlmaj	709	360	0.51	TRUE
**quantity of unconnected members	ΔTlmaj	419	240	0.57	TRUE

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_E_2.5** Length: 34.0 ft Comb 3 LRFD alt
position:
comments: Support 1: 0.0 ft; Support 2: 34.0 ft

Deflection LL 360, TL 240 L/()
Span f EI Req'd: LLmaj center 1.30E+07; TLmaj center 1.58E+07

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	34.0	0.011	0.000	0.010	0.000	
TRUE		pt-kip	-1	4.0		4.000	0.000	4.900	0.000	
TRUE		pt-kip	-1	14.0		4.000	0.000	4.900	0.000	
TRUE		pt-kip	-1	24.0		4.000	0.000	4.900	0.000	
	Support 1-reaction Fy		-1	0		-7.2	0.0	-8.8	0.0	-16.1
	Support 2-reaction Fy		-1	34		-5.1	0.0	-6.2	0.0	-11.4
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_E_2.5 Qty** 1 Name W21X44 A992 method: LRFD

YY bracing 34.0 ft; XX bracing(top) 10.0 ft; XX bracing(bottom) 10.0 ft; ZZ Torsional Bracing 10.0 ft Cb 1.00

wt	d	h/tw	tw	bf	tf	A
44	20.7	53.6	0.35	6.5	0.45	13

Kxx	Kyy	Kzz
1.0	1.0	1.0

Fy 50; Fu 65

	S	Z	R	L	I
XX	81.6	95.4	8.06		843
YY	6.37	10.2	1.26	408	20.7

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 95.2
tension hole area deduct.: 0.0 in2

		Mode	Value	Control:pt:2	Check		Max
Øb=	0.90	ØbMn,pos	181.2	264.5	0.68	TRUE	0.68
		ØbMn,neg	0.0	-264.5	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	3.0	217.4	0.01	TRUE	0.10
Øc=	0.90	ØcPn	0.0	260.4	0.00	TRUE	0.19
Øt=	0.90	ØtTn	0.0	585.0	0.00	TRUE	0.09
		Interaction (C)	0.68	1.00	0.68	TRUE	
		ΔLlmaj	677	360	0.53	TRUE	
		ΔTlmaj	371	240	0.65	TRUE	

*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_E_3** Length: 26.5 ft Comb 3 LRFD alt
position:
comments: Support 1: 0.0 ft; Support 2: 26.5 ft

Deflection LL 360, TL 240 L/()
Span f EI Req'd: LLmaj center 6.32E+06; TLmaj center 6.85E+06

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	26.5	0.011	0.000	0.010	0.000	
TRUE		pt-kip	-1	4.0		4.000	0.000	5.000	0.000	
TRUE		pt-kip	-1	14.0		3.300	0.000	6.000	0.000	
	Support 1-reaction Fy		-1	0		-5.1	0.0	-7.2	0.0	-12.3
	Support 2-reaction Fy		-1	26.5		-2.5	0.0	-4.1	0.0	-6.5
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_E_3 Qty** 1 Name W18X35 A992 method: LRFD

YY bracing 26.5 ft; XX bracing(top) 10.0 ft; XX bracing(bottom) 10.0 ft; ZZ Torsional Bracing 10.0 ft Cb 1.00

wt	d	h/tw	tw	bf	tf	A
35	17.7	53.5	0.3	6	0.425	10.3

Kxx	Kyy	Kzz
1.0	1.0	1.0

Fy 50; Fu 65

	S	Z	R	L	I
XX	57.6	66.5	7.04		510
YY	5.12	8.06	1.22	318	15.3

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 98.4
tension hole area deduct.: 0.0 in2

		Mode	Value	Control:pt:2	Check		Max
Øb=	0.90	ØbMn,pos	112.9	180.2	0.63	TRUE	0.63
		ØbMn,neg	0.0	-180.2	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	4.5	159.3	0.03	TRUE	0.11
Øc=	0.90	ØcPn	0.0	199.8	0.00	TRUE	0.32
Øt=	0.90	ØtTn	0.0	463.5	0.00	TRUE	0.14
		Interaction (C)	0.63	1.00	0.63	TRUE	
		ΔLlmaj	842	360	0.43	TRUE	
		ΔTlmaj	518	240	0.46	TRUE	

*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_E_3.2** Length: 25.3 ft Comb 3 LRFD alt
position:
comments: Support 1: 0.0 ft

Deflection LL 360, TL 240 L/()
Span f EI Req'd:

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Support 2: 25.3 ft
LLmaj center 0.00E+00
TLmaj center 3.64E+05

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	25.3	0.050	0.000	0.000	0.000	
	Support 1-reaction Fy		-1	0		-0.6	0.0	0.0	0.0	-0.6
	Support 2-reaction Fy		-1	25.3		-0.6	0.0	0.0	0.0	-0.6
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_E_3.2 Qty** 1 Name W12X40 A992 method: LRFD YY bracing 25.3 ft

wt	d	h/tw	tw	bf	tf	A
40	11.9	33.6	0.295	8.01	0.515	11.7

Kxx	Kyy	Kzz
1.0	1.0	1.0

XX bracing(top) 25.3 ft
XX bracing(bottom) 25.3 ft
Fy 50 ZZ Torsional Bracing 25.3 ft Cb 1.00
Fu 65

	S	Z	R	L	I
XX	51.5	57	5.13		307
YY	11	16.8	1.94	303.6	44.1

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 156.5
tension hole area deduct.: 0.0 in2
**quantity of unconnected members

		Mode	Value	Control:pt:3	Check		Max
Øb=	0.90	ØbMn,pos	5.6	106.1	0.06	TRUE	0.06
		ØbMn,neg	0.0	-106.1	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	0.0	105.3	0.00	TRUE	0.01
Øc=	0.90	ØcPn	64.2	107.9	0.59	TRUE	0.59
Øt=	0.90	ØtTn	0.0	526.5	0.00	TRUE	0.12
		Interaction (C)	0.65	1.00	0.65	TRUE	
		ΔTlmaj	5864	240	0.04	TRUE	

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam
number: **DS_E_4.3** Length: 36.8 ft Comb 3 LRFD alt
position:
comments: Support 1: 0.0 ft
Support 2: 36.8 ft

Deflection LL 360, TL 240 L/()
Span f EI Req'd:
LLmaj center 4.41E+06
TLmaj center 5.16E+06

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	36.8	0.099	0.000	0.131	0.000	
	Support 1-reaction Fy		-1	0		-1.8	0.0	-2.4	0.0	-4.2
	Support 2-reaction Fy		-1	36.8		-1.8	0.0	-2.4	0.0	-4.2
	Axial Load(kip)					0.000	0.000	0.000	###	

DS_E_4.3 Qty** 1 Name W16X26 A992 method: LRFD YY bracing 36.8 ft

wt	d	h/tw	tw	bf	tf	A
26	15.7	56.8	0.25	5.5	0.345	7.68

Kxx	Kyy	Kzz
1.0	1.0	1.0

XX bracing(top) 2.0 ft
XX bracing(bottom) 12.0 ft
Fy 50 ZZ Torsional Bracing 12.0 ft Cb 1.00
Fu 65

	S	Z	R	L	I
XX	38.4	44.2	6.26		301
YY	3.49	5.48	1.12	441.6	9.59

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
governing kL/r: 70.5
tension hole area deduct.: 0.0 in2
*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

		Mode	Value	Control:pt:3	Check		Max
Øb=	0.90	ØbMn,pos	28.0	165.8	0.21	TRUE	0.34
		ØbMn,neg	0.0	-89.4	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	0.0	114.8	0.00	TRUE	0.05
Øc=	0.90	ØcPn	86.8	142.5	0.61	TRUE	0.61
Øt=	0.90	ØtTn	0.0	345.6	0.00	TRUE	0.25
		Interaction (C)	0.80	1.00	0.80	TRUE	
		ΔLlmaj	713	360	0.50	TRUE	
		ΔTlmaj	406	240	0.59	TRUE	

10/30/2023 C_ROLL3 v1.0 11/7/17 TRUE

Joist Plan Span: 7.0 ft L= 7.0 ft Spacing 1.33 ft Slope: 0.00:12 0.0°
number: **FLRJST 7FT** Comb 1 ASD
position:
comments:

Deflection LL 360, TL 240 L/()

	D	L	L2/S	W(E)
w(plan)(ksf):	0.020	0.100	0.000	0.000
w(adj)	0.020	0.100	0.000	0.000

Axial load from slope as: C (T or C)
dead & wind load to be applied to actual instead of plan length: TRUE TRUE/FALSE

Reactions(kip):	max	min
RLmajor	0.56	0.056
RRmajor	0.56	0.056

EI Req'd:
LLmaj 3.09E+04
TLmaj 2.47E+04

FLRJST 7FT Qty* 1 Name 2x8 HF #2 Edge Bracing(x,ft) 1.0 top 7.0 bottom

Wt	2.026 plf			Cr	1.15	CfBend	1.20	
d	7.3 in			Cd	1.00	CfComp	1.05	
b	1.5 in			CL(pos)	1.00	CfTens	1.20	
		Cm x Ci	Cmisc	CL(neg)	0.79	Cfu	1.15	
Fb	850	1.00	1.00	Dimension Adj:				
Fv	150	1.00	1.00	b:	0.0			
E	1300	1.00	1.00					

Imaj(zz) 48 In4 Bracing(y,ft) 7.0
Imin(yy) 2 In4 Wet Use / Incised: FALSE FALSE
Duration Live Repetitive TRUE (TRUE/FALSE)

Mode	Value	Control:pt:2	Check		Max
Mmajor	1.0	1.3	0.76	TRUE	0.76
Vmajor	0.0	1.1	0.00	TRUE	0.51
ΔLlmaj	722	360	0.50	TRUE	
ΔTlmaj	602	240	0.40	TRUE	

*Members are not connected for composite action in minor axis bending

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Joist Plan Span: 10.0 ft L= 10.0 ft Spacing 1.33 ft Slope: 0.00:12 0.0° Deflection LL TL
number: **FLRJST_10FT** Comb 1 ASD L/() 360 240
position:

		D	L	L2/S	W(E)
comments:	w(plan)(ksf):	0.020	0.100	0.000	0.000
	w(adj)	0.020	0.100	0.000	0.000

Axial load from slope as: C (T or C)
dead & wind load to be applied to actual instead of plan length: TRUE TRUE/FALSE

Reactions(kip):	max	min	EI Req'd:	
RLmajor	0.798	0.08	LLmaj	8.98E+04
RRmajor	0.798	0.08	TLmaj	7.18E+04

FLRJST_10F Qty* 1 Name 2x12 HF #2 Edge Bracing(x,ft) 1.0 top 10.0 bottom

Wt	3.144 plf	Cr	1.15	CfBend	1.00	Imaj(zz)	178 In4	Bracing(y,ft)	10.0		
d	11.3 in	Cd	1.00	CfComp	1.00	Imin(yy)	3 In4	Wet Use / Incised:	FALSE	FALSE	
b	1.5 in	CL(pos)	1.00	CfTens	1.00		Duration Live	Repetitive	TRUE	(TRUE/FALSE)	

		Cm x Ci	Cmisc		Mode	Value	Control:pt:2	Check		Max
CL(neg) 0.48 Cfu 1.20										
Fb	850	1.00	1.00	Dimension Adj:	Mmajor	2.0	2.6	0.77	TRUE	0.77
Fv	150	1.00	1.00	b: 0.0	Vmajor	0.0	1.7	0.00	TRUE	0.47
E	1300	1.00	1.00		ΔLImaj	928	360	0.39	TRUE	
					ΔTImaj	773	240	0.31	TRUE	

*Members are not connected for composite action in minor axis bending

10/16/2023 C_SAWN v2.00 11/13/17 TRUE

Beam Span 25.4 ft Deflection LL TL
number: **LRBM_E_3.5_OOP** Comb 1 LRFD L/() 168 168
position:

comments:	D	L	L2/S	W(E)
Wmajor	0.050	0.000	0.000	0.000
Wminor	0.000	0.000	0.000	0.230
Axial	0.000	0.000	0.000	0.000

Reactions:	max	min	EI Req'd:	
RLmajor	0.9	0.6	LLmaj	2.3E+05
RRmajor	0.9	0.6	TLmaj	2.6E+05
RLminor	2.9	-2.9	LLmin	1.2E+06
RRminor	2.9	-2.9	TLmin	1.2E+06

LRBM_E_3.5 Qty** 1 Name W12X40 A992 method: LRFD YY bracing 25.3 ft

wt	d	h/tw	tw	bf	tf	A
40	11.9	33.6	0.295	8.01	0.515	11.7

Kxx	Kyy	Kzz
1.0	1.0	1.0

XX bracing(top) 25.3 ft
XX bracing(bottom) 25.3 ft
Fy 50 ZZ Torsional Bracing 25.3 ft Cb 1.00
Fu 65

	S	Z	R	L	I
XX	51.5	57	5.13		307
YY	11	16.8	1.94	303.6	44.1

		Mode	Value	Control:pt:4	Check		Max
Øb=	0.90	ØbMn,pos	4.8	106.1	0.05	TRUE	0.05
		ØbMn,neg	0.0	-106.1	0.00	TRUE	0.00
Øv=	1.00	ØvVn*	0.0	105.3	0.00	TRUE	0.01
		ØbMn,min	-18.5	63.0	0.29	TRUE	0.29
Øv=	1.00	ØvVn,min	0.0	247.5	0.00	TRUE	0.01
		ΔLImaj	6439	168	0.03	TRUE	
		ΔTImaj	5795	168	0.03	TRUE	
		ΔLImin	362	168	0.46	TRUE	
		ΔTImin	181	168	0.93	TRUE	

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
MAX MOMENT MAGNIFIER: 1.000
*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

12/6/2023 C_ROLL3 v1.0 11/7/17 TRUE

2 Support Beam Deflection LL TL
number: **MANIFOLD GIRDER** Length: 8.0 ft Comb 1 ASD L/() 360 240
position:
comments: Support 1: 0.0 ft Support 2: 8.0 ft

Span f	EI Req'd:
LLmaj center	8.84E+04
TLmaj center	8.77E+04

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	RF	udl-klf	0	0.0	8.0	0.015	0.000	0.000	0.000	
TRUE		pt-kip	-1	4.0		0.548	0.000	1.279	0.000	
	Support 1-reaction Fy		-1	0		-0.3	0.0	-0.6	0.0	-1.0
	Support 2-reaction Fy		-1	8		-0.3	0.0	-0.6	0.0	-1.0

MANIFOLD G Qty** 1 Name W6X15 A992 method: ASD YY bracing 5.0 ft

wt	d	h/tw	tw	bf	tf	A
15	5.99	21.2	0.23	5.99	0.26	4.43

Kxx	Kyy	Kzz
1.0	1.0	1.0

XX bracing(top) 5.0 ft
XX bracing(bottom) 5.0 ft
Fy 50 ZZ Torsional Bracing 5.0 ft Cb 1.00
Fu 65

	S	Z	R	L	I
XX	9.72	10.8	2.56		29.1
YY	3.11	4.75	1.45	60	9.32

		Mode	Value	Control:pt:3	Check		Max
1/Ωb=	0.60	Mn,pos/Ωb	3.8	25.4	0.15	TRUE	0.15
		Mn,neg/Ωb	0.0	-25.4	0.00	TRUE	0.00
1/Ωv=	0.67	Vn*/Ωv	0.9	27.6	0.03	TRUE	0.04
		ΔLImaj	3436	360	0.10	TRUE	

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
*assumes web is unstiffened (kv=5.34)

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**quantity of unconnected members ΔTlmaj 2310 240 0.10 TRUE

11/29/2023 C_ROLL3 v1.0 11/7/17 TRUE

Beam Span 14.2 ft
number: **MANIFOLD PURLIN** Comb 1 ASD
position:
comments:

	D	L	L2/S	W(E)
Wmajor	0.048	0.000	0.166	0.000
Wminor	0.000	0.000	0.000	0.000
Axial	0.000	0.000	0.000	0.000

Reactions:	max	min
RLmajor	1.5	0.2
RRmajor	1.5	0.2

Deflection	LL	TL
L/()	240	180

EI Req'd: LLmaj 2.1E+05, TLmaj 2.1E+05

MANIFOLD P Qty 1 Name HSS4x4x0.25 A500grB(rect) method: ASD YY bracing 14.2 ft; XX bracing(top) 14.2 ft; XX bracing(bottom) 14.2 ft

wt	d	w	tw	b/t	h/t	A
12.21	4	4	0.233	14.2	14.2	3.37

Kxx 1.0 Kyy 1.0

Fy 46 Cb 1.00
Fu 58

	S	Z	R	L	I
XX	3.9	4.69	1.52	170.4	7.8
YY	3.9	4.69	1.52	170.4	7.8

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
*assumes web is unstiffened (k=5)

		Mode	Value	Control:pt:3	Check		Max
1/Ωb=	0.60	Mn,pos/Ωb	5.4	10.8	0.50	TRUE	0.50
		Mn,neg/Ωb	0.0	-10.8	0.00	TRUE	0.00
1/Ωv=	0.67	Vn*/Ωv	0.0	28.4	0.00	TRUE	0.05
		ΔLlmaj	253	240	0.95	TRUE	
		ΔTlmaj	197	180	0.91	TRUE	

11/29/2023 HSS v2.1 12/6/17 TRUE

2 Support Beam
number: **opwallbeam** Length: 46.5 ft Comb 1 ASD
position:
comments: Support 1: 0.0 ft; Support 2: 46.5 ft

Deflection	LL	TL
L/()	2232	240

Span f EI Req'd: LLmaj center 3.99E+08; TLmaj center 5.44E+07

valid	Description	Type	type	Start	End	D	L	L2/S	W(E)	
TRUE	rf	udl-klf	0	0.0	46.5	0.255	0.200	0.000	0.000	
TRUE		tdl-klf/	1	0.0	7.0	0.000	0.022	0.000	0.000	
TRUE		tdl-klf/	1	32.5	46.5	0.000	0.051	0.000	0.000	
TRUE		pt-kip	-1	23.3		0.000	5.400	0.000	0.000	
	Support 1-reaction Fy		-1	0		-5.9	-15.8	0.0	0.0	-21.7
	Support 2-reaction Fy		-1	46.5		-5.9	-27.7	0.0	0.0	-33.6

opwallbeam Qty** 1 Name W40X211 A992 method: ASD YY bracing 46.0 ft; XX bracing(top) 1.0 ft; XX bracing(bottom) 46.0 ft; ZZ Torsional Bracing 46.0 ft

wt	d	h/tw	tw	bf	tf	A
211	39.4	45.6	0.75	11.8	1.42	62

Kxx 1.0 Kyy 1.0 Kzz 1.0

Fy 50 Cb 1.00
Fu 65

	S	Z	R	L	I
XX	786	906	15.8		15500
YY	66.1	105	2.51	552	390

USE MOMENT MAGNIFIER FOR (2ND ORDER EFFECTS): TRUE
*assumes web is unstiffened (kv=5.34)
**quantity of unconnected members

		Mode	Value	Control:pt:2	Check		Max
1/Ωb=	0.60	Mn,pos/Ωb	335.7	2260.5	0.15	TRUE	0.15
		Mn,neg/Ωb	0.0	-656.3	0.00	TRUE	0.00
1/Ωv=	0.67	Vn*/Ωv	0.2	591.0	0.00	TRUE	0.06
		ΔLlmaj	2517	2232	0.89	TRUE	
		ΔTlmaj	1983	240	0.12	TRUE	

10/27/2023 C_ROLL3 v1.0 11/7/17 TRUE

Beam Span 9.0 ft
number: **RES_INT BM** Comb 1 ASD
position:
comments:

	D	L	L2/S	W(E)
Wmajor	0.256	0.500	0.000	0.000
Wminor	0.000	0.000	0.000	0.000
Axial	0.000	0.000	0.000	0.000

Reactions:	max	min
RLmajor	3.4	0.7
RRmajor	3.4	0.7

Deflection	LL	TL
L/()	360	240

EI Req'd: LLmaj 2.5E+05, TLmaj 2.5E+05

RES_INT BM Qty* 1 Name 6x12 Beam HF #1 Edge Bracing(x, ft) 2.0 top 9.0 bottom

Wt	11.79 plf	Cd	1.00	CfBend	1.00	Imaj(zz)	697 In4
d	11.5 in	CL(pos)	1.00	CfComp	1.00	Imin(yy)	159 In4
b	5.5 in	CL(neg)	0.99	CfTens	1.00		

Bracing(y, ft) 12.0
Wet Use / Incised: FALSE FALSE
Duration Live

		Cm x Ci	Cfu	Cmisc
Fb	1050	1.00	0.74	1.00
Fv	140	1.00	1.00	1.00
E	1300	1.00	0.90	1.00

Dimension Adj: b: 0.0

Mode	Value	Control:pt:2	Check		Max
Mmajor	7.7	10.6	0.72	TRUE	0.72
Vmajor	0.0	5.9	0.00	TRUE	0.58
ΔLlmaj	1326	360	0.27	TRUE	
ΔTlmaj	877	240	0.27	TRUE	

*Members are not connected for composite action in minor axis bending

10/16/2023 C_TIMB v2.00 11/13/17 TRUE

Joist Plan Span: 12.5 ft L= 12.6 ft Spacing 2.00 ft Slope: 1.50:12 7.1°
number: **trash joist** Comb 1 ASD

Deflection	LL	TL
L/()	240	180

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Project:	PSE OTC
Project #:	021239 Page ____ of ____
By	DL Date
Subject	MISC FRAMING

		D	L	L2/S	W(E)					
position:										
comments:	w(plan)(ksf):	0.015	0.000	0.020	0.000	Reactions(kip):	max	min	EI Req'd:	
	w(adj)	0.015	0.000	0.020	0.000	RLmajor	0.44	0.114	LLmaj	3.60E+04
	Axial load from slope as:	C	(T or C)			RRmajor	0.44	0.114	TLmaj	4.74E+04
dead & wind load to be applied to actual instead of plan length:		TRUE	TRUE/FALSE							

trash joist	Qty*	1	Name		2x8	HF #2		Edge Bracing(x,ft)	1.0	top	12.5	bottom
Wt	2.026 plf			Cr	1.15	CfBend	1.20	Imaj(zz)	48 In4	Bracing(y,ft)	12.5	
d	7.3 in			Cd	1.15	CfComp	1.05	Imin(yy)	2 In4	Wet Use / Incised:	FALSE	FALSE
b	1.5 in			CL(pos)	1.00	CfTens	1.20		Duration Snow	Repetitive	TRUE	(TRUE/FALSE)
		Cm x Ci	Cmisc	CL(neg)	0.47	Cfu	1.15	Mode	Value	Control:pt:3	Check	Max
Fb	850	1.00	1.00	Dimension Adj:				Mmajor	1.4	1.5	0.94 TRUE	0.94
Fv	150	1.00	1.00	b:	0.0			Vmajor	0.0	1.3	0.00 TRUE	0.35
Fc	1300	1.00	1.00					Pallow	0.1	8.3	0.01 TRUE	0.01
								Interaction (C)	0.95	1.00	0.95 TRUE	
E	1300	1.00	1.00					ΔLImaj	413	240	0.58 TRUE	
*Members are not connected for composite action in minor axis bending								ΔTImaj	235	180	0.76 TRUE	

11/1/2023 C_SAWN v2.00 11/13/17 TRUE

Current Date: 12/6/2023 9:05 PM
Units system: English
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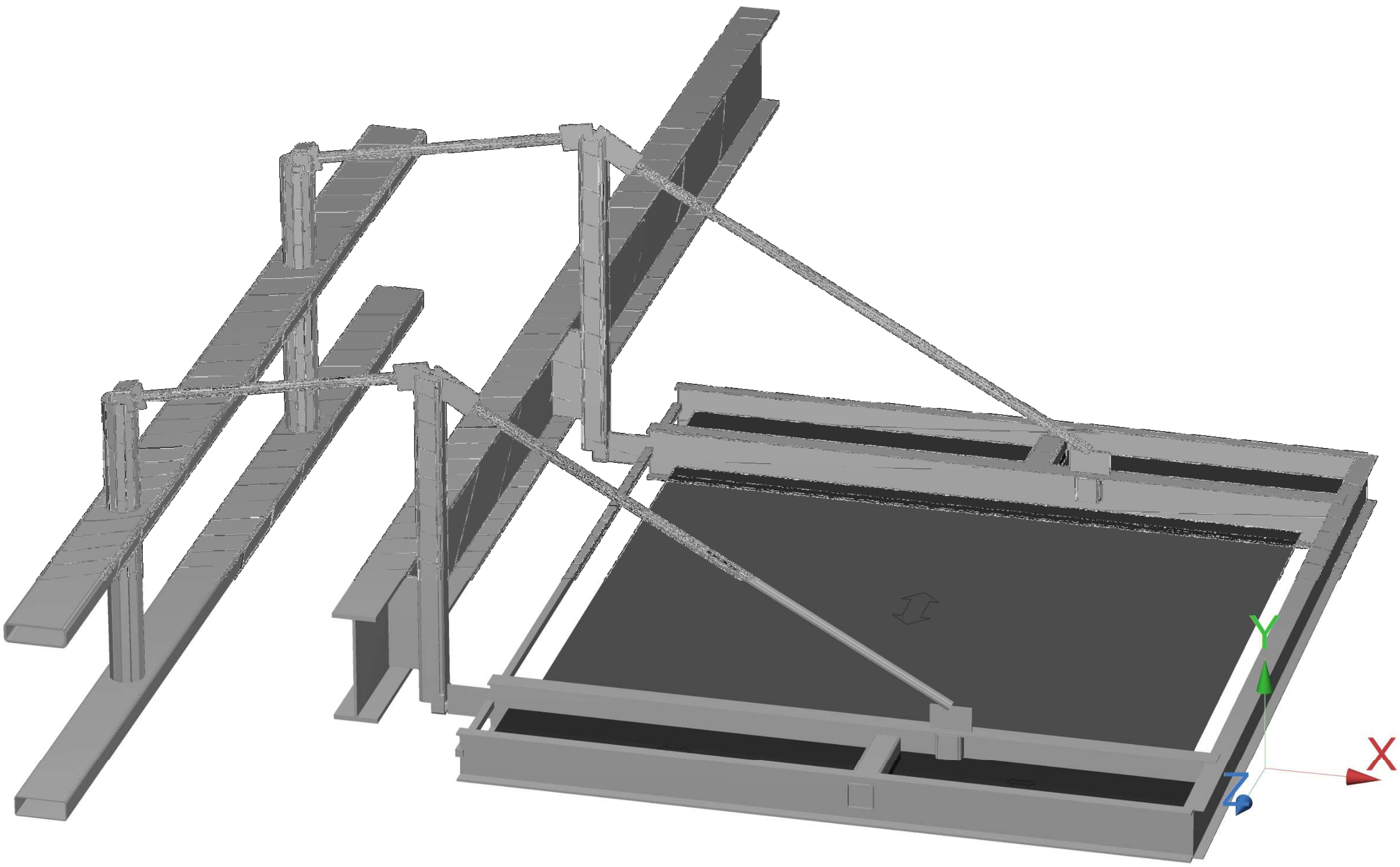
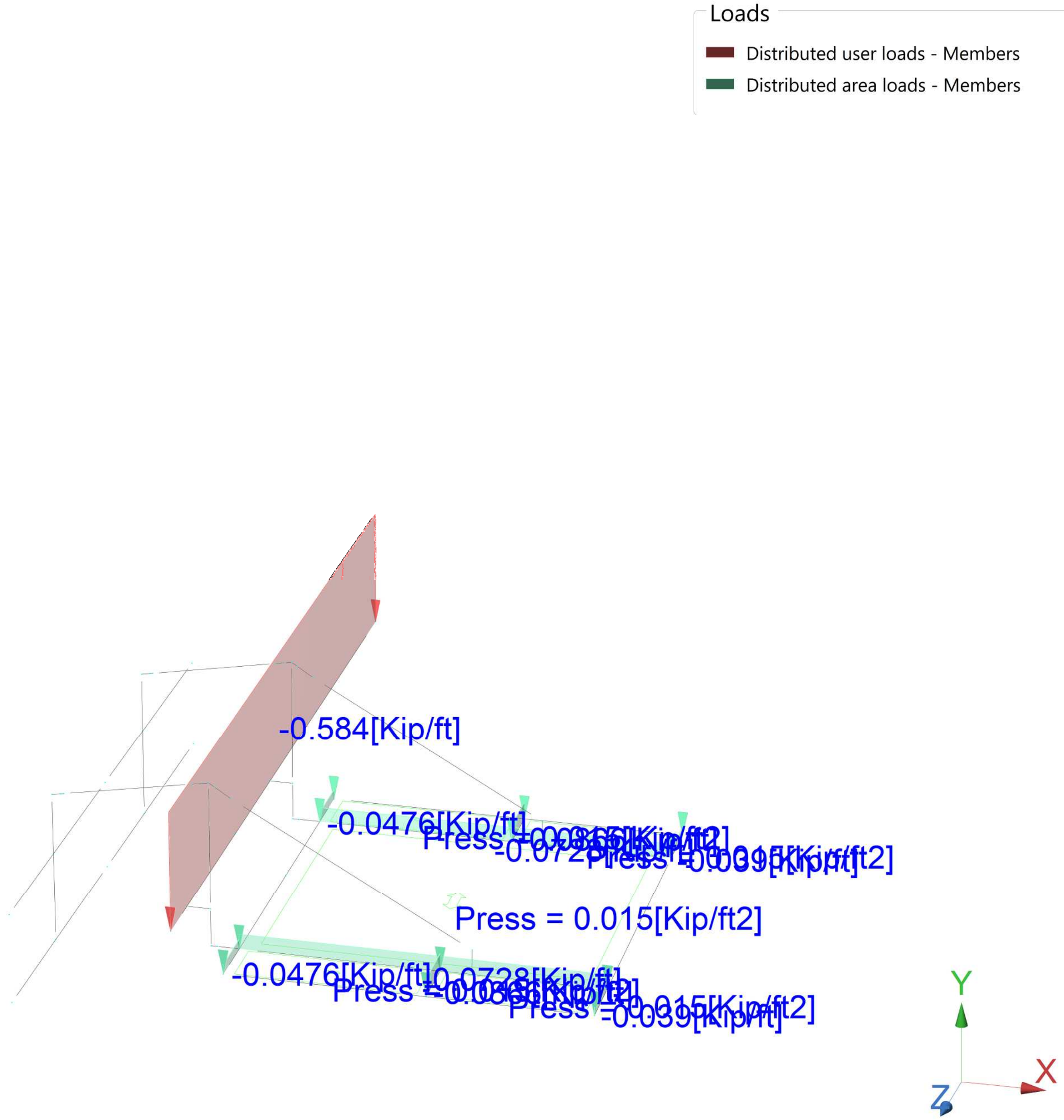


RAM Elements

Current Date: 12/6/2023 9:07 PM
Units system: English
File name: \\kwserver\KW Operations\Projects\21239 PSE IOTC\CALCULATIONS\231027 PSE CANOPY.retx
Load condition: DL=Dead Load



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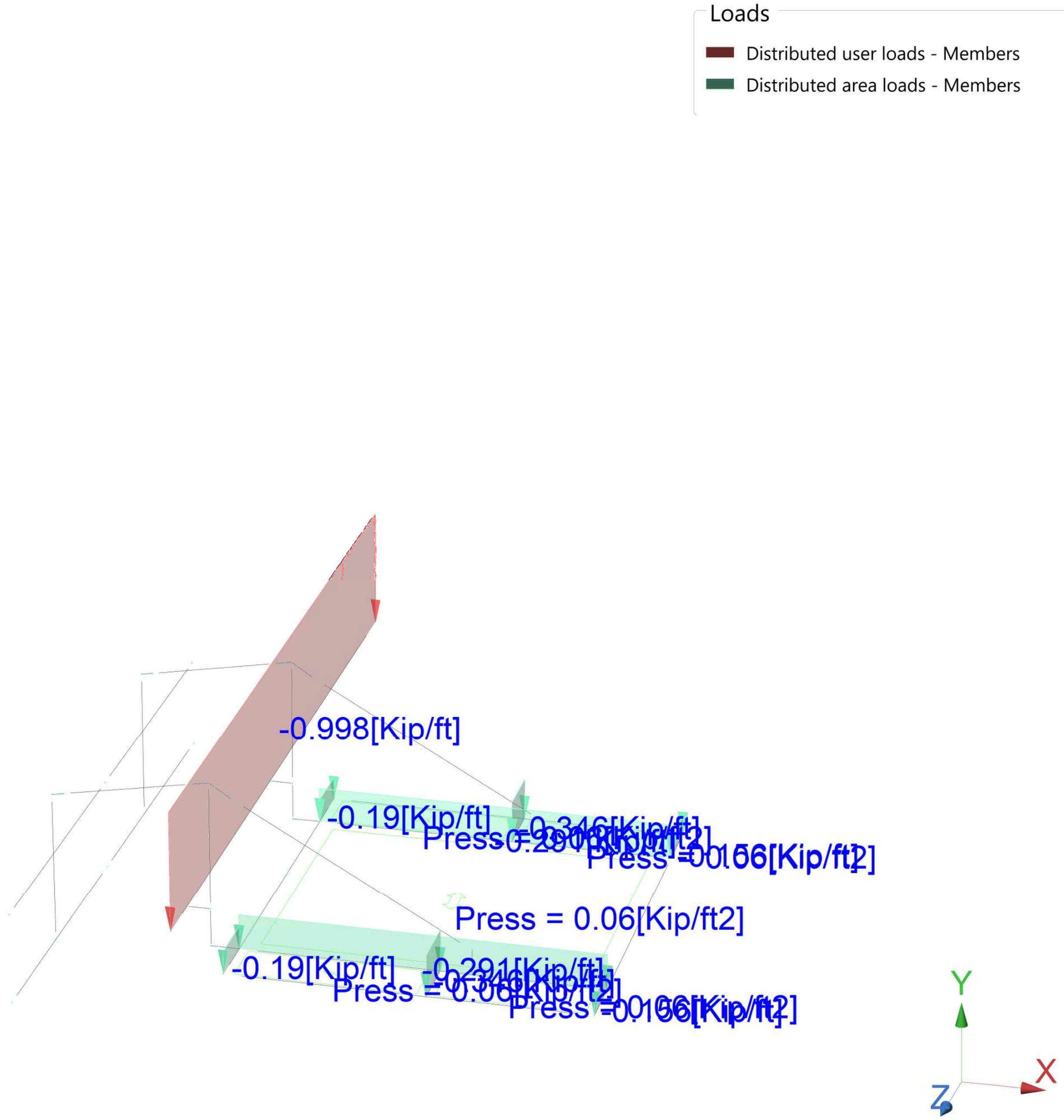

