KRAMER ENGINEERING, INC

Job No. 19-060.01

Date: Sep-19

STRUCTURAL CALCULATIONS
FOR

ROSS - CVDC TI - Phase 3

SHAFTER, CA

FOR

H+M

REGISTERED PROFESSIONAL ENGINEER
DAVID ROBERT KRAMER
SE 2309
STRUCTURAL
STATE OF CALIFORNIA

September 27 2019

DESIGN CRITERIA

Building Code:

X 2016 California Building Code (CBC)

___ 2016 Los Angeles County Building Code

___ 2016 Los Angeles City Building Code

___ 2015 International Building Code (IBC)

Selected IBC References:

Loads:	ASCE 7-10
Steel:	AISC 360-10
	AISC 341-10 (Seismic)
Wood:	AF&PA NDS -15
	AF&PA SDPWS -15 (Wind & Seismic)
Concrete:	ACI 318-14
Masonry:	ACI 530-13

MATERIAL SPECIFICATIONS Typical unless noted otherwise in calculations

Concrete: (Specified Strength f'c is Minimum Strength at 28 days)

Foundations: f'_C = 2,500 psi min for Design (f'_C = 3,000 psi min Specified on Plans, Sec 1704

Walls: f'_C = 3,500 psi min

Reinforcing: ASTM A615 - Grade 60 ASTM A706 - Grade 60

Masonry: Grade "N" units: f'm = 1,500 psi (All cells grouted)

Steel:	Structural	ASTM A992 for Wide flange beams	Fy = 50 ksi
		ASTM A36 for channels, angles, and misc	Fy = 36 ksi
	Pipes	ASTM A53	Fy = 35 ksi
	Tubes	ASTM A500 Grade B	Fy = 46 ksi
	Round HSS	ASTM A500 Grade B	Fy = 42 ksi
	Bolts	ASTM A307	Per Code
		ASTM A325SC	Per Code
	Metal Studs	SSMA Member	Studs $\leq$ 18GA, Fy = 33 ksi
		(ICC ESR 3064P)	Studs $\geq$ 16GA, Fy = 50 ksi

Lumber: Visually Graded Douglas Fir

2x4 rafters DF #1; 2x6, 3x4 & larger DF #2

All other sawn lumber DF #1

Glu-Lam Beams - Visual Comb. 24f-V4 & -V8

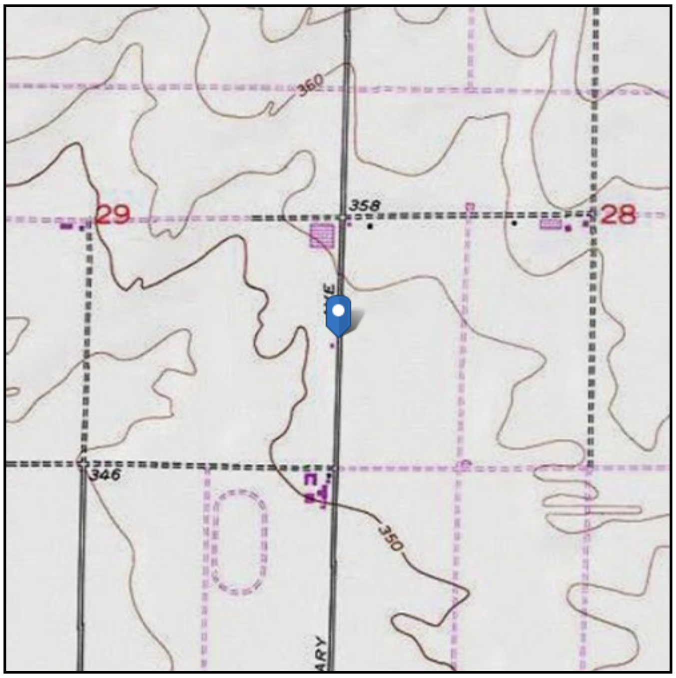
Hardware: Simpson "Strong-Tie" or equal

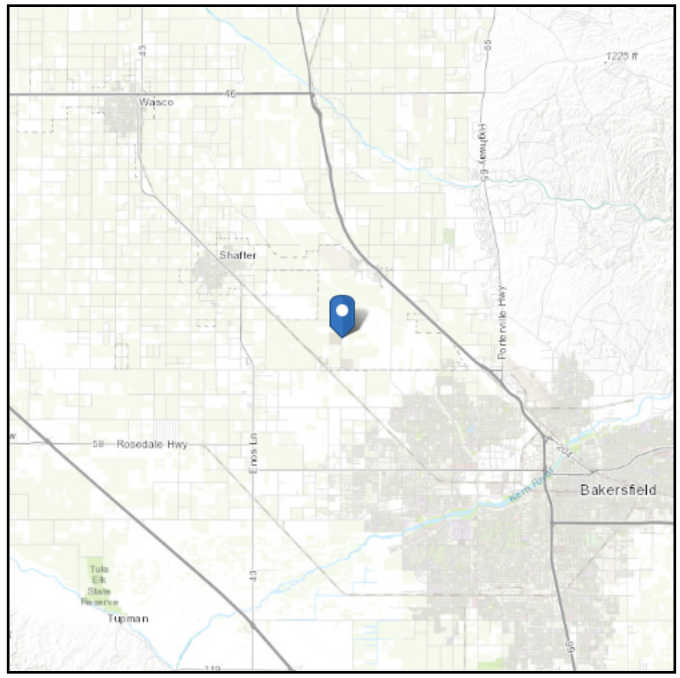
ASCE 7 Hazards Report

Address:
2801 Zachary Ave
Shafter, California
93263

Standard: ASCE/SEI 7-10
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 354.28 ft (NAVD 88)
Latitude: 35.459693
Longitude: -119.189226





Wind

Results:

Wind Speed:	110 Vmph
10-year MRI	72 Vmph
25-year MRI	79 Vmph
50-year MRI	85 Vmph
100-year MRI	91 Vmph
Data Source:	ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014
Date Accessed:	Fri Aug 09 2019

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 7-10 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 7-10 Section 26.2.

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

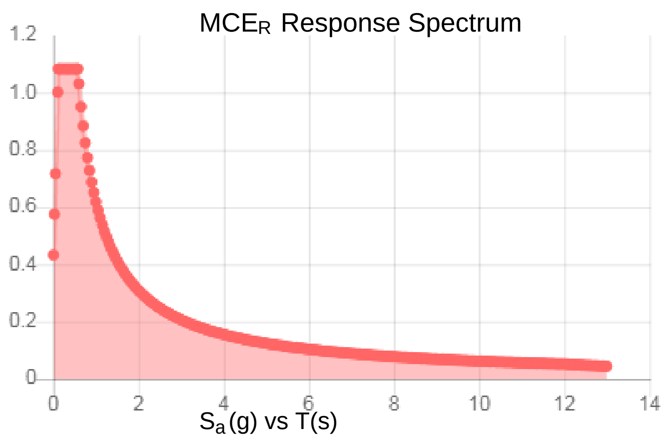
Seismic

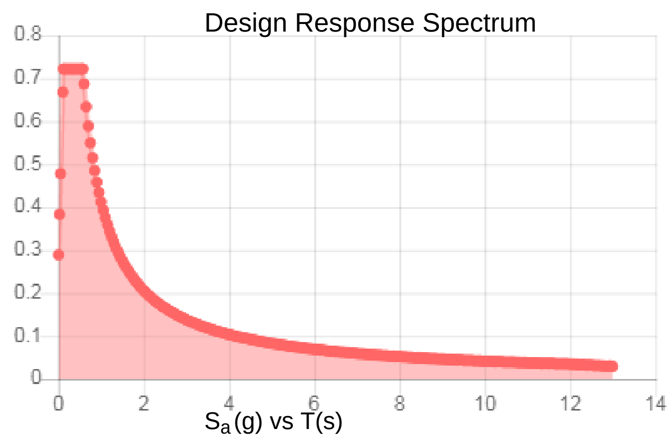
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.976	S_{DS} :	0.722
S_1 :	0.375	S_{D1} :	0.412
F_a :	1.11	T_L :	12
F_v :	1.651	PGA :	0.374
S_{MS} :	1.083	PGA_M :	0.421
S_{M1} :	0.618	F_{PGA} :	1.126
		I_e :	1

Seismic Design Category D





Data Accessed: Fri Aug 09 2019

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

Mechanical Unit Anchorage (Seismic)

Description:	ATO UNIT

w_1 = 13000 lbs
z_1 = 336.0 in
x_1 = 101.3 in
y_1 = 83.0 in

w_2 = 0 lbs
e_x = 0.0 in
e_y = 0.0 in

Seismic Data

S_{DS} = 0.722
a_p = 2.5
R_p = 6.0
I_p = 1.0
z_a/h = 0.0
Ω_0 = 2.0

$h1_{\_COG}$ = 168.0 in
x_{1_COG} = 63.3 in
d_{1_x} = 95.3 in
y_{1_COG} = 51.9 in
d_{1_y} = 77.0 in

$$F_P = \frac{0.4a_pS_{DS}W_P}{\left(\frac{R_P}{I_P}\right)}\left(1+2\left(\frac{z}{h}\right)\right) = 0.120\ W_p$$

$$F_{P,min} = 0.3S_{DS}I_PW_P = 0.2166\ W_p$$ <-- CONTROLS

$$F_{P,max} = 1.6S_{DS}I_PW_P = 1.1552\ W_p$$

Seismic Loading

	X	Y	
$M_{OT} = (1.0) * F_P * H_2 =$	473,054	473,054	in-lbs
$M_{R1} = (1.2 + 0.2S_{DS})W_P*d/2 =$	663,587	543,978	in-lbs
$M_{R2} = (0.9 - 0.2S_{DS})W_P*d/2 =$	372,959	305,735	in-lbs
$\boldsymbol{Compression} = \frac{(M_{OT})}{d} =$	4,966	6,144	lbs
$\boldsymbol{Uplift} = \frac{(M_{OT} - M_R)}{d} =$	1,051	2,173	lbs
$\boldsymbol{Shear} = F_P =$	2,816	2,816	lbs

Loads to Foundation

Compression	X	Y
# Supports Total =	4	4
# Supports Comp. =	2	2
P_u/Support =	4.7 k	5.3 k

Tension	X	Y
Tu =	1.1	2.2
# Supports =	2	2
T_u/Support =	0.5 k	1.1 k

Guy Wire Loading

TENSION ONLY	X	Y
# Supports =	2	2
Tu/Wire =	4.3 k	4.3 k

Concrete Anchorage Loads

Shear	X	Y
# Supports =	4	4
V_u/Support =	1.4 k	1.4 k

Tension	X	Y
Tu =	2.1	4.3
# Supports =	2	2
T_u/Support =	1.1 k	2.2 k

TRIGONOMETRIC FACTORS
35 DEG (X) = 1.74
35 DEG (Y) = 1.74

KRAMER ENGINEERING, INC

Job No.	19-060.01
Date:	Sep-19

Mechanical Unit Anchorage (Seismic)

Description:	CU UNIT

w_1 =	6200	lbs	w_2 =	0	lbs			
z_1 =	80.0	in	e_x =	0.0	in			
x_1 =	227.0	in	e_y =	0.0	in			
y_1 =	88.0	in						
$h1\_COG$ =	70.0	in						
x_{1_COG} =	141.9	in						
d_{1_x} =	221.0	in						
y_{1_COG} =	55.0	in						
d_{1_y} =	82.0	in						

Seismic Data

S_{DS} =	0.72
a_p =	2.5
R_p =	6.0
I_p =	1.0
z_a/h =	0.0
Ω_0 =	2.0

$$F_P = \frac{0.4 a_p S_{DS} W_P}{\left(\frac{R_P}{I_P}\right)}\left(1 + 2\left(\frac{z}{h}\right)\right) = 0.120 \quad W_p$$

$$F_{P,min} = 0.3 S_{DS} I_P W_P = 0.2166 \quad W_p$$

<-- CONTROLS

$$F_{P,max} = 1.6 S_{DS} I_P W_P = 1.1552 \quad W_p$$

Seismic Loading

	X	Y	
$M_{OT} = (1.0) * F_P * H_2 =$	94,004	94,004	in-lbs
$M_{R1} = (1.2 + 0.2S_{DS})W_P * d/2 =$	709,541	275,064	in-lbs
$M_{R2} = (0.9 - 0.2S_{DS})W_P * d/2 =$	398,787	154,596	in-lbs
$\boldsymbol{Compression} = \frac{(M_{OT})}{d} =$	425	1,146	lbs
$\boldsymbol{Uplift} = \frac{(M_{OT} - M_R)}{d} =$	No Uplift	No Uplift	
$\boldsymbol{Shear} = F_P =$	1,343	1,343	lbs

Loads to Foundation

Compression	X	Y
# Supports Total =	8	8
# Supports Comp. =	4	4
P_u/Support =	0.4 k	0.5 k

