Architect

WANNEMACHER JENSEN ARCHITECTS
815 NORTHWEST 57 AVE. SUITE 219
MIAMI, FLORIDA 33126
727-822-5566
WJARC.COM AA0002277

MECHANICAL, PLUMBING, & ELECTRICAL ENGINEERING:

Project

GARY MATZNER PARK

CLIENT

VILLAGE OF PINECREST
PINECREST PARKS & RECREATION

Structural Engineer

DONNEL DUQUESNE & ALBAISA, P.E.
4930 SW 74th COURT
MIAMI, FL 33155
Date: June-23-2022
Project. No. 2210-B

Seal:

Aida M Albaisa

Digitally signed by Aida M Albaisa
DN: CN=Aida M Albaisa, email=AIDA@DDAENGINEERS.COM, C=US, O=DDA Engineers PA
Reason: I am approving this document
Date: 2024.11.20 13:49:16-05'00'

AIDA M. ALBAISA
P.E. 45130

Title

STRUCTURAL CALCULATIONS

PERMIT SET

GARY MATZNER PARK

DDA
ENGINEERS, P.A.
4930 Southwest 74th Court
Miami, FL 33155
v. 305.666.0711
f. 305.666.5259
www.ddaeng.com

CLIENT

VILLAGE OF PINECREST

PINECREST PARKS & RECREATION

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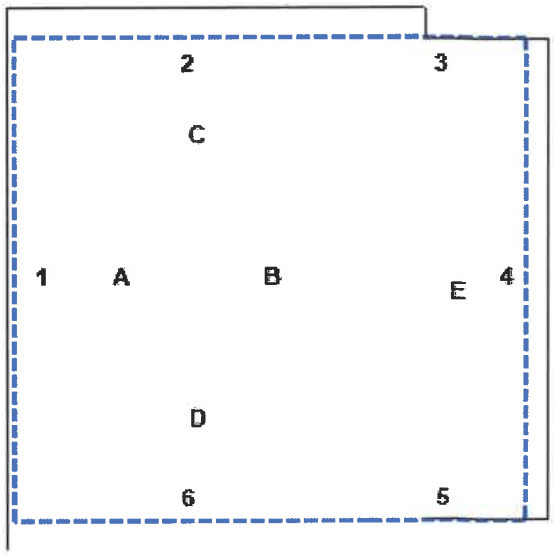
GARY MATZNER PARK

Title

September 19, 2024

Prepared By: yr



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Site Information

Wind Dir.	Exposure
1	C
2	C
3	C
4	C

Basic Wind Speed: 175 mph
Topography: Flat

Optional Factors

This project uses load combinations from ASCE 7.

Structure Information

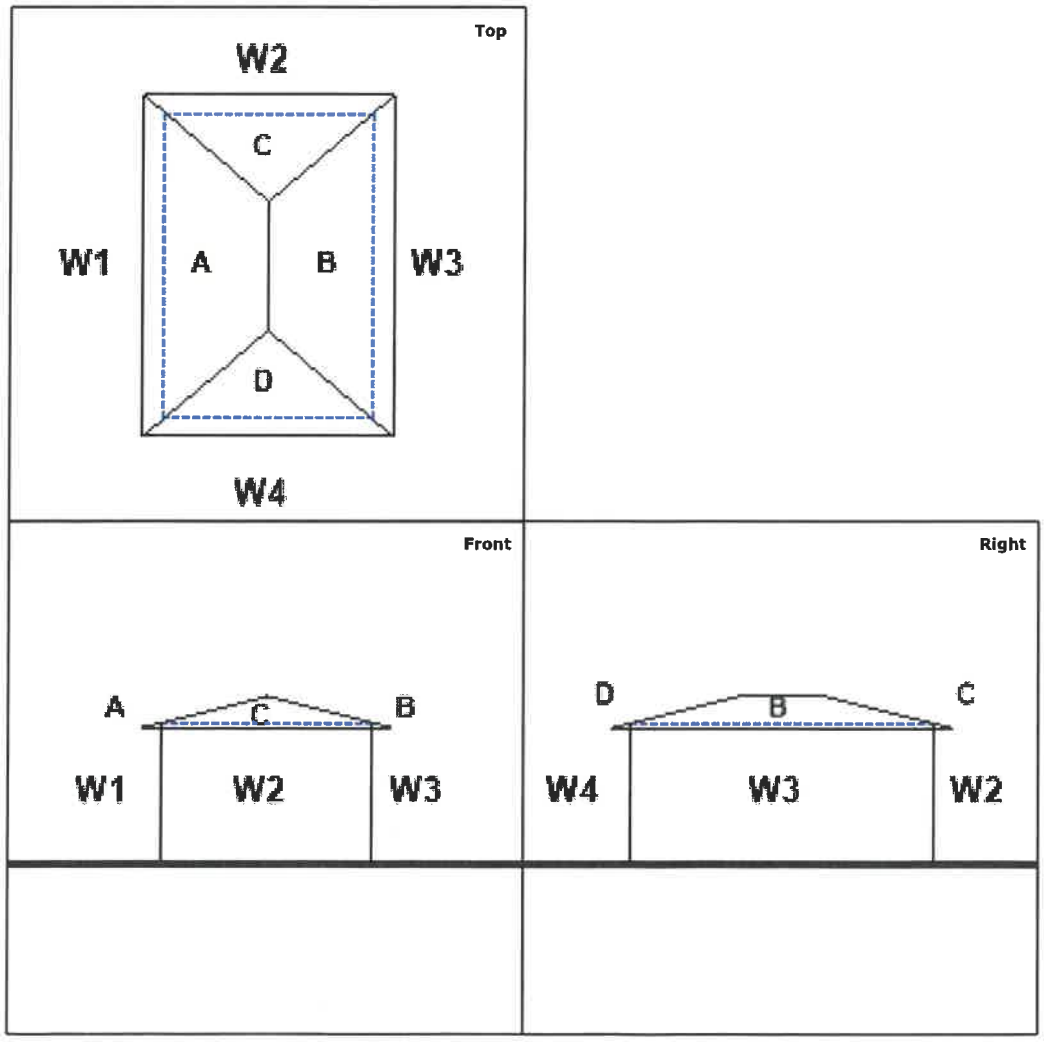
Structure Type: Building
Structure Category: II
Enclosure Classification: Enclosed

Main Section

Wall	Length (ft)	Overhang (ft)
1	40.0	2.50
2	28.0	2.50
3	40.0	2.50
4	28.0	2.50

Eave Height: 18.5 ft
Parapet Height: 0.00 ft
Parapet Enclosure: Solid
Roof Shape: Hipped

Roof	Slope (X:12)
A & B	3.00
C & D	3.00



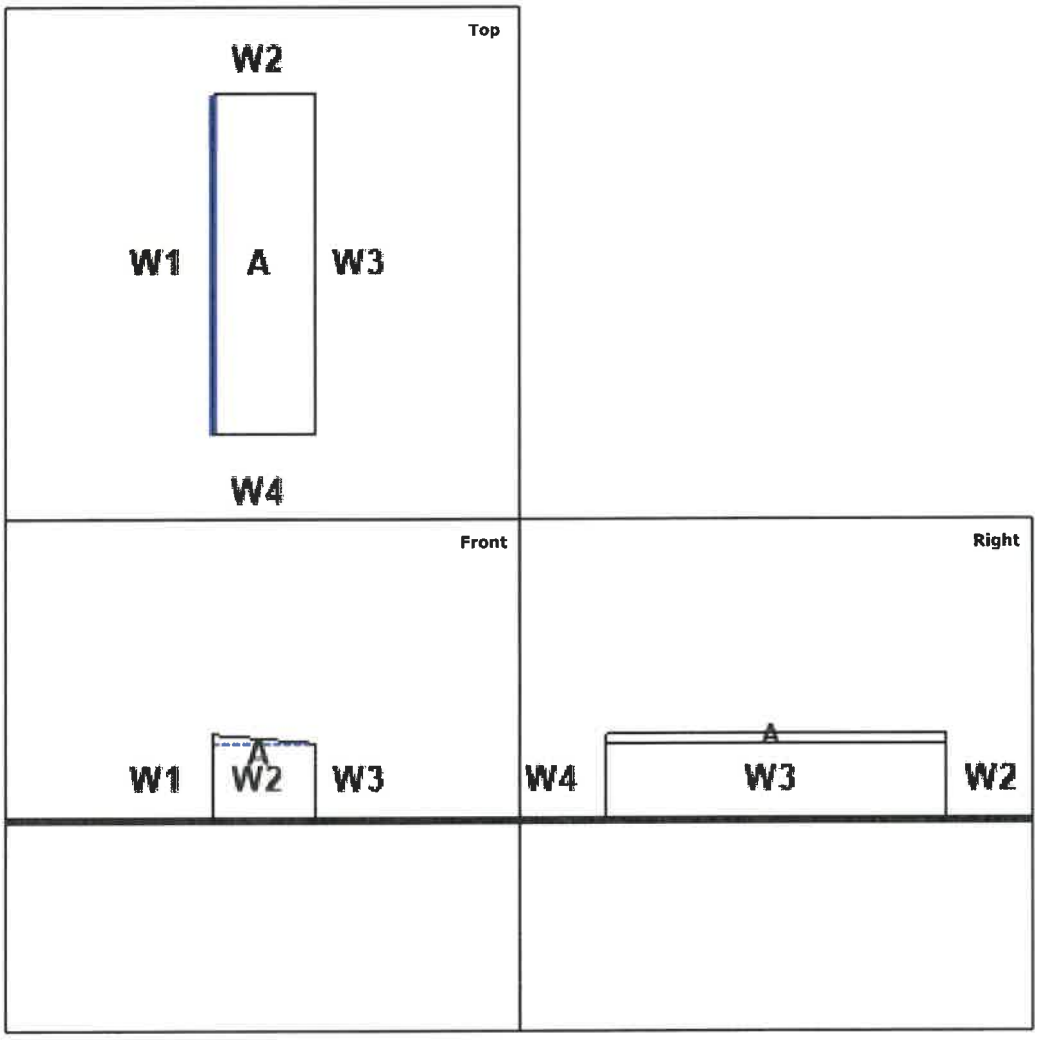
Section 1

Connected to:	Main Section
Connected to Wall:	W3
Position on W3:	0.00 ft

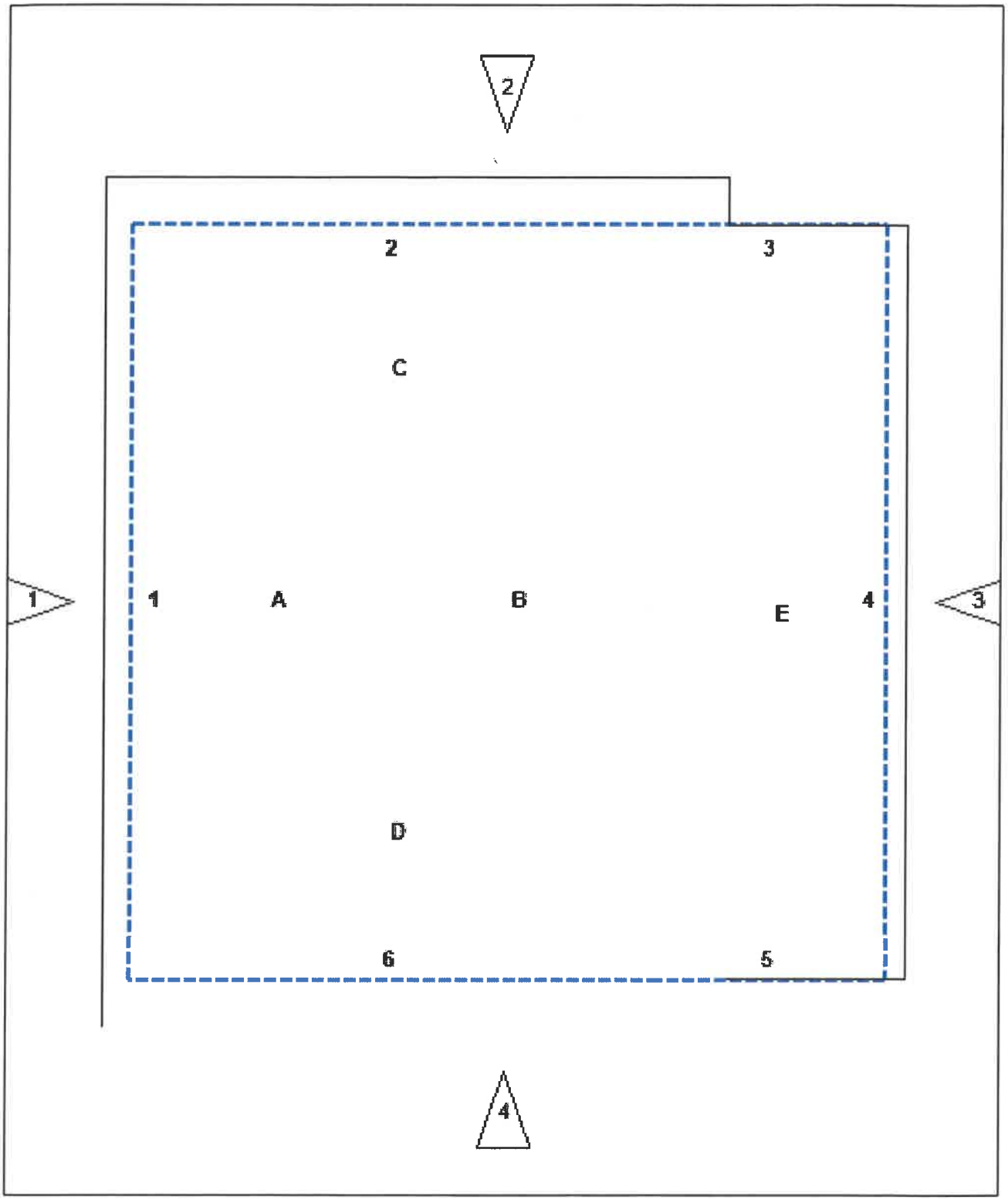
Wall	Length (ft)	Overhang (ft)
1	40.0	0.00
2	12.0	0.00
3	40.0	0.00
4	12.0	0.00

Eave Height:	9.00 ft
Parapet Height:	0.00 ft
Parapet Enclosure:	Partially Enclosed
Roof Shape:	Monoslope

Roof	Slope (X:12)
A	1.00



Composite Drawing



ASCE 7-22 Wind Load Report

Main Wind Force Resisting System - Wind Direction 1

September 19, 2024

This data was calculated using the building of all heights method.

#	Surface	z (ft)	q (psf)	G	Cp	GCpi	Ext Pres (psf)	Net w/ +GCpi (psf)	Net w/ -GCpi (psf)
1	Windward	9.00	66.7	0.883	0.800	0.180	40.0	29.2	50.9
		10.00	66.7				40.0	29.2	50.9
		15.0	66.7				40.0	29.2	50.9
		18.5	69.6				41.8	30.9	52.6
	Overhang Top	20.3	70.9		-0.180		-9.57		
		20.3	70.9		-0.742		-39.5		
	Overhang Bot	18.5	69.6		0.800		41.8		
2	Side	20.3	70.9	0.883	-0.700	0.180	-37.2	-48.1	-26.4
3	Side	20.3	70.9	0.883	-0.700	0.180	-37.2	-48.1	-26.4
4	Leeward	20.3	70.9	0.883	-0.500	0.180	-26.6	-37.4	-15.7
5	Side	20.3	70.9	0.883	-0.700	0.180	-37.2	-48.1	-26.4
6	Side	20.3	70.9	0.883	-0.700	0.180	-37.2	-48.1	-26.4
A	Windward Roof	20.3	70.9	0.883	-0.180	0.180	-9.57	-20.4	1.27
		20.3	70.9		-0.865		-46.0	-56.9	-35.2
B	Leeward Roof	20.3	70.9	0.883	-0.553	0.180	-29.4	-40.3	-18.6
C&D	Roof	0.00 - 10.1*	70.9	0.883	-1.01	0.180	-53.6	-64.4	-42.7
		10.1 - 20.3*	70.9		-0.811		-43.1	-54.0	-32.3
		20.3 - 28.0*	70.9		-0.589		-31.3	-42.2	-20.5
		0.00 - 28.0*	70.9		-0.180		-9.57	-20.4	1.27
E	Roof	0.00 - 10.1*	70.9	0.883	-1.14	0.180	-60.8	-71.6	-50.0
		10.1 - 12.0*	70.9		-0.700		-37.2	-48.1	-26.4
		0.00 - 12.0*	70.9		-0.180		-9.57	-20.4	1.27

This is load case 1 in ASCE 7-22 Figure 27.3-8. See Figure 27.3-8 for other cases.

* Distance from windward edge.

69 PSF

ASCE 7-22 Wind Load Report

Main Wind Force Resisting System - Wind Direction 2

September 19, 2024

This data was calculated using the building of all heights method.

#	Surface	z (ft)	q (psf)	G	Cp	GCpi	Ext Pres (psf)	Net w/ +GCpi (psf)	Net w/ -GCpi (psf)
1	Side	20.3	70.9	0.883	-0.700	0.180	-37.2	-48.1	-26.4
2	Windward	9.00	66.7	0.883	0.800	0.180	40.0	29.2	50.9
		10.00	66.7				40.0	29.2	50.9
		15.0	66.7				40.0	29.2	50.9
		20.0	70.7				42.4	31.6	53.3
		20.3	70.9				42.6	31.7	53.4
		22.0	72.1				43.3	32.4	54.1
	Overhang Top	20.3	70.9		-0.180		-9.57		
		20.3	70.9		-0.742		-39.5		
	Overhang Bot	18.5	69.6		0.800		41.8		
3	Windward	9.00	66.7	0.883	0.800	0.180	40.0	29.2	50.9
		10.00	66.7				40.0	29.2	50.9
4	Side	20.3	70.9	0.883	-0.700	0.180	-37.2	-48.1	-26.4
5	Leeward	20.3	70.9	0.883	-0.500	0.180	-26.6	-37.4	-15.7
6	Leeward	20.3	70.9	0.883	-0.500	0.180	-26.6	-37.4	-15.7
A&B	Roof	0.00 - 10.1*	70.9	0.883	-0.903	0.180	-48.0	-58.9	-37.2
		10.1 - 20.3*	70.9		-0.898		-47.7	-58.6	-36.9
		20.3 - 40.0*	70.9		-0.502		-26.7	-37.6	-15.9
		0.00 - 40.0*	70.9		-0.180		-9.57	-20.4	1.27
C	Windward Roof	20.3	70.9	0.883	-0.180	0.180	-9.57	-20.4	1.27
		20.3	70.9		-0.742		-39.5	-50.3	-28.6
D	Leeward Roof	20.3	70.9	0.883	-0.501	0.180	-26.7	-37.5	-15.8
E	Roof	0.00 - 10.1*	70.9	0.883	-0.905	0.180	-48.1	-59.0	-37.3
		10.1 - 20.3*	70.9		-0.898		-47.7	-58.6	-36.9
		20.3 - 40.0*	70.9		-0.502		-26.7	-37.6	-15.9
		0.00 - 40.0*	70.9		-0.180		-9.57	-20.4	1.27

This is load case 1 in ASCE 7-22 Figure 27.3-8. See Figure 27.3-8 for other cases.

* Distance from windward edge.

ASCE 7-22 Wind Load Report

Main Wind Force Resisting System - Wind Direction 3

September 19, 2024

This data was calculated using the building of all heights method.

#	Surface	z (ft)	q (psf)	G	Cp	GCpi	Ext Pres (psf)	Net w/ +GCpi (psf)	Net w/ -GCpi (psf)
1	Leeward	20.3	70.9	0.883	-0.500	0.180	-26.6	-37.4	-15.7
2	Side	20.3	70.9	0.883	-0.700	0.180	-37.2	-48.1	-26.4
3	Side	20.3	70.9	0.883	-0.700	0.180	-37.2	-48.1	-26.4
4	Windward	9.00	66.7	0.883	0.800	0.180	40.0	29.2	50.9
5	Side	20.3	70.9	0.883	-0.700	0.180	-37.2	-48.1	-26.4
6	Side	20.3	70.9	0.883	-0.700	0.180	-37.2	-48.1	-26.4
A	Leeward Roof	20.3	70.9	0.883	-0.553	0.180	-29.4	-40.3	-18.6
B	Windward Roof	20.3	70.9	0.883	-0.180	0.180	-9.57	-20.4	1.27
		20.3	70.9		-0.865		-46.0	-56.9	-35.2
C&D	Roof	0.00 - 10.1*	70.9	0.883	-1.01	0.180	-53.6	-64.4	-42.7
		10.1 - 20.3*	70.9		-0.811		-43.1	-54.0	-32.3
		20.3 - 28.0*	70.9		-0.589		-31.3	-42.2	-20.5
		0.00 - 28.0*	70.9		-0.180		-9.57	-20.4	1.27
E	Roof	0.00 - 10.1*	70.9	0.883	-1.14	0.180	-60.8	-71.6	-50.0
		10.1 - 12.0*	70.9		-0.700		-37.2	-48.1	-26.4
		0.00 - 12.0*	70.9		-0.180		-9.57	-20.4	1.27

This is load case 1 in ASCE 7-22 Figure 27.3-8. See Figure 27.3-8 for other cases.

* Distance from windward edge.

ASCE 7-22 Wind Load Report

Main Wind Force Resisting System - Wind Direction 4

September 19, 2024

This data was calculated using the building of all heights method.

#	Surface	z (ft)	q (psf)	G	Cp	GCpi	Ext Pres (psf)	Net w/ +GCpi (psf)	Net w/ -GCpi (psf)
1	Side	20.3	70.9	0.883	-0.700	0.180	-37.2	-48.1	-26.4
2	Leeward	20.3	70.9	0.883	-0.500	0.180	-26.6	-37.4	-15.7
3	Leeward	20.3	70.9	0.883	-0.500	0.180	-26.6	-37.4	-15.7
4	Side	20.3	70.9	0.883	-0.700	0.180	-37.2	-48.1	-26.4
5	Windward	9.00	66.7	0.883	0.800	0.180	40.0	29.2	50.9
		10.00	66.7				40.0	29.2	50.9
6	Windward	9.00	66.7	0.883	0.800	0.180	40.0	29.2	50.9
		10.00	66.7				40.0	29.2	50.9
		15.0	66.7				40.0	29.2	50.9
		20.0	70.7				42.4	31.6	53.3
		20.3	70.9				42.6	31.7	53.4
		22.0	72.1				43.3	32.4	54.1
A	Leeward Roof	20.3	70.9	0.883	-0.501	0.180	-26.7	-37.5	-15.8
B	Windward Roof	20.3	70.9	0.883	-0.180	0.180	-9.57	-20.4	1.27
		20.3	70.9		-0.742		-39.5	-50.3	-28.6
C&D	Roof	0.00 - 10.1*	70.9	0.883	-0.903	0.180	-48.0	-58.9	-37.2
		10.1 - 20.3*	70.9		-0.898		-47.7	-58.6	-36.9
		20.3 - 40.0*	70.9		-0.502		-26.7	-37.6	-15.9
		0.00 - 40.0*	70.9		-0.180		-9.57	-20.4	1.27
E	Roof	0.00 - 10.1*	70.9	0.883	-0.905	0.180	-48.1	-59.0	-37.3
		10.1 - 20.3*	70.9		-0.898		-47.7	-58.6	-36.9
		20.3 - 40.0*	70.9		-0.502		-26.7	-37.6	-15.9
		0.00 - 40.0*	70.9		-0.180		-9.57	-20.4	1.27

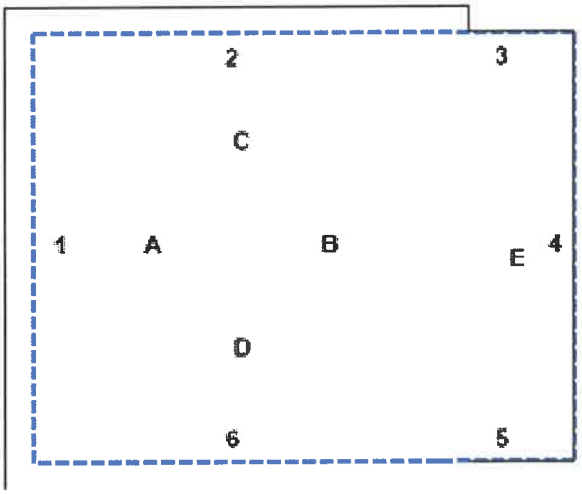
This is load case 1 in ASCE 7-22 Figure 27.3-8. See Figure 27.3-8 for other cases.
* Distance from windward edge.

GARY MATZNER PARK

Title

October 16, 2024

Prepared By: yr



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Site Information

Wind Dir.	Exposure
1	C
2	C
3	C
4	C

Basic Wind Speed: 175 mph
Topography: Flat

Optional Factors

This project uses load combinations from ASCE 7.

Structure Information

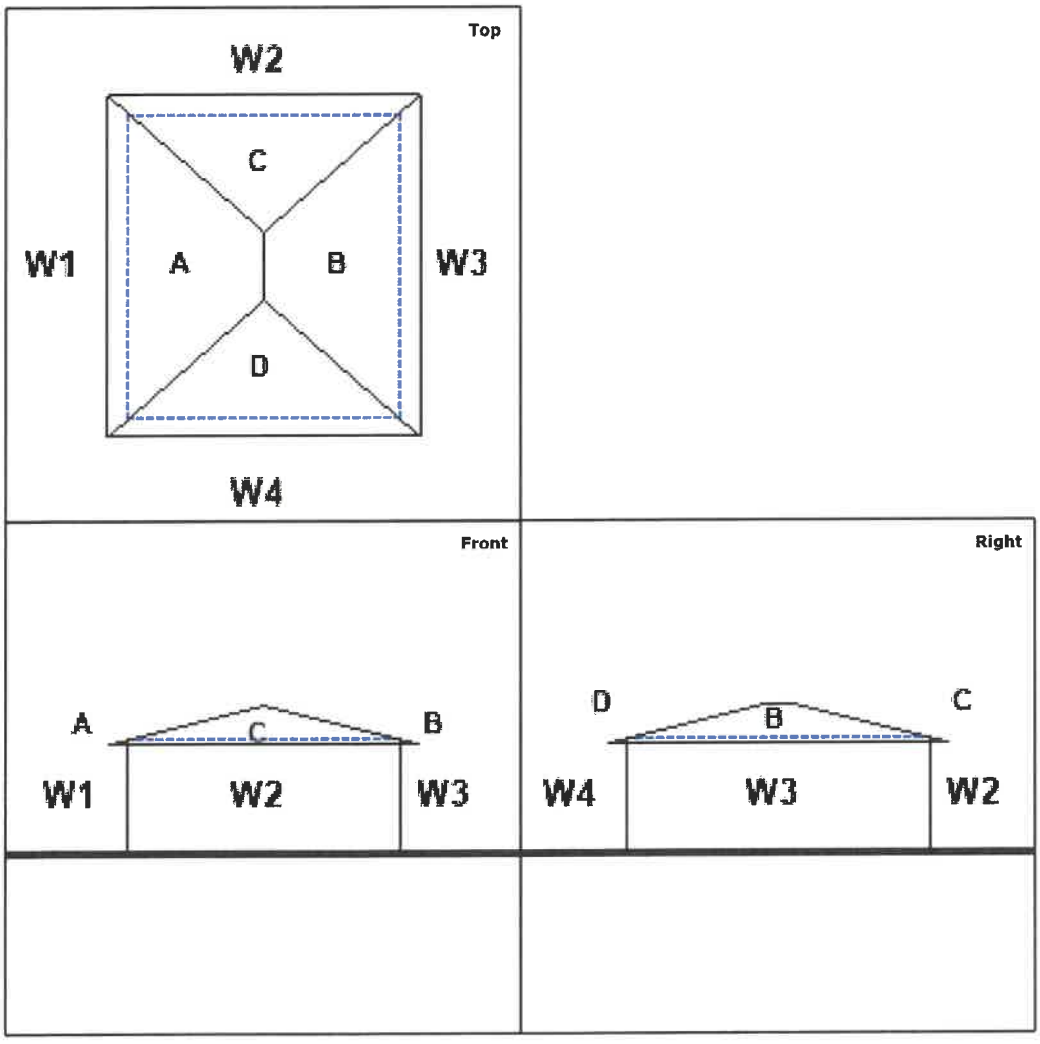
Structure Type: Building
Structure Category: II
Enclosure Classification: Enclosed

Main Section

Wall	Length (ft)	Overhang (ft)
1	40.0	2.50
2	36.0	2.50
3	40.0	2.50
4	36.0	2.50

Eave Height: 15.0 ft
Parapet Height: 0.00 ft
Parapet Enclosure: Solid
Roof Shape: Hipped

Roof	Slope (X:12)
A & B	3.00
C & D	3.00



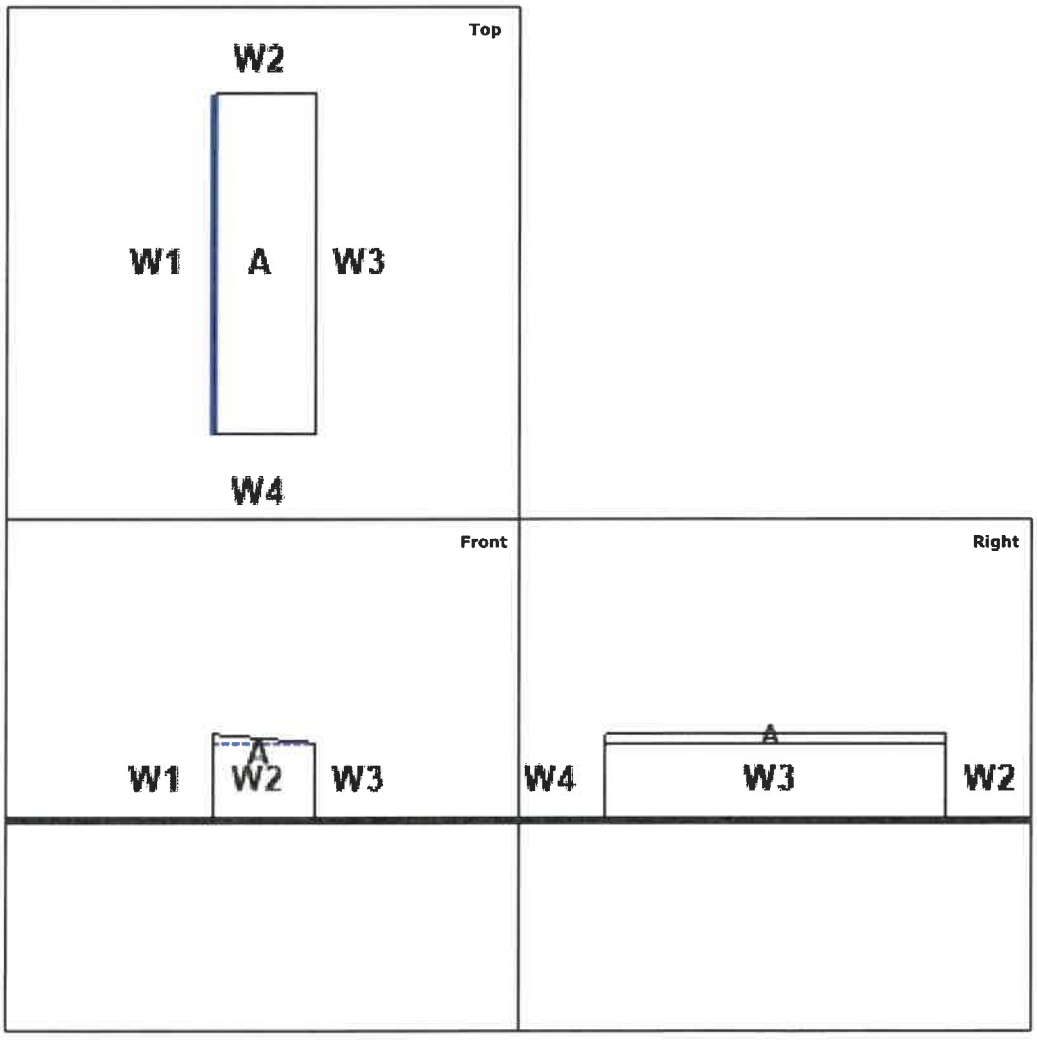
Section 1

Connected to:	Main Section
Connected to Wall:	W3
Position on W3:	0.00 ft

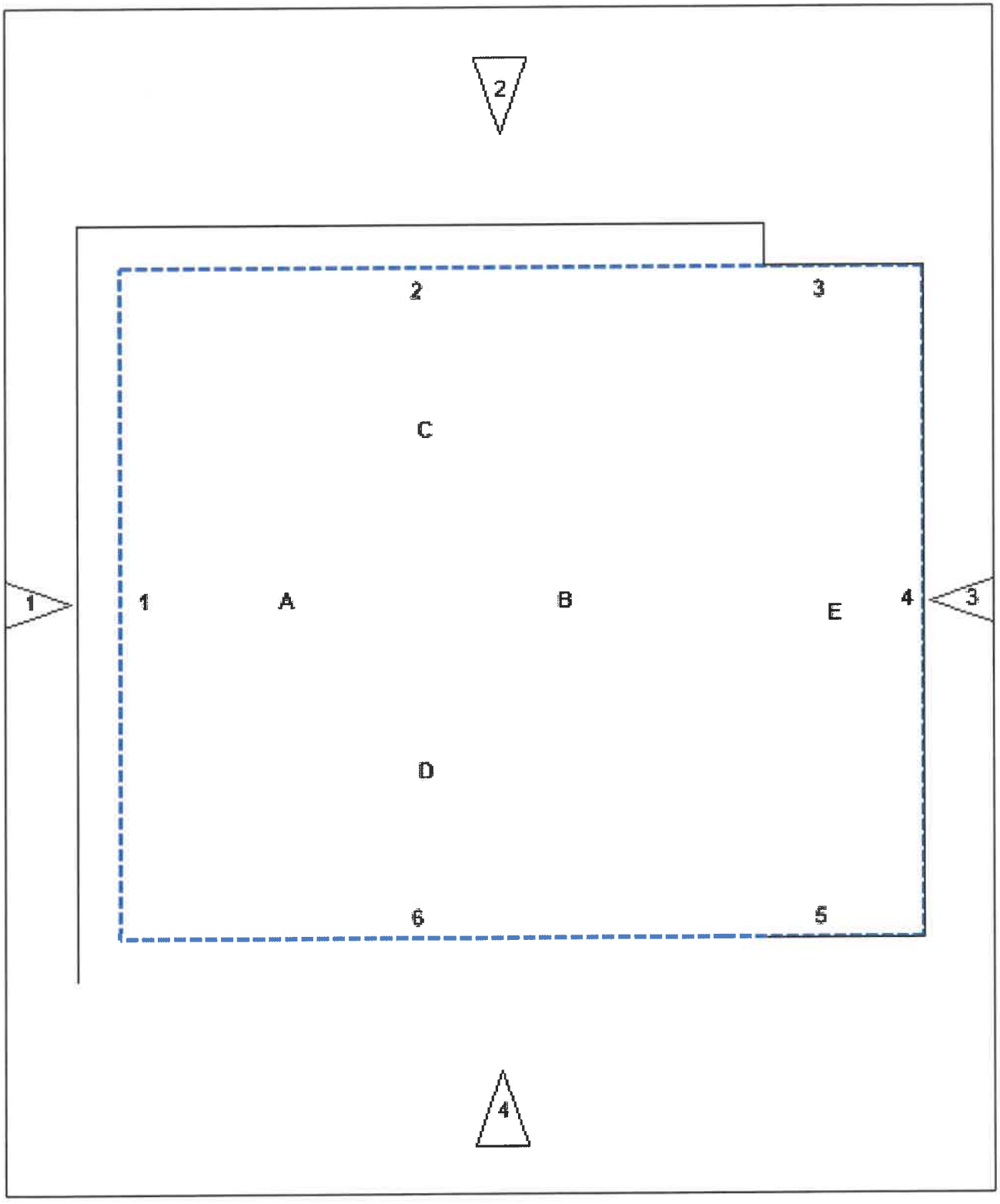
Wall	Length (ft)	Overhang (ft)
1	40.0	0.00
2	12.0	0.00
3	40.0	0.00
4	12.0	0.00

Eave Height:	9.00 ft
Parapet Height:	0.00 ft
Parapet Enclosure:	Partially Enclosed
Roof Shape:	Monoslope

Roof	Slope (X:12)
A	1.00



Composite Drawing



Components & Cladding

Description	Wall/Roof	Surface	Zone	Span	Width	Area
10 sq ft	Wall	1	(All)	0.00 ft	0.00 ft	10.00 ft²
25 sq ft	Wall	1	(All)	0.00 ft	0.00 ft	25.0 ft²
50 sq ft	Wall	1	(All)	0.00 ft	0.00 ft	50.0 ft²
75 sq ft	Wall	1	(All)	0.00 ft	0.00 ft	75.0 ft²
100 sq ft	Wall	1	(All)	0.00 ft	0.00 ft	100.0 ft²
250 sq ft	Wall	1	(All)	0.00 ft	0.00 ft	250 ft²
Roofing	Roof	A	(All)	0.00 ft	0.00 ft	10.00 ft²
T1	Roof	A	(All)	21.7 ft	3.50 ft	156 ft²
T2	Roof	A	(All)	21.7 ft	2.00 ft	156 ft²
T3-T4	Roof	A	(All)	5.00 ft	2.00 ft	10.00 ft²
T5	Roof	A	(All)	9.00 ft	2.00 ft	27.0 ft²
T6	Roof	A	(All)	12.0 ft	2.00 ft	48.0 ft²
T7	Roof	A	(All)	18.7 ft	3.50 ft	117 ft²
T8	Roof	A	(All)	18.7 ft	2.00 ft	117 ft²

ASCE 7-22 Wind Load Report

Components & Cladding

October 16, 2024

This data was calculated using the components and cladding method.

Component Description	Surface	Zone	z (ft)	q (psf)	GCp	GCpi	Ext Pres (psf)	Net w/ +GCpi (psf)	Net w/ -GCpi (psf)
10 sq ft	1	4	17.2	68.6	1.00	0.180	58.3	47.8	68.8
			17.2	68.6	-1.10		-64.2	-74.7	-53.7
		5	17.2	68.6	1.00		58.3	47.8	68.8
			17.2	68.6	-1.40		-81.7	-92.2	-71.2
25 sq ft	1	4	17.2	68.6	0.930	0.180	54.2	43.7	64.7
			17.2	68.6	-1.03		-60.1	-70.6	-49.6
		5	17.2	68.6	0.930		54.2	43.7	64.7
			17.2	68.6	-1.26		-73.5	-84.0	-63.0
50 sq ft	1	4	17.2	68.6	0.877	0.180	51.1	40.6	61.6
			17.2	68.6	-0.977		-57.0	-67.5	-46.5
		5	17.2	68.6	0.877		51.1	40.6	61.6
			17.2	68.6	-1.15		-67.3	-77.8	-56.8
75 sq ft	1	4	17.2	68.6	0.846	0.180	49.3	38.8	59.8
			17.2	68.6	-0.946		-55.1	-65.6	-44.7
		5	17.2	68.6	0.846		49.3	38.8	59.8
			17.2	68.6	-1.09		-63.6	-74.1	-53.1
100 sq ft	1	4	17.2	68.6	0.823	0.180	48.0	37.5	58.5
			17.2	68.6	-0.923		-53.9	-64.4	-43.4
		5	17.2	68.6	0.823		48.0	37.5	58.5
			17.2	68.6	-1.05		-61.1	-71.6	-50.6
0 sq ft	1	4	17.2	68.6	0.753	0.180	43.9	33.4	54.4
			17.2	68.6	-0.853		-49.8	-60.3	-39.3
		5	17.2	68.6	0.753		43.9	33.4	54.4
			17.2	68.6	-0.906		-52.9	-63.4	-42.4
Roofing	A	1	17.2	68.6	0.700	0.180	40.8	30.3	51.3
			17.2	68.6	-1.80		-105	-115	-94.5
			17.2	68.6	-3.60		-210		
		2	17.2	68.6	0.700	0.180	40.8	30.3	51.3
			17.2	68.6	-2.40		-140	-150	-129
			17.2	68.6	-3.60		-210		
		3	17.2	68.6	0.700	0.180	40.8	30.3	51.3
			17.2	68.6	-2.60		-152	-162	-141
			17.2	68.6	-3.60		-210		
T1	A	1	17.2	68.6	0.300	0.180	17.5	7.00	28.0
			17.2	68.6	-0.882		-51.5	-62.0	-41.0
			17.2	68.6	-2.29		-133		
		2	17.2	68.6	0.300	0.180	17.5	7.00	28.0
			17.2	68.6	-1.39		-81.1	-91.6	-70.6
			17.2	68.6	-2.29		-133		
		3	17.2	68.6	0.300	0.180	17.5	7.00	28.0
			17.2	68.6	-1.50		-87.4	-97.9	-76.9
			17.2	68.6	-2.29		-133		

ASCE 7-22 Wind Load Report

Components & Cladding

October 16, 2024

This data was calculated using the components and cladding method.