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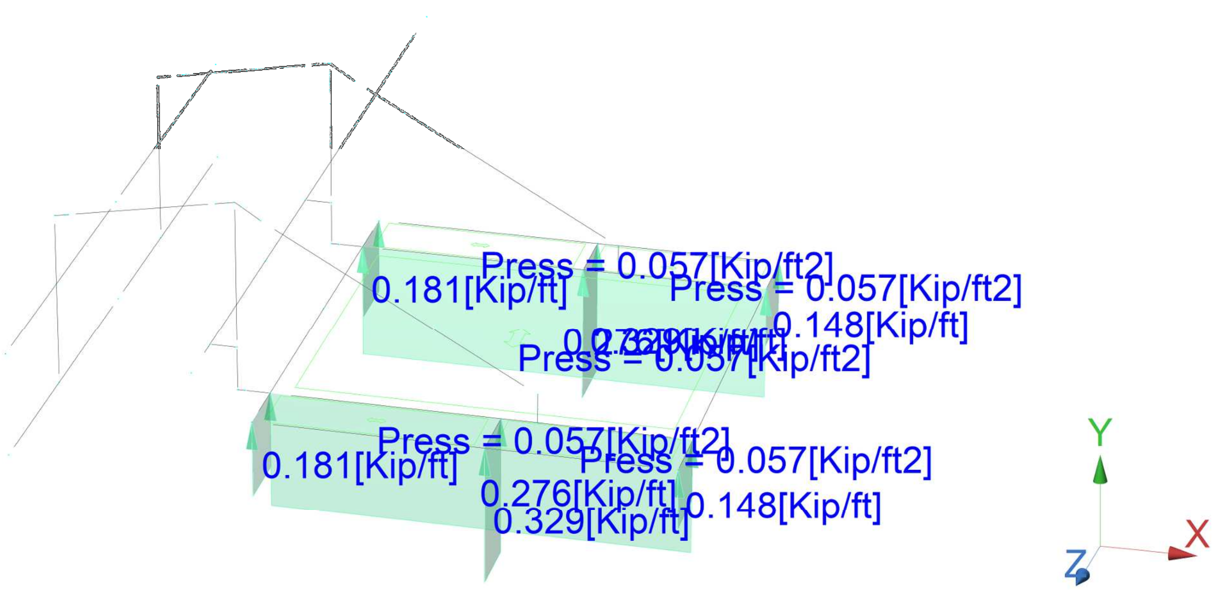
File name: \\kwserver\KW Operations\Projects\21239 PSE IOTC\CALCULATIONS\231027 PSE CANOPY.retx
Load condition: WUP=WIND

Loads
Distributed area loads - Members



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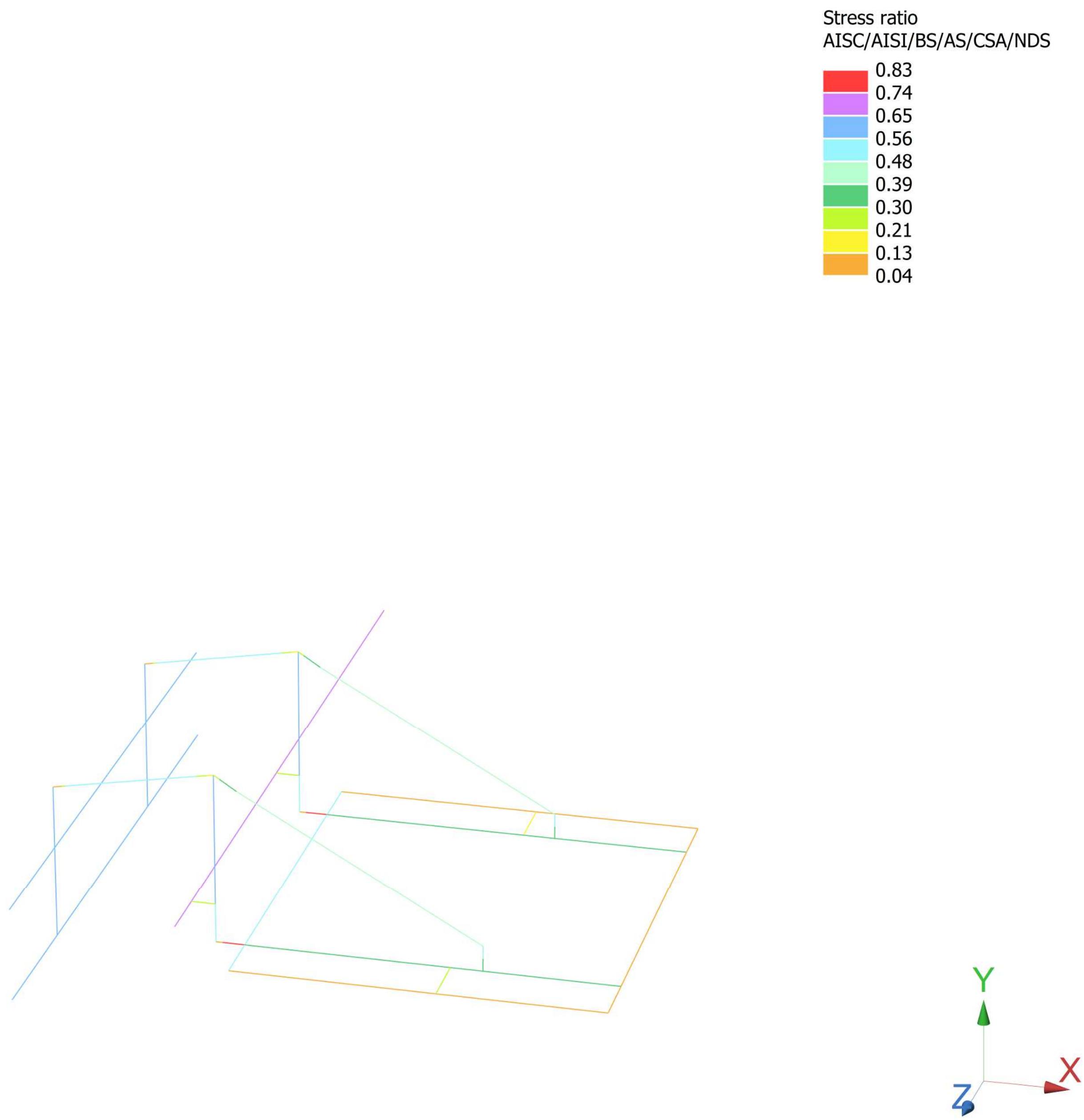

RAM Elements

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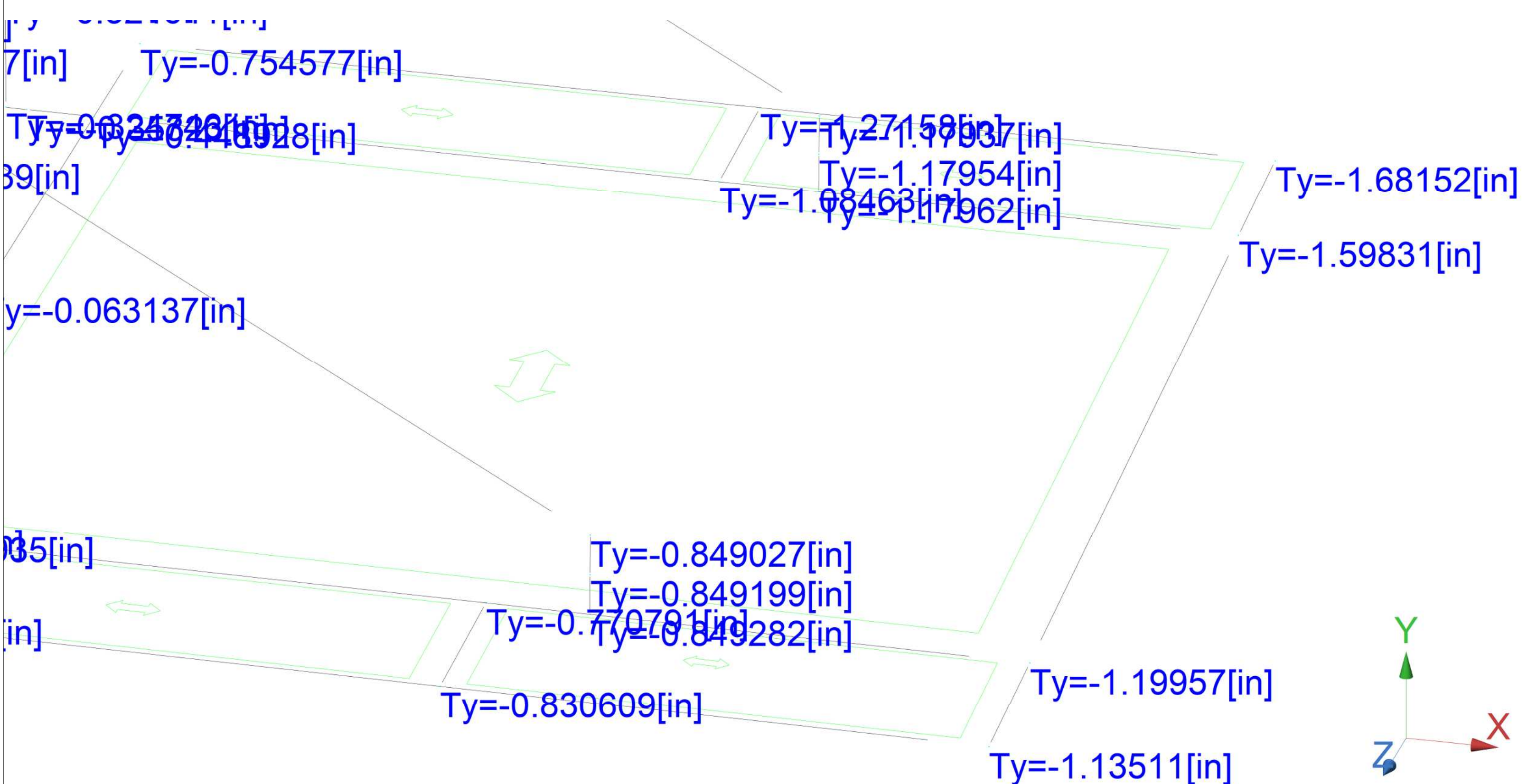

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JOB TITLE PSE - PUYALLUP OTC
BLEACHER ROOF ONLY
JOB NO. SHEET NO.
CALCULATED BY DATE
CHECKED BY DATE

Seismic Loads: IBC 2018 Strength Level Forces

Risk Category : II
Importance Factor (Ie) : 1.00
Site Class : E

Ss (0.2 sec) = 127.70 %g
S1 (1.0 sec) = 43.90 %g

A site specific ground motion analysis is required for seismically isolated structures or with damping systems
Site specific ground motion analysis performed:

Fa =	1.200	use 1.20	Sms =	1.532	S_{DS} =	1.022	Design Category =	D
Fv =	0.000	use 2.32	Sm1 =	1.018	S_{D1} =	0.679	Design Category =	D

ASCE7 11.4.8 exception 1 applied and Fa taken equal to site class C

Seismic Design Category = **D**
Redundancy Coefficient ρ = 1.30
Number of Stories: 1
Structure Type: All other building systems
Horizontal Struct Irregularities: No plan Irregularity
Vertical Structural Irregularities: No vertical Irregularity
Flexible Diaphragms: No
Building System: **Cantilevered Column Systems detailed to conform to the requirements for:**
Seismic resisting system: **Steel ordinary cantilever column system**
System Structural Height Limit: **System not permitted for this seismic design category**
Actual Structural Height (hn) = 13.5 ft
See ASCE7 Section 12.2.5 for exceptions and other system limitations

DESIGN COEFFICIENTS AND FACTORS

Response Modification Coefficient (R) = 1.25
Over-Strength Factor (Ωo) = 1.25
Deflection Amplification Factor (Cd) = 1.25
S_{DS} = 1.022
S_{D1} = 0.679

Seismic Load Effect (E) = Eh +/-Ev = ρ Q_E +/- $0.2S_{DS}$ D = 1.3Qe +/ 0.204D Q_E = horizontal seismic force
Special Seismic Load Effect (Em) = Emh +/- Ev = Ωo Q_E +/- $0.2S_{DS}$ D = 1.25Qe - 0.204D D = dead load

PERMITTED ANALYTICAL PROCEDURES

Simplified Analysis - Use Equivalent Lateral Force Analysis

Equivalent Lateral-Force Analysis - Permitted
Building period coef. (C_T) = 0.020 Cu = 1.40
Approx fundamental period (Ta) = $C_T h_n^x$ = 0.141 sec x= 0.75 Tmax = CuTa = 0.197 sec
User calculated fundamental period = T = 0.141 sec
Long Period Transition Period (TL) = ASCE7 map = 6 sec
Seismic response coef. (Cs) = SdsI/R = 0.817
need not exceed Cs = Sd1 I /RT = 3.856
but not less than Cs = 0.044SdsI = 0.045
USE Cs = 0.817
Design Base Shear V = 0.817W

Model & Seismic Response Analysis - Permitted (see code for procedure)

ALLOWABLE STORY DRIFT

Structure Type: Non- masonry, 4 story or less designed to accommodate the story drift
Allowable story drift Δa = 0.025hsx no limit if single story is designed to accommodate the story drift

Total Stories =	2	Floor Dead Load =	10.0 psf	Roof Dead Load =	10.0 psf
Building length L =	35.0 ft	Floor LL to include =	0.0 psf	Roof Snow Load =	0.0 psf
Building width W =	9.0 ft	Floor Equip wt =	0.0 kips	Roof Equip wt =	0.0 kips
hn =	13.5 ft	Partition weight =	0.0 psf	Parapet weight =	0.0 psf
k =	1.000	Ext Wall Weight =	0.0 psf	Parapet height =	0.0 ft
V =	0.817W				

Bottom Floor is a slab on grade

Diaphragm shall be designed for level force Fx,
but not less than Fpx = (Σ Fi / Σ wi) wpx, but :
Fpx min = $0.2S_{DS}$ Ie wpx = 0.204 wpx
Fpx max = $0.4S_{DS}$ Ie wpx = 0.409 wpx

Seismic Forces Normal to Building Lengtl

V = 1,070.6k

Level (x)	EL above Seismic Base hx (ft)	Level Weight Wx (kips)	Wx hx^k (ft-kips)	Cvx = Wx hx^k / Σ Wi hi^k	Base Shear Distribution Fx=CvxV	Σ Fx (k)	Story M	Diaphragm Force Fpx Σ Wi (k)	Fpx	Design Fpx
Roof	23.50	690	16,215	0.606	648.86	648.9	0	690	648.9	282.0
2	17.00	620	10,540	0.394	421.77	1070.6	4,218	1,310	506.7	253.4
1	0.00	0	0	0.000	0.00	0.0	0	0	0.0	0.0
Base		1,310		1.000		1070.6	18,201			
							22,418 = Base M			

Seismic Forces Parallel to Building Length

V = 1,070.6k

Level (x)	hx (ft)	Wx (kips)	Wx hx^k	Cvx =	Base Shear Distribution Fx=CvxV	Σ Fx (k)	Story M	Diaphragm Force Fpx Σ Wi (k)	Fpx	Design Fpx
Roof	23.50	690	16,215	0.606	648.86	648.9	0	690	648.9	282.0
2	17.00	620	10,540	0.394	421.77	1070.6	4,218	1,310	506.7	253.4
1	0.00	0	0	0.000	0.00	0.0	0	0	0.0	0.0
Base	0.00	1,310		1.000		1070.6	18,201			
							22,418 = Base M			

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PROJECT	PSE OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	
SUBJECT	BLEACHER ROOF		

LATERAL LOADS - WIND v. SEISMIC AND VERT DISTRIBUTION

PAGE: 1 / 3

ref: ASCE 7-16 / 2018 IBC

C_S = 0.817 * W   Cs already incl I_E = 1.00 S_{DS} = 1.022

T = 0.141 sec   *(Note I_E NOT added within this spreadsheet)*

Redundancy Factor "ρ"
(E-W loads) 1.00
(N-S loads) 1.00

UNIT WTS OF (H) & (V) ELEMENTS

TYPE	DESCRIPTION	UNIT WT (PSF)
A	ROOF	20
B		
C		
D		
E		
F		
G		
H		
J		
K		
L		
M		

LEVELS

LEVEL	HT FROM BASE (FT)
RF	13.5

HORIZONTAL ELEMENT DEFINITION

LEVEL	TYPE	PROJECTED AREA (SF)	SLOPE (DEG)	APPROX. % SOLID	UNIT WT (PSF)	EFFECTIVE UNIT WT (PSF)	SUBTOTAL (KIPS)	
RF	A	350	0	100%	20	20.0	7	
						WT SUBTOTAL	7	KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS

VERTICAL ELEMENT DEFINITION

LEVEL	TYPE	LENGTH (LF)	TRIB HT (FT)	APPROX. % SOLID	AREA (SF)	UNIT WT (PSF)	SUBTOTAL (KIPS)	
RF								
						WT SUBTOTAL	0	KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS

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LATERAL LOADS - CONTINUED

PAGE: 2 / 3

SEISMIC BASE SHEAR SUMMARY

	LEVEL	TOTAL WT	C_S	ρ	V (seismic) LRFD (1.0E)	V (seismic) ASD (0.7E)	
EAST-WEST LOAD DIRECTION	RF	7	0.817	1.00	5.7	4.0	
	SUM =	7.0			5.7	4.0	KIPS
NORTH-SOUTH LOAD DIRECTION	RF	7	0.817	1.00	5.7	4.0	
	SUM =	7.0			5.7	4.0	KIPS

[Vertical load distribution per ASCE 7-16 is attached separately, the story forces shown at left are for purposes of summing total base shear only]

LATERAL LOADS - WIND (MWFRS)

METHOD: 1

ref: ASCE 7-16 / 2018 IBC

Note wind pressures below already include I_W = 1.00

METHOD 1 - FLAT ROOF - RECTANGULAR BUILDING

[ASCE 7-10 "ultimate" wind pressures and zone lengths per "Code Analysis" spreadsheet for MWFRS < 60 ft]

EAST-WEST LOAD DIRECTION

		Value	Unit	TRIB HT (FT)	WIND FORCE (KIPS)
Bldg. Width		35	FT		
Zone "2a" Length		6	FT		
Typ. Wall Pressure		6.66666667	PSF		
Zone "2a" Pressure		6.66666667	PSF		
	PARAPET	13.5			
Elev. Above Grade	RF	13.5	FT	6.8	1.6
		0	FT		
		0	FT		
		0	FT		
		0	FT		
				SUM=	1.6 KIPS (LRFD)

NORTH-SOUTH LOAD DIRECTION

		Value	Unit	TRIB HT (FT)	WIND FORCE (KIPS)
Bldg. Width		10	FT		
Zone "2a" Length		5	FT		
Typ. Wall Pressure		6.67	PSF		
Zone "2a" Pressure		6.67	PSF		
	PARAPET	13.5			
Elev. Above Grade	RF	13.5	FT	6.8	0.5
		0	FT		
		0			
		0			
		0	FT		
				SUM=	0.5 KIPS (LRFD)

BASE SHEAR SUMMARY- WIND VS. SEISMIC

	V (seismic)		V (wind)		**V (governing)**	
LOAD DIRECTION	LRFD (1.0E)	ASD (0.7E)	LRFD (1.0W)	ASD (0.6W)	**LRFD (1.0E or 1.0W)**	**ASD (0.7E or 0.6W)**
EAST-WEST	5.7	4.0	1.6	0.9	**5.7 (SEISMIC)**	**4.0 (SEISMIC)**
NORTH-SOUTH	5.7	4.0	0.5	0.3	**5.7 (SEISMIC)**	**4.0 (SEISMIC)**

[Note: Seismic detailing provisions shall apply regardless of governing load case, in each direction.]

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PROJECT	PSE OTC		
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LATERAL LOADS - SEISMIC FORCE VERTICAL DISTRIBUTION PAGE: 3 / 3
ref: ASCE 7-16 Sec. 12.8.3

SEISMIC	E-W	N-S	
V_{LRFD}	5.7	5.7	kips
V_{ASD}	4.0	4.0	kips
k	1.00		

						STORY SHEAR $F_x=C_{vx} \times V$		CUMULATIVE SHEAR Σ V (kips)	
	STORY	W_x	H_x	$W_x \times H_x^k$	C_{vx}	LRFD	ASD	LRFD	ASD
EAST-WEST LOAD DIRECTION	RF	7.0	13.5	94.5	1.00	5.7	4.0	5.7	4.0
			Σ =	94.5		5.7	4.0	kips	
NORTH-SOUTH LOAD DIRECTION	RF	7.0	13.5	94.5	1.00	5.7	4.0	5.7	4.0
			Σ =	94.5		5.7	4.0	kips	

*** Note that all story and cumulative shears include both I_E and Redundancy Factor "ρ"*

LATERAL LOADS - SEISMIC DIAPHRAGM FORCES
ref: ASCE 7-16 Sec. 12.10.1.1

Rho Applied? Y

							LIMITS		V_{DIA} (kips)	
	STORY	W_x	F_x	ΣF_i	ΣW_i	F_{px}	≥	≤	**LRFD**	**ASD**
EAST-WEST LOAD DIRECTION	RF	7.0	5.7	5.7	7.0	5.7	1.4	2.9	**2.9**	**2.0**
NORTH-SOUTH LOAD DIRECTION	RF	7.0	5.7	5.7	7.0	5.7	1.4	2.9	**2.9**	**2.0**

*** Note that all diaphragm shears include $I_{E,}$ but only include Redundancy Factor "ρ" if "Y" checked above.*

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IBC 2018 1807.3 Pole Foundation

Project	PSE OTC		#21239
Description	BLEACHER FOUNDATIONS		
Engineer	DL	Date	

		CASE 1		CASE 2	CASE 3	CASE 4	CASE 5	CASE 6
Nonconstraned:		TRUE						
b=Diameter of round or diagonal dimension of square footing:		1.5	FT					
h=Distance in feet from ground surface to point of load application:		13.5	FT					
P=Applied load	E *omega * 0.7 for ASD	840	LB					
Presumptive Lateral Bearing Pressure:		300						
Nonconstrained only:								
S1=Allowable lateral soil bearing pressure as set forth in section 1806.2 based on a depth of one - third the depth of embedment								
	S1=	653	PSF					
	A=	2.01		N/A	N/A	N/A	N/A	N/A
d=Depth of embedment in earth but not over 12 feet		6.53	FT	N/A	N/A	N/A	N/A	N/A
	calculated S1	653		N/A	N/A	N/A	N/A	N/A
Contrained only:	covergence test	TRUE		N/A	N/A	N/A	N/A	N/A
S3=Allowable lateral soil bearing pressure as set for the in sectio n1806.2 based on a depth equal to the depth of embedment								
	S3=		PSF					
d=Depth of embedment in earth but not over 12 feet		N/A	FT	N/A	N/A	N/A	N/A	N/A
	calculated S3	N/A		N/A	N/A	N/A	N/A	N/A
	covergence test	N/A		N/A	N/A	N/A	N/A	N/A

Table 1806.2 Presumptive Load Bearing Values
Lateral Bearing Pressure

Bedrock	400 to 1200 psf/ft
Sandy gravel or or gravel	200 psf/ft
sand, silty sand, silty gravel and glayey gravel	150 psf/ft
clay sandy clay, silty clay, clayey silt, silt, and sandy silt	100 psf/ft

1806.1 Lateral loads may be increased by 1/3 where used with the alternative basic load combinations of section 1605.3.2 that include wind or earthquake loads

1806.3.3 Lateral loads may be increased by the value above for each additional foot of depth to a maximum of 15 times the tabular value

1806.3.4 Increase for poles: Isolated poles for uses such as flagpoles or signs and poles usded to support buildings that are not adversely affected by a 1/2 inch motion at the ground surface due to short tem lateral loads shall be permitted to be designed unsing lateral bearing pressures equal to two times the tabular values

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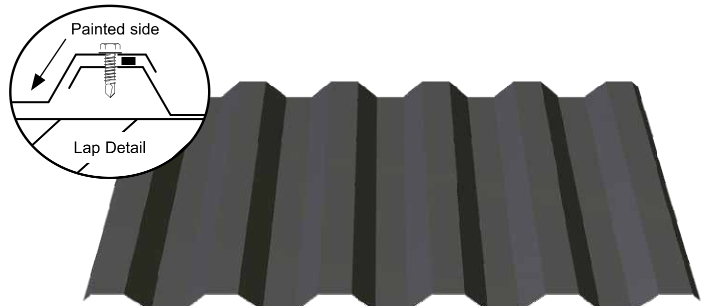
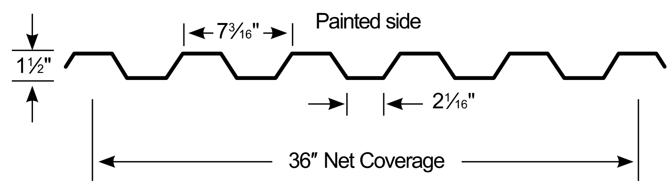
HR-36 is an economical, structural, exposed-fastener roof and wall panel suitable for general usage.

HR-36 is ideal for architectural, commercial, industrial and agricultural roof and wall applications. Can be installed as a vertical or horizontal wall. **HR-36** is also well suited for open framed canopy or carports designs.



HR-36 Roof & Wall



Properties									Standard Finishes	
Gauge	Base Steel Thickness (in)	Yield (ksi)	Tensile (ksi)	Wt. (lbs/ft²)	I+ (in⁴/ft)	S+ (in³/ft)	I- (in⁴/ft)	S- (in³/ft)	Metallic Coating	Paint System
26	0.0173	80	82	0.89	0.0889	0.0762	0.0873	0.0623	AZ50	Cool Dura Tech™ *nt*
24	0.0232	50	65	1.19	0.1267	0.1272	0.1200	0.1132	AZ50	Cool Dura Tech™ *5000* (polyvinylidene fluoride) or Dura Tech™ *mx* (metallic polyvinylidene)
22	0.0294	50	65	1.51	0.1600	0.1759	0.1600	0.1559	AZ50	
20	0.0354	40	55	1.82	0.2000	0.2371	0.2000	0.2095	G90	
18	0.0459	40	55	2.36	0.2600	0.3160	0.2600	0.2987	G90	

NOTES: The moments of inertia, I^+ and I^-, presented for determining deflection are: $(2I_{Effective} + I_{Gross})/3$

standard features

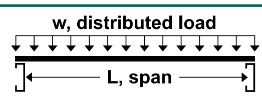
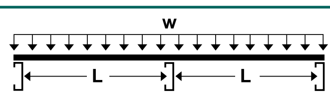
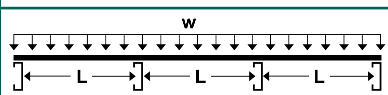
- 36" coverage roof and wall panel.
- Minimum recommended slope 1:12.
- Gauges: 22ga, 24ga and 26ga in standard finishes and 20ga available in ZINCALUME® Plus.
- Refer to AEP Span Color Charts for full range of color options and paint systems.
- Custom manufactured panel lengths: 6'-0" to 50'-0".
- Matching polycarbonate panels available.
- Testing: ASTM E283 (air infiltration) and ASTM E331 (water infiltration). All testing performed by accredited third-party.
- Roof assemblies Class A Fire Rated when installed on non-combustible deck or framing per IBC or IRC or when installed in accordance to UL listings (UL790). Wall assemblies rated for fire resistance (UL263) when installed in accordance with UL listings.
- Building Code Approval Report: #ER-0550.
- Manufactured in Sacramento, CA.

optional features

- Short cut sheets from 6'-0" to 1'-0". Additional fees and lead times may apply.
- 18ga and 20ga available in G-90 with standard and custom colors subject to a minimum order size of 4,500 square feet and longer lead times.
- 18ga available in bare G-90 galvanized subject to a minimum order size of 18,000 square feet and longer lead times.
- 20ga available in bare G-90 galvanized subject to a minimum order size of 25,500 square feet and longer lead times.
- Custom colors, thick film primer and/or clear coat paint finishes available. Subject to 4,500 square feet minimum order.* (See back)
- Perforation options available for an additional charge. Minimum order size 1,500 square feet (Inquire for smaller orders). Select from standard perforation patterns with open areas of 7.8%, 13.8%, 23.4%, 30.6% or 41.4%.
- Stucco embossed available on 26ga, 24ga and 22ga. Subject to minimum order size of 1,500 square feet.

HR-36® Roof and Wall

Gauge	Span	Cond.	Allowable Inward Loads (lbs/ft²) per Span (ft.-in.)								
			2'-0"	2'-6"	3'-0"	4'-0"	5'-0"	6'-0"	7'-0"	8'-0"	10'-0"
26	Single Span	ASD, W/Ω	456	292	203	114	73	51	37	29	18
		L/180	-	-	-	-	62	36	23	15	8
	Double Span	ASD, W/Ω	301	205	149	87	57	40	29	22	14
		L/180	-	-	-	-	-	-	-	-	-
	Triple Span	ASD, W/Ω	351	244	178	107	70	49	36	28	18
		L/180	-	-	-	-	-	-	-	-	15
24	Single Span	ASD, W/Ω	635	406	282	159	102	71	52	40	25
		L/180	-	-	-	-	89	51	32	22	11
	Double Span	ASD, W/Ω	505	335	237	136	88	61	45	35	22
		L/180	-	-	-	-	-	-	-	-	-
	Triple Span	ASD, W/Ω	605	406	290	168	109	76	56	44	27
		L/180	-	-	-	-	-	-	-	41	21
22	Single Span	ASD, W/Ω	878	562	390	219	140	98	72	55	35
		L/180	-	-	-	219	112	65	41	27	14
	Double Span	ASD, W/Ω	715	471	332	189	122	85	63	48	30
		L/180	-	-	-	-	-	-	-	-	-
	Triple Span	ASD, W/Ω	866	576	409	235	152	106	78	60	39
		L/180	-	-	-	-	-	-	77	52	26
20	Single Span	ASD, W/Ω	947	606	421	237	151	105	77	59	38
		L/180	-	-	-	-	140	81	51	34	17
	Double Span	ASD, W/Ω	778	510	360	205	131	92	68	51	33
		L/180	-	-	-	-	-	-	-	-	-
	Triple Span	ASD, W/Ω	946	626	443	254	164	114	84	64	41
		L/180	-	-	-	-	-	-	-	-	33
18	Single Span	ASD, W/Ω	1261	807	561	315	202	140	103	79	50
		L/180	-	-	-	-	182	105	66	44	23
	Double Span	ASD, W/Ω	1094	720	508	291	187	130	96	73	47
		L/180	-	-	-	-	-	-	-	-	-
	Triple Span	ASD, W/Ω	1322	880	625	360	233	163	120	92	59
		L/180	-	-	-	-	-	-	-	84	43

Inward Loads		
Single Span		
Double Span		
Triple Span		

NOTES:
Top values based on allowable stress (ASD).
Bottom values based on a deflection limit of L/180.

"-" denotes that the allowable load is limited by the panel stress vs. deflection limit.

Steel conforms to ASTM A653 (Galvanized) or ASTM A792 (ZINCALUME) structural steel.

Tabulated values are for positive (inward) uniform loading only.

Values are based on the American Iron and Steel Institute "Cold Formed Steel Design Manual" (AISI S100-12).

Refer to aepspan.com for more complete HR-36 performance data.

Oil Canning : All flat metal surfaces can display waviness commonly referred to as "oil canning". "Oil canning" is an inherent characteristic of steel products, not a defect, and therefore is not a cause for panel rejection.