Concrete Anchorage Loads

Shear	X	Y
# Supports =	8	8
V_u/Support =	0.3 k	0.3 k

KRAMER ENGINEERING, INC

Job No. 19-060.01
Date: Sep-19

Panel 223

Tilt-up Concrete Wall

Tiltup-I varies.xltm(Ver 7.3)

2015 IBC, ASCE 7-10, ACI 318-14 Section 11.8

MATERIALS:

Thick =	10	in.	Base Fixity?	Y	(Y/N)		
L(tot) =	44.2	feet	f'c =	4000	psi		
Lc(clr) =	39.2	feet	fy =	60000	psi		
Width =	22.375	in.	Bar Size =	# 6			
Reveal=	0.75	in.	Bar Qty =	2	E.F.		
Eff. d =	7.75	in.	As =	0.88	in^2		

ADJACENT OPENINGS:

Opening #1
- B1 = 0.67 feet
- H1 = 2.67 feet

Opening #2
- B2 = 0.00 feet
- H2 = 0.00 feet

Min % Horiz & Vertical Reinf. = 0.0025 Min. Horiz & Vert Reinf. = #6 @ 17.6 " o.c. (if single layer)

VERTICAL LOADS:

Roof Bay Width =	10.00	feet	Ecc. = t/2 + 4 =	8.63	in.
Roof (DL) =	11.00	psf	P1(floor/roof DL)=	121	lbs.
Roof (LL) =	20.00	psf	P1 (floor LL)=	0	lbs.
Floor (DL) =	0.00	plf	P1 (roof LL)=	220	lbs.
Floor (LL) =	0.00	plf	P2(wall DL above)=	6754	at mid-height

Is "floor live" over 100 psf? Or from public assembly? Or from garage? N (Y/N)

Is vertical load to be evaluated at wall's mid-height at seismic loading? Y (Y/N)

LATERAL LOADS & MOMENTS: Importance I = 1.00

SEISMIC E

S_{DS} = 0.722 ASCE EQ. 11.4-3

$F_p = 0.4 * S_{DS} * Ie * W_W$ (wall) ASCE Sec 12.11

F_p = 0.289 W

F_p = 36.10 psf

M (add'l) = 0 "k

M (unfactored) = 182.3 "k

WIND W

p= 24.9 psf - Strength

(Leeward is entered as positive number)

M (unfactored) = 125.9 "k

SECTION PROPERTIES:

Ec =	3605	ksi	Ig =	1865	in^4	Mcr= 7.5*sqrt(f'c)*Ig/(thick/2)	
n = Es/Ec =	8.04		Ac =	206.969	in^2	Mcr=	176.9 "k

LOAD COMBINATIONS:					(16-5)	(16-7)	(16-3)	(16-4)	(16-6)
IBC Seismic	D+L+E	IBC (16-5)	D		1.34	0.76	1.20	1.20	0.90
	D+E	IBC (16-7)	L		0.50	0.00	0.50	0.50	0.00
IBC Wind	D+L+W	IBC (16-3)	L_r		0.00	0.00	1.60	0.50	0.00
	D+L+W	IBC (16-4)	E		1.00	1.00	0.00	0.00	0.00
	D+W	IBC (16-6)	W		0.00	0.00	0.50	1.00	1.00
FACTORED LOADINGS			Mu (basic seismic)	"k	182	182	0	0	0
			Mu (basic wind)	"k	0	0	63	126	126
			P1(ult)	lbs	163	91	497	255	109
			P2(ult)	lbs	9080	5103	8105	8105	6079
NOMINAL MOMENT STRENGTH:									
As(eff)= [As*fy+P1(ult)+P2(ult)]/fy=				""	1.03	0.97	1.02	1.02	0.98
a= [As*fy+P1(ult)+P2(ult)]/[0.85*f'c*b]=				in	0.82	0.76	0.81	0.80	0.78
Mn=	As(eff)*fy*(d-a/2)=			"k	455.5	427.4	451.1	449.4	434.3
			øMn =	"k	410.0	384.6	406.0	404.5	390.9
FACTORED ACTUAL MOMENT:									
I(cr)= n*(As+Pu/fy*h/2d)*(d-c)^2+[L*c^3]/3=				in^4	369.9	359.0	368.2	367.5	361.7
			where c=a/B=	in	0.96	0.90	0.95	0.95	0.91
			Mu (basic) =	"k	182.3	182.3	63.0	125.9	125.9
			Mu (eccentric roof) = P1(ult)*e/2 =	"k	0.7	0.4	2.1	1.1	0.5
			Mu = Mua/(1-(5PuL^2)/(0.75*48*Ec*Icr)) =	"k	232.5	208.4	81.3	157.5	147.9
			Mu =	"k	232.5	208.4	81.3	157.5	147.9
					57%	54%	20%	39%	38%

DEFLECTION CHECK (service loads):

Upper wall Portion: b = 22.38 in (gross)

Ig = 1865 in^4 (gross) Mcr= 176.9 "k (gross)

Ma>2/3Mcr: $\Delta s=0.67\Delta cr+(Ma-0.67Mcr)/(Mn-0.67Mcr)*(\Delta n-0.67\Delta cr)$

			Seismic		Wind	
			Lower	Upper	Lower	Upper
Service load combinations per	Ma basic	"k	127.6	127.6	54.2	54.2
	Ma ecc	"k	0.6	0.6	0.5	0.5
	Ma (initial)	"k	128.2	128.2	54.7	54.7
ACI 318 14.8.4 Comm.	Ps	k	7.6	7.6	6.9	6.9
(Seismic: D+0.5L+0.7E)	Δcr	in	0.61	0.61	0.61	0.61
(Wind: D+0.5L+Wa)	Δn	in	7.86	7.86	7.80	7.80
First Iteration:						
	Cracked?		Y	Y	N	N
	Δs	in	0.69	0.69	0.19	0.19
Second Iteration:						
	M(P-Δ)	"k	5.2	5.2	1.3	1.3
	Ma	"k	133.4	133.4	56.0	56.0
	Cracked?	Y/N	Y	Y	N	N
	Δs	in	0.74	0.77	0.19	0.19
Third Iteration:						
	M(P-Δ)	"k	5.6	5.8	1.3	1.3
	Ma	"k	133.8	134.0	56.0	56.0
	Cracked?	Y/N	Y	Y	N	N
	Δs	in	0.74	0.75	0.19	0.19
Fourth Iteration:						
	M(P-Δ)	"k	5.6	5.7	1.3	1.3
	Ma	"k	133.8	133.9	56.0	56.0
	Cracked?	Y/N	Y	Y	N	N
	Δs	in	0.74	0.75	0.19	0.19
Fifth Iteration						
	M(P-Δ)	"k	5.6	5.6	1.3	1.3
	Ma	"k	133.8	133.8	56.0	56.0
	Cracked?	Y/N	Y	Y	N	N
	Δs	in	0.74	0.74	0.19	0.19

Combined Cross Sections

Conservatively assume the net cross section occurs over the entire lower half and the gross cross section occurs over the entire upper half.

	Seismic	Wind
Δs = [Δs lower + Δs upper]/2 =	0.74 in	0.19 in

DESIGN CHECK:

Mu =	57%	øMn			OK	Wall Thick =	10.00 in.
Δs=	0.3	< Lc/150 =	3.1	in	OK	Vert. Reinf.=	2-#6 Each Face
fa =	44.7	< .06f'c=	240	psi	OK	Horiz. Reinf.=	#6 @ 17.6"o.c.(single layer ass
Mcr =	176.9	< øMn =	384.6	"k	OK		
c/d_t=	0.124	<	0.375		OK	DESIGN SUMMARY:	**WALL OK**

Equiptpd.xlt
Ver 1.40

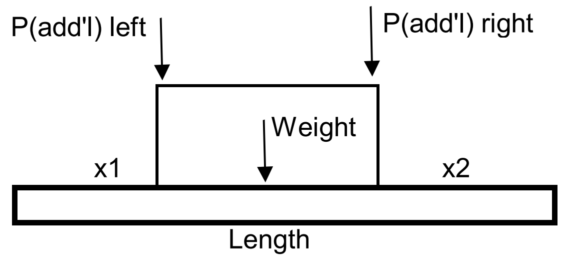
Equipment Pad Footing

Single Symmetric Piece of Equipment (2015 IBC, 2016 CBC)

Description: CU UNIT - SEISMIC

LOADS: (ASD)		
Moment OT(applied	ft-k	7.8
Equipment Weight	k	6.2
P(add'l) left	k	0.0
P(add'l) right	k	0.0
S_{DS} =		0.722

DIMENSIONS:			
Bearing separation	ft	6.83	between extremes of support
Fdn ext. left x1	ft	0.67	
Fdn ext. right x2	ft	0.67	
Pad Length	ft	8.16667	



PAD FOUNDATION:			
Pad Width	ft	20.286	
Pad Thickness	ft	1.00	
Soil over Pad	ft	0	
F'c	ksi	2.5	
Fy	ksi	60	
Concrete Weight	pcf	50	net
Depth(reinf)	in	8	

FOUNDATION ANALYSIS:		
P (OT)= (ASD)	k	1.1463
Foundation Weight=	k	8.2836
Soil Weight(abv)=	k	0
Total Weight=	k	14.484

ASD LOAD COMBINATION 16-12 (D+0.7E)

LATERAL FROM THE RIGHT <-			LATERAL FROM THE LEFT ->		
M (OT)=	ft-k	7.8	M (OT)=	ft-k	7.8
M (R)=	ft-k	59.1	M (R)=	ft-k	59.1
RP middle 1/3 =	ft	3.54	RP middle 1/3 =	ft	3.54
SP(max)=	ksf	0.12	SP(max)=	ksf	0.12
Vu =	k	-1	Vu =	k	-1
+Mu =	ft-k	1	+Mu =	ft-k	1
As (+Mu) =	in^2	0.02	As (+Mu) =	in^2	0.02

ASD LOAD COMBINATION 16-15 ((0.6-0.7*0.2Sds)D+0.7E)

LATERAL FROM THE RIGHT <-			LATERAL FROM THE LEFT ->		
M (OT)=	ft-k	7.8	M (OT)=	ft-k	7.8
0.499*M (R)=	ft-k	29.5	0.499*M (R)=	ft-k	29.5
RP middle 1/3 =	ft	3.00	RP middle 1/3 =	ft	3.00
SP(max)=	ksf	0.16	SP(max)=	ksf	0.16
Vu =	k	-1	Vu =	k	-1
+Mu =	ft-k	1	+Mu =	ft-k	1
As (+Mu) =	in^2	0.02	As (+Mu) =	in^2	0.02

ASD LOAD COMBINATION 16-21 ((0.9-0.2S_{DS}/1.4)D+E/1.4)

Equip't uplift(right)	k	-1.32	Equip't uplift(left)	k	-1.32
		No Uplift			No Uplift

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description: Slab Anchors for ATO Units

Location:
Fastening description:

2. Input Data & Anchor Parameters

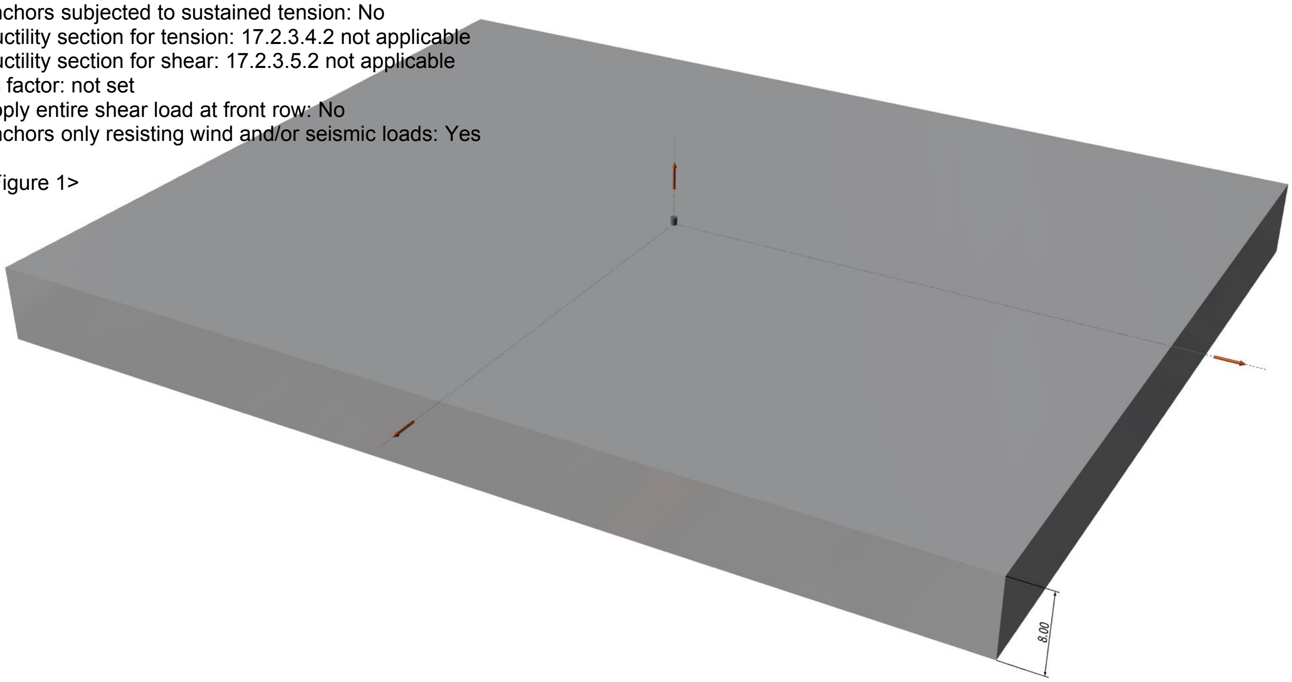
General
Design method:ACI 318-14
Units: Imperial units

