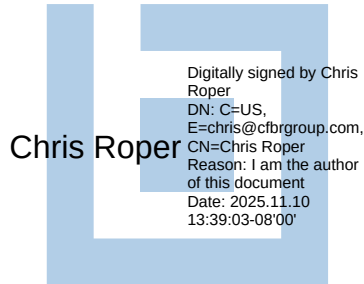
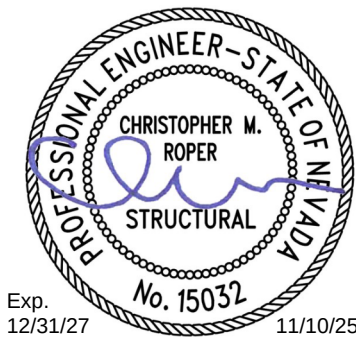


CFBR STRUCTURAL GROUP, LLC

STRUCTURAL CALCULATIONS

DCSD Jacks Valley ES RTUs
701 Jacks Valley Road
Carson City, NV 89705

CFBR #25_114



DESIGN CRITERIA

CODE

2024 IBC / ASCE 7-22

RISK CATEGORY

III

SNOW LOAD

Roof Snow Load, S **30** psf (Per Original Design)

WIND LOADS

Basic Wind Speed, V **130** mph
Exposure **C**

SEISMIC LOADS

Ss **2.32**
Site Class **CD**
Sds **1.61**
S1 **0.75**
Ip **1**
Seismic Design Category **D**

Note:

Per Original 1978 As-Built Drawings Depicts Original Framing Designed for 7500# Mech Unit for AC-1

New Unit Weight: **5900** lbs

Per Original 1978 As-Built Drawings Depicts Original Framing Designed for 7300# Mech Unit for AC-3

New Unit Weight: **6600** lbs

Per Original 1978 As-Built Drawings Depicts Original Framing Designed for 6300# Mech Unit for AC-5

New Unit Weight: **4950** lbs

Per Original 1978 As-Built Drawings Depicts Original Framing Designed for 7130# Mech Unit for AC-6

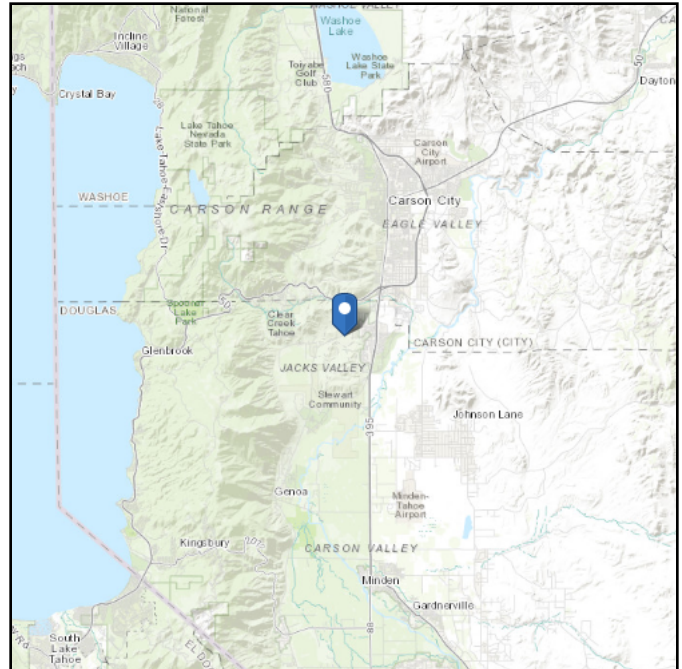
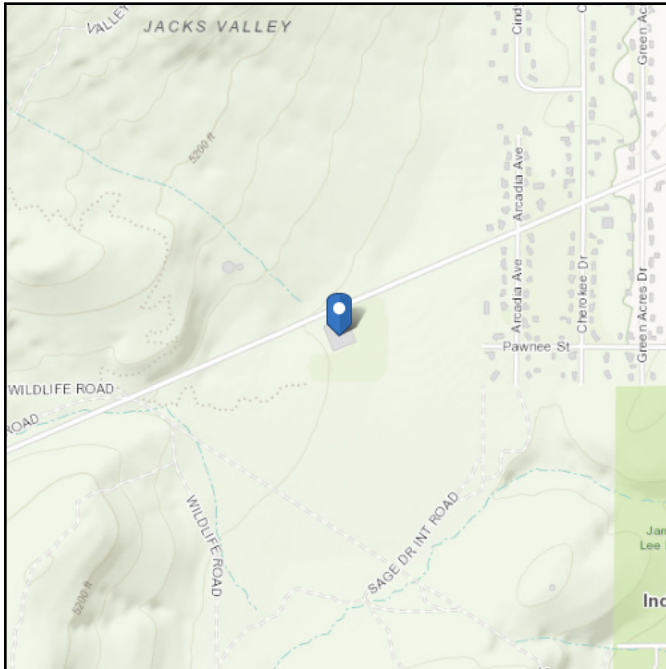
New Unit Weight: **5000** lbs