Component Description	Surface	Zone	z (ft)	q (psf)	GCp	GCpi	Ext Pres (psf)	Net w/ +GCpi (psf)	Net w/ -GCpi (psf)
T2	A	1	17.2	68.6	0.300	0.180	17.5	7.00	28.0
			17.2	68.6	-0.882		-51.5	-62.0	-41.0
			17.2	68.6	-2.29		-133		
		2	17.2	68.6	0.300	0.180	17.5	7.00	28.0
			17.2	68.6	-1.39		-81.1	-91.6	-70.6
			17.2	68.6	-2.29		-133		
		3	17.2	68.6	0.300	0.180	17.5	7.00	28.0
			17.2	68.6	-1.50		-87.4	-97.9	-76.9
			17.2	68.6	-2.29		-133		
T3-T4	A	1	17.2	68.6	0.700	0.180	40.8	30.3	51.3
			17.2	68.6	-1.80		-105	-115	-94.5
			17.2	68.6	-3.60		-210		
		2	17.2	68.6	0.700	0.180	40.8	30.3	51.3
			17.2	68.6	-2.40		-140	-150	-129
			17.2	68.6	-3.60		-210		
		3	17.2	68.6	0.700	0.180	40.8	30.3	51.3
			17.2	68.6	-2.60		-152	-162	-141
			17.2	68.6	-3.60		-210		
T5	A	1	17.2	68.6	0.528	0.180	30.8	20.3	41.3
			17.2	68.6	-1.47		-85.7	-96.2	-75.2
			17.2	68.6	-3.13		-182		
		2	17.2	68.6	0.528	0.180	30.8	20.3	41.3
			17.2	68.6	-2.04		-119	-129	-108
			17.2	68.6	-3.13		-182		
		3	17.2	68.6	0.528	0.180	30.8	20.3	41.3
			17.2	68.6	-2.20		-128	-139	-118
			17.2	68.6	-3.13		-182		
T6	A	1	17.2	68.6	0.428	0.180	24.9	14.4	35.4
			17.2	68.6	-1.28		-74.5	-85.0	-64.0
			17.2	68.6	-2.85		-166		
		2	17.2	68.6	0.428	0.180	24.9	14.4	35.4
			17.2	68.6	-1.82		-106	-117	-95.9
			17.2	68.6	-2.85		-166		
		3	17.2	68.6	0.428	0.180	24.9	14.4	35.4
			17.2	68.6	-1.97		-115	-126	-105
			17.2	68.6	-2.85		-166		
T7	A	1	17.2	68.6	0.300	0.180	17.5	7.00	28.0
			17.2	68.6	-0.980		-57.2	-67.7	-46.7
			17.2	68.6	-2.43		-142		
		2	17.2	68.6	0.300	0.180	17.5	7.00	28.0
			17.2	68.6	-1.50		-87.4	-97.9	-76.9
			17.2	68.6	-2.43		-142		
		3	17.2	68.6	0.300	0.180	17.5	7.00	28.0
			17.2	68.6	-1.62		-94.3	-105	-83.8
			17.2	68.6	-2.43		-142		

ASCE 7-22 Wind Load Report

Components & Cladding

October 16, 2024

This data was calculated using the components and cladding method.

Component Description	Surface	Zone	z (ft)	q (psf)	GCp	GCpi	Ext Pres (psf)	Net w/ +GCpi (psf)	Net w/ -GCpi (psf)
T8	A	1	17.2	68.6	0.300	0.180	17.5	7.00	28.0
			17.2	68.6	-0.980		-57.2	-67.7	-46.7
			17.2	68.6	-2.43		-142		
		2	17.2	68.6	0.300	0.180	17.5	7.00	28.0
			17.2	68.6	-1.50		-87.4	-97.9	-76.9
			17.2	68.6	-2.43		-142		
		3	17.2	68.6	0.300	0.180	17.5	7.00	28.0
			17.2	68.6	-1.62		-94.3	-105	-83.8
			17.2	68.6	-2.43		-142		

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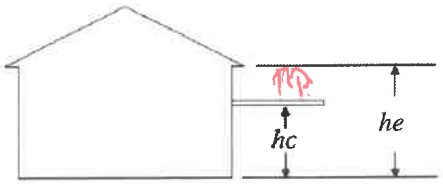
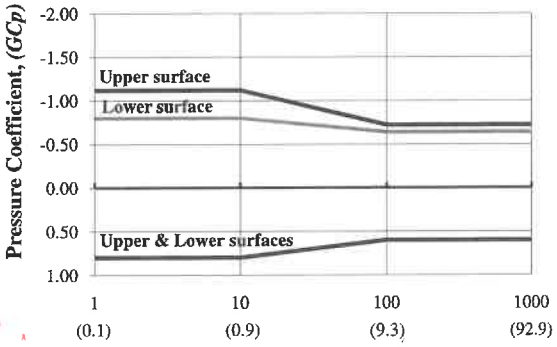
Diagram



ELEVATION

Pressure Coefficient



For roofing only

$q_z = 70.6$ PSF (See previous page)

$P = 70.6 \times 0.85 \times 1.2 = 72$ PSF.

Notation

hc = Mean canopy height, ft (m).
he = Mean eave height, ft (m).
(GCp) = Pressure coefficients.
q_h = Velocity pressure evaluated at height $z = h$, lb/ft2 (N/m2).

Notes

1. Pressures are based on the most critical values for all ratios of hc/he.
2. Vertical scale denotes (GCp) to be used with q_h.
3. Horizontal scale denotes effective wind area, ft^2 (m^2).
4. Negative signs signify pressures acting away from the surface.

Figure 30.9-1A. Pressure coefficients on separate surfaces of attached canopies on buildings with $h \leq 60$ ft ($h \leq 18.3$ m).

PART 5: NONBUILDING STRUCTURES

30.10 CIRCULAR BINS, SILOS, AND TANKS WITH $h \leq 120$ft ($h \leq 36.6m$)

Wind pressures on surfaces of isolated circular bins, silos, and tanks shall be calculated from Sections 30.10.1 through 30.10.5.

Grouped circular bins, silos, and tanks of similar size with center-to-center spacing greater than 2 diameters shall be treated as isolated structures. For spacings less than 1.25 diameters, the structures shall be treated as grouped and the wind pressure shall be determined from Section 30.10.6. For intermediate spacings, linear interpolation of the C_p (or C_f) values shall be used.

The steps required for the determination of wind loads for circular bins, silos, and tanks are shown in Table 30.10-1.

30.10.1 Design Wind Pressure Design wind pressure on C&C for isolated circular bins, silos, and tanks in $(\text{lb/ft}^2)(N/m^2)$ shall be determined from the following equation:

$$p = q_h K_d [(GC_p) - (GC_{pi})] \qquad (30.10\text{-}1)$$

where

q_h = Velocity pressure for all surfaces evaluated at mean roof height h
K_d = Wind directionality factor; see Section 26.6.
(GC_p) = External pressure coefficients given in

- Section 30.10.2 for walls
- Section 30.10.5 for underneath sides
- Section 30.10.4 for roofs

(GC_{pi}) = Internal pressure coefficient given in Table 26.13-1 and Section 30.11.3.

30.10.2 External Walls of Isolated Circular Bins, Silos, and Tanks The external pressures on the walls of circular bins, silos, and tanks shall be determined from the external pressure

Table 30.10-1. Steps to Determine C&C Wind Loads for Circular Bins, Silos, and Tanks.

Step 1: Determine risk category; see Table 1.5-1.
Step 2: Determine the basic wind speed, V, for applicable risk category; see Figure. 26.5-1.
Step 3: Determine wind load parameters:

- Wind directionality factor, K_d; see Section 26.6 and Table 26.6-1.
- Exposure Category B, C, or D; see Section 26.7.
- Topographic factor, K_{zt}; see Section 26.8 and Figure 26.8-1.
- Ground elevation factor, K_e; see Section 26.9 and Table 26.9-1.
- Enclosure classification; see Section 26.12.
- Internal pressure coefficient (GC_{pi}); see Section 26.13 and Section 30.11.3.

Step 4: Determine velocity pressure exposure coefficient, K_z or K_h; see Table 26.10-1.
Step 5: Determine velocity pressure, q_h, Equation (26.10-1).
Step 6: Determine external pressure coefficient (GC_p).

- Walls; see Sections 30.10.2 and 30.10.6.
- Roofs; see Sections 30.10.4 and 30.10.6.

Step 7: Calculate wind pressure, p, using Equation (30.10-1).

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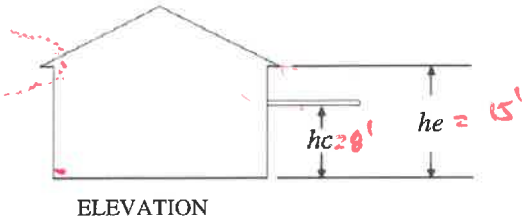
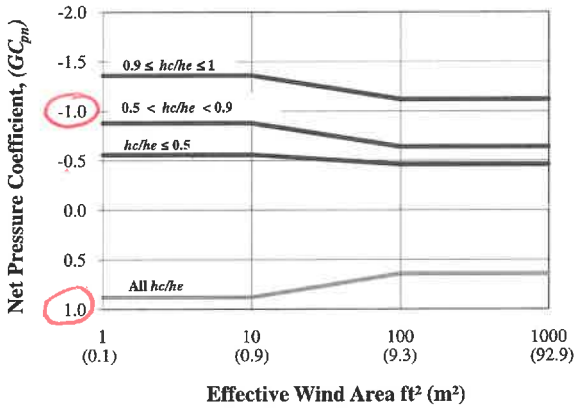
Diagram



Notation

hc = Mean canopy height, ft (m).
he = Mean eave height, ft (m).
$(GCpn)$ = Net pressure coefficients.
q_h = Velocity pressure evaluated at height $z = h$, lb/ft^2 (N/m^2).

Net Pressure Coefficients



Notes

1. Vertical scale denotes $(GCpn)$ to be used with q_h.
2. Horizontal scale denotes effective wind area, ft^2 (m^2).
3. Negative and positive signs signify uplifting and downward pressures, respectively.
4. Each component shall be designed for maximum positive and negative pressures.
5. Use linear interpolation for intermediate values of hc/he.

Figure 30.9-1B. Net pressure coefficients considering simultaneous contributions from upper and lower surfaces on attached canopies on buildings with $h \leq 60$ ft ($h \leq 18.3$ m).

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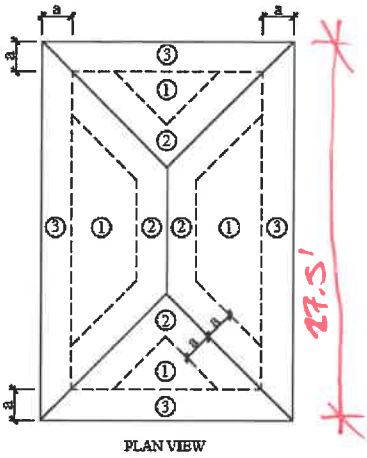
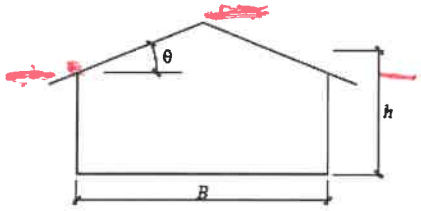
Diagrams





Notation

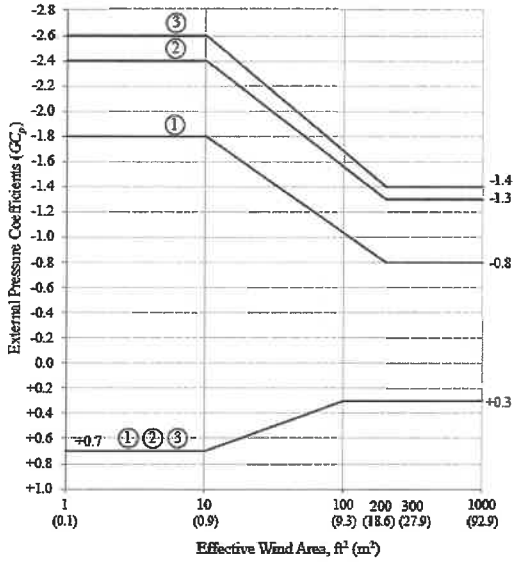
a = 10% of least horizontal dimension or $0.4h$, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9 m). If an overhang exists, the edge distance shall be measured from the outside edge of the overhang. The horizontal dimensions used to compute the edge distance shall not include any overhang dimensions.

B = Horizontal dimension of building measured normal to wind direction, ft (m).

h = Mean roof height, in ft (m), except that eave height shall be used for $\theta \le 10°$.

θ = Angle of plane of roof from horizontal, degrees.

External Pressure Coefficients (GC_p)



Notes

1. Vertical scale denotes (GCp) to be used with q_h.
2. Horizontal scale denotes effective wind area A, ft^2 (m^2).
3. Plus and minus signs signify pressures acting toward and away from the surfaces, respectively.
4. Each component shall be designed for maximum positive and negative pressures.
5. Values of (GCp) for roof overhangs to be determined in accordance with Section 30.7 Roof Overhangs.

Figure 30.3-2E. Components and cladding [$h \le 60$ ft ($h \le 18.3$ m)]: external pressure coefficients, (GC_p), for enclosed and partially enclosed, and partially open buildings—hip roofs, $7° < \theta \le 20°$.

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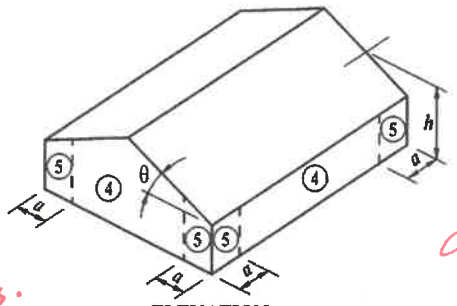
Diagram



Notation

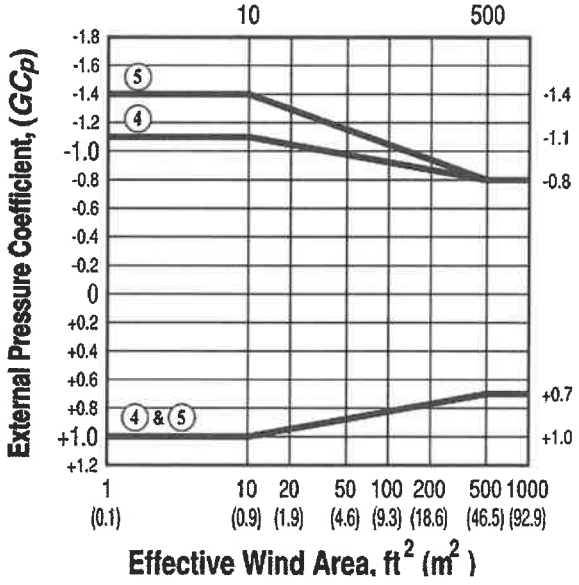
a = 10% of least horizontal dimension or $0.4h$, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9 m).

Exception: For buildings with $\theta = 0°$ to 7° and a least horizontal dimension greater than 300 ft (90 m), dimension a shall be limited to a maximum of $0.8h$.

h = Mean roof height, ft (m), except that eave height shall be used for $\theta \le 10°$.

θ = Angle of plane of roof from horizontal, degrees.

External Pressure Coefficient, (GC_p) - Walls



Notes

1. Vertical scale denotes (GCp) to be used with qh.
2. Horizontal scale denotes effective wind area A, ft^2 (m^2).
3. Plus and minus signs signify pressures acting toward and away from the surfaces, respectively.
4. Each component shall be designed for maximum positive and negative pressures.
5. Values of (GCp) for walls shall be reduced by 10% when $\theta \le 10°$.

Figure 30.3-1. Components and cladding, $h \le 60$ ft (18.3 m): external pressure coefficients (GC_p) for enclosed, partially enclosed, and partially open buildings—walls.

12.5.2 End Grain Factor, C_{eg}

12.5.2.1 Where lag screws are loaded in withdrawal from end grain, the reference withdrawal design values, W, shall be multiplied by the end grain factor, $C_{eg} = 0.75$.

12.5.2.2 Where dowel-type fasteners are inserted in the end grain of the main member, with the fastener axis parallel to the wood fibers, reference lateral design values, Z, shall be multiplied by the end grain factor, $C_{eg} = 0.67$.

12.5.2.3 Where dowel-type fasteners with D≥1/4" are loaded laterally in the narrow edge of cross-laminated timber, the reference lateral design value, Z, shall be multiplied by the end grain factor, C_{eg}=0.67, regardless of grain orientation.

Table 12.5.1C Edge Distance Requirements[1,2]

Direction of Loading	Minimum Edge Distance
Parallel to Grain:	
where $\ell/D \leq 6$	1.5D
where $\ell/D > 6$	1.5D or ½ the spacing between rows, whichever is greater
Perpendicular to Grain:[2]	
loaded edge	4D
unloaded edge	1.5D

1. The ℓ/D ratio used to determine the minimum edge distance shall be the lesser of:
   (a) length of fastener in wood main member/D = ℓ_m/D
   (b) total length of fastener in wood side member(s)/D = ℓ_s/D
2. Heavy or medium concentrated loads shall not be suspended below the neutral axis of a single sawn lumber or structural glued laminated timber beam except where mechanical or equivalent reinforcement is provided to resist tension stresses perpendicular to grain (see 3.8.2 and 11.1.3).

Table 12.5.1D Spacing Requirements Between Rows[1]

Direction of Loading	Minimum Spacing
Parallel to Grain	1.5D
Perpendicular to Grain:	
where $\ell/D \leq 2$	2.5D
where $2 < \ell/D < 6$	(5ℓ + 10D) / 8
where $\ell/D \geq 6$	5D

1. The ℓ/D ratio used to determine the minimum edge distance shall be the lesser of:
   (a) length of fastener in wood main member/D = ℓ_m/D
   (b) total length of fastener in wood side member(s)/D = ℓ_s/D

12.5.3 Diaphragm Factor, C_{di}

Where nails or spikes are used in diaphragm construction, reference lateral design values, Z, are permitted to be multiplied by the diaphragm factor, C_{di} = 1.1.

12.5.4 Toe-Nail Factor, C_{tn}

12.5.4.1 Reference withdrawal design values, W, for toe-nailed connections shall be multiplied by the toe-nail factor, $C_{tn} = 0.67$. The wet service factor, C_M, shall not apply.

12.5.4.2 Reference lateral design values, Z, for toe-nailed connections shall be multiplied by the toe-nail factor, $C_{tn} = 0.83$.

Table 12.5.1E Edge and End Distance and Spacing Requirements for Lag Screws Loaded in Withdrawal and Not Loaded Laterally

Orientation	Minimum Distance/Spacing
Edge Distance	1.5D
End Distance	4D
Spacing	4D

Table 12.5.1F Perpendicular to Grain Distance Requirements for Outermost Fasteners in Structural Glued Laminated Timber Members

Fastener Type	Moisture Content: At Time of Fabrication	Moisture Content: In-Service	Maximum Distance Between Outer Rows
All Fasteners	>16%	<16%	5"
	Any	>16%	5"
Bolts	<16%	<16%	10"
Lag Screws	<16%	<16%	6"
Drift Pins	<16%	<16%	6"

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Table 12G BOLTS: Reference Lateral Design Values, Z, for Double Shear (three member) Connections[1,2]

for sawn lumber or SCL main member with 1/4" ASTM A 36 steel side plates

Thickness			G=0.67 Red Oak		G=0.55 Mixed Maple Southern Pine		G=0.50 Douglas Fir-Larch		G=0.49 Douglas Fir-Larch (N)		G=0.46 Douglas Fir(S) Hem-Fir(N)		G=0.43 Hem-Fir		G=0.42 Spruce-Pine-Fir		G=0.37 Redwood		G=0.36 Eastern Softwoods Spruce-Pine-Fir(S) Western Cedars Western Woods		G=0.35 Northern Species	
Main Member	Side Member	Bolt Diameter																				
t_m	t_s	D	$Z_\parallel$	$Z_\perp$	$Z_\parallel$	$Z_\perp$	$Z_\parallel$	$Z_\perp$	$Z_\parallel$	$Z_\perp$	$Z_\parallel$	$Z_\perp$	$Z_\parallel$	$Z_\perp$	$Z_\parallel$	$Z_\perp$	$Z_\parallel$	$Z_\perp$	$Z_\parallel$	$Z_\perp$	$Z_\parallel$	$Z_\perp$
in.	in.	in.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1-1/2	1/4	1/2	1410	730	1150	550	1050	470	1030	460	970	420	900	380	880	370	780	310	760	290	730	290
		5/8	1760	810	1440	610	1310	530	1290	520	1210	470	1130	420	1100	410	970	350	950	330	910	320
		3/4	2110	890	1730	660	1580	590	1550	560	1450	520	1350	460	1320	450	1170	370	1140	360	1100	350
		7/8	2460	960	2020	720	1840	630	1800	600	1690	550	1580	500	1540	490	1360	410	1330	390	1280	370
		1	2810	1020	2310	770	2100	680	2060	650	1930	600	1800	540	1760	530	1560	440	1520	420	1460	410
1-3/4	1/4	1/2	1640	850	1350	640	1230	550	1200	530	1130	490	1050	450	1030	430	910	360	890	340	850	330
		5/8	2050	940	1680	710	1530	610	1500	600	1410	550	1310	490	1290	480	1130	400	1110	380	1070	370
		3/4	2460	1040	2020	770	1840	680	1800	660	1690	600	1580	540	1540	530	1360	430	1330	420	1280	410
		7/8	2870	1120	2350	840	2140	740	2110	700	1970	640	1840	580	1800	570	1590	470	1550	460	1490	430
		1	3280	1190	2690	890	2450	790	2410	750	2250	700	2100	630	2060	610	1820	510	1770	490	1710	470
2-1/2	1/4	1/2	1870	1210	1720	910	1650	790	1640	760	1590	700	1500	640	1470	610	1300	510	1270	490	1220	480
		5/8	2740	1340	2400	1020	2190	880	2150	860	2010	780	1880	700	1840	690	1620	580	1580	550	1520	530
		3/4	3520	1480	2880	1110	2630	980	2580	940	2410	860	2250	770	2200	750	1950	620	1900	600	1830	580
		7/8	4100	1600	3360	1200	3060	1050	3010	1010	2820	920	2630	830	2570	810	2270	680	2210	660	2130	610
		1	4690	1700	3840	1280	3500	1130	3440	1080	3220	1000	3000	900	2940	880	2590	730	2530	700	2440	680
3-1/2	1/4	1/2	1870	1240	1720	1100	1650	1030	1640	1010	1590	970	1540	890	1530	860	1450	720	1430	680	1410	670
		5/8	2740	1720	2510	1420	2410	1230	2390	1200	2330	1090	2260	980	2230	960	2110	810	2090	770	2060	740
		3/4	3800	2070	3480	1550	3340	1370	3320	1310	3220	1210	3120	1080	3080	1050	2720	870	2660	840	2560	810
		7/8	5060	2240	4630	1680	4290	1470	4210	1410	3940	1290	3680	1160	3600	1130	3180	950	3100	920	2990	860
		1	6520	2380	5380	1790	4900	1580	4810	1510	4510	1400	4200	1260	4110	1230	3630	1020	3540	980	3410	950
		5/8	2740	1720	2510	1510	2410	1420	2390	1400	2330	1340	2260	1280	2230	1270	2110	1170	2090	1140	2060	1120

$Z_\perp = 660 \times 2 = 1320$

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Table 12K LAG SCREWS: Reference Lateral Design Values, Z, for Single Shear (two member) Connections[1,2,3,4]

for sawn lumber or SCL with ASTM A653, Grade 33 steel side plate (for t_s<1/4") or ASTM A 36 steel side plate (for t_s=1/4")
(tabulated lateral design values are calculated based on an assumed length of lag screw penetration, p, into the main member equal to 8D)

Side Member Thickness	Lag Screw Diameter	G=0.67 Red Oak		G=0.55 Mixed Maple Southern Pine		G=0.5 Douglas Fir-Larch		G=0.49 Douglas Fir-Larch (N)		G=0.46 Douglas Fir(S) Hem-Fir(N)		G=0.43 Hem-Fir		G=0.42 Spruce-Pine-Fir		G=0.37 Redwood		G=0.36 Eastern Softwoods Spruce-Pine-Fir(S) Western Cedars Western Woods		G=0.35 Northern Species	
t_s	D	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$
in.	in.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
0.075	1/4	170	130	160	120	150	110	150	110	150	100	140	100	140	100	130	90	130	90	130	90
(14 gage)	5/16	220	160	200	140	190	130	190	130	190	130	180	120	180	120	170	110	170	110	160	100
	3/8	220	160	200	140	200	130	190	130	190	120	180	120	180	120	170	110	170	100	170	100
0.105	1/4	180	140	170	130	160	120	160	120	160	110	150	110	150	110	140	100	140	100	140	90
(12 gage)	5/16	230	170	210	150	200	140	200	140	190	130	190	130	190	120	180	110	170	110	170	110
	3/8	230	160	210	140	200	140	200	130	200	130	190	120	190	120	180	110	180	110	170	110
0.120	1/4	190	150	180	130	170	120	170	120	160	120	160	110	160	110	150	100	150	100	140	100
(11 gage)	5/16	230	170	210	150	210	140	200	140	200	140	190	130	190	130	180	120	180	120	180	110
	3/8	240	170	220	150	210	140	210	140	200	130	200	130	190	120	180	110	180	110	180	110
0.134	1/4	200	150	180	140	180	130	170	130	170	120	160	120	160	110	150	110	150	100	150	100
(10 gage)	5/16	240	180	220	160	210	150	210	140	200	140	200	130	200	130	190	120	180	120	180	120
	3/8	240	170	220	150	220	140	210	140	210	140	200	130	200	130	190	120	190	120	180	110
0.179	1/4	220	170	210	150	200	150	200	140	190	140	190	130	190	130	180	120	170	120	170	120
(7 gage)	5/16	260	190	240	170	230	160	230	160	230	150	220	150	220	150	210	130	200	130	200	130
	3/8	270	190	250	170	240	160	240	160	230	150	220	140	220	140	210	130	210	130	200	130
0.239	1/4	240	180	220	160	210	150	210	150	200	140	190	140	190	130	180	120	180	120	180	120
(3 gage)	5/16	300	220	280	190	270	180	260	180	260	170	250	160	250	160	230	150	230	150	230	140
	3/8	310	220	280	190	270	180	270	180	260	170	250	160	250	160	240	140	230	140	230	140
	7/16	420	290	390	260	380	240	370	240	360	230	350	220	350	220	330	200	330	200	320	190
	1/2	510	340	470	300	460	290	450	280	440	270	430	260	420	260	400	240	400	230	390	230
	5/8	770	490	710	430	690	400	680	400	660	380	640	370	630	360	600	330	590	330	580	320
	3/4	1110	670	1020	590	980	560	970	550	950	530	920	500	910	500	860	450	850	450	840	440
	7/8	1510	880	1390	780	1330	730	1320	710	1280	690	1250	650	1230	650	1170	590	1160	590	1140	570
	1	1940	1100	1780	960	1710	910	1700	890	1650	860	1600	820	1590	810	1500	740	1480	730	1460	710
1/4	1/4	240	180	220	160	210	150	210	150	200	140	200	140	190	130	180	120	180	120	180	120
	5/16	310	220	280	200	270	180	270	180	260	170	250	170	250	160	230	150	230	150	230	140
	3/8	320	220	290	190	280	180	270	180	270	170	260	160	250	160	240	150	240	140	230	140
	7/16	480	320	440	280	420	270	420	260	410	250	390	240	390	230	370	220	360	210	360	210
	1/2	580	390	540	340	520	320	510	320	500	310	480	290	480	290	460	270	450	260	440	260
	5/8	850	530	780	470	750	440	740	440	720	420	700	400	690	400	660	370	650	360	640	350
	3/4	1200	730	1100	640	1060	600	1050	590	1020	570	990	540	980	530	930	490	920	480	900	470
	7/8	1600	930	1470	820	1410	770	1400	750	1360	720	1320	690	1310	680	1240	630	1220	620	1200	600
	1	2040	1150	1870	1000	1800	950	1780	930	1730	900	1680	850	1660	840	1570	770	1550	760	1530	740

1. Tabulated lateral design values, Z, shall be multiplied by all applicable adjustment factors (see Table 11.3.1).
2. Tabulated lateral design values, Z, are for "reduced body diameter" lag screws (see Appendix Table L2) inserted in side grain with screw axis perpendicular to wood fibers; screw penetration, p, into the main member equal to 8D; dowel bearing strengths, F_e, of 61,850 psi for ASTM A653, Grade 33 steel and 87,000 psi for ASTM A36 steel and screw bending yield strengths, F_{yb}, of 70,000 psi for D = 1/4", 60,000 psi for D = 5/16", and 45,000 psi for D ≥3/8".
3. Where the lag screw penetration, p, is less than 8D but not less than 4D, tabulated lateral design values, Z, shall be multiplied by p/8D or lateral design values shall be calculated using the provisions of 12.3 for the reduced penetration.
4. The length of lag screw penetration, p, not including the length of the tapered tip, E (see Appendix Table L2), of the lag screw into the main member shall not be less than 4D. See 12.1.4.6 for minimum length of penetration, p_{min}.

Table 12J (Cont.) **LAG SCREWS: Reference Lateral Design Values (Z) for Single Shear (two member) Connections[1,2,3,4]**

for sawn lumber or SCL with both members of identical specific gravity (tabulated lateral design values are calculated based on an assumed length of lag screw penetration, p, into the main member equal to 8D)

Side Member Thickness	Lag Screw Diameter	G=0.43 Hem-Fir				G=0.42 Spruce-Pine-Fir				G=0.37 Redwood				G=0.36 Eastern Softwoods Spruce-Pine-Fir(S) Western Cedars Western Woods				G=0.35 Northern Species			
l_s	D	$Z_{\|\|}$	$Z_{\perp\|\|}$	$Z_{m\perp}$	$Z_{\perp}$	$Z_{\|\|}$	$Z_{\perp\|\|}$	$Z_{m\perp}$	$Z_{\perp}$	$Z_{\|\|}$	$Z_{\perp\|\|}$	$Z_{m\perp}$	$Z_{\perp}$	$Z_{\|\|}$	$Z_{\perp\|\|}$	$Z_{m\perp}$	$Z_{\perp}$	$Z_{\|\|}$	$Z_{\perp\|\|}$	$Z_{m\perp}$	$Z_{\perp}$
in.	in.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1/2	1/4	110	80	80	70	110	80	80	70	100	70	70	60	100	70	70	60	90	70	70	60
	5/16	130	90	100	80	130	90	90	80	120	80	90	80	120	80	80	70	120	80	80	70
	3/8	140	80	100	80	130	80	90	80	120	60	90	60	120	60	80	60	120	60	80	60
5/8	1/4	120	80	90	80	110	80	90	70	110	70	80	70	100	70	80	60	100	70	70	60
	5/16	140	90	100	90	140	90	100	90	130	80	90	80	130	80	90	80	120	80	90	70
	3/8	140	90	100	80	140	90	100	80	130	80	90	70	130	70	90	70	120	70	90	70
3/4	1/4	130	90	100	80	120	80	90	80	110	80	80	70	110	70	80	70	110	70	60	70
	5/16	150	100	110	90	150	100	110	90	130	90	100	80	130	90	80	80	130	80	80	80
	3/8	150	100	110	90	150	90	110	90	140	90	100	80	130	80	80	70	130	80	90	70
1	1/4	140	100	110	90	140	100	100	90	130	90	100	80	130	90	90	80	130	80	90	70
	5/16	170	110	130	100	170	110	120	100	150	90	110	90	150	90	110	80	150	90	100	80
	3/8	170	100	120	100	170	100	120	90	150	90	110	80	150	90	110	80	150	90	100	80
1-1/4	1/4	140	110	110	100	140	100	100	100	130	100	100	90	130	90	90	90	130	90	90	80
	5/16	180	120	130	110	180	120	130	110	170	100	120	100	170	100	120	90	160	100	110	90
	3/8	190	120	130	110	180	110	130	100	170	100	120	90	170	100	120	90	170	90	110	80
1-1/2	1/4	140	110	110	100	140	100	100	100	130	100	100	90	130	90	90	90	130	90	90	80
	5/16	180	130	130	120	180	130	130	120	170	110	120	110	170	110	120	100	160	110	110	100
	3/8	190	130	130	120	180	130	130	110	170	110	120	100	170	110	120	100	170	100	110	90
	7/16	290	170	190	150	280	160	190	150	260	140	180	130	260	140	170	130	250	140	170	120
	1/2	350	190	240	180	350	190	240	170	310	170	210	150	310	160	210	150	300	160	200	140
	5/8	500	280	340	240	490	270	330	240	450	250	300	210	440	240	290	210	430	240	280	200
	3/4	700	360	450	330	690	350	440	330	630	290	400	290	620	280	390	280	610	270	380	270
	7/8	930	390	580	390	910	380	570	380	850	320	520	320	840	310	510	310	820	290	490	290
	1	1180	420	720	420	1160	410	710	410	1080	340	640	340	1070	330	630	330	1050	320	620	320
1-3/4	1/4	140	110	110	100	140	100	100	100	130	100	100	90	130	90	90	90	130	90	90	80
	5/16	180	130	130	120	180	130	130	120	170	120	120	110	170	120	120	110	160	110	110	100
	3/8	190	130	130	120	180	130	130	110	170	120	120	100	170	120	120	100	170	110	110	100
	7/16	290	180	190	150	280	180	190	150	270	160	180	140	260	160	170	140	260	140	170	130
	1/2	360	210	240	190	360	200	240	180	340	180	220	160	340	170	220	150	330	170	210	150
	5/8	540	290	360	250	530	280	360	250	490	250	320	220	480	250	310	210	460	240	300	210
	3/4	740	400	480	340	730	390	470	340	670	330	420	300	660	320	420	300	640	310	410	290
	7/8	970	450	610	440	950	440	600	440	880	370	540	370	870	360	530	360	850	330	520	330
	1	1210	490	750	490	1200	480	740	480	1110	400	670	400	1090	380	650	380	1070	370	640	370
2-1/2	1/4	140	110	110	100	140	100	100	100	130	100	100	90	130	90	90	90	130	90	90	80
	5/16	180	130	130	120	180	130	130	120	170	120	120	110	170	120	120	110	160	110	110	100
	3/8	190	130	130	120	180	130	130	110	170	120	120	100	170	120	120	100	170	110	110	100
	7/16	290	190	190	170	280	190	190	170	270	180	180	150	260	170	170	150	260	170	170	150
	1/2	360	240	240	210	360	240	240	210	340	220	220	190	340	210	220	190	330	200	210	180
	5/8	590	330	380	290	580	320	370	290	550	290	340	250	540	280	340	240	530	270	330	240
	3/4	890	430	550	380	880	420	540	370	800	380	500	320	780	370	490	320	760	360	480	310
	7/8	1130	560	730	470	1110	540	710	460	1010	490	640	420	990	480	620	410	970	470	600	390
	1	1390	680	870	580	1360	670	850	570	1240	570	760	510	1220	560	750	500	1190	530	730	490
3-1/2	1/4	140	110	110	100	140	100	100	100	130	100	100	90	130	90	90	90	130	90	90	80
	5/16	180	130	130	120	180	130	130	120	170	120	120	110	170	120	120	110	160	110	110	100
	3/8	190	130	130	120	180	130	130	110	170	120	120	100	170	120	120	100	170	110	110	100
	7/16	290	190	190	170	280	190	190	170	270	180	180	150	260	170	170	150	260	170	170	150
	1/2	360	240	240	210	360	240	240	210	340	220	220	190	340	220	220	190	330	210	210	180
	5/8	590	380	390	320	580	370	370	320	550	340	340	290	540	330	340	280	530	320	330	280
	3/4	890	500	550	440	880	490	540	430	830	430	500	370	820	420	490	370	800	410	480	360
	7/8	1240	610	750	530	1220	600	740	520	1150	530	680	460	1140	520	670	450	1110	500	650	430
	1	1610	740	950	630	1600	720	940	620	1480	650	860	550	1450	630	850	540	1410	620	830	520

1 Tabulated lateral design values, Z, shall be multiplied by all applicable adjustment factors (see Table 11.3.1).

2 Tabulated lateral design values, Z, are for "reduced body diameter" lag screws (see Appendix Table L2) inserted in side grain with screw axis perpendicular to wood fibers; screw penetration, p, into the main member equal to 8D; screw bending yield strengths, F_{yb}, of 70,000 psi for D < 1/4", 60,000 psi for D = 5/16", and 45,000 psi for D ≥ 3/8".

3 Where the lag screw penetration, p, is less than 8D but not less than 4D, tabulated lateral design values, Z, shall be multiplied by p/8D or lateral design values shall be calculated using the provisions of 12.3 for the reduced penetration.

4 The length of lag screw penetration, p, not including the length of the tapered tip, (see Appendix Table L2), of the lag screw into the main member shall not be less than 4D. See 12.1.4.6 for minimum length of penetration, p_{min}.

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Table 2.3.2 Frequently Used Load Duration Factors, C_D[1]

Load Duration	C_D	Typical Design Loads
Permanent	0.9	Dead Load
Ten years	1.0	Occupancy Live Load
Two months	1.15	Snow Load
Seven days	1.25	Construction Load
Ten minutes	1.6	Wind/Earthquake Load
Impact[2]	2.0	Impact Load

1. Load duration factors shall not apply to reference modulus of elasticity, E, reference modulus of elasticity for beam and column stability, E_{min}, nor to reference compression perpendicular to grain design values, $F_{c\perp}$, based on a deformation limit.
2. Load duration factors greater than 1.6 shall not be used in the design of structural members pressure-treated with water-borne preservatives (see Reference 30), or fire retardant chemicals. Load duration factors greater than 1.6 shall not be used in the design of connections or wood structural panels.

2.3.3 Temperature Factor, C_t

Reference design values shall be multiplied by the temperature factors, C_t, in Table 2.3.3 for structural members that will experience sustained exposure to elevated temperatures up to 150°F (see Appendix C).

2.3.4 Fire Retardant Treatment

The effects of fire retardant chemical treatment on strength shall be accounted for in the design. Adjusted design values, including adjusted connection design values, for lumber and structural glued laminated timber pressure-treated with fire retardant chemicals shall be obtained from the company providing the treatment and redrying service. Load duration factors greater than 1.6 shall not apply to structural members pressure-treated with fire retardant chemicals (see Table 2.3.2).

2.3.5 Format Conversion Factor, K_F (LRFD Only)

For LRFD, reference design values shall be multiplied by the format conversion factor, K_F, specified in Table 2.3.5. The format conversion factor, K_F, shall not apply for designs in accordance with ASD methods specified herein.

2.3.6 Resistance Factor, ϕ (LRFD Only)

For LRFD, reference design values shall be multiplied by the resistance factor, ϕ, specified in Table 2.3.6. The resistance factor, ϕ, shall not apply for designs in accordance with ASD methods specified herein.

2.3.7 Time Effect Factor, λ (LRFD Only)

For LRFD, reference design values shall be multiplied by the time effect factor, λ, specified in Appendix N.3.3. The time effect factor, λ, shall not apply for designs in accordance with ASD methods specified herein.

Table 2.3.3 Temperature Factor, C_t

Reference Design Values	In-Service Moisture Conditions[1]	C_t		
		T≤100°F	100°F<T≤125°F	125°F<T≤150°F
F_t, E, E_{min}	Wet or Dry	1.0	0.9	0.9
F_b, F_v, F_c, and $F_{c\perp}$	Dry	1.0	0.8	0.7
	Wet	1.0	0.7	0.5

1. Wet and dry service conditions for sawn lumber, structural glued laminated timber, prefabricated wood I-joists, structural composite lumber, wood structural panels and cross-laminated timber are specified in 4.1.4, 5.1.4, 7.1.4, 8.1.4, 9.3.3, and 10.1.5 respectively.

Table N1 Format Conversion Factor, K_F (LRFD Only)

Application	Property	K_F
Member	F_b	2.54
	F_t	2.70
	F_v, F_{rt}, F_s	2.88
	$F_{c\perp}$	2.40
	F_c	1.67
	E_{min}	1.76
All Connections	(all design values)	3.32

N.3.2 Resistance Factor, ϕ (LRFD Only)

Reference design values shall be multiplied by the resistance factor, ϕ, as specified in Table N2 (see Reference 55).

Table N2 Resistance Factor, ϕ (LRFD Only)

Application	Property	Symbol	Value
Member	F_b	ϕ_b	0.85
	F_t	ϕ_t	0.80
	F_v, F_{rt}, F_s	ϕ_s	0.75
	F_c, $F_{c\perp}$	ϕ_c	0.90
	E_{min}	ϕ_s	0.85
All Connections	(all design values)	ϕ_z	0.65

N.3.3 Time Effect Factor, λ (LRFD Only)

Reference design values shall be multiplied by the time effect factor, λ, as specified in Table N3.

Table N3 Time Effect Factor, λ (LRFD Only)

Load Combination[2]	λ
1.4D	0.6
1.2D + 1.6L + 0.5(L_r or S or R)	0.7 when L is from storage 0.8 when L is from occupancy 1.25 when L is from impact[1]
1.2D + 1.6(L_r or S or R) + (L or 0.5W)	0.8
1.2D + 1.0W + L + 0.5(L_r or S or R)	1.0
1.2D + 1.0E + L + 0.2S	1.0
0.9D + 1.0W	1.0
0.9D + 1.0E	1.0

1. Time effect factors, λ, greater than 1.0 shall not apply to connections or to structural members pressure-treated with water-borne preservatives (see Reference 30) or fire retardant chemicals.
2. Load combinations and load factors consistent with ASCE 7-16 are listed for ease of reference. Nominal loads shall be in accordance with N.1.2. D = dead load; L = live load; L_r = roof live load; S = snow load; R = rain load; W = wind load; and E = earthquake load.

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9.3 Adjustment of Reference Design Values

9.3.1 General

Reference design values shall be multiplied by the adjustment factors specified in Table 9.3.1 to determine adjusted design values.

9.3.2 Load Duration Factor, C_D (ASD Only)

All reference strength design values (F_bS, F_tA, F_vt_v, $F_s(lb/Q)$, F_cA) shall be multiplied by load duration factors, C_D, as specified in 2.3.2.