Anchor Information:
Anchor type: Bonded anchor
Material: F1554 Grade 36
Diameter (inch): 0.625
Effective Embedment depth, h_{ef} (inch): 4.500
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 7.63
c_{ac} (inch): 9.59
C_{min} (inch): 1.75
S_{min} (inch): 3.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 8.00
State: Cracked
Compressive strength, f'_c (psi): 4000
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout in tension: No
Do not evaluate concrete breakout in shear: No
Hole condition: Dry concrete
Inspection: Continuous
Temperature range, Short/Long: 110/75°F
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: Yes
Anchors subjected to sustained tension: No
Ductility section for tension: 17.2.3.4.2 not applicable
Ductility section for shear: 17.2.3.5.2 not applicable
Ω_0 factor: not set
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: Yes

<Figure 1>



<Figure 2>

Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 5/8"Ø F1554 Gr. 36
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2200.0	1400.0	0.0	1400.0
Sum	2200.0	1400.0	0.0	1400.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 2200
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

4. Steel Strength of Anchor in Tension (Sec. 17.4.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
13110	0.75	9833

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.4.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. 17.4.2.2a)

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	4000	4.500	10264

$0.75\phi N_{cb} = 0.75\phi\,(A_{Nc}/A_{Nco})\,\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b$ (Sec. 17.3.1 & Eq. 17.4.2.1a)

A_{Nc} (in^2)	A_{Nco} (in^2	$c_{a,min}$ (in)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	$0.75\phi N_{cb}$ (lb)
182.25	182.25	41.50	1.000	1.00	1.000	10264	0.65	5003

6. Adhesive Strength of Anchor in Tension (Sec. 17.4.5)

$\tau_{k,cr} = \tau_{k,cr} f_{short\text{-}term} K_{sat} \alpha_{N.seis}$

$\tau_{k,cr}$ (psi)	$f_{short\text{-}term}$	K_{sat}	$\alpha_{N.seis}$	$\tau_{k,cr}$ (psi)
980	1.00	1.00	0.85	833

$N_{ba} = \lambda_a \tau_{cr} \pi d_a h_{ef}$ (Eq. 17.4.5.2)

λ_a	τ_{cr} (psi)	d_a (in)	h_{ef} (in)	N_{ba} (lb)
1.00	833	0.63	4.500	7360

$0.75\phi N_a = 0.75\phi\,(A_{Na}/A_{Na0})\,\Psi_{ed,Na}\Psi_{cp,Na}N_{ba}$ (Sec. 17.3.1 & Eq. 17.4.5.1a)

A_{Na} (in^2)	A_{Na0} (in^2)	c_{Na} (in)	$c_{a,min}$ (in)	$\Psi_{ed,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	ϕ	$0.75\phi N_a$ (lb)
243.61	243.61	7.80	41.50	1.000	1.000	7360	0.65	3588

8. Steel Strength of Anchor in Shear (Sec. 17.5.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\alpha_{V,seis}$	$\phi_{grout}\alpha_{V,seis}\phi V_{sa}$ (lb)
7865	1.0	0.65	0.85	4345

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.5.2)

Shear perpendicular to edge in x-direction:

$V_{bx} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5}; 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
4.50	0.625	1.00	4000	34.67	106024

$\phi V_{cbx} = \phi\,(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. 17.3.1 & Eq. 17.5.2.1a)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
832.00	5408.00	1.000	1.000	2.550	106024	0.70	29110

Shear parallel to edge in x-direction:

$V_{by} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5}; 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.50	0.625	1.00	4000	27.67	75591

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. 17.3.1, 17.5.2.1(c) & Eq. 17.5.2.1a)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
664.00	3444.50	1.000	1.000	2.278	75591	0.70	46464

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.5.3)

$\phi V_{cp} = \phi \min|k_{cp}N_a ; k_{cp}N_{cb}| = \phi \min|k_{cp}(A_{Na} / A_{Na0})\Psi_{ed,Na}\Psi_{cp,Na}N_{ba} ; k_{cp}(A_{Nc} / A_{Nco})\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b|$ (Sec. 17.3.1 & Eq. 17.5.3.1a)

k_{cp}	A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{cp,Na}$	N_{ba} (lb)	N_a (lb)
2.0	243.61	243.61	1.000	1.000	7360	7360

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ	ϕV_{cp} (lb)
182.25	182.25	1.000	1.000	1.000	10264	10264	0.70	10304

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.6)

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	2200	9833	0.22	Pass
Concrete breakout	2200	5003	0.44	Pass
Adhesive	**2200**	**3588**	**0.61**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	**1400**	**4345**	**0.32**	**Pass (Governs)**
T Concrete breakout x+	1400	29110	0.05	Pass
|| Concrete breakout y-	1400	46464	0.03	Pass
Pryout	1400	10304	0.14	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. 17.6.3	0.61	0.32	93.5 %	1.2	Pass

AT-XP w/ 5/8"Ø F1554 Gr. 36 with hef = 4.500 inch meets the selected design criteria.

12. Warnings

- This temperature range is currently outside the scope of ACI 318-14/-11 and ACI 355.4, and is provided for historical purposes.

- Minimum spacing and edge distance requirement of 6da per ACI 318 Sections 17.7.1 and 17.7.2 for torqued cast-in-place anchor is waived per designer option.

- Per designer input, the tensile component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor tensile force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.2.3.4.2 for tension need not be satisfied – designer to verify.

- Per designer input, the shear component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor shear force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.2.3.5.2 for shear need not be satisfied – designer to verify.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer's product literature for hole cleaning and installation instructions.

Anchor Designer™ Software
Version 2.5.6163.39

Company:		Date:	9/11/2019
Engineer:		Page:	1/5
Project:			
Address:			
Phone:			
E-mail:			

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description: Slab Anchors for ATO Units

Location:
Fastening description:

2. Input Data & Anchor Parameters

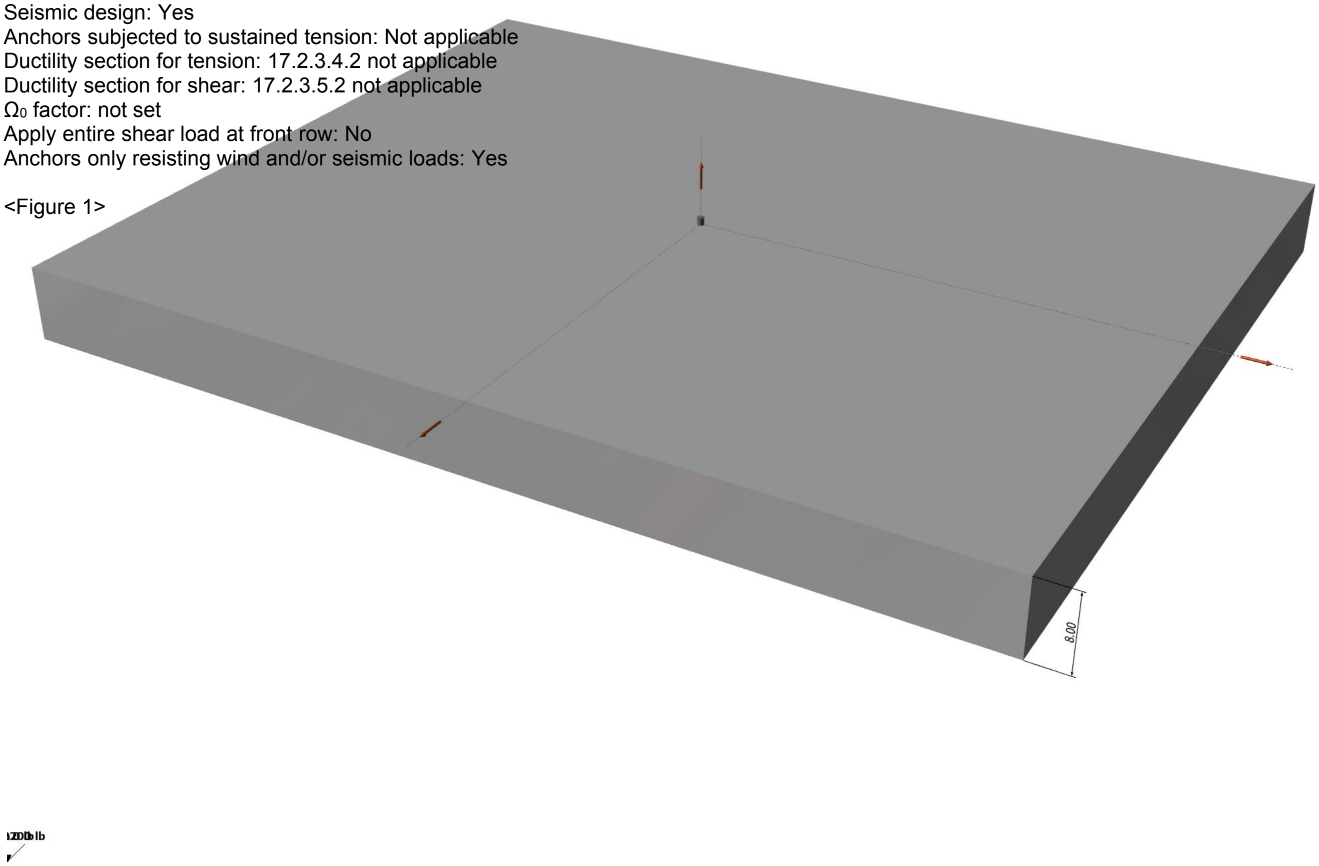
General
Design method:ACI 318-14
Units: Imperial units

Anchor Information:
Anchor type: Concrete screw
Material: Carbon Steel
Diameter (inch): 0.625
Nominal Embedment depth (inch): 5.000
Effective Embedment depth, h_{ef} (inch): 3.820
Code report: ICC-ES ESR-2713
Anchor category: 1
Anchor ductility: No
h_{min} (inch): 7.67
c_{ac} (inch): 5.75
C_{min} (inch): 1.75
S_{min} (inch): 3.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 8.00
State: Cracked
Compressive strength, f'c (psi): 4000
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout in tension: No
Do not evaluate concrete breakout in shear: No
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: Yes
Anchors subjected to sustained tension: Not applicable
Ductility section for tension: 17.2.3.4.2 not applicable
Ductility section for shear: 17.2.3.5.2 not applicable
Ω_0 factor: not set
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: Yes

<Figure 1>



<Figure 2>

Recommended Anchor
Anchor Name: Titen HD® - 5/8"Ø Titen HD (THDB model), hnom:5" (127mm)
Code Report: ICC-ES ESR-2713

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2200.0	1400.0	0.0	1400.0
Sum	2200.0	1400.0	0.0	1400.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 2200
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

4. Steel Strength of Anchor in Tension (Sec. 17.4.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
30360	0.65	19734

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.4.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. 17.4.2.2a)

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	4000	3.820	8027

$0.75\phi N_{cb} = 0.75\phi\,(A_{Nc}/A_{Nco})\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b$ (Sec. 17.3.1 & Eq. 17.4.2.1a)

A_{Nc} (in^2)	A_{Nco} (in^2	$c_{a,min}$ (in)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	$0.75\phi N_{cb}$ (lb)
131.33	131.33	41.50	1.000	1.00	1.000	8027	0.65	3913

6. Pullout Strength of Anchor in Tension (Sec. 17.4.3)

$0.75\phi N_{pn} = 0.75\phi\Psi_{c,P}\lambda_a N_p (f'_c/2{,}500)^n$ (Sec. 17.3.1, Eq. 17.4.3.1 & Code Report)

$\Psi_{c,P}$	λ_a	N_p (lb)	f'_c (psi)	n	ϕ	$0.75\phi N_{pn}$ (lb)
1.0	1.00	4727	4000	0.50	0.65	2915

8. Steel Strength of Anchor in Shear (Sec. 17.5.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
8000	1.0	0.60	4800

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.5.2)

Shear perpendicular to edge in x-direction:

$V_{bx} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5}; 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
3.82	0.625	1.00	4000	34.67	102606

$\phi V_{cbx} = \phi\,(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. 17.3.1 & Eq. 17.5.2.1a)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
832.00	5408.00	1.000	1.000	2.550	102606	0.70	28172

Shear parallel to edge in x-direction:

$V_{by} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5}; 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
3.82	0.625	1.00	4000	27.67	73154

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. 17.3.1, 17.5.2.1(c) & Eq. 17.5.2.1a)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
664.00	3444.50	1.000	1.000	2.278	73154	0.70	44966

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.5.3)

$\phi V_{cp} = \phi k_{cp}N_{cb} = \phi k_{cp}(A_{Nc} / A_{Nco})\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b$ (Sec. 17.3.1 & Eq. 17.5.3.1a)

k_{cp}	A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	131.33	131.33	1.000	1.000	1.000	8027	0.70	11238

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.6)

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	2200	19734	0.11	Pass
Concrete breakout	2200	3913	0.56	Pass
Pullout	**2200**	**2915**	**0.75**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	**1400**	**4800**	**0.29**	**Pass (Governs)**
T Concrete breakout x+	1400	28172	0.05	Pass
|| Concrete breakout y-	1400	44966	0.03	Pass
Pryout	1400	11238	0.12	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. 17.6.3	0.75	0.29	104.6 %	1.2	Pass

5/8"Ø Titen HD (THDB model), hnom:5" (127mm) meets the selected design criteria.