Address:
701 Jacks Valley Rd
Carson City, Nevada
89705

ASCE Hazards Report

Standard: ASCE/SEI 7-22
Risk Category: III
Soil Class: CD

Latitude: 39.093476
Longitude: -119.798128
Elevation: 4957.3260113968945 ft
(NAVD 88)

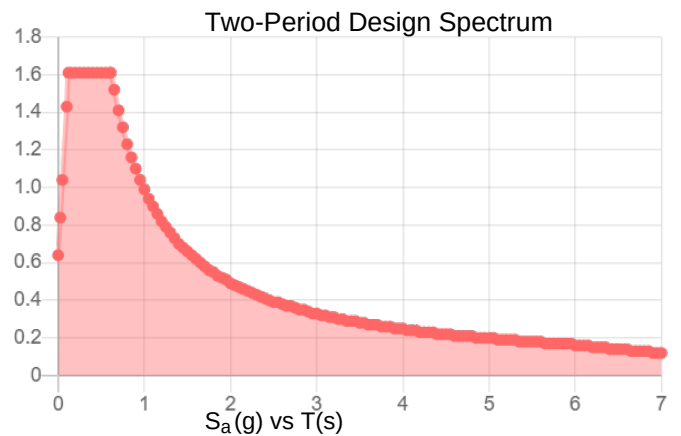
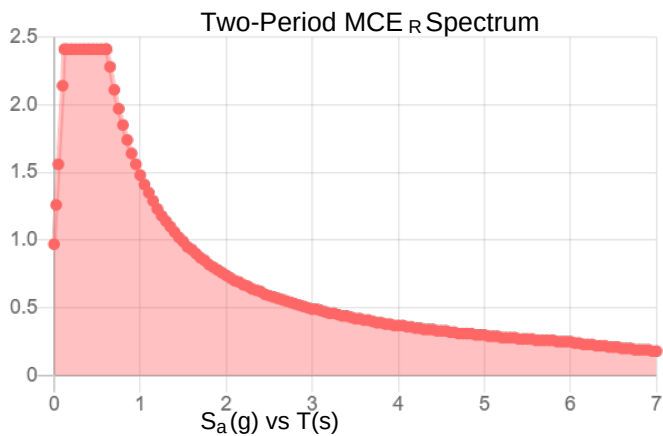
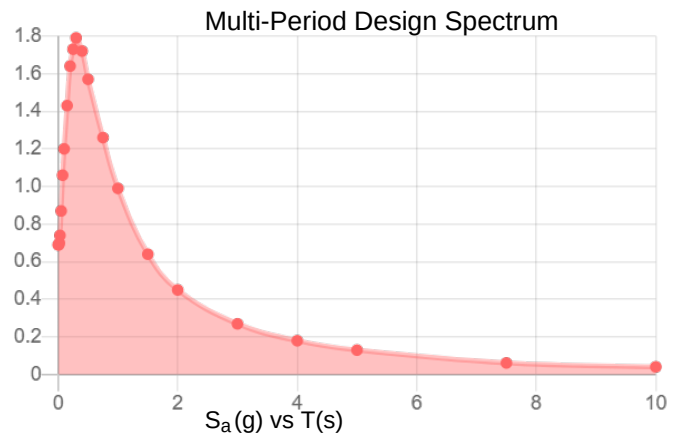
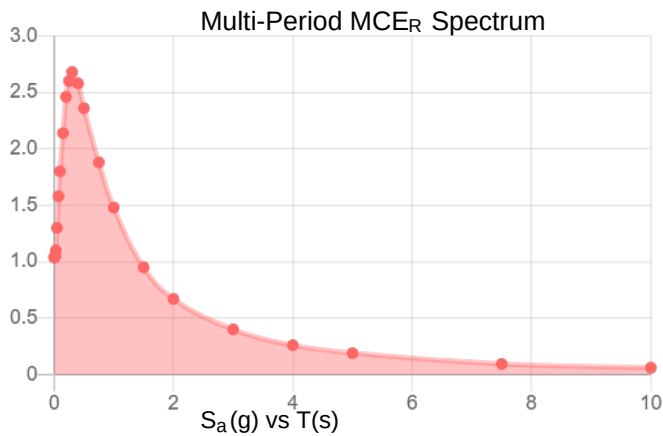