9.3.3 Wet Service Factor, C_M, and Temperature Factor, C_t

Reference design values for wood structural panels are applicable to dry service conditions as specified in 9.1.4 where $C_M = 1.0$ and $C_t = 1.0$. When the service conditions differ from the specified conditions, adjustments for high moisture and/or high temperature shall be based on information from an approved source.

Table 9.3.1 Applicability of Adjustment Factors for Wood Structural Panels

		ASD only	ASD and LRFD			LRFD only		
		Load Duration Factor	Wet Service Factor	Temperature Factor	Panel Size Factor	Format Conversion Factor	Resistance Factor	Time Effect Factor
						K_F	ϕ	
$F_bS' = F_bS$	x	C_D	C_M	C_t	C_s	2.54	0.85	λ
$F_tA' = F_tA$	x	C_D	C_M	C_t	C_s	2.70	0.80	λ
$F_vt_v' = F_vt_v$	x	C_D	C_M	C_t	-	2.88	0.75	λ
$F_s(lb/Q)' = F_s(lb/Q)$	x	C_D	C_M	C_t	-	2.88	0.75	λ
$F_cA' = F_cA$	x	C_D	C_M	C_t	-	2.40	0.90	λ
$F_{c\perp}' = F_{c\perp}$	x	-	C_M	C_t	-	1.67	0.90	-
$EI' = EI$	x	-	C_M	C_t	-	-	-	-
$EA' = EA$	x	-	C_M	C_t	-	-	-	-
$G_vt_v' = G_vt_v$	x	-	C_M	C_t	-	-	-	-

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ASD Method

From Table 6.5,

$$C_D = 1.00$$

From Ex. 6.11, the allowable tension capacity of the members is

$$\begin{aligned} T &= F_t' A_n \\ &= F_t'\left(A - \left(D + \frac{1}{16}\right)b\right) \\ &= \left(1300\ \frac{\text{lbf}}{\text{in}^2}\right)\left(8.25\ \text{in}^2 - \left(\frac{3}{4}\ \text{in} + \frac{1}{16}\ \text{in}\right)(1.5\ \text{in})\right) \\ &= 9140\ \text{lbf} \end{aligned}$$

The allowable capacity for eight bolts is

$$\begin{aligned} T &= nZ_{||}C_M C_g C_\Delta C_D C_t \\ &= (8)(720\ \text{lbf})(0.7)(0.71)(0.76)(1.00)(1.0) \\ &= 2176\ \text{lbf} \quad \text{[governs]} \end{aligned}$$

LRFD Method

From Table 6.4, for dead load plus occupancy live load, λ is 0.8. From Ex. 6.11, the strength capacity of the members in tension is

$$\begin{aligned} T &= F_t' A_n \\ &= F_t'\left(A - \left(D + \frac{1}{16}\right)b\right) \\ &= \left(2246\ \frac{\text{lbf}}{\text{in}^2}\right)\left(8.25\ \text{in}^2 - \left(\frac{3}{4}\ \text{in} + \frac{1}{16}\ \text{in}\right)(1.5\ \text{in})\right) \\ &= 15{,}791\ \text{lbf} \end{aligned}$$

The strength lateral capacity for eight bolts is

$$\begin{aligned} T &= nZ_{||}C_M C_g C_\Delta C_t K_F \lambda \phi \\ &= (8)(720\ \text{lbf})(0.7)(0.71)(0.76)(1.0)(3.32)(0.8)(0.65) \\ &= 3756\ \text{lbf} \quad \text{[governs]} \end{aligned}$$

Bolted Connections

Installation Requirements

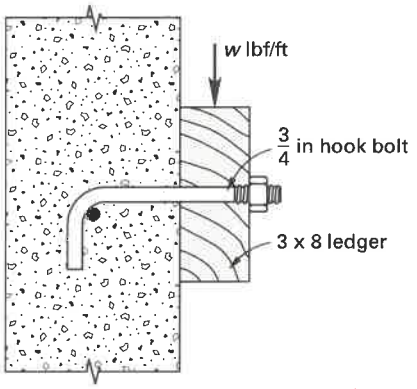
In accordance with NDS Sec. 12.1.3, bolt holes must be $\frac{1}{32}$ in to $\frac{1}{16}$ in larger than the bolt diameter, and a metal washer or plate is required between the wood and the nut and bolt head. To ensure that the full design values of bolts are attained, spacing and edge and end distances are specified in NDS Sec. 12.5 and are illustrated in Fig. 6.8.

Single Shear Connection

Reference design values for single shear connections are specified in NDS Sec. 12.3 and are tabulated in NDS Table 12A for two sawn lumber members of identical species, in NDS Table 12.B for a sawn lumber member with a steel side plate, in NDS Table 12.C for a glued laminated member with sawn lumber side member, in NDS Table 12D for a glued laminated member with a steel side plate, and in NDS Table 12.E for connections to concrete.

Example 6.13

A 3×8 select structural Douglas fir-larch ledger attached to a concrete wall with $\frac{3}{4}$ in hook bolts at 4 ft centers is shown. What is the maximum dead load plus occupancy live load that the ledger can support?



Solution

The applicable adjustment factors are

$$C_M = C_g = C_t = 1.0$$

From NDS Table 12E, the reference lateral design value of a $\frac{3}{4}$ in diameter bolt in a $2\frac{1}{2}$ in thick member loaded perpendicular to the grain and attached to a concrete wall is

$$Z_\perp = 800\ \text{lbf}$$

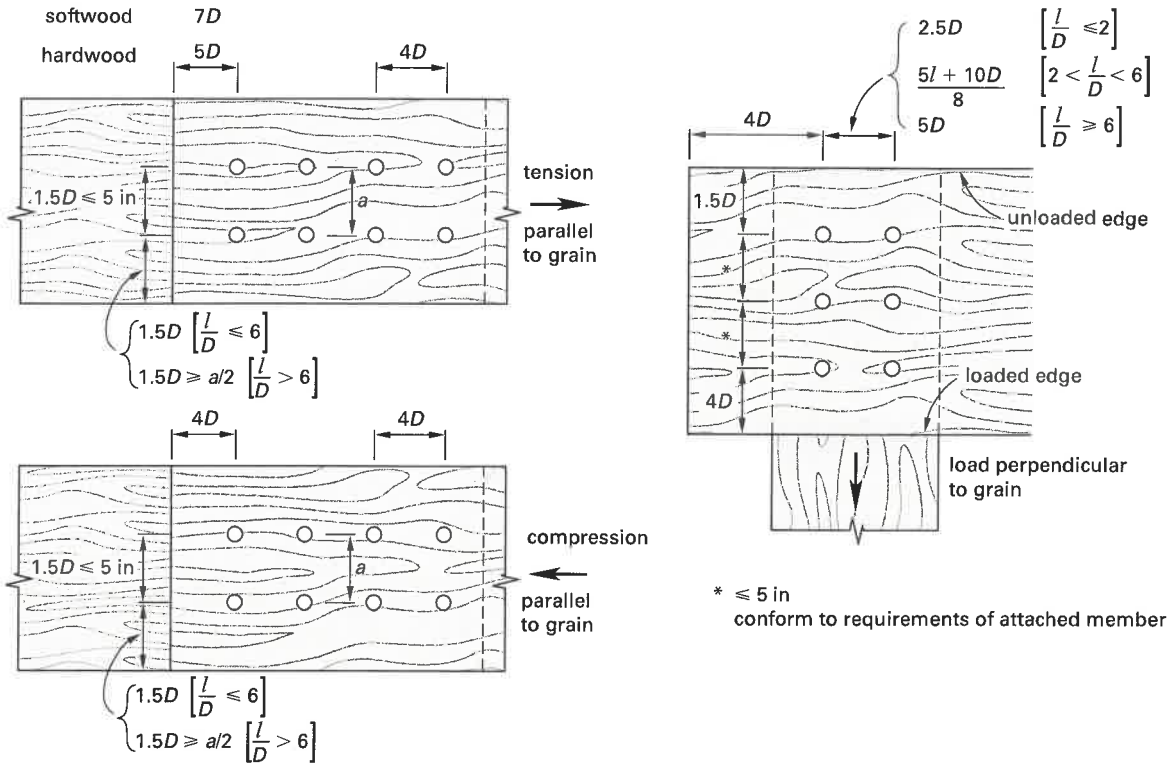
From NDS Table 12.5.1C, the minimum edge distance for the full bolt design value, for loading perpendicular to grain, is

$$e_{q,\text{full}} = 4D = (4)(0.75\ \text{in}) = 3.0\ \text{in}$$

The actual edge distance is

$$\begin{aligned} e_q &= \frac{7.5\ \text{in}}{2} \\ &= 3.75\ \text{in} > e_{q,\text{full}} \quad \text{[satisfactory]} \end{aligned}$$

Figure 6.8 *Bolt Spacing Requirements for Full Design Values*



l = lesser of length of bolt in main member or total length of bolt in side member(s)
D = diameter of bolt

The geometry factor given by NDS Sec. 12.5.1 is

$$C_\Delta = 1.0$$

ASD Method

From Table 6.5, for dead load plus occupancy live load, the load duration factor is

$$C_D = 1.00$$

The adjusted allowable lateral design value is

$$\begin{aligned} Z'_\perp &= Z_\perp C_M C_g C_\Delta C_i C'_D \\ &= (800 \text{ lbf})(1.0)(1.0)(1.0)(1.0)(1.00) \\ &= 800 \text{ lbf} \end{aligned}$$

The maximum allowable load that the ledger can support is

$$\begin{aligned} w &= \frac{Z'_\perp}{4} = \frac{800 \text{ lbf}}{4 \text{ ft}} \\ &= 200 \text{ lbf/ft} \end{aligned}$$

LRFD Method

From Table 6.4, for dead load plus occupancy live load, the time effect factor is

$$\lambda = 0.8$$

From NDS Table 11.3.1, the format conversion factor is

$$K_F = 3.32$$

The resistance factor given by NDS Table 11.3.1 is

$$\phi = 0.65$$

The adjusted factored lateral design value is

$$\begin{aligned} Z'_\perp &= Z_\perp C_M C_g C_\Delta C_i K_F \lambda \phi \\ &= (800 \text{ lbf})(1.0)(1.0)(1.0)(1.0)(3.32)(0.8)(0.65) \\ &= 1381 \text{ lbf} \end{aligned}$$

The maximum strength level load that the ledger can support is

$$w = \frac{Z'_\perp}{4} = \frac{1381 \text{ lbf}}{4 \text{ ft}} = 345 \text{ lbf/ft}$$

Double Shear Connection

Reference design values for double shear connections are tabulated in NDS Table 12F for three sawn lumber members of identical species, in NDS Table 12G for a

DDA ENGINEERS, P.A.
1930 S.W. 74th CT. MIAMI, FLORIDA 33155
(305) 666-0711 FAX (305) 666-5259

PROJECT Matzner Park SUBJECT Rafter connection to hip rafter & to perimeter. SHEET NO. ____ OF ____

BY ____ DATE Nov. 14/24. JOB NO. ____

CHKD. BY ____ DATE ____

- for Rafter Connection to hip rafter.

$C_M = 1$ $C_g = 0.97$ (two lag screws).

$$Z'_\perp = Z_\perp \times C_M C_g C_\Delta C_e K_F \lambda \phi \times 4 = 276 \times 4 = 1104\#$$

(200 for 5/8 lag screw. (will use 4 of them). 4 screws. 0.8 for 4 screws. 3.32 0.9 0.65)

1104 >> 270 lb ok.

↑ Lag. 4 screws.

Rafter Connection to perimeter beam

550 for 1/2 ϕ bolt.

$$Z'_\perp = Z_\perp C_M C_g C_\Delta C_e K_F \lambda^{0.8} \phi^{0.65} = 921 \text{ lb} > 392 \text{ lb (PS)}$$

3.32

OK.

Perimeter Beams to base plate

$$Z'_\perp = Z_\perp C_M C_g C_\Delta C_e K_F \lambda \phi \times 2 \text{ bolts} = 2210 \text{ lb} > 1826 \text{ uplift}$$

660 (3/4" bolt) 0.97 3.32 0.9 0.65

OK

Use 2 – 3/4" ϕ through bolts.

w_2 (For uplift)

D = 8.5' × 10PSF = 85 PLF. ÷2 0.043 KLF

W = 8.5' × (±60) = 510PLF ÷2 0.255KLF } w_2

Lr = 8.5' × 20 = 170 PLF ÷2 0.085

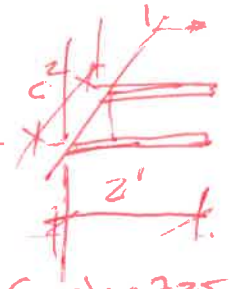
Used on ENERCALC.

approx tw.

D = 3' × 10 = 30 PLF

W = 3' × ±60 = 180 PLF } w_1

Lr = 3' × 20 = 60 PLF.

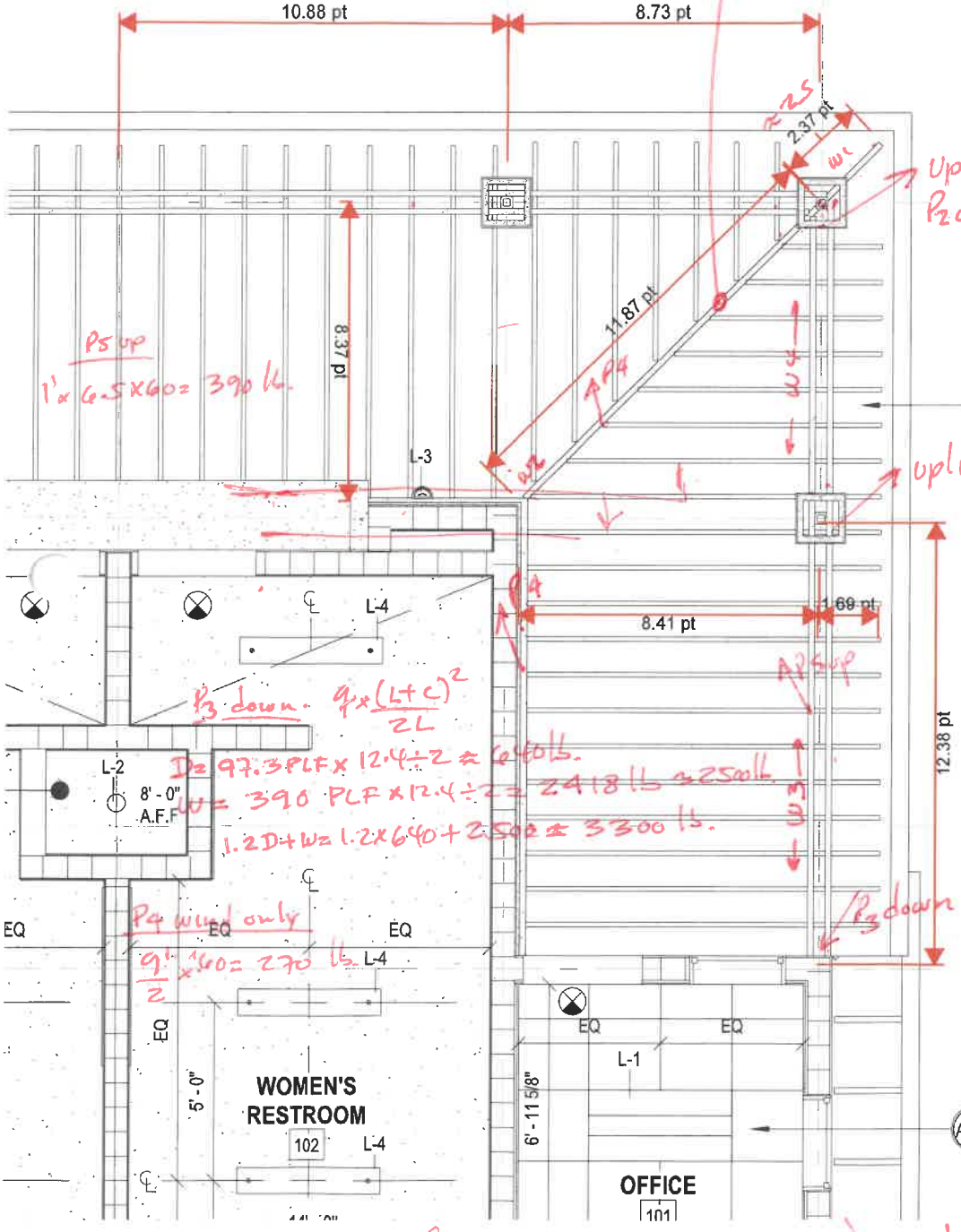


$C^2 = 2 \times 1.17^2$

$C = \sqrt{2.74} = 1.65$

$(2+2) \times 0.735 = 2.92 \approx 3'$ TW

or $\frac{3.73}{11.87} = 0.735$



P_2 (uplift) (0.9D − 1W)

$(0.9 \cdot 85PLF - 510) \cdot \frac{1}{2} 12' +$

$2.5' \times (0.9 \cdot 30 - 180) = -866 - 383$

$= -1250$ lb.

not governs. uplift ultimate to check bolts.

Uplift P_2 up

P_5 up

$1' \times 6.5 \times 60 = 390$ lb.

uplift reaction P_1 up

w_3 $\frac{7 \times (L+c)^2}{2L}$

$D = 15 \cdot \frac{(8.5+2)^2}{6.5} \div (2 \cdot 8.5) = 97.3$ PLF

$Lr = 6.5 \times 20 = 130$ PLF

$W = 6.5 \times 60 = 390$ PLF

2 Beams on perimeter.

D = 97 ÷ 2 = 0.048 KLF

Lr = 130 ÷ 2 = 0.065 KLF

W = 390 ÷ 2 = 0.195 KLF

P_3 down. $\frac{9 \times (L+c)^2}{2L}$

D = 97.3PLF × 12.4 ÷ 2 ≈ 640 lb.

W = 390 PLF × 12.4 ÷ 2 = 2418 lb ≈ 2500 lb

1.2D + W = 1.2 × 640 + 2500 ≈ 3300 lb.

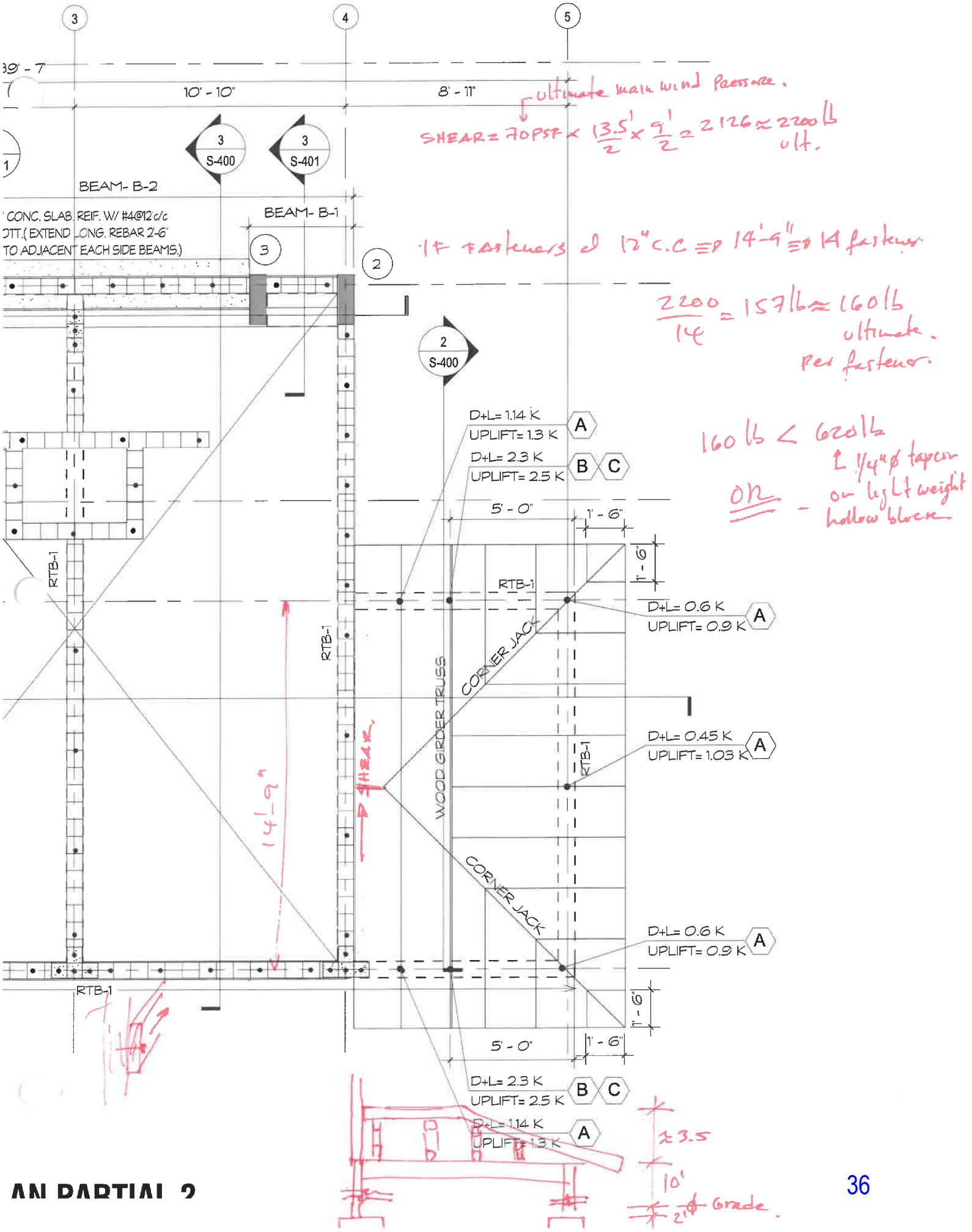
P_4 wind only

$\frac{9'}{2} \times 60 = 270$ lb.

$P_1 up = 0.9D - 1W = (0.9 \times 97PLF - 1 \times 390 PLF) \times 12' \div 2) = -1816$ lb total for both beams. ultimate.

↑ uplift.

Governs check two bolts with this value for 2x12 perimeter beam and same for 3x8 Hip rafter).



ultimate main wind pressure.

SHEAR = 70PSF × $\frac{13.5'}{2}$ × $\frac{9'}{2}$ = 2126 ≈ 2200 lb ult.

14 fasteners @ 12" c.c ⇒ 14'-9" ⇒ 14 fasteners

$\frac{2200}{14}$ = 157 lb ≈ 160 lb ultimate. per fastener.

160 lb < 620 lb

1 1/4" ϕ tapcon on light weight hollow block

AN PARTIAL 2

DDA ENGINEERS, P.A.
7930 S.W. 74th CT. MIAMI, FLORIDA 33155
(305) 666-0711 FAX (305) 666-5259

PROJECT _____ SUBJECT Ledger SHEAR SHEET NO. ____ OF ____

BY _____ DATE _____ JOB NO. _____

CHKD. BY _____ DATE _____

1- 1/4"ϕ fastener SHEAR ON WOOD = $Z_{||}$ C_M C_g C_Δ K_F λ ϕ z

(140, 1, 0.88, 1, 3.32, 0.8, 0.65)

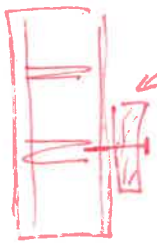
= 140 x 1 x 0.88 x 1 x 3.32 x 0.8 x 0.65 = 212 lb. > 160 lb per fastener OK

ultimate capacity on wood.

Force per screw. See calcs. two pages ahead

1

For 1/4" ϕ screw.



OK

See table next pag.

Nails take 66 lb

$\therefore$ Spacing = $\frac{14'}{2200/66}$ = 0.42' = 5" .1

use nails @ 4" c.c.

ULTIMATE TENSION AND SHEAR VALUES (LBS/KN) IN CONCRETE

ANCHOR DIA In.(mm)	MIN. DEPTH OF EMBEDMENT In.(mm)	f' c = 2000 PSI (13.8 MPa)		f' c = 3000 PSI (20.7 MPa)		f' c = 4000 PSI (27.6 MPa)		f' c = 5000 PSI (34.5 MPa)	
		TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/16 (4.8)	1 (25.4)	600 (2.7)	720 (3.2)	625 (2.8)	720 (3.2)	650 (2.9)	720 (3.2)	800 (3.6)	860 (3.8)
	1-1/4 (31.8)	845 (3.7)	720 (3.2)	858 (3.8)	720 (3.2)	870 (3.9)	720 (3.2)	1,010 (4.5)	860 (3.8)
	1-1/2 (38.1)	1,090 (4.8)	860 (3.8)	1,090 (4.8)	860 (3.8)	1,090 (4.8)	860 (3.8)	1,220 (4.8)	860 (3.8)
	1-3/4 (44.5)	1,450 (6.5)	870 (3.9)	1455 (6.5)	870 (3.9)	1,460 (6.5)	990 (4.4)	1,730 (7.7)	990 (4.4)
1/4 (6.4)	1 (25.4)	750 (3.3)	900 (4.0)	775 (3.4)	900 (4.0)	800 (3.6)	1,360 (6.1)	950 (4.2)	1,440 (6.4)
	1-1/4 (31.8)	1,050 (4.7)	900 (4.0)	1,160 (5.2)	900 (4.0)	1,270 (5.6)	1,360 (6.1)	1,515 (6.7)	1,440 (6.4)
	1-1/2 (38.1)	1,380 (6.1)	1,200 (5.3)	1,600 (7.2)	1,200 (5.3)	1,820 (8.1)	1,380 (6.1)	2,170 (9.7)	1,670 (7.4)
	1-3/4 (44.5)	2,020 (9.0)	1,670 (7.4)	2,200 (9.8)	1,670 (7.4)	2,380 (10.6)	1,670 (7.4)	2,770 (12.3)	1,670 (7.4)

Safe working loads for single installation under static loading should not exceed 25% of the ultimate load capacity.

ULTIMATE TENSION AND SHEAR VALUES (LBS/KN) IN HOLLOW BLOCK

ANCHOR DIA In.(mm)	ANCHOR EMBEDMENT In.(mm)	LIGHTWEIGHT BLOCK		MEDIUM WEIGHT BLOCK	
		TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/16 (4.8)	1 (25.4)	220 (1.0)	400 (1.8)	340 (1.5)	730 (3.2)
1/4 (6.4)	1 (25.4)	250 (1.1)	620 (1.8)	500 (2.2)	1,000 (4.4)

Safe working loads for single installation under static loading should not exceed 25% of the ultimate load capacity.
NOTE: 3/16" Tapcon requires 5/32" bit, 1/4" Tapcon requires 3/16" bit.

ALLOWABLE EDGE AND SPACING DISTANCES

PARAMETER	ANCHOR DIA. In.(mm)	NORMAL WEIGHT CONCRETE			CONCRETE MASONRY UNITS (CMU)		
		FULL CAPACITY (Critical Distance Inches)	REDUCED CAPACITY (Minimal Distnce Inches)	LOAD REDUCTION FACTOR	FULL CAPACITY (Critical Distance Inches)	REDUCED CAPACITY (Minimal Distance Inches)	LOAD REDUCTION FACTOR
Spacing Between Anchors - Tension	3/16 1/4	3 4	1-1/2 2	0.73 0.66	3 4	1-1/2 2	1.00 0.84
Spacing Between Anchors - Shear	3/16 1/4	3 4	1-1/2 2	0.83 0.82	3 4	1-1/2 2	1.00 0.81
Edge Distance - Tension	3/16 1/4	1-7/8 2-1/2	1 1-1/4	0.83 0.82	3 4	2 2	0.91 0.81
Edge Distance - Shear	3/16 1/4	2-1/4 3	1-1/8 1-1/2	0.70 0.59	3 4	2 2	0.93 0.80

For SI: 1 inch = 25.4 mm

NAILS

Table 11Q COMMON WIRE, BOX, or SINKER NAILS: Reference Lateral Design Values (Z) for Single Shear (two member) Connections[1,2,3,4]

with wood structural panel side members with an effective G = 0.50

Side Member Thickness t_s	Nail Diameter D	Common Wire Nail	Box Nail	Sinker Nail	G=0.67 Red Oak	G=0.55 Mixed Maple, Southern Pine	G=0.5 Douglas Fir-Larch	G=0.49 Douglas Fir-Larch (N)	G=0.46 Douglas Fir(S) Hem-Fir(N)	G=0.43 Hem-Fir	G=0.42 Spruce-Pine-Fir	G=0.37 Redwood (open grain)	G=0.36 Eastern Softwoods Spruce-Pine-Fir(S) Western Cedars Western Woods	G=0.35 Northern Species
in.	in.	Pennyweight			lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
3/8	0.099		6d	7d	47	45	43	43	42	40	40	38	37	37
	0.113	6d	8d	8d	60	56	54	54	52	51	50	47	47	46
	0.120			10d	67	62	60	60	58	56	56	52	52	51
	0.128		10d		75	70	68	67	65	63	63	59	58	57
	0.131	8d			78	73	71	70	68	66	65	61	61	60
	0.135		16d	12d	83	78	75	74	72	70	69	65	64	63
	0.148	10d	20d	16d	94	88	85	84	82	79	78	73	72	71
7/16	0.099		6d	7d	50	47	45	45	44	43	42	40	40	39
	0.113	6d	8d	8d	62	58	56	56	55	53	52	49	49	48
	0.120			10d	69	65	63	62	60	59	58	55	54	53
	0.128		10d		77	72	70	69	68	66	65	61	60	59
	0.131	8d			80	75	73	72	70	68	67	63	63	62
	0.135		16d	12d	85	80	77	76	74	72	71	67	66	65
	0.148	10d	20d	16d	96	90	87	86	84	81	80	76	75	73
	0.162	16d	40d		114	106	102	101	99	96	95	89	88	86
15/32	0.099		6d	7d	51	48	47	46	45	44	44	41	41	40
	0.113	6d	8d	8d	64	60	58	57	56	54	54	51	50	49
	0.120			10d	70	66	64	63	62	60	59	56	55	54
	0.128		10d		78	74	71	71	69	67	66	62	62	61
	0.131	8d			82	77	74	73	72	70	69	65	64	63
	0.135		16d	12d	86	81	78	77	76	73	72	68	67	66
	0.148	10d	20d	16d	97	91	88	87	85	83	82	77	76	75
	0.162	16d	40d		115	108	104	103	100	97	96	90	89	88
19/32	0.099		6d	7d	58	55	53	53	51	50	50	47	46	46
	0.113	6d	8d	8d	70	66	64	64	62	61	60	57	56	55
	0.120			10d	77	73	70	70	68	66	66	62	61	60
	0.128		10d		85	80	78	77	75	73	72	68	68	67
	0.131	8d			88	83	80	80	78	76	75	71	70	69
	0.135		16d	12d	93	87	84	84	82	79	79	74	73	72
	0.148	10d	20d	16d	104	98	95	94	92	89	88	83	82	81
	0.162	16d	40d		121	114	110	109	107	103	102	96	95	94
	0.177			20d	137	128	124	123	120	116	115	108	107	105
	0.192	20d		30d	142	133	128	127	124	120	119	112	111	109
23/32	0.099		6d	7d	62	58	55	55	53	51	51	47	47	46
	0.113	6d	8d	8d	78	74	72	71	69	67	66	62	61	60
	0.120			10d	85	80	78	77	76	73	73	69	68	67
	0.128		10d		93	88	85	85	83	80	80	75	75	74
	0.131	8d			96	91	88	87	86	83	82	78	77	76
	0.135		16d	12d	101	95	92	91	89	87	86	81	81	79
	0.148	10d	20d	16d	113	106	103	102	100	97	96	91	90	89
	0.162	16d	40d		130	122	118	117	115	111	110	104	103	102
	0.177			20d	145	137	132	131	128	124	123	116	115	113
	0.192	20d		30d	150	141	136	135	132	128	127	120	118	116
1	0.099[5]		6d	7d	62	58	55	55	53	51	51	47	47	46
	0.113[5]	6d[4]	8d	8d	81	75	72	71	69	67	66	62	61	60
	0.120[5]			10d	92	85	81	81	78	76	75	69	69	67
	0.128		10d		104	97	93	92	89	86	85	79	78	77
	0.131	8d			109	101	97	96	93	90	89	83	82	80
	0.135		16d	12d	116	108	103	102	99	96	94	88	87	85
	0.148	10d	20d	16d	132	123	118	116	113	109	108	100	99	97
	0.162	16d	40d		154	146	141	139	135	131	129	120	119	116
	0.177			20d	169	160	155	154	151	146	145	137	136	134
	0.192	20d		30d	174	164	159	158	155	150	149	141	140	138
1-1/8	0.128[5]		10d		104	97	93	92	89	86	85	79	78	77
	0.131[5]	8d			109	101	97	96	93	90	89	83	82	80
	0.135[6]		16d	12d	116	108	103	102	99	96	94	88	87	85
	0.148[6]	10d	20d	16d	132	123	118	116	113	109	108	100	99	97
	0.162	16d	40d		158	147	141	139	135	131	129	120	119	116
	0.177			20d	181	170	163	161	157	151	149	139	137	135
	0.192	20d		30d	186	176	170	168	163	157	155	145	143	140
1-1/4	0.148	10d	20d	16d	132	123	118	116	113	109	108	100	99	97
	0.162	16d	40d		158	147	141	139	135	131	129	120	119	116
	0.177			20d	183	170	163	161	157	151	149	139	137	135
	0.192	20d		30d	191	177	170	168	163	157	155	145	143	140

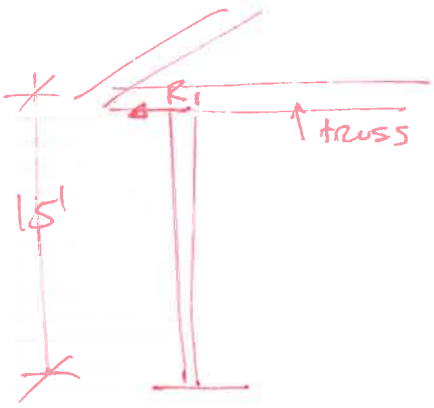
1. Tabulated lateral design values (Z) shall be multiplied by all applicable adjustment factors (see Table 10.3.1).
2. Tabulated lateral design values (Z) are for common wire, box, and sinker nails (see Appendix L) inserted in side grain with nail axis perpendicular to wood fibers; minimum nail penetration, p, into the main member equal to 10D and nail bending yield strengths (F_{yb}): F_{yb} = 100,000 psi for 0.099" ≤ D ≤ 0.142"; F_{yb} = 90,000 psi for 0.142" < D ≤ 0.177"; F_{yb} = 80,000 psi for 0.177" < D ≤ 0.236"
3. When 6D ≤ p < 10D, tabulated lateral design values (Z) shall be multiplied by p/10D.
4. Nail length is insufficient to provide 10D penetration. Tabulated lateral design values (Z) shall be adjusted per footnote 3.
5. Tabulated lateral design values (Z) shall be permitted to apply for greater side member thickness when adjusted per footnote 3.

DDA ENGINEERS, P.A.
4930 S.W. 74th CT. MIAMI, FLORIDA 33155
(305) 666-0711 FAX (305) 666-5259

PROJECT _____ SUBJECT Wall Top React. SHEET NO. ____ OF ____

BY _____ DATE _____ JOB NO. _____

CHKD. BY _____ DATE _____

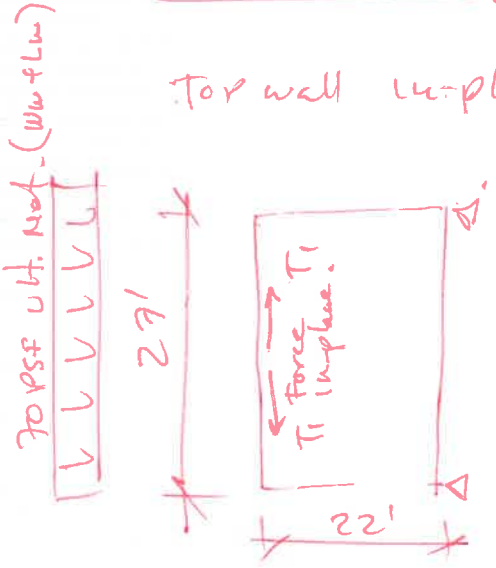


truss spacing.

$R_1 = \frac{15'}{2} \times 40 \times 2' = 600\ lb.$ service out of plane.

$\frac{L^2}{3} = \frac{15^2}{3} = 75\ SF \Rightarrow$ Wind = $-66\ PSF \times 0.6 = 40\ PSF$ Net Service.

Top wall in-plane force.



$UDL = 70 \times \left(\frac{15}{2} + 3.5'\right) = 770\ PLF.\ ult.$
462 PLF serv.

$M = \frac{462 \times 27^2}{8} = 42.1\ K\text{-}F.$

$T_1 = \frac{42.1\ K\text{-}F}{22'} = 1.92\ k.$

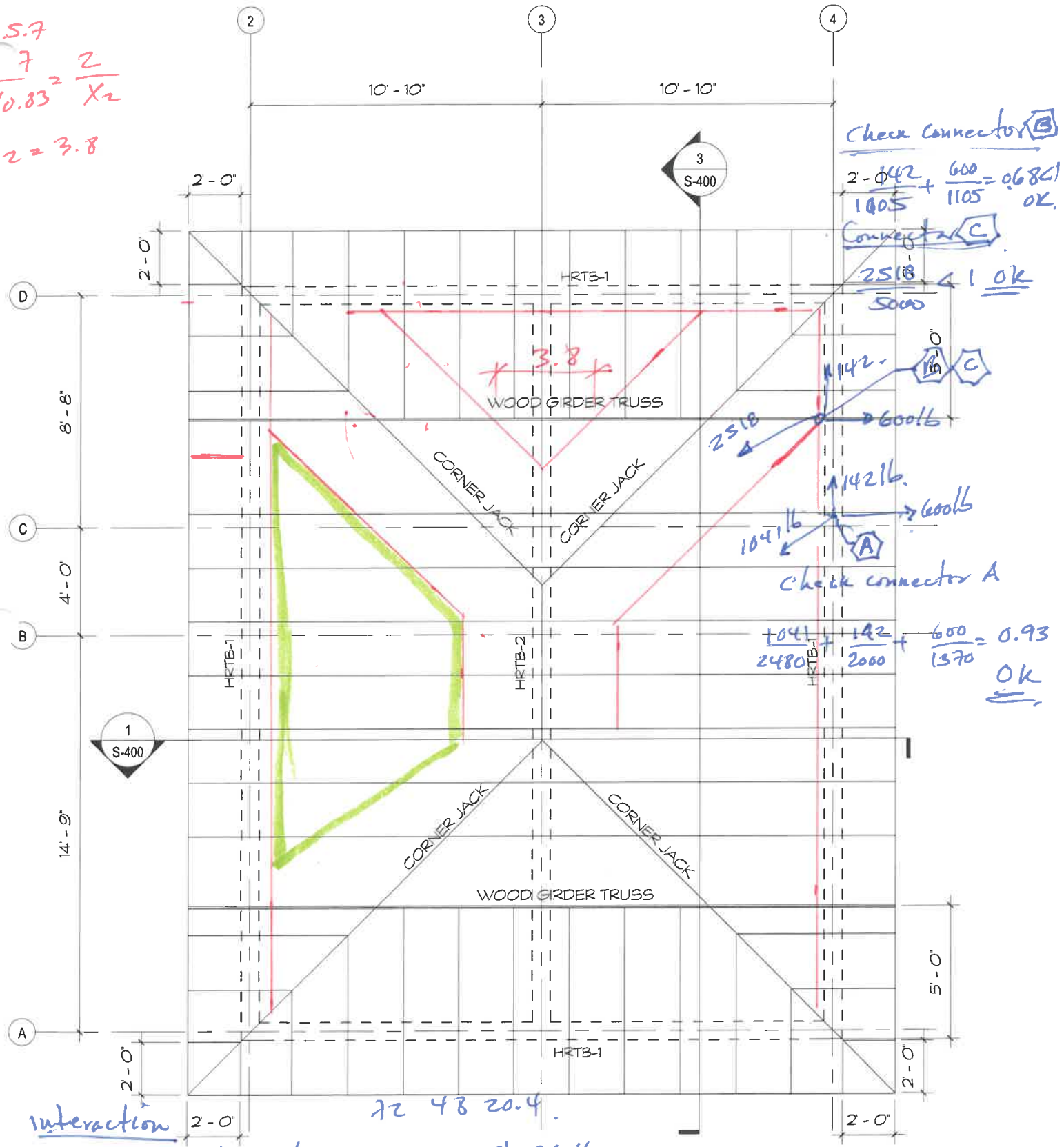
truss spacing.

$\frac{1.92}{27} \times 2' = 0.142\ k = 142\ lb.$ per connection. Service.