12. Warnings

- Minimum spacing and edge distance requirement of 6da per ACI 318 Sections 17.7.1 and 17.7.2 for torqued cast-in-place anchor is waived per designer option.

- Per designer input, the tensile component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor tensile force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.2.3.4.2 for tension need not be satisfied – designer to verify.

- Per designer input, the shear component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor shear force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.2.3.5.2 for shear need not be satisfied – designer to verify.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer's product literature for hole cleaning and installation instructions.

SIMPSON Strong-Tie®

Anchor Designer™
Software
Version 2.5.6163.40

Company:		Date:	9/11/2019
Engineer:		Page:	1/5
Project:			
Address:			
Phone:			
E-mail:			

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description: Slab Anchors for CU Units

Location:
Fastening description:

2. Input Data & Anchor Parameters

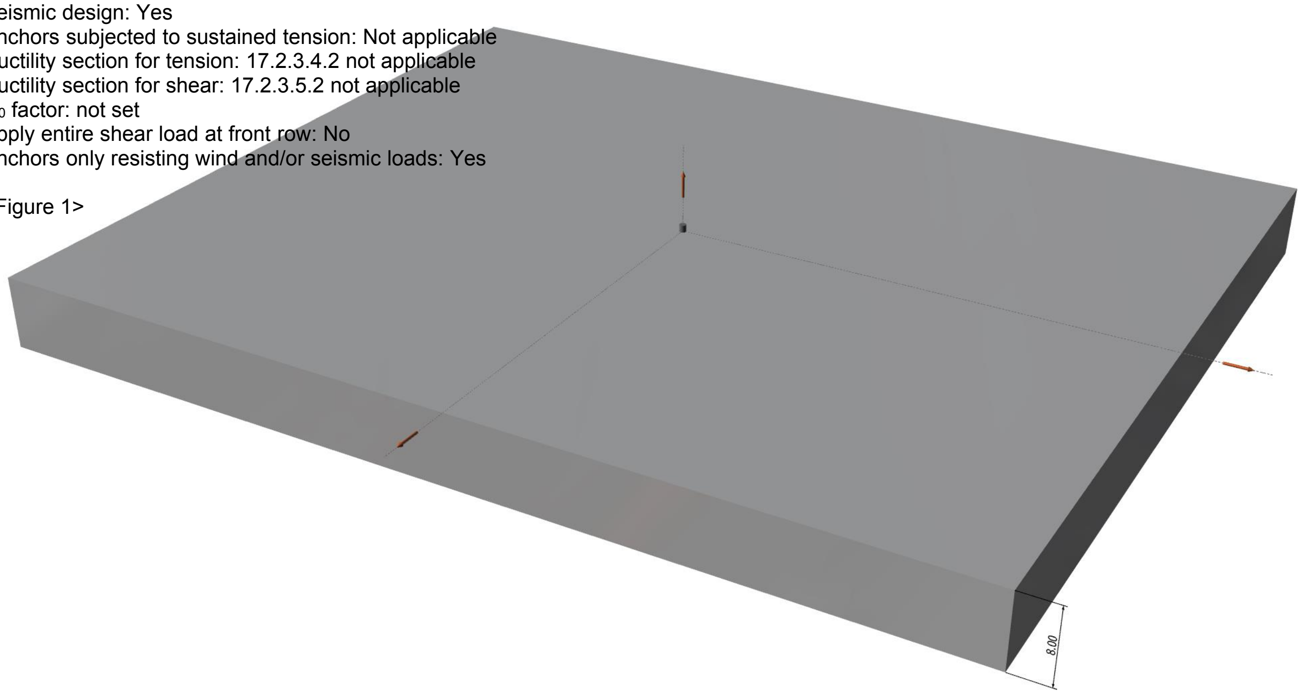
General
Design method:ACI 318-14
Units: Imperial units

Anchor Information:
Anchor type: Concrete screw
Material: Carbon Steel
Diameter (inch): 0.625
Nominal Embedment depth (inch): 5.000
Effective Embedment depth, h_{ef} (inch): 3.820
Code report: ICC-ES ESR-2713
Anchor category: 1
Anchor ductility: No
h_{min} (inch): 7.67
c_{ac} (inch): 5.75
C_{min} (inch): 1.75
S_{min} (inch): 3.00

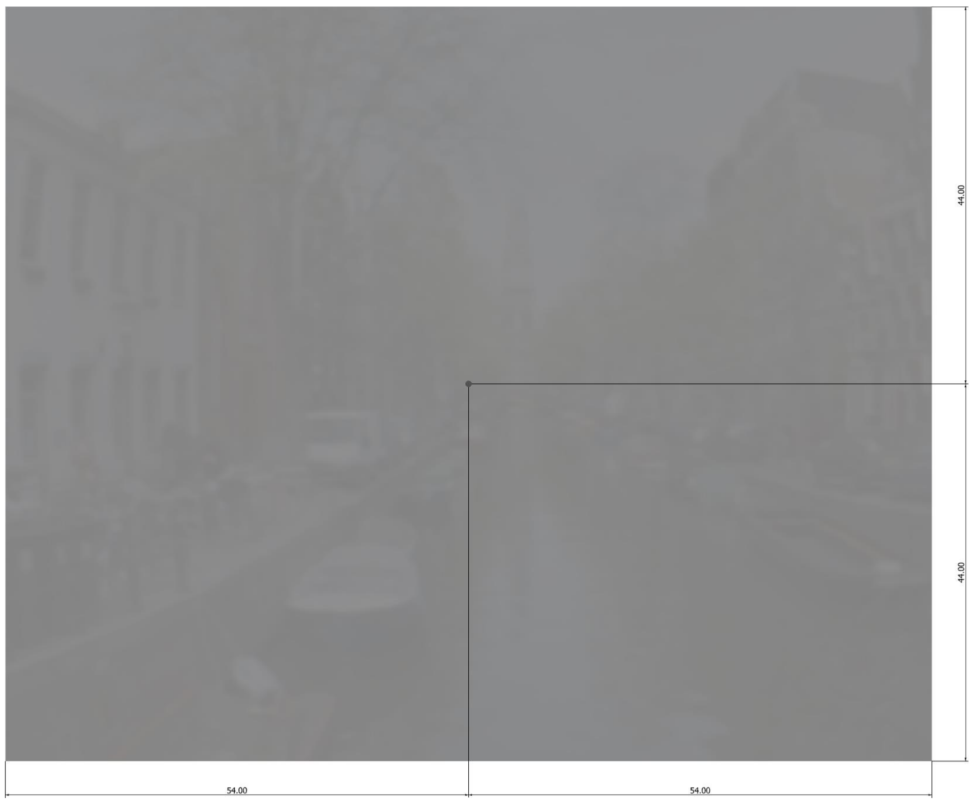
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 8.00
State: Cracked
Compressive strength, f'_c (psi): 4000
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout in tension: No
Do not evaluate concrete breakout in shear: No
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: Yes
Anchors subjected to sustained tension: Not applicable
Ductility section for tension: 17.2.3.4.2 not applicable
Ductility section for shear: 17.2.3.5.2 not applicable
Ω_0 factor: not set
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: Yes

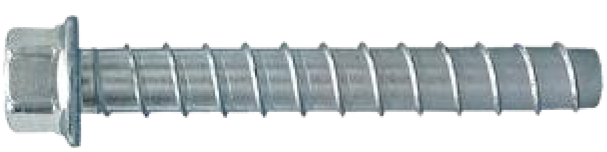
<Figure 1>



<Figure 2>



Recommended Anchor
Anchor Name: Titen HD® - 5/8"Ø Titen HD (THDB model), hnom:5" (127mm)
Code Report: ICC-ES ESR-2713



3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2200.0	1400.0	0.0	1400.0
Sum	2200.0	1400.0	0.0	1400.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 2200
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

4. Steel Strength of Anchor in Tension (Sec. 17.4.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
30360	0.65	19734

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.4.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. 17.4.2.2a)

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	4000	3.820	8027

$0.75\phi N_{cb} = 0.75\phi\,(A_{Nc} / A_{Nco})\,\Psi_{ed,N}\,\Psi_{c,N}\,\Psi_{cp,N} N_b$ (Sec. 17.3.1 & Eq. 17.4.2.1a)

A_{Nc} (in^2)	A_{Nco} (in^2	$c_{a,min}$ (in)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	$0.75\phi N_{cb}$ (lb)
131.33	131.33	44.00	1.000	1.00	1.000	8027	0.65	3913

6. Pullout Strength of Anchor in Tension (Sec. 17.4.3)

$0.75\phi N_{pn} = 0.75\phi \Psi_{c,P} \lambda_a N_p (f'_c / 2{,}500)^n$ (Sec. 17.3.1, Eq. 17.4.3.1 & Code Report)

$\Psi_{c,P}$	λ_a	N_p (lb)	f'_c (psi)	n	ϕ	$0.75\phi N_{pn}$ (lb)
1.0	1.00	4727	4000	0.50	0.65	2915

8. Steel Strength of Anchor in Shear (Sec. 17.5.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
8000	1.0	0.60	4800

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.5.2)

Shear perpendicular to edge in x-direction:

$V_{bx} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5}; 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
3.82	0.625	1.00	4000	36.00	108582

$\phi V_{cbx} = \phi\, (A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. 17.3.1 & Eq. 17.5.2.1a)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
864.00	5832.00	1.000	1.000	2.598	108582	0.70	29255

Shear parallel to edge in x-direction:

$V_{by} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5}; 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
3.82	0.625	1.00	4000	29.33	79863

$\phi V_{cbx} = \phi\, (2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. 17.3.1, 17.5.2.1(c) & Eq. 17.5.2.1a)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
704.00	3872.00	1.000	1.000	2.345	79863	0.70	47675

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.5.3)

$\phi V_{cp} = \phi k_{cp}N_{cb} = \phi k_{cp}(A_{Nc} / A_{Nco})\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b$ (Sec. 17.3.1 & Eq. 17.5.3.1a)

k_{cp}	A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	131.33	131.33	1.000	1.000	1.000	8027	0.70	11238

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.6)

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	2200	19734	0.11	Pass
Concrete breakout	2200	3913	0.56	Pass
Pullout	**2200**	**2915**	**0.75**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	**1400**	**4800**	**0.29**	**Pass (Governs)**
T Concrete breakout x+	1400	29255	0.05	Pass
|| Concrete breakout y-	1400	47675	0.03	Pass
Pryout	1400	11238	0.12	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. 17.6.3	0.75	0.29	104.6 %	1.2	Pass

5/8"Ø Titen HD (THDB model), hnom:5" (127mm) meets the selected design criteria.

12. Warnings

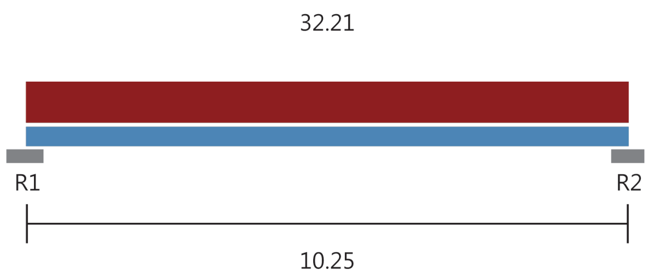
- Minimum spacing and edge distance requirement of 6da per ACI 318 Sections 17.7.1 and 17.7.2 for torqued cast-in-place anchor is waived per designer option.

- Per designer input, the tensile component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor tensile force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.2.3.4.2 for tension need not be satisfied – designer to verify.

- Per designer input, the shear component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor shear force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.2.3.5.2 for shear need not be satisfied – designer to verify.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer's product literature for hole cleaning and installation instructions.