Site Soil Class: CD

Results:

PGA _M :	0.91	T _L :	6
S _{MS} :	2.41	S _S :	2.32
S _{M1} :	1.48	S ₁ :	0.75
S _{DS} :	1.61	V _{S30} :	365
S _{D1} :	0.99		

Seismic Design Category: D



MCE_R Vertical Response Spectrum
Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum
Vertical ground motion data has not yet been made available by USGS.

Data Accessed: Mon Sep 29 2025

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.

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EQUIPMENT

AC-1

W = **5900** lb
H unit = **6.4** ft
H base = **1.5** ft
H tot = **7.90** ft

Note: Center of seismic mass is assumed at mid-point of H unit
Assume base solid for wind? **y** y or n
H center of wind = **3.95** ft

Projected Width B1 (for wind) = **19.3** ft, long side 1 Af1 = 152 sf, long side 1 wind area
Base Anchor Spacing in B1 direction = **19.3** ft, short side to short side
Projected Width B2 (for wind) = **7.5** ft, short side 2 Af2 = 59 sf, short side 2 wind area
Base Anchor Spacing in B2 direction = **7.5** ft, long side to long side

WIND

Basic Wind Speed, V = **130** mph, per local requirements
Exposure = **C** per local requirements
Kz = **0.85** exposure coefficient
Kzt = **1** topographic factor
Kd = **0.85** directionality factor
Ke = **1** elevation factor
 $qz = 0.00256(Kz)(Kzt)(Ke)(V^2) = 36.8$ psf - LRFD
 $0.6 qz = 22.1$ psf - ASD
G = **1** gust factor
h/D = **1.1** max
Cf (or Cr) = **1.9** force coefficient

ASD Loading Normal to Long Side 1

F1=0.6(qz)(Kd)(GCr)(Af1) = 5433 lb
OTM1 = 21461 ft-lb
0.6MR1 = 13275 ft-lb
Max. Uplift @ B1 = -1091 lb

ASD Loading Normal to Short Side 2

F2=0.6(qz)(Kd)(GCr)(Af2) = 2111 lb
OTM2 = 8340 ft-lb
0.6MR2 = 34161 ft-lb
Max. Uplift @ B2 = 0 lb

LRFD Loading Normal to Long Side 1

F1=(qz)(Kd)(GCr)(Af1) = 9055 lb
OTM1 = 35768 ft-lb
0.9MR1 = 19913 ft-lb
Max. Uplift @ B1 = -2114 lb

LRFD Loading Normal to Short Side 2

F2=(qz)(Kd)(GCr)(Af2) = 3519 lb
OTM2 = 13900 ft-lb
0.9MR2 = 51242 ft-lb
Max. Uplift @ B2 = 0 lb