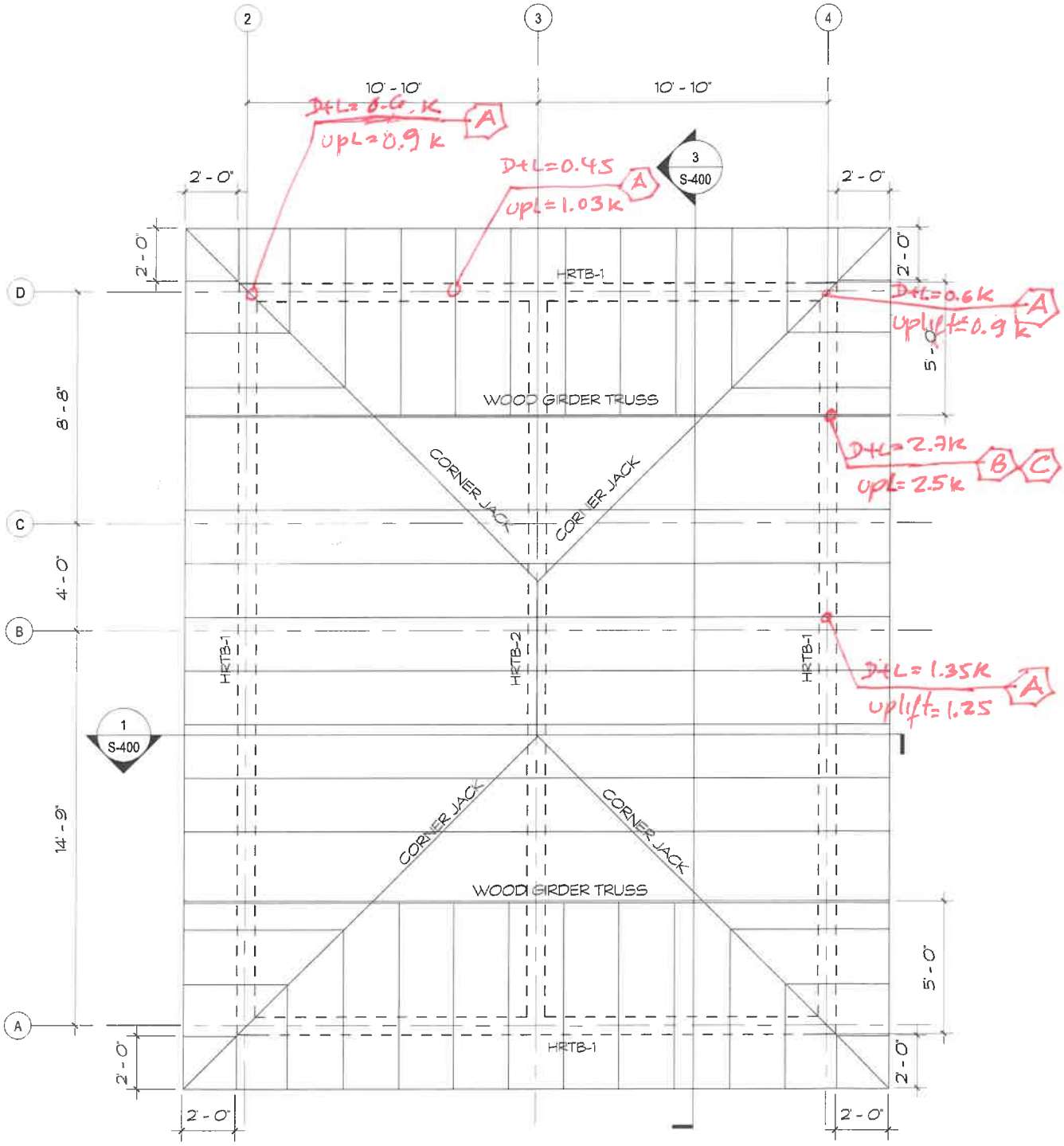
$\frac{5.7}{10.83} = \frac{x}{3'}$ $x = 1.6$

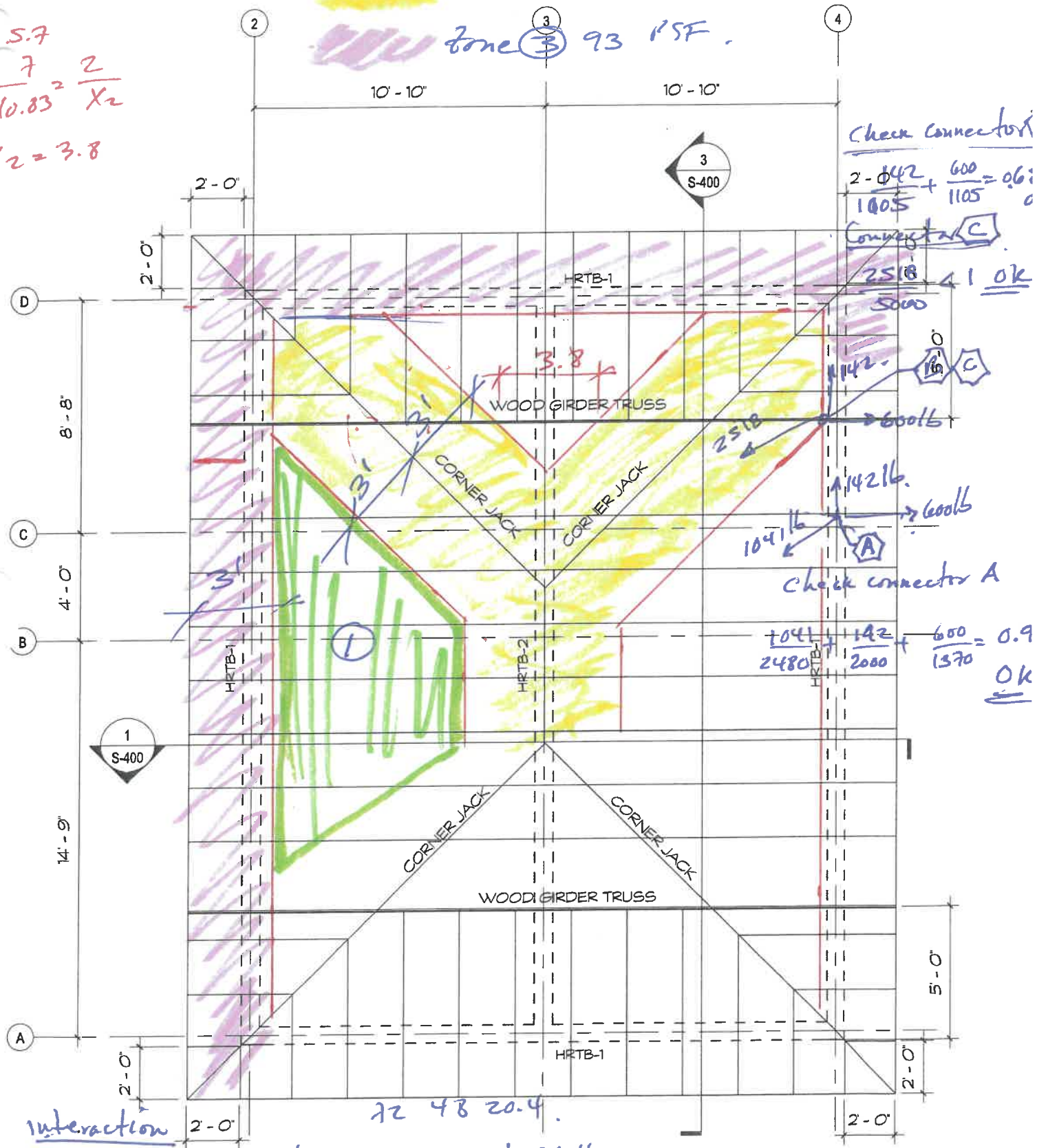
$\frac{5.7}{10.83^2} = \frac{2}{x_2}$

$x_2 = 3.8$



1 ROOF FRAMING PLAN PARTIAL 1


2
3
4
10' - 10"
10' - 10"
D+L= 8.6 K
upL=0.9 k
A
D+L=0.45
A
upL=1.03k
3
S-400
2' - 0"
2' - 0"
2' - 0"
D
HRTB-1
D+L=0.6k
A
uplift=0.9 k
5' - 0"
8' - 8"
WOOD GIRDER TRUSS
CORNER JACK
CORNER JACK
D+L=2.7k
B
C
upL=2.5k
C
4' - 0"
B
HRTB-1
HRTB-2
HRTB-1
D+L=1.35K
A
uplift=1.25
1
S-400
14' - 9"
CORNER JACK
CORNER JACK
WOOD GIRDER TRUSS
5' - 0"
A
HRTB-1
2' - 0"
2' - 0"
2' - 0"
2' - 0"



5.7 / 10.83 = x / 3' x = 1.6

5.7 / 7 / 10.83² 2 / X2

X2 = 3.8

Zone (1) 63 PSF.

Zone (2) 84 PSF

Zone (3) 93 PSF.

Check Connector C

2 - Φ42 / 1605 + 600 / 1105 = 0.6

Connector C

2518 < 5000 Ok

1421 < 6000lb

Check connector A

1041 / 2480 + 1421 / 2000 + 600 / 1370 = 0.9

Ok

72 48 20.4.

Interaction

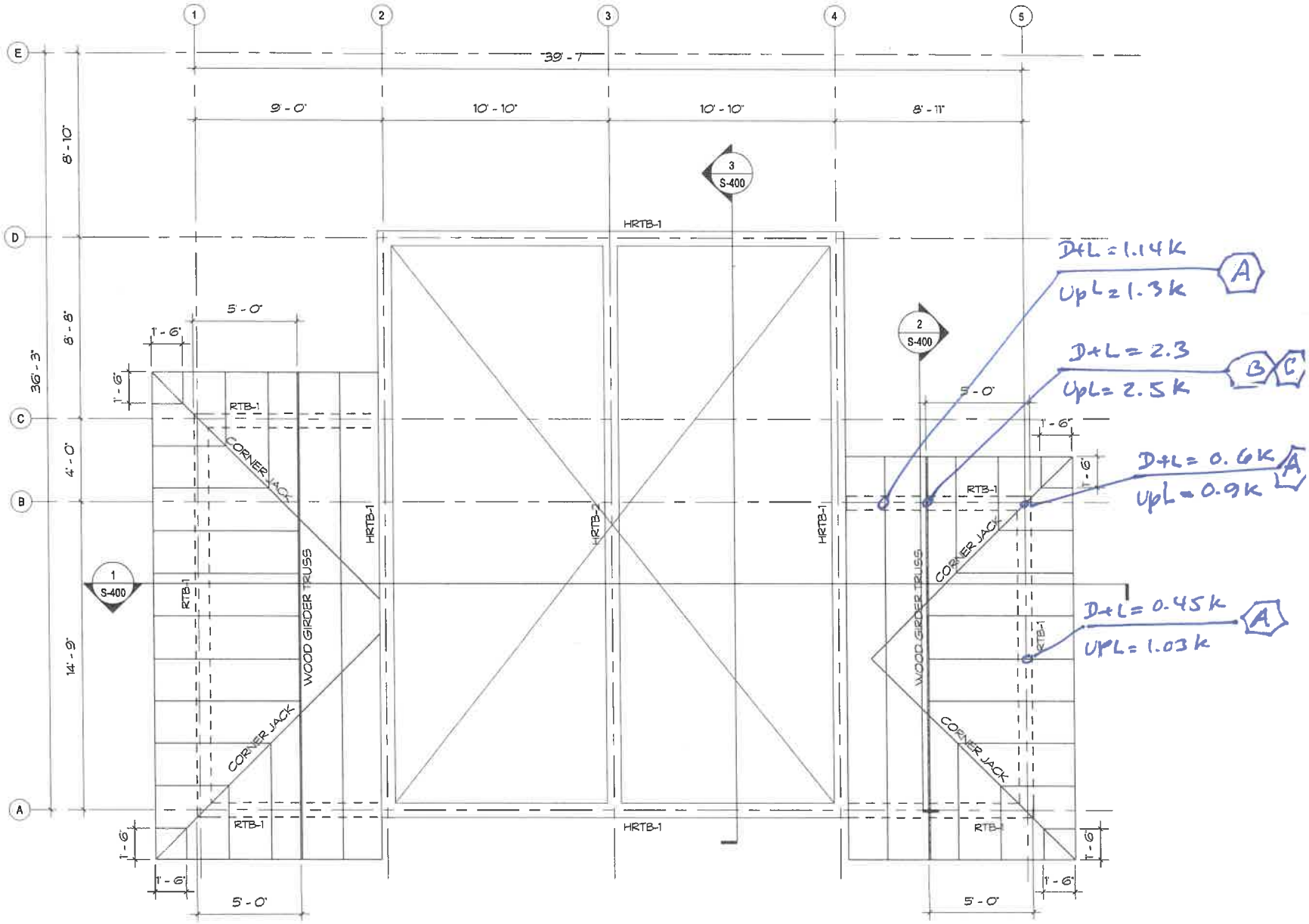
T2=0 0-10' from edge - 72 x 0.6 x 2' = 86.4

10-12 - 48 x 0.6 x 2' = 58

0-12 - 20.4 x 0.6 x 2' = 25

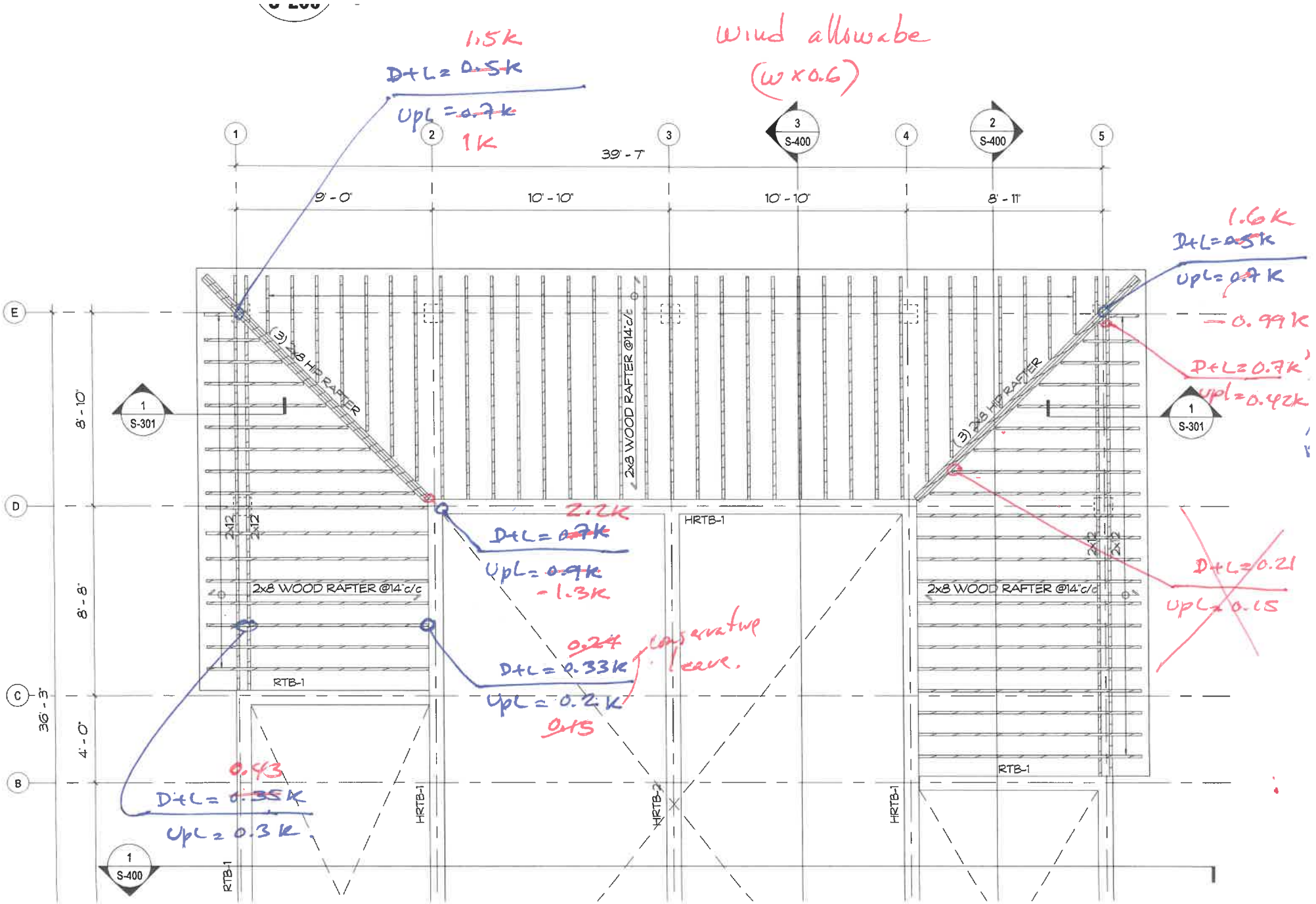
overhang. 81 x 0.6 x 2 = 98

1 ROOF FRAMING PLAN PARTIAL 1



2 ROOF FRAMING PLAN PARTIAL 2

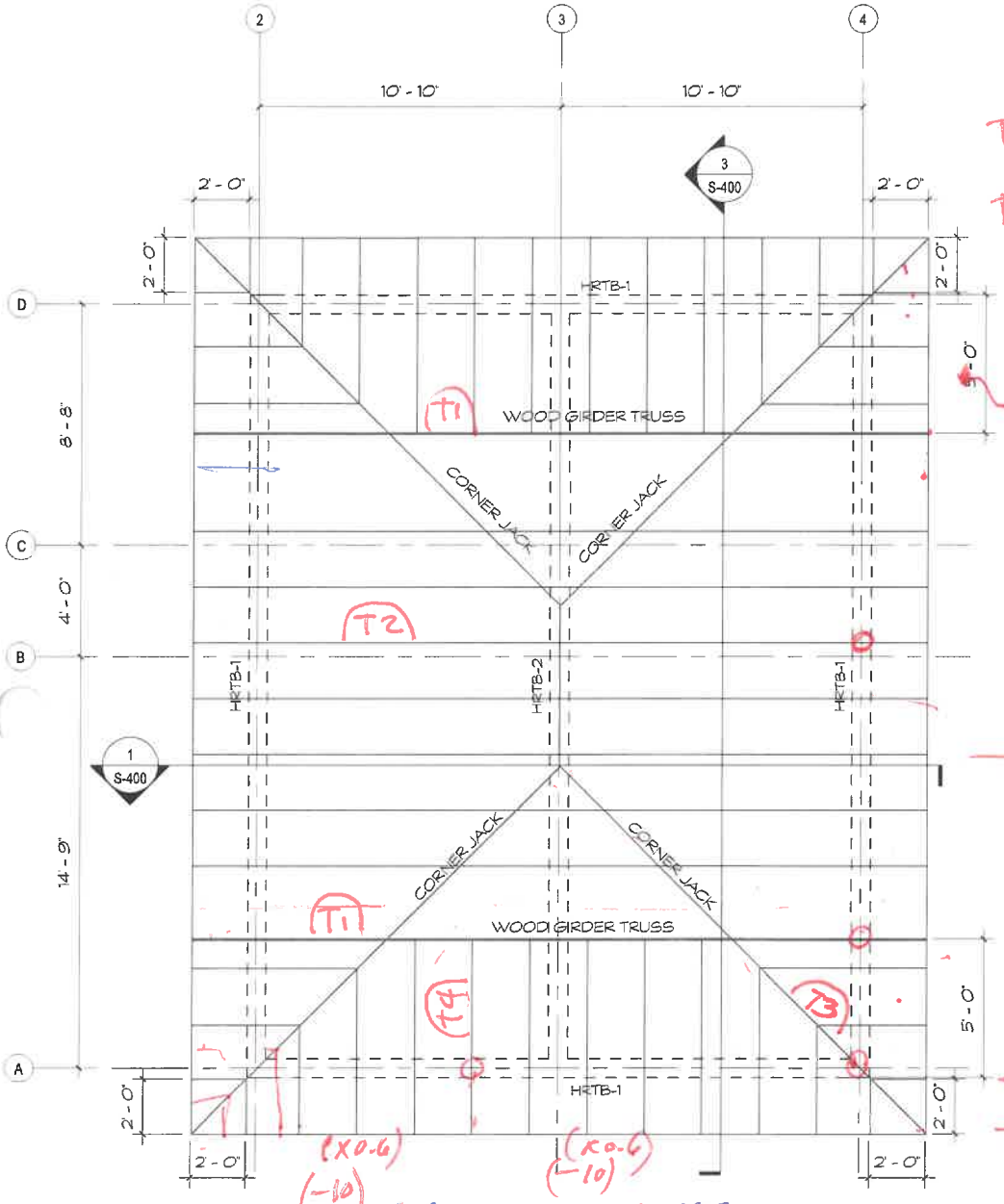
S-200 Scale: 1/4" = 1'-0"


1.5k
D+L= 0.5k
Upl = 0.7k
1k
Wind allowable
(w x 0.6)
39' - 7"
9' - 0"
10' - 10"
10' - 10"
8' - 11"
1.6k
D+L=0.5k
Upl=0.9k
=0.99k
D+L=0.7k
upl=0.42k
(3) 2x8 HIP RAFTER
2x8 WOOD RAFTER @14"c/c
HRTB-1
2.2k
D+L= 0.7k
Upl= 0.9k
-1.3k
0.24
D+L = 0.33k
Upl = 0.2k
0.15
conservative
case.
D+L=0.21
Upl=0.15
0.43
D+L= 0.35k
Upl = 0.3k
RTB-1
HRTB-2
8' - 10"
8' - 8"
4' - 0"
36' - 3"
2x12
2x6
1 S-301
1 S-400
3 S-400
2 S-400

Uplift reaction

Combo 0.6D + 0.6W = (W − 10 PSF) × 0.6

↑ 10 PSF



T.A

$T_1 = \left(\frac{2'}{2} + \frac{5'}{2}\right) \cdot (22' + 4) = 91\ SF$

$T_2 = 2' \times (22 + 2) = 48\ SF$

$T_3 = \frac{X' \times 10.9'}{3} =$ ~~TOO ER~~ (Use T_4 area)

$T_4 = 2' \times 5' + 2 \times 2' = 14\ SF.$

$\times 6'$

LIVE + DEAD

20 + 30 = 50 PSF.

Reactions:

$T_1 = \left(\frac{22 + 2.5}{2}\right) \times 50 \times 4' = 2.7K$

$T_2 = 13.5 \times 50 \times 2' = 1.35\ K$

$T_3 = \frac{1}{6} \times 50 \times 6' \times 6' + \underbrace{50 \times 2' \times 3'}_{cant.}$

$= 0.6\ K.$

11' $T_4 = \left(\frac{5'}{2} + 2'\right) \times 50 \times 2' = 0.45K$

2'

T_4 UDL = ? $Z_2 = 2 \times \frac{(\times 0.6)}{(-10)} 150 = 168$ $Z_3 = 162 \times 2' = 183$

1 ROOF FRAMING PLAN PARTIAL 1

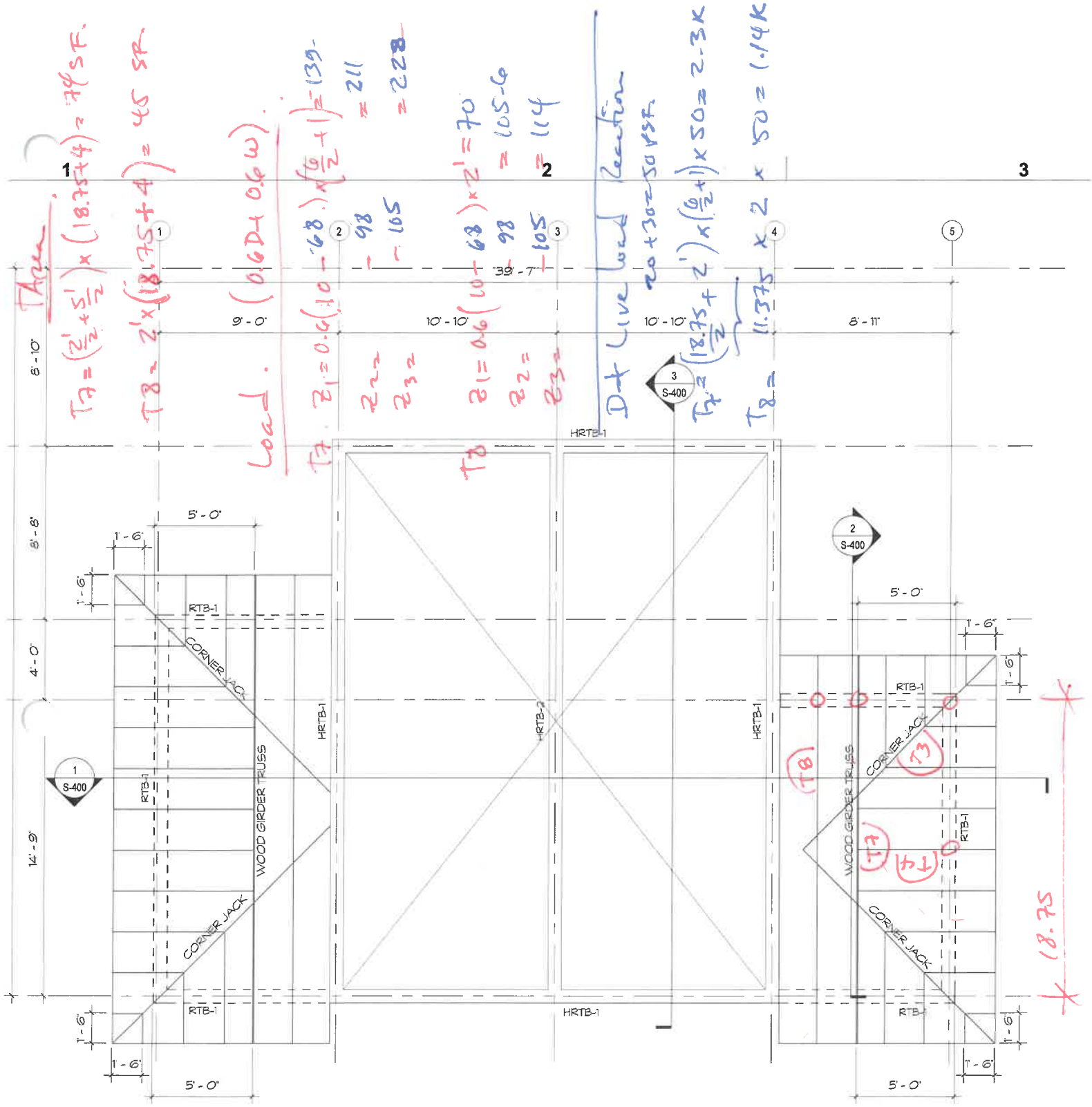
S-200 Scale: 1/4" = 1'-0"

T_1 UDL = ? $Z_1 = \left(\frac{6'}{2} + \underbrace{1'}_{4'}\right) \times \frac{(\times 0.6)}{(-10)} 62 = 125$ $Z_2 = 4' \times \frac{(\times 0.6)}{(-10)} 92 = 147$ $Z_3 = 4' \times \frac{(\times 0.6)}{(-10)} 98 = 211$

T_2 UDL = $Z_1 = 2' \times \frac{(\times 0.6)}{(-10)} 62 = 62.4$ $Z_2 = 2 \times \frac{(\times 0.6)}{(-10)} 91.6 = 98.$ $Z_3 = 2 \times \frac{(\times 0.6)}{(-10)} 98 = 105.6$

T_3 UDL: $Z_2 = \frac{5'}{2} \times \frac{(\times 0.6)}{(-10)} 150 = 210$ $Z_3 = \frac{(\times 0.6)}{(-10)} 162 \cdot \frac{2.5}{2} = 114$ cantilev $Z_3 = 2 \times \frac{(\times 0.6)}{(-10)} 162 = 183$

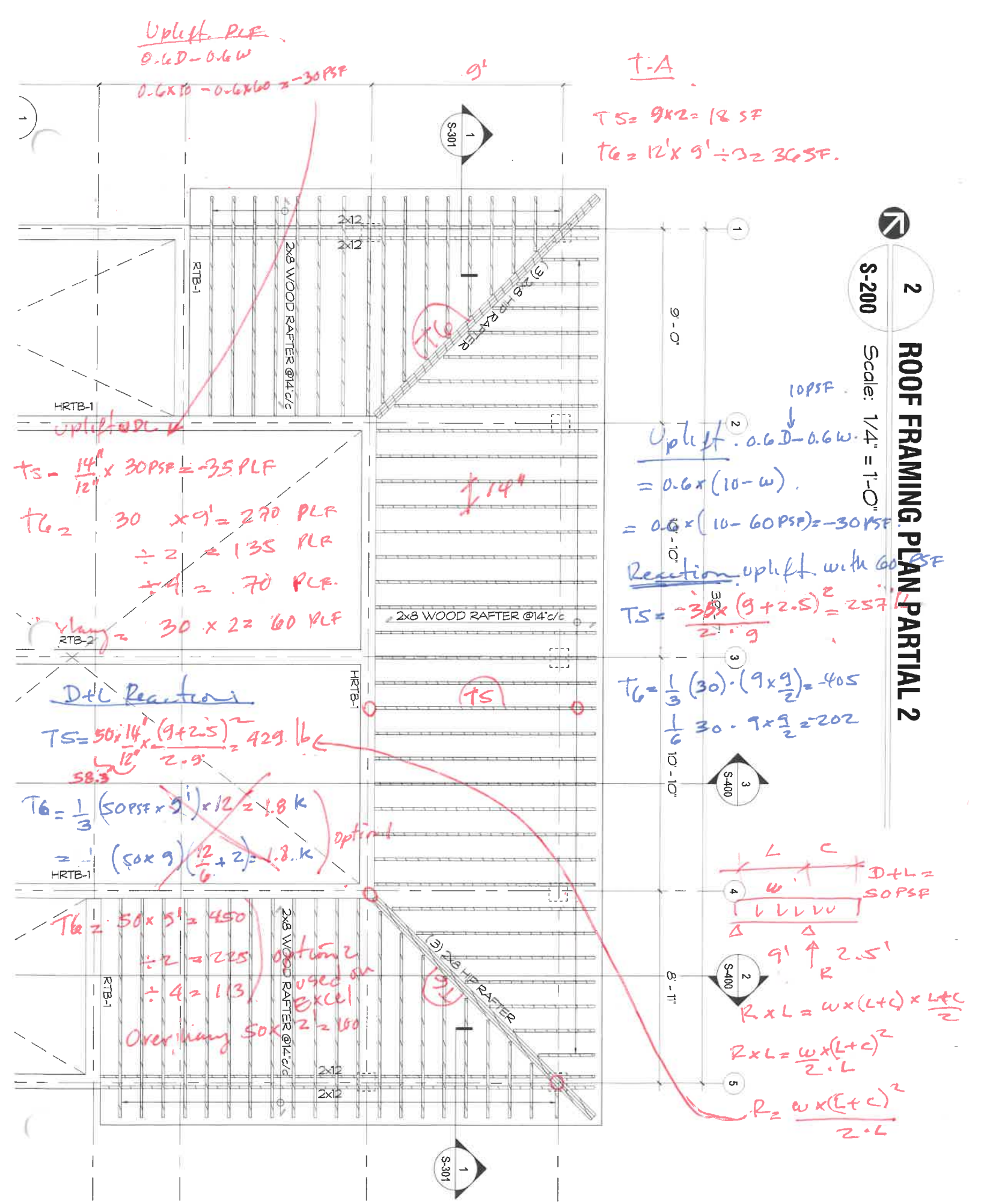
$Z_3 = \frac{(\times 0.6)}{(-10)} 162 \times \frac{2.5}{2} = 57$



2 ROOF FRAMING PLAN PARTIAL 2

S-200

Scale: 1/4" = 1'-0"

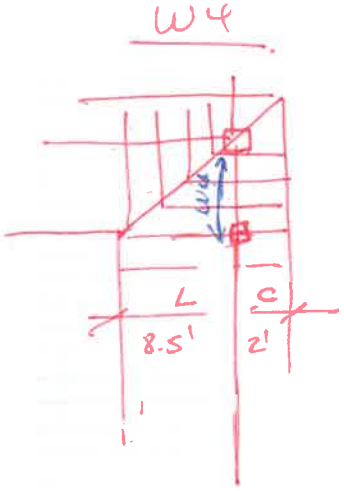

Uplift PLF
0.6D - 0.6W
0.6x10 - 0.6x60 = -30PSF
9'
T-A
TS = 9x2 = 18 SF
T6 = 12'x 9' ÷ 3 = 36 SF.
2x12
2x12
RTB-1
2x8 WOOD RAFTER @14"c/c
(3) 2x8 HIP RAFTER
T6
9' - 0"
HRTB-1
uplift @ DL
TS = 14"/12" x 30PSF = -35 PLF
T6 = 30 x 9' = 270 PLF
÷ 2 = 135 PLF
÷ 4 = 70 PLF.
Overhang = 30 x 2 = 60 PLF
RTB-2
14"
2x8 WOOD RAFTER @14"c/c
HRTB-1
TS
D+L Reaction
TS = 50 x 14"/12" x (9+2.5)/2.9 = 429 lb
58.3
T6 = 1/3 (50PSF x 9') x 12 = 1.8 k
= 1/6 (50 x 9)(12/6 + 2) = 1.8 k
optional
HRTB-1
T6 = 50 x 9' = 450
÷ 2 = 225
÷ 4 = 113
Overhang 50 x 2 = 100
optional
used on excel
RTB-1
2x8 WOOD RAFTER @14"c/c
(3) 2x8 HIP RAFTER
2x12
2x12
10' - 10"
10' - 10"
8' - 11"
1
S-301
1
S-301
1
S-200
2
ROOF FRAMING PLAN PARTIAL 2
Scale: 1/4" = 1'-0"
10PSF
Uplift: 0.6D - 0.6W
= 0.6 x (10 - W)
= 0.6 x (10 - 60PSF) = -30PSF
Reaction uplift with 60 PSF
TS = -30 x (9+2.5)²/(2·9) = 257
T6 = 1/3 (30) · (9 x 9/2) = 405
1/6 30 · 9 x 9/2 = 202
3
S-400
L
C
D+L = 50PSF
W
4
9'
2.5'
R
2
S-400
R x L = W x (L+C) x (L+C)/2
R x L = W/(2·L) x (L+C)²
R = W x (L+C)²/(2·L)
5

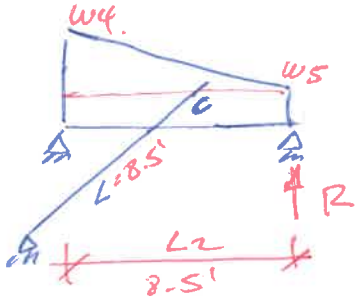
DDA ENGINEERS, P.A.
4930 S.W. 74th CT. MIAMI, FLORIDA 33155
(305) 666-0711 FAX (305) 666-5259

PROJECT Matzner Park SUBJECT Perimeter Beam Corner UDL. SHEET NO. ____ OF ____

BY ____ DATE ____ JOB NO. ____

CHKD. BY ____ DATE ____





Service Reaction 0.6D+0.6W - 0.6D-0.6W. uplift.

$0.6 \times (10-60) = -30$ PSF. net

$W4_{uplift} = \frac{q \times (L+C)^2}{2L} = \frac{30 \times (8.5'+2)^2}{2 \times 8.5} = 195$ PLF.

$W5_{uplift} = q \times C = 30 \times 2 = 60$ PLF.

$R_{uplift} = L2 \times W5 + (W4-W5) \times \frac{L2}{6} = \frac{8.5' \times 60}{2} + (195-60) \times \frac{8.5}{6}$

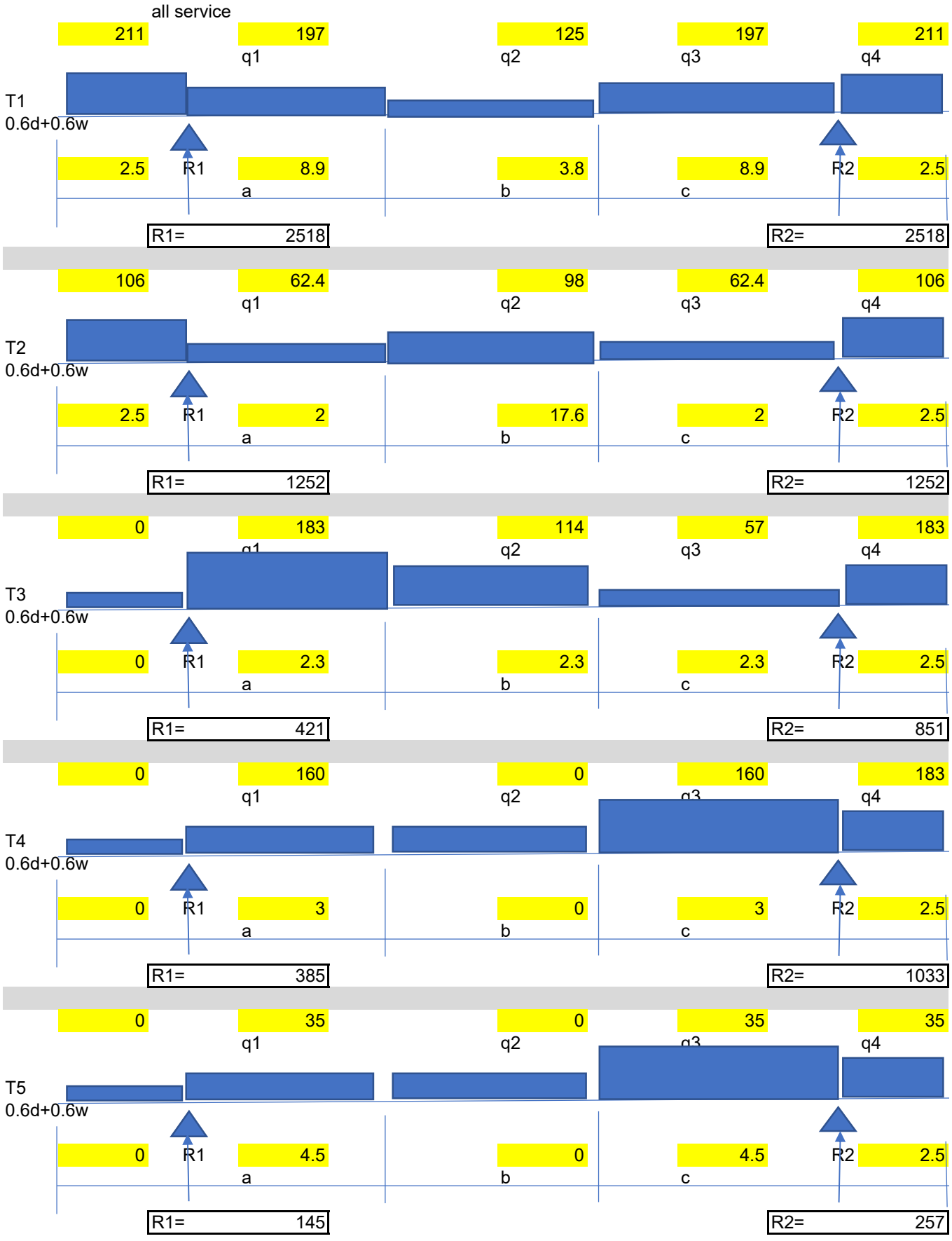
$= 225 + 192 = 420$ lb. uplift

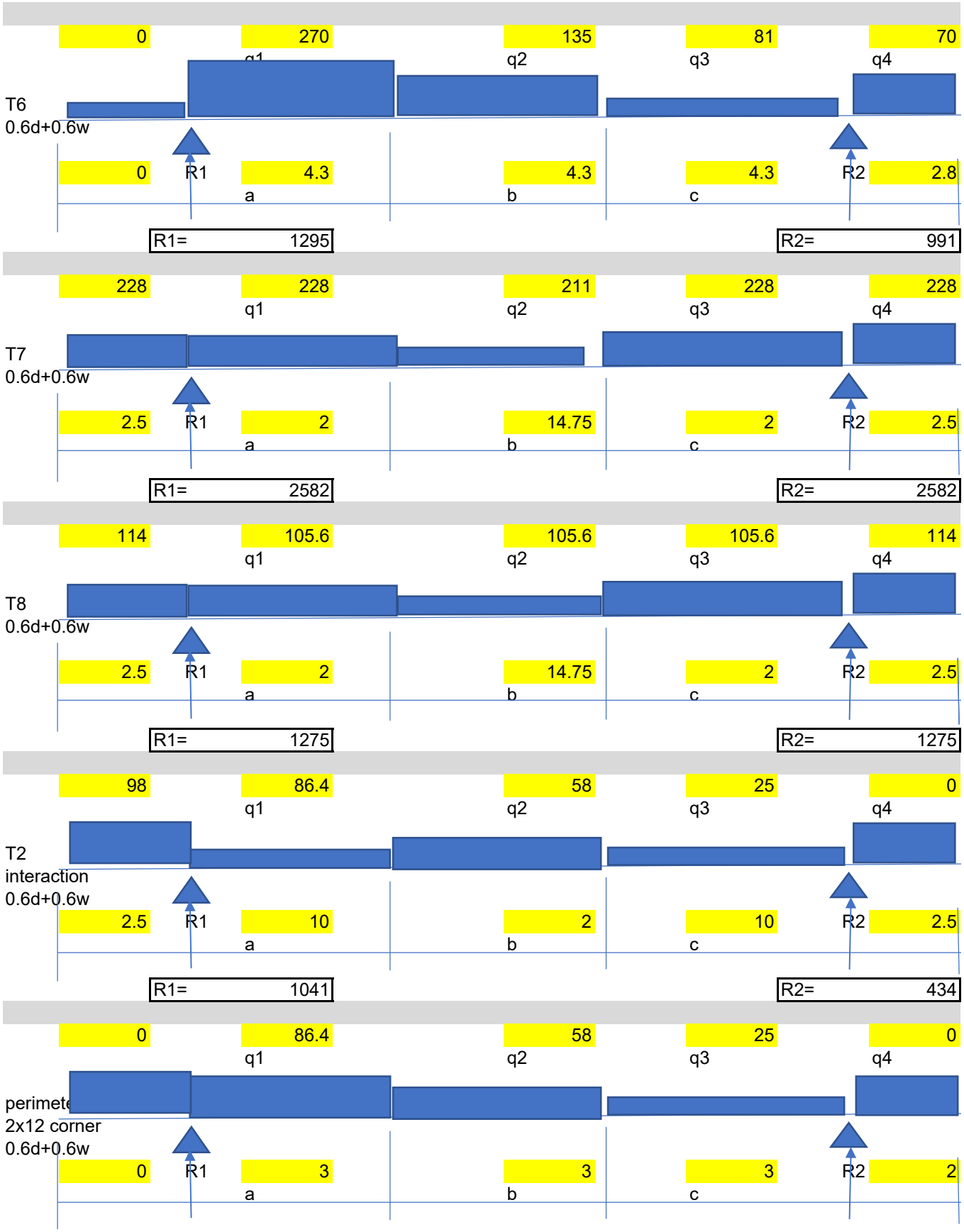
Service Reaction D+L = 20+30 = 50 gravity