RAM Elements

Current Date: 11/16/2023 9:35 AM
Units system: English
File name: \\kwserver\KW Operations\Projects\21239 PSE IOTC\CALCULATIONS\231116 bleacher model - OCCS.retx

Steel Connections Results

Connection: 1 - Fixed biaxial BP

Family:	Column - Base (CB)
Type:	Base plate
Description:	Smart Fixed Biaxial Base Plate 1

Design code: AISC 360-16 LRFD, ACI 318-19

Demands

Description	Pu [kip]	Mu22 [kip*ft]	Mu33 [kip*ft]	Vu2 [kip]	Vu3 [kip]	Load type
L101	-1.86	0.00	0.00	0.00	0.00	Design
L305	-4.41	0.00	0.00	0.00	0.00	Design
L517	-2.22	0.00	13.04	-0.94	0.00	Design
L521	-2.22	-13.28	0.00	0.00	-0.96	Design
L525	-2.22	0.00	-13.04	0.94	0.00	Design
L529	-2.22	13.28	0.00	0.00	0.96	Design
L701	-0.92	0.00	12.93	-0.95	0.00	Design
L703	-0.92	-13.17	0.00	0.00	-0.97	Design
L705	-0.92	0.00	-12.93	0.95	0.00	Design
L707	-0.92	13.17	0.00	0.00	0.97	Design
om1	-1.86	0.00	0.00	0.00	0.00	Seismic
om2	-4.41	0.00	0.00	0.00	0.00	Seismic
om3	-2.22	0.00	16.30	-1.18	0.00	Seismic
om4	-2.22	-16.60	0.00	0.00	-1.20	Seismic
om5	-2.22	0.00	-16.30	1.18	0.00	Seismic
om6	-2.22	16.60	0.00	0.00	1.20	Seismic
om7	-0.92	0.00	16.16	-1.19	0.00	Seismic
om8	-0.92	-16.46	0.00	0.00	-1.21	Seismic
om9a	-0.92	0.00	-16.16	1.19	0.00	Seismic
om9b	-0.92	16.46	0.00	0.00	1.21	Seismic

Design calculations

Design for major axis

Base plate (AISC 360-16 LRFD)

Geometric Considerations

Dimensions	Unit	Value	Min.	Max.	Sta.	References
Base plate						
Distance from anchor to edge	[in]	1.12	0.25	--	✔	
Weld size	[1/16in]	4	2	--	✔	table J2.4

Design Check

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Pedestal						
Axial bearing	[Kip/in2]	3.32	0.80	om6	**0.24**	DG1 3.1.1
Base plate						
Flexural yielding (bearing interface)	[Kip*ft/ft]	8.10	3.65	om3	**0.45**	DG1 Sec 3.1.2
Flexural yielding (tension interface)	[Kip*ft/ft]	8.10	5.39	om9b	**0.67**	DG1 Eq. 3.3.13
Column						
Weld capacity	[Kip/ft]	100.23	25.94	om9b	**0.26**	HSS Manual p. 7-10
Elastic method weld shear and axial capacity	[Kip/ft]	100.23	57.57	om7	**0.57**	Sec. J2.4

Ratio **0.67**

Anchors

Geometric Considerations

Dimensions	Unit	Value	Min.	Max.	Sta.	References
Anchors						
Anchor spacing	[in]	9.00	3.00	--	✔	Sec. 17.9.2
Concrete cover	[in]	4.12	2.00	--	✔	Sec. 20.5.1.3.1
Effective length	[in]	16.49	--	35.51	✔	

Design Check

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Anchor tension	[Kip]	14.55	10.30	om9b	**0.71**	Eq. 17.6.1.2
Pullout of anchor in tension	[Kip]	10.99	10.30	om9b	**0.94**	Sec. 17.10.5.4
Side-face blowout of anchor in tension	[Kip]	10.36	10.30	om9b	**0.99**	Sec. 17.10.5.4
Side-face blowout of group of anchors in tension	[Kip]	27.62	20.22	om7	**0.73**	Sec. 17.10.5.4
Anchors reinforcement in tension	[Kip]	27.90	20.59	om9b	**0.74**	Sec. 17.5.3
Anchor shear	[Kip]	7.57	0.30	om7	**0.04**	Eq. 17.7.1.2b
Pryout of anchor in shear	[Kip]	20.40	0.30	om7	**0.01**	Sec. 17.5.2
Pryout of group of anchors in shear	[Kip]	44.17	1.19	om7	**0.03**	Sec. 17.5.2
Anchors reinforcement in shear	[Kip]	9.90	1.19	om7	**0.12**	Sec. 17.5.3
Interaction of tensile and shear forces	[Kip]	1.20	0.00	L517	**0.00**	Sec. 17.8.1

Ratio **0.99**

Design for minor axis

Base plate (AISC 360-16 LRFD)

Geometric Considerations

Dimensions	Unit	Value	Min.	Max.	Sta.	References
Base plate						
Distance from anchor to edge	[in]	1.12	0.25	--	✔	
Weld size	[1/16in]	4	2	--	✔	table J2.4

Design Check

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Pedestal						
Axial bearing	[Kip/in2]	3.32	0.80	om6	**0.24**	DG1 3.1.1
Base plate						
Flexural yielding (bearing interface)	[Kip*ft/ft]	8.10	3.71	om6	**0.46**	DG1 Sec 3.1.2
Flexural yielding (tension interface)	[Kip*ft/ft]	8.10	5.39	om9b	**0.67**	DG1 Eq. 3.3.13
Column						
Weld capacity	[Kip/ft]	100.23	25.94	om9b	**0.26**	HSS Manual p. 7-10
Elastic method weld shear and axial capacity	[Kip/ft]	100.23	58.62	om9b	**0.58**	Sec. J2.4

Ratio **0.67**

Anchors

Geometric Considerations

Dimensions	Unit	Value	Min.	Max.	Sta.	References
Anchors						
Anchor spacing	[in]	9.00	3.00	--	✔	Sec. 17.9.2
Concrete cover	[in]	4.12	2.00	--	✔	Sec. 20.5.1.3.1
Effective length	[in]	16.49	--	35.51	✔	

Design Check

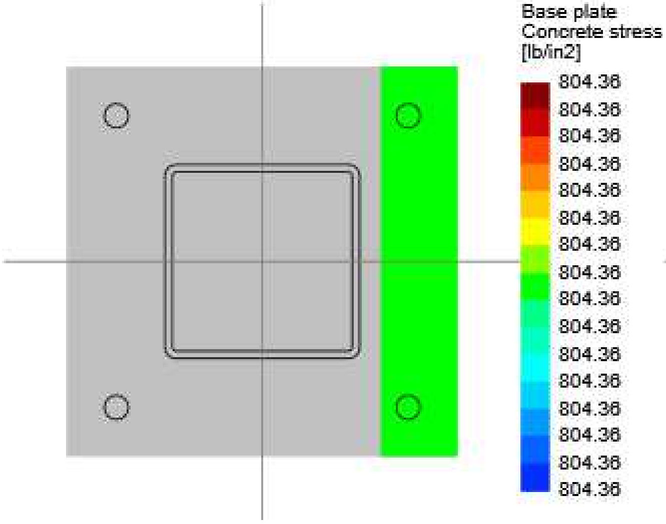
Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Anchor tension	[Kip]	14.55	10.30	om9b	**0.71**	Eq. 17.6.1.2
Pullout of anchor in tension	[Kip]	10.99	10.30	om9b	**0.94**	Sec. 17.10.5.4
Side-face blowout of anchor in tension	[Kip]	10.36	10.30	om9b	**0.99**	Sec. 17.10.5.4
Side-face blowout of group of anchors in tension	[Kip]	27.62	20.59	om9b	**0.75**	Sec. 17.10.5.4
Anchors reinforcement in tension	[Kip]	27.90	20.59	om9b	**0.74**	Sec. 17.5.3
Anchor shear	[Kip]	7.57	0.30	om9b	**0.04**	Eq. 17.7.1.2b
Pryout of anchor in shear	[Kip]	20.40	0.30	om9b	**0.01**	Sec. 17.5.2
Pryout of group of anchors in shear	[Kip]	44.17	1.21	om9b	**0.03**	Sec. 17.5.2
Anchors reinforcement in shear	[Kip]	9.90	1.21	om9b	**0.12**	Sec. 17.5.3
Interaction of tensile and shear forces	[Kip]	1.20	0.00	L521	**0.00**	Sec. 17.8.1

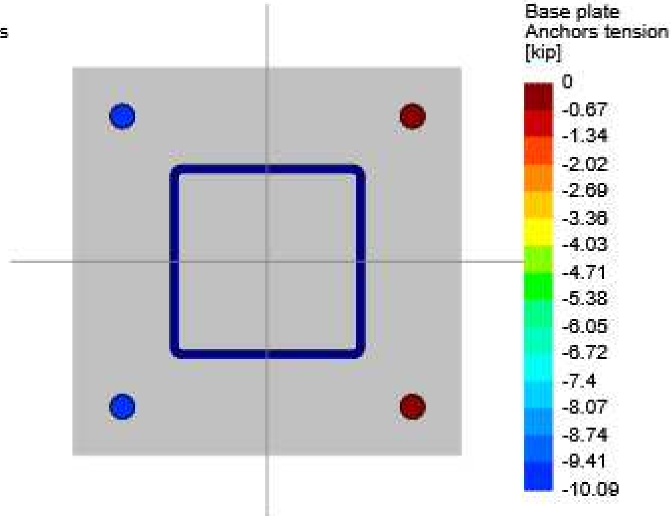
Ratio **0.99**

Global critical strength ratio **0.99**

Biaxial

Maximum compression (om6)



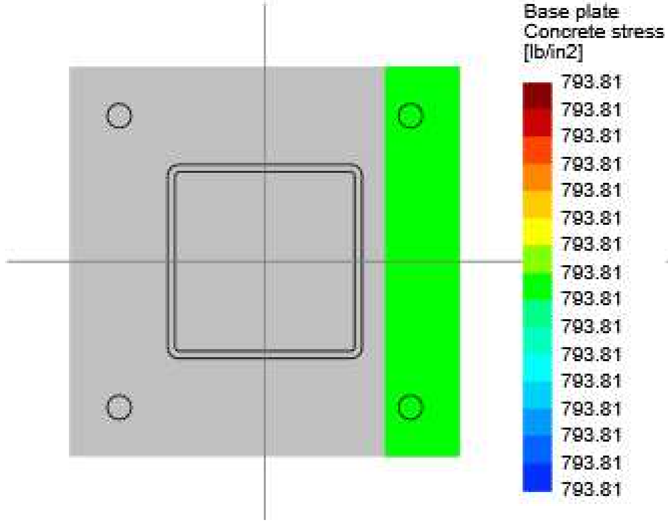


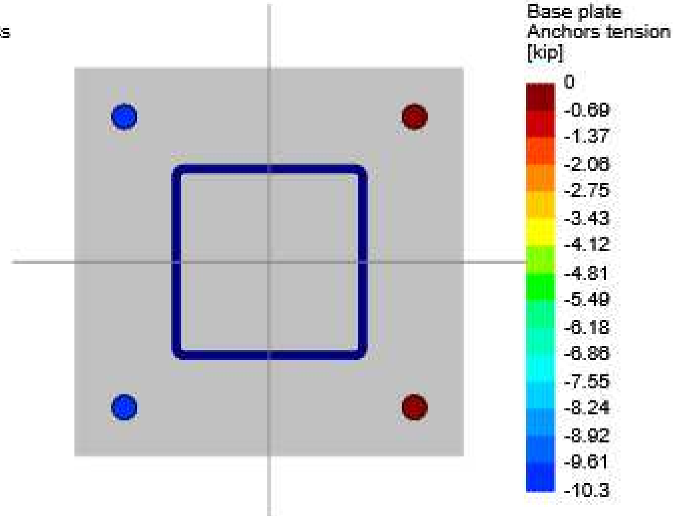
Maximum bearing pressure	804.36	[lb/in2]
Minimum bearing pressure	804.36	[lb/in2]
Maximum anchor tension	10.09	[kip]
Minimum anchor tension	0.00	[kip]
Neutral axis angle	-90.00	[deg]
Neutral axis location	2.32	[in]
Bearing length	2.32	[in]

Anchors tensions

Anchor	Transverse [in]	Longitudinal [in]	Shear [kip]	Tension [kip]
1	-4.50	-4.50	0.00	10.09
2	-4.50	4.50	0.00	10.09
3	4.50	4.50	0.00	0.00
4	4.50	-4.50	0.00	0.00

Maximum tension (om9b)





Maximum bearing pressure	793.81	[lb/in2]
Minimum bearing pressure	793.81	[lb/in2]
Maximum anchor tension	10.30	[kip]
Minimum anchor tension	0.00	[kip]
Neutral axis angle	-90.00	[deg]
Neutral axis location	2.26	[in]
Bearing length	2.26	[in]

Anchors tensions

Anchor	Transverse [in]	Longitudinal [in]	Shear [kip]	Tension [kip]
1	-4.50	-4.50	0.00	10.30
2	-4.50	4.50	0.00	10.30
3	4.50	4.50	0.00	0.00
4	4.50	-4.50	0.00	0.00

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360-714-8260 www.king-works.com

JOB TITLE PSE - PUYALLUP OTC
CONTROL HOUSE ONLY
JOB NO. SHEET NO.
CALCULATED BY DATE
CHECKED BY DATE

Seismic Loads: IBC 2018 Strength Level Forces

Risk Category : II
Importance Factor (Ie) : 1.00
Site Class : E

Ss (0.2 sec) = 127.70 %g
S1 (1.0 sec) = 43.90 %g

A site specific ground motion analysis is required for seismically isolated structures or with damping systems
Site specific ground motion analysis performed:

Fa =	1.200	use 1.20	Sms =	1.532	S_{DS} =	1.022	Design Category =	D
Fv =	0.000	use 2.32	Sm1 =	1.018	S_{D1} =	0.679	Design Category =	D

ASCE7 11.4.8 exception 1 applied and Fa taken equal to site class C

Seismic Design Category = **D**
Redundancy Coefficient ρ = 1.30
Number of Stories: 1
Structure Type: All other building systems
Horizontal Struct Irregularities: No plan Irregularity
Vertical Structural Irregularities: No vertical Irregularity
Flexible Diaphragms: Yes
Building System: **Bearing Wall Systems**
Seismic resisting system: **Special reinforced masonry shear walls**
System Structural Height Limit: **160 ft**
Actual Structural Height (hn) = 13.0 ft
See ASCE7 Section 12.2.5 for exceptions and other system limitations

DESIGN COEFFICIENTS AND FACTORS

Response Modification Coefficient (R) = 5
Over-Strength Factor (Ωo) = 2
Deflection Amplification Factor (Cd) = 3.5
S_{DS} = 1.022
S_{D1} = 0.679

Seismic Load Effect (E) = Eh +/-Ev = ρ Q_E +/- 0.2S_{DS} D = 1.3Qe +/ 0.204D Q_E = horizontal seismic force
Special Seismic Load Effect (Em) = Emh +/- Ev = Ωo Q_E +/- 0.2S_{DS} D = 2Qe +/- 0.204D D = dead load

PERMITTED ANALYTICAL PROCEDURES

Simplified Analysis - Use Equivalent Lateral Force Analysis

Equivalent Lateral-Force Analysis - Permitted
Building period coef. (C_T) = 0.020 Cu = 1.40
Approx fundamental period (Ta) = $C_T h_n{}^x$ = 0.137 sec x= 0.75 Tmax = CuTa = 0.192 sec
User calculated fundamental period = T = 0.137 sec
Long Period Transition Period (TL) = ASCE7 map = 6 sec
Seismic response coef. (Cs) = SdsI/R = 0.204
need not exceed Cs = Sd1 I /RT = 0.992
but not less than Cs = 0.044SdsI = 0.045
USE Cs = 0.204
Design Base Shear V = 0.204W

Model & Seismic Response Analysis - Permitted (see code for procedure)

ALLOWABLE STORY DRIFT

Structure Type: Masonry cantilever shear wall structures
Allowable story drift Δa = 0.010hsx where hsx is the story height below level x

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PROJECT	PSE OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	
SUBJECT	CONTROL HOUSE		

LATERAL LOADS - WIND v. SEISMIC AND VERT DISTRIBUTION

PAGE: 1 / 3

ref: ASCE 7-16 / 2018 IBC

C_S = 0.204 * W   Cs already incl I_E = 1.00 S_{DS} = 1.022

T = 0.137 sec   *(Note I_E NOT added within this spreadsheet)*

Redundancy Factor "ρ"
(E-W loads) 1.30
(N-S loads) 1.30

UNIT WTS OF (H) & (V) ELEMENTS

TYPE	DESCRIPTION	UNIT WT (PSF)
A	ROOF	15
B		
C	WALLS	84
D		
E		
F		
G		
H		
J		
K		
L		
M		

LEVELS

LEVEL	HT FROM BASE (FT)
RF	13

HORIZONTAL ELEMENT DEFINITION

LEVEL	TYPE	PROJECTED AREA (SF)	SLOPE (DEG)	APPROX. % SOLID	UNIT WT (PSF)	EFFECTIVE UNIT WT (PSF)	SUBTOTAL (KIPS)	
RF	A	517	0	100%	15	15.0	8	
						WT SUBTOTAL	8	KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS

VERTICAL ELEMENT DEFINITION

LEVEL	TYPE	LENGTH (LF)	TRIB HT (FT)	APPROX. % SOLID	AREA (SF)	UNIT WT (PSF)	SUBTOTAL (KIPS)	
RF	C	82	6.5	100%	533	84	45	
						WT SUBTOTAL	45	KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS

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SUBJECT	CONTROL HOUSE		

LATERAL LOADS - CONTINUED

PAGE: 2 / 3

SEISMIC BASE SHEAR SUMMARY

	LEVEL	TOTAL WT	C_S	ρ	V (seismic) LRFD (1.0E)	V (seismic) ASD (0.7E)	
EAST-WEST LOAD DIRECTION	RF	53	0.204	1.30	13.9	9.8	
	SUM =	52.5			13.9	9.8	KIPS
NORTH-SOUTH LOAD DIRECTION	RF	53	0.204	1.30	13.9	9.8	
	SUM =	52.5			13.9	9.8	KIPS

[Vertical load distribution per ASCE 7-16 is attached separately, the story forces shown at left are for purposes of summing total base shear only]

LATERAL LOADS - WIND (MWFRS) METHOD: 1

ref: ASCE 7-16 / 2018 IBC

Note wind pressures below already include I_W = 1.00

METHOD 1 - FLAT ROOF - RECTANGULAR BUILDING

[ASCE 7-10 "ultimate" wind pressures and zone lengths per "Code Analysis" spreadsheet for MWFRS < 60 ft]

EAST-WEST LOAD DIRECTION

Bldg. Width		24.6	FT		
Zone "2a" Length		6	FT		
Typ. Wall Pressure		17	PSF	TRIB HT	WIND FORCE
Zone "2a" Pressure		25	PSF	(FT)	(KIPS)
Elev. Above Grade	PARAPET	15			
	RF	13	FT	8.5	4.4
		0	FT		
		0	FT		
		0	FT		
		0	FT		
				SUM=	4.4 KIPS (LRFD)

NORTH-SOUTH LOAD DIRECTION

Bldg. Width		14.6	FT		
Zone "2a" Length		6	FT		
Typ. Wall Pressure		13	PSF	TRIB HT	WIND FORCE
Zone "2a" Pressure		19	PSF	(FT)	(KIPS)
Elev. Above Grade	PARAPET	15			
	RF	13	FT	8.5	2.2
		0	FT		
		0			
		0			
		0	FT		
				SUM=	2.2 KIPS (LRFD)

BASE SHEAR SUMMARY- WIND VS. SEISMIC

LOAD DIRECTION	V (seismic) LRFD (1.0E)	V (seismic) ASD (0.7E)	V (wind) LRFD (1.0W)	V (wind) ASD (0.6W)	**V (governing) LRFD (1.0E or 1.0W)**	**V (governing) ASD (0.7E or 0.6W)**
EAST-WEST	13.9	9.8	4.4	2.6	**13.9 (SEISMIC)**	**9.8 (SEISMIC)**
NORTH-SOUTH	13.9	9.8	2.2	1.3	**13.9 (SEISMIC)**	**9.8 (SEISMIC)**

[Note: Seismic detailing provisions shall apply regardless of governing load case, in each direction.]

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PROJECT	PSE OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	1/0/1900
SUBJECT	CONTROL HOUSE		

LATERAL LOADS - SEISMIC FORCE VERTICAL DISTRIBUTION PAGE: 3 / 3
ref: ASCE 7-16 Sec. 12.8.3

SEISMIC	E-W	N-S	
V_{LRFD}	13.9	13.9	kips
V_{ASD}	9.8	9.8	kips
k	1.00		

						STORY SHEAR		CUMULATIVE SHEAR	
						$F_x=C_{vx}$ x V		Σ V (kips)	
	STORY	W_x	H_x	W_x x H_x^k	C_{vx}	LRFD	ASD	LRFD	ASD
EAST-WEST LOAD DIRECTION	RF	52.5	13.0	682.9	1.00	13.9	9.8	13.9	9.8
			Σ =	682.9		13.9	9.8	kips	
NORTH-SOUTH LOAD DIRECTION	RF	52.5	13.0	682.9	1.00	13.9	9.8	13.9	9.8
			Σ =	682.9		13.9	9.8	kips	

*** Note that all story and cumulative shears include both I_E and Redundancy Factor "ρ"*

LATERAL LOADS - SEISMIC DIAPHRAGM FORCES
ref: ASCE 7-16 Sec. 12.10.1.1

Rho Applied? Y

							LIMITS		V_{DIA} (kips)	
	STORY	W_x	F_x	Σ F_i	Σ W_i	F_{px}	≥	≤	**LRFD**	**ASD**
EAST-WEST LOAD DIRECTION	RF	52.5	13.9	13.9	52.5	13.9	10.7	21.5	**13.9**	**9.8**
NORTH-SOUTH LOAD DIRECTION	RF	52.5	13.9	13.9	52.5	13.9	10.7	21.5	**13.9**	**9.8**

*** Note that all diaphragm shears include $I_{E,}$ but only include Redundancy Factor "ρ" if "Y" checked above.*

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JOB TITLE PSE - PUYALLUP 4-PLEX
JOB NO.
SHEET NO.
CALCULATED BY
DATE
CHECKED BY
DATE

Seismic Loads:

IBC 2018 — Strength Level Forces

Risk Category : II
Importance Factor (Ie) : 1.00
Site Class : E

Ss (0.2 sec) = 127.70 %g
S1 (1.0 sec) = 43.90 %g

A site specific ground motion analysis is required for seismically isolated structures or with damping systems
Site specific ground motion analysis performed:

Fa =	1.200	use 1.20	Sms =	1.532	S_{DS} =	1.022	Design Category =	D
Fv =	0.000	use 2.32	Sm1 =	1.018	S_{D1} =	0.679	Design Category =	D

ASCE7 11.4.8 exception 1 applied and Fa taken equal to site class C

Seismic Design Category = **D**
Redundancy Coefficient ρ = 1.30
Number of Stories: 1
Structure Type: Light Frame
Horizontal Struct Irregularities: No plan Irregularity
Vertical Structural Irregularities: No vertical Irregularity
Flexible Diaphragms: Yes
Building System: **Bearing Wall Systems**
Seismic resisting system: **Light frame (wood) walls with structural wood shear panels**
System Structural Height Limit: **65 ft**
Actual Structural Height (hn) = 13.0 ft
See ASCE7 Section 12.2.5 for exceptions and other system limitations

DESIGN COEFFICIENTS AND FACTORS

Response Modification Coefficient (R) = 6.5
Over-Strength Factor (Ωo) = 2.5
Deflection Amplification Factor (Cd) = 4
S_{DS} = 1.022
S_{D1} = 0.679

Seismic Load Effect (E) = Eh +/-Ev = ρ Q_E +/- $0.2S_{DS}$ D = 1.3Qe +/ 0.204D Q_E = horizontal seismic force
Special Seismic Load Effect (Em) = Emh +/- Ev = Ωo Q_E +/- $0.2S_{DS}$ D = 2.5Qe +/ 0.204D   D = dead load

PERMITTED ANALYTICAL PROCEDURES

Simplified Analysis - Use Equivalent Lateral Force Analysis

Equivalent Lateral-Force Analysis - Permitted

Building period coef. (C_T) = 0.020   Cu = 1.40
Approx fundamental period (Ta) = $C_T h_n^x$ = 0.137 sec x= 0.75   Tmax = CuTa = 0.192 sec
User calculated fundamental period =   T = 0.137 sec
Long Period Transition Period (TL) = ASCE7 map = 6 sec
Seismic response coef. (Cs) = SdsI/R = 0.157
need not exceed Cs = Sd1 I /RT = 0.763
but not less than Cs = 0.044SdsI = 0.045
USE Cs = 0.157

Design Base Shear V = 0.157W

Model & Seismic Response Analysis - Permitted (see code for procedure)

ALLOWABLE STORY DRIFT

Structure Type: All other structures

Allowable story drift Δa = 0.020hsx where hsx is the story height below level x

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PROJECT
PROJECT # PAGE OF
BY DATE
SUBJECT Lateral Loads - Primary LFRS

LATERAL LOADS - WIND v. SEISMIC AND VERT DISTRIBUTION PAGE: 1 / 3
ref: ASCE 7-16 / 2018 IBC

C_S = 0.157 * W   Cs already incl I_E = 1.00 S_{DS} = 1.022
T = 0.137 sec   *(Note I_E NOT added within this spreadsheet)*

Redundancy Factor "ρ"
(E-W loads) 1.30
(N-S loads) 1.30

UNIT WTS OF (H) & (V) ELEMENTS

TYPE	DESCRIPTION	UNIT WT (PSF)
A	ROOF	16
B	FLOOR	10
C	WALLS	12
D		
E		
F		
G		
H		
J		
K		
L		
M		

LEVELS

LEVEL	HT FROM BASE (FT)
RF	12.5
FLR	2

HORIZONTAL ELEMENT DEFINITION

LEVEL	TYPE	PROJECTED AREA (SF)	SLOPE (DEG)	APPROX. % SOLID	UNIT WT (PSF)	EFFECTIVE UNIT WT (PSF)	SUBTOTAL (KIPS)	
RF	A	704	0	100%	16	16.0	11	
						WT SUBTOTAL	11	KIPS
FLR	A	480	0	100%	16	16.0	8	
						WT SUBTOTAL	8	KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS

VERTICAL ELEMENT DEFINITION

LEVEL	TYPE	LENGTH (LF)	TRIB HT (FT)	APPROX. % SOLID	AREA (SF)	UNIT WT (PSF)	SUBTOTAL (KIPS)	
RF	C	135	5	100%	675	12	8	
						WT SUBTOTAL	8	KIPS
FLR	C	135	5	100%	675	12	8	
						WT SUBTOTAL	8	KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS

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LATERAL LOADS - CONTINUED PAGE: 2 / 3

SEISMIC BASE SHEAR SUMMARY

					V (seismic)		
	LEVEL	TOTAL WT	C_S	ρ	LRFD (1.0E)	ASD (0.7E)	
EAST-WEST LOAD DIRECTION	RF	19	0.157	1.30	4.0	2.8	
	FLR	16	0.157	1.30	3.2	2.3	
	SUM =	35.1			7.2	5.0	KIPS
NORTH-SOUTH LOAD DIRECTION	RF	19	0.157	1.30	4.0	2.8	
	FLR	16	0.157	1.30	3.2	2.3	
	SUM =	35.1			7.2	5.0	KIPS

[Vertical load distribution per ASCE 7-16 is attached separately, the story forces shown at left are for purposes of summing total base shear only]

LATERAL LOADS - WIND (MWFRS) METHOD: 1

ref: ASCE 7-16 / 2018 IBC *Note wind pressures below already include I_W =* 1.00

METHOD 1 - FLAT ROOF - RECTANGULAR BUILDING

[ASCE 7-10 "ultimate" wind pressures and zone lengths per "Code Analysis" spreadsheet for MWFRS < 60 ft]

EAST-WEST LOAD DIRECTION

Bldg. Width		12	FT
Zone "2a" Length		3	FT
Typ. Wall Pressure		16	PSF
Zone "2a" Pressure		16	PSF
Elev. Above Grade	PARAPET	12.5	
	RF	12.5	FT
	FLR	2	FT
		0	FT
		0	FT
		0	FT

TRIB HT (FT)	WIND FORCE (KIPS)	
5.3	1.0	
6.3	1.2	
SUM=	2.2	KIPS (LRFD)

NORTH-SOUTH LOAD DIRECTION

Bldg. Width		40	FT
Zone "2a" Length		3	FT
Typ. Wall Pressure		19.6	PSF
Zone "2a" Pressure		19.6	PSF
Elev. Above Grade	PARAPET	12.5	
	RF	12.5	FT
	FLR	2	FT
		0	
		0	
		0	FT

TRIB HT (FT)	WIND FORCE (KIPS)	
5.3	4.1	
6.3	4.9	
SUM=	9.0	KIPS (LRFD)

BASE SHEAR SUMMARY- WIND VS. SEISMIC

	V (seismic)		V (wind)		**V (governing)**	
LOAD DIRECTION	LRFD (1.0E)	ASD (0.7E)	LRFD (1.0W)	ASD (0.6W)	**LRFD (1.0E or 1.0W)**	**ASD (0.7E or 0.6W)**
EAST-WEST	7.2	5.0	2.2	1.3	**7.2 (SEISMIC)**	**5.0 (SEISMIC)**
NORTH-SOUTH	7.2	5.0	9.0	5.4	**9.0 (WIND)**	**5.4 (WIND)**

[Note: Seismic detailing provisions shall apply regardless of governing load case, in each direction.]

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PROJECT	0		
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SUBJECT	Lateral Loads - Primary LFRS		

LATERAL LOADS - SEISMIC FORCE VERTICAL DISTRIBUTION PAGE: 3 / 3
ref: ASCE 7-16 Sec. 12.8.3

SEISMIC	E-W	N-S	
V_{LRFD}	7.2	7.2	kips
V_{ASD}	5.0	5.0	kips
k	1.00		

						STORY SHEAR $F_x=C_{vx}$ x V		CUMULATIVE SHEAR Σ V (kips)	
	STORY	W_x	H_x	W_x x H_x^k	C_{vx}	LRFD	ASD	LRFD	ASD
EAST-WEST LOAD DIRECTION	RF	19.4	12.5	242.1	0.88	6.3	4.4	6.3	4.4
	FLR	15.8	2.0	31.6	0.12	0.8	0.6	7.2	5.0
			Σ =	273.6		7.2	5.0	kips	
NORTH-SOUTH LOAD DIRECTION	RF	19.4	12.5	242.1	0.88	6.3	4.4	6.3	4.4
	FLR	15.8	2.0	31.6	0.12	0.8	0.6	7.2	5.0
			Σ =	273.6		7.2	5.0	kips	

*** Note that all story and cumulative shears include both I_E and Redundancy Factor "ρ"*

LATERAL LOADS - SEISMIC DIAPHRAGM FORCES
ref: ASCE 7-16 Sec. 12.10.1.1

Rho Applied? Y

							LIMITS		V_{DIA} (kips)	
	STORY	W_x	F_x	Σ F_i	Σ W_i	F_{px}	≥	≤	**LRFD**	**ASD**
EAST-WEST LOAD DIRECTION	RF	19.4	6.3	6.3	19.4	6.3	4.0	7.9	**6.3**	**4.4**
	FLR	15.8	0.8	7.2	35.1	3.2	3.2	6.5	**3.2**	**2.3**
NORTH-SOUTH LOAD DIRECTION	RF	19.4	6.3	6.3	19.4	6.3	4.0	7.9	**6.3**	**4.4**
	FLR	15.8	0.8	7.2	35.1	3.2	3.2	6.5	**3.2**	**2.3**

*** Note that all diaphragm shears include $I_{E,}$ but only include Redundancy Factor "ρ" if "Y" checked above.*

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DIAPHRAGM FORCE DISTRIBUTION

Project	PSE OTC	#	21239
Description	4PLEX		
Engineer	DL	Date	

Level: RF

v1.14 3/21/18 JRK

ANALYSIS Analysis type: RIGID SEISMIC
un-amplifiedaccidental eccentricity(%) 5.00% (SEISMIC rigid diaphragm analysis only)

All plywood wall deflections converged: TRUE (if false-adjust trial shears on wood section of walls sht)
All wall lines sorted: TRUE (if false-hit sort button on wall sht)

TORSIONAL IRREGULARITY AMPLIFICATION (SEISMIC)
(to determine values below, set APPLY to false and enter governing max and avg from left)
max delta at Ax=1.0 3.00E+00 TRUE (APPLY - only applies to Seismic Forces and Rigid diaphragm analysis)
avg delta at Ax=1.0 1.00E+00 Ax= 3.00 Calculated Deflection: max dX(Vx) 1.22E-01
accidental eccentricity used 15.00% (based on Ax= 3.00 avg dX(Vx) 8.44E-02
max dY(Vy) 3.88E-01
avg dY(Vy) 2.99E-01

DIAPHRAGM

Diaphragm Segment information	Start (y start)	End (y end)	Depth (x dir)		
Definition in Y direction: (for x direction forces)	0.0	12.0	40.0		
				overall length X	40.0
				Y	12.0
				V	5.4
				Ax	480
		12.0		wx	0.01125

OVERRIDE DIAPH DIMENSIONS FOR ACCIDENTAL ECCENTRICITY
Override? FALSE

	OVERRIDE	CALC'D	USED
XLENGTH=	0.0	40	40
YLENGTH=	0.0	12	12

	Start (x start)	End (x end)	Depth (y dir)		
Definition in X direction: (for y direction forces)	0.0	40.0	12.0		
				V	5
				Ay	480
		40.0		wy	0.010417

LOADS

MFRS X Force Direction Load Definition: 1.000 (multiple for X diaphragm shear)

	start Y ft	stop Y ft	Load case 1 distributed loads W(kip/ft)	total force	center	1st moment	Load case 2 distributed loads W(kip/ft)	total force	center	1st moment
1	0.0	12.0	0.450	5.4	6.0	32.4	0.000	0.0	6.0	0.0
2				0.0	0.0	0.0		0.0	0.0	0.0
3				0.0	0.0	0.0		0.0	0.0	0.0
4				0.0	0.0	0.0		0.0	0.0	0.0
5				0.0	0.0	0.0		0.0	0.0	0.0
6				0.0	0.0	0.0		0.0	0.0	0.0
7				0.0	0.0	0.0		0.0	0.0	0.0
8				0.0	0.0	0.0		0.0	0.0	0.0
MFRS X Force Direction Forces From Above			12.0	5.4	6.0			0.0	0.0	

label	Y coord	X force1	total force	center	1st moment	X force2	total force	center	1st moment
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Fx1	5.4	7.8	42.1	Fx2	5.4	4.2	22.7

MFRS Y Force Direction Load Definition: 1.000 (multiple for Y diaphragm shear)

	start X ft	stop X ft	Load case 1 distributed loads W(kip/ft)	total force	center	1st moment	Load case 2 distributed loads W(kip/ft)	total force	center	1st moment
1	0.0	40.0	0.125	5.0	20.0	100.0	0.000	0.0	20.0	0.0
2				0.0	0.0	0.0		0.0	0.0	0.0
3				0.0	0.0	0.0		0.0	0.0	0.0
4				0.0	0.0	0.0		0.0	0.0	0.0
5				0.0	0.0	0.0		0.0	0.0	0.0
6				0.0	0.0	0.0		0.0	0.0	0.0
7				0.0	0.0	0.0		0.0	0.0	0.0
8				0.0	0.0	0.0		0.0	0.0	0.0
MFRS Y Force Direction Forces From Above			40.0	5.0	20.0			0.0	0.0	

label	X coord	Y force1	total force	center	1st moment	Y force2	total force	center	1st moment
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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DIAPHRAGM FORCE DISTRIBUTION (Page 2)

Project: PSE OTC # 21239
Description:
Engineer: DL Date: 01/00/00

Level: **RF**

All plywood wall deflections converged: TRUE (if false-adjust trial shears on wood section of walls sht)

0.00
0.00

Wood Framed Walls w/Plywood
Individual Wall Geometry

Wall Properties
Wood Light Framed w/Plywood

Line label	reference position ft	length ft	height ft	Panel/Sides/Fastener Type lookup	spacing in	end post lookup	MOE ksi	hold down lookup	other vert slop in	trial shear kips/ft	wall shear kip/ft	Indivdual Wall Max Shear kip	Wall Line Max Shear kip	trial shear converged	used	ridgity R kip/in	line summation R kip/in	relative stiffness
1	0	12	11	15/32 STR 1 PLY - 1 SIDE - 8d	6	2-2x6	1600	HDU2	0	0.146	0.146	1.75	1.75	TRUE	TRUE	8.37	8.37	1.00
2	0	12	11	15/32 STR 1 PLY - 1 SIDE - 8d	6	2-2x6	1600	HDU2	0	0.271	0.271	3.25	3.25	TRUE	TRUE	8.37	8.37	1.00
B	0	40	9	15/32 STR 1 PLY - 1 SIDE - 8d	6	2-2x6	1600	HDU2	0	0.135	0.135	5.40	5.40	TRUE	TRUE	44.24	44.24	1.00
A	0	1	20	15/32 STR 1 PLY - 1 SIDE - 8d	6	2-2x6	1600	HDU2	0	0.003	0.003	0.00	0.00	TRUE	TRUE	0.05	0.05	1.00
										0.000	0.000	0.00	0.00	TRUE	FALSE	0.00	0.00	0.00
												10.40		TRUE				

Line Geometry

line label	WALL DIRECTION (X or Y)	position (ft)
B	X	0
A	X	12
1	Y	0
2	Y	40

Rigid Diaphragm Distribution
Load case 1

line label	Due to Vx Fvx (kip)	Due to Vx Ft (kip)	Shear due to Vx	deflection at maxVx (")	Due to Vy Fvy (kip)	Due to Vy Ft (kip)	Shear due to Vy	deflection at maxVy (")	Max Wall Shear	max from:
B	5.4	0.00	5.4	0.122	0.0	0.00	0.0	0.000	5.4	Vx
A	0.0	0.00	0.0	0.047	0.0	0.00	0.0	0.054	0.0	Vy
1	0.0	1.05	1.1	0.126	2.5	-0.75	1.8	0.209	1.8	Vy
2	0.0	-1.05	-1.1	-0.126	2.5	0.75	3.2	0.388	3.2	Vy
0	0.0	0.00	0.0	0.000	0.0	0.00	0.0	0.000	0.0	N/A
	5.4	T1			5.0	T1				

Center of Rigity(ft)	20.0	0.0
Center of Force(ft)	26.0	7.8
Total Shear (kip	5.0	5.4
Eccentricity(ft)	6.0	7.8
TORSION	30.0	42.0

0.00
0.00

trial shear kips/ft	wall shear kip/ft	Indivdual Wall Max Shear kip	Wall Line Max Shear kip	trial shear converged	used	ridgity R kip/in	line summation R kip/in	relative stiffness
0.271	0.271	3.25	3.25	TRUE	TRUE	8.37	8.37	1.00
0.146	0.146	1.75	1.75	TRUE	TRUE	8.37	8.37	1.00
0.135	0.135	5.40	5.40	TRUE	TRUE	44.24	44.24	1.00
0.004	0.004	0.00	0.00	TRUE	TRUE	0.05	0.05	1.00
0.000	0.000	0.00	0.00	TRUE	FALSE	0.00	0.00	0.00
		10.40		TRUE				