SEISMIC (NON-STRUCTURAL COMPONENT)

Sds = **1.61**
Ip = **1.00**
Car = **1**
Rpo = **1.5**
z = **20** ft, point of attachment ht.
h = **20** ft, roof ht.
Rμ = **1.3**
Fp = 0.4(Sds)(Ip)(Wp)(Hf/Rμ)(Car/Rpo) = 6820 lb
Fp min = 0.3(Sds)(Ip)(Wp) = 2850 lb
Fp max = 1.6(Sds)(Ip)(Wp) = 15198 lb
Fp final = 6820 lb

ASD Loading Normal to Long Side 1

F1 = 0.7Fp = 4774 lb
OTM1 = 22437 ft-lb
0.6MR1 = 13275 ft-lb
Max. Uplift @ B1 = -1222 lb

ASD Loading Normal to Short Side 2

F2 = 0.7Fp = 4774 lb
OTM2 = 22437 ft-lb
0.6MR2 = 34161 ft-lb
Max. Uplift @ B2 = 0 lb

LRFD Loading Normal to Long Side 1

F1 = Fp = 6820 lb
OTM1 = 32053 ft-lb
0.9MR1 = 19913 ft-lb
Max. Uplift @ B1 = -1619 lb

LRFD Loading Normal to Short Side 2

F2 = Fp = 6820 lb
OTM2 = 32053 ft-lb
0.9MR2 = 51242 ft-lb
Max. Uplift @ B2 = 0 lb

CONTROLLING LOADSASD Loading Normal to Long Side 1

F1 = **5433** lb, Wind
OTM1 = **22437** ft-lb, Seismic
Max. Uplift @ B1 = **-1222** lb, Seismic

ASD Loading Normal to Short Side 2

F2 = **4774** lb, Seismic
OTM2 = **22437** ft-lb, Seismic
Max. Uplift @ B2 = **0** lb, Seismic

LRFD Loading Normal to Long Side 1

F1 = **9055** lb, Wind
OTM1 = **35768** ft-lb, Wind
Max. Uplift @ B1 = **-2114** lb, Wind

LRFD Loading Normal to Short Side 2

F2 = **6820** lb, Seismic
OTM2 = **32053** ft-lb, Seismic
Max. Uplift @ B2 = **0** lb, Seismic

Use 1/4" Tekes @12" O.C. Max Around Perimeter, (6) Min. per Side

EQUIPMENT

AC-3
W = 6600 lb
H unit = 6.4 ft
H base = 1.5 ft
H tot = 7.90 ft

Note: Center of seismic mass is assumed at mid-point of H unit
Assume base solid for wind? y y or n
H center of wind = 3.95 ft

Projected Width B1 (for wind) = 19.3 ft, long side 1 Af1 = 152 sf, long side 1 wind area
Base Anchor Spacing in B1 direction = 19.3 ft, short side to short side
Projected Width B2 (for wind) = 7.5 ft, short side 2 Af2 = 59 sf, short side 2 wind area
Base Anchor Spacing in B2 direction = 7.5 ft, long side to long side

WIND

Basic Wind Speed, V = 130 mph, per local requirements
Exposure = C per local requirements
Kz = 0.85 exposure coefficient
Kzt = 1 topographic factor
Kd = 0.85 directionality factor
Ke = 1 elevation factor
 $qz = 0.00256(Kz)(Kzt)(Ke)(V^2) = 36.8$ psf - LRFD
 $0.6 qz = 22.1$ psf - ASD
G = 1 gust factor
h/D = 1.1 max
Cf (or Cr) = 1.9 force coefficient

ASD Loading Normal to Long Side 1

F1=0.6(qz)(Kd)(GCr)(Af1) = 5433 lb
OTM1 = 21461 ft-lb
0.6MR1 = 14850 ft-lb
Max. Uplift @ B1 = -881 lb

ASD Loading Normal to Short Side 2

F2=0.6(qz)(Kd)(GCr)(Af2) = 2111 lb
OTM2 = 8340 ft-lb
0.6MR2 = 38214 ft-lb
Max. Uplift @ B2 = 0 lb