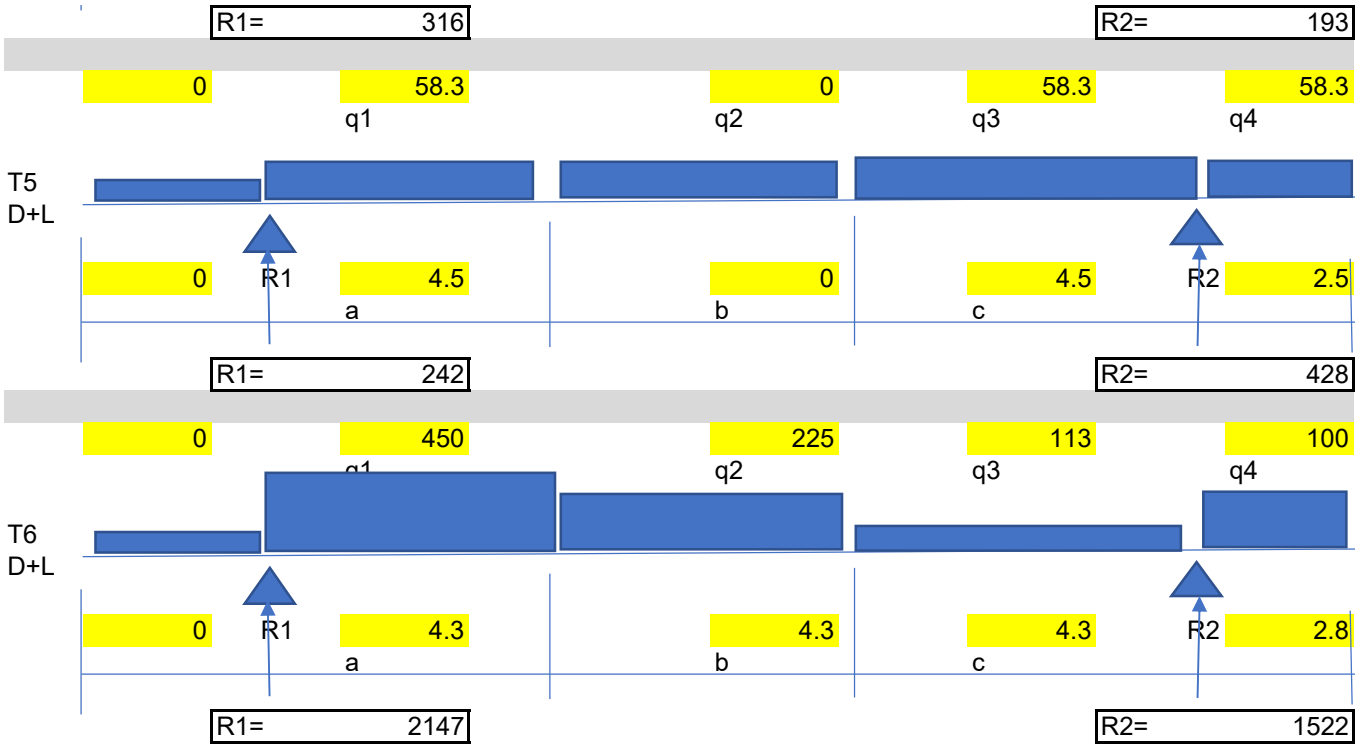
$W4_{gravity} = 50 \frac{(8.5'+2)^2}{2 \times 8.5} = 325$

$W5_{gravity} = 50 \times 2 = 100$

$R_{gravity} = \frac{100 \times 8.5'}{2} + (325-100) \times \frac{8.5}{6} = 425 + 226 = 652$ lb. gravity


all service
211
197
125
197
211
q1
q2
q3
q4
T1
0.6d+0.6w
2.5
R1
8.9
3.8
8.9
R2
2.5
a
b
c
R1=
2518
R2=
2518
106
62.4
98
62.4
106
q1
q2
q3
q4
T2
0.6d+0.6w
2.5
R1
2
17.6
2
R2
2.5
a
b
c
R1=
1252
R2=
1252
0
183
114
57
183
q1
q2
q3
q4
T3
0.6d+0.6w
0
R1
2.3
2.3
2.3
R2
2.5
a
b
c
R1=
421
R2=
851
0
160
0
160
183
q1
q2
q3
q4
T4
0.6d+0.6w
0
R1
3
0
3
R2
2.5
a
b
c
R1=
385
R2=
1033
0
35
0
35
35
q1
q2
q3
q4
T5
0.6d+0.6w
0
R1
4.5
0
4.5
R2
2.5
a
b
c
R1=
145
R2=
257


0
270
135
81
70
q1
q2
q3
q4
T6
0.6d+0.6w
0
R1
4.3
4.3
4.3
R2
2.8
a
b
c
R1= 1295
R2= 991
228
228
211
228
228
q1
q2
q3
q4
T7
0.6d+0.6w
2.5
R1
2
14.75
2
R2
2.5
a
b
c
R1= 2582
R2= 2582
114
105.6
105.6
105.6
114
q1
q2
q3
q4
T8
0.6d+0.6w
2.5
R1
2
14.75
2
R2
2.5
a
b
c
R1= 1275
R2= 1275
98
86.4
58
25
0
q1
q2
q3
q4
T2
interaction
0.6d+0.6w
2.5
R1
10
2
10
R2
2.5
a
b
c
R1= 1041
R2= 434
0
86.4
58
25
0
q1
q2
q3
q4
perimete
2x12 corner
0.6d+0.6w
0
R1
3
3
3
R2
2
a
b
c


R1= 316
R2= 193
0
58.3
q1
0
q2
58.3
q3
58.3
q4
T5
D+L
0
R1
4.5
a
0
b
4.5
c
R2
2.5
R1= 242
R2= 428
0
450
q1
225
q2
113
q3
100
q4
T6
D+L
0
R1
4.3
a
4.3
b
4.3
c
R2
2.8
R1= 2147
R2= 1522

Company:		Date:	9/8/2022
Engineer:		Page:	1/5
Project:			
Address:			
Phone:			
E-mail:			

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

General
Design method:ACI 318-19
Units: Imperial units

Anchor Information:
Anchor type: Cast-in-place
Material: AWS Type A
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 7.25
C_{min} (inch): 1.25
S_{min} (inch): 2.00

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: Supplementary reinforcement not present
Supplemental edge reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: No
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 13.50 x 6.00 x 0.25
Yield stress: 36000 psi

Profile type/size: HSS2X1X1/8

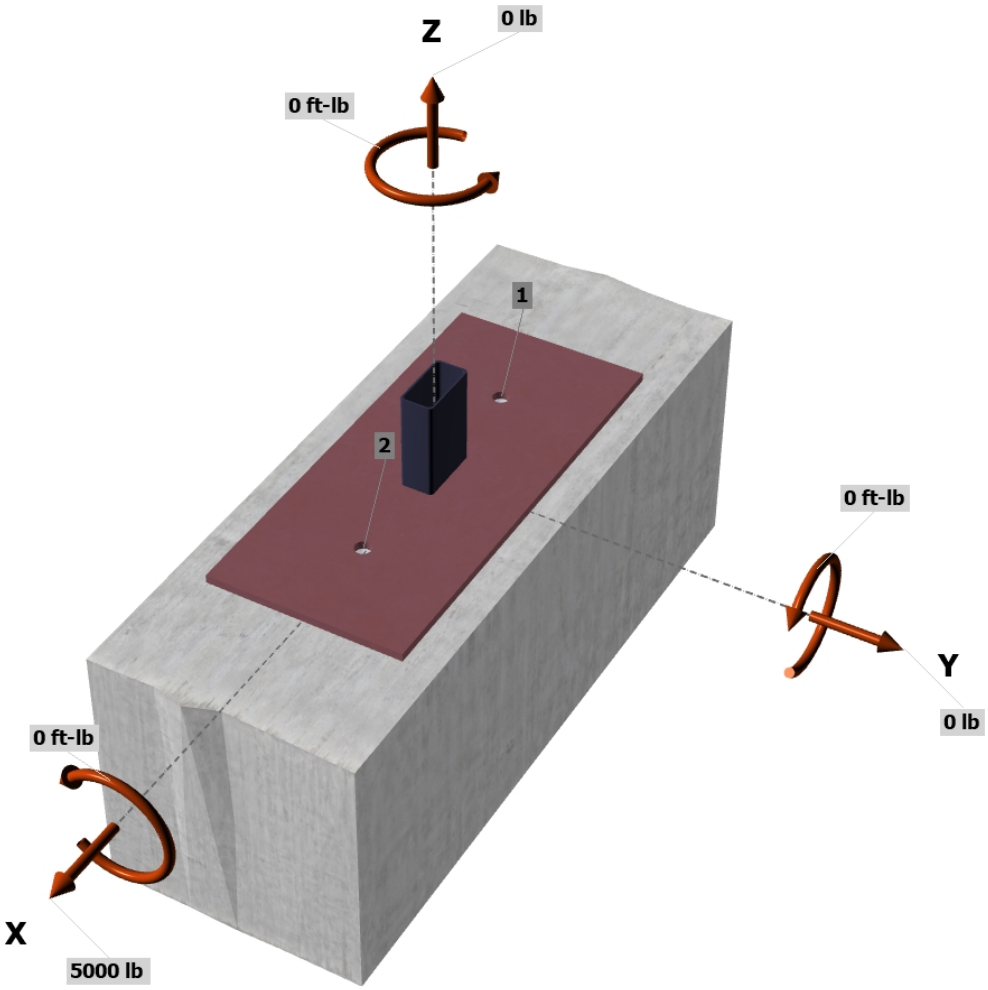
Recommended Anchor
Anchor Name: Headed Stud - 1/2"Ø AWS Type A Headed Stud

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

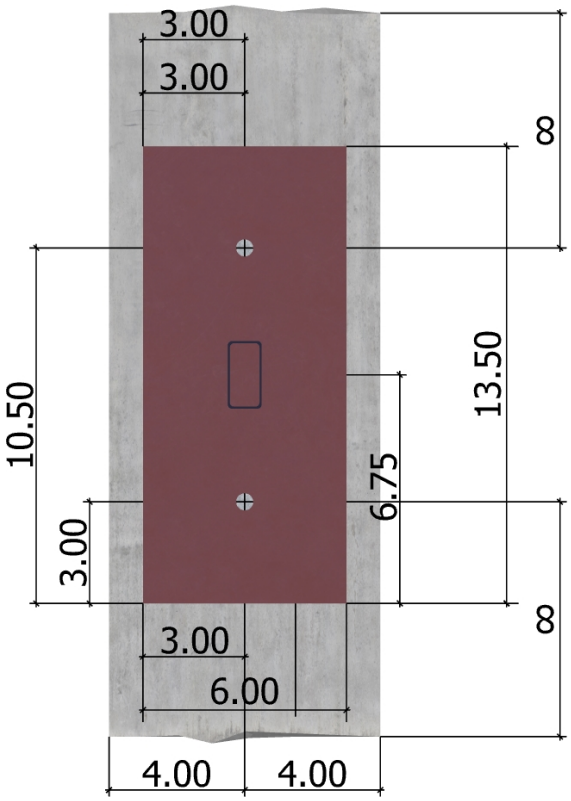
Strength level loads:

N_{ua} [lb]: 0
V_{uax} [lb]: 5000
V_{uay} [lb]: 0
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0
M_{uz} [ft-lb]: 0

<Figure 1>



<Figure 2>

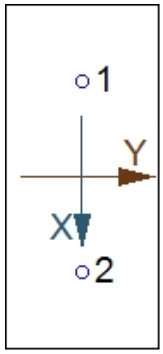


3. Resulting Anchor Forces

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	0.0	2500.0	0.0	2500.0
2	0.0	2500.0	0.0	2500.0
Sum	0.0	5000.0	0.0	5000.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 0
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

<Figure 3>



8. Steel Strength of Anchor in Shear (Sec. 17.7.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
11975	1.0	0.65	7784

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.7.2)

Shear parallel to edge in y-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. 17.7.2.2.1a & Eq. 17.7.2.2.1b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
4.00	0.500	1.00	4000	4.00	3796

$\phi V_{cbgy} = \phi\ (2)(A_{Vc} / A_{Vco})\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. 17.5.1.2, 17.7.2.1(c) & Eq. 17.7.2.1b)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgy} (lb)
117.00	72.00	1.000	1.000	1.000	1.000	3796	0.70	8636

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.7.3)

$\phi V_{cpg} = \phi k_{cp}N_{cbg} = \phi k_{cp}(A_{Nc} / A_{Nco})\Psi_{ec,N}\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b$ (Sec. 17.5.1.2 & Eq. 17.7.3.1b)

k_{cp}	A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cpg} (lb)
2.0	204.00	324.00	1.000	0.833	1.000	1.000	22308	0.70	16387

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	2500	7784	0.32	Pass
|| Concrete breakout y+	**5000**	**8636**	**0.58**	**Pass (Governs)**
Pryout	5000	16387	0.31	Pass

1/2"Ø AWS Type A Headed Stud with hef = 6.000 inch meets the selected design criteria.

12. Warnings

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

Company:		Date:	9/8/2022
Engineer:		Page:	1/5
Project:			
Address:			
Phone:			
E-mail:			

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

General
Design method:ACI 318-19
Units: Imperial units

Anchor Information:
Anchor type: Cast-in-place
Material: AWS Type A
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 7.25
C_{min} (inch): 1.25
S_{min} (inch): 2.00

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: Supplementary reinforcement not present
Supplemental edge reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: No
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 9.00 x 9.00 x 0.25
Yield stress: 36000 psi

Profile type/size: HSS2X1X1/8

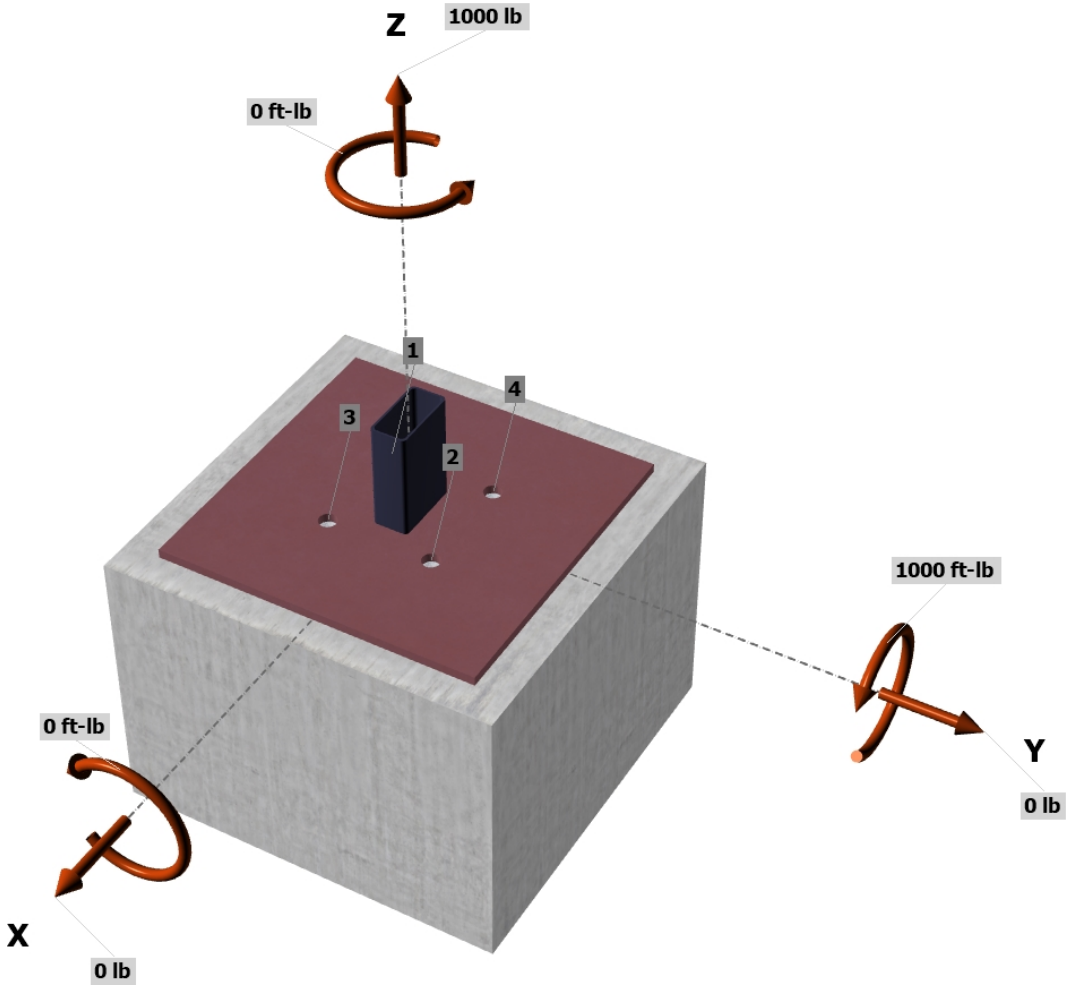
Recommended Anchor
Anchor Name: Headed Stud - 1/2"Ø AWS Type A Headed Stud

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

Strength level loads:

N_{ua} [lb]: 1000
V_{uax} [lb]: 0
V_{uay} [lb]: 0
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 1000
M_{uz} [ft-lb]: 0

<Figure 1>



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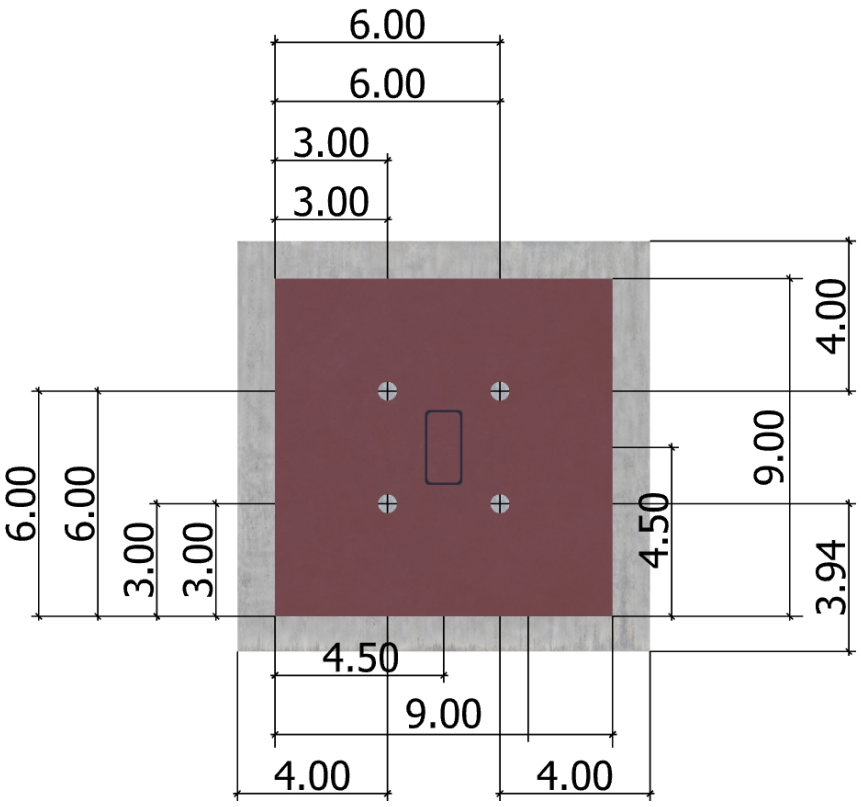
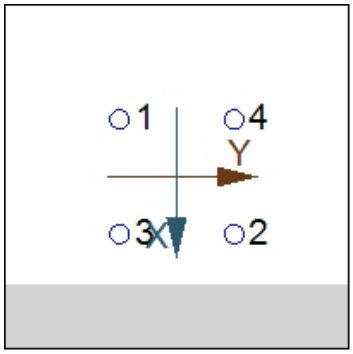


3. Resulting Anchor Forces

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	1286.7	0.0	0.0	0.0
2	395.3	0.0	0.0	0.0
3	395.3	0.0	0.0	0.0
4	1286.7	0.0	0.0	0.0
Sum	3364.0	0.0	0.0	0.0

Maximum concrete compression strain (‰): 0.07
Maximum concrete compression stress (psi): 315
Resultant tension force (lb): 3364
Resultant compression force (lb): 2364
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.79

<Figure 3>



4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
11975	0.75	8981

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.6.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. 17.6.2.2.1)

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
24.0	1.00	4000	2.667	6610

$\phi N_{cbg} = \phi \, (A_{Nc} / A_{Nco}) \, \Psi_{ec,N} \, \Psi_{ed,N} \, \Psi_{c,N} \, \Psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.6.2.1a)

A_{Nc} (in²)	A_{Nco} (in²)	$c_{a,min}$ (in)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
120.31	64.00	3.94	0.834	0.995	1.00	1.000	6610	0.70	7221

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$\phi N_{pn} = \phi \Psi_{c,P} N_p = \phi \Psi_{c,P} 8 A_{brg} f'_c$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)

$\Psi_{c,P}$	A_{brg} (in²)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.0	0.59	4000	0.70	13194

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	1287	8981	0.14	Pass
Concrete breakout	**3364**	**7221**	**0.47**	**Pass (Governs)**
Pullout	1287	13194	0.10	Pass

1/2"Ø AWS Type A Headed Stud with hef = 6.000 inch meets the selected design criteria.

12. Warnings

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

Company:		Date:	9/8/2022
Engineer:		Page:	1/5
Project:			
Address:			
Phone:			
E-mail:			

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

General
Design method:ACI 318-19
Units: Imperial units

Anchor Information:
Anchor type: Cast-in-place
Material: AWS Type A
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 7.25
C_{min} (inch): 1.25
S_{min} (inch): 2.00

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: Supplementary reinforcement not present
Supplemental edge reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: No
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 9.00 x 9.00 x 0.25
Yield stress: 36000 psi

Profile type/size: HSS2X1X1/8

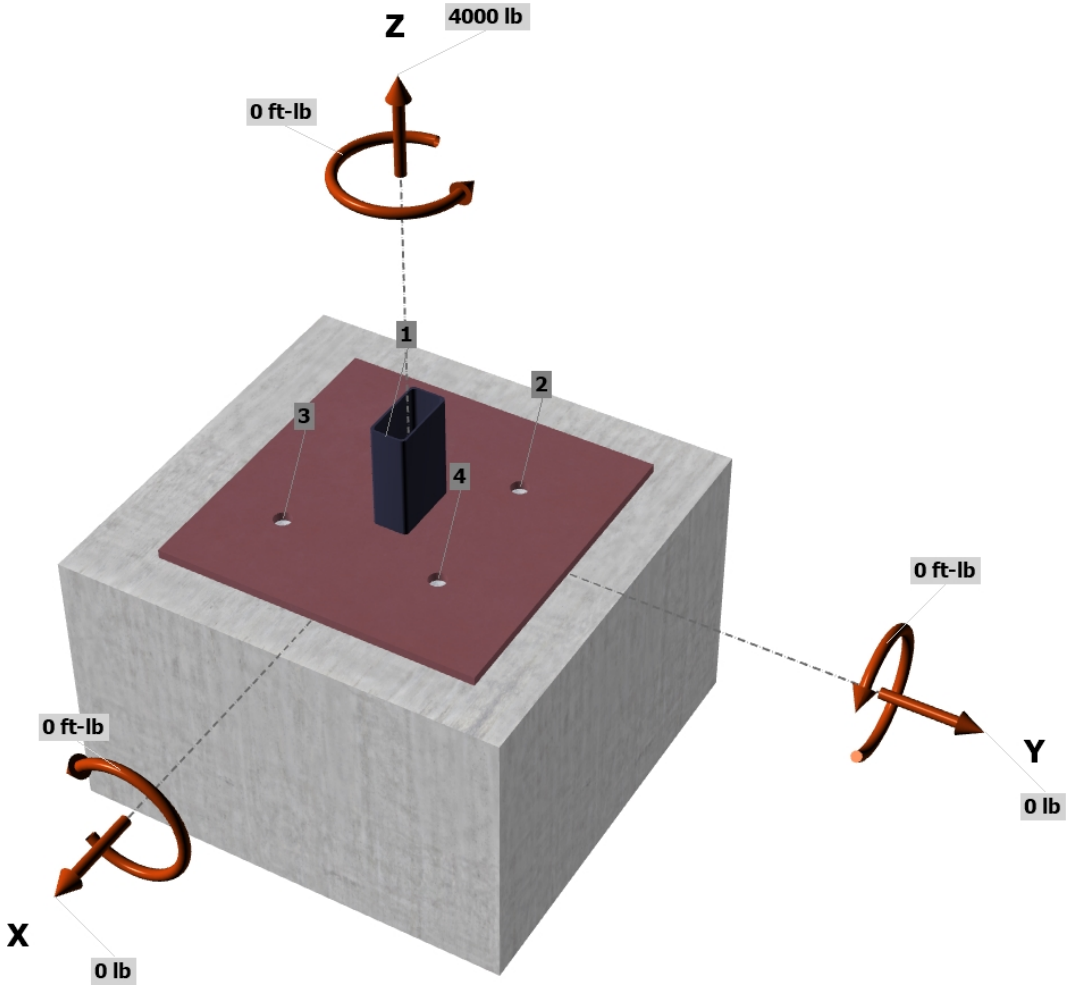
Recommended Anchor
Anchor Name: Headed Stud - 1/2"Ø AWS Type A Headed Stud

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

Strength level loads:

N_{ua} [lb]: 4000
V_{uax} [lb]: 0
V_{uay} [lb]: 0
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0
M_{uz} [ft-lb]: 0

<Figure 1>



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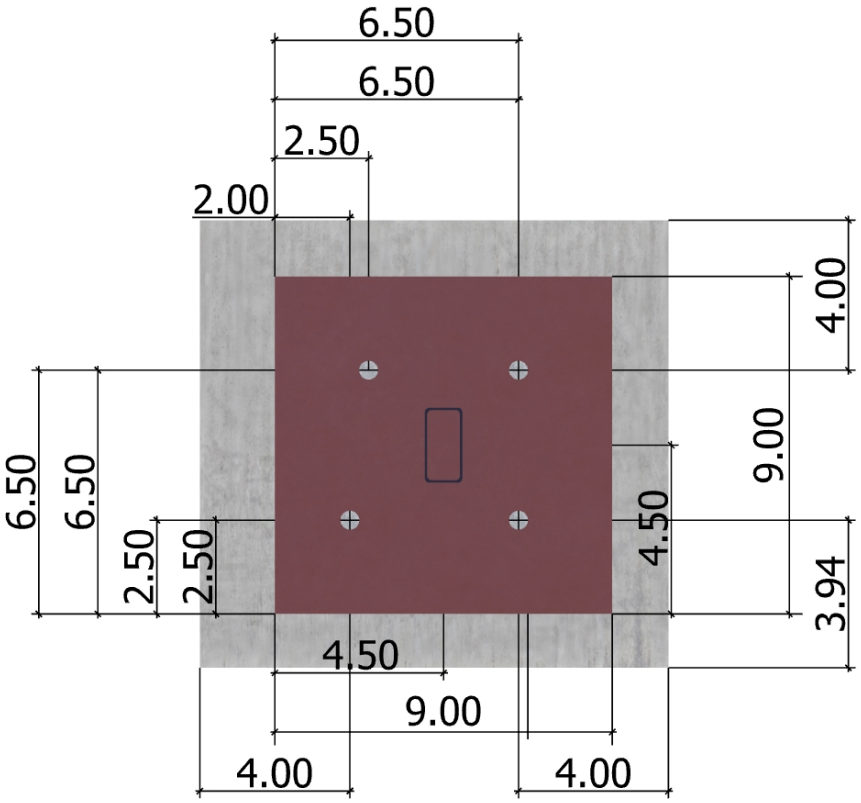
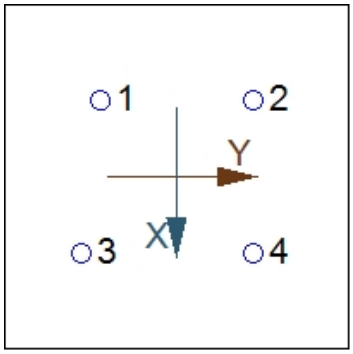


3. Resulting Anchor Forces

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	945.4	0.0	0.0	0.0
2	1054.5	0.0	0.0	0.0
3	938.7	0.0	0.0	0.0
4	1061.4	0.0	0.0	0.0
Sum	4000.0	0.0	0.0	0.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 4000
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.12
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
11975	0.75	8981

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.6.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. 17.6.2.2.1)

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
24.0	1.00	4000	2.667	6610

$\phi N_{cbg} = \phi (A_{Nc} / A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.6.2.1a)

A_{Nc} (in^2)	A_{Nco} (in^2)	$c_{a,min}$ (in)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
147.21	64.00	3.94	0.970	0.995	1.00	1.000	6610	0.70	10275

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$\phi N_{pn} = \phi \Psi_{c,P} N_p = \phi \Psi_{c,P} 8 A_{brg} f'_c$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)

$\Psi_{c,P}$	A_{brg} (in^2)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.0	0.59	4000	0.70	13194

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	1061	8981	0.12	Pass
Concrete breakout	**4000**	**10275**	**0.39**	**Pass (Governs)**
Pullout	1061	13194	0.08	Pass

1/2"Ø AWS Type A Headed Stud with hef = 6.000 inch meets the selected design criteria.

12. Warnings

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

Company:		Date:	9/8/2022
Engineer:		Page:	1/5
Project:			
Address:			
Phone:			
E-mail:			

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

General
Design method:ACI 318-19
Units: Imperial units

Anchor Information:
Anchor type: Cast-in-place
Material: AWS Type A
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 7.25
C_{min} (inch): 1.25
S_{min} (inch): 2.00

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: Supplementary reinforcement not present
Supplemental edge reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: No
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 9.00 x 9.00 x 0.25
Yield stress: 36000 psi

Profile type/size: HSS2X1X1/8

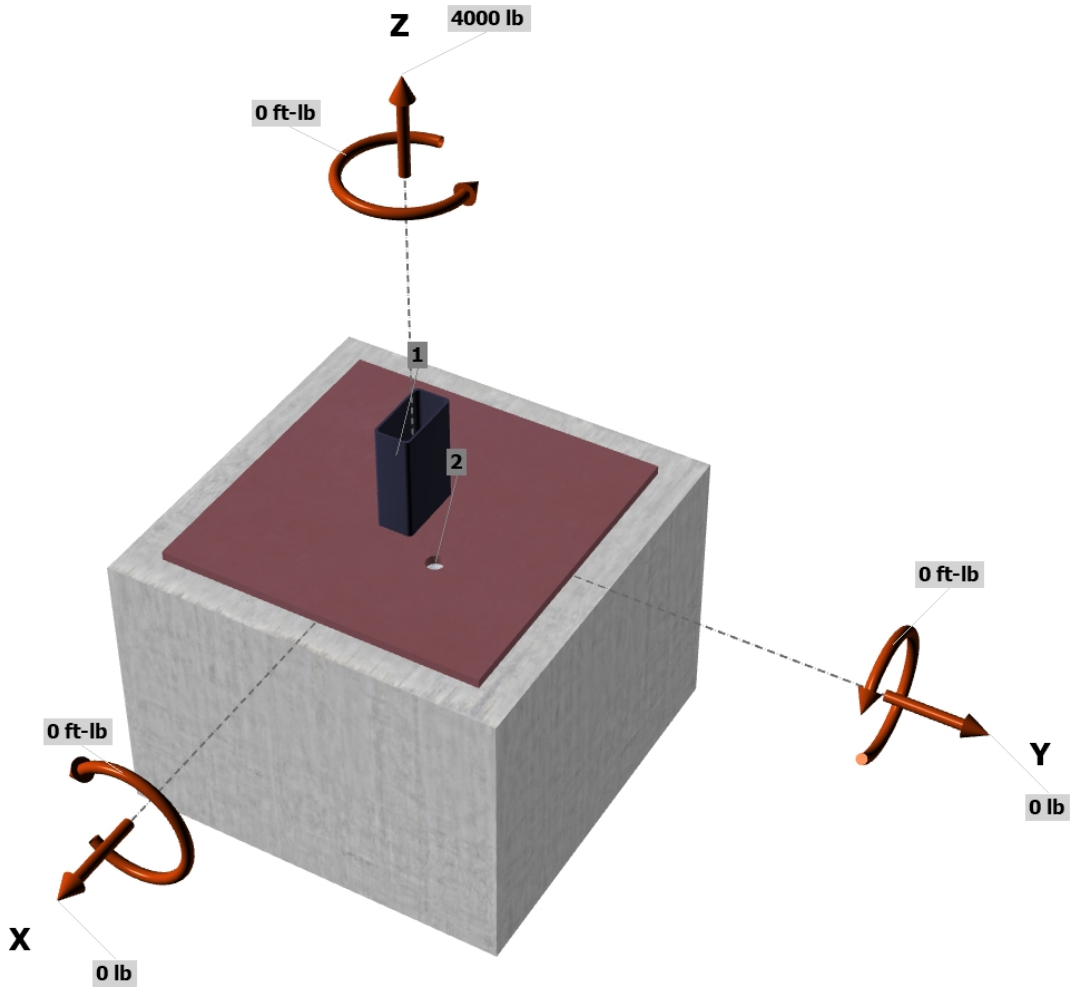
Recommended Anchor
Anchor Name: Headed Stud - 1/2"Ø AWS Type A Headed Stud

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

Strength level loads:

N_{ua} [lb]: 4000
V_{uax} [lb]: 0
V_{uay} [lb]: 0
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0
M_{uz} [ft-lb]: 0

<Figure 1>



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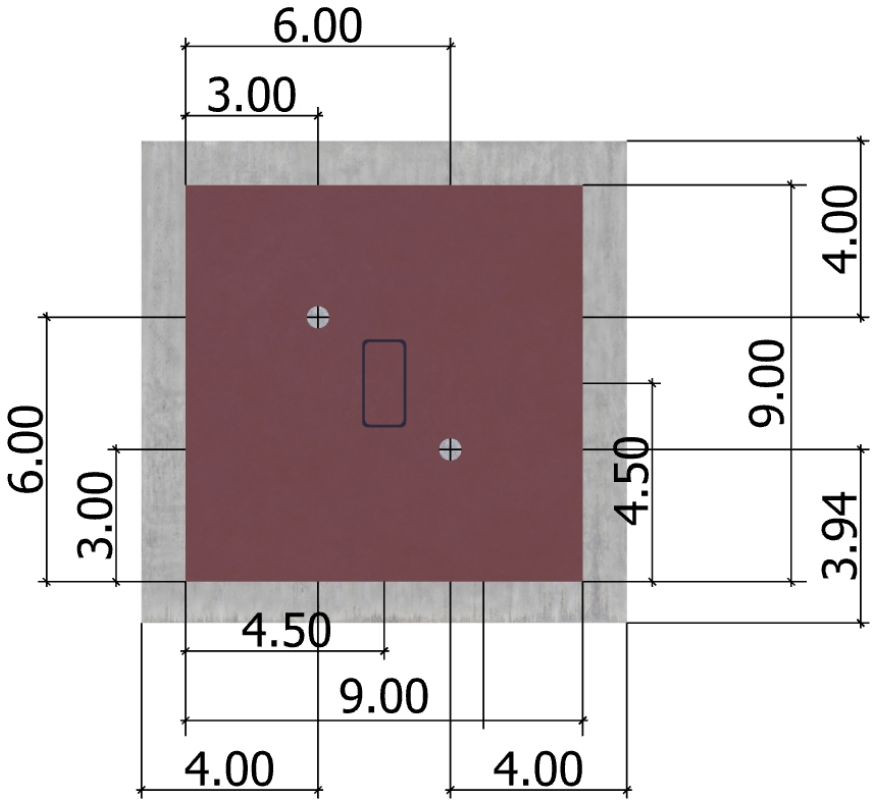
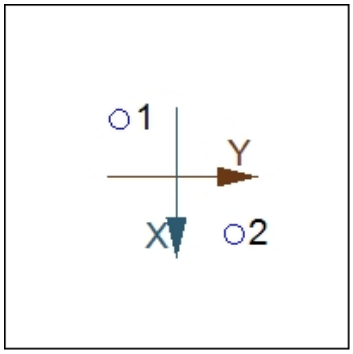


3. Resulting Anchor Forces

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	2000.0	0.0	0.0	0.0
2	2000.0	0.0	0.0	0.0
Sum	4000.0	0.0	0.0	0.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 4000
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

<Figure 3>



4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
11975	0.75	8981

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.6.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. 17.6.2.2.1)

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
24.0	1.00	4000	2.667	6610

$\phi N_{cbg} = \phi \, (A_{Nc} / A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.6.2.1a)

A_{Nc} (in²)	A_{Nco} (in²)	$c_{a,min}$ (in)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
102.50	64.00	3.94	1.000	0.995	1.00	1.000	6610	0.70	7375

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$\phi N_{pn} = \phi \Psi_{c,P} N_p = \phi \Psi_{c,P} 8 A_{brg} f'_c$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)

$\Psi_{c,P}$	A_{brg} (in²)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.0	0.59	4000	0.70	13194

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	2000	8981	0.22	Pass
Concrete breakout	**4000**	**7375**	**0.54**	**Pass (Governs)**
Pullout	2000	13194	0.15	Pass

1/2"Ø AWS Type A Headed Stud with hef = 6.000 inch meets the selected design criteria.

12. Warnings

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

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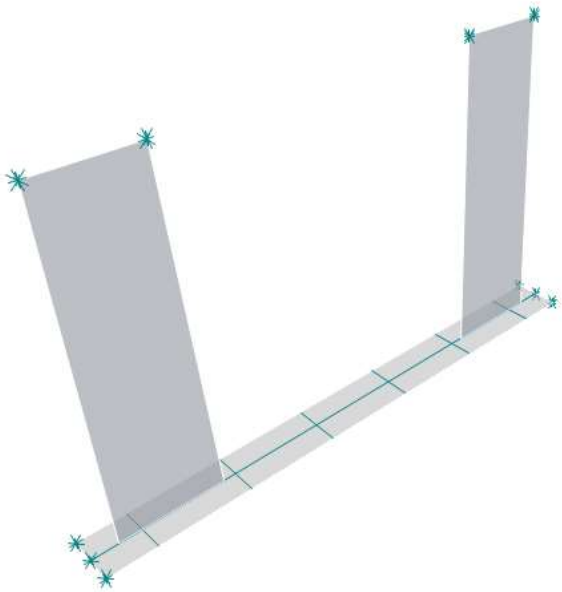


Fundation check

Gary Matzner Park

Model File: fund check, Revision

11/18/2024

1 Properties

This chapter provides property information for materials, frame sections, shell sections, and links.

1.1 Spring Properties

Table 1.1 - Spring Property Definitions - Area Springs

Name	Subgrade Modulus kip/in/in2	Nonlinear Option	Color	Notes
SOIL1	0.15	Compression Only	Cyan	

2 Assignments

This chapter provides a listing of the assignments applied to the model.

2.1 Shell Assignments

Table 2.1 - Area Assignments - Area Springs

UniqueName	Spring Property
16	SOIL1
3	SOIL1

3 Loads

This chapter provides loading information as applied to the model.