Section : 362S162-33 Single C Stud **Fy =** 33.0 ksi
Maxo = 440.9 Ft-Lb **Moment of Intertia, I =** 0.55 in^4 **Va =** 1023.6 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	423.0	0.959	423.0	48.0	432.4	0.978	0.344	L/357

Distortional Buckling Check

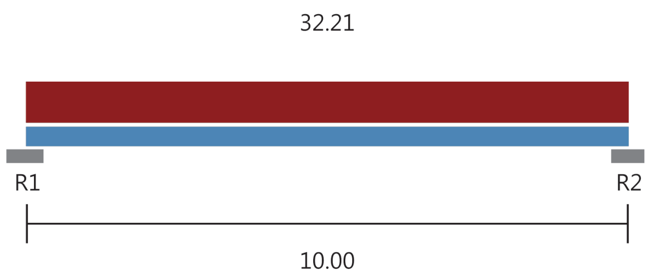
Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	123.0	452.4	0.935

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	165.1	1.00	165.2	289.1	0.0	0.52	NO
R2	165.1	1.00	165.2	289.1	0.0	0.52	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	165.1	0.0	1.00	0.16	0.00	0.16
R2	165.1	0.0	1.00	0.16	0.00	0.16



Section : 362S162-33 Single C Stud **Fy =** 33.0 ksi
Maxo = 440.9 Ft-Lb **Moment of Intertia, I =** 0.55 in^4 **Va =** 1023.6 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	402.6	0.913	402.6	Mid-Pt	422.9	0.952	0.312	L/385

Distortional Buckling Check

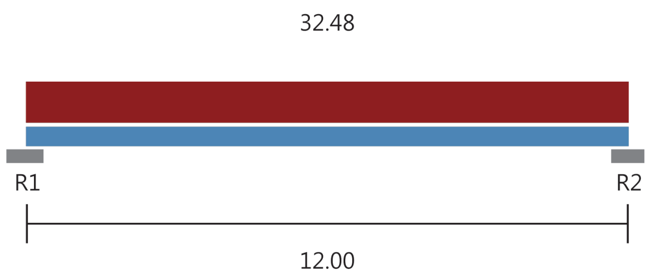
Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	120.0	452.4	0.890

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	161.1	1.00	165.2	289.1	0.0	0.51	NO
R2	161.1	1.00	165.2	289.1	0.0	0.51	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	161.1	0.0	1.00	0.16	0.00	0.16
R2	161.1	0.0	1.00	0.16	0.00	0.16



Section : 362S162-43 Single C Stud **Fy =** 33.0 ksi
Maxo = 612.0 Ft-Lb **Moment of Intertia, I =** 0.71 in^4 **Va =** 1739.1 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	584.6	0.955	584.6	48.0	595.7	0.981	0.507	L/284

Distortional Buckling Check

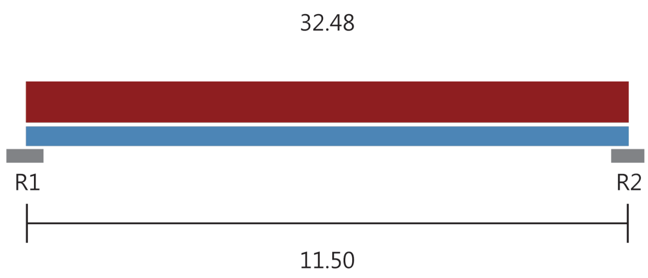
Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	144.0	634.9	0.921

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	194.9	1.00	276.7	484.3	0.0	0.37	NO
R2	194.9	1.00	276.7	484.3	0.0	0.37	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	194.9	0.0	1.00	0.11	0.00	0.11
R2	194.9	0.0	1.00	0.11	0.00	0.11



Section : 362S162-43 Single C Stud
Maxo = 612.0 Ft-Lb **Moment of Intertia, I =** 0.71 in^4
Fy = 33.0 ksi
Va = 1739.1 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	536.9	0.877	536.9	Mid-Pt	549.2	0.978	0.427	L/323

Distortional Buckling Check

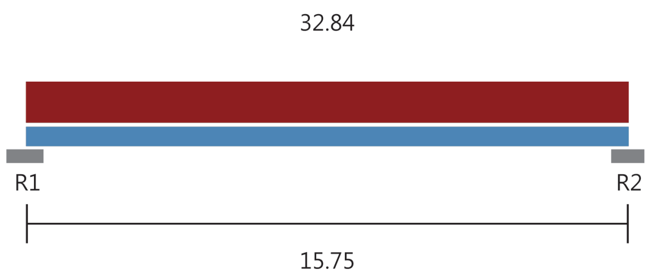
Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	138.0	634.9	0.846

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	186.8	1.00	276.7	484.3	0.0	0.35	NO
R2	186.8	1.00	276.7	484.3	0.0	0.35	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	186.8	0.0	1.00	0.11	0.00	0.11
R2	186.8	0.0	1.00	0.11	0.00	0.11



Section : 600S162-43 Single C Stud **Fy =** 33.0 ksi
Maxo = 1390.0 Ft-Lb **Moment of Intertia, I =** 2.32 in^4 **Va =** 1415.7 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	1018.3	0.733	1018.3	48.0	1220.1	0.835	0.466	L/406

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	189.0	1205.1	0.845

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	258.6	1.00	259.1	453.4	0.0	0.52	NO
R2	258.6	1.00	259.1	453.4	0.0	0.52	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	258.6	0.0	1.00	0.18	0.00	0.18
R2	258.6	0.0	1.00	0.18	0.00	0.18

Project Name: GYP 3 - MID
Model: GYP 3 - MID
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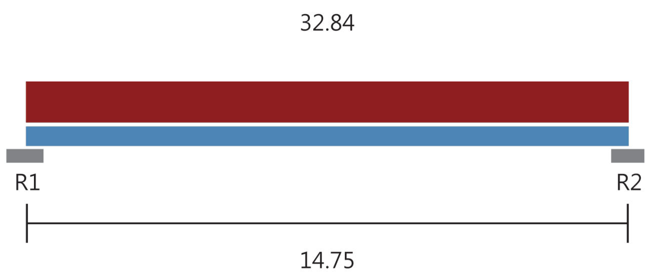


Section : 600S162-43 Single C Stud **Fy =** 33.0 ksi
Maxo = 1390.0 Ft-Lb **Moment of Intertia, I =** 2.32 in^4 **Va =** 1415.7 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	893.1	0.643	893.1	Mid-Pt	919.2	0.972	0.358	L/494

Distortional Buckling Check

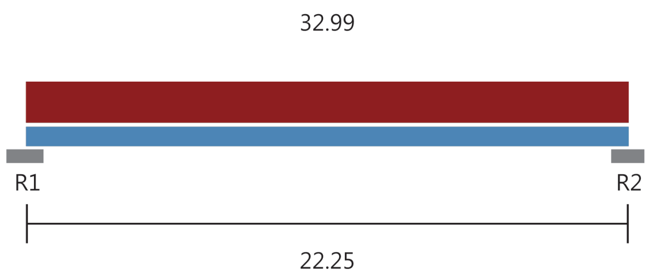
Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	177.0	1205.1	0.741

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	242.2	1.00	259.1	453.4	0.0	0.49	NO
R2	242.2	1.00	259.1	453.4	0.0	0.49	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	242.2	0.0	1.00	0.17	0.00	0.17
R2	242.2	0.0	1.00	0.17	0.00	0.17



Section : 600S162-54 Single C Stud **Fy =** 50.0 ksi
Maxo = 2527.1 Ft-Lb **Moment of Intertia, I =** 2.86 in^4 **Va =** 2822.9 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	2041.5	0.808	2041.5	48.0	2078.8	0.982	1.509	L/177

Distortional Buckling Check

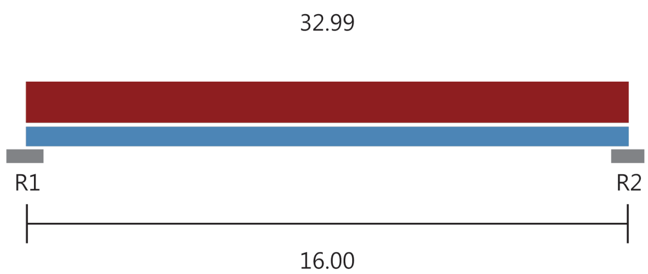
Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	267.0	2158.3	0.946

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	367.0	1.00	598.9	1048.1	0.0	0.32	NO
R2	367.0	1.00	598.9	1048.1	0.0	0.32	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	367.0	0.0	1.00	0.13	0.00	0.13
R2	367.0	0.0	1.00	0.13	0.00	0.13



Section : 600S162-54 Single C Stud
Fy = 50.0 ksi
Maxo = 2527.1 Ft-Lb
Moment of Intertia, I = 2.86 in^4
Va = 2822.9 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	1055.7	0.418	1055.7	Mid-Pt	1082.7	0.975	0.404	L/476

Distortional Buckling Check

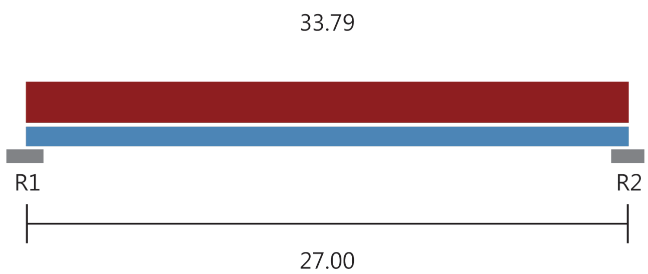
Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	192.0	2158.3	0.489

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	263.9	1.00	598.9	1048.1	0.0	0.23	NO
R2	263.9	1.00	598.9	1048.1	0.0	0.23	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	263.9	0.0	1.00	0.09	0.00	0.09
R2	263.9	0.0	1.00	0.09	0.00	0.09



Section : 800S200-54 Single C Stud **Fy =** 50.0 ksi
Maxo = 3738.9 Ft-Lb **Moment of Intertia, I =** 6.57 in^4 **Va =** 2091.3 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	3079.1	0.824	3079.1	48.0	3672.7	0.838	1.459	L/222

Distortional Buckling Check

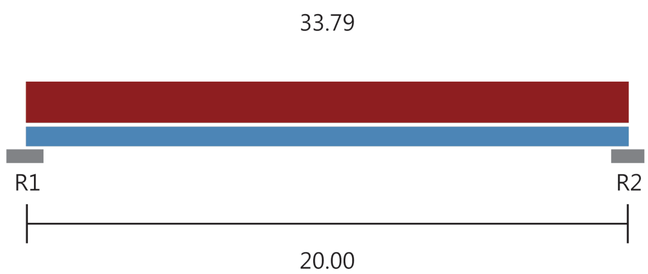
Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	324.0	3114.2	0.989

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	456.2	1.00	574.6	1005.5	0.0	0.41	NO
R2	456.2	1.00	574.6	1005.5	0.0	0.41	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	456.2	0.0	1.00	0.22	0.00	0.22
R2	456.2	0.0	1.00	0.22	0.00	0.22



Section : 800S200-54 Single C Stud **Fy =** 50.0 ksi
Maxo = 3738.9 Ft-Lb **Moment of Intertia, I =** 6.57 in^4 **Va =** 2091.3 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	1689.5	0.452	1689.5	Mid-Pt	1767.1	0.956	0.439	L/546

Distortional Buckling Check

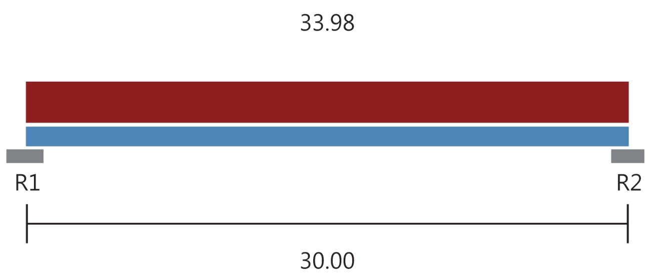
Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	240.0	3114.2	0.543

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	337.9	1.00	574.6	1005.5	0.0	0.31	NO
R2	337.9	1.00	574.6	1005.5	0.0	0.31	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	337.9	0.0	1.00	0.16	0.00	0.16
R2	337.9	0.0	1.00	0.16	0.00	0.16



Section : 1000S200-54 Single C Stud **Fy =** 50.0 ksi
Maxo = 4254.2 Ft-Lb **Moment of Intertia, I =** 10.77 in^4 **Va =** 1660.8 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	3822.7	0.899	3822.7	48.0	4147.0	0.922	1.364	L/264

Distortional Buckling Check

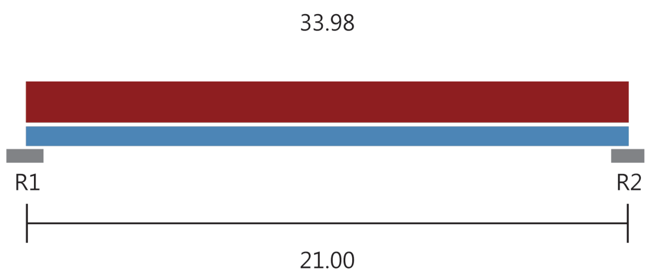
Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	360.0	3884.7	0.984