LRFD Loading Normal to Long Side 1

F1=(qz)(Kd)(GCr)(Af1) = 9055 lb
OTM1 = 35768 ft-lb
0.9MR1 = 22275 ft-lb
Max. Uplift @ B1 = -1799 lb

LRFD Loading Normal to Short Side 2

F2=(qz)(Kd)(GCr)(Af2) = 3519 lb
OTM2 = 13900 ft-lb
0.9MR2 = 57321 ft-lb
Max. Uplift @ B2 = 0 lb

SEISMIC (NON-STRUCTURAL COMPONENT)

Sds = 1.61
Ip = 1.00
Car = 1
Rpo = 1.5
z = 20 ft, point of attachment ht.
h = 20 ft, roof ht.
Rμ = 1.3

Fp = 0.4(Sds)(Ip)(Wp)(Hf/Rμ)(Car/Rpo) = 7629 lb
Fp min = 0.3(Sds)(Ip)(Wp) = 3188 lb
Fp max = 1.6(Sds)(Ip)(Wp) = 17002 lb
Fp final = 7629 lb

ASD Loading Normal to Long Side 1

F1 = 0.7Fp = 5340 lb
OTM1 = 25099 ft-lb
0.6MR1 = 14850 ft-lb
Max. Uplift @ B1 = -1367 lb

ASD Loading Normal to Short Side 2

F2 = 0.7Fp = 5340 lb
OTM2 = 25099 ft-lb
0.6MR2 = 38214 ft-lb
Max. Uplift @ B2 = 0 lb

LRFD Loading Normal to Long Side 1

F1 = Fp = 7629 lb
OTM1 = 35856 ft-lb
0.9MR1 = 22275 ft-lb
Max. Uplift @ B1 = -1811 lb

LRFD Loading Normal to Short Side 2

F2 = Fp = 7629 lb
OTM2 = 35856 ft-lb
0.9MR2 = 57321 ft-lb
Max. Uplift @ B2 = 0 lb

CONTROLLING LOADSASD Loading Normal to Long Side 1

F1 = 5433 lb, Wind
OTM1 = 25099 ft-lb, Seismic
Max. Uplift @ B1 = -1367 lb, Seismic

ASD Loading Normal to Short Side 2

F2 = 5340 lb, Seismic
OTM2 = 25099 ft-lb, Seismic
Max. Uplift @ B2 = 0 lb, Seismic

LRFD Loading Normal to Long Side 1

F1 = 9055 lb, Wind
OTM1 = 35856 ft-lb, Seismic
Max. Uplift @ B1 = -1811 lb, Seismic

LRFD Loading Normal to Short Side 2

F2 = 7629 lb, Seismic
OTM2 = 35856 ft-lb, Seismic
Max. Uplift @ B2 = 0 lb, Seismic

Use 1/4" Tekes @12" O.C. Max Around Perimeter, (6) Min. per Side

EQUIPMENT

AC-5

W = **4950** lb
H unit = **5.83** ft
H base = **1.5** ft
H tot = **7.33** ft

Note: Center of seismic mass is assumed at mid-point of H unit
Assume base solid for wind? **y** y or n
H center of wind = **3.67** ft

Projected Width B1 (for wind) = **14.92** ft, long side 1 Af1 = 109 sf, long side 1 wind area
Base Anchor Spacing in B1 direction = **14.92** ft, short side to short side
Projected Width B2 (for wind) = **7.5** ft, short side 2 Af2 = 55 sf, short side 2 wind area
Base Anchor Spacing in B2 direction = **7.5** ft, long side to long side

WIND

Basic Wind Speed, V = **130** mph, per local requirements
Exposure = **C** per local requirements
Kz = **0.85** exposure coefficient
Kzt = **1** topographic factor
Kd = **0.85** directionality factor
Ke = **1** elevation factor
 $qz = 0.00256(Kz)(Kzt)(Ke)(V^2) = 36.8$ psf - LRFD
 $0.6 qz = 22.1$ psf - ASD
G = **1** gust factor
h/D = **1.0** max
Cf (or Cr) = **1.9** force coefficient