3.1 Load Combinations

Table 3.1 - Load Combination Definitions

Name	Type	Is Auto	Load Name	SF	Notes
0.9D-W	Linear Add	No	D	0.9	DWal12
0.9D-W			SD	0.9	
0.9D-W			Wind(case)	-1	
0.9D+W	Linear Add	No	D	0.9	DWal11
0.9D+W			SD	0.9	
0.9D+W			Wind(case)	1	
1.2D+1.0L-W	Linear Add	No	D	1.2	DWal6
1.2D+1.0L-W			L	1	
1.2D+1.0L-W			SD	1.2	
1.2D+1.0L-W			Wind(case)	-1	
1.2D+1.0L+0.5Lr-W	Linear Add	No	D	1.2	DWal8
1.2D+1.0L+0.5Lr-W			L	1	
1.2D+1.0L+0.5Lr-W			Lr	0.5	
1.2D+1.0L+0.5Lr-W			SD	1.2	
1.2D+1.0L+0.5Lr-W			Wind(case)	-1	
1.2D+1.0L+0.5Lr+W	Linear Add	No	D	1.2	DWal7
1.2D+1.0L+0.5Lr+W			L	1	
1.2D+1.0L+0.5Lr+W			Lr	0.5	
1.2D+1.0L+0.5Lr+W			SD	1.2	
1.2D+1.0L+0.5Lr+W			Wind(case)	1	
1.2D+1.0L+W	Linear Add	No	D	1.2	DWal5
1.2D+1.0L+W			L	1	
1.2D+1.0L+W			SD	1.2	
1.2D+1.0L+W			Wind(case)	1	
1.2D+1.6L	Linear Add	No	D	1.2	DWal2
1.2D+1.6L			L	1.6	
1.2D+1.6L			SD	1.2	
1.2D+1.6L+0.5Lr	Linear Add	No	D	1.2	DWal3
1.2D+1.6L+0.5Lr			L	1.6	
1.2D+1.6L+0.5Lr			Lr	0.5	
1.2D+1.6L+0.5Lr			SD	1.2	
1.2D+1.6Lr-0.5W	Linear Add	No	D	1.2	DWal10
1.2D+1.6Lr-0.5W			Lr	1.6	
1.2D+1.6Lr-0.5W			SD	1.2	
1.2D+1.6Lr-0.5W			Wind(case)	-0.5	
1.2D+1.6Lr+0.5W	Linear Add	No	D	1.2	DWal9
1.2D+1.6Lr+0.5W			Lr	1.6	
1.2D+1.6Lr+0.5W			SD	1.2	
1.2D+1.6Lr+0.5W			Wind(case)	0.5	
1.2D+1.6Lr+1.0L	Linear Add	No	D	1.2	DWal4
1.2D+1.6Lr+1.0L			L	1	

Table 3.1 - Load Combination Definitions (continued)

Name	Type	Is Auto	Load Name	SF	Notes
1.2D+1.6Lr+1.0L			Lr	1.6	
1.2D+1.6Lr+1.0L			SD	1.2	
1.4D+1.4SD	Linear Add	No	D	1.4	DWal1
1.4D+1.4SD			SD	1.4	
DConS1	Linear Add	Yes	D	1.4	Dead [Strength]
DConS1			SD	1.4	
DConS2	Linear Add	Yes	D	1.2	Dead + Live [Strength]
DConS2			L	1.6	
DConS2			SD	1.2	
DConS3	Linear Add	Yes	D	1.2	Dead + Live + Wind + Snow [Strength]
DConS3			L	1	
DConS3			SD	1.2	
DConS3			Wind(case)	1	
DConS4	Linear Add	Yes	D	1.2	Dead + Live - Wind + Snow [Strength]
DConS4			L	1	
DConS4			SD	1.2	
DConS4			Wind(case)	-1	
DConS5	Linear Add	Yes	D	0.9	Dead (min) + Wind [Strength]
DConS5			SD	0.9	
DConS5			Wind(case)	1	
DConS6	Linear Add	Yes	D	0.9	Dead (min) - Wind [Strength]
DConS6			SD	0.9	
DConS6			Wind(case)	-1	
Live only	Linear Add	No	L	1	
Live only			Lr	1	
service1...D	Linear Add	No	D	1	
service1...D			SD	1	
service2...D+L	Linear Add	No	D	1	
service2...D+L			L	1	
service2...D+L			SD	1	
service4...D+0.75L+0.75Lr	Linear Add	No	D	1	
service4...D+0.75L+0.75Lr			L	0.75	
service4...D+0.75L+0.75Lr			Lr	0.75	
service4...D+0.75L+0.75Lr			SD	1	
service5...D-0.6W	Linear Add	No	D	1	
service5...D-0.6W			Wind(case)	-0.6	
service5...D-0.6W			SD	1	
service5...D+0.6W	Linear Add	No	D	1	
service5...D+0.6W			Wind(case)	0.6	
service5...D+0.6W			SD	1	
service6...D+0.75L+0.75*0.6W+0.75Lr	Linear Add	No	D	1	
service6...D+0.75L+0.75*0.6W+0.75Lr			L	0.75	
service6...D+0.75L+0.75*0.6W+0.75Lr			Wind(case)	0.45	
service6...D+0.75L+0.75*0.6W+0.75Lr			Lr	0.75	
service6...D+0.75L+0.75*0.6W+0.75Lr			SD	1	
service6(-1/12)...D+0.75L-0.75*0.6W+0.75Lr	Linear Add	No	D	1	

Table 3.1 - Load Combination Definitions (continued)

Name	Type	Is Auto	Load Name	SF	Notes
service6(-1/12)...D+0.75L-0.75*0.6W+0.75Lr			L	0.75	
service6(-1/12)...D+0.75L-0.75*0.6W+0.75Lr			Wind(case)	-0.45	
service6(-1/12)...D+0.75L-0.75*0.6W+0.75Lr			Lr	0.75	
service6(-1/12)...D+0.75L-0.75*0.6W+0.75Lr			SD	1	
service7...0.6D-0.6W	Linear Add	No	D	0.6	
service7...0.6D-0.6W			Wind(case)	-0.6	
service7...0.6D-0.6W			SD	0.6	
service7...0.6D+0.6W	Linear Add	No	D	0.6	
service7...0.6D+0.6W			Wind(case)	0.6	
service7...0.6D+0.6W			SD	0.6	

4 Design Data

This chapter provides design data and results.

4.1 Concrete Slab Design

Table 4.1 - Concrete Slab Design Summary - Span Definition Data

StripObject	SpanID	SpanLength in	StartDist in	EndDist in	GlobalX1 in	GlobalY1 in	GlobalX2 in	GlobalY2 in
CSB1	Span 1	10	12	242	47.8735	182.4324	57.8735	182.4324
CSB1	Span 2	38	22	204	57.8735	182.4324	95.8735	182.4324
CSB1	Span 3	6	60	198	95.8735	182.4324	101.8735	182.4324
CSB1	Span 4	44	66	154	101.8735	182.4324	145.8735	182.4324
CSB1	Span 5	44	110	110	145.8735	182.4324	189.8735	182.4324
CSB1	Span 6	44	154	66	189.8735	182.4324	233.8735	182.4324
CSB1	Span 7	6	198	60	233.8735	182.4324	239.8735	182.4324
CSB1	Span 8	38	204	22	239.8735	182.4324	277.8735	182.4324
CSB1	Span 9	10	242	12	277.8735	182.4324	287.8735	182.4324
CSA1	Span 1	24	0	0	57.8735	170.4324	57.8735	194.4324
SA1	Span 1	24	0	0	101.8735	170.4324	101.8735	194.4324
SA2	Span 1	24	0	0	145.8735	170.4324	145.8735	194.4324
SA3	Span 1	24	0	0	189.8735	170.4324	189.8735	194.4324
SA4	Span 1	24	0	0	233.8735	170.4324	233.8735	194.4324
SA5	Span 1	24	0	0	277.8735	170.4324	277.8735	194.4324

Table 4.2 - Concrete Slab Design Summary - Flexure and Shear Data (Part 1 of 2)

StripObject	SpanID	FTopCombo	FBotCombo	VCombo	Location	FTopMoment kip-ft	FTopArea in2	FTopAMin in2	FBotMoment kip-ft	FBotArea in2	FBotAMin in2
CSB1	Span 1	DConS5	DConS3	DConS6	Start	-1.0903	0.0872	0.5184	0.4736	0.0775	0
CSB1	Span 1				Middle	0	0	0	0	0	0
CSB1	Span 1	DConS5	DConS3	DConS6	End	-0.8856	0.0491	0	1.431	0.0707	0.5184
CSB1	Span 2	DConS5	DConS3	DConS6	Start	-0.8856	0.0491	0	1.431	0.0707	0.5184
CSB1	Span 2				Middle	0	0	0	0	0	0
CSB1	Span 2	DConS4	DConS5	DConS6	End	-33.9931	0.8963	0	33.0215	0.9943	0.5184
CSB1	Span 3	DConS4	DConS5	DConS6	Start	-33.9931	0.8963	0	33.0215	0.9943	0.5184
CSB1	Span 3				Middle	0	0	0	0	0	0
CSB1	Span 3	DConS4	DConS5	DConS6	End	-31.8448	0.8367	0	29.6909	0.8879	0.5184
CSB1	Span 4	DConS4	DConS5	DConS6	Start	-31.8448	0.8367	0	29.6909	0.8879	0.5184
CSB1	Span 4				Middle	0	0	0	0	0	0
CSB1	Span 4	DConS4	DConS5	DConS6	End	-15.2377	0.3926	0.5184	4.4973	0.1315	0
CSB1	Span 5	DConS4	DConS5	DConS6	Start	-15.2377	0.3926	0.5184	4.4973	0.1315	0
CSB1	Span 5				Middle	0	0	0	0	0	0
CSB1	Span 5	DConS3	DConS6	DConS6	End	-15.2381	0.3928	0.5184	4.4977	0.1314	0
CSB1	Span 6	DConS3	DConS6	DConS6	Start	-15.2381	0.3928	0.5184	4.4977	0.1314	0
CSB1	Span 6				Middle	0	0	0	0	0	0
CSB1	Span 6	DConS3	DConS6	DConS6	End	-31.8453	0.8369	0	29.6914	0.8878	0.5184
CSB1	Span 7	DConS3	DConS6	DConS6	Start	-31.8453	0.8369	0	29.6914	0.8878	0.5184
CSB1	Span 7				Middle	0	0	0	0	0	0
CSB1	Span 7	DConS3	DConS6	DConS6	End	-33.9936	0.8965	0	33.022	0.9943	0.5184
CSB1	Span 8	DConS3	DConS6	DConS6	Start	-33.9936	0.8965	0	33.022	0.9943	0.5184

Table 4.2 - Concrete Slab Design Summary - Flexure and Shear Data (Part 1 of 2, continued)

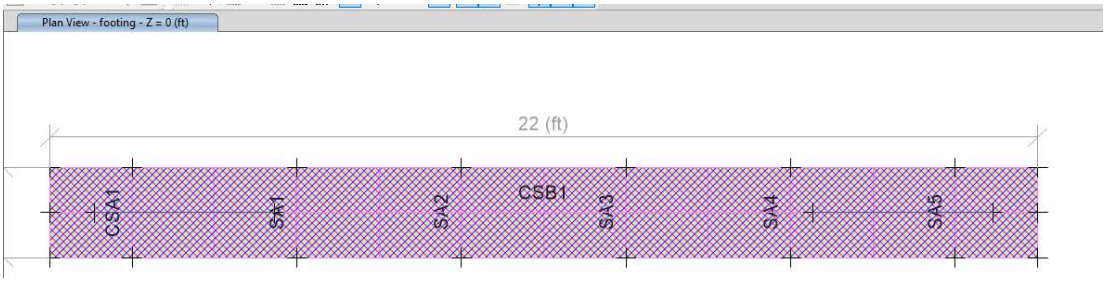
StripObject	SpanID	TopCombo	BotCombo	VCombo	Location	TopMoment kip-ft	TopArea in2	TopAMin in2	BotMoment kip-ft	BotArea in2	BotAMin in2
CSB1	Span 8				Middle	0	0	0	0	0	0
CSB1	Span 8	DConS6	DConS4	DConS6	End	-0.8878	0.0492	0	1.4282	0.0708	0.5184
CSB1	Span 9	DConS6	DConS4	DConS6	Start	-0.8878	0.0492	0	1.4282	0.0708	0.5184
CSB1	Span 9				Middle	0	0	0	0	0	0
CSB1	Span 9	DConS6	DConS4	DConS6	End	-1.0898	0.087	0.5184	0.4732	0.0773	0
CSA1	Span 1	DConS5	DConS4		Start	-2.3324	0.0715	0	2.6956	0.0815	0.9504
CSA1	Span 1	DConS5	DConS4	DConS6	Middle	-2.2535	0.063	0	5.2075	0.1382	0.9504
CSA1	Span 1	DConS5	DConS4	DConS6	End	-2.3324	0.0715	0	2.6956	0.0815	0.9504
SA1	Span 1	DConS6	DConS3		Start	-2.9918	0.0718	0	3.4367	0.0926	0.9504
SA1	Span 1	DConS6	DConS3	DConS6	Middle	-2.9177	0.0688	0	4.2877	0.1123	0.9504
SA1	Span 1	DConS6	DConS3	DConS6	End	-2.9918	0.0718	0	3.4367	0.0926	0.9504
SA2	Span 1	DConS4	DConS5		Start	-2.1098	0.052	0	1.8077	0.0521	0.9504
SA2	Span 1	DConS6	DConS3	DConS6	Middle	-2.4986	0.0607	0	2.7448	0.0747	0.9504
SA2	Span 1	DConS4	DConS5	DConS6	End	-2.1098	0.052	0	1.8077	0.0521	0.9504
SA3	Span 1	DConS3	DConS6		Start	-2.1098	0.052	0	1.8077	0.0522	0.9504
SA3	Span 1	DConS5	DConS4	DConS6	Middle	-2.4987	0.0607	0	2.7449	0.0747	0.9504
SA3	Span 1	DConS3	DConS6	DConS6	End	-2.1099	0.052	0	1.8078	0.0522	0.9504
SA4	Span 1	DConS5	DConS4		Start	-2.992	0.0719	0	3.4369	0.0927	0.9504
SA4	Span 1	DConS5	DConS4	DConS6	Middle	-2.918	0.0688	0	4.2879	0.1123	0.9504
SA4	Span 1	DConS5	DConS4	DConS6	End	-2.9919	0.0719	0	3.4368	0.0927	0.9504
SA5	Span 1	DConS6	DConS3		Start	-2.3329	0.0713	0	2.696	0.0815	0.9504
SA5	Span 1	DConS6	DConS3	DConS6	Middle	-2.2542	0.0629	0	5.2078	0.1382	0.9504
SA5	Span 1	DConS6	DConS3	DConS6	End	-2.3329	0.0713	0	2.6961	0.0815	0.9504

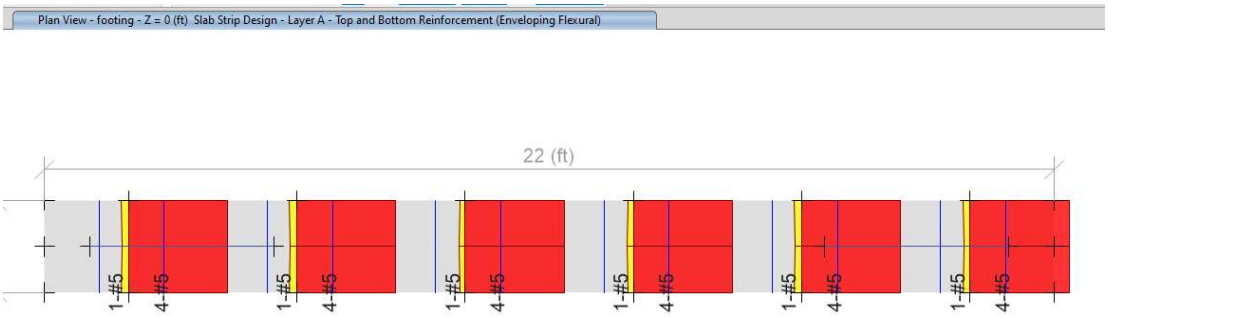
Table 4.2 - Concrete Slab Design Summary - Flexure and Shear Data (Part 2 of 2)

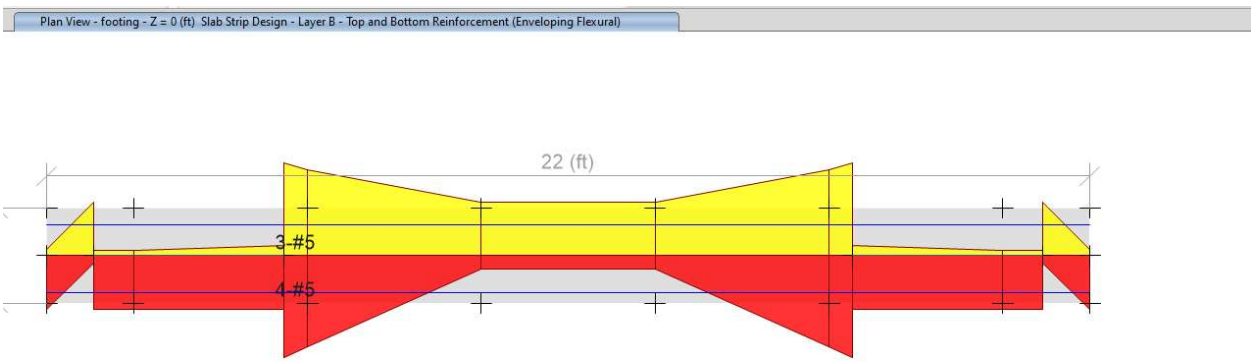
StripObject	SpanID	TopCombo	BotCombo	VCombo	VForce kip	VArea in2/ft	Status	Layer
CSB1	Span 1	DConS5	DConS3	DConS6	1.924	0	OK	B
CSB1	Span 1				0	0	OK	B
CSB1	Span 1	DConS5	DConS3	DConS6	0.494	0	OK	B
CSB1	Span 2	DConS5	DConS3	DConS6	0.494	0	OK	B
CSB1	Span 2				0	0	OK	B
CSB1	Span 2	DConS4	DConS5	DConS6	0.786	0	OK	B
CSB1	Span 3	DConS4	DConS5	DConS6	0.786	0	OK	B
CSB1	Span 3				0	0	OK	B
CSB1	Span 3	DConS4	DConS5	DConS6	4.897	0	OK	B
CSB1	Span 4	DConS4	DConS5	DConS6	4.897	0	OK	B
CSB1	Span 4				0	0	OK	B
CSB1	Span 4	DConS4	DConS5	DConS6	4.524	0	OK	B
CSB1	Span 5	DConS4	DConS5	DConS6	4.524	0	OK	B
CSB1	Span 5				0	0	OK	B
CSB1	Span 5	DConS3	DConS6	DConS6	4.524	0	OK	B
CSB1	Span 6	DConS3	DConS6	DConS6	4.524	0	OK	B
CSB1	Span 6				0	0	OK	B
CSB1	Span 6	DConS3	DConS6	DConS6	7.047	0	OK	B
CSB1	Span 7	DConS3	DConS6	DConS6	7.047	0	OK	B

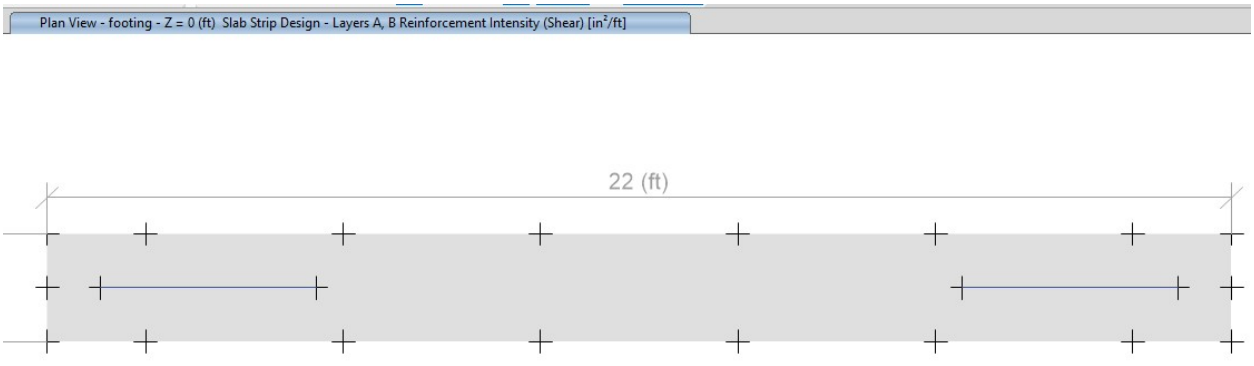
Table 4.2 - Concrete Slab Design Summary - Flexure and Shear Data (Part 2 of 2, continued)

StripObject	SpanIDF	TopCombS	BotComboS	VCombo	VForce kip	VArea in2/ft	Status	Layer
CSB1	Span 7				0	0	OK	B
CSB1	Span 7	DConS3	DConS6	DConS6	7.047	0	OK	B
CSB1	Span 8	DConS3	DConS6	DConS6	7.047	0	OK	B
CSB1	Span 8				0	0	OK	B
CSB1	Span 8	DConS6	DConS4	DConS6	0.658	0	OK	B
CSB1	Span 9	DConS6	DConS4	DConS6	0.658	0	OK	B
CSB1	Span 9				0	0	OK	B
CSB1	Span 9	DConS6	DConS4	DConS6	0.658	0	OK	B
CSA1	Span 1	DConS5	DConS4		0	0	OK	A
CSA1	Span 1	DConS5	DConS4	DConS6	2.424	0	OK	A
CSA1	Span 1	DConS5	DConS4	DConS6	2.424	0	OK	A
SA1	Span 1	DConS6	DConS3		0	0	OK	A
SA1	Span 1	DConS6	DConS3	DConS6	0.339	0	OK	A
SA1	Span 1	DConS6	DConS3	DConS6	0.339	0	OK	A
SA2	Span 1	DConS4	DConS5		0	0	OK	A
SA2	Span 1	DConS6	DConS3	DConS6	0.412	0	OK	A
SA2	Span 1	DConS4	DConS5	DConS6	0.412	0	OK	A
SA3	Span 1	DConS3	DConS6		0	0	OK	A
SA3	Span 1	DConS5	DConS4	DConS6	0.942	0	OK	A
SA3	Span 1	DConS3	DConS6	DConS6	0.942	0	OK	A
SA4	Span 1	DConS5	DConS4		0	0	OK	A
SA4	Span 1	DConS5	DConS4	DConS6	1.854	0	OK	A
SA4	Span 1	DConS5	DConS4	DConS6	1.854	0	OK	A
SA5	Span 1	DConS6	DConS3		0	0	OK	A
SA5	Span 1	DConS6	DConS3	DConS6	0.19	0	OK	A
SA5	Span 1	DConS6	DConS3	DConS6	0.19	0	OK	A


Plan View - footing - Z = 0 (ft)
22 (ft)
CSA1
SA1
SA2
CSB1
SA3
SA4
SA5


Plan View - footing - Z = 0 (ft) Slab Strip Design - Layer A - Top and Bottom Reinforcement (Enveloping Flexural)
22 (ft)
1-#5
4-#5


Plan View - footing - Z = 0 (ft) Slab Strip Design - Layer B - Top and Bottom Reinforcement (Enveloping Flexural)
22 (ft)
3-#5
4-#5


Plan View - footing - Z = 0 (ft) Slab Strip Design - Layers A, B Reinforcement Intensity (Shear) [in²/ft]
22 (ft)

ACI 318-14 Concrete Strip Design

Geometric Properties
Combination = Overall Envelope
Strip Label = CSB1
Length = 22 ft
Distance to Top Rebar Center = 3.125 in
Distance to Bot Rebar Center = 4.125 in

Material Properties
Concrete Comp. Strength = 3000 lb/in²
Concrete Modulus = 3122019.6 lb/in²
Longitudinal Rebar Yield = 60000 lb/in²

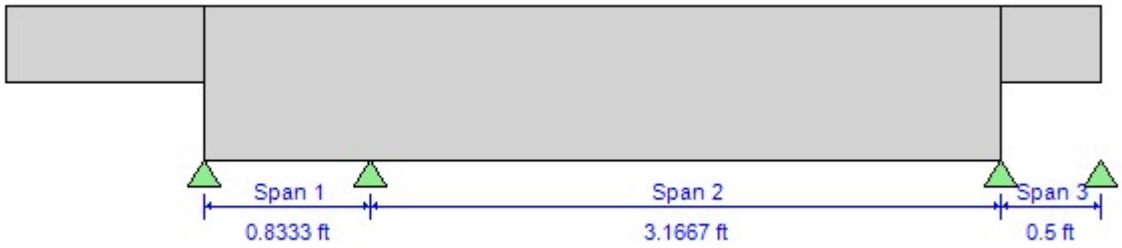


Figure 4-1-

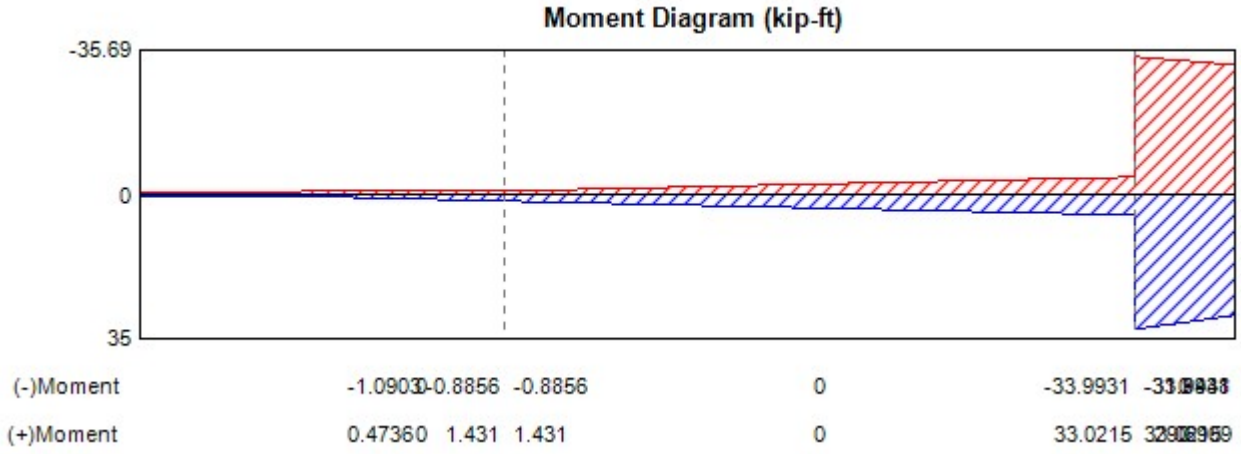


Figure 4-2-

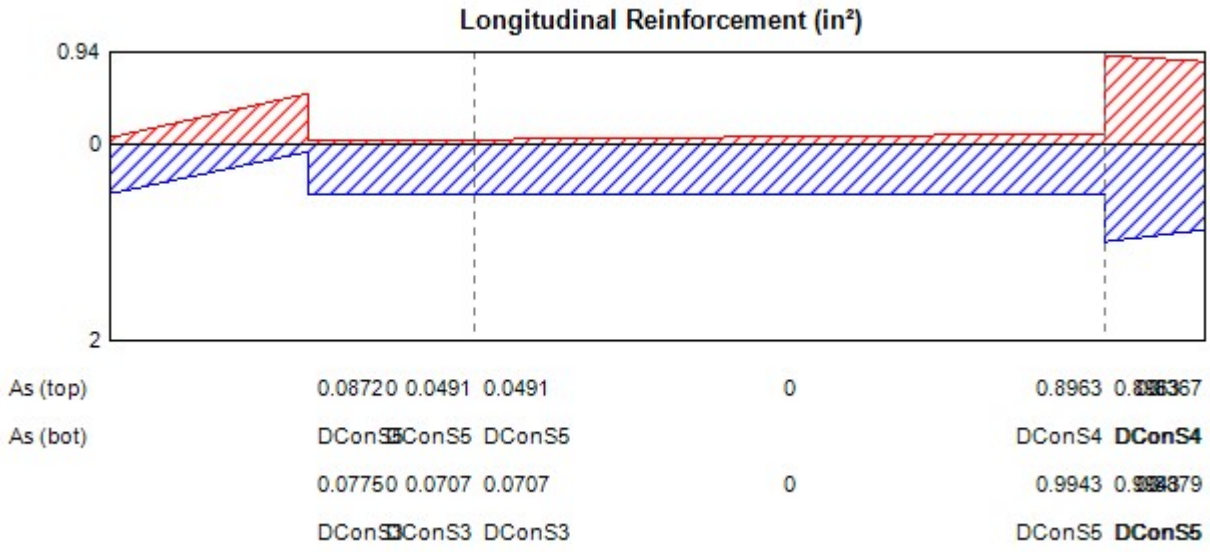


Figure 4-3-

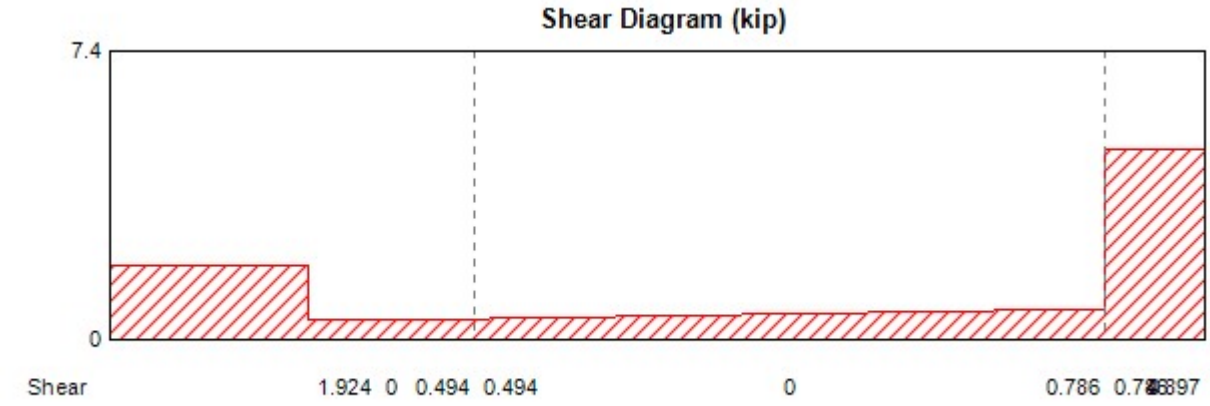


Figure 4-4-

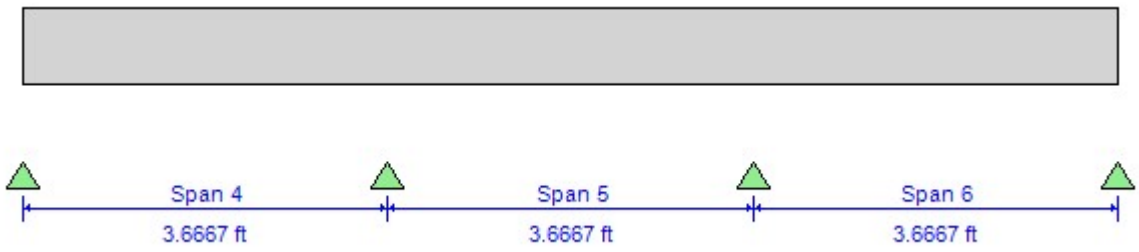


Figure 4-5-

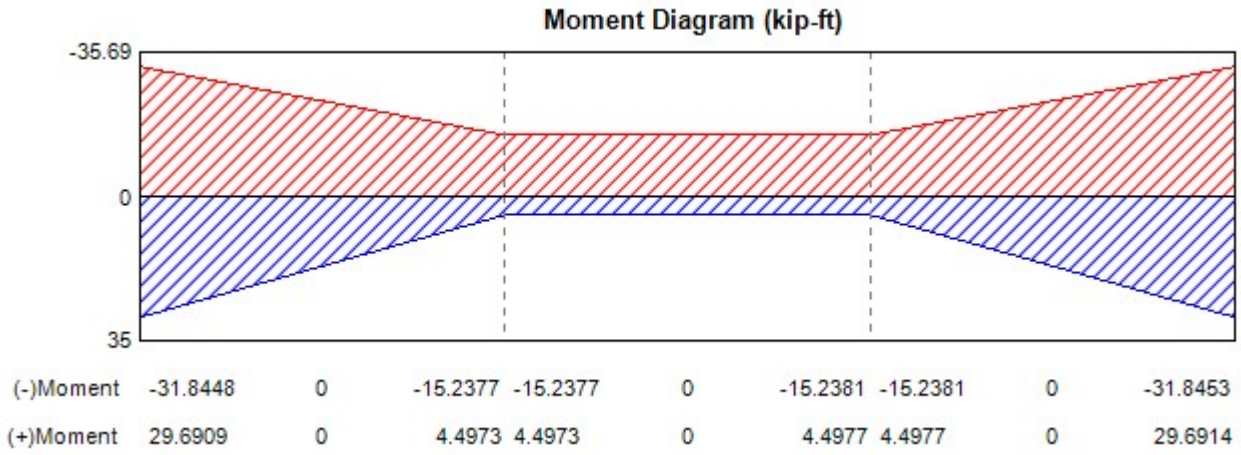


Figure 4-6-

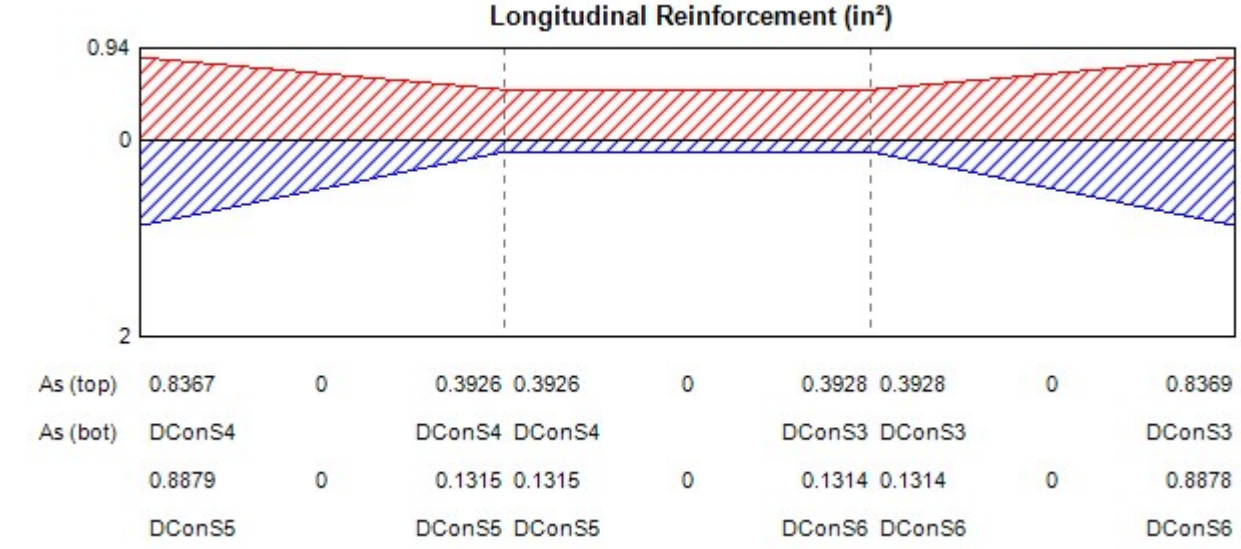


Figure 4-7-

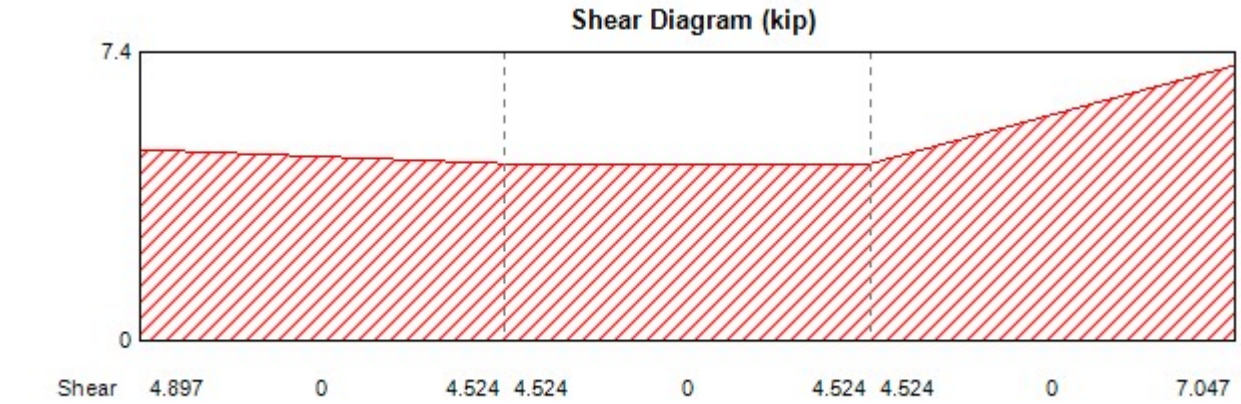


Figure 4-8-

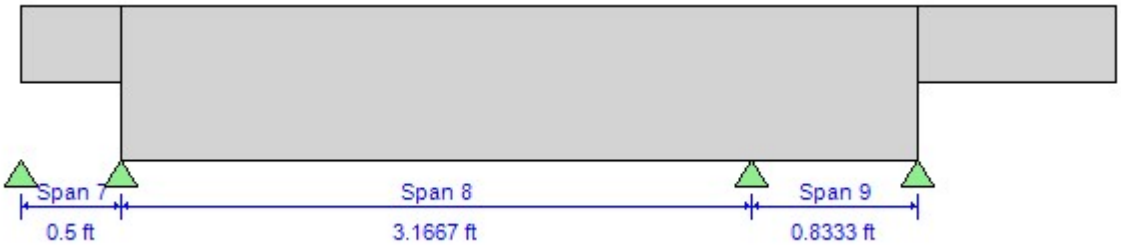


Figure 4-9-

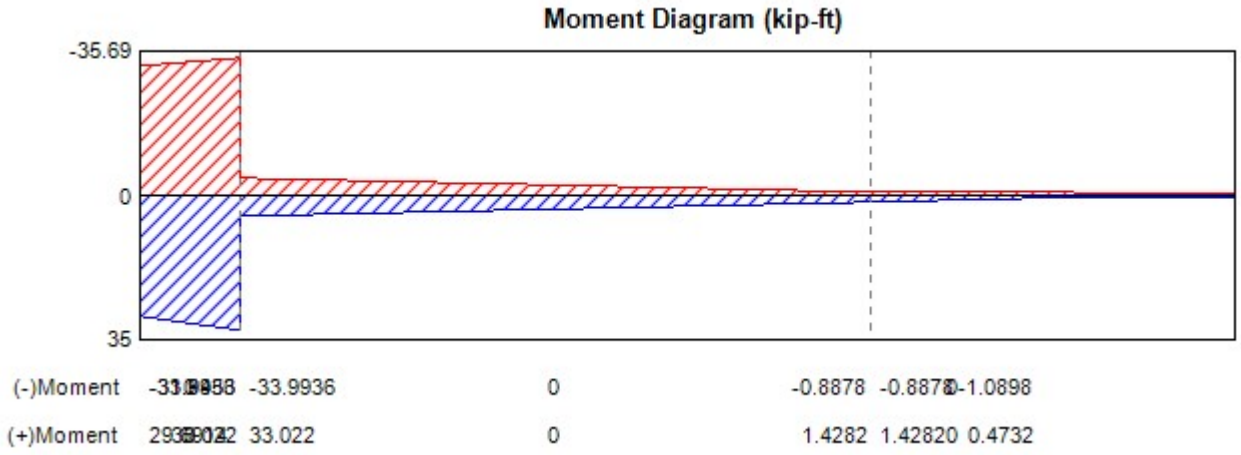


Figure 4-10-

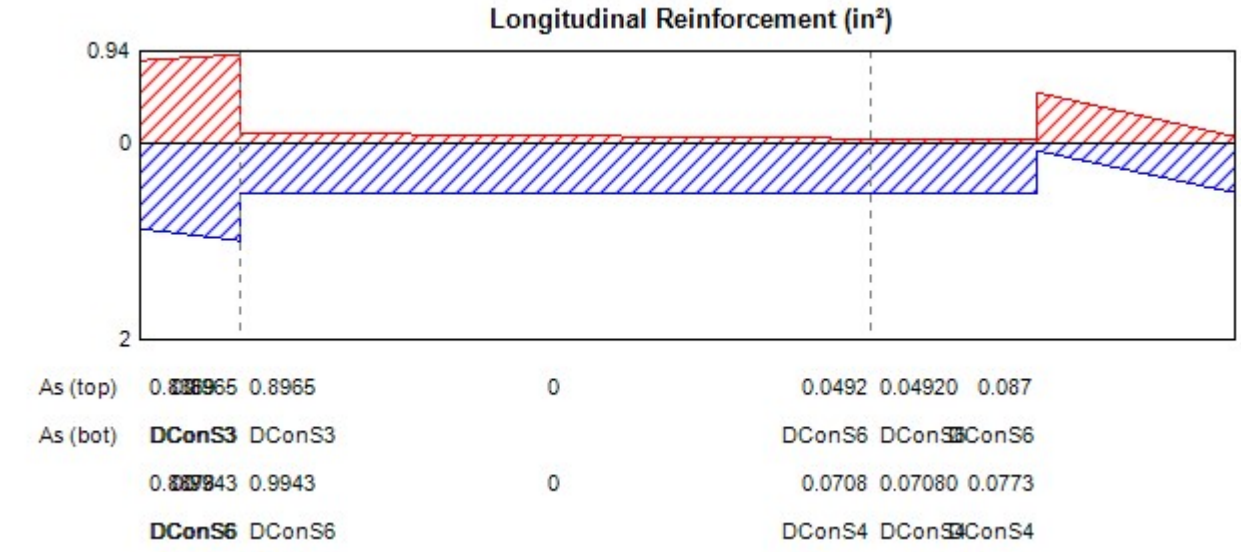


Figure 4-11-

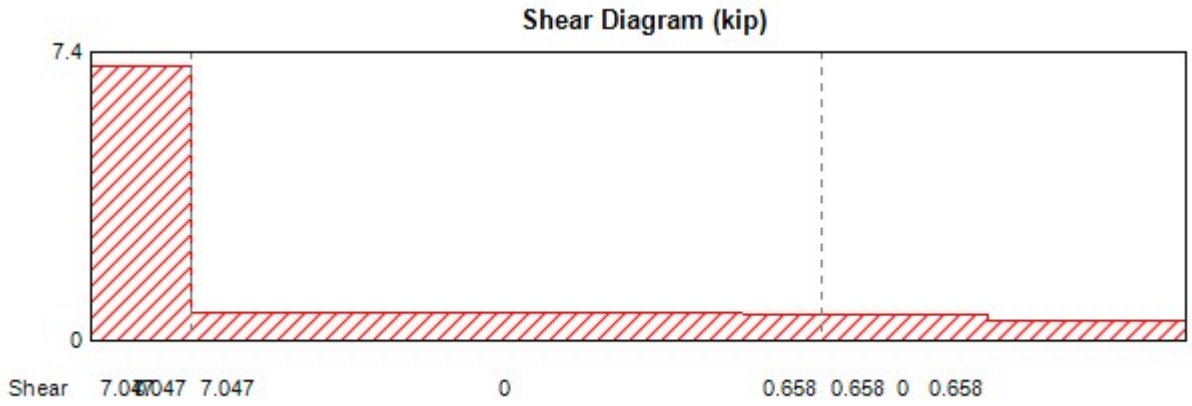


Figure 4-12-

ACI 318-14 Concrete Strip Design

Geometric Properties
Combination = Overall Envelope
Strip Label = CSA1
Length = 2 ft
Distance to Top Rebar Center = 2.375 in
Distance to Bot Rebar Center = 3.375 in