Load case 2

line label	Due to Vx Fvx (kip)	Due to Vx Ft (kip)	Max Wall Shear due to Vx	deflection at maxVx (")	Due to Vy Fvy (kip)	Due to Vy Ft (kip)	Max Wall Shear due to Vy	deflection at maxVx (")	Max Wall Shear	max from:
B	5.4	0.00	5.4	0.122	0.0	0.00	0.0	0.000	5.4	Vx
A	0.0	0.00	0.0	0.081	0.0	0.00	0.0	-0.054	0.0	Vx
1	0.0	0.56	0.6	0.067	2.5	0.75	3.2	0.388	3.2	Vy
2	0.0	-0.56	-0.6	-0.067	2.5	-0.75	1.8	0.209	1.8	Vy
0	0.0	0.00	0.0	0.000	0.0	0.00	0.0	0.000	0.0	N/A
	5.4	T2			5.0	T2				

Center of Rigity(ft)	20.0	0.0
Center of Force(ft)	14.0	4.2
Total Shear (kip	5.0	5.4
Eccentricity(ft)	-6.0	4.2
TORSION	-30.0	22.6

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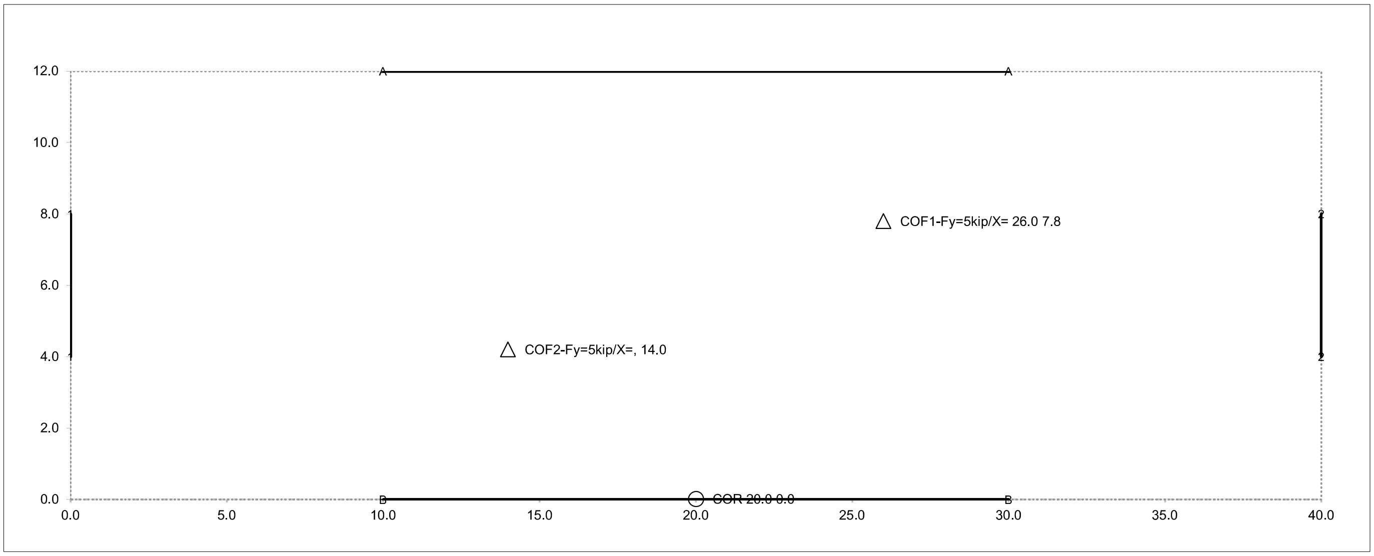
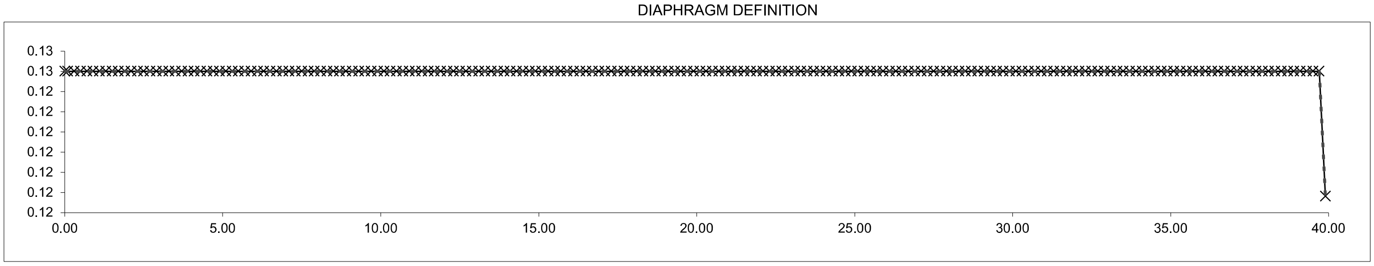
Y FORCE DIAPH FORCES (Page 3)

Project PSE OTC # 21239
Description
Engineer DL Date 01/00/00
v1.14 3/21/18 JRK

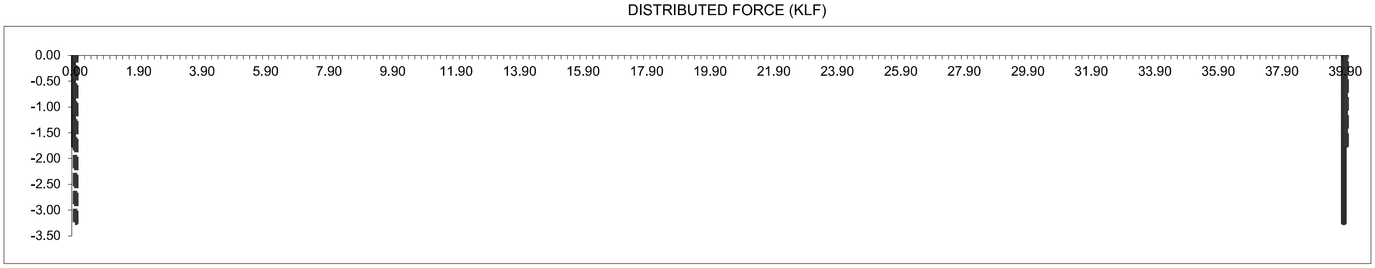
Level: RF



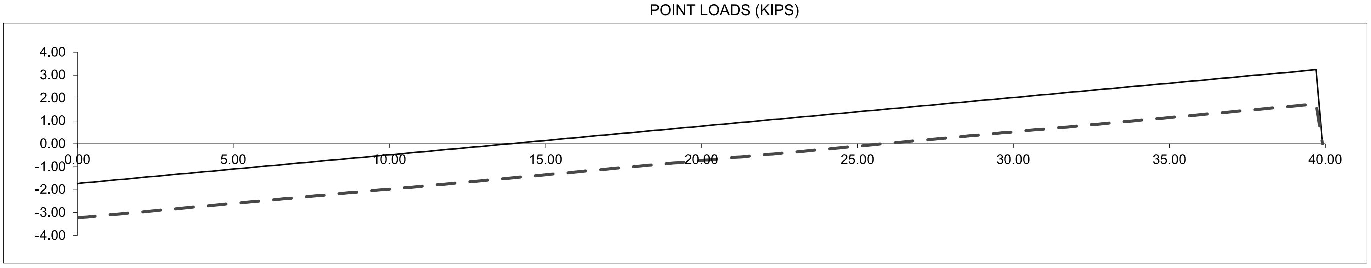
DIAPHRAGM DEFINITION



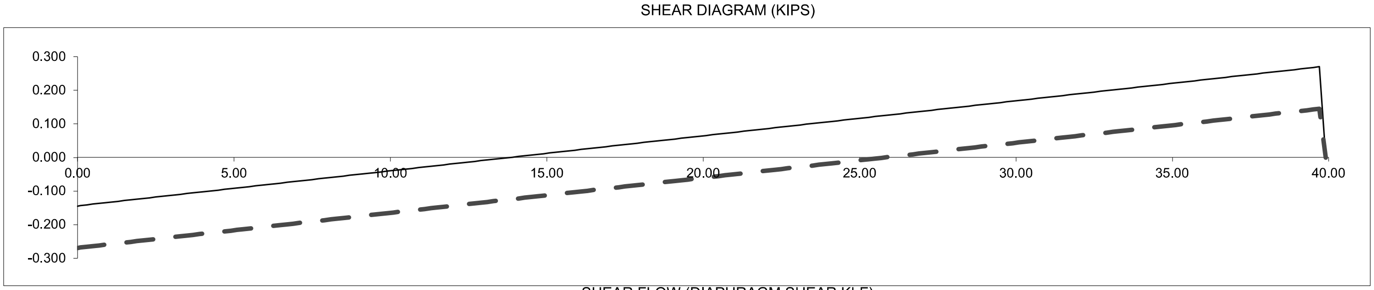
DISTRIBUTED FORCE (KLF)



POINT LOADS (KIPS)



SHEAR DIAGRAM (KIPS)



SHEAR FLOW (DIAPHRAGM SHEAR KLF)

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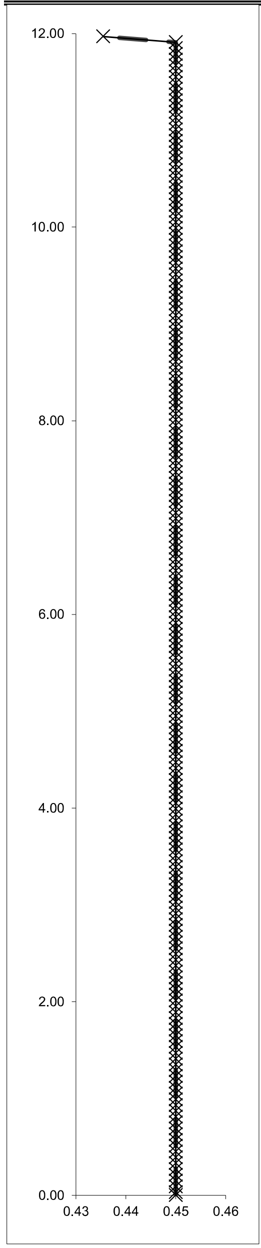
X FORCE DIAPH FORCES (Page 4)

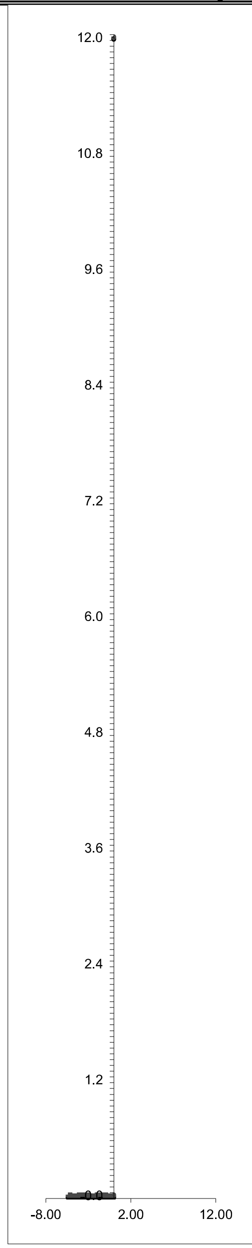
Project	PSE OTC	#	21239
Description			
Engineer	DL	Date	01/00/00

v1.14 3/21/18 JRK

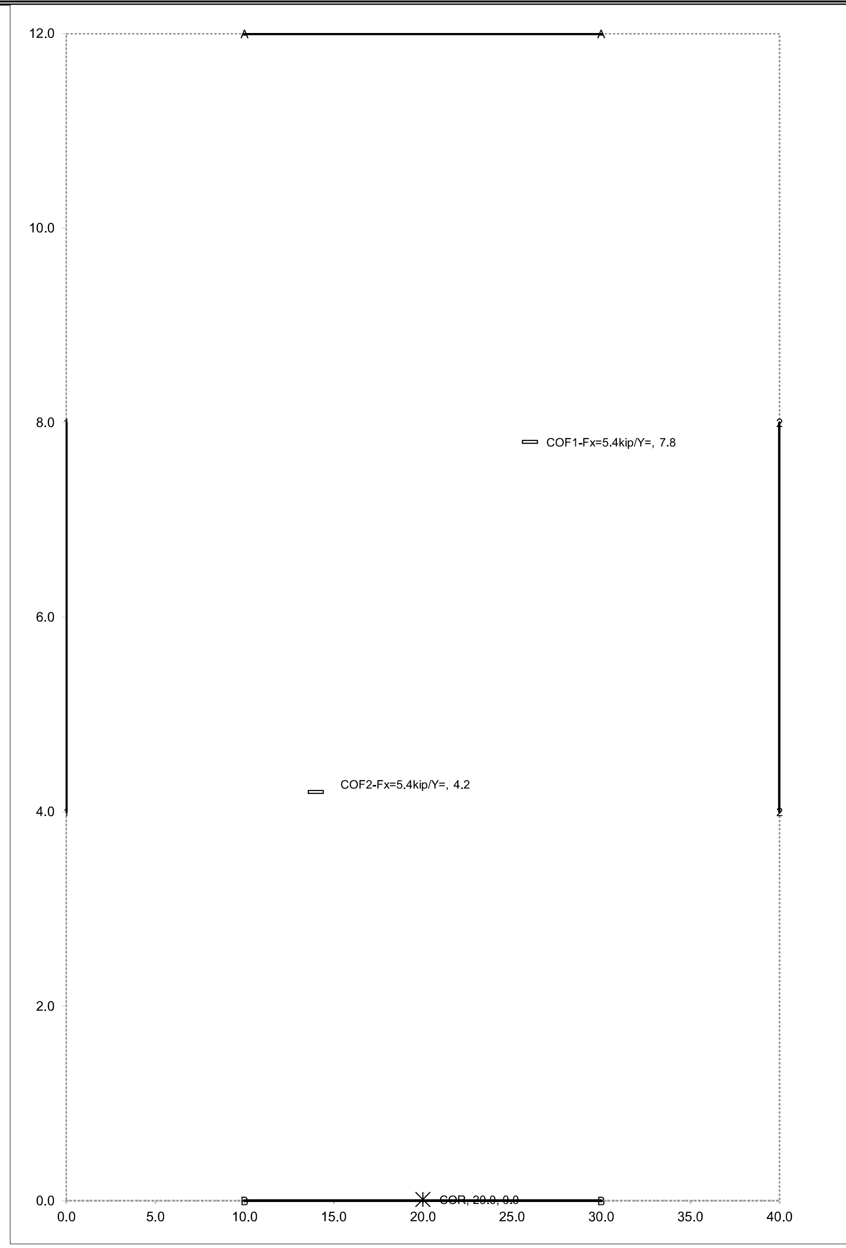
Level: RF



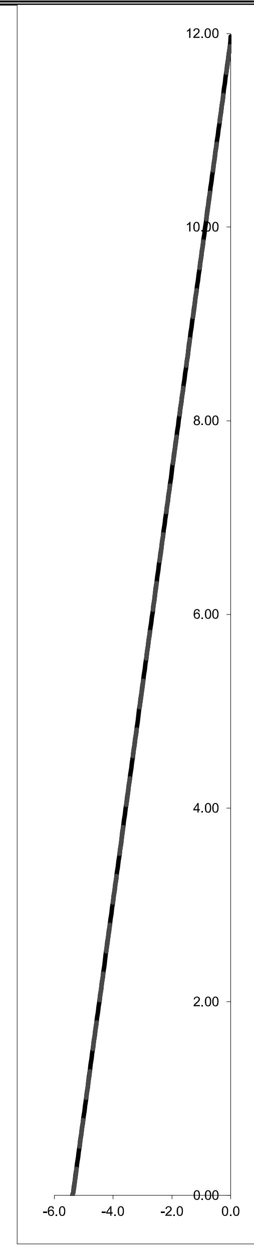
DISTRIBUTED FORCE (KIP/FT)



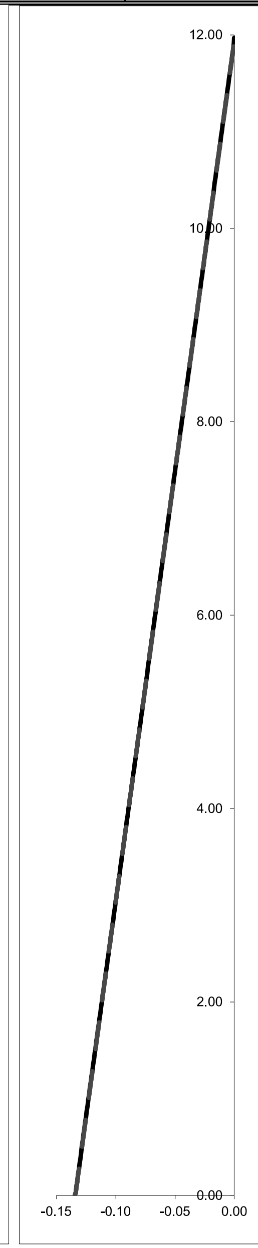
POINT LOADS (KIPS)



DIAPHRAGM DEFINITION



SHEAR DIAGRAM (KIP)



SHEAR FLOW (KIP/FT)

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SHEAR WALL DESIGN 12/06/23

Project PSE OTC 21239
Description 4PLEX
Engineer DL Date 10/16/23

SHEARLINE V1.5 6/19/13

DEFAULT PLY: 15/32 Sheath 10d
FRAMING SG: 0.42
GOVERNING LOAD TYPE: SEISMIC

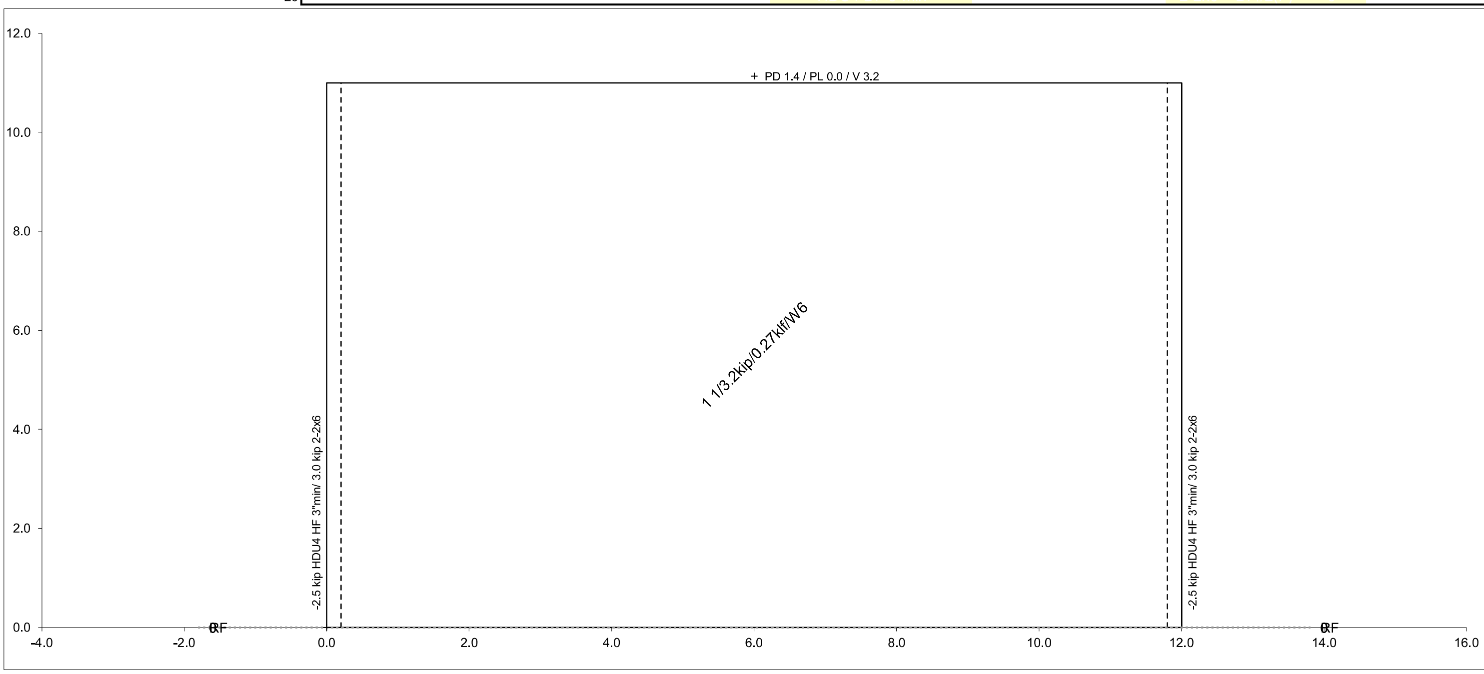
	Line label	reference position ft	length ft	height ft	level	shear kip	values used for stiffness analysis for comparison Plywood and nailing	nail spacing in	end post	hd	PLY	PLY NUMBER OF SIDES	q (KLF) klf	SPACING in	FRAMING SG	ASPECT RATIO	ADJUSTED ASPECT R	Q ALLOW klf	Q CHECK
1	1	0	12	11	RF	3.2492	.Y - 1 SIDE - 8d	6	2-2x6	HDU2	15/32 Sheath 10d	1	0.271	6	0.42	0.92	0.92	0.285	TRUE
2																			
20																			

^---this row must have a character in each line that has data

PD kip	OFFSET FROM CENTER ft
1.44	0

	START LOOKUP AXIAL POSITION ft	ELEV ft	MIN kip	MAX kip	MIN THIS LEVEL kip	MAX THIS LEVEL kip	SUM OF MIN kip	HOLD DOWN	T ALLOW kip	T CHECK	SUM OF MAX kip	END POST	SPECIES GRADE	BUCKLING LENGTH ft	C ALLOW kip	C CHECK
1	0.0	0	0.0	0.0	-2.5	3.0	-2.5	HDU4 HF 3"min	-3.3	TRUE	3.0	2-2x6	DF#2(F)	11	16.5	TRUE

	END LOOKUP AXIAL POSITION ft		MIN kip	MAX kip	MIN THIS LEVEL kip	MAX THIS LEVEL kip	SUM OF MIN kip	HOLD DOWN	T ALLOW kip	T CHECK	SUM OF MAX kip	END POST	SPECIES GRADE	BUCKLING LENGTH ft	C ALLOW kip	C CHECK
1	12.0	0	0.0	0.0	-2.5	3.0	-2.5	HDU4 HF 3"min	-3.3	TRUE	3.0	2-2x6	DF#2(F)	11	16.5	TRUE
20																



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IBC 2018 1807.3 Pole Foundation

Project	PSE OTC		#23129
Description	4PLEX FOUNDATIONS		
Engineer	DL	Date	

	CASE 1		CASE 2	CASE 3	CASE 4	CASE 5	CASE 6
Nonconstraned:	TRUE		TRUE				
b=Diameter of round or diagonal dimension of square footing:	2	FT	1.5				
h=Distance in feet from ground surface to point of load application:	12.5	FT	12.5				
P=Applied load	675	LB	675				
Presumptive Lateral Bearing Pressure:	300		300				
Nonconstrained only:							
S1=Allowable lateral soil bearing pressure as set forth in section 1806.2 based on a depth of one - third the depth of embedment							
S1=	530	PSF	590				
A=	1.49		1.78	N/A	N/A	N/A	N/A
d=Depth of embedment in earth but not over 12 feet	5.31	FT	5.90	N/A	N/A	N/A	N/A
calculated S1	531		590	N/A	N/A	N/A	N/A
Contrained only: covergence test	TRUE		TRUE	N/A	N/A	N/A	N/A
S3=Allowable lateral soil bearing pressure as set for the in sectio n1806.2 based on a depth equal to the depth of embedment							
S3=		PSF					
d=Depth of embedment in earth but not over 12 feet	N/A	FT	N/A	N/A	N/A	N/A	N/A
calculated S3	N/A		N/A	N/A	N/A	N/A	N/A
covergence test	N/A		N/A	N/A	N/A	N/A	N/A

Table 1806.2 Presumptive Load Bearing Values
Lateral Bearing Pressure

Bedrock	400 to 1200 psf/ft
Sandy gravel or or gravel	200 psf/ft
sand, silty sand, silty gravel and glayey gravel	150 psf/ft
clay sandy clay, silty clay, clayey silt, silt, and sandy silt	100 psf/ft

1806.1 Lateral loads may be increased by 1/3 where used with the alternative basic load combinations of section 1605.3.2 that include wind or earthquake loads

1806.3.3 Lateral loads may be increased by the value above for each additional foot of depth to a maximum of 15 times the tabular value

1806.3.4 Increase for poles: Isolated poles for uses such as flagpoles or signs and poles usded to support buildings that are not adversely affected by a 1/2 inch motion at the ground surface due to short tem lateral loads shall be permitted to be designed unsing lateral bearing pressures equal to two times the tabular values

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PROJECT	PSE OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	
SUBJECT	TRASH ENCLOSURE		

LATERAL LOADS - WIND v. SEISMIC AND VERT DISTRIBUTION
ref: ASCE 7-16 / 2018 IBC

PAGE: 1 / 3

C_S = 0.204 * W   Cs already incl I_E = 1.00 S_{DS} = 1.022
T = 0.152 sec   *(Note I_E NOT added within this spreadsheet)*

Redundancy Factor "ρ"
(E-W loads) 1.30
(N-S loads) 1.30

UNIT WTS OF (H) & (V) ELEMENTS

TYPE	DESCRIPTION	UNIT WT (PSF)
A	ROOF	15
B		
C	WALLS	84
D		
E		
F		
G		
H		
J		
K		
L		
M		

LEVELS

LEVEL	HT FROM BASE (FT)
RF	15

HORIZONTAL ELEMENT DEFINITION

LEVEL	TYPE	PROJECTED AREA (SF)	SLOPE (DEG)	APPROX. % SOLID	UNIT WT (PSF)	EFFECTIVE UNIT WT (PSF)	SUBTOTAL (KIPS)	
RF	A	482	0	100%	15	15.0	7	
						WT SUBTOTAL	7	KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS

VERTICAL ELEMENT DEFINITION

LEVEL	TYPE	LENGTH (LF)	TRIB HT (FT)	APPROX. % SOLID	AREA (SF)	UNIT WT (PSF)	SUBTOTAL (KIPS)	
RF	C	50.4	7.5	100%	378	84	32	
	C	24	2.7	100%	65	84	5	
						WT SUBTOTAL	37	KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS
						WT SUBTOTAL		KIPS

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PROJECT	PSE OTC		
PROJECT #	21239	PAGE	OF
BY	DL	DATE	1/0/1900
SUBJECT	TRASH ENCLOSURE		

LATERAL LOADS - CONTINUED

PAGE: 2 / 3

SEISMIC BASE SHEAR SUMMARY

	LEVEL	TOTAL WT	C_S	ρ	V (seismic) LRFD (1.0E)	V (seismic) ASD (0.7E)	
EAST-WEST LOAD DIRECTION	RF	44	0.204	1.30	11.8	8.2	
	SUM =	44.4			11.8	8.2	KIPS
NORTH-SOUTH LOAD DIRECTION	RF	44	0.204	1.30	11.8	8.2	
	SUM =	44.4			11.8	8.2	KIPS

[Vertical load distribution per ASCE 7-16 is attached separately, the story forces shown at left are for purposes of summing total base shear only]

LATERAL LOADS - WIND (MWFRS)

METHOD: 1

ref: ASCE 7-16 / 2018 IBC

Note wind pressures below already include I_W = 1.00

METHOD 1 - FLAT ROOF - RECTANGULAR BUILDING

[ASCE 7-10 "ultimate" wind pressures and zone lengths per "Code Analysis" spreadsheet for MWFRS < 60 ft]

EAST-WEST LOAD DIRECTION

Bldg. Width	24	FT
Zone "2a" Length	6	FT
Typ. Wall Pressure	20	PSF
Zone "2a" Pressure	20	PSF

Elev. Above Grade			TRIB HT (FT)	WIND FORCE (KIPS)
PARAPET	15			
RF	15	FT	7.5	3.6
	0	FT		
	0	FT		
	0	FT		
	0	FT		
			SUM=	3.6 KIPS (LRFD)

NORTH-SOUTH LOAD DIRECTION

Bldg. Width	13.2	FT
Zone "2a" Length	6	FT
Typ. Wall Pressure	20	PSF
Zone "2a" Pressure	20	PSF

Elev. Above Grade			TRIB HT (FT)	WIND FORCE (KIPS)
PARAPET	15			
RF	15	FT	7.5	2.0
	0	FT		
	0			
	0			
	0	FT		
			SUM=	2.0 KIPS (LRFD)

BASE SHEAR SUMMARY- WIND VS. SEISMIC

LOAD DIRECTION	V (seismic) LRFD (1.0E)	V (seismic) ASD (0.7E)	V (wind) LRFD (1.0W)	V (wind) ASD (0.6W)	**V (governing) LRFD (1.0E or 1.0W)**	**V (governing) ASD (0.7E or 0.6W)**
EAST-WEST	11.8	8.2	3.6	2.2	**11.8 (SEISMIC)**	**8.2 (SEISMIC)**
NORTH-SOUTH	11.8	8.2	2.0	1.2	**11.8 (SEISMIC)**	**8.2 (SEISMIC)**

[Note: Seismic detailing provisions shall apply regardless of governing load case, in each direction.]

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PROJECT	PSE OTC		
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SUBJECT	TRASH ENCLOSURE		

LATERAL LOADS - SEISMIC FORCE VERTICAL DISTRIBUTION PAGE: 3 / 3

ref: ASCE 7-16 Sec. 12.8.3

SEISMIC	E-W	N-S	
V_{LRFD}	11.8	11.8	kips
V_{ASD}	8.2	8.2	kips
k	1.00		

						STORY SHEAR		CUMULATIVE SHEAR	
						$F_x=C_{vx}$ x V		Σ V (kips)	
	STORY	W_x	H_x	W_x x H_x^k	C_{vx}	LRFD	ASD	LRFD	ASD
EAST-WEST LOAD DIRECTION	RF	44.4	15.0	666.3	1.00	11.8	8.2	11.8	8.2
			Σ =	666.3		11.8	8.2	kips	
NORTH-SOUTH LOAD DIRECTION	RF	44.4	15.0	666.3	1.00	11.8	8.2	11.8	8.2
			Σ =	666.3		11.8	8.2	kips	

*** Note that all story and cumulative shears include both I_E and Redundancy Factor "ρ"*

LATERAL LOADS - SEISMIC DIAPHRAGM FORCES

ref: ASCE 7-16 Sec. 12.10.1.1

Rho Applied? Y

							LIMITS		V_{DIA} (kips)	
	STORY	W_x	F_x	Σ F_i	Σ W_i	F_{px}	≥	≤	**LRFD**	**ASD**
EAST-WEST LOAD DIRECTION	RF	44.4	11.8	11.8	44.4	11.8	9.1	18.2	**11.8**	**8.2**
NORTH-SOUTH LOAD DIRECTION	RF	44.4	11.8	11.8	44.4	11.8	9.1	18.2	**11.8**	**8.2**

*** Note that all diaphragm shears include $I_{E,}$ but only include Redundancy Factor "ρ" if "Y" checked above.*

RAM Elements

TRASH ENCLOSURE END WALL

Current Date: 10/31/2023 12:30 PM
Units system: English
File name: \\kwserver\KW Operations\Projects\21239 PSE IOTC\CALCULATIONS\231031 TRASH ENCLOSURE - CMU END WALL.msw

Design Results
Masonry wall

General Information

**Global status : ** OK

Design code	:	TMS 402-16 SD
<u>Materials:</u>		
Material	:	CMU 1.5-60
Mortar type	:	Port/Mort - M/S
Grouting type	:	Partial grouting
Mortar bed type	:	Full bed
Masonry compression strength (F`m)	:	1.5 [Kip/in2]
Steel tension strength (fy)	:	60 [Kip/in2]
Steel allowable tension strength (Fs)	:	24 [Kip/in2]
Steel elasticity modulus (Es)	:	29000 [Kip/in2]
Masonry elasticity modulus (Em)	:	1350 [Kip/in2]
Masonry unit weight	:	0.135 [Kip/ft3]
<u>Seismic data:</u>		
Seismic design category	:	SDC D
Response modification factor	:	5.00
Shear wall type	:	Special

Geometry

Total height	:	15.00 [ft]
Total length	:	13.20 [ft]
Foundation type	:	Continuous
Wall bottom restraint	:	Pinned
Column bottom restraint	:	Fixed
Rigidity elements	:	None

Number of stories: 1

Story	Story height [ft]	Wall thickness [in]	Effective unit weight [Kip/ft3]
1	15.00	7.63	0.07

Load Conditions

ID	Comb.	Category	Description
DL	No	DL	Dead Load
S	No	SNOW	SNOW
Eip	No	EQ	E_IN PLANE
Eop	No	EQ	E_OUT PLANE
SM1	Yes		DL+S+0.7Eip+0.7Eop
DM1	Yes		1.4DL
DM2	Yes		1.2DL+1.6S
DM3	Yes		1.4044DL+0.2S+Eip
DM4	Yes		1.4044DL+0.2S+Eop
DM5	Yes		1.4044DL+0.2S-Eip
DM6	Yes		1.4044DL+0.2S-Eop
DM7	Yes		0.6956DL+Eip
DM8	Yes		0.6956DL+Eop
DM9	Yes		0.6956DL-Eip
DM10	Yes		0.6956DL-Eop

Loads

Concentrated loads:

Story	Condition	Direction	Magnitude [Kip]	Eccentricity [in]	Distance [ft]
1	DL	Vertical	5.00	0.00	12.90
1	S	Vertical	3.00	0.00	12.90

Distributed loads:

Consider self weight : DL

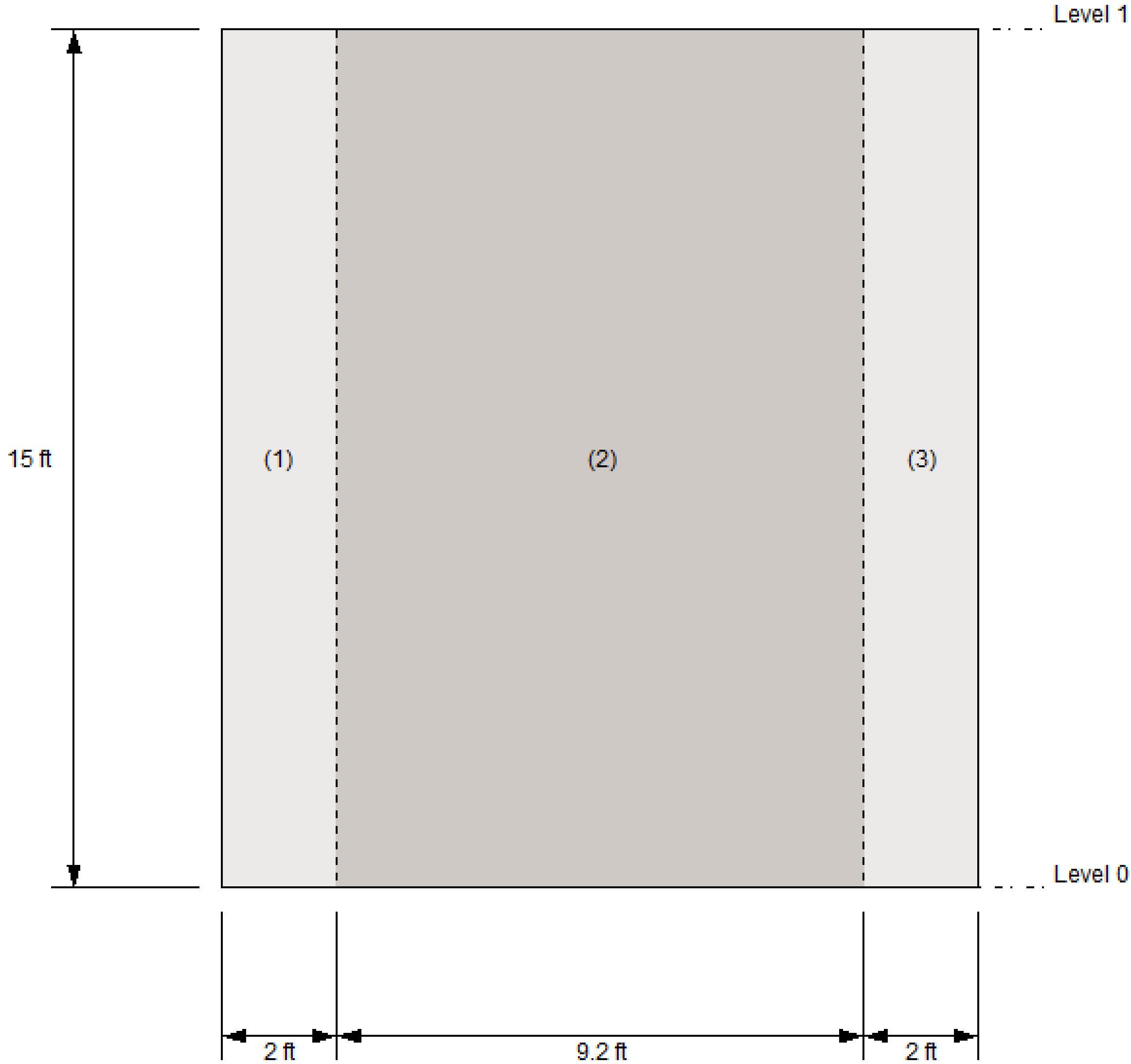
Story	Condition	Direction	Magnitude [Kip/ft]	Eccentricity [ft]
1	Eip	Horizontal	0.45	0.00

Out-of-plane loads:

Story	Condition	Magnitude [Kip/ft2]
1	Eop	0.04

Bearing Wall Design

Status : OK



Geometry

Level	Segment	X Coordinate [ft]	Y Coordinate [ft]	Width [ft]	Height [ft]
0	1	0.00	0.00	2.00	15.00
	2	2.00	0.00	9.20	15.00
	3	11.20	0.00	2.00	15.00

Vertical reinforcement

Segment	Bars	Spacing [in]	Ld [in]
1	2-#5	16.00	39.33
2	3-#5	48.00	39.33
3	2-#5	16.00	39.33

Combined axial flexure

Segment	Condition	Pu [Kip]	Mua [Kip*ft]	Mu [Kip*ft]	ϕMn [Kip*ft]	Ratio
1	DM4(Max)	-0.33	2.01	2.00	6.89	0.29
2	DM10(Max)	4.44	8.95	9.06	12.97	0.70
3	DM8(Max)	2.53	2.01	2.02	7.56	0.27

Flexural reinforcement area

Segment	Condition	Pu [Kip]	As [in2]	Asmax [in2]	Ratio
1	DM4(Max)	0.00	0.47	0.57	0.82
2	DM10(Max)	0.00	0.71	2.30	0.31
3	DM4(Max)	0.00	0.47	0.57	0.82

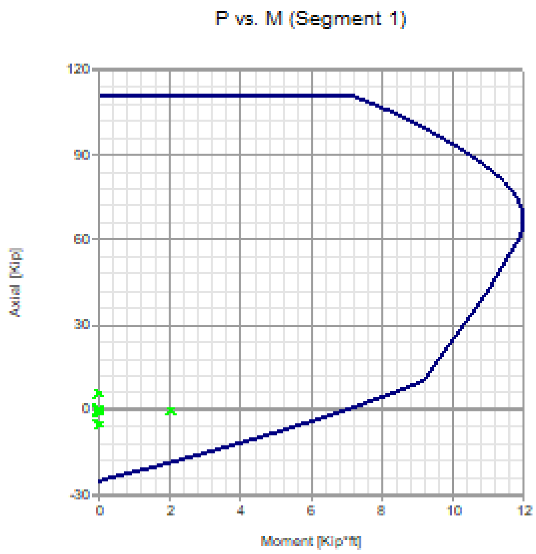
Intermediate results for axial-bending

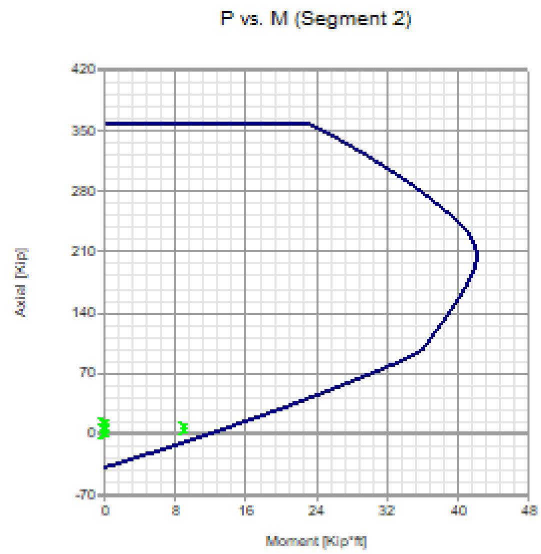
Segment	Condition	c [in]	d [in]	Mcr [Kip*ft]
1	DM4(Max)	1.20	3.81	1.05
2	DM10(Max)	0.47	3.81	0.86
3	DM8(Max)	1.40	3.81	1.22

Inertias

Segment	Condition	Ig [in4]	Icr [in4]
1	DM4(Max)	385.13	42.98
2	DM10(Max)	347.53	22.14
3	DM8(Max)	385.13	46.39

Interaction diagrams, P vs. M





Axial compression

Segment	Condition	Pu [Kip]	ϕPn [Kip]	Ratio
1	DM5(Bottom)	5.79	80.41	0.07
2	DM2(Bottom)	14.70	291.68	0.05
3	DM3(Bottom)	11.51	80.41	0.14

Axial stress

Segment	Condition	Pu [Kip]	Pu/Ag [Kip/in2]	Fn [Kip/in2]	Ratio
1	DM5(Bottom)	5.79	0.04	0.30	0.15
2	DM2(Bottom)	14.70	0.03	0.30	0.11
3	DM3(Bottom)	11.51	0.09	0.30	0.30

Shear

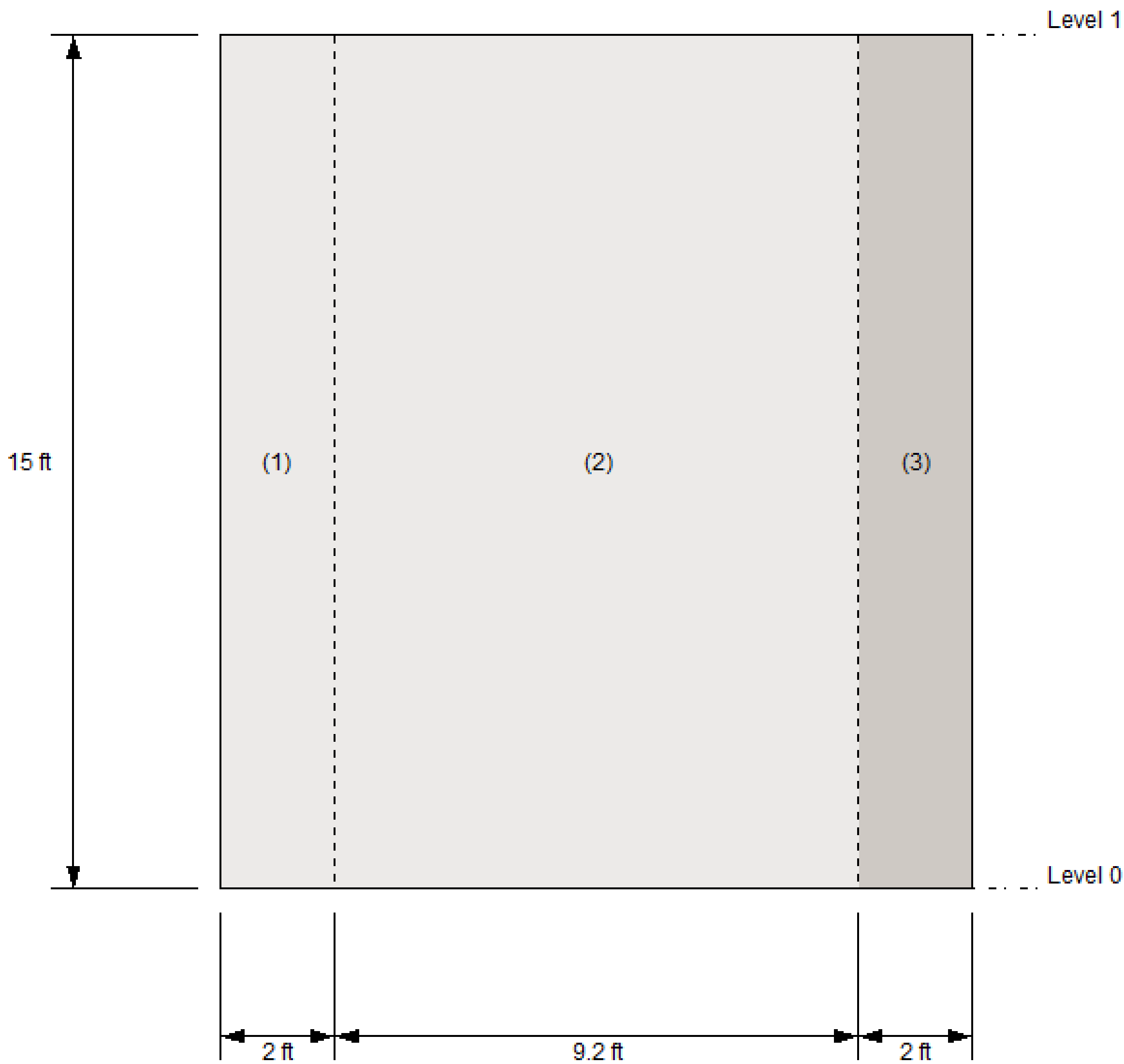
Segment	Condition	Vu [Kip]	ϕVn [Kip]	Ratio
1	DM10(Max)	0.16	3.19	0.05
2	DM8(Max)	0.16	3.29	0.05
3	DM10(Max)	0.16	3.44	0.05

Deflection

Segment	Condition	δs [in]	δmax [in]	δs/δmax
1	SM1(Max)	0.05	1.26	0.04
2	SM1(Max)	0.06	1.26	0.05
3	SM1(Max)	0.05	1.26	0.04

Shear Wall Design

Status : OK



Geometry

Level	Segment	X Coordinate [ft]	Y Coordinate [ft]	Width [ft]	Height [ft]
0	1	0.00	0.00	2.00	15.00
	2	2.00	0.00	9.20	15.00
	3	11.20	0.00	2.00	15.00

Reinforcement

	Vertical reinforcement			Horizontal reinforcement		
Segment	**Bars**	**Spacing** [in]	**Ld** [in]	**Bars**	**Spacing** [in]	**Ld** [in]
1	2-#5	16.00	39.33	8-#5	24.00	39.33
2	3-#5	48.00	39.33	8-#5	24.00	39.33
3	2-#5	16.00	39.33	8-#5	24.00	39.33

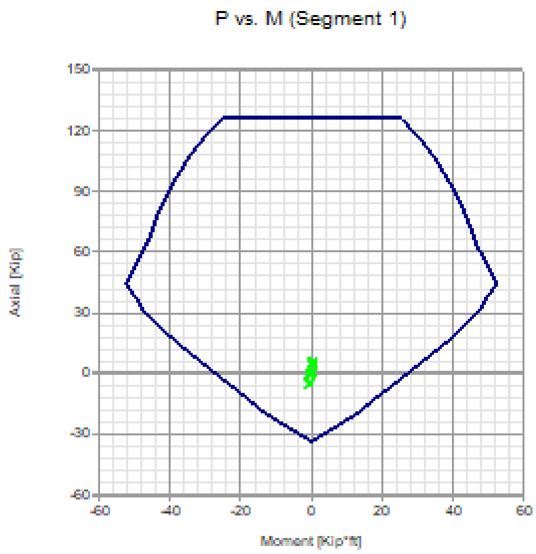
Combined axial flexure

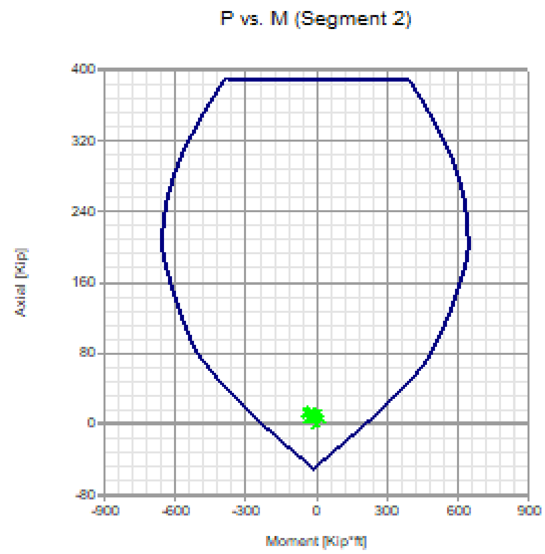
Segment	Condition	Pu [Kip]	Mu [Kip*ft]	ϕMn [Kip*ft]	Ratio
1	DM3(Bottom)	-5.06	-0.85	23.48	0.04
2	DM3(Max)	12.81	-40.25	279.39	0.14
3	DM2(Top)	7.66	-8.54	32.62	0.26

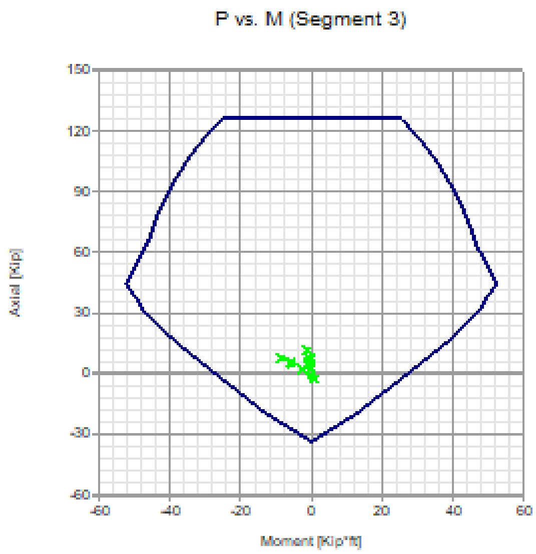
Flexural reinforcement area

Segment	Condition	Pu [Kip]	As [in2]	Asmax [in2]	Ratio
1	DM2(Bottom)	0.00	0.62	1.35	0.46
2	DM10(Bottom)	0.00	0.93	4.22	0.22
3	DM10(Top)	0.00	0.62	1.35	0.46

Interaction diagrams, P vs. M







Axial compression

Segment	Condition	Pu [Kip]	ϕPn [Kip]	Ratio
1	DM5(Bottom)	5.79	88.59	0.07
2	DM2(Bottom)	14.70	300.10	0.05
3	DM3(Bottom)	11.51	88.59	0.13

Shear

Segment	Condition	Vu [Kip]	ϕVn [Kip]	Ratio
1	DM5(Bottom)	2.19	15.51	0.14
2	DM3(Max)	11.39	54.12	0.21
3	DM5(Top)	4.77	12.18	0.39

Shear friction

Segment	Condition	Vf [Kip]	ϕVnf [Kip]	Ratio
1	DM7(Bottom)	1.71	32.02	0.05
2	DM3(Max)	11.39	49.94	0.23
3	DM5(Top)	4.77	17.57	0.27

Notes

* Pu = Factored axial load
* Pn = Nominal compression strength
* δ = Moment magnification factor
* Mu = Factored total flexural moment
* Mua = Factored flexural moment from analysis
* Mn = Nominal moment strength
* Mcr = Nominal cracking moment
* ft = Stress due to flexural tension
* fc = Stress due to flexural compression
* Fn = Nominal stress
* Vu = Factored shear force
* Vn = Nominal shear strength
* Vf = Nominal shear friction strength
* δs = Calculated deflection
* δmax = Maximum allowable deflection
* ld = Embedment length
* Ag = Gross cross sectional area of a member
* As = Effective cross sectional area of reinforcement
* c = Distance from the fiber of maximum compressive strain to the neutral axis
* d = Distance from the extreme compression fiber to centroid of tension reinforcement

RAM Elements

TRASH ENCLOSURE
LINTEL DESIGN

Current Date: 10/31/2023 12:55 PM
Units system: English
File name: \\kwserver\KW Operations\Projects\21239 PSE IOTC\CALCULATIONS\231031 TRASH ENCLOSURE - LINTEL.msw

Design Results
Masonry wall

General Information

**Global status : ** OK

Design code	:	TMS 402-16 SD

Materials:

Material	:	CMU 1.5-60
Mortar type	:	Port/Mort - M/S
Grouting type	:	Full grouting
Masonry compression strength (F`m)	:	1.5 [Kip/in2]
Steel tension strength (fy)	:	60 [Kip/in2]
Steel allowable tension strength (Fs)	:	24 [Kip/in2]
Steel elasticity modulus (Es)	:	29000 [Kip/in2]
Masonry elasticity modulus (Em)	:	1350 [Kip/in2]
Masonry unit weight	:	0.135 [Kip/ft3]

Seismic data:

Seismic design category	:	SDC D
Response modification factor	:	5.00
Shear wall type	:	Special

Geometry

Total height	:	14.67 [ft]
Total length	:	24.00 [ft]
Foundation type	:	Continuous
Wall bottom restraint	:	Pinned
Column bottom restraint	:	Fixed
Rigidity elements	:	None

Number of stories: 1

Story	Story height [ft]	Wall thickness [in]	Effective unit weight [Kip/ft3]
1	14.67	7.63	0.14

Openings:

Reference	X Coordinate [ft]	Y Coordinate [ft]	Width [ft]	Height [ft]
Lower left	0.67	0.00	22.60	12.00

Load Conditions

ID	Comb.	Category	Description
DL	No	DL	Dead Load
S	No	SNOW	SNOW
Eip	No	EQ	E_IN PLANE
Eop	No	EQ	E_OUT PLANE
SM1	Yes		DL+S+0.7Eip+0.7Eop
DM1	Yes		1.4DL
DM2	Yes		1.2DL+1.6S
DM3	Yes		1.4044DL+0.2S+Eip
DM4	Yes		1.4044DL+0.2S+Eop
DM5	Yes		1.4044DL+0.2S-Eip
DM6	Yes		1.4044DL+0.2S-Eop
DM7	Yes		0.6956DL+Eip
DM8	Yes		0.6956DL+Eop
DM9	Yes		0.6956DL-Eip
DM10	Yes		0.6956DL-Eop

Loads

Distributed loads:

Consider self weight : DL

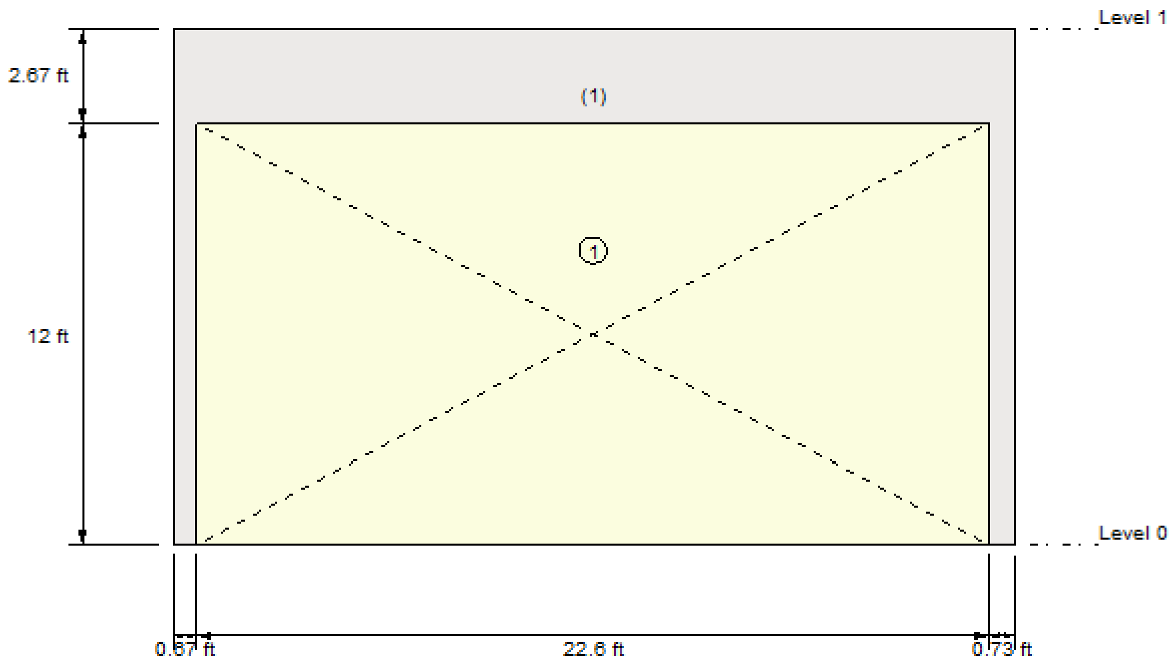
Story	Condition	Direction	Magnitude [Kip/ft]	Eccentricity [ft]
1	DL	Vertical	0.13	0.00
1	S	Vertical	0.17	0.00

Out-of-plane loads:

Story	Condition	Magnitude [Kip/ft2]
1	Eop	0.04

Lintel Design

Status : OK



Geometry

Lintel	X Coordinate [ft]	Y Coordinate [ft]	Length [ft]	Depth [in]
1	0.67	0.00	22.60	32.00

Reinforcement

Lintel	Top long. reinforcement Bars	Extent [in]	Bottom long. reinforcement Bars	Extent [in]	Transverse reinforcement Bars	Spacing [in]	Ld [in]
1	--	0.00	2-#5	2.50	--	0.00	0.00

Bending

Lintel	Condition	Mu [Kip*ft]	ϕMn [Kip*ft]	Ratio
1	DM2(Top)	44.82	77.15	0.58

Flexural reinforcement area

Segment	Condition	Pu [Kip]	As [in2]	Asmax [in2]	Ratio
1	DM1(Top)	0.00	0.62	1.60	0.39

Cracking moment

Lintel	Condition	1.3 Mcr [Kip*ft]	Mn [Kip*ft]	Ratio
1	DM1(Top)	11.85	85.72	0.14

Shear

Lintel	Condition	Vu [Kip]	ϕVn [Kip]	Ratio
1	DM2(Bottom)	6.78	15.79	0.43

Deflection

Lintel	Condition	δs [in]	δmax [in]	Ratio
1	SM1(Top)	0.30	0.45	0.67

Notes

* Pu = Factored axial load
* Pn = Nominal compression strength
* δ = Moment magnification factor
* Mu = Factored total flexural moment
* Mua = Factored flexural moment from analysis
* Mn = Nominal moment strength
* Mcr = Nominal cracking moment
* ft = Stress due to flexural tension
* fc = Stress due to flexural compression
* Fn = Nominal stress
* Vu = Factored shear force
* Vn = Nominal shear strength
* Vf = Nominal shear friction strength
* δs = Calculated deflection
* δmax = Maximum allowable deflection
* ld = Embedment length
* Ag = Gross cross sectional area of a member
* As = Effective cross sectional area of reinforcement
* c = Distance from the fiber of maximum compressive strain to the neutral axis
* d = Distance from the extreme compression fiber to centroid of tension reinforcement

RAM Elements

Current Date: 9/25/2023 5:09 PM
Units system: English
File name: \\kwserver\KW Operations\Projects\21239 PSE IOTC\CALCULATIONS\230925 site retaining wall 2.5ft.rtw

Design Results
Retaining wall

General Information

Design code : ACI 318-2019

Materials

Description	:	C 4-60
Concrete, f'c	:	4.00 [Kip/in2]
Steel, fy	:	60.00 [Kip/in2]
Elasticity modulus	:	3605.00 [Kip/in2]
Unit weight	:	0.15 [Kip/ft3]

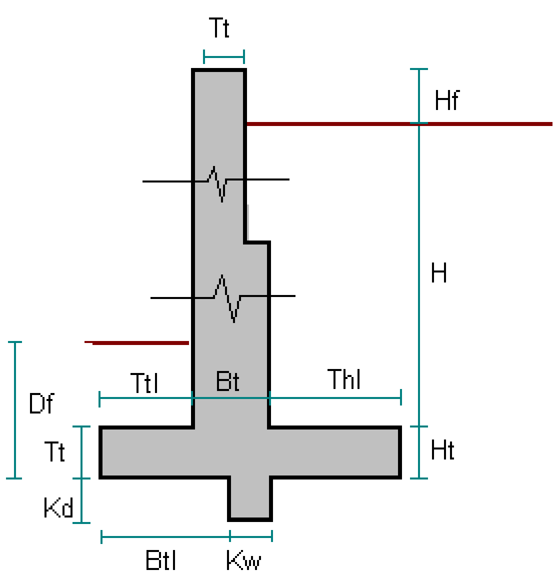
Soil

Modulus of subgrade reaction	:	200.00 [Kip/ft3]
Backfill slope	:	0.00 [°]

Description	U.W. [Kip/ft3]	Saturated U.W. [Kip/ft3]	phi [°]	c [Lb/ft2]	Friction wall/soil	Ko
Base Soil	0.11	0.14	30.00	0.00	26.57	--
Soil1	0.11	--	30.00	0.00	0.00	0.00

Geometry

Wall type : Cantilever



Retained height H	:	36.00 [in]	Wall height above retained soil Hf	:	0.00 [in]
Base depth Df	:	18.00 [in]	Use key	:	No
Top toe length Ttl	:	12.00 [in]	Toe thickness Tt	:	10.00 [in]
Bottom toe length Btl	:	24.00 [in]			
Top heel length Thl	:	15.96 [in]	Heel thickness Ht	:	10.00 [in]
Base material	:	C 4-60			

Stem thickness at base Bt	:	8.00 [in]
Stem blocks number	:	1

Block	**Thickness** [in]	**Height** [in]	**Material**
1	8.00	36.00	C 4-60

Loads

Backfill surcharge	:	0.25 [Kip/ft2]

Load conditions included in the design:

Service Load Combinations:
S1 = DL+LL+H

Strength Design Load Combinations:
R1 = 1.2DL+1.6LL+1.6H

Reinforcement

Steel reinforcement bars:

Stem free cover	:	0.25 [ft]
Base free cover	:	0.25 [ft]
Maximum Rho/Rho balanced ratio	:	0.75
Round longitudinal bar lengths to	:	1.00 [in]

Longitudinal reinforcement

Element	**Size**	**Spacing** [in]	**Pos**	**Axis**	**Dist1** [in]	**Dist2** [in]	**Hook1**	**Hook2**

Development and splice lengths

Element	**Diameter**	**Ld** [in]	**Ldh** [in]	**L. Splice** [in]	**L. total** [in]

Horizontal reinforcement

Element	**Diameter**	**Nr**	**@** [in]	**Position**

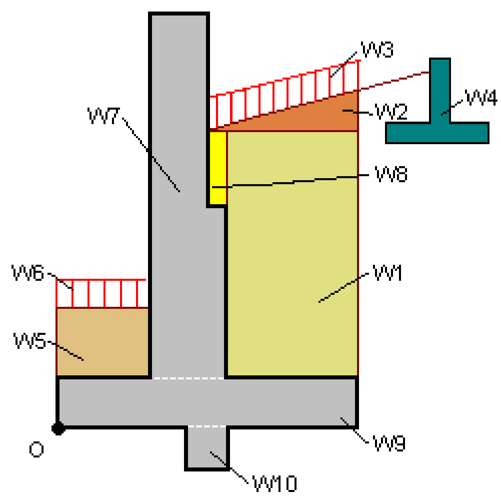
Assumptions

Active pressures calculation method	:	Rankine
Use resistant soil pressures for overturning	:	Passive
Calculation method for lateral soil pressures	:	Boussinesq
Calculation method for soil bearing pressures	:	Hansen
Use vertical component of soil pressures for overturning	:	No
Use vertical component of soil pressures for sliding	:	No
Use vertical component of soil pressures for bearing	:	No
Frost depth	:	0.00 [in]
Undermining depth	:	0.00 [in]

Design

Status : OK

Calculation of resisting forces



Description	Force [Kip]	Distance [in]	Moment [Kip*in]
Weight of soil over heel (W1)	0.44	27.98	12.28
Surcharge over heel (W3)	0.33	27.98	9.30
Weight of soil over toe (W5)	0.07	6.00	0.44
Stem weight (W7)	0.30	16.00	4.79
Base weight (W9)	0.37	17.98	6.73
Total	1.52		33.54
Toe horizontal soil pressure against sliding (Pp)	0.37	6.00	2.23
Toe horizontal soil pressure against overturning (Pp)	0.37	6.00	2.23

Calculation of destabilizing forces

Description	Force [Kip]	Distance [in]	Moment [Kip*in]
Heel horizontal soil pressure (Pah)	0.59	19.49	11.48
Seismic load (Pe)	0.13	27.60	3.55

Global stability

Allowable safety factor for overturning : 1.50
Allowable safety factor for sliding : 1.50
Minimum additional safety factor for soil pressures : 1.00

Load case	qmax [Lb/ft2]	qa [Lb/ft2]	Soil Pres. SF	RM [Kip*ft]	OTM [Kip*ft]	Overt. SF	Res F [Kip]	Slid F [Kip]	Slid. SF	Defl [in]
S1	674.23	3000.00	4.45	2.98	0.96	3.12	1.13	0.59	1.92	0.08

Bending and Shear per element

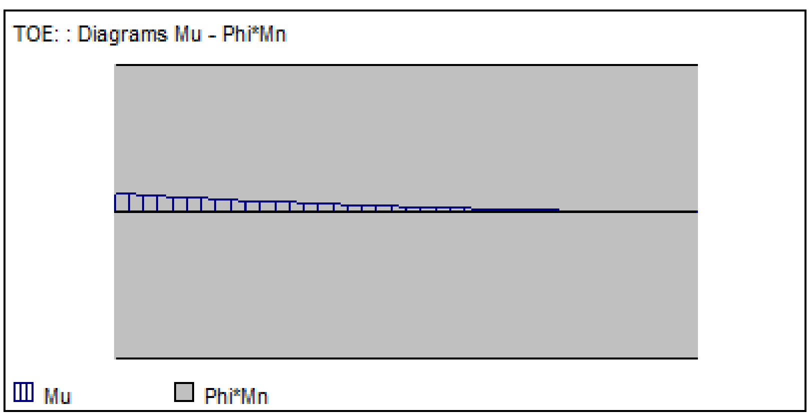
Element : Toe

Station Nr.	Dist	d [in]	Mu[Kip*ft] neg	Mu[Kip*ft] pos	ϕ*Mn[Kip*ft] neg	ϕ*Mn[Kip*ft] pos	Asreq [in2] ext	Asreq [in2] int	Asprov [in2] ext	Asprov [in2] int	sb [in] ext	sb [in] int	Mu/(ϕ*Mn)
1	0%	10.00	0.00	0.39	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.12
2	10%	10.00	0.00	0.32	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.10
3	20%	10.00	0.00	0.25	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.08
4	30%	10.00	0.00	0.20	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.06
5	40%	10.00	0.00	0.14	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.05
6	50%	10.00	0.00	0.10	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.03
7	60%	10.00	0.00	0.07	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.02
8	70%	10.00	0.00	0.04	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.01
9	80%	10.00	0.00	0.02	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.01
10	90%	10.00	0.00	0.00	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.00
11	100%	10.00	0.00	0.00	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.00
C	0%	10.00	0.00	0.39	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.12

Maximum allowed spacing between bars : 18.00 [in]

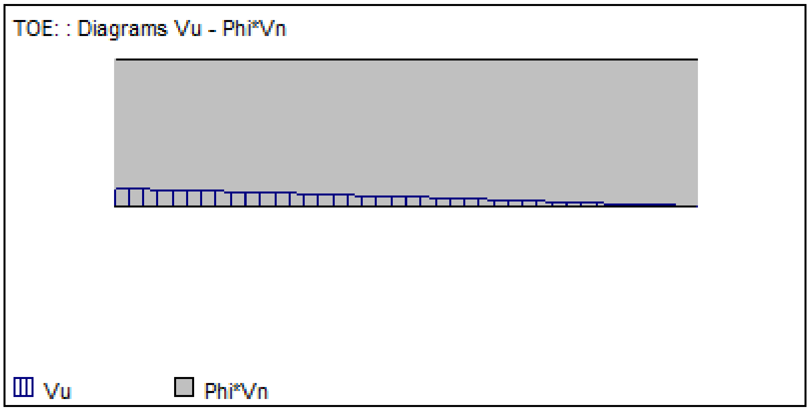
Base transverse reinforcement:

Top reinforcement : 0.00 [in2]
Bottom reinforcement : 0.00 [in2]
Minimum shrinkage and temperature reinforcement : 0.24 [in2]



Station Nr.	Dist	Vu [Kip]	Vc [Kip]	ϕ*Vn [Kip]	Vu/(ϕ*Vn)
1	0%	0.75	10.12	6.07	0.12
2	10%	0.68	10.12	6.07	0.11
3	20%	0.62	10.12	6.07	0.10
4	30%	0.54	10.12	6.07	0.09
5	40%	0.47	10.12	6.07	0.08
6	50%	0.40	10.12	6.07	0.07

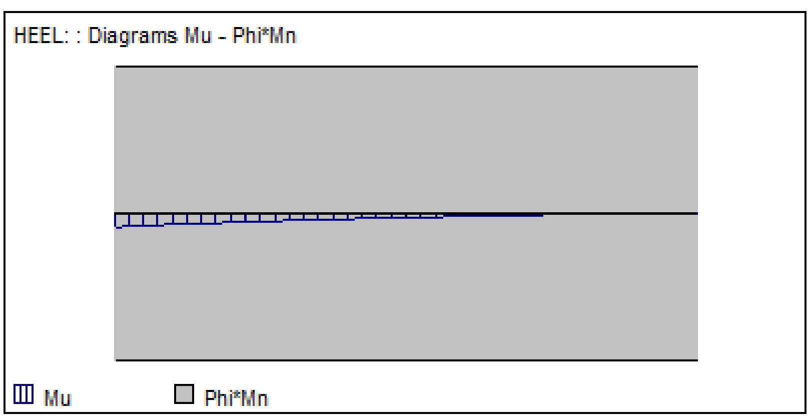
7	60%	0.32	10.12	6.07	0.05
8	70%	0.24	10.12	6.07	0.04
9	80%	0.16	10.12	6.07	0.03
10	90%	0.08	10.12	6.07	0.01
11	100%	0.00	10.12	6.07	0.00
C	0%	0.75	10.12	6.07	0.12