ASD Loading Normal to Long Side 1

F1=0.6(qz)(Kd)(GCr)(Af1) = 3897 lb
OTM1 = 14283 ft-lb
0.6MR1 = 11138 ft-lb
Max. Uplift @ B1 = -419 lb

ASD Loading Normal to Short Side 2

F2=0.6(qz)(Kd)(GCr)(Af2) = 1959 lb
OTM2 = 7180 ft-lb
0.6MR2 = 22156 ft-lb
Max. Uplift @ B2 = 0 lb

LRFD Loading Normal to Long Side 1

F1=(qz)(Kd)(GCr)(Af1) = 6495 lb
OTM1 = 23805 ft-lb
0.9MR1 = 16706 ft-lb
Max. Uplift @ B1 = -946 lb

LRFD Loading Normal to Short Side 2

F2=(qz)(Kd)(GCr)(Af2) = 3265 lb
OTM2 = 11966 ft-lb
0.9MR2 = 33234 ft-lb
Max. Uplift @ B2 = 0 lb

SEISMIC (NON-STRUCTURAL COMPONENT)

Sds = **1.61**
Ip = **1.00**
Car = **1**
Rpo = **1.5**
z = **20** ft, point of attachment ht.
h = **20** ft, roof ht.
Rμ = **1.3**
 $Fp = 0.4(Sds)(Ip)(Wp)(Hf/Rμ)(Car/Rpo) = 5722$ lb
 $Fp \text{ min} = 0.3(Sds)(Ip)(Wp) = 2391$ lb
 $Fp \text{ max} = 1.6(Sds)(Ip)(Wp) = 12751$ lb
 $Fp \text{ final} = 5722$ lb

ASD Loading Normal to Long Side 1

F1 = 0.7Fp = 4005 lb
OTM1 = 17683 ft-lb
0.6MR1 = 11138 ft-lb
Max. Uplift @ B1 = -873 lb

ASD Loading Normal to Short Side 2

F2 = 0.7Fp = 4005 lb
OTM2 = 17683 ft-lb
0.6MR2 = 22156 ft-lb
Max. Uplift @ B2 = 0 lb

LRFD Loading Normal to Long Side 1

F1 = Fp = 5722 lb
OTM1 = 25261 ft-lb
0.9MR1 = 16706 ft-lb
Max. Uplift @ B1 = -1141 lb

LRFD Loading Normal to Short Side 2

F2 = Fp = 5722 lb
OTM2 = 25261 ft-lb
0.9MR2 = 33234 ft-lb
Max. Uplift @ B2 = 0 lb

CONTROLLING LOADSASD Loading Normal to Long Side 1

F1 = **4005** lb, Seismic
OTM1 = **17683** ft-lb, Seismic
Max. Uplift @ B1 = **-873** lb, Seismic

ASD Loading Normal to Short Side 2

F2 = **4005** lb, Seismic
OTM2 = **17683** ft-lb, Seismic
Max. Uplift @ B2 = **0** lb, Seismic

LRFD Loading Normal to Long Side 1

F1 = **6495** lb, Wind
OTM1 = **25261** ft-lb, Seismic
Max. Uplift @ B1 = **-1141** lb, Seismic

LRFD Loading Normal to Short Side 2

F2 = **5722** lb, Seismic
OTM2 = **25261** ft-lb, Seismic
Max. Uplift @ B2 = **0** lb, Seismic

Use 1/4" Tekes @12" O.C. Max Around Perimeter, (6) Min. per Side

EQUIPMENT

AC-6
W = 5000 lb
H unit = 6.4 ft
H base = 1.5 ft
H tot = 7.90 ft

Note: Center of seismic mass is assumed at mid-point of H unit
Assume base solid for wind? y y or n
H center of wind = 3.95 ft