Material Properties
Concrete Comp. Strength = 3000 lb/in²
Concrete Modulus = 3122019.6 lb/in²
Longitudinal Rebar Yield = 60000 lb/in²

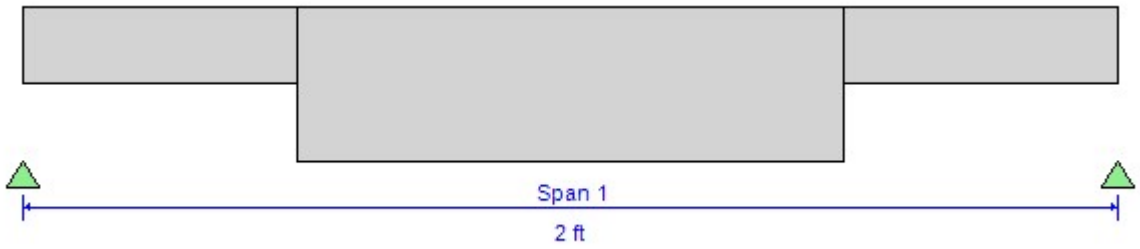


Figure 4-13-

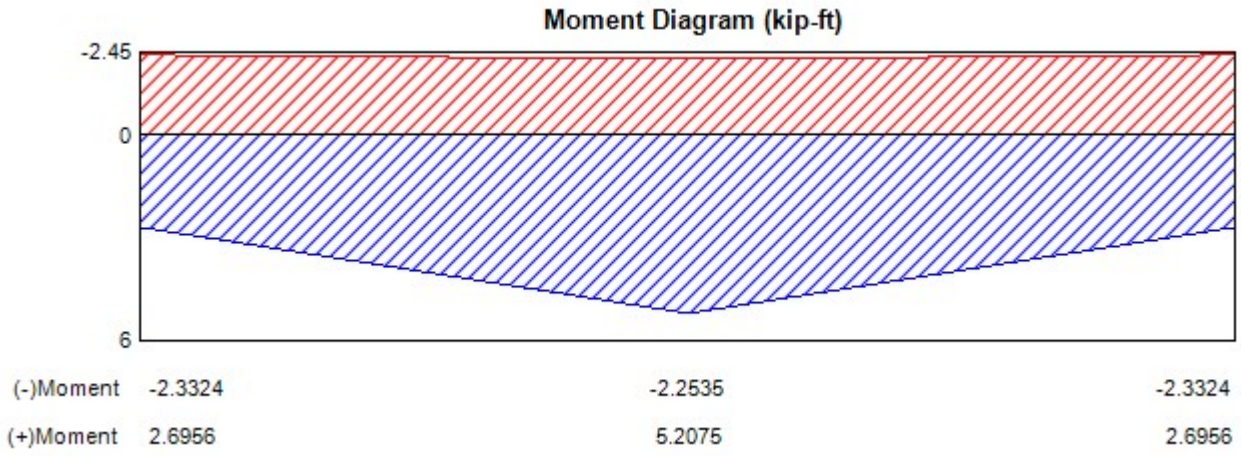


Figure 4-14-

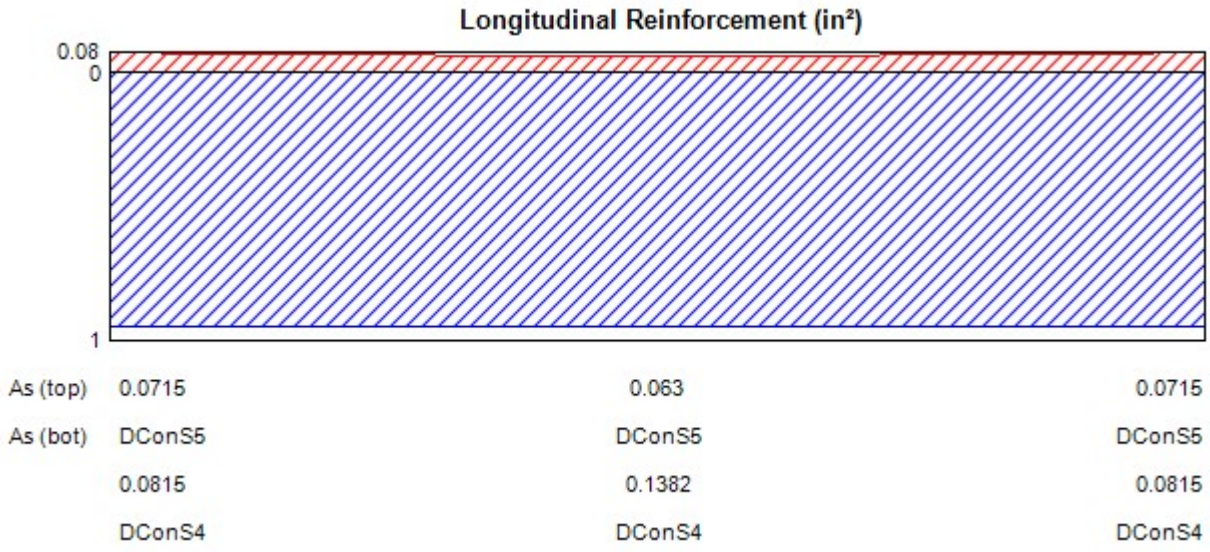


Figure 4-15-

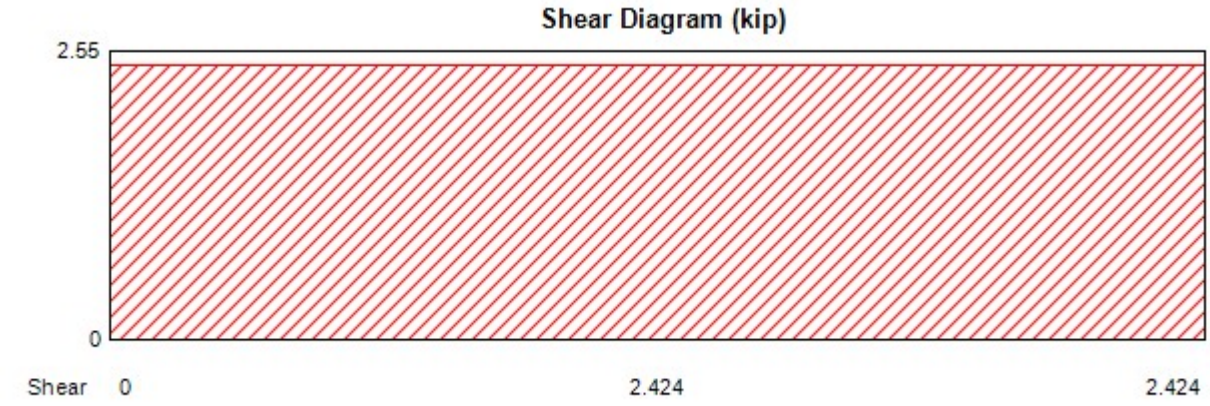


Figure 4-16-

ACI 318-14 Concrete Strip Design

Geometric Properties
Combination = Overall Envelope
Strip Label = SA1
Length = 2 ft
Distance to Top Rebar Center = 2.375 in
Distance to Bot Rebar Center = 3.375 in

Material Properties
Concrete Comp. Strength = 3000 lb/in²
Concrete Modulus = 3122019.6 lb/in²
Longitudinal Rebar Yield = 60000 lb/in²

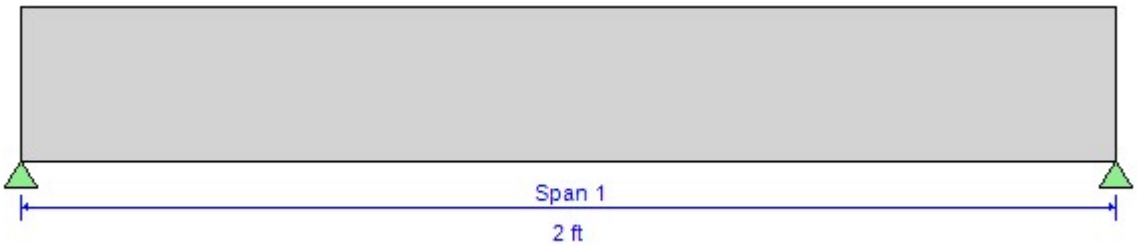


Figure 4-17-

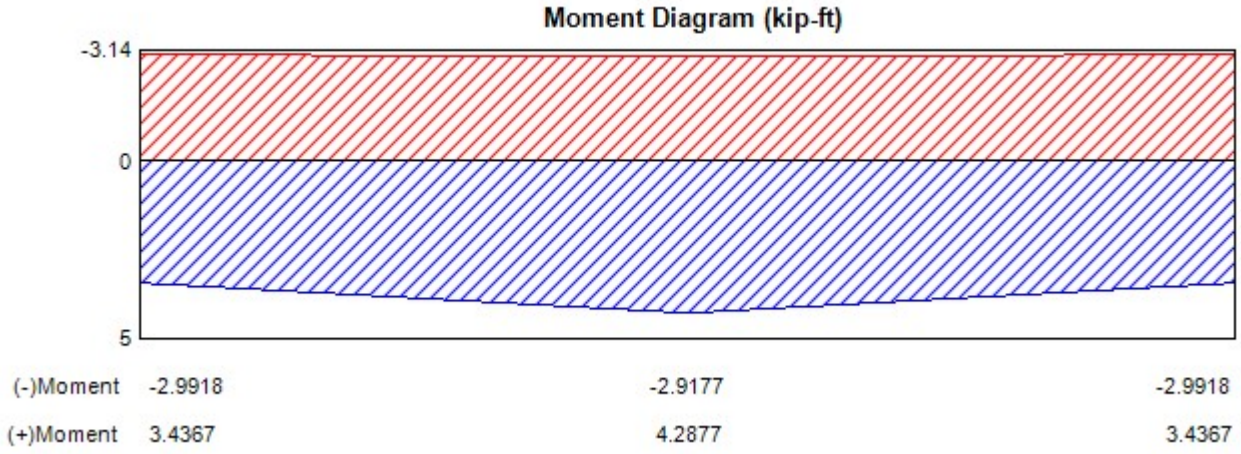


Figure 4-18-

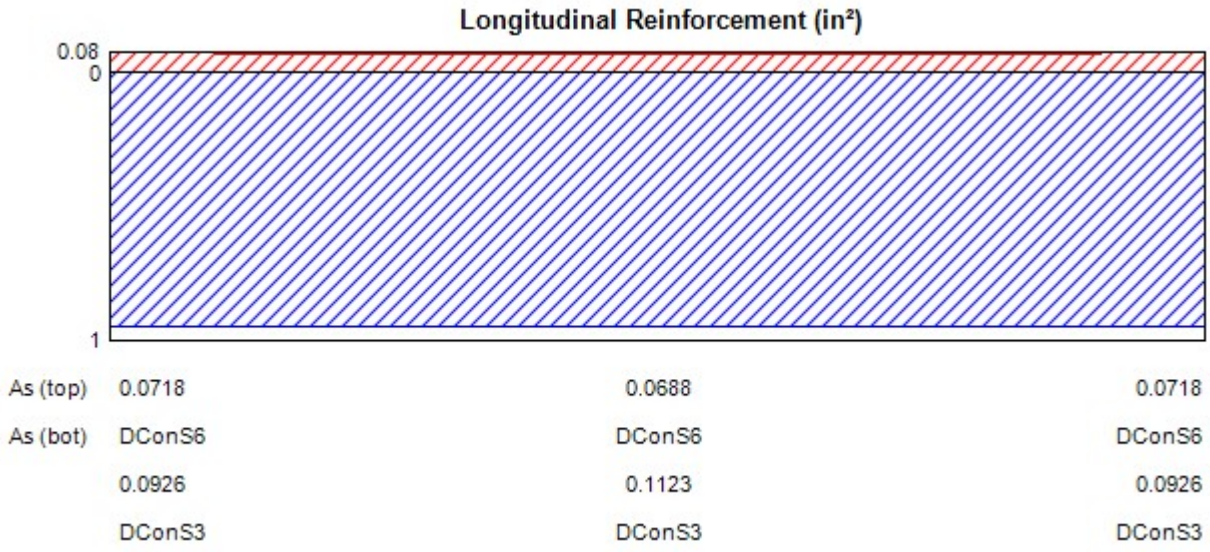


Figure 4-19-

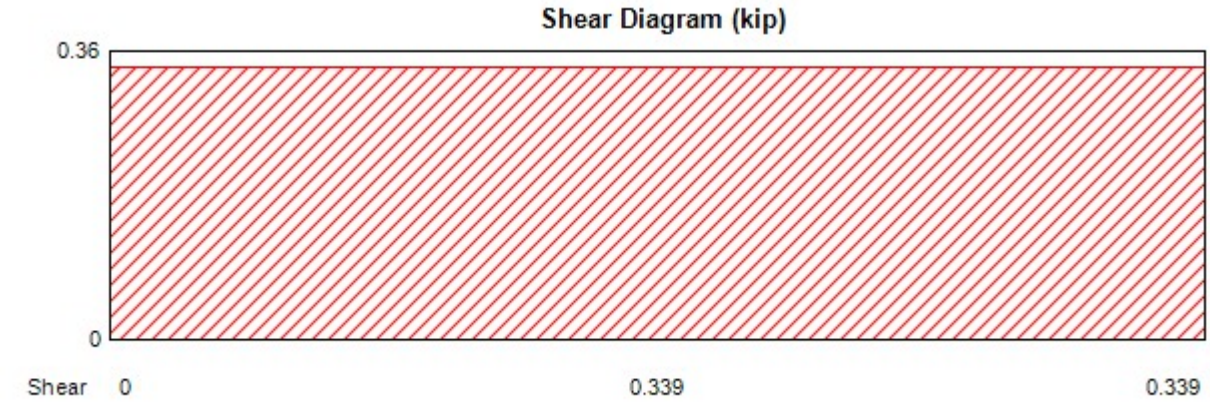


Figure 4-20-

ACI 318-14 Concrete Strip Design

Geometric Properties
Combination = Overall Envelope
Strip Label = SA2
Length = 2 ft
Distance to Top Rebar Center = 2.375 in
Distance to Bot Rebar Center = 3.375 in

Material Properties
Concrete Comp. Strength = 3000 lb/in²
Concrete Modulus = 3122019.6 lb/in²
Longitudinal Rebar Yield = 60000 lb/in²

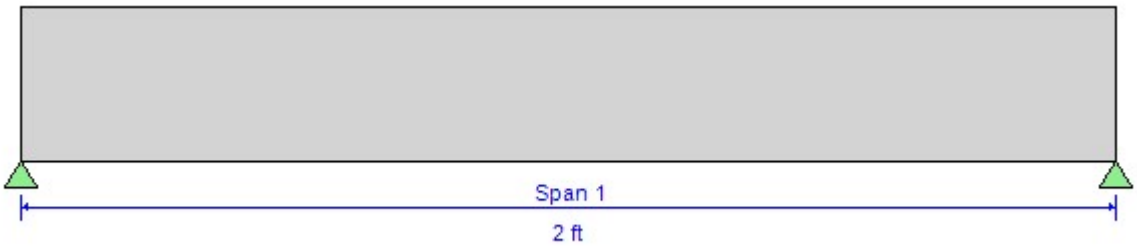


Figure 4-21-

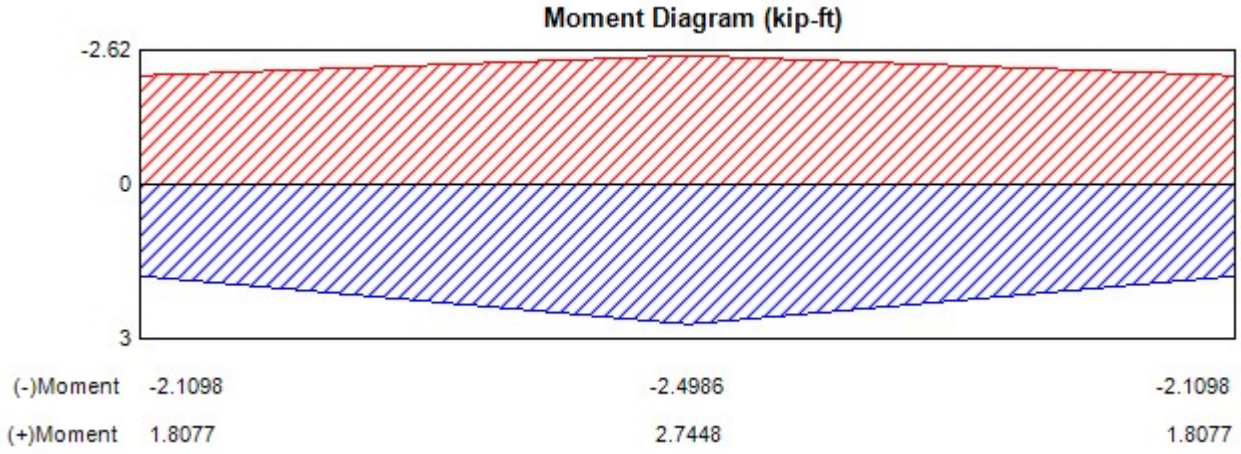


Figure 4-22-

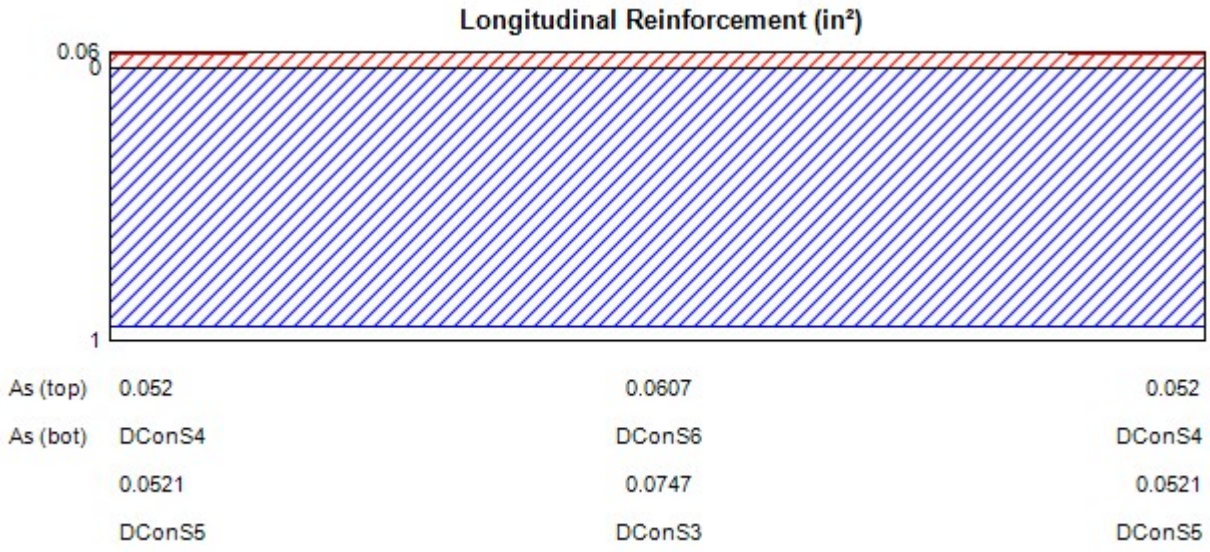


Figure 4-23-

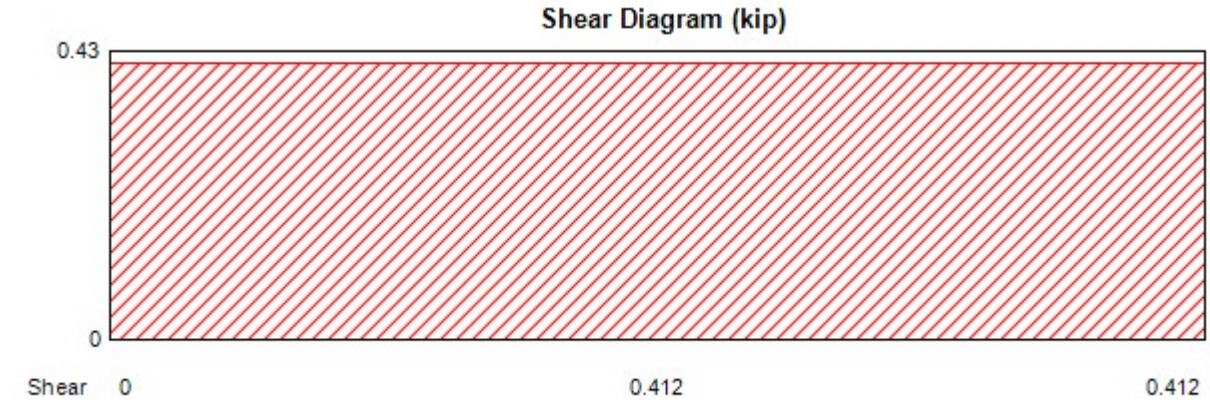


Figure 4-24-

ACI 318-14 Concrete Strip Design

Geometric Properties
Combination = Overall Envelope
Strip Label = SA3
Length = 2 ft
Distance to Top Rebar Center = 2.375 in
Distance to Bot Rebar Center = 3.375 in

Material Properties
Concrete Comp. Strength = 3000 lb/in²
Concrete Modulus = 3122019.6 lb/in²
Longitudinal Rebar Yield = 60000 lb/in²

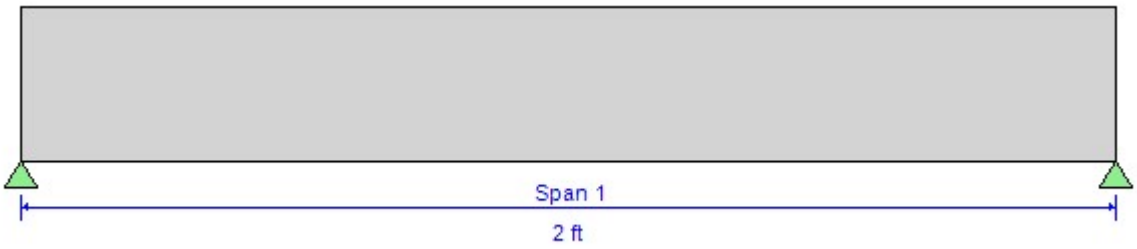


Figure 4-25-

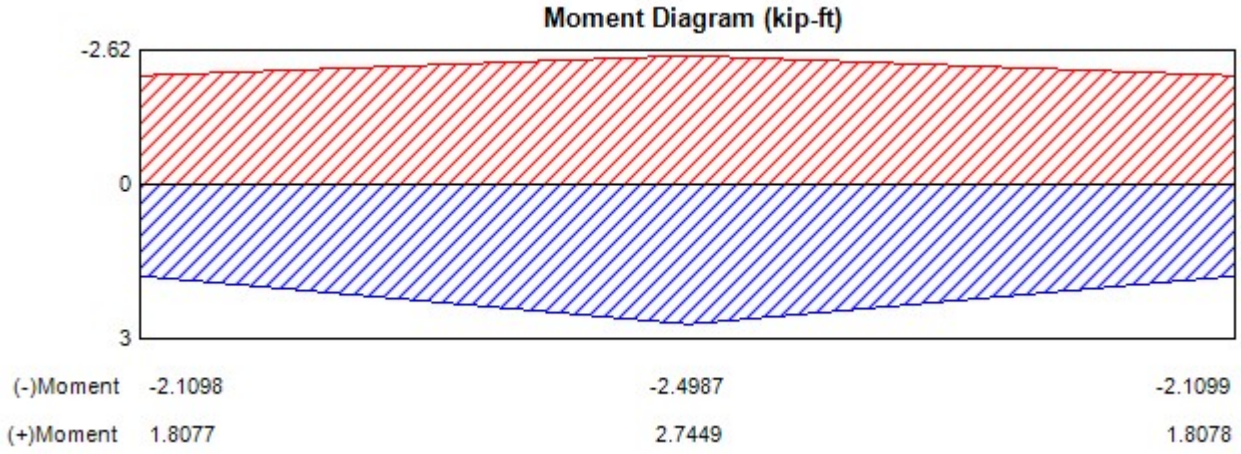


Figure 4-26-

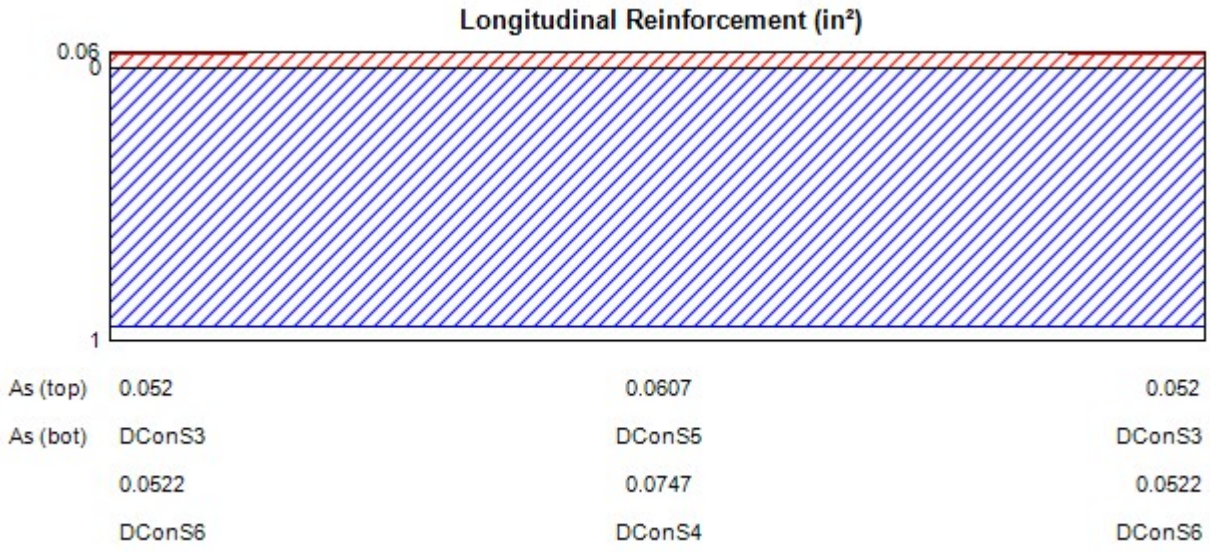


Figure 4-27-

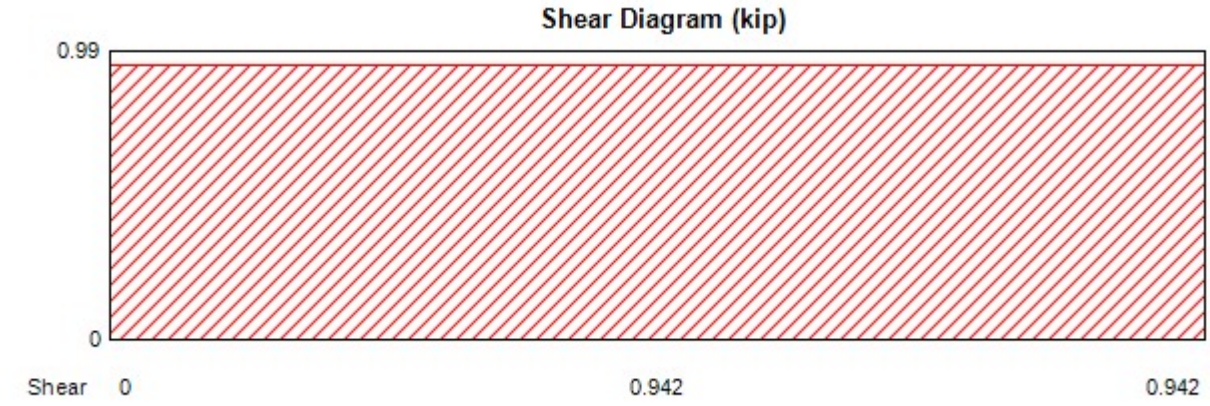


Figure 4-28-

ACI 318-14 Concrete Strip Design

Geometric Properties
Combination = Overall Envelope
Strip Label = SA4
Length = 2 ft
Distance to Top Rebar Center = 2.375 in
Distance to Bot Rebar Center = 3.375 in

Material Properties
Concrete Comp. Strength = 3000 lb/in²
Concrete Modulus = 3122019.6 lb/in²
Longitudinal Rebar Yield = 60000 lb/in²

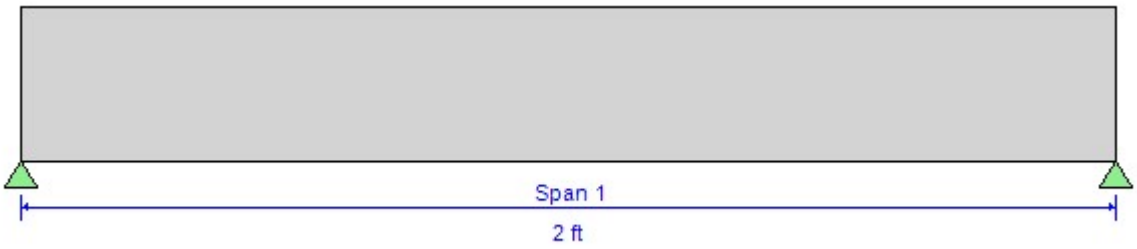


Figure 4-29-

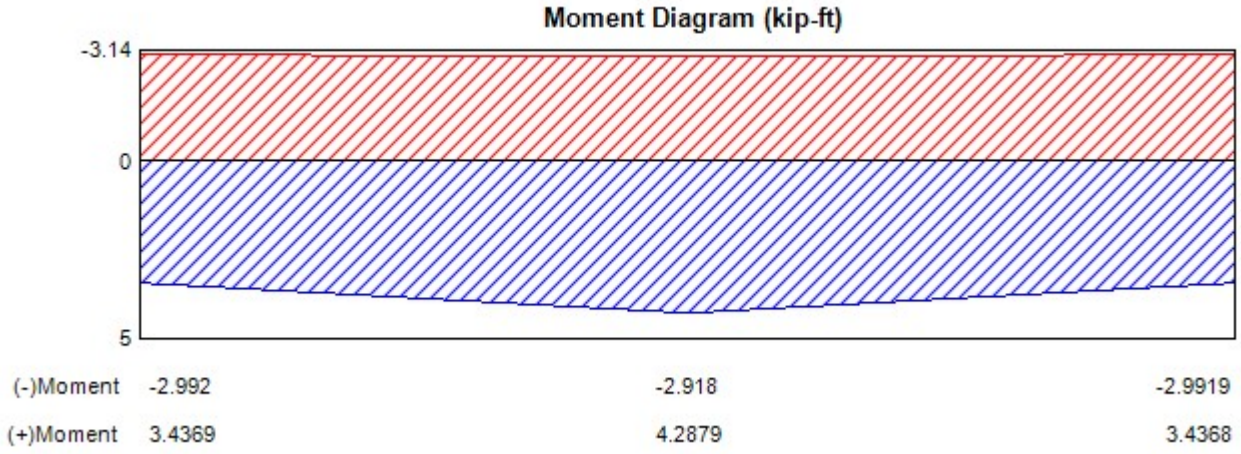


Figure 4-30-

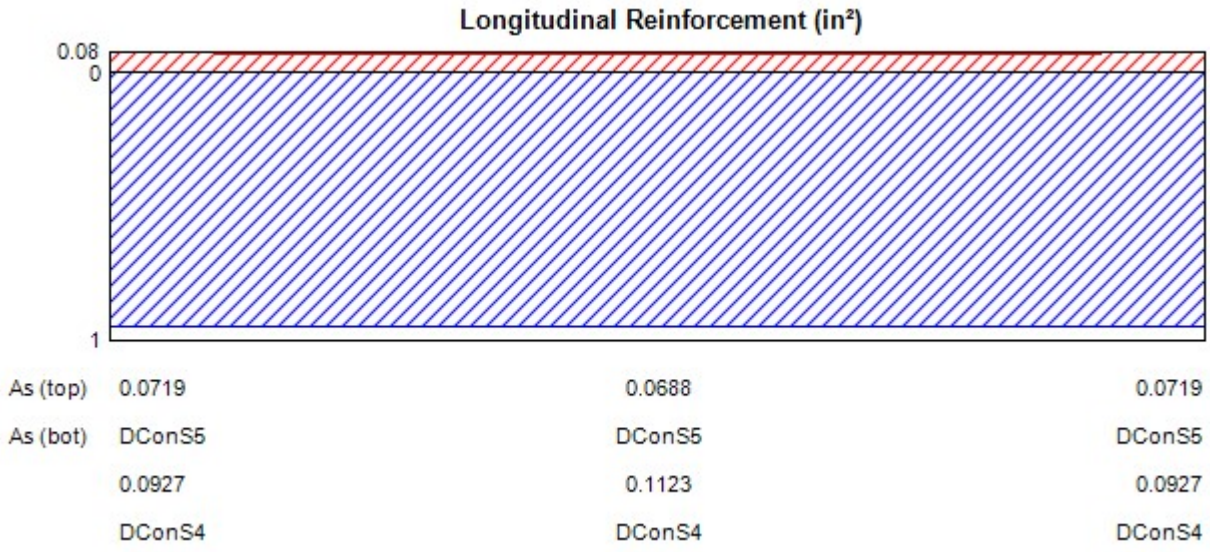


Figure 4-31-

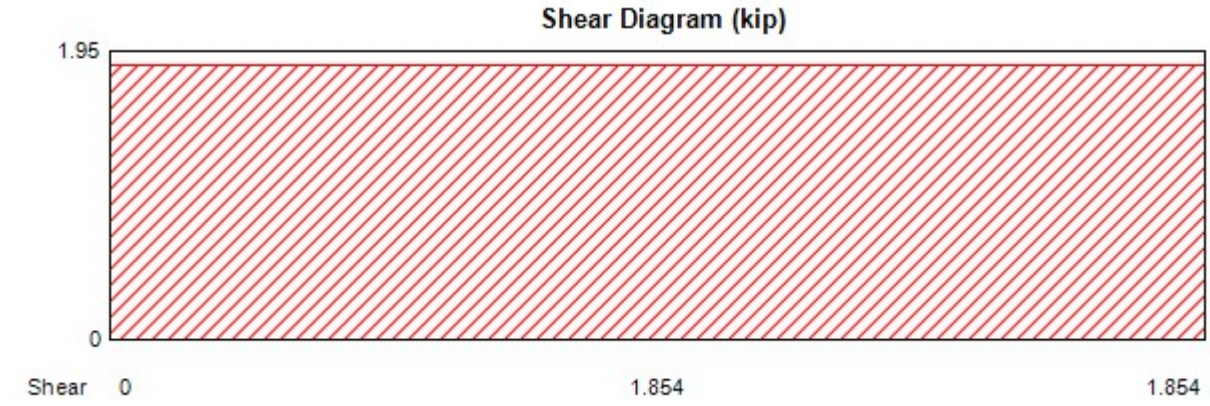


Figure 4-32-

ACI 318-14 Concrete Strip Design

Geometric Properties
Combination = Overall Envelope
Strip Label = SA5
Length = 2 ft
Distance to Top Rebar Center = 2.375 in
Distance to Bot Rebar Center = 3.375 in

Material Properties
Concrete Comp. Strength = 3000 lb/in²
Concrete Modulus = 3122019.6 lb/in²
Longitudinal Rebar Yield = 60000 lb/in²

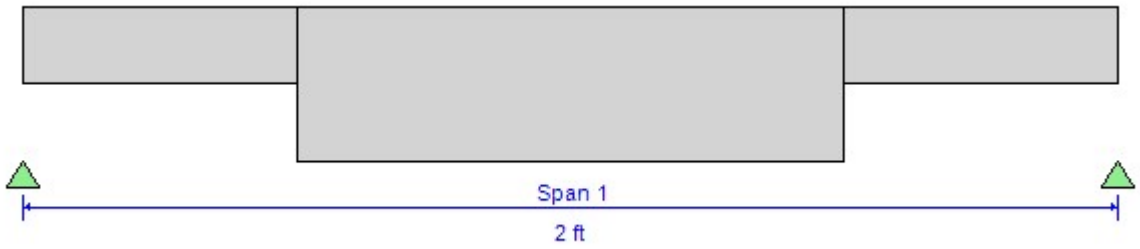


Figure 4-33-

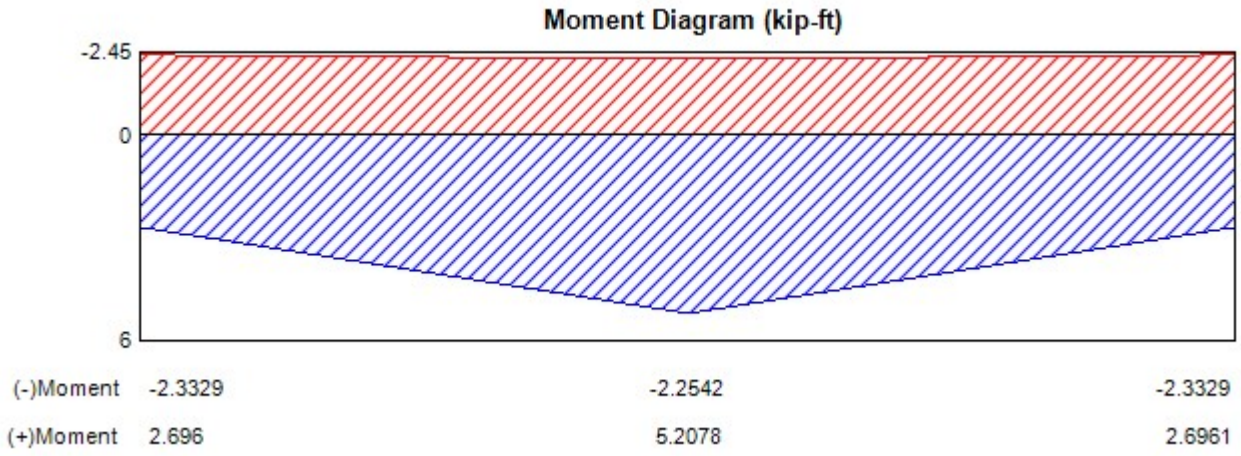


Figure 4-34-

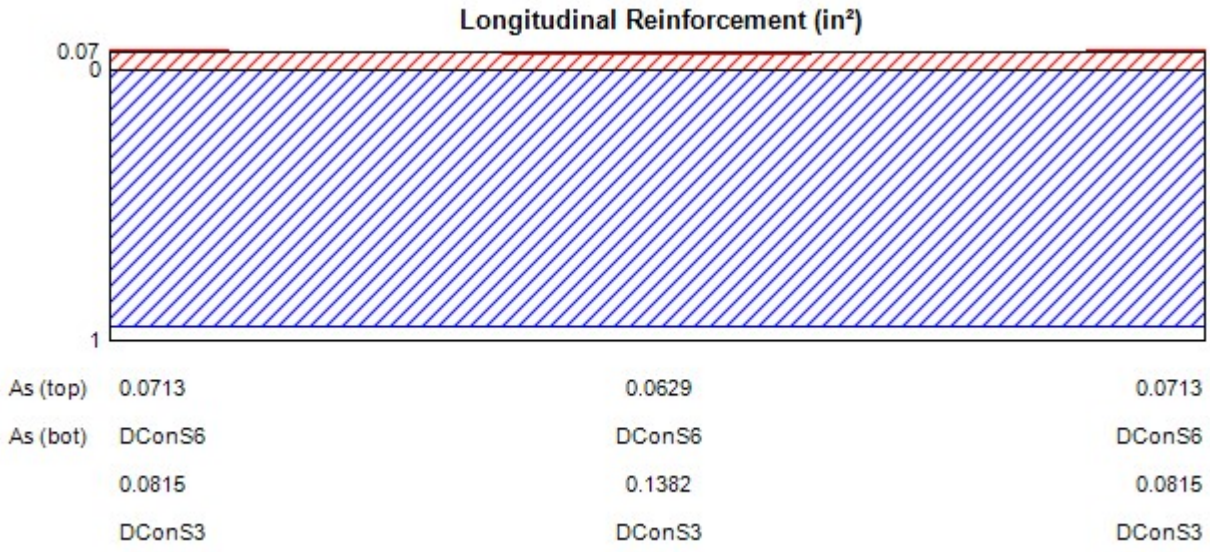


Figure 4-35-

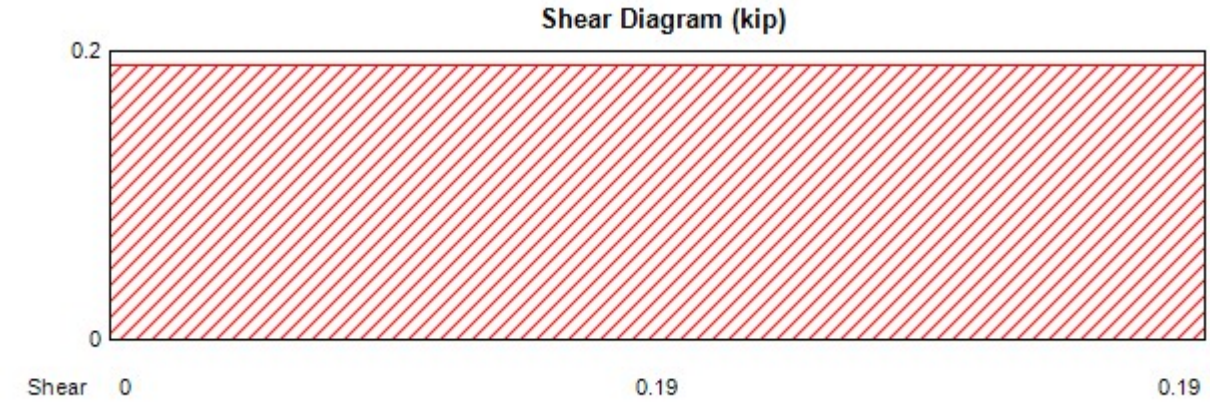
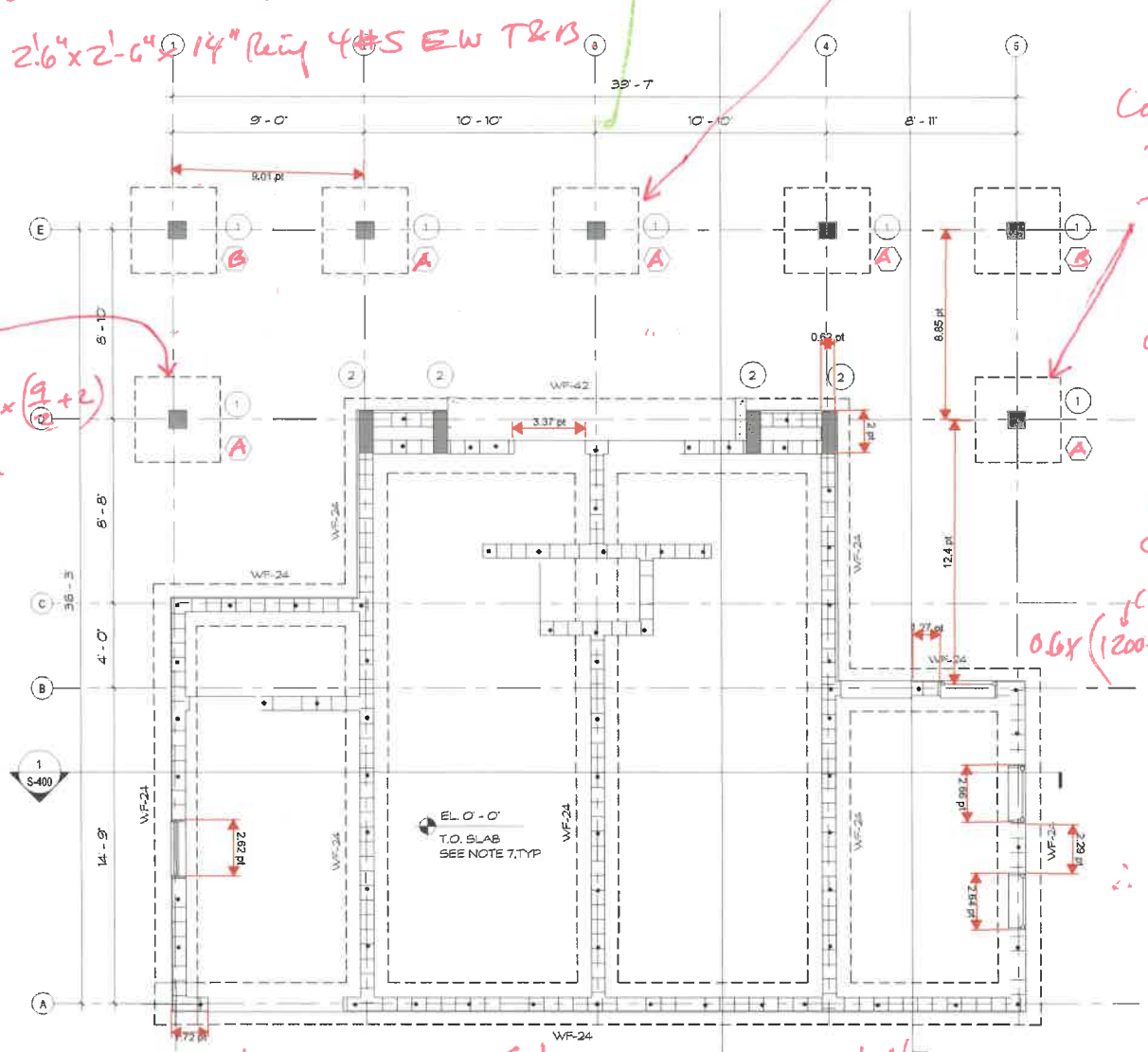


Figure 4-36-

Footing Schedule

(A) 2'6"x2'6"x18" Reinf 4#5 E.W. T&B

(B) 2'6"x2'-6"x14" Reinf 4#5 EW T&B



TA = $\left(\frac{9}{2}+\frac{9}{2}\right)\times\left(\frac{9}{2}+2\right)$

58 SF.

TA = $\left(\frac{11}{2}+\frac{9}{2}\right)\times\left(\frac{9}{2}+2\right)$ = 65 SF (6.5)

Footing size for uplift on Columns

Column weight = $0.8\times0.8\times13'\times150$ = 1248 lb. (+16" ≈ 1200 lb.)