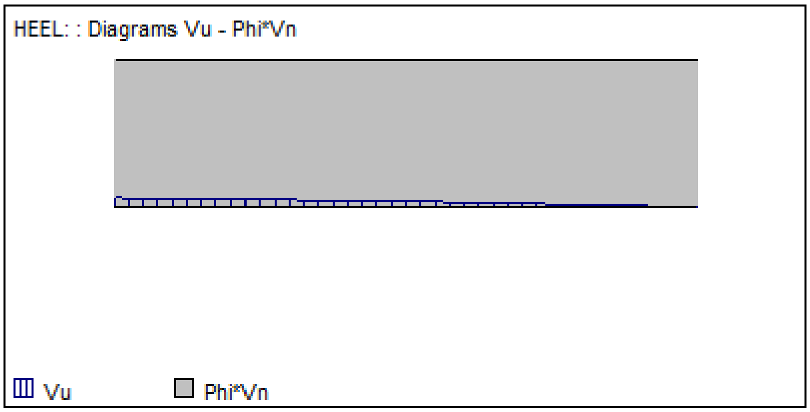
Element : Heel

Station		**d**	**Mu**[Kip*ft]		**ϕ*Mn**[Kip*ft]		**Asreq** [in2]		**Asprov** [in2]		**sb** [in]		**Mu/(ϕ*Mn)**
Nr.	Dist	[in]	neg	pos	neg	pos	ext	int	ext	int	ext	int	
1	0%	10.00	-0.29	0.00	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.09
2	10%	10.00	-0.24	0.00	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.08
3	20%	10.00	-0.19	0.00	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.06
4	30%	10.00	-0.15	0.00	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.05
5	40%	10.00	-0.11	0.00	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.04
6	50%	10.00	-0.08	0.00	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.03
7	60%	10.00	-0.05	0.00	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.02
8	70%	10.00	-0.03	0.00	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.01
9	80%	10.00	-0.01	0.00	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.00
10	90%	10.00	0.00	0.00	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.00
11	100%	10.00	0.00	0.00	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.00
C	0%	10.00	-0.29	0.00	-3.16	3.16	0.00	0.00	0.00	0.00	--	--	0.09

Maximum allowed spacing between bars : 18.00 [in]



Station Nr.	Dist	**Vu** [Kip]	**Vc** [Kip]	**ϕ*Vn** [Kip]	**Vu/(ϕ*Vn)**
1	0%	0.38	10.12	6.07	0.06
2	10%	0.35	10.12	6.07	0.06
3	20%	0.33	10.12	6.07	0.05
4	30%	0.30	10.12	6.07	0.05
5	40%	0.26	10.12	6.07	0.04
6	50%	0.23	10.12	6.07	0.04
7	60%	0.19	10.12	6.07	0.03
8	70%	0.15	10.12	6.07	0.02
9	80%	0.10	10.12	6.07	0.02
10	90%	0.05	10.12	6.07	0.01
11	100%	0.00	10.12	6.07	0.00
C	0%	0.38	10.12	6.07	0.06



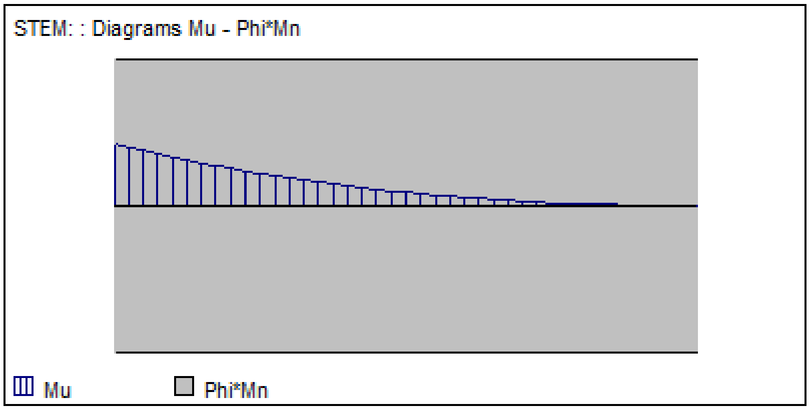
Element : Stem (Block 1)

Station Nr.	Dist	**d** [in]	**Mu**[Kip*ft] neg	pos	**ϕ*Mn**[Kip*ft] neg	pos	**Asreq** [in2] ext	int	**Asprov** [in2] ext	int	**sb** [in] ext	int	**Mu/(ϕ*Mn)**
1	0%	8.00	0.00	0.86	-2.02	2.02	0.00	0.00	0.00	0.00	--	--	0.43
2	10%	8.00	0.00	0.68	-2.02	2.02	0.00	0.00	0.00	0.00	--	--	0.34
3	20%	8.00	0.00	0.52	-2.02	2.02	0.00	0.00	0.00	0.00	--	--	0.26
4	30%	8.00	0.00	0.38	-2.02	2.02	0.00	0.00	0.00	0.00	--	--	0.19
5	40%	8.00	0.00	0.27	-2.02	2.02	0.00	0.00	0.00	0.00	--	--	0.13
6	50%	8.00	0.00	0.18	-2.02	2.02	0.00	0.00	0.00	0.00	--	--	0.09
7	60%	8.00	0.00	0.11	-2.02	2.02	0.00	0.00	0.00	0.00	--	--	0.06
8	70%	8.00	0.00	0.06	-2.02	2.02	0.00	0.00	0.00	0.00	--	--	0.03
9	80%	8.00	0.00	0.03	-2.02	2.02	0.00	0.00	0.00	0.00	--	--	0.01
10	90%	8.00	0.00	0.01	-2.02	2.02	0.00	0.00	0.00	0.00	--	--	0.00
11	100%	8.00	0.00	0.00	-2.02	2.02	0.00	0.00	0.00	0.00	--	--	0.00
C	0%	8.00	0.00	0.86	-2.02	2.02	0.00	0.00	0.00	0.00	--	--	0.43

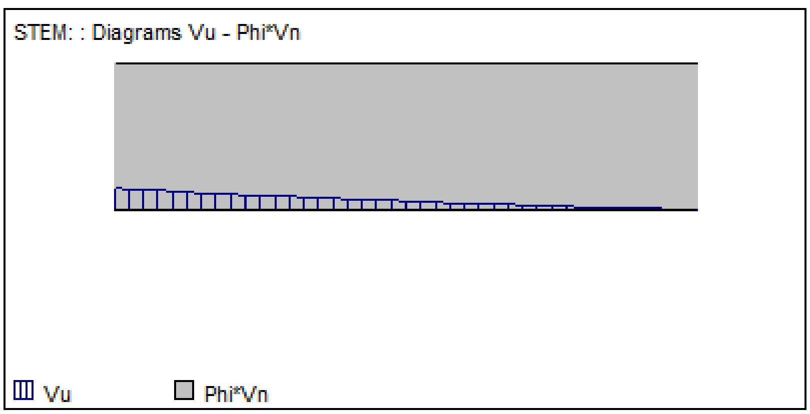
Maximum allowed spacing between bars : 18.00 [in]

Stem transverse reinforcement:

Exterior reinforcement : 0.00 [in2]
Interior reinforcement : 0.00 [in2]
Minimum shrinkage and temperature reinforcement : 0.19 [in2]



Station Nr.	Dist	Vu [Kip]	Vc [Kip]	ϕ*Vn [Kip]	Vu/(ϕ*Vn)
1	0%	0.66	7.59	4.55	0.15
2	10%	0.57	7.59	4.55	0.13
3	20%	0.49	7.59	4.55	0.11
4	30%	0.41	7.59	4.55	0.09
5	40%	0.34	7.59	4.55	0.07
6	50%	0.27	7.59	4.55	0.06
7	60%	0.20	7.59	4.55	0.04
8	70%	0.14	7.59	4.55	0.03
9	80%	0.09	7.59	4.55	0.02
10	90%	0.04	7.59	4.55	0.01
11	100%	0.00	7.59	4.55	0.00
C	0%	0.66	7.59	4.55	0.15



Notes

* The soil beneath the wall is considered elastic and homogeneous. A linear variation of pressures is adopted.
* The required reinforcement for bending takes into account the minimum reinforcement ratio given by Code.
* For bending and shear design, the critical section is adopted at the support faces and axial forces are not considered.
* Shear reinforcement is not considered.
* Values shown in red are not in compliance with a provision of the code
* Ld,Ldh = Development length of each bar. If the bar ends with a hook, it considers the Ldh length.
*qprom = Mean compression pressure on soil.
*qmax = Maximum compression pressure on soil.
* SF = Safety factor, RM = Resisting moment, OTM = Overturning moment.
* ResF = Resisting force, SlidF = Sliding force, Defl = Deflection.
* sb = Free distance between bars.
* If the section at which member flexural strength is being calculated is within the development length of a group of bars, the bars will contribute to the bending capacity an amount proportional to their actual length / their full development length.
* Asprov is the provided reinforcement, considering the reduction due to the development length as described previously.

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JOB TITLE PSE - OTC - PUYALLUP

JOB NO. 21239 **SHEET NO.**
CALCULATED BY BJ **DATE**
CHECKED BY **DATE**

Wind and Seismic Criteria

Seismic (ASCE 7-16 Chapter 13)

Site Class =	E	[Per Geotech
S_{DS} =	1.02g	[USGS Hazard Calculator]
I_p =	1	[ASCE Section 13.1.3]
a_p =	1	[ASCE Table 13.6-1]
R_p =	2.5	[ASCE Table 13.6-1]
Bldg Ht =	10 ft	[h]
unit Ht on Bldg =	0 ft	[z]

Seismic Design Force(ASCE 13.3)

Horizontal

$$F_p = \frac{0.4 a_p S_{DS} W_p}{\left(\frac{R_p}{I_p}\right)}\left(1 + 2\frac{z}{h}\right)$$

$$F_{p_{max}} = 1.6 S_{DS} I_P W_p$$

$$F_{p_{min}} = 0.3 S_{DS} I_P W_p$$

F_p = .16 x Wp
F_{pmax} = 1.64 x Wp
F_{pmin} = .31 x Wp <-----controls
Design F_{phoriz} = .31 x Wp

Vertical

F_{pvert} = +/-0.2SdsWp
Design F_{pvert} = .20 x Wp

Wind Loads (ASCE 7-16 Chapter 29 Building Appurtenances)

Wind Speed, V =	98 MPH	
Exposure Cat =	b	[ASCE Section 26.7.3]
K_d =	0.85	[ASCE Table 26.6-1]
K_{zt} =	1	[ASCE Section 26.8]
α =	7	[ASCE Table 26.11-1]
z_g =	1200	[ASCE Table 26.11-1]
K_z =	0.57	[ASCE Table 26.10-1 Footnote Equations]
Horizontal GC_r =	1.9	[ASCE Section 29.4.1]
Vertical GC_r =	1.5	[ASCE Section 29.4.1]
q_h =	12.0107 psf	[ASCE Eq 26.10-1]

P_{horiz} = 22.8203 psf
P_{vert} = 18.016 psf

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JOB NO.	21239	**SHEET NO.**	
CALCULATED BY	BJ	**DATE**	
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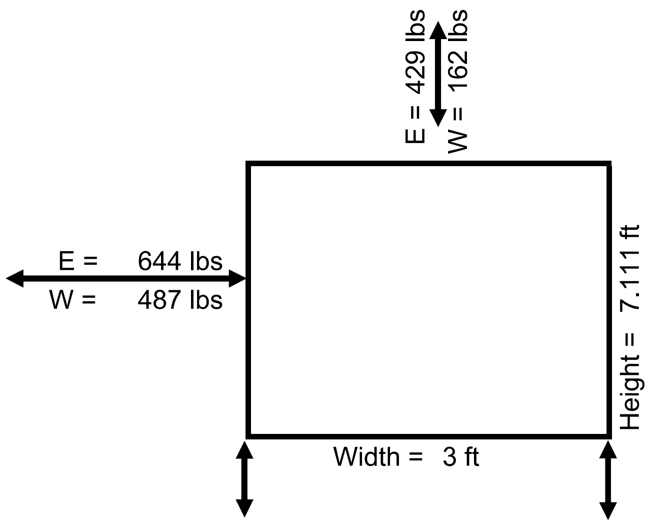
Calculate Unit Overturning and Shear For Wind & Seismic

Unit:	Battery Enclosure
Weight =	2100 lbs
Length =	3 ft
Width =	3 ft
Ht =	7.11083 ft

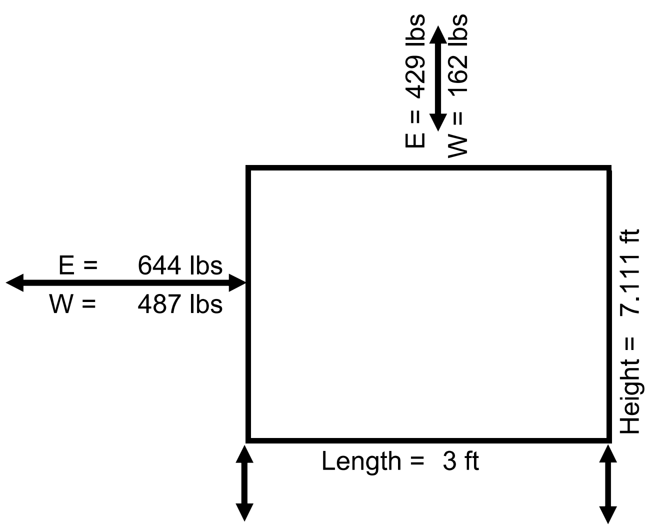
Overturning in Short Direction



Max/Min Reactions (LRFD w/ Omega)

1.2D+ΩE:	**3215 lbs**
.9D+ΩE:	**-1010 lbs**
1.2D+W:	2495 lbs
.9D+W:	287 lbs

Overturning in Long Direction



Max/Min Reactions (LRFD)

1.2D+E:	**3215 lbs**
.9D+E:	**-1010 lbs**
1.2D+W:	1918 lbs
.9D+W:	287 lbs

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JOB TITLE PSE - OTC - PUYALLUP

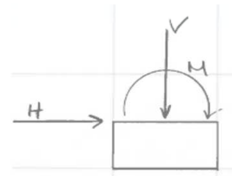
JOB NO. 21239 **SHEET NO.**
CALCULATED BY BJ **DATE**
CHECKED BY **DATE**

Pad Checks

Allowable Bearing Pressure = 2.50 ksf

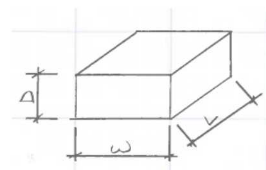
Design Loading - Service Level

V = 2.1 kips [Vertical Load]
H = 0.451 kips [Horizontal Loading Applied at top of Footing]
M = 3.206 k-ft [Overturning Moment]



Footing Geometry

W = 4.75 ft [Length direction of Overturning]
L = 4.75 ft [Length Perpendicular to Overturning]
D = 1 ft [Depth]



Calculate Eccentricity

P_{total} = 5.484 kips [Vertical Load plus Footing Self Weight]
M_x = 4.107 k-ft [Overturning Moment plus horizontal load x footing height]
e_x = .75 ft

Calculate Bearing Pressure

x = 4.88 ft
q = .47 ksf

Bearing Pressure OK!

Calculate FS against Overturning

M_{OTM} = 4.107 k-ft
M_{RTM} = 13.03 k-ft [P_{total} * (W/2)]
FS = 3.17 [M_{RTM} / M_{OTM}]

OK for Overturning!

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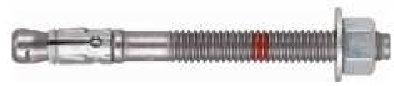
Company:	Kingworks Structural Engineers	Page:	1
Address:	600 Dupont Streetm Suite B, Bellingham, WA 98225	Specifier:	Bernt Johnson PE, SE
Phone I Fax:	360-714-8260 |	E-Mail:	bernt@king-works.com
Design:	Concrete - Nov 6, 2023	Date:	11/7/2023
Fastening point:			

Specifier's comments:

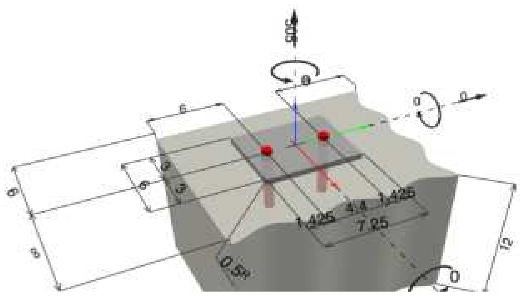
1 Input data



Anchor type and diameter:	**Kwik Bolt TZ2 - SS 304 3/4 (4 3/4) hnom3**
Item number:	2210288 KB-TZ2 3/4x7 SS304
Effective embedment depth:	$h_{ef,act}$ = 4.750 in., h_{nom} = 5.500 in.
Material:	AISI 304
Evaluation Service Report:	ESR-4266
Issued I Valid:	12/17/2021 | 12/1/2023
Proof:	Design Method ACI 318-14 / Mech
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.500 in.
Anchor plate^R :	l_x x l_y x t = 6.000 in. x 7.250 in. x 0.500 in.; (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	cracked concrete, Custom, f_c' = 4,500 psi; h = 12.000 in.
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (d)) Shear load: yes (17.2.3.5.3 (c))

^{R} - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.] & Loading [lb, in.lb]



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Phone I Fax:	360-714-8260 |	E-Mail:	bernt@king-works.com
Design:	Concrete - Nov 6, 2023	Date:	11/7/2023
Fastening point:			

2 Proof I Utilization (Governing Cases)

		Design values [lb]		Utilization	
Loading	Proof	Load	Capacity	β_N / β_V [%]	Status
Tension	Concrete Breakout Failure	505	7,672	7 / -	OK
Shear	Concrete edge failure in direction y-	322	10,086	- / 4	OK

Loading	β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	0.066	0.032	5/3	2	OK

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

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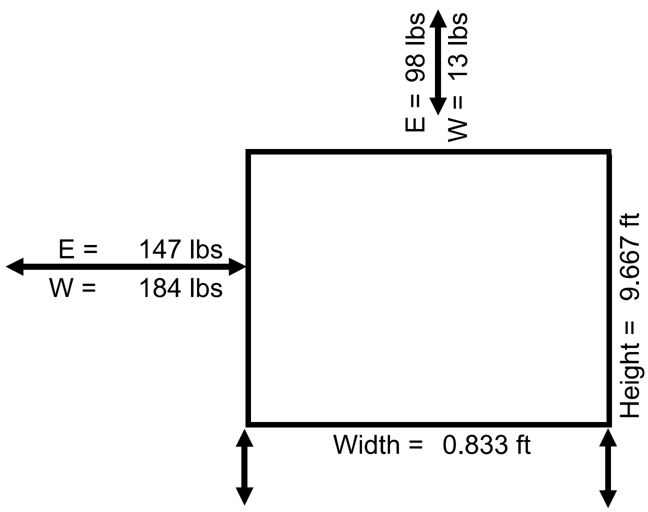
JOB TITLE	PSE - OTC - PUYALLUP		
JOB NO.	21239	**SHEET NO.**	
CALCULATED BY	BJ	**DATE**	
CHECKED BY		**DATE**	

Calculate Unit Overturning and Shear For Wind & Seismic

Unit: Nuetral Reactor

Weight =	481 lbs
Length =	0.83333 ft
Width =	0.83333 ft
Ht =	9.66667 ft

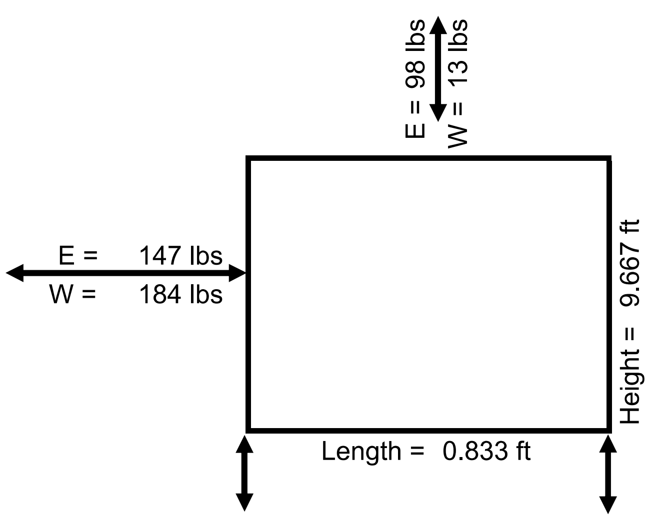
Overturning in Short Direction



Max/Min Reactions (LRFD w/ Omega)

1.2D+ΩE:	2098 lbs
.9D+ΩE:	**-1593 lbs**
1.2D+W:	**2427 lbs**
.9D+W:	-856 lbs

Overturning in Long Direction



Max/Min Reactions (LRFD)

1.2D+E:	**2098 lbs**
.9D+E:	**-1593 lbs**
1.2D+W:	1361 lbs
.9D+W:	-856 lbs

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JOB TITLE PSE - OTC - PUYALLUP

JOB NO. 21239 **SHEET NO.**

CALCULATED BY BJ **DATE**

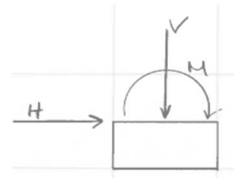
CHECKED BY **DATE**

Pad Checks

Allowable Bearing Pressure = 2.50 ksf

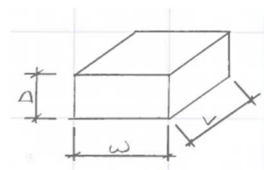
Design Loading - Service Level

V = 0.481 kips [Vertical Load]
H = 0.134 kips [Horizontal Loading Applied at top of Footing]
M = 0.647 k-ft [Overturning Moment]



Footing Geometry

W = 4 ft [Length direction of Overturning]
L = 4 ft [Length Perpendicular to Overturning]
D = 1.5 ft [Depth]



Calculate Eccentricity

P_{total} = 4.081 kips [Vertical Load plus Footing Self Weight]
M_x = 0.914 k-ft [Overturning Moment plus horizontal load x footing height]
e_x = .22 ft

Calculate Bearing Pressure

x = 5.33 ft
q = .34 ksf

Bearing Pressure OK!

Calculate FS against Overturning

M_{OTM} = 0.914 k-ft
M_{RTM} = 8.162 k-ft [P_{total} * (W/2)]
FS = 8.93 [M_{RTM} / M_{OTM}]

OK for Overturning!

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Phone I Fax:	360-714-8260 |	E-Mail:	bernt@king-works.com
Design:	Nuetral Reactor	Date:	11/7/2023
Fastening point:			

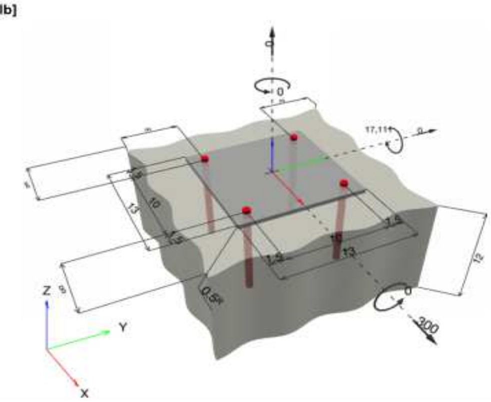
Specifier's comments:

1 Input data

Anchor type and diameter:	**Hex Head ASTM F 1554 GR. 36 3/4**
Item number:	not available
Effective embedment depth:	h_{ef} = 10.000 in.
Material:	ASTM F 1554
Evaluation Service Report:	Hilti Technical Data
Issued I Valid:	- | -
Proof:	Design Method ACI 318-14 / CIP
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.500 in.
Anchor plate^R :	l_x x l_y x t = 13.000 in. x 13.000 in. x 0.500 in.; (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	cracked concrete, Custom, f_c' = 4,500 psi; h = 12.000 in.
Reinforcement:	tension: condition B, shear: condition B; edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (d)) Shear load: yes (17.2.3.5.3 (c))

^{R} - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.] & Loading [lb, in.lb]



2 Proof I Utilization (Governing Cases)

		Design values [lb]		Utilization	
Loading	**Proof**	**Load**	**Capacity**	**β_N / β_V [%]**	**Status**
Tension	Pullout Strength	802	12,361	7 / -	OK
Shear	Pryout Strength	300	126,713	- / 1	OK

Loading	β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	0.065	0.010	5/3	2	OK

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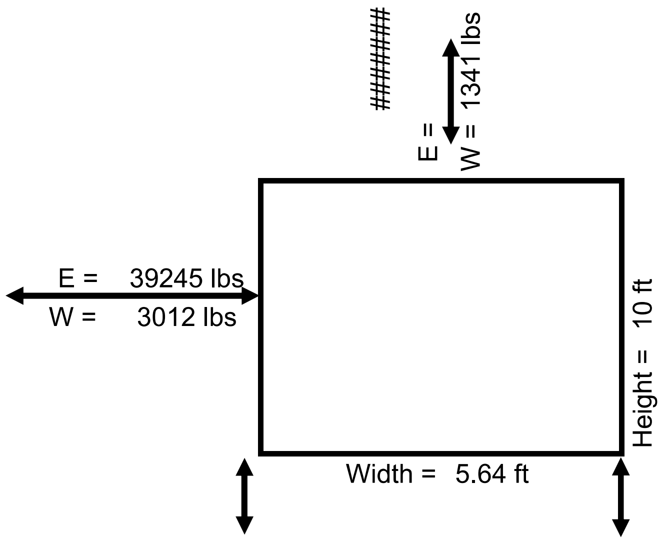
JOB TITLE	PSE - OTC - PUYALLUP		
JOB NO.	21239	SHEET NO.	
CALCULATED BY	BJ	DATE	
CHECKED BY		DATE	

Calculate Unit Overturning and Shear For Wind & Seismic

Unit:	Transformer Foundation
Weight =	128000 lbs
Length =	13.2 ft
Width =	5.64 ft
Ht =	10 ft

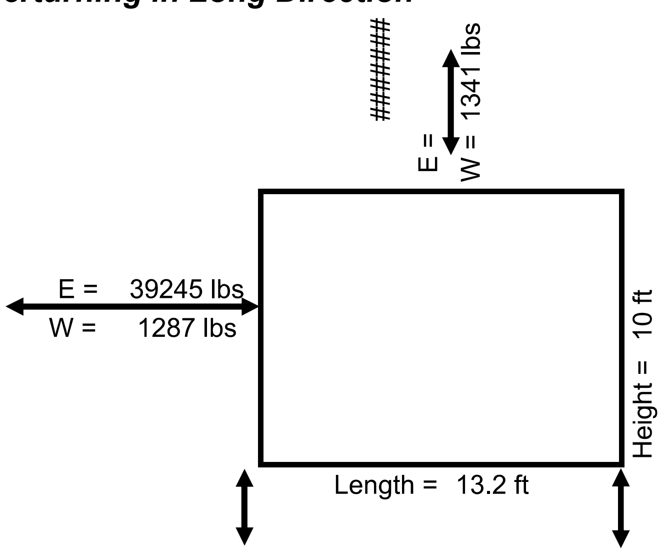
Overturning in Short Direction



Max/Min Reactions (LRFD w/ Omega)

1.2D+ΩE:	**172546 lbs**
.9D+ΩE:	**-38146 lbs**
1.2D+W:	82812 lbs
.9D+W:	54259 lbs

Overturning in Long Direction



Max/Min Reactions (LRFD)

1.2D+E:	**132694 lbs**
.9D+E:	**1706 lbs**
1.2D+W:	77958 lbs
.9D+W:	56442 lbs

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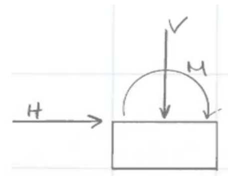
JOB TITLE	PSE - OTC - PUYALLUP		
JOB NO.	21239	**SHEET NO.**	
CALCULATED BY	BJ	**DATE**	
CHECKED BY		**DATE**	

Pad Checks

Allowable Bearing Pressure = 2.50 ksf

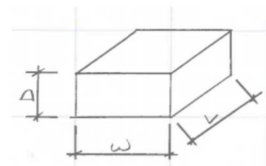
Design Loading - Service Level

V = 128 kips [Vertical Load]
H = 27.471 kips [Horizontal Loading Applied at top of Footing]
M = 137.36 k-ft [Overturning Moment]



Footing Geometry

W = 12 ft [Length direction of Overturning]
L = 14 ft [Length Perpendicular to Overturning]
D = 1 ft [Depth]



Calculate Eccentricity

P_{total} = 153.2 kips [Vertical Load plus Footing Self Weight]
M_x = 192.3 k-ft [Overturning Moment plus horizontal load x footing height]
e_x = 1.26 ft

Calculate Bearing Pressure

x = 14.23 ft
q = 1.48 ksf

Bearing Pressure OK!

Calculate FS against Overturning

M_{OTM} = 192.3 k-ft
M_{RTM} = 919.2 k-ft [P_{total} * (W/2)]
FS = 4.78 [M_{RTM} / M_{OTM}]

OK for Overturning!

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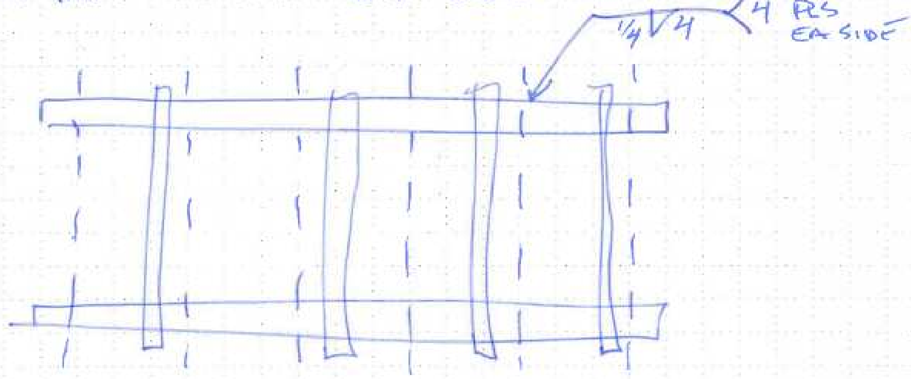
PROJECT DESCRIPTION			
ENGINEER	PROJECT NO.	DATE	PAGE

CALCULATE ATTACHMENT OF SKID TO EMBEDDED W6'S

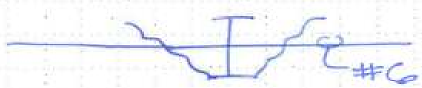
MAX UPLIFT EA SIDE = -39^{KIPS}



DEMAND PER WELD → $39^k / 6$ LOC $= 6.5^k$

$\phi R_n = 1.392 \times 4 \times 4 = 22^k$

CHECK SHEAR FRICTION OF CROSS BARS TO HOLD W6 FROM BRKING OUT



$\phi V_n = .75(1.4)(.44)(60) \times 2$
$= 55^k$ OK

FLEXURE IN FTG

$M_u = 195^{k\text{-}ft}$

(6) W6x20 → $\phi M_n = 334^{k\text{-}ft}$
(9) #7 → $226^{k\text{-}ft}$ ✓
(14) #6 → $213^{k\text{-}ft}$ ✓

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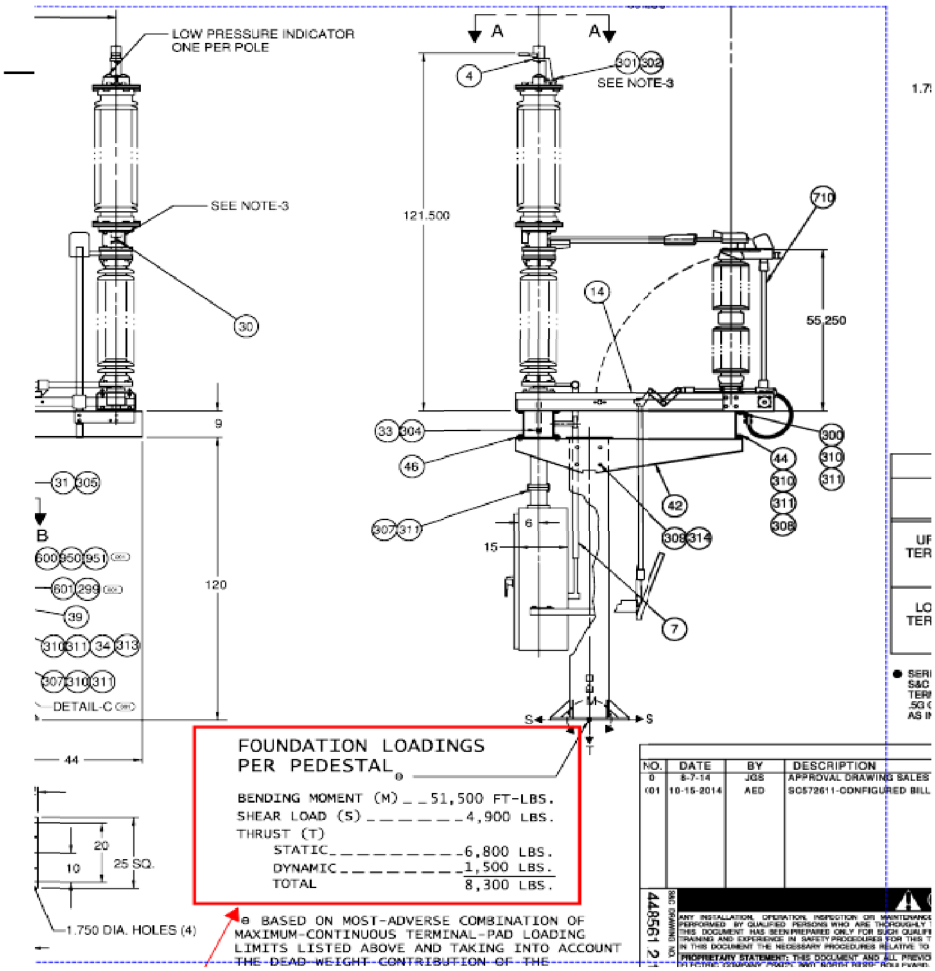
JOB TITLE PSE - OTC - PUYALLUP

JOB NO. 21239 **SHEET NO.**

CALCULATED BY BJ **DATE**

CHECKED BY **DATE**

Circuit Switcher



Loads from Sample Calculations that have higher wind and seismic loads, will use in our design
(Sds ~ same, Higher Wind Load)

Mu Max = 26.7 k-ft / ft from sample calculations

Phi Mn = 43 k-ft / ft - OK

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Address:	600 Dupont Streetm Suite B, Bellingham, WA 98225	Specifier:	Bernt Johnson PE, SE
Phone I Fax:	360-714-8260 |	E-Mail:	bernt@king-works.com
Design:	Circuit Switchers Anchorage	Date:	11/7/2023
Fastening point:			

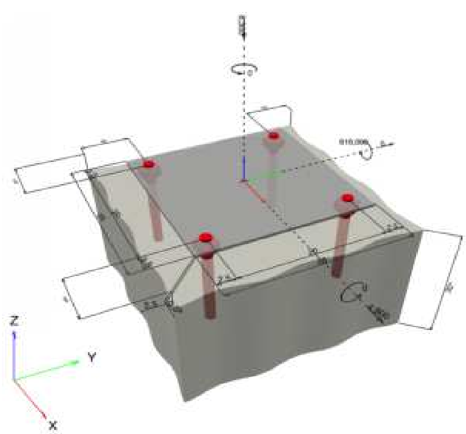
Specifier's comments:

1 Input data

Anchor type and diameter:	**Hex Head ASTM F 1554 GR. 36 1 1/2**
Item number:	not available
Effective embedment depth:	h_{ef} = 12.000 in.
Material:	ASTM F 1554
Evaluation Service Report:	Hilti Technical Data
Issued I Valid:	- | -
Proof:	Design Method ACI 318-14 / CIP
Stand-off installation:	without clamping (anchor); restraint level (anchor plate): 1.00; e_b = 2.500 in.; t = 0.500 in.
Anchor plate[R] :	l_x x l_y x t = 25.000 in. x 25.000 in. x 0.500 in.; (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	cracked concrete, Custom, f_c' = 4,500 psi; h = 30.000 in.
Reinforcement:	tension: condition B, shear: condition B; edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (d)) Shear load: yes (17.2.3.5.3 (c))

[R] - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.] & Loading [lb, in.lb]



2 Proof I Utilization (Governing Cases)

		Design values [lb]		Utilization	
Loading	**Proof**	**Load**	**Capacity**	**β_N / β_V [%]**	**Status**
Tension	Concrete Breakout Failure	26,750	55,132	49 / -	OK
Shear	Steel failure (with lever arm)	1,225	2,083	- / 59	OK

Loading	β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	0.485	0.588	5/3	72	OK

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Bellingham, WA 98225
360-714-8260 www.king-works.com

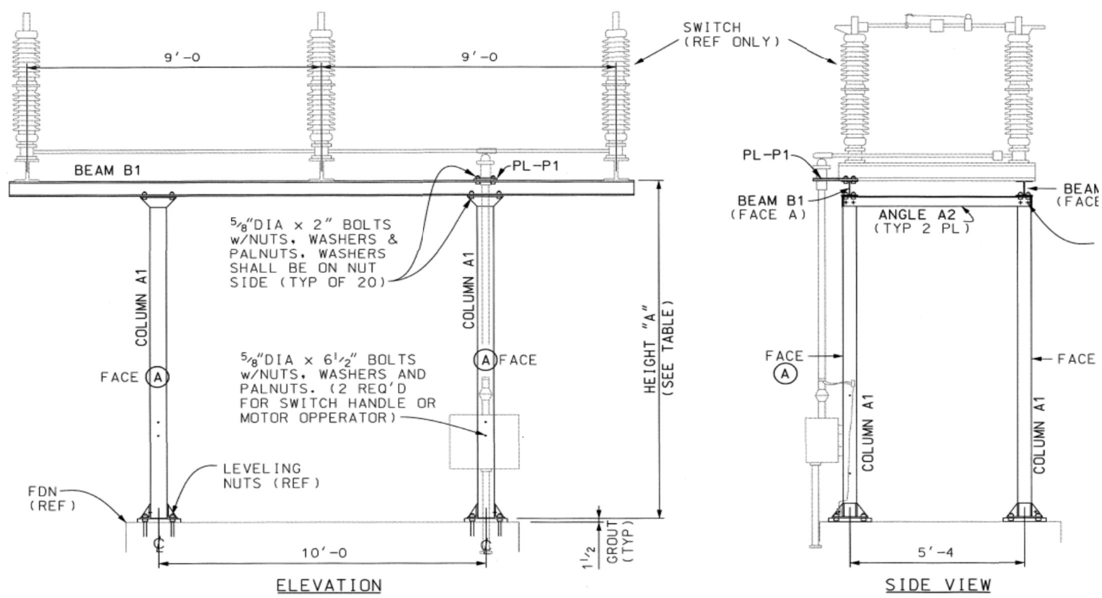
JOB TITLE PSE - OTC - PUYALLUP

JOB NO. 21239 **SHEET NO.**

CALCULATED BY BJ **DATE**

CHECKED BY **DATE**

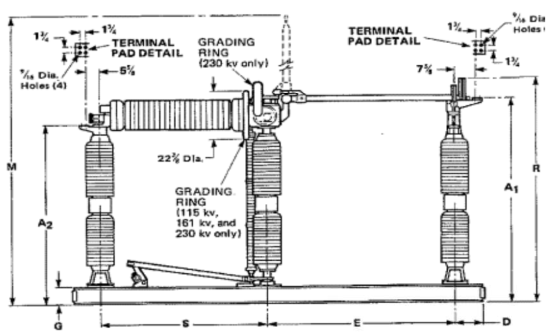
112 kV Switch Stand



ERECTION DIAGRAM
SCALE: 1" = 3'-0

TABLE OF DIMENSIONS AND TOTAL WEIGHT

DIMENSIONS			WEIGHT		MATERIAL
HEIGHT "A"	"B" (COL)	"C" (TS)	MARK-a	TOTAL	ID.
8'-0"	7'-6	7'-5 3/8	356.6	1200.2	9997453
8'-6"	8'-0	7'-11 3/8	380.5	1224.1	
9'-0"	8'-6	8'-5 3/8	404.4	1248.0	9998634
9'-6"	9'-0	8'-11 3/8	428.3	1271.9	9998733
10'-0"	9'-6	9'-5 3/8	452.2	1295.8	
10'-6"	10'-0	9'-11 3/8	476.4	1320.0	
11'-0"	10'-6	10'-5 3/8	500.3	1343.9	
11'-6"	11'-0	10'-11 3/8	524.2	1367.8	
12'-0"	11'-6	11'-5 3/8	548.1	1391.7	



Rating						No. of Interrupting Gaps ⑤	Applications (see Table on page 3)	Insulator T.R. No.	Catalog Number ②⑧		Dimensions in Inches (to nearest 1/8")									Net Wt. per Pole-Unit, Lbs.
Kv			Amperes, Rms						Upright* Mounting, Station Post Insulators	Vertical Mounting, Station Post Insulators	A1	A2	C	D	E	G	M	R	S	
Nom.	Max Des.	Impulse Withstand, Live Parts to Base ①	Cont.	Short Time Mom.	Short Time 3-Sec.															
69	72.5	350	1200	61 000	40 000	1	BEFGJ	216	282416	382416	58⅜	46¾	110	11⅝	43	6	100¼	68¼	44⅞	840
115	121	550	1200	61 000	40 000	2▲	BEFGJ	286	282428	382428	75⅜	63½	138	12¼	61	7	136⅝	85⅜	52⅞	1195
138	145	650	1200	61 000	40 000	2▲	BEFGJ	288	282439	382439	84⅜	72½	165	11⅝	71	7	155	94⅞	71⅞	1390
161	169	750	1200	61 000	40 000	3▲	BEFGJ	291	282460	382460	92⅜	80½	173	11⅝	79	7	171⅝	102⅜	71⅞	1510
230	242	900	1200	61 000	40 000	3▲	BEFGJ	304	282461	Not available	110⅜	98½	179	11⅝	85	7	195⅜	120⅜	71⅞	1720

weight per pole is per phase. 3 phases per transrupter.

[redacted]

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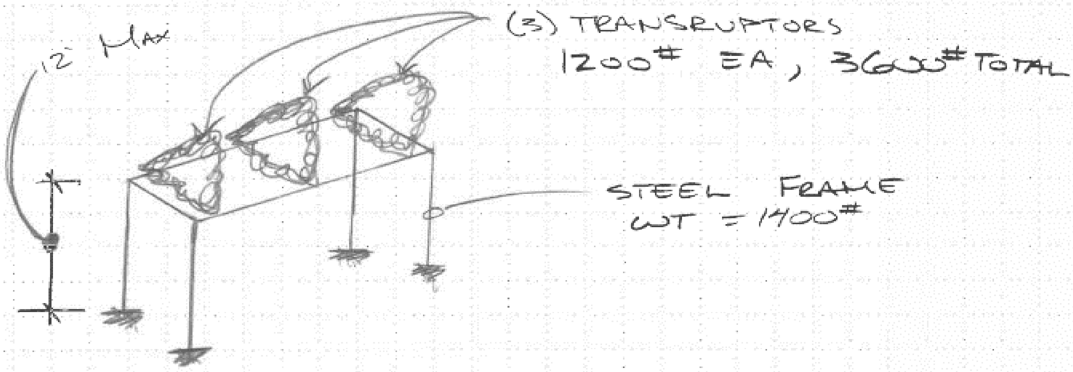
PROJECT	10TC		
DESCRIPTION	115 kV SWITCH STAND FOUNDATION		
ENGINEER	PROJECT NO.	DATE	PAGE
BJ	21239	11/8/23	

115 kV SWITCH STAND



$F_p = .31(1400 + 3600) = 1600^{\#}$ ← CONTROLS

$F_w = 22\ PSF\ (32\ SF) = 704^{\#}$

DESIGN ANCHORAGE (ASSUMING FIXED BASE CANT. COLS)

$M_u = [.31 \times 1.4^k \times 8' + .31 \times 3.6^k \times 14.5'] \times 2 / 4\ LEGS$ (Ω)

$M_u = 9.8^{k\text{-}ft} = 118^{k\text{-}in}$

$P_u = .9\left(\frac{5^k}{4}\right) - .2\left(\frac{5^k \times 2}{4}\right) = .625^k$ (DOWN)

$V_u = \frac{5^k \times .31}{4\ LEGS} \times 2 = 775^{\#}$

CHECK PAD M CAPACITY

$\phi M_n = .9(8 \times .2)(60)\left(8.75 - \frac{1.6 \times 60}{1.7 \times 4.5 \times 83}\right) = 62^{k\text{-}ft}$

$M_u = 20^{k\text{-}ft}$ OK

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www.hilti.com

Company:	Kingworks Structural Engineers	Page:	1
Address:	600 Dupont Streetm Suite B, Bellingham, WA 98225	Specifier:	Bernt Johnson PE, SE
Phone I Fax:	360-714-8260 |	E-Mail:	bernt@king-works.com
Design:	Concrete - Nov 8, 2023	Date:	11/8/2023
Fastening point:			

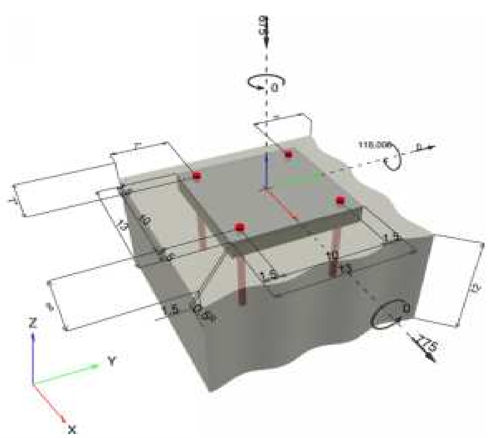
Specifier's comments:

1 Input data

Anchor type and diameter:	**Heavy Hex Head ASTM F 1554 GR. 36 3/4**
Item number:	not available
Effective embedment depth:	h_{ef} = 8.000 in.
Material:	ASTM F 1554
Evaluation Service Report:	Hilti Technical Data
Issued I Valid:	- | -
Proof:	Design Method ACI 318-14 / CIP
Stand-off installation:	without clamping (anchor); restraint level (anchor plate): 2.00; e_b = 1.500 in.; t = 0.500 in.
	Hilti Grout: CB-G EG, epoxy, $f_{c,Grout}$ = 14,939 psi
Anchor plate[R] :	l_x x l_y x t = 13.000 in. x 13.000 in. x 0.500 in.; (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	cracked concrete, Custom, f_c' = 4,500 psi; h = 12.000 in.
Reinforcement:	tension: condition B, shear: condition B;
	edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (d))
	Shear load: yes (17.2.3.5.3 (c))

[R] - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.] & Loading [lb, in.lb]



2 Proof I Utilization (Governing Cases)

		Design values [lb]		Utilization	
Loading	**Proof**	**Load**	**Capacity**	**β_N / β_V [%]**	**Status**
Tension	Concrete Breakout Failure	10,723	16,008	67 / -	OK
Shear	Steel failure (with lever arm)	194	697	- / 28	OK

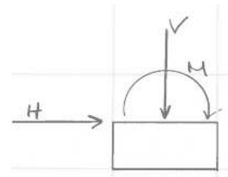
Loading	**β_N**	**β_V**	**ζ**	**Utilization $\beta_{N,V}$ [%]**	**Status**
Combined tension and shear loads	0.670	0.278	5/3	64	OK

Pad Checks

Allowable Bearing Pressure = 2.50 ksf

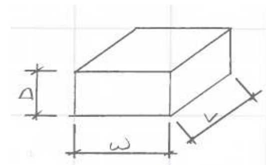
Design Loading - Service Level

V = 5 kips [Vertical Load]
H = 1.12 kips [Horizontal Loading Applied at top of Footing]
M = 13.8 k-ft [Overturning Moment]



Footing Geometry

W = 7.333 ft [Length direction of Overturning]
L = 12 ft [Length Perpendicular to Overturning]
D = 1 ft [Depth]



Calculate Eccentricity

P_{total} = 18.199 kips [Vertical Load plus Footing Self Weight]
M_x = 16.04 k-ft [Overturning Moment plus horizontal load x footing height]
e_x = .88 ft

Calculate Bearing Pressure

x = 8.36 ft
q = .36 ksf
Bearing Pressure OK!

Calculate FS against Overturning

M_{OTM} = 16.04 k-ft
M_{RTM} = 66.728 k-ft [P_{total} * (W/2)]
FS = 4.16 [M_{RTM} / M_{OTM}]
OK for Overturning!

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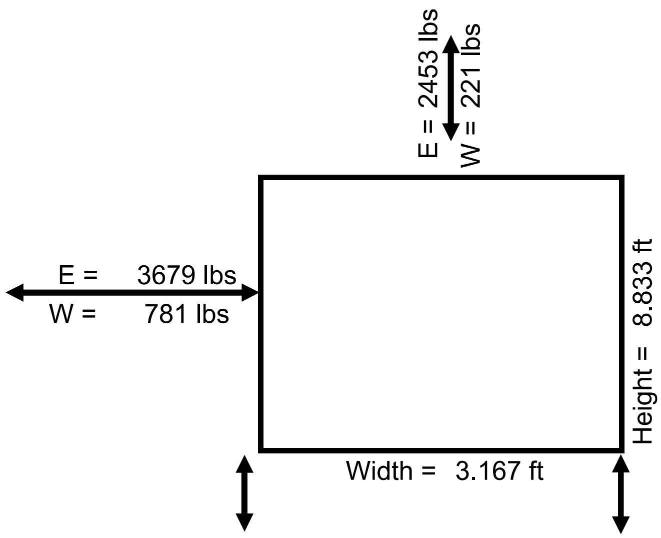
JOB TITLE	PSE - OTC - PUYALLUP		
JOB NO.	21239	**SHEET NO.**	
CALCULATED BY	BJ	**DATE**	
CHECKED BY		**DATE**	

Calculate Unit Overturning and Shear For Wind & Seismic

Unit:	Substation Base
Weight =	12000 lbs
Length =	3.875 ft
Width =	3.166667 ft
Ht =	8.833333 ft

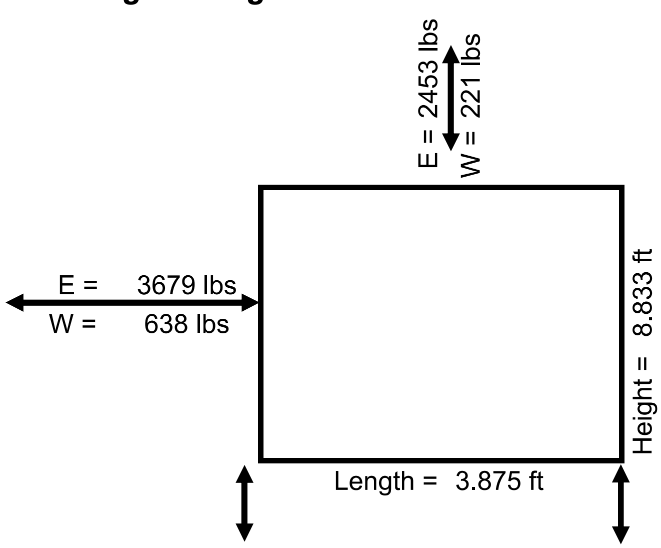
Overturning in Short Direction



Max/Min Reactions (LRFD w/ Omega)

1.2D+ΩE:	**19916 lbs**
.9D+ΩE:	**-7316 lbs**
1.2D+W:	9489 lbs
.9D+W:	4200 lbs

Overturning in Long Direction



Max/Min Reactions (LRFD)

1.2D+E:	**18040 lbs**
.9D+E:	**-5440 lbs**
1.2D+W:	8038 lbs
.9D+W:	4562 lbs

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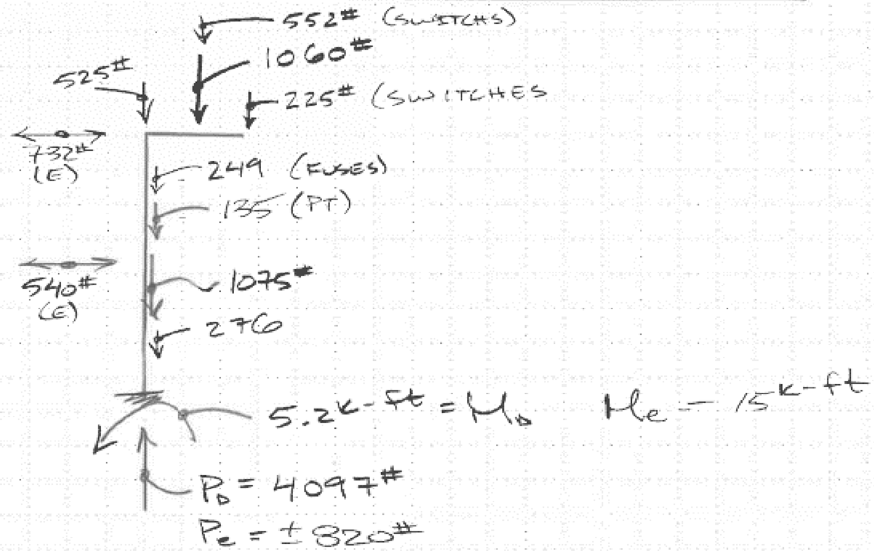
PROJECT	PSE OTC		
DESCRIPTION	12 kV REGULATOR		
ENGINEER	PROJECT NO.	DATE	PAGE
BI	21239	11/9/23	

12 kV REGULATOR STRUCTURE



$1.2D + \Omega E \Rightarrow P_u = 3.3^k \quad M_u = 36^{k\text{-}ft}$

$.9D + \Omega E \Rightarrow P_u = 2^k \quad M_u = 34.7^k$

* REACTION ARE FOR WHOLE FRAME (2) COL. EA COL TAKES ½ LOAD.

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Address:	600 Dupont Streetm Suite B, Bellingham, WA 98225	Specifier:	Bernt Johnson PE, SE
Phone I Fax:	360-714-8260 |	E-Mail:	bernt@king-works.com
Design:	Concrete - Nov 9, 2023	Date:	11/10/2023
Fastening point:			

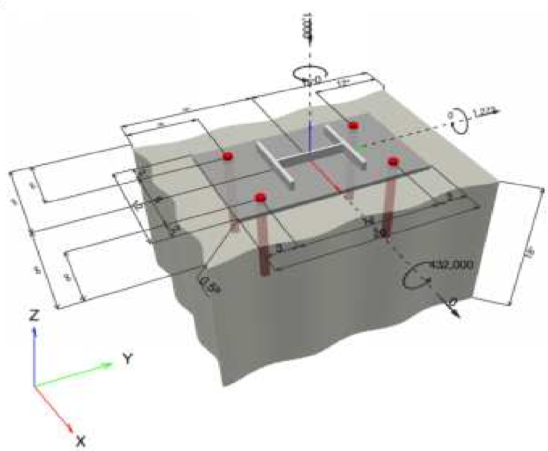
Specifier's comments:

1 Input data

Anchor type and diameter:	**Hex Head ASTM F 1554 GR. 36 1**
Item number:	not available
Effective embedment depth:	h_{ef} = 10.000 in.
Material:	ASTM F 1554
Evaluation Service Report:	Hilti Technical Data
Issued I Valid:	- | -
Proof:	Design Method ACI 318-14 / CIP
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.500 in.
Anchor plate[R] :	l_x x l_y x t = 12.000 in. x 20.000 in. x 0.500 in.; (Recommended plate thickness: not calculated)
Profile:	W shape (AISC), W8X31; (L x W x T x FT) = 8.000 in. x 8.000 in. x 0.285 in. x 0.435 in.
Base material:	cracked concrete, Custom, f_c' = 4,500 psi; h = 18.000 in.
Reinforcement:	tension: condition B, shear: condition B;
	edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (d))
	Shear load: yes (17.2.3.5.3 (c))

[R] - The anchor calculation is based on a rigid anchor plate assumption.

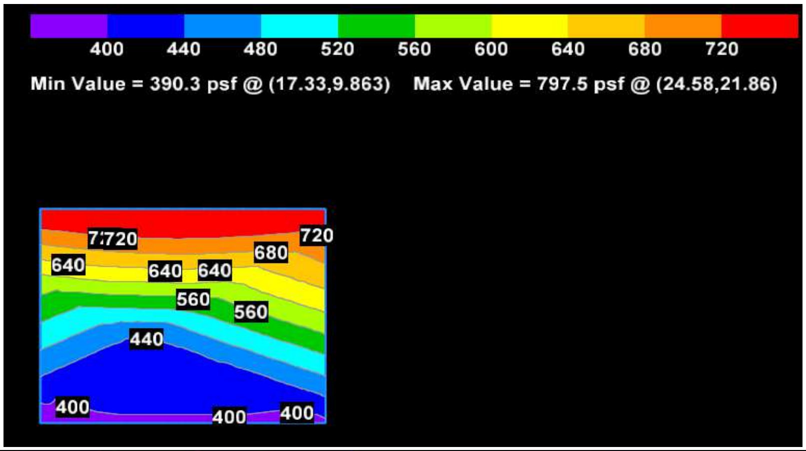
Geometry [in.] & Loading [lb, in.lb]

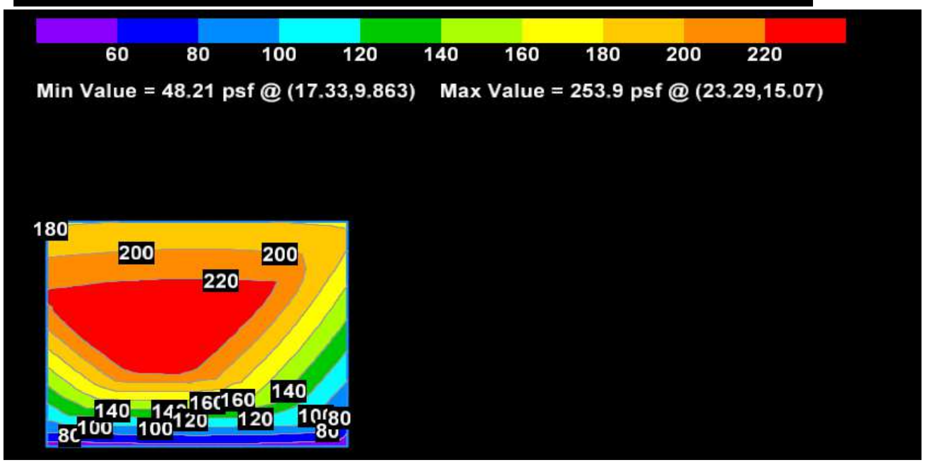


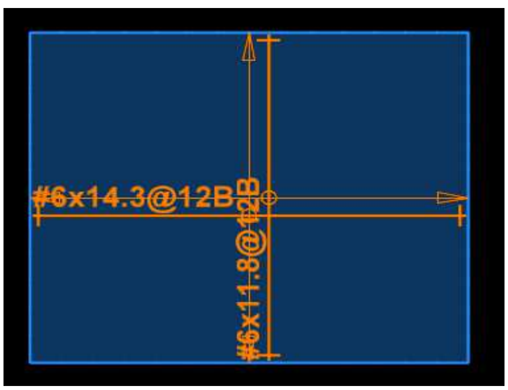
2 Proof I Utilization (Governing Cases)

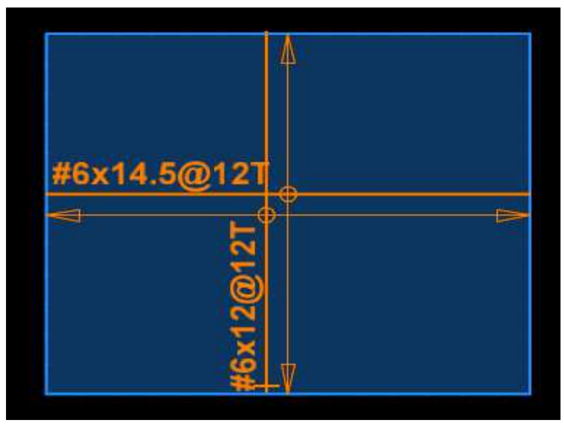
		Design values [lb]		Utilization	
Loading	**Proof**	**Load**	**Capacity**	**β_N / β_V [%]**	**Status**
Tension	Concrete Breakout Failure	27,155	28,642	95 / -	OK
Shear	Concrete edge failure in direction y+	1,272	21,472	- / 6	OK

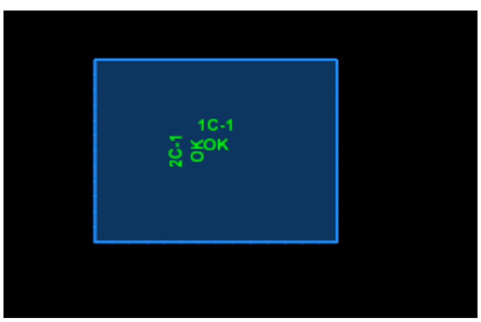
Loading	β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	0.948	0.059	1.000	84	OK


400 440 480 520 560 600 640 680 720
Min Value = 390.3 psf @ (17.33,9.863) Max Value = 797.5 psf @ (24.58,21.86)
720
720
640
640
640
680
560
560
440
400
400
400


60 80 100 120 140 160 180 200 220
Min Value = 48.21 psf @ (17.33,9.863) Max Value = 253.9 psf @ (23.29,15.07)
180
200
200
220
140
160
160
140
120
120
100
100
80
80


#6x14.3@12B
#6x11.8@12B


#6x14.5@12T
#6x12@12T


1C-1
OK
2C-1
OK

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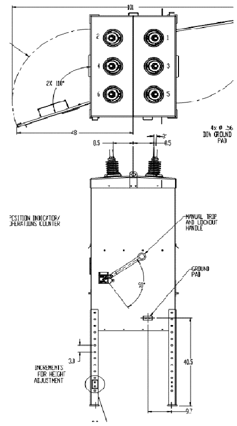
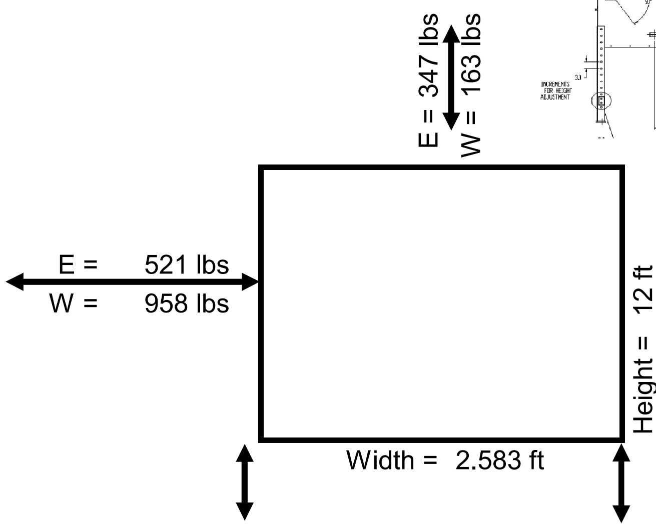
JOB TITLE	PSE - OTC - PUYALLUP		
JOB NO.	21239	**SHEET NO.**	
CALCULATED BY	BJ	**DATE**	
CHECKED BY		**DATE**	

Calculate Unit Overturning and Shear For Wind & Seismic



Unit:	ABB 12 KV Breaker
Weight =	1700 lbs
Length =	3.5 ft
Width =	2.583333 ft
Ht =	12 ft

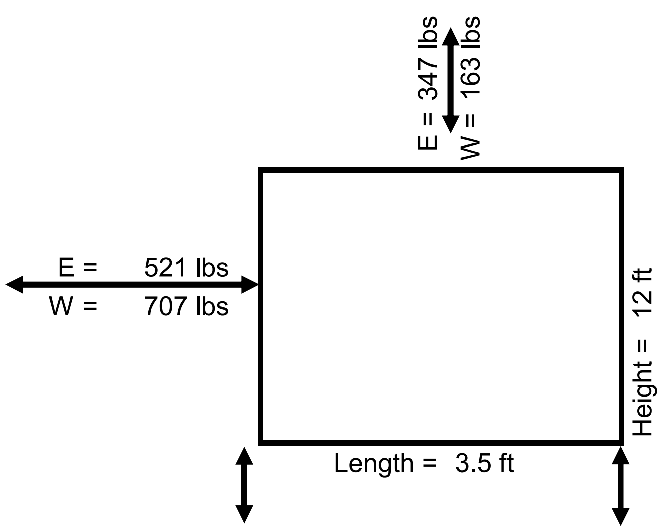
Overturning in Short Direction



Max/Min Reactions (LRFD w/ Omega)

1.2D+ΩE:	3789 lbs
.9D+ΩE:	**-2004 lbs**
1.2D+W:	**5554 lbs**
.9D+W:	-1543 lbs

Overturning in Long Direction



Max/Min Reactions (LRFD)

1.2D+E:	**3155 lbs**
.9D+E:	**-1370 lbs**
1.2D+W:	2314 lbs
.9D+W:	-529 lbs

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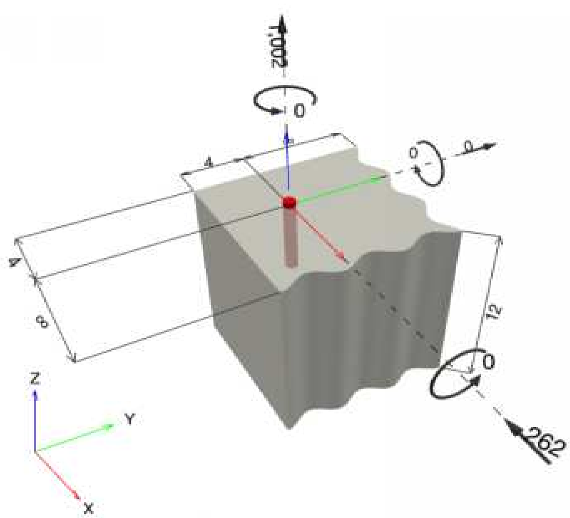
Address:	600 Dupont Streetm Suite B, Bellingham, WA 98225	Specifier:	Bernt Johnson PE, SE
Phone I Fax:	360-714-8260 |	E-Mail:	bernt@king-works.com
Design:	12kV Breaker	Date:	11/9/2023
Fastening point:			

Specifier's comments:

1 Input data

Anchor type and diameter:	**Kwik Bolt TZ2 - SS 304 3/4 (4 3/4) hnom3**
Item number:	2210287 KB-TZ2 3/4x6 1/4 SS304
Effective embedment depth:	$h_{ef,act}$ = 4.750 in., h_{nom} = 5.500 in.
Material:	AISI 304
Evaluation Service Report:	ESR-4266
Issued I Valid:	12/17/2021 | 12/1/2023
Proof:	Design Method ACI 318-14 / Mech
Stand-off installation:	
Profile:	
Base material:	cracked concrete, Custom, f_c' = 4,500 psi; h = 12.000 in.
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (d)) Shear load: yes (17.2.3.5.3 (c))

Geometry [in.] & Loading [lb, in.lb]

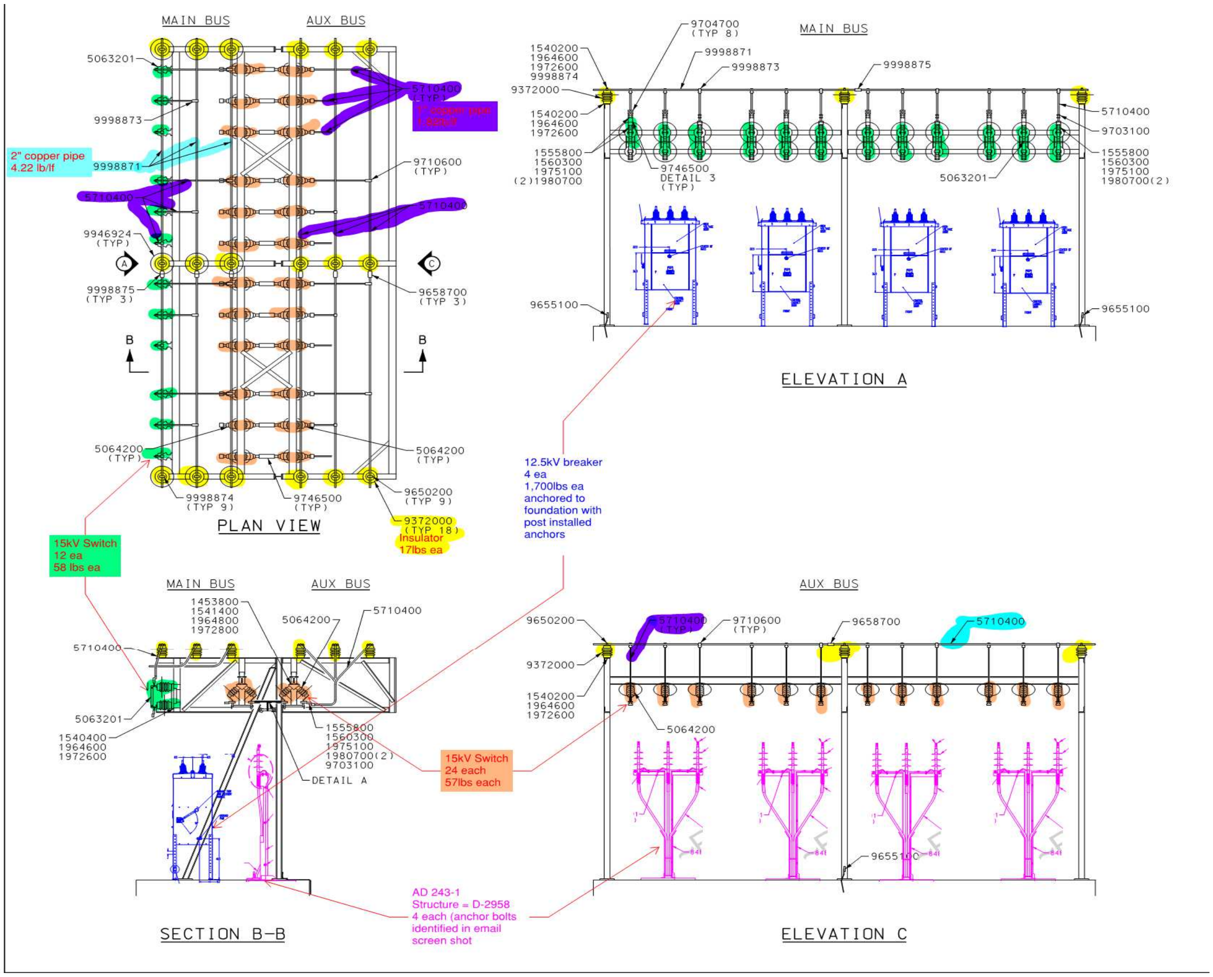


2 Proof I Utilization (Governing Cases)

Loading	Proof	Design values [lb] Load	Capacity	Utilization β_N / β_V [%]	Status
Tension	Concrete Breakout Failure	1,002	3,763	27 / -	OK
Shear	Concrete edge failure in direction x-	262	2,471	- / 11	OK