Projected Width B1 (for wind) = 19.3 ft, long side 1 Af1 = 152 sf, long side 1 wind area
Base Anchor Spacing in B1 direction = 19.3 ft, short side to short side
Projected Width B2 (for wind) = 7.5 ft, short side 2 Af2 = 59 sf, short side 2 wind area
Base Anchor Spacing in B2 direction = 7.5 ft, long side to long side

WIND

Basic Wind Speed, V = 130 mph, per local requirements
Exposure = C per local requirements
Kz = 0.85 exposure coefficient
Kzt = 1 topographic factor
Kd = 0.85 directionality factor
Ke = 1 elevation factor
 $qz = 0.00256(Kz)(Kzt)(Ke)(V^2) = 36.8$ psf - LRFD
 $0.6 qz = 22.1$ psf - ASD
G = 1 gust factor
h/D = 1.1 max
Cf (or Cr) = 1.9 force coefficient

ASD Loading Normal to Long Side 1

F1=0.6(qz)(Kd)(GCr)(Af1) = 5433 lb
OTM1 = 21461 ft-lb
0.6MR1 = 11250 ft-lb
Max. Uplift @ B1 = -1361 lb

ASD Loading Normal to Short Side 2

F2=0.6(qz)(Kd)(GCr)(Af2) = 2111 lb
OTM2 = 8340 ft-lb
0.6MR2 = 28950 ft-lb
Max. Uplift @ B2 = 0 lb

LRFD Loading Normal to Long Side 1

F1=(qz)(Kd)(GCr)(Af1) = 9055 lb
OTM1 = 35768 ft-lb
0.9MR1 = 16875 ft-lb
Max. Uplift @ B1 = -2519 lb

LRFD Loading Normal to Short Side 2

F2=(qz)(Kd)(GCr)(Af2) = 3519 lb
OTM2 = 13900 ft-lb
0.9MR2 = 43425 ft-lb
Max. Uplift @ B2 = 0 lb

SEISMIC (NON-STRUCTURAL COMPONENT)

Sds = 1.61
Ip = 1.00
Car = 1
Rpo = 1.5
z = 20 ft, point of attachment ht.
h = 20 ft, roof ht.
Rμ = 1.3

Fp = 0.4(Sds)(Ip)(Wp)(Hf/Rμ)(Car/Rpo) = 5779 lb
Fp min = 0.3(Sds)(Ip)(Wp) = 2415 lb
Fp max = 1.6(Sds)(Ip)(Wp) = 12880 lb
Fp final = 5779 lb

ASD Loading Normal to Long Side 1

F1 = 0.7Fp = 4046 lb
OTM1 = 19015 ft-lb
0.6MR1 = 11250 ft-lb
Max. Uplift @ B1 = -1035 lb

ASD Loading Normal to Short Side 2

F2 = 0.7Fp = 4046 lb
OTM2 = 19015 ft-lb
0.6MR2 = 28950 ft-lb
Max. Uplift @ B2 = 0 lb

LRFD Loading Normal to Long Side 1

F1 = Fp = 5779 lb
OTM1 = 27164 ft-lb
0.9MR1 = 16875 ft-lb
Max. Uplift @ B1 = -1372 lb

LRFD Loading Normal to Short Side 2

F2 = Fp = 5779 lb
OTM2 = 27164 ft-lb
0.9MR2 = 43425 ft-lb
Max. Uplift @ B2 = 0 lb

CONTROLLING LOADSASD Loading Normal to Long Side 1

F1 = 5433 lb, Wind
OTM1 = 21461 ft-lb, Wind
Max. Uplift @ B1 = -1361 lb, Wind

ASD Loading Normal to Short Side 2

F2 = 4046 lb, Seismic
OTM2 = 19015 ft-lb, Seismic
Max. Uplift @ B2 = 0 lb, Seismic

LRFD Loading Normal to Long Side 1

F1 = 9055 lb, Wind
OTM1 = 35768 ft-lb, Wind
Max. Uplift @ B1 = -2519 lb, Wind

LRFD Loading Normal to Short Side 2

F2 = 5779 lb, Seismic
OTM2 = 27164 ft-lb, Seismic
Max. Uplift @ B2 = 0 lb, Seismic