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	509.7	1.00	553.2	968.1	0.0	0.48	NO
R2	509.7	1.00	553.2	968.1	0.0	0.48	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	509.7	0.0	1.00	0.31	0.00	0.31
R2	509.7	0.0	1.00	0.31	0.00	0.31



Section : 1000S200-54 Single C Stud **Fy =** 50.0 ksi
Maxo = 4254.2 Ft-Lb **Moment of Intertia, I =** 10.77 in^4 **Va =** 1660.8 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	1873.1	0.440	1873.1	Mid-Pt	1968.7	0.951	0.328	L/769

Distortional Buckling Check

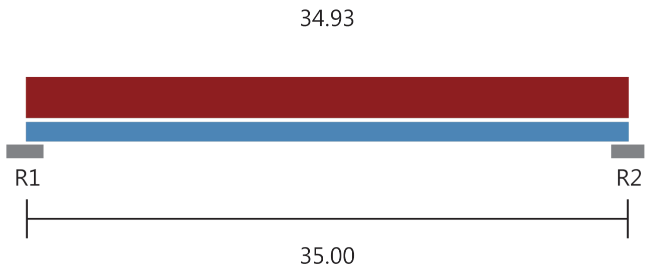
Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	252.0	3884.7	0.482

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	356.8	1.00	553.2	968.1	0.0	0.34	NO
R2	356.8	1.00	553.2	968.1	0.0	0.34	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	356.8	0.0	1.00	0.21	0.00	0.21
R2	356.8	0.0	1.00	0.21	0.00	0.21



Section : 1000S200-68 Single C Stud **Fy =** 50.0 ksi
Maxo = 6038.7 Ft-Lb **Moment of Intertia, I =** 13.67 in^4 **Va =** 3345.4 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	5348.7	0.886	5348.7	48.0	5826.9	0.918	2.048	L/205

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	420.0	5375.1	0.995

Combined Bending and Web Crippling

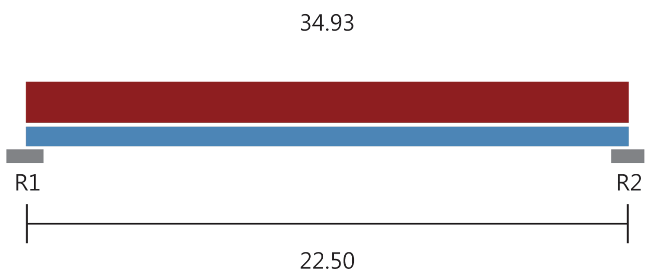
Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	611.3	1.00	853.6	1493.8	0.0	0.37	NO
R2	611.3	1.00	853.6	1493.8	0.0	0.37	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	611.3	0.0	1.00	0.18	0.00	0.18
R2	611.3	0.0	1.00	0.18	0.00	0.18

Project Name: GYP 7 - MID
Model: GYP 7 - MID
Code: 2012 NASPEC [AISI S100-2012]

Date: 06/22/2017
Simpson Strong-Tie® CFS Designer™ 1.5.0.0



Section : 1000S200-68 Single C Stud
Fy = 50.0 ksi
Maxo = 6038.7 Ft-Lb
Moment of Intertia, I = 13.67 in^4
Va = 3345.4 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	2210.4	0.366	2210.4	Mid-Pt	2291.8	0.964	0.350	L/772

Distortional Buckling Check

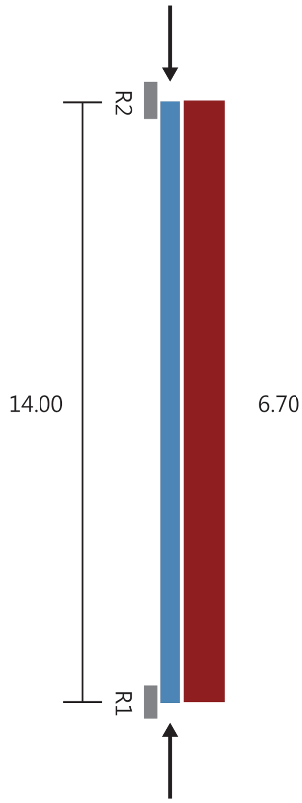
Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	270.0	5375.1	0.411

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	393.0	1.00	853.6	1493.8	0.0	0.24	NO
R2	393.0	1.00	853.6	1493.8	0.0	0.24	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	393.0	0.0	1.00	0.12	0.00	0.12
R2	393.0	0.0	1.00	0.12	0.00	0.12



Section : 362S162-33 Single C Stud **Fy =** 33.0 ksi
Maxo = 440.9 Ft-Lb **Moment of Intertia, I =** 0.55 in^4 **Va =** 1023.6 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations
Reactions have been multiplied by 1.0 for opposite load direction for connection design

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	164.1	0.372	164.1	48.0	432.0	0.380	0.249	L/674

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	168.0	452.4	0.363

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	46.9	1.00	165.2	289.1	0.0	0.15	NO
R2	46.9	1.00	165.2	289.1	0.0	0.15	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	46.9	0.0	1.00	0.05	0.00	0.05
R2	46.9	0.0	1.00	0.05	0.00	0.05

Combined Bending and Axial Load Details

Span	Axial Ld (lb)	Bracing(in) KyLy	Bracing(in) KtLt	Max KL/r	K-phi (lb-in/in)	Lm Bracing (in)	Allow load(lb)	P/Pa	Intr. Value
Span	692.0(c)	48.0	48.0	116	0.0	168.0	1535.2(c)	0.45	0.94

Simpson Strong-Tie Connectors

Number Of Connectors Required at each Reaction : 1

Reaction	Shear (lb.)	Tension (lb)	Compression (lb)	Simpson Strong-Tie Connector	No. of Req'd screws to stud	Connect or Stress Ratio	No. of Req'd # 12-14 Anchors	Stress Ratio	Design Ok ?
R1	-			No Solutions	-	-	-	-	-
R2	-	46.9	46.9	SCB43.5	2	0.09	2	0.06	Yes

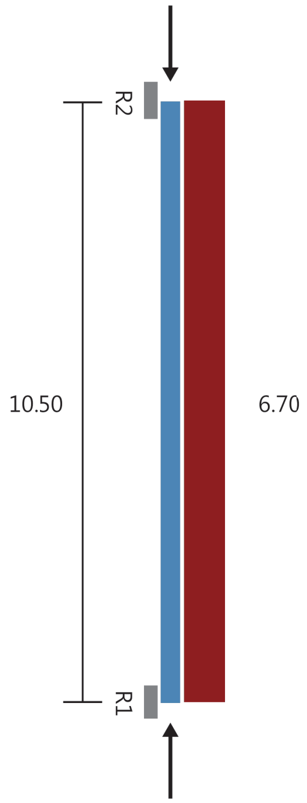
Simpson Strong-Tie Wall Stud Bridging Connectors

Design Method = AISI S100

Span/CantiLever	Bracing Length (in.)	Design Number of Braces	Pn(lb.)	LSUBH (Min)[1]	LSUBH (Max)[1]	SUBH (Min)[1]	SUBH (Max)[1]	MSUBH (Min)[1]	MSUBH (Max)[1]
Span	48	4	2763.3	OK (0.27)	OK (0.16)	OK (0.28)	OK (0.20)	No Soln	No Soln

Notes:

1) Values in parentheses are stress ratios.
2) Bridging connectors are not designed for back-back,box, or built-up sections.
3) Reference www.strongtie.com for latest load data, important information, and general notes
4) CFS Designer will not select bridging connectors unless all flexural and axial bracing settings are the same.
5) If the bracing length is larger than the span length, bridging connectors are not designed.



Section : 362S162-33 Single C Stud **Fy =** 33.0 ksi

Maxo = 440.9 Ft-Lb **Moment of Intertia, I =** 0.55 in^4 **Va =** 1023.6 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations
Reactions have been multiplied by 1.0 for opposite load direction for connection design

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	92.3	0.209	92.3	48.0	432.3	0.214	0.079	L/1597

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	126.0	452.4	0.204

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	35.2	1.00	165.2	289.1	0.0	0.11	NO
R2	35.2	1.00	165.2	289.1	0.0	0.11	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	35.2	0.0	1.00	0.03	0.00	0.03
R2	35.2	0.0	1.00	0.03	0.00	0.03

Combined Bending and Axial Load Details

Span	Axial Ld (lb)	Bracing(in) KyLy	KtLt	Max KL/r	K-phi (lb-in/in)	Lm Bracing (in)	Allow load(lb)	P/Pa	Intr. Value
Span	1304.0(c)	48.0	48.0	87	0.0	126.0	1909.9(c)	0.68	0.96

Simpson Strong-Tie Connectors

Number Of Connectors Required at each Reaction : 1

Reaction	Shear (lb.)	Tension (lb)	Compression (lb)	Simpson Strong-Tie Connector	No. of Req'd screws to stud	Connect or Stress Ratio	No. of Req'd # 12-14 Anchors	Stress Ratio	Design Ok ?
R1	-			No Solutions	-	-	-	-	-
R2	-	35.2	35.2	SCB43.5	2	0.07	2	0.04	Yes

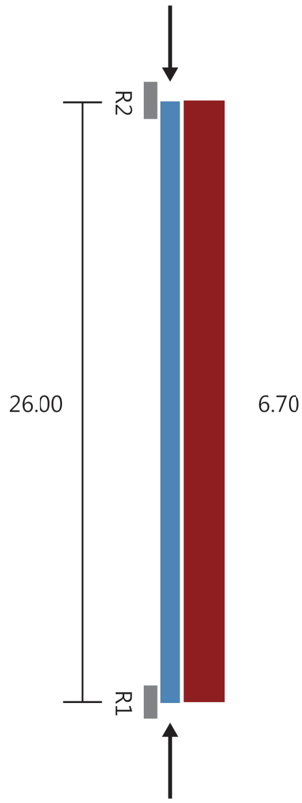
Simpson Strong-Tie Wall Stud Bridging Connectors

Design Method = AISI S100

Span/CantiLever	Bracing Length (in.)	Design Number of Braces	Pn(lb.)	LSUBH (Min)[1]	LSUBH (Max)[1]	SUBH (Min)[1]	SUBH (Max)[1]	MSUBH (Min)[1]	MSUBH (Max)[1]
Span	48	3	3437.9	OK (0.30)	OK (0.18)	OK (0.33)	OK (0.24)	No Soln	No Soln

Notes:

1) Values in parentheses are stress ratios.
2) Bridging connectors are not designed for back-back,box, or built-up sections.
3) Reference www.strongtie.com for latest load data, important information, and general notes
4) CFS Designer will not select bridging connectors unless all flexural and axial bracing settings are the same.
5) If the bracing length is larger than the span length, bridging connectors are not designed.



Section : 600S162-43 Single C Stud

Fy = 33.0 ksi

Maxo = 1390.0 Ft-Lb **Moment of Intertia, I =** 2.32 in^4 **Va =** 1415.7 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations
Reactions have been multiplied by 1.0 for opposite load direction for connection design

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	566.2	0.407	566.2	48.0	1219.1	0.464	0.706	L/442

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	312.0	1205.1	0.470

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	87.1	1.00	259.1	453.4	0.0	0.17	NO
R2	87.1	1.00	259.1	453.4	0.0	0.17	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	87.1	0.0	1.00	0.06	0.00	0.06
R2	87.1	0.0	1.00	0.06	0.00	0.06

Combined Bending and Axial Load Details

Span	Axial Ld (lb)	Bracing(in) KyLy	KtLt	Max KL/r	K-phi (lb-in/in)	Lm Bracing (in)	Allow load(lb)	P/Pa	Intr. Value
Span	765.0(c)	48.0	48.0	137	0.0	312.0	2054.4(c)	0.37	0.96

Simpson Strong-Tie Connectors

Number Of Connectors Required at each Reaction : 1

Reaction	Shear (lb.)	Tension (lb)	Compression (lb)	Simpson Strong-Tie Connector	No. of Req'd screws to stud	Connect or Stress Ratio	No. of Req'd # 12-14 Anchors	Stress Ratio	Design Ok ?
R1	-			No Solutions	-	-	-	-	-
R2	-	87.1	87.1	SCB45.5	2	0.14	2	0.11	Yes

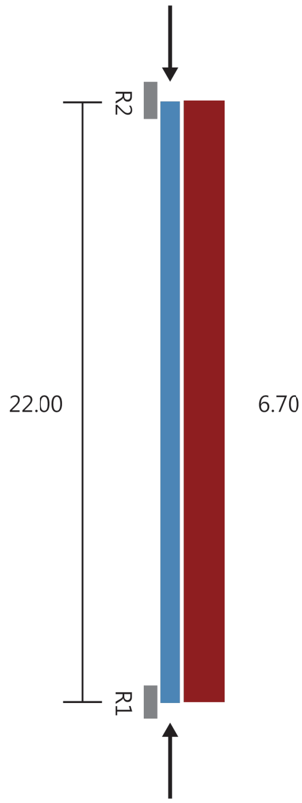
Simpson Strong-Tie Wall Stud Bridging Connectors

Design Method = AISI S100

Span/CantiLever	Bracing Length (in.)	Design Number of Braces	Pn(lb.)	LSUBH (Min)[1]	LSUBH (Max)[1]	SUBH (Min)[1]	SUBH (Max)[1]	MSUBH (Min)[1]	MSUBH (Max)[1]
Span	48	7	3698.0	OK (0.57)	OK (0.28)	OK (0.55)	OK (0.47)	No Soln	No Soln

Notes:

1) Values in parentheses are stress ratios.
2) Bridging connectors are not designed for back-back,box, or built-up sections.
3) Reference www.strongtie.com for latest load data, important information, and general notes
4) CFS Designer will not select bridging connectors unless all flexural and axial bracing settings are the same.
5) If the bracing length is larger than the span length, bridging connectors are not designed.