Loading	β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	0.266	0.106	5/3	14	OK

Feeder Structure



KINGWORKS STRUCTURAL ENGINEERS			
PROJECT	PSE 10TC		
DESCRIPTION	12.5 kV FEEDER		
ENGINEER	PROJECT NO.	DATE	PAGE
BJ	21239	11/13/23	

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Bellingham, WA 98225
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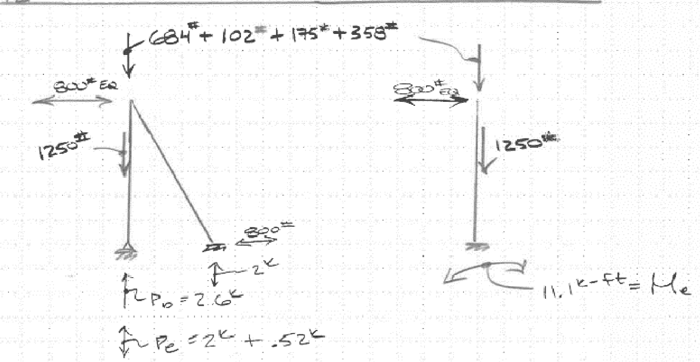
12.5 kV FEEDER – LOADING PER FRAME



Load Perpendicular to main frame - triangular braced frame

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Phone I Fax:	360-714-8260 |	E-Mail:	bernt@king-works.com
Design:	Feeder Structure Anchorage - Load Perp Condition	Date:	11/13/2023
Fastening point:			

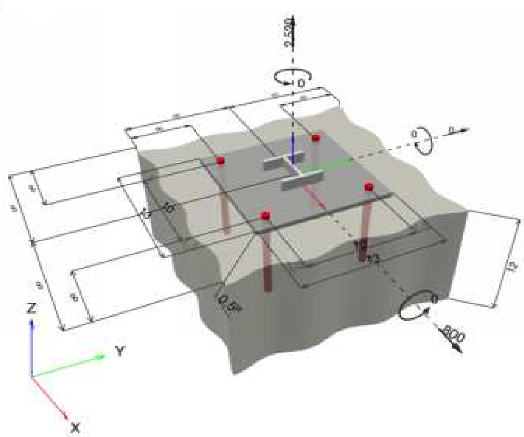
Specifier's comments:

1 Input data

Anchor type and diameter:	**Heavy Hex Head ASTM F 1554 GR. 36 3/4**
Item number:	not available
Effective embedment depth:	h_{ef} = 9.000 in.
Material:	ASTM F 1554
Evaluation Service Report:	Hilti Technical Data
Issued I Valid:	- | -
Proof:	Design Method ACI 318-14 / CIP
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.500 in.
Anchor plate[R] :	l_x x l_y x t = 13.000 in. x 13.000 in. x 0.500 in.; (Recommended plate thickness: not calculated)
Profile:	W shape (AISC), W4X13; (L x W x T x FT) = 4.160 in. x 4.060 in. x 0.280 in. x 0.345 in.
Base material:	cracked concrete, Custom, f_c' = 4,500 psi; h = 12.000 in.
Reinforcement:	tension: condition B, shear: condition B;
	edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (d))
	Shear load: yes (17.2.3.5.3 (c))

[R] - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.] & Loading [lb, in.lb]



Loading	Proof	Design values [lb] Load	Capacity	Utilization β_N / β_V [%]	Status
Tension	Concrete Breakout Failure	2,520	42,856	6 / -	OK
Shear	Steel Strength	200	7,555	- / 3	OK

Loading	β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	0.059	0.026	5/3	2	OK

Feeder Anchorage - load parallel to structure length (6 columns with fixed base resisting load)

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Address:	600 Dupont Streetm Suite B, Bellingham, WA 98225	Specifier:	Bernt Johnson PE, SE
Phone I Fax:	360-714-8260 |	E-Mail:	bernt@king-works.com
Design:	Feeder Structure Anchorage - Load Parallel Conditio	Date:	11/13/2023
Fastening point:			

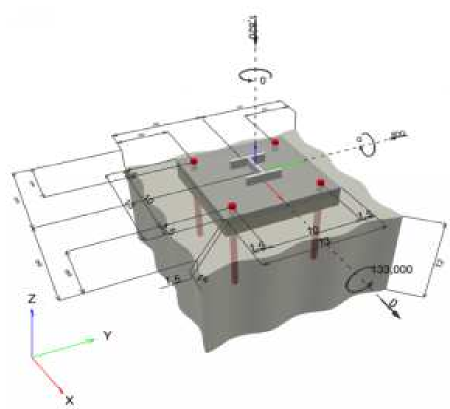
Specifier's comments:

1 Input data

Anchor type and diameter:	**Heavy Hex Head ASTM F 1554 GR. 36 3/4**
Item number:	not available
Effective embedment depth:	h_{ef} = 9.000 in.
Material:	ASTM F 1554
Evaluation Service Report:	Hilti Technical Data
Issued I Valid:	- | -
Proof:	Design Method ACI 318-14 / CIP
Stand-off installation:	without clamping (anchor); restraint level (anchor plate): 2.00; e_b = 1.500 in.; t = 1.000 in.
	Hilti Grout: CB-G EG, epoxy, $f_{c,Grout}$ = 14,939 psi
Anchor plate[R] :	l_x x l_y x t = 13.000 in. x 13.000 in. x 1.000 in.; (Recommended plate thickness: not calculated)
Profile:	W shape (AISC), W4X13; (L x W x T x FT) = 4.160 in. x 4.060 in. x 0.280 in. x 0.345 in.
Base material:	cracked concrete, Custom, f_c' = 4,500 psi; h = 12.000 in.
Reinforcement:	tension: condition B, shear: condition B;
	edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (d))
	Shear load: yes (17.2.3.5.3 (c))

[R] - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.] & Loading [lb, in.lb]



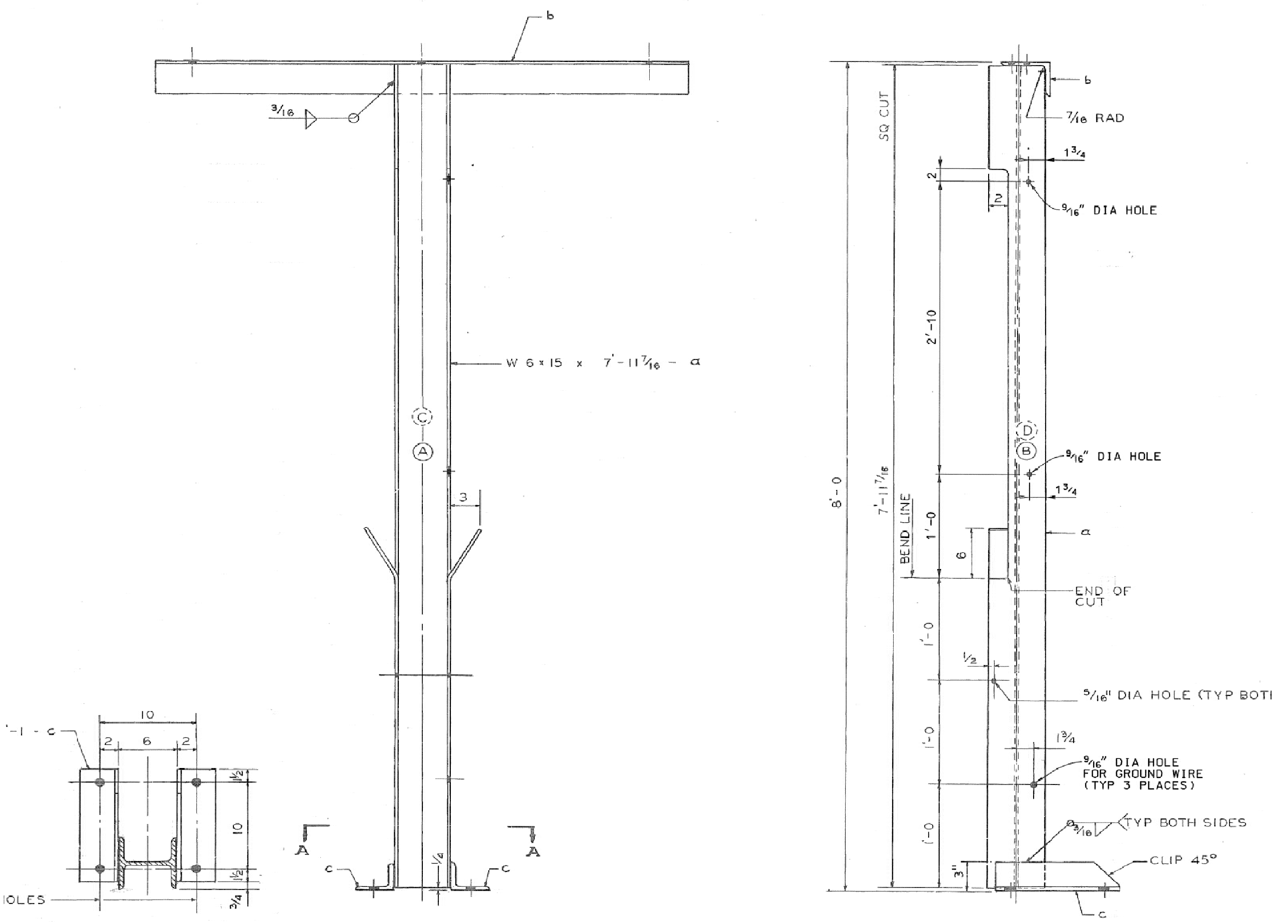
1

Loading	Proof	Design values [lb] Load	Capacity	Utilization β_N / β_V [%]	Status
Tension	Steel Strength	5,782	14,529	40 / -	OK
Shear	Steel failure (with lever arm)	200	595	- / 34	OK

Loading	β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	0.398	0.336	5/3	38	OK

Cable Termination Support

Assuming 1 kip max total dead load for anchorage and foundation calcs



SECTION A-A

CABLE TERMINATION SUPPORT A-1 (MID 9581800) 5

SCALE: 1 1/2" = 1'-0"

Hilti PROFIS Engineering 3.0.88

www.hilti.com

Company:	Kingworks Structural Engineers	Page:	1
Address:	600 Dupont Streetm Suite B, Bellingham, WA 98225	Specifier:	Bernt Johnson PE, SE
Phone I Fax:	360-714-8260 |	E-Mail:	bernt@king-works.com
Design:	Cable Termination Support	Date:	11/13/2023
Fastening point:			

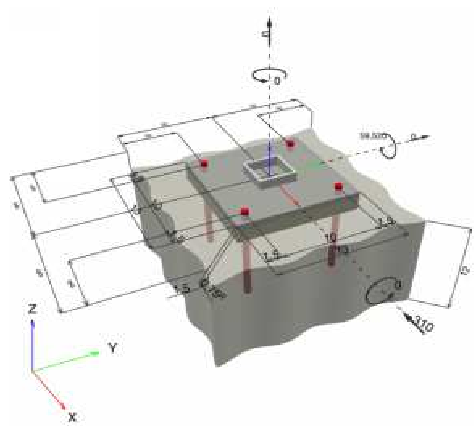
Specifier's comments:

1 Input data

Anchor type and diameter:	**Heavy Hex Head ASTM F 1554 GR. 36 3/4**
Item number:	not available
Effective embedment depth:	h_{ef} = 9.000 in.
Material:	ASTM F 1554
Evaluation Service Report:	Hilti Technical Data
Issued I Valid:	- | -
Proof:	Design Method ACI 318-14 / CIP
Stand-off installation:	without clamping (anchor); restraint level (anchor plate): 2.00; e_b = 1.500 in.; t = 0.750 in.
	Hilti Grout: CB-G PG, precision, $f_{c,Grout}$ = 10,443 psi
Anchor plate[R] :	l_x x l_y x t = 13.000 in. x 13.000 in. x 0.750 in.; (Recommended plate thickness: not calculated)
Profile:	Square HSS (AISC), HSS4X4X.25; (L x W x T) = 4.000 in. x 4.000 in. x 0.250 in.
Base material:	cracked concrete, Custom, f_c' = 4,500 psi; h = 12.000 in.
Reinforcement:	tension: condition B, shear: condition B;
	edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (d))
	Shear load: yes (17.2.3.5.3 (c))

[R] - The anchor calculation is based on a rigid anchor plate assumption.

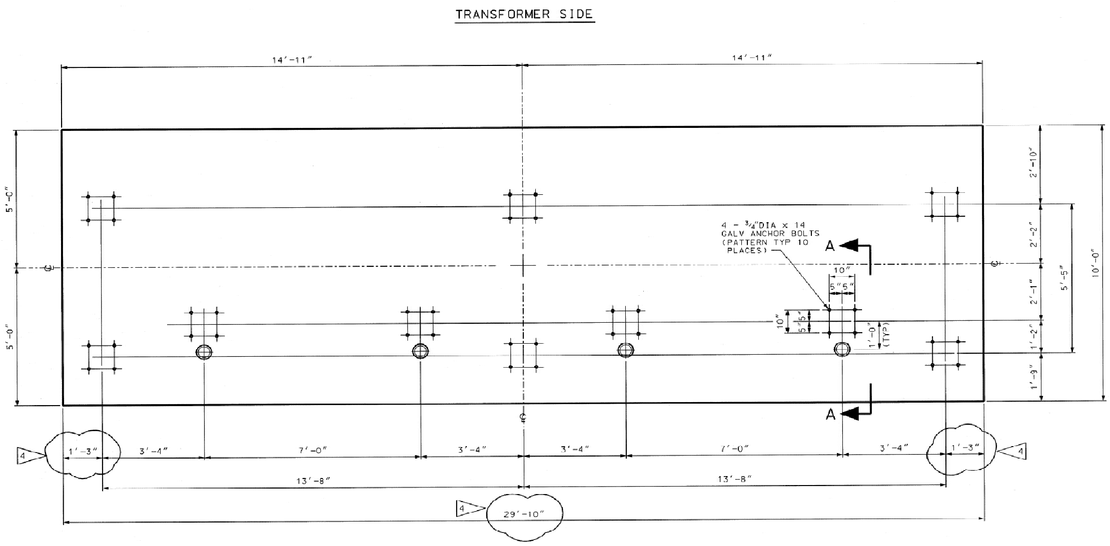
Geometry [in.] & Loading [lb, in.lb]

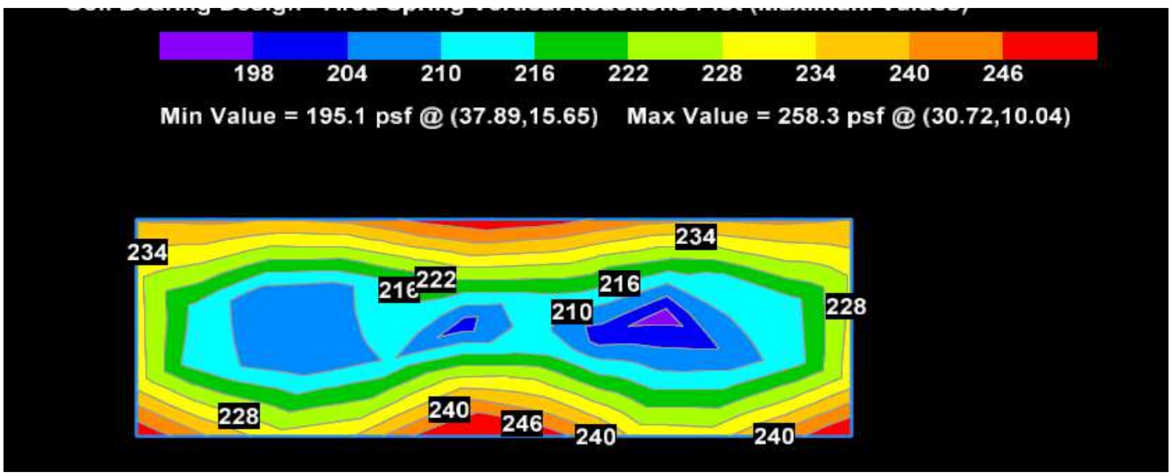


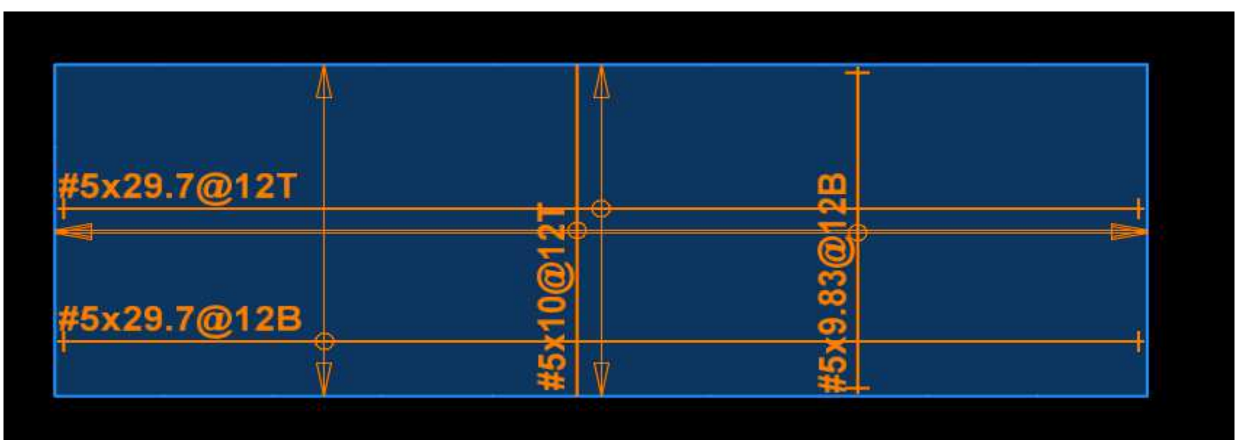
2 Proof I Utilization (Governing Cases)

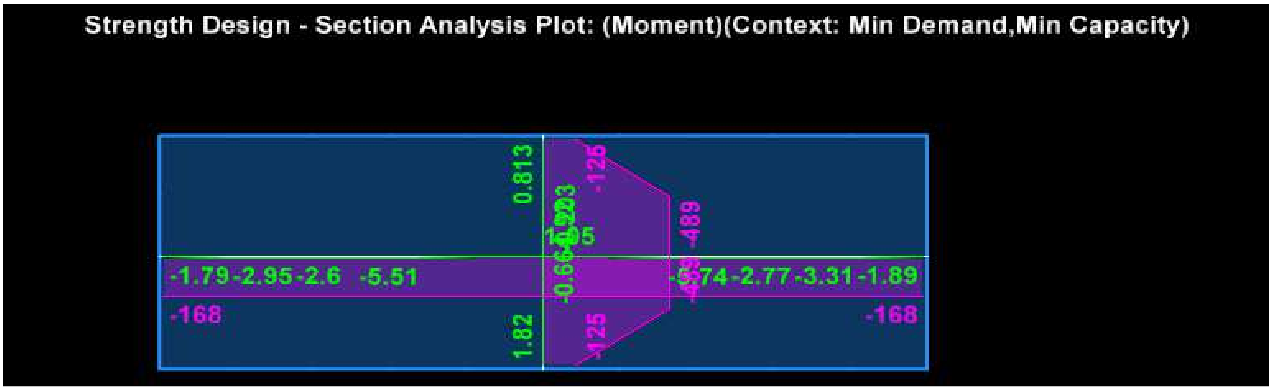
		Design values [lb]		Utilization	
Loading	**Proof**	**Load**	**Capacity**	**β_N / β_V [%]**	**Status**
Tension	Steel Strength	2,789	14,529	20 / -	OK
Shear	Steel failure (with lever arm)	77	843	- / 10	OK

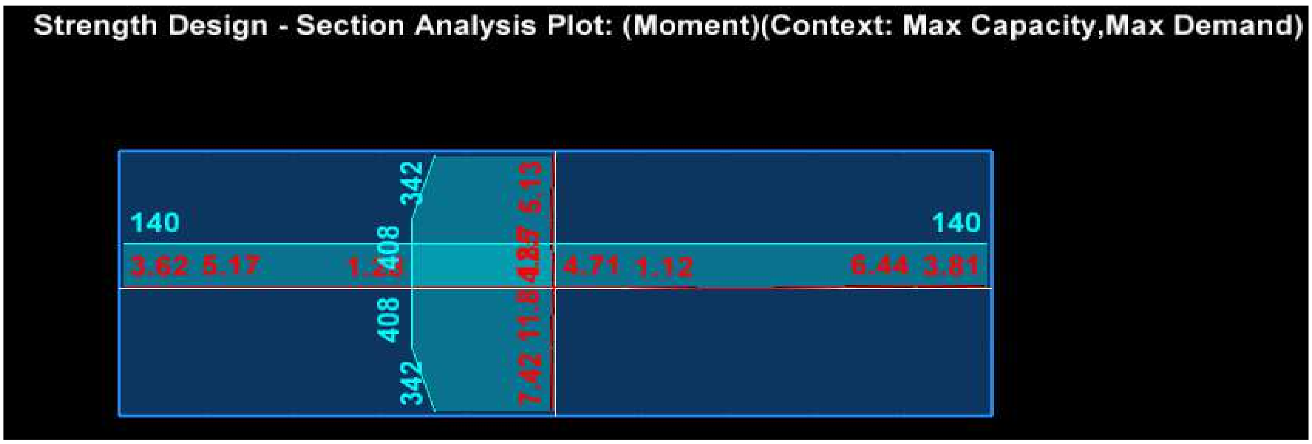
Loading	**β_N**	**β_V**	**ζ**	**Utilization $\beta_{N,V}$ [%]**	**Status**
Combined tension and shear loads	0.192	0.092	5/3	9	OK


TRANSFORMER SIDE
14'-11"
14'-11"
4 - 3/4"DIA x 14 GALV ANCHOR BOLTS (PATTERN TYP 10 PLACES)
A
A
2'-10"
2'-2"
2'-1"
1'-2"
1'-3"
5'-5"
10'-0"
5'-0"
5'-0"
10"
1'-0" (TYP)
1'-3"
3'-4"
7'-0"
3'-4"
3'-4"
7'-0"
3'-4"
1'-3"
13'-8"
13'-8"
29'-10"


198
204
210
216
222
228
234
240
246
Min Value = 195.1 psf @ (37.89,15.65)
Max Value = 258.3 psf @ (30.72,10.04)
234
234
216
222
216
210
228
228
240
246
240
240


#5x29.7@12T
#5x29.7@12B
#5x10@12T
#5x9.83@12B


Strength Design - Section Analysis Plot: (Moment)(Context: Min Demand,Min Capacity)
0.813
-125
-489
-1.79
-2.95
-2.6
-5.51
-2.77
-3.31
-1.89
-168
-168
1.82
-125


Strength Design - Section Analysis Plot: (Moment)(Context: Max Capacity,Max Demand)
342
5.13
140
140
3.62
5.17
4.71
1.12
6.44
3.81
408
408
342
7.42

Kingworks
STRUCTURAL ENGINEERS
600 Dupont St * Ste B
Bellingham, WA 98225
360-714-8260 www.king-works.com

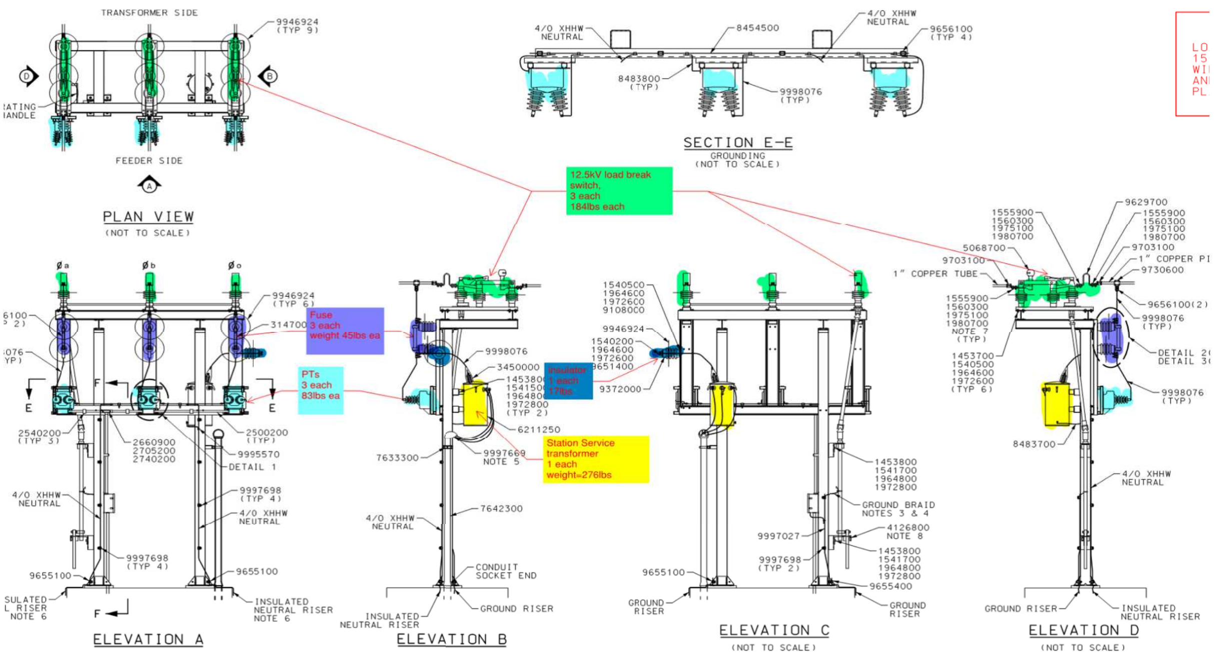
JOB TITLE PSE - OTC - PUYALLUP

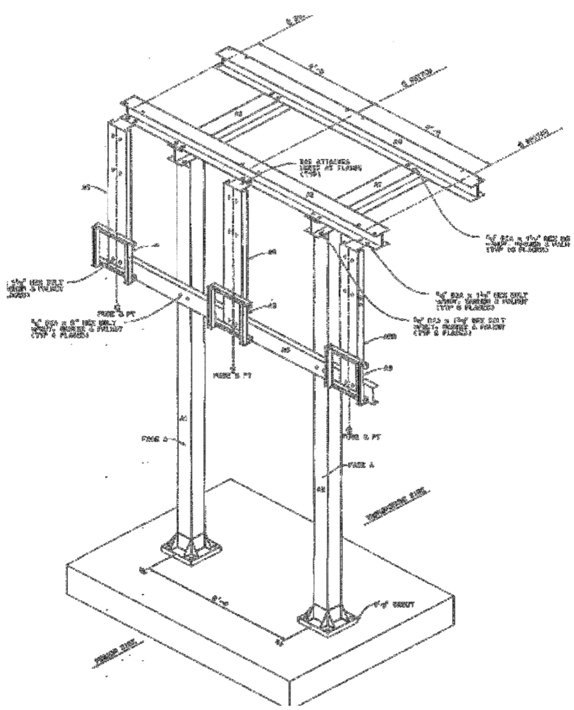
JOB NO. 21239 **SHEET NO.**

CALCULATED BY BJ **DATE**

CHECKED BY **DATE**

12.5 kV LOAD BREAK SWITCH



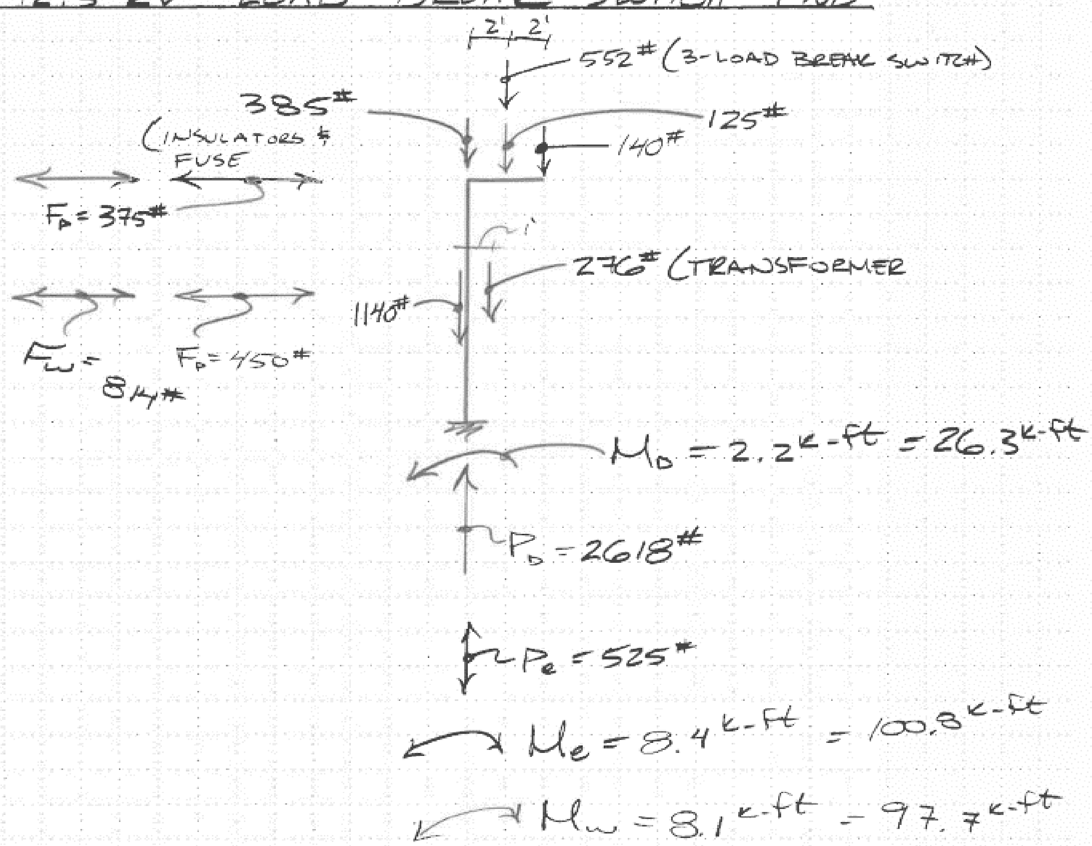


KINGWORKS STRUCTURAL ENGINEERS
600 Dupont St, Suite B
Bellingham, WA 98225
360.714.8260
www.king-works.com

PROJECT	PSE 10TC
DESCRIPTION	LOAD BREAK SWITCH FOUNDATION

ENGINEER	PROJECT NO.	DATE	PAGE
BI	21239	11/13/23	

12.5 kV LOAD BREAK SWITCH END



Kingworks
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600 Dupont St * Ste B
Bellingham, WA 98225
360-714-8260 www.king-works.com

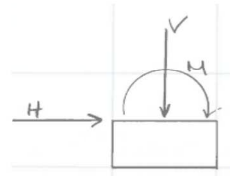
JOB TITLE	PSE - OTC - PUYALLUP		
JOB NO.	21239	SHEET NO.	
CALCULATED BY	BJ	DATE	
CHECKED BY		DATE	

Pad Checks

Allowable Bearing Pressure = 2.50 ksf

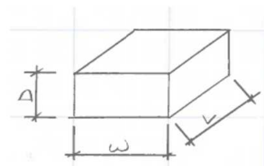
Design Loading - Service Level

V = 1.6 kips [Vertical Load]
H = 0.6 kips [Horizontal Loading Applied at top of Footing]
M = 7.2 k-ft [Overturning Moment]



Footing Geometry

W = 6 ft [Length direction of Overturning]
L = 8.1666 ft [Length Perpendicular to Overturning]
D = 1.5 ft [Depth]



Calculate Eccentricity

P_{total} = 12.625 kips [Vertical Load plus Footing Self Weight]
M_x = 8.4 k-ft [Overturning Moment plus horizontal load x footing height]
e_x = .67 ft

Calculate Bearing Pressure

x = 7.00 ft
q = .43 ksf

Bearing Pressure OK!

Calculate FS against Overturning

M_{OTM} = 8.4 k-ft
M_{RTM} = 37.875 k-ft [P_{total} * (W/2)]
FS = 4.51 [M_{RTM} / M_{OTM}]

OK for Overturning!

Hilti PROFIS Engineering 3.0.88

www.hilti.com

Company:	Kingworks Structural Engineers	Page:	1
Address:	600 Dupont Streetm Suite B, Bellingham, WA 98225	Specifier:	Bernt Johnson PE, SE
Phone I Fax:	360-714-8260 |	E-Mail:	bernt@king-works.com
Design:	Concrete - Nov 13, 2023	Date:	11/13/2023
Fastening point:			

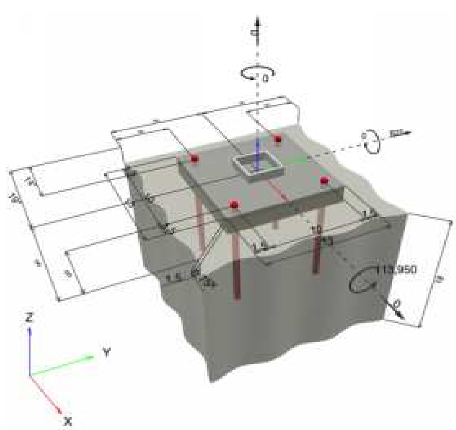
Specifier's comments:

1 Input data

Anchor type and diameter:	**Heavy Hex Head ASTM F 1554 GR. 36 3/4**
Item number:	not available
Effective embedment depth:	h_{ef} = 12.000 in.
Material:	ASTM F 1554
Evaluation Service Report:	Hilti Technical Data
Issued I Valid:	- | -
Proof:	Design Method ACI 318-14 / CIP
Stand-off installation:	without clamping (anchor); restraint level (anchor plate): 2.00; e_b = 1.500 in.; t = 0.750 in.
	Hilti Grout: CB-G PG, precision, $f_{c,Grout}$ = 10,443 psi
Anchor plate[R] :	l_x x l_y x t = 13.000 in. x 13.000 in. x 0.750 in.; (Recommended plate thickness: not calculated)
Profile:	Square HSS (AISC), HSS4X4X.25; (L x W x T) = 4.000 in. x 4.000 in. x 0.250 in.
Base material:	cracked concrete, Custom, f_c' = 4,500 psi; h = 18.000 in.
Reinforcement:	tension: condition B, shear: condition B;
	edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (d))
	Shear load: yes (17.2.3.5.3 (c))

[R] - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.] & Loading [lb, in.lb]



Loading	Proof	Design values [lb] Load	Capacity	Utilization β_N / β_V [%]	Status
Tension	Steel Strength	5,339	14,529	37 / -	OK
Shear	Steel failure (with lever arm)	206	660	- / 32	OK

Loading	β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	0.367	0.313	5/3	34	OK