Use 1/4" Tekes @12" O.C. Max Around Perimeter, (6) Min. per Side

CFBR STRUCTURAL GROUP, LLC

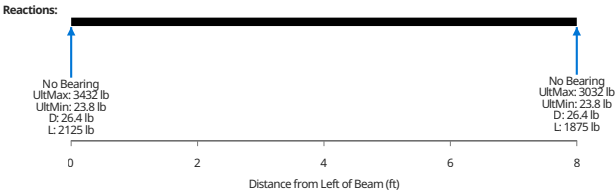
Client:	Author: Zack Grow	Date: Oct 20, 2025
Project: DCSD Jacks Valley ES RTU's copy		Job #: 25_114
Address: 701 Jacks Valley Road, Carson City, NV, USA		Subject: Member Schedule

	Calculation	Member	Quantity	Comments
50%	Typ. Angle Brace	L4X4X1/4	8 ft	

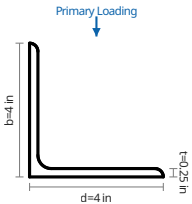
CFBR STRUCTURAL GROUP, LLC	Client:	Author: Zack Grow	Date: Oct 20, 2025
	Project: DCSD Jacks Valley ES RTU's copy		Job #: 25_114
	Address: 701 Jacks Valley Road, Carson City, NV, USA		Subject: Typ. Angle Brace PASS
	References: AISC 360-16 (LRFD)		

Summary

50%	Moment Capacity	$\phi M_n = 3037 \text{ lb} \cdot \text{ft}$
16%	Shear Capacity	$\phi V_n = 19\,440 \text{ lb}$
30%	Critical Deflection	$\delta_{gov} = -0.0811 \text{ in}$
	Critical Deflection Ratio	$L/ = 1184$
	Dead Load Deflection	$\delta_D = -0.00699 \text{ in}$

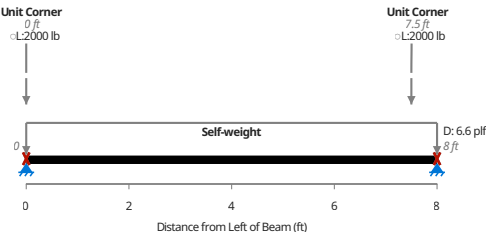


Key Properties



Designation	L4X4X1/4
Yield Strength	$F_y = 36\,000 \text{ psi}$
Beam Plan Length	$L_X = 8 \text{ ft}$
Continuous Bracing for Lateral Torsional Buckling	Top flange

Loads



Enable Automatic Live Load Patterning? (BETA)	No
---	----

Design Criteria

Design Code for Load Combinations	International Building Code (IBC) 2024
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Member Properties

Gross Area	$A_g = 1.93 \text{ in}^2$
Moment of Inertia	$I = 3 \text{ in}^4$

Section Classification (AISC 360-16 B4)

Section Classification - Long Leg	Non-Compact
Section Classification - Short Leg	Non-Compact

Section Flexural Capacity (AISC 360-16, Chapter F)

Nominal Cross-Section Bending Resistance - Positive Bending	$M_{sxn}^+ = 3374 \text{ lb} \cdot \text{ft}$
Nominal Cross-Section Bending Resistance - Negative Bending	$M_{sxn}^- = 3374 \text{ lb} \cdot \text{ft}$

Flexural Capacity - Positive Bending (AISC 360-16, Chapter F)

Lateral-Torsional Buckling Governs? - Positive Bending	$LTB_{flag}^+ = \text{No}$
--	----------------------------

Flexural Capacity - Negative Bending (AISC 360-16, Chapter F)

Lateral-Torsional Buckling Governs? - Negative Bending	$LTB_{flag}^- = \text{No}$
--	----------------------------

Shear Capacity (AISC 360-16, Chapter G)

Shear Slenderness	$h/t_w = 16$
Shear Buckling Coefficient	$C_{v2} = 1$
Nominal Shear Capacity	$V_n = 21\,600 \text{ lb}$

Comments