Section : 600S162-43 Single C Stud **Fy =** 33.0 ksi
Maxo = 1390.0 Ft-Lb **Moment of Intertia, I =** 2.32 in^4 **Va =** 1415.7 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations
Reactions have been multiplied by 1.0 for opposite load direction for connection design

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	405.4	0.292	405.4	48.0	1219.4	0.332	0.362	L/730

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	264.0	1205.1	0.336

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	73.7	1.00	259.1	453.4	0.0	0.15	NO
R2	73.7	1.00	259.1	453.4	0.0	0.15	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	73.7	0.0	1.00	0.05	0.00	0.05
R2	73.7	0.0	1.00	0.05	0.00	0.05

Combined Bending and Axial Load Details

Span	Axial Ld (lb)	Bracing(in) KyLy	KtLt	Max KL/r	K-phi (lb-in/in)	Lm Bracing (in)	Allow load(lb)	P/Pa	Intr. Value
Span	1377.0(c)	48.0	48.0	116	0.0	264.0	2533.2(c)	0.54	1.00

Simpson Strong-Tie Connectors

Number Of Connectors Required at each Reaction : 1

Reaction	Shear (lb.)	Tension (lb)	Compression (lb)	Simpson Strong-Tie Connector	No. of Req'd screws to stud	Connect or Stress Ratio	No. of Req'd # 12-14 Anchors	Stress Ratio	Design Ok ?
R1	-			No Solutions	-	-	-	-	-
R2	-	73.7	73.7	SCB45.5	2	0.12	2	0.09	Yes

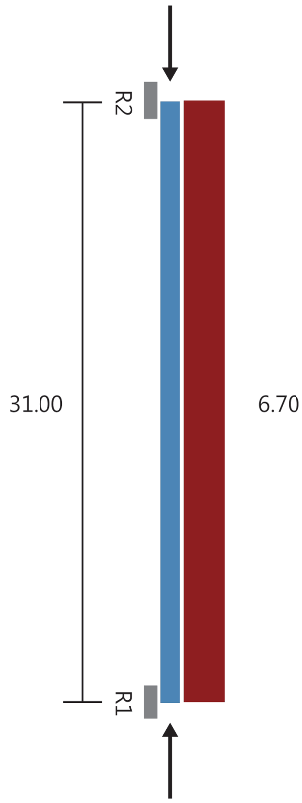
Simpson Strong-Tie Wall Stud Bridging Connectors

Design Method = AISI S100

Span/CantiLever	Bracing Length (in.)	Design Number of Braces	Pn(lb.)	LSUBH (Min)[1]	LSUBH (Max)[1]	SUBH (Min)[1]	SUBH (Max)[1]	MSUBH (Min)[1]	MSUBH (Max)[1]
Span	48	6	4559.7	OK (0.69)	OK (0.34)	OK (0.66)	OK (0.58)	No Soln	No Soln

Notes:

1) Values in parentheses are stress ratios.
2) Bridging connectors are not designed for back-back,box, or built-up sections.
3) Reference www.strongtie.com for latest load data, important information, and general notes
4) CFS Designer will not select bridging connectors unless all flexural and axial bracing settings are the same.
5) If the bracing length is larger than the span length, bridging connectors are not designed.



Section : 800S162-43 Single C Stud **Fy =** 33.0 ksi
Maxo = 1678.4 Ft-Lb **Moment of Intertia, I =** 4.50 in^4 **Va =** 1051.2 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations
Reactions have been multiplied by 1.0 for opposite load direction for connection design

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	804.8	0.480	804.8	48.0	1605.0	0.501	0.734	L/507

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	372.0	1527.4	0.527

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	103.9	1.00	246.9	432.1	0.0	0.22	NO
R2	103.9	1.00	246.9	432.1	0.0	0.22	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	103.9	0.0	1.00	0.10	0.00	0.10
R2	103.9	0.0	1.00	0.10	0.00	0.10

Combined Bending and Axial Load Details

Span	Axial Ld (lb)	Bracing(in) KyLy	KtLt	Max KL/r	K-phi (lb-in/in)	Lm Bracing (in)	Allow load(lb)	P/Pa	Intr. Value
Span	810.0(c)	48.0	48.0	127	0.0	372.0	2396.9(c)	0.34	0.96

Simpson Strong-Tie Connectors

Number Of Connectors Required at each Reaction : 1

Reaction	Shear (lb.)	Tension (lb)	Compression (lb)	Simpson Strong-Tie Connector	No. of Req'd screws to stud	Connect or Stress Ratio	No. of Req'd # 12-14 Anchors	Stress Ratio	Design Ok ?
R1	-			No Solutions	-	-	-	-	-
R2	-	103.9	103.9	SCB47.5	2	0.17	2	0.13	Yes

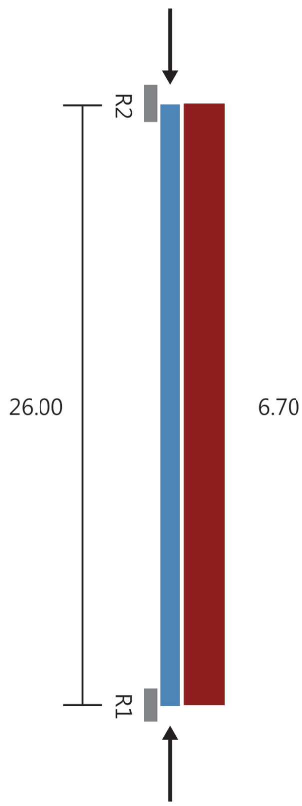
Simpson Strong-Tie Wall Stud Bridging Connectors

Design Method = AISI S100

Span/CantiLever	Bracing Length (in.)	Design Number of Braces	Pn(lb.)	LSUBH (Min)[1]	LSUBH (Max)[1]	SUBH (Min)[1]	SUBH (Max)[1]	MSUBH (Min)[1]	MSUBH (Max)[1]
Span	48	8	4314.4	OK (0.83)	OK (0.83)	NO GOOD (1.33)	NO GOOD (1.26)	No Soln	No Soln

Notes:

1) Values in parentheses are stress ratios.
2) Bridging connectors are not designed for back-back,box, or built-up sections.
3) Reference www.strongtie.com for latest load data, important information, and general notes
4) CFS Designer will not select bridging connectors unless all flexural and axial bracing settings are the same.
5) If the bracing length is larger than the span length, bridging connectors are not designed.



Section : 800S162-43 Single C Stud **Fy =** 33.0 ksi
Maxo = 1678.4 Ft-Lb **Moment of Intertia, I =** 4.50 in^4 **Va =** 1051.2 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations
Reactions have been multiplied by 1.0 for opposite load direction for connection design

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	566.2	0.337	566.2	48.0	1605.2	0.353	0.363	L/859

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	312.0	1527.4	0.371

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	87.1	1.00	246.9	432.1	0.0	0.18	NO
R2	87.1	1.00	246.9	432.1	0.0	0.18	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	87.1	0.0	1.00	0.08	0.00	0.08
R2	87.1	0.0	1.00	0.08	0.00	0.08

Combined Bending and Axial Load Details

Span	Axial Ld (lb)	Bracing(in) KyLy	KtLt	Max KL/r	K-phi (lb-in/in)	Lm Bracing (in)	Allow load(lb)	P/Pa	Intr. Value
Span	1422.0(c)	48.0	48.0	106	0.0	312.0	2882.0(c)	0.49	0.95

Simpson Strong-Tie Connectors

Number Of Connectors Required at each Reaction : 1

Reaction	Shear (lb.)	Tension (lb)	Compression (lb)	Simpson Strong-Tie Connector	No. of Req'd screws to stud	Connect or Stress Ratio	No. of Req'd # 12-14 Anchors	Stress Ratio	Design Ok ?
R1	-			No Solutions	-	-	-	-	-
R2	-	87.1	87.1	SCB47.5	2	0.14	2	0.11	Yes

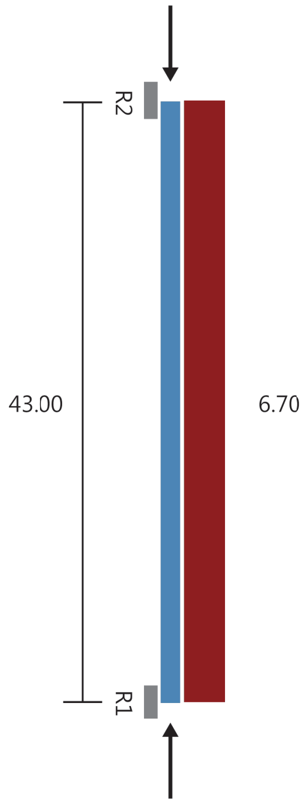
Simpson Strong-Tie Wall Stud Bridging Connectors

Design Method = AISI S100

Span/CantiLever	Bracing Length (in.)	Design Number of Braces	Pn(lb.)	LSUBH (Min)[1]	LSUBH (Max)[1]	SUBH (Min)[1]	SUBH (Max)[1]	MSUBH (Min)[1]	MSUBH (Max)[1]
Span	48	7	5187.5	OK (0.99)	OK (0.99)	NO GOOD (1.59)	NO GOOD (1.50)	No Soln	No Soln

Notes:

1) Values in parentheses are stress ratios.
2) Bridging connectors are not designed for back-back,box, or built-up sections.
3) Reference www.strongtie.com for latest load data, important information, and general notes
4) CFS Designer will not select bridging connectors unless all flexural and axial bracing settings are the same.
5) If the bracing length is larger than the span length, bridging connectors are not designed.



Section : 1000S162-54 Single C Stud **Fy =** 50.0 ksi
Maxo = 3922.2 Ft-Lb **Moment of Intertia, I =** 9.39 in^4 **Va =** 1660.8 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations
Reactions have been multiplied by 1.0 for opposite load direction for connection design

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	1548.5	0.395	1548.5	48.0	3532.9	0.438	1.302	L/396

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	516.0	3364.1	0.460

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	144.1	1.00	553.2	968.1	0.0	0.14	NO
R2	144.1	1.00	553.2	968.1	0.0	0.14	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	144.1	0.0	1.00	0.09	0.00	0.09
R2	144.0	0.0	1.00	0.09	0.00	0.09

Combined Bending and Axial Load Details

Span	Axial Ld (lb)	Bracing(in) KyLy	KtLt	Max KL/r	K-phi (lb-in/in)	Lm Bracing (in)	Allow load(lb)	P/Pa	Intr. Value
Span	885.0(c)	48.0	48.0	145	0.0	516.0	2743.8(c)	0.32	0.86

Simpson Strong-Tie Connectors

Number Of Connectors Required at each Reaction : 1

Reaction	Shear (lb.)	Tension (lb)	Compression (lb)	Simpson Strong-Tie Connector	No. of Req'd screws to stud	Connect or Stress Ratio	No. of Req'd # 12-14 Anchors	Stress Ratio	Design Ok ?
R1	-			No Solutions	-	-	-	-	-
R2	-	144.1	144.1	SCB49.5	2	0.19	2	0.18	Yes

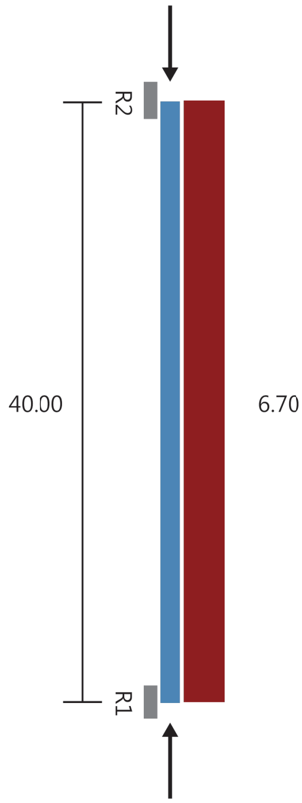
Simpson Strong-Tie Wall Stud Bridging Connectors

Design Method = AISI S100

Span/CantiLever	Bracing Length (in.)	Design Number of Braces	Pn(lb.)	LSUBH (Min)[1]	LSUBH (Max)[1]	SUBH (Min)[1]	SUBH (Max)[1]	MSUBH (Min)[1]	MSUBH (Max)[1]
Span	48	11	0.0	No Soln	No Soln	No Soln	No Soln	No Soln	No Soln

Notes:

1) Values in parentheses are stress ratios.
2) Bridging connectors are not designed for back-back,box, or built-up sections.
3) Reference www.strongtie.com for latest load data, important information, and general notes
4) CFS Designer will not select bridging connectors unless all flexural and axial bracing settings are the same.
5) If the bracing length is larger than the span length, bridging connectors are not designed.



Section : 1000S162-54 Single C Stud **Fy =** 50.0 ksi
Maxo = 3922.2 Ft-Lb **Moment of Intertia, I =** 9.39 in^4 **Va =** 1660.8 lb

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations
Reactions have been multiplied by 1.0 for opposite load direction for connection design

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	1340.0	0.342	1340.0	48.0	3533.0	0.379	0.975	L/492

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	480.0	3364.1	0.398

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R1	134.0	1.00	553.2	968.1	0.0	0.13	NO
R2	134.0	1.00	553.2	968.1	0.0	0.13	NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	134.0	0.0	1.00	0.08	0.00	0.08
R2	134.0	0.0	1.00	0.08	0.00	0.08

Combined Bending and Axial Load Details

Span	Axial Ld (lb)	Bracing(in) KyLy	Bracing(in) KtLt	Max KL/r	K-phi (lb-in/in)	Lm Bracing (in)	Allow load(lb)	P/Pa	Intr. Value
Span	1497.0(c)	48.0	48.0	135	0.0	480.0	3074.2(c)	0.49	0.99

Simpson Strong-Tie Connectors

Number Of Connectors Required at each Reaction : 1

Reaction	Shear (lb.)	Tension (lb)	Compression (lb)	Simpson Strong-Tie Connector	No. of Req'd screws to stud	Connect or Stress Ratio	No. of Req'd # 12-14 Anchors	Stress Ratio	Design Ok ?
R1	-			No Solutions	-	-	-	-	-
R2	-	134.0	134.0	SCB49.5	2	0.18	2	0.17	Yes

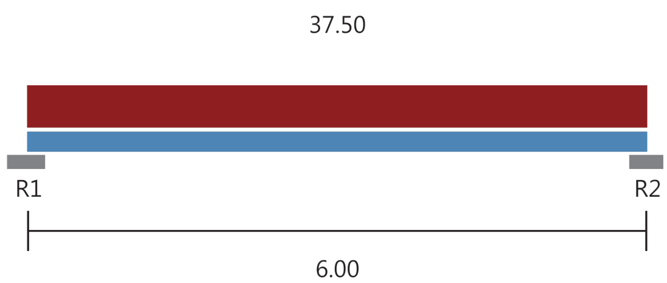
Simpson Strong-Tie Wall Stud Bridging Connectors

Design Method = AISI S100

Span/CantiLever	Bracing Length (in.)	Design Number of Braces	Pn(lb.)	LSUBH (Min)[1]	LSUBH (Max)[1]	SUBH (Min)[1]	SUBH (Max)[1]	MSUBH (Min)[1]	MSUBH (Max)[1]
Span	48	10	0.0	No Soln	No Soln	No Soln	No Soln	No Soln	No Soln

Notes:

1) Values in parentheses are stress ratios.
2) Bridging connectors are not designed for back-back,box, or built-up sections.
3) Reference www.strongtie.com for latest load data, important information, and general notes
4) CFS Designer will not select bridging connectors unless all flexural and axial bracing settings are the same.
5) If the bracing length is larger than the span length, bridging connectors are not designed.



Reactions

Support	**Reactions (lb)**
R1	112.50
R2	112.50

Shear and Web Crippling Checks

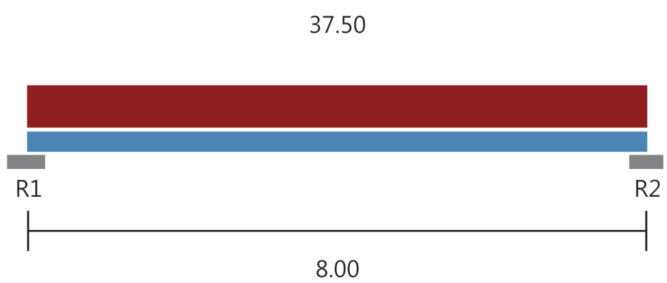
Bending and Shear (Unstiffened):	4.1% Stressed @R1
Bending and Shear (Stiffened):	NA
Web Stiffeners Required?:	No

Section : 600T150-54 (50 ksi) Single Track
Maxo = 1519.8 Ft-Lb **Va =** 2728.3 lb **I =** 2.40 in^4

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	**Mmax Ft-Lb**	**Mmax/ Maxo**	**Mpos Ft-Lb**	**Bracing (in)**	**Ma(Brc) Ft-Lb**	**Mpos/ Ma(Brc)**	**Deflection (in)**	**Deflection Ratio**
Span	168.8	0.111	168.8	Full	1519.8	0.111	0.011	L/6661



Reactions

Support	Reactions (lb)
R1	150.00
R2	150.00

Shear and Web Crippling Checks

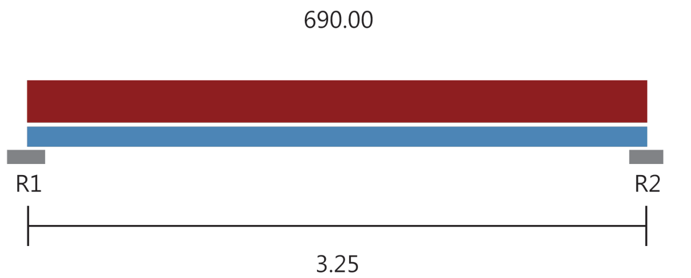
Bending and Shear (Unstiffened):	5.5% Stressed @R1
Bending and Shear (Stiffened):	NA
Web Stiffeners Required?:	No

Section : 600T150-54 (50 ksi) Single Track
Maxo = 1519.8 Ft-Lb **Va =** 2728.3 lb **I =** 2.40 in^4

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	300.0	0.197	300.0	Full	1519.8	0.197	0.034	L/2810



Reactions

Support	Reactions (lb)
R1	1121.25
R2	1121.25

Shear and Web Crippling Checks

Bending and Shear (Unstiffened):	39.6% Stressed @R1
Bending and Shear (Stiffened):	NA
Web Stiffeners Required?:	No

Section : (2) 600S250-43 (33 ksi) Back-To-Back C Stud
Maxo = 3023.2 Ft-Lb **Va =** 2831.3 lb **I =** 6.16 in^4

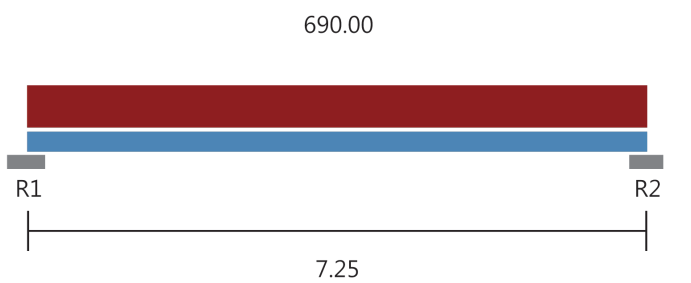
Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	911.0	0.301	911.0	Full	3023.2	0.301	0.007	L/5850

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	39.0	2701.4	0.337



Reactions

Support	Reactions (lb)
R1	2501.25
R2	2501.25

Shear and Web Crippling Checks

Bending and Shear (Unstiffened): 44.3% Stressed @R2

Bending and Shear (Stiffened): NA

Web Stiffeners Required?: No

Section : (2) 600S250-54 (50 ksi) Back-To-Back C Stud
Maxo = 5333.4 Ft-Lb **Va =** 5645.8 lb **I =** 7.53 in^4

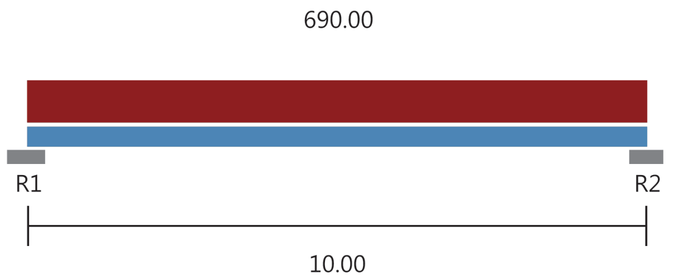
Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	4533.5	0.850	4533.5	Full	5333.4	0.850	0.135	L/644

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	87.0	4785.5	0.947



Reactions

Support	Reactions (lb)
R1	3450.00
R2	3450.00

Shear and Web Crippling Checks

Bending and Shear (Unstiffened):	40.9% Stressed @R2
Bending and Shear (Stiffened):	NA
Web Stiffeners Required?:	No

Section : (2) 800S250-68 (50 ksi) Back-To-Back C Stud
Maxo = 10275.0 **Va =** 8441.5 lb **I =** 18.48 in^4

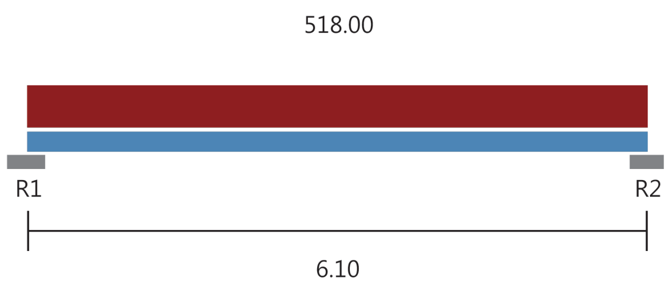
Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	8625.0	0.839	8625.0	Full	10275.0	0.839	0.199	L/602

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	120.0	8959.0	0.963



Reactions

Support	Reactions (lb)
R1	1579.90
R2	1579.90

Shear and Web Crippling Checks

Bending and Shear (Unstiffened):	28.0% Stressed @R1
Bending and Shear (Stiffened):	NA
Web Stiffeners Required?:	No

Section :	(2) 600S250-54 (50 ksi) Back-To-Back C Stud				
Maxo =	5333.4 Ft-Lb	**Va =**	5645.8 lb	**I =**	7.53 in^4

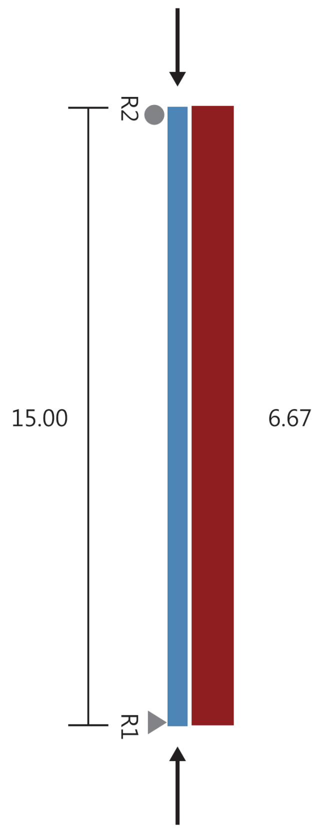
Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	2409.3	0.452	2409.3	Full	5333.4	0.452	0.051	L/1440

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	73.2	4785.5	0.503



Section :	(2) 600S162-43 (33 ksi) Back-To-Back C Stud		
Maxo = 2779.9 Ft-Lb	**Va =** 2831.3 lb	**I =** 4.63 in^4	

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Bridging Connectors - Design Method = AISI S100

Span/CantiLever	Simpson Strong-Tie Bridging Connector	Stress Ratio
Span	N/A	-

Shear and Web Crippling Checks

Bending and Shear (Unstiffened): 1.8% Stressed @R2

Bending and Shear (Stiffened): NA

Web Stiffeners Required?: No

Simpson Strong-Tie Connectors

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie Connector	Connector Interaction	Anchor Interaction
R1	50.03	3841	600T125-33 (33) & (1) .157" SST PDPA/PDPAT-62KP to steel (3/16" to 1/2" thickness)	6.10 %	22.72 %
R2	50.03	0	SCB45.5(2) & (2) #12 SST X to A36 Steel	8.20 %	6.29 %

* Reference catalog for connector and anchor requirement notes as well as screw placements requirement

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	187.6	0.067	187.6	Full	2779.9	0.067	0.039	L/4624

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	180.0	2410.3	0.078

Combined Bending and Axial Load Details

Span	Axial Ld (lb)	Bracing(in) KyLy	Bracing(in) KtLt	Max KL/r	K-phi (lb-in/in)	Lm Bracing (in)	Allow load(lb)	P/Pa	Intr. Value
Span	3841.0(c)	96.0	96.0	137	0.0	180.0	4355.7(c)	0.88	0.98

Member Interconnection Spacing = 12 in
See NASPEC D1.2 for additional interconnection requirements