Combs: 0.6D = 0.6W.

Roof DL = 10 PSF.

TA = $\frac{(12+8.6)}{2}\times\left(\frac{9'}{2}+2\right)$ (overhang) = 67 SF.

↓ wind uplift.

$0.6\left(10PSF\times67-60PSF\times67\right)=2010$ lb

↑ column reaction on footing

Using 3x3 footing

Check required thickness for uplift.

$0.6\times\left(1200+2.5^2\times x\times150+2'\times2.5^2\times100\right)=2010$

(Column; Soil; uplift; 1250; 1470)

$x=\frac{2010-(1200+1250)\times0.6}{937\times0.6}=\frac{540}{562}=0.96$

∴ 3x3 x 18" footing thickness.

$2\times12\times0.018=0.432$ ∴ #5 @12.

3x3 Footing 2.5x2.5x 18" Reinf

5#5 EW T&B.

3350

Corner Footing

$0.6\times2\times2\times x\times150+0.6\left(2\times2\times2\times100+1200\right)=1260$

(Soil; Column; uplift)

TA = $\left(\frac{9}{2}+2\right)\times\left(\frac{9}{2}+2\right)=42$ SF.

$0.6\times(10\times42-60\times42)=1260$

$x=\frac{1260-1200}{360}$

$x=0.16'$ ∴ use 2.5'x2.5'x18" thick Corner Footing.

100

Wall footing.

Tribut width = $\frac{9}{2} + \frac{22}{2} + 2' = 17.5$. ← overh.

Effective soil pressure = 2500 PSF − 3' × 150 = 2050.

Block cells at 24" grouted.

UDL = 17' × 61 + 17.5' × (30 + 25) = 1037 + 962 = 2000. PLF.

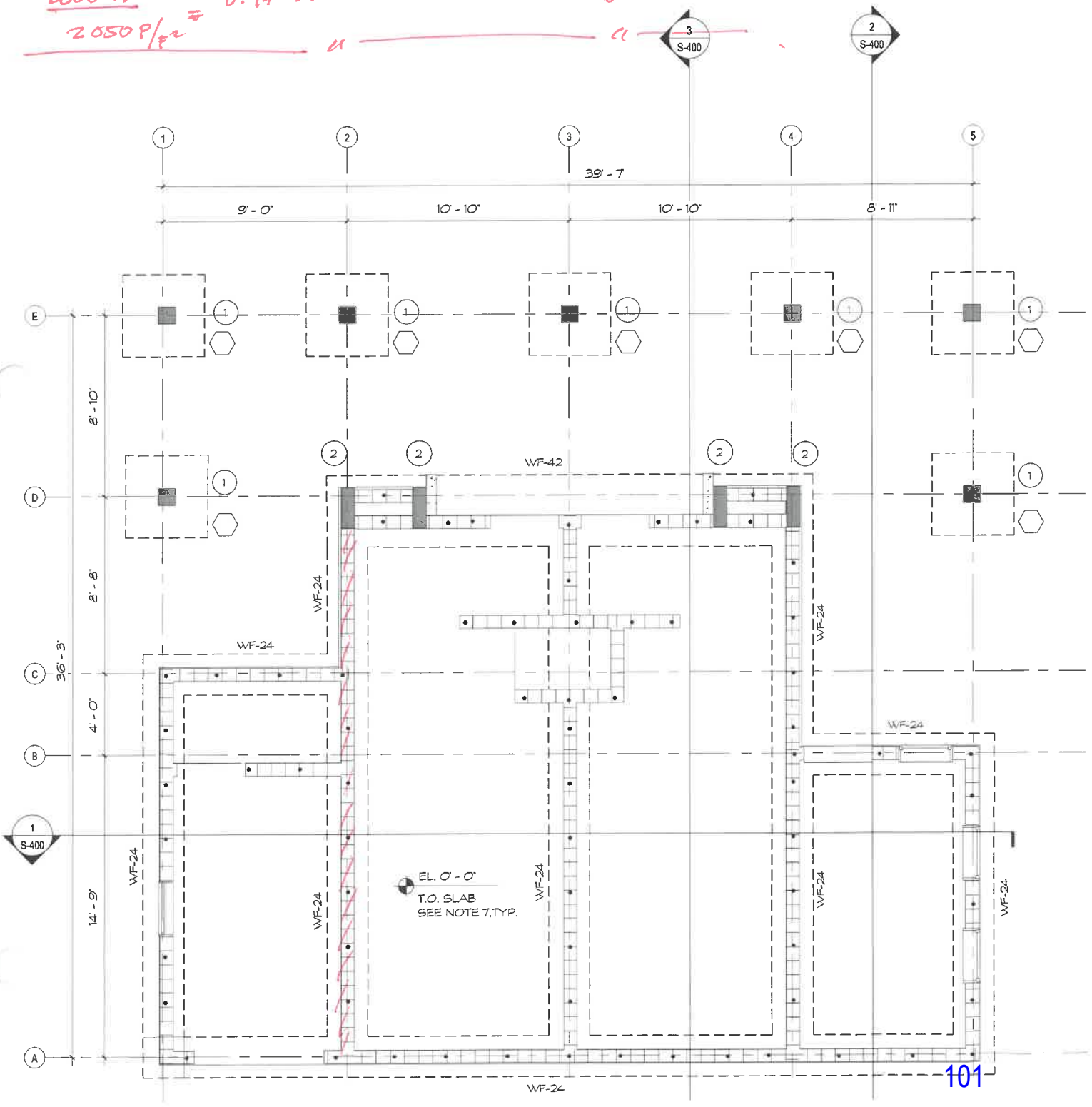
height ↑ LL ↑ Dead.

2000 P/F / 2050 P/F² = 0.97' ∴ use 2' Wall Footing.

Roof Slope 3:12

$x = \sqrt{3^2 + 12^2} = 12.4$

$\frac{12.4}{12} = 1.033$



W1 = 36' x 70 PSF x (15/2 + 3.5) = 27720

W1 36' x ↑ ultimate

DL Vertical UDL = 9' x 20 + 5' x 20 = 280 PLF

LL Vertical = 9' x 30 = 270

Total vertical load on wall

= 280 x 4' = 1120 lb = 1.1 K

In plane force on Grid D.

Force = 8.6/2 x 70 PSF x (15'/2 + 3.5) +

8.8' x 3' x 70 = 3311 + 1848

= 5159 K ultimate

x 0.6 = 3095 service.

but will use 4.2K.

NET. 70 PSF ULTIMATE HAIL WIND PRESSURE

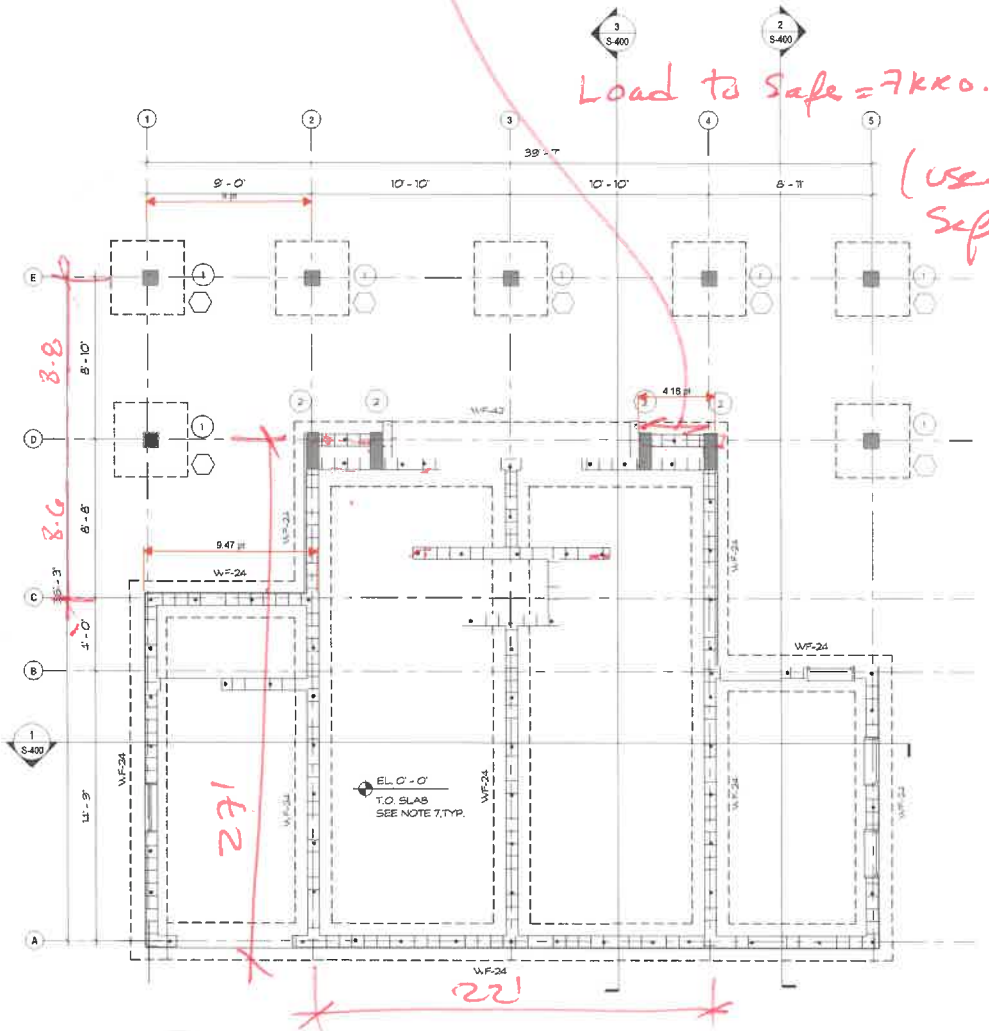
ultimate

Force in plane = 27720 ÷ 4 = 7000 lb.

↓ to service.

Moment = 15' x 7 x 0.6 = 63 K-Ft Service

Load to Safe = 7K x 0.6 = 4.2K Service. (used on Safe model)



1 S-100 **FOUNDATION AND GROUND FLOOR PLAN**

Scale: 1/4" = 1'-0"

PLAN NOTES: GROUND FLOOR

2:12 ⇒ $\frac{100}{12} = \frac{x}{2}$ $x = 16\%$ $\tan\frac{2}{12} \Rightarrow 9.5°$

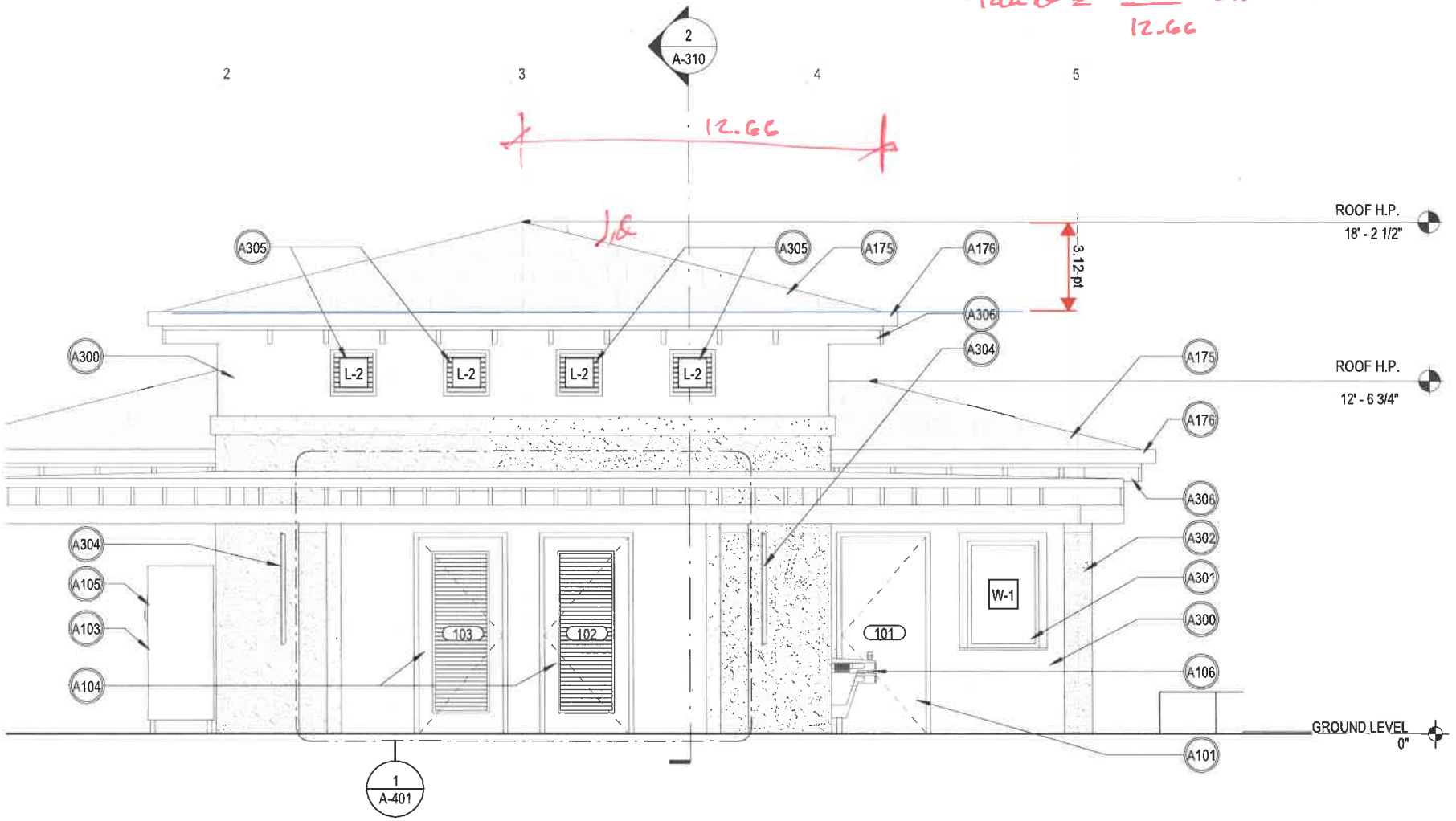
$\tan = \frac{2}{12} = 9.5°$

1/4" = 1'-0"

$\frac{3.12}{12.66} \times 12$ 3:12.

$\frac{100}{12.66} = \frac{x}{3.12}$ $x =$ 25%.

$\tan\theta = \frac{3.12}{12.66} \Rightarrow \alpha = 13.8°$



Wood Beam

File: wood joist.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06010740 — DDA Engineers, P.A.

DESCRIPTION: 12' perimeter bouble beam (2x12works)

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Load Resistance Factor D
Load Combination : ASCE 7-16

Wood Species : Southern Pine
Wood Grade : No.1 Dense: 2"-4" Thick: 12" Wide

Beam Bracing : Beam bracing is defined Beam-by-Beam

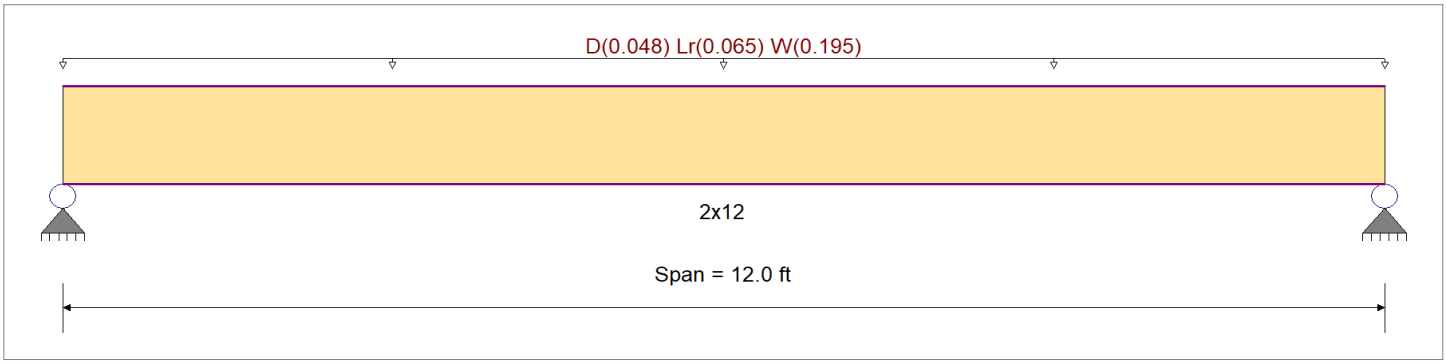
Fb +	1,100.0 psi
Fb -	1,100.0 psi
Fc - Prll	1,500.0 psi
Fc - Perp	660.0 psi
Fv	175.0 psi
Ft	750.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	660.0 ksi
Density	34.330 pcf

Unbraced Lengths

Span # 1, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0480, Lr = 0.0650, W = 0.1950 ksf, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.948 : 1	Maximum Shear Stress Ratio	=	0.394 : 1
Section used for this span		2x12	Section used for this span		2x12
fb: Actual	=	1,801.75 psi	fv: Actual	=	119.18 psi
Fb: Allowable	=	1,900.80 psi	Fv: Allowable	=	302.40 psi
Load Combination		+1.20D+1.60Lr+0.50W	Load Combination		+1.20D+1.60Lr+0.50W
Location of maximum on span	=	6.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.286 in	Ratio =	504 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.276 in	Ratio =	521 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	λ	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values Mu	fb	Fb	Shear Values Vu	fv	Fv
+1.40D													0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.349	0.145	0.60	1.000	1.00	1.00	1.00	1.00	1.00	1.31	497.20	1425.60	0.37	32.89	226.80
+1.20D+0.50Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.341	0.142	0.80	1.000	1.00	1.00	1.00	1.00	1.00	1.71	648.04	1900.80	0.48	42.87	302.40
+1.20D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.224	0.093	0.80	1.000	1.00	1.00	1.00	1.00	1.00	1.12	426.17	1900.80	0.32	28.19	302.40
+1.20D+1.60Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.598	0.249	0.80	1.000	1.00	1.00	1.00	1.00	1.00	3.00	1,136.15	1900.80	0.85	75.16	302.40
+1.20D+1.60Lr+0.50W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.948	0.394	0.80	1.000	1.00	1.00	1.00	1.00	1.00	4.75	1,801.75	1900.80	1.34	119.18	302.40
+1.20D+0.50W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12' perimeter bouble beam (2x12works)

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	λ	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values Mu	fb	Fb	Shear Values Vu	fv	Fv
Length = 12.0 ft	1	0.574	0.239	0.80	1.000	1.00	1.00	1.00	1.00	1.00	2.88	1,091.77	1900.80	0.81	72.22	302.40
+1.20D+0.50Lr+W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.833	0.346	1.00	1.000	1.00	1.00	1.00	1.00	1.00	5.22	1,979.24	2376.00	1.47	130.93	378.00
+1.20D+W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.740	0.308	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.63	1,757.37	2376.00	1.31	116.25	378.00
+0.90D+W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.695	0.289	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.35	1,650.83	2376.00	1.23	109.20	378.00
+0.90D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.135	0.056	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.84	319.63	2376.00	0.24	21.14	378.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	0.2856	6.044		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span		Max. Upward Defl		Location in Span	
D Only	1	0.0762	in	6.044	ft	0.0000	in	0.000	ft
+D+Lr	1	0.1714	in	6.044	ft	0.0000	in	0.000	ft
+D+0.750Lr	1	0.1476	in	6.044	ft	0.0000	in	0.000	ft
+D+0.60W	1	0.2476	in	6.044	ft	0.0000	in	0.000	ft
+D+0.750Lr+0.450W	1	0.2762	in	6.044	ft	0.0000	in	0.000	ft
+D+0.450W	1	0.2047	in	6.044	ft	0.0000	in	0.000	ft
+0.60D+0.60W	1	0.2171	in	6.044	ft	0.0000	in	0.000	ft
+0.60D	1	0.0457	in	6.044	ft	0.0000	in	0.000	ft
Lr Only	1	0.0952	in	6.044	ft	0.0000	in	0.000	ft
W Only	1	0.2856	in	6.044	ft	0.0000	in	0.000	ft

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.170	1.170
Overall MINimum	1.170	1.170
D Only	0.312	0.312
+D+Lr	0.702	0.702
+D+0.750Lr	0.605	0.605
+D+0.60W	1.014	1.014
+D+0.750Lr+0.450W	1.131	1.131
+D+0.450W	0.839	0.839
+0.60D+0.60W	0.889	0.889
+0.60D	0.187	0.187
Lr Only	0.390	0.390
W Only	1.170	1.170

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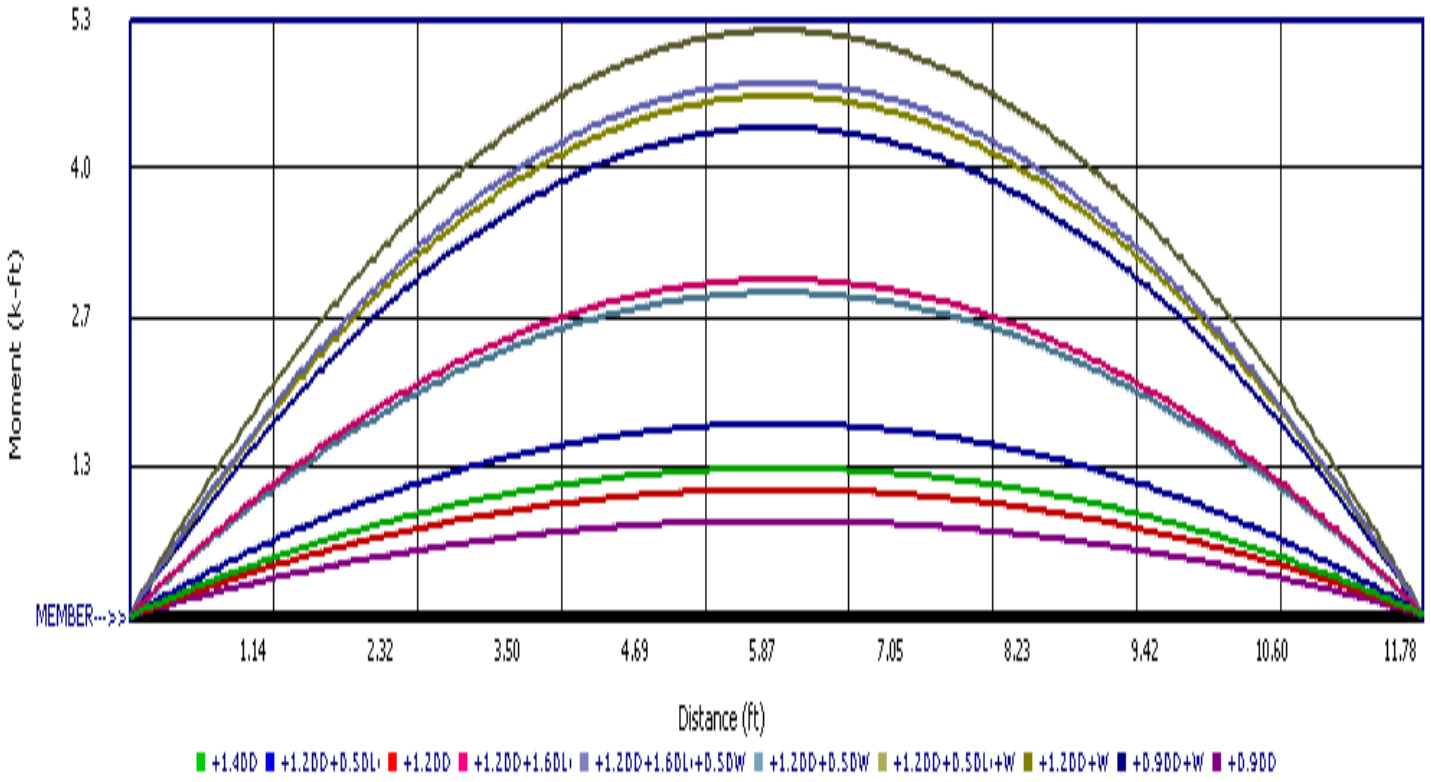
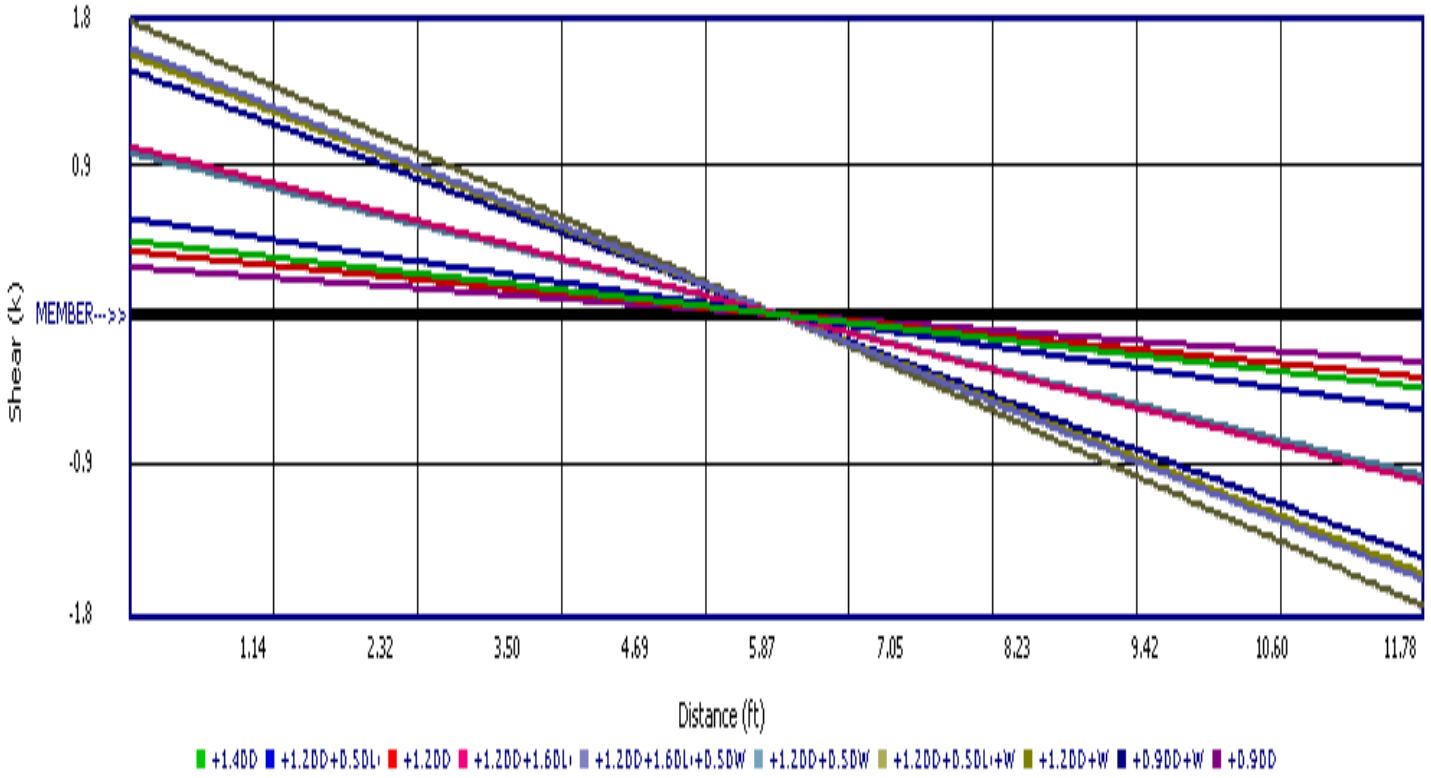
DESCRIPTION: 12' perimeter bouble beam (2x12works)

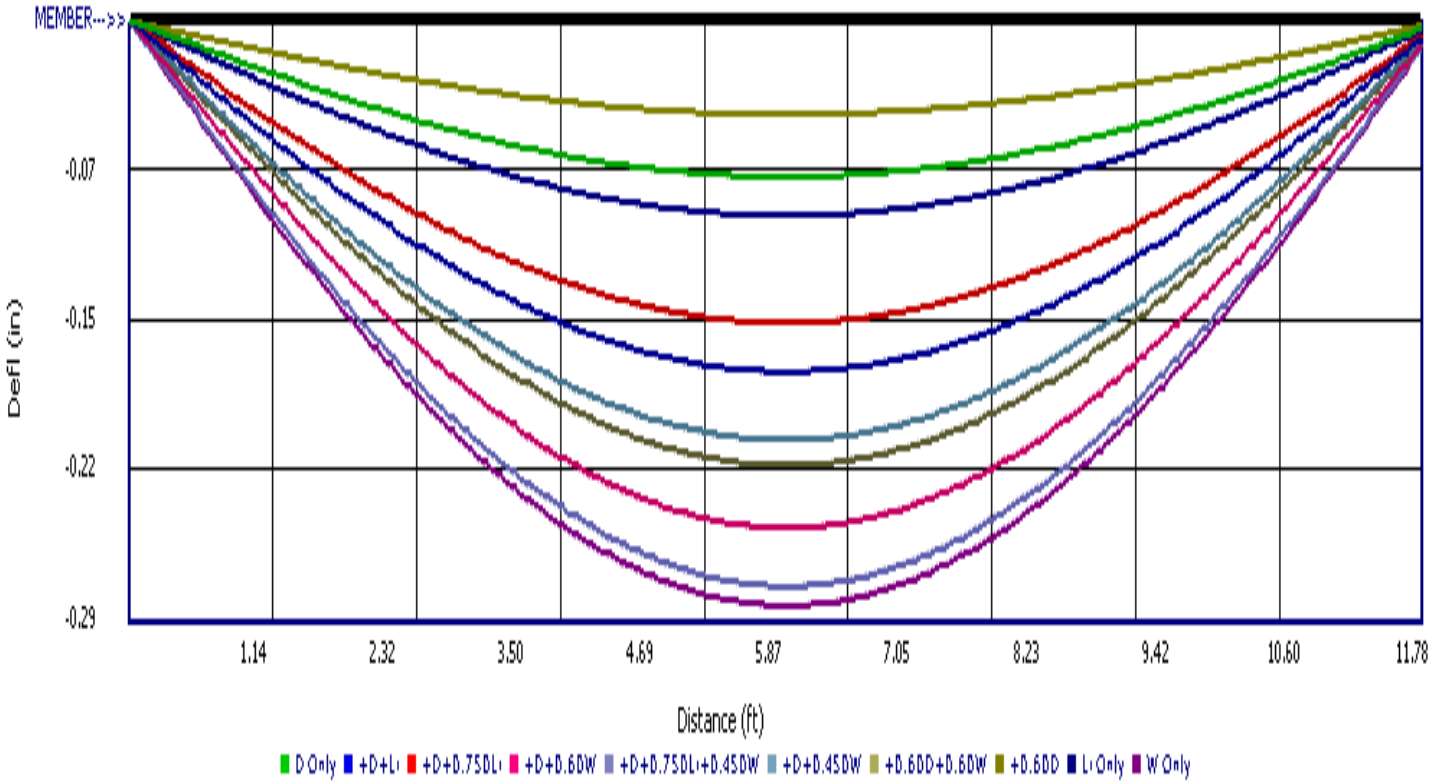




Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12' perimeter bouble beam (2x12works)



Summary of Values per Beam Span

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.40D	0.00	Span 1	0.437	0.000
+1.40D	0.31	Span 1	0.415	0.131
+1.40D	0.61	Span 1	0.392	0.254
+1.40D	0.92	Span 1	0.370	0.371
+1.40D	1.23	Span 1	0.348	0.481
+1.40D	1.53	Span 1	0.325	0.584
+1.40D	1.84	Span 1	0.303	0.681
+1.40D	2.15	Span 1	0.281	0.770
+1.40D	2.45	Span 1	0.258	0.853
+1.40D	2.76	Span 1	0.236	0.928
+1.40D	3.07	Span 1	0.214	0.997
+1.40D	3.37	Span 1	0.191	1.060
+1.40D	3.68	Span 1	0.169	1.115
+1.40D	3.99	Span 1	0.147	1.163
+1.40D	4.29	Span 1	0.124	1.205
+1.40D	4.60	Span 1	0.102	1.239
+1.40D	4.91	Span 1	0.080	1.267
+1.40D	5.21	Span 1	0.057	1.288
+1.40D	5.52	Span 1	0.035	1.303
+1.40D	5.82	Span 1	0.013	1.310

Wood Beam

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DESCRIPTION: 12' perimeter bouble beam (2x12works)

+1.40D	6.13	Span 1	-0.010	1.310

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.40D	6.44	Span 1	-0.032	1.304
+1.40D	6.74	Span 1	-0.054	1.291
+1.40D	7.05	Span 1	-0.077	1.271
+1.40D	7.36	Span 1	-0.099	1.244
+1.40D	7.66	Span 1	-0.121	1.210
+1.40D	7.97	Span 1	-0.144	1.170
+1.40D	8.28	Span 1	-0.166	1.122
+1.40D	8.58	Span 1	-0.188	1.068
+1.40D	8.89	Span 1	-0.211	1.007
+1.40D	9.20	Span 1	-0.233	0.939
+1.40D	9.50	Span 1	-0.255	0.864
+1.40D	9.81	Span 1	-0.278	0.782
+1.40D	10.12	Span 1	-0.300	0.694
+1.40D	10.42	Span 1	-0.322	0.598
+1.40D	10.73	Span 1	-0.344	0.496
+1.40D	11.04	Span 1	-0.367	0.387
+1.40D	11.34	Span 1	-0.389	0.271
+1.40D	11.65	Span 1	-0.411	0.149
+1.40D	11.96	Span 1	-0.434	0.019
+1.20D+0.50Lr	0.00	Span 1	0.570	0.000
+1.20D+0.50Lr	0.31	Span 1	0.540	0.170
+1.20D+0.50Lr	0.61	Span 1	0.511	0.331
+1.20D+0.50Lr	0.92	Span 1	0.482	0.484
+1.20D+0.50Lr	1.23	Span 1	0.453	0.627
+1.20D+0.50Lr	1.53	Span 1	0.424	0.762
+1.20D+0.50Lr	1.84	Span 1	0.395	0.887
+1.20D+0.50Lr	2.15	Span 1	0.366	1.004
+1.20D+0.50Lr	2.45	Span 1	0.337	1.111
+1.20D+0.50Lr	2.76	Span 1	0.308	1.210
+1.20D+0.50Lr	3.07	Span 1	0.279	1.300
+1.20D+0.50Lr	3.37	Span 1	0.249	1.381
+1.20D+0.50Lr	3.68	Span 1	0.220	1.453
+1.20D+0.50Lr	3.99	Span 1	0.191	1.516
+1.20D+0.50Lr	4.29	Span 1	0.162	1.570
+1.20D+0.50Lr	4.60	Span 1	0.133	1.615
+1.20D+0.50Lr	4.91	Span 1	0.104	1.652
+1.20D+0.50Lr	5.21	Span 1	0.075	1.679
+1.20D+0.50Lr	5.52	Span 1	0.046	1.698
+1.20D+0.50Lr	5.82	Span 1	0.017	1.707
+1.20D+0.50Lr	6.13	Span 1	-0.012	1.708
+1.20D+0.50Lr	6.44	Span 1	-0.042	1.700
+1.20D+0.50Lr	6.74	Span 1	-0.071	1.682
+1.20D+0.50Lr	7.05	Span 1	-0.100	1.656
+1.20D+0.50Lr	7.36	Span 1	-0.129	1.621
+1.20D+0.50Lr	7.66	Span 1	-0.158	1.577

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+0.50Lr	7.97	Span 1	-0.187	1.524
+1.20D+0.50Lr	8.28	Span 1	-0.216	1.463
+1.20D+0.50Lr	8.58	Span 1	-0.245	1.392
+1.20D+0.50Lr	8.89	Span 1	-0.274	1.312
+1.20D+0.50Lr	9.20	Span 1	-0.303	1.224
+1.20D+0.50Lr	9.50	Span 1	-0.333	1.126
+1.20D+0.50Lr	9.81	Span 1	-0.362	1.020
+1.20D+0.50Lr	10.12	Span 1	-0.391	0.904
+1.20D+0.50Lr	10.42	Span 1	-0.420	0.780
+1.20D+0.50Lr	10.73	Span 1	-0.449	0.647
+1.20D+0.50Lr	11.04	Span 1	-0.478	0.505
+1.20D+0.50Lr	11.34	Span 1	-0.507	0.354
+1.20D+0.50Lr	11.65	Span 1	-0.536	0.194
+1.20D+0.50Lr	11.96	Span 1	-0.565	0.025
+1.20D	0.00	Span 1	0.375	0.000
+1.20D	0.31	Span 1	0.355	0.112
+1.20D	0.61	Span 1	0.336	0.218
+1.20D	0.92	Span 1	0.317	0.318
+1.20D	1.23	Span 1	0.298	0.412
+1.20D	1.53	Span 1	0.279	0.501
+1.20D	1.84	Span 1	0.260	0.583
+1.20D	2.15	Span 1	0.241	0.660
+1.20D	2.45	Span 1	0.221	0.731
+1.20D	2.76	Span 1	0.202	0.796
+1.20D	3.07	Span 1	0.183	0.855
+1.20D	3.37	Span 1	0.164	0.908
+1.20D	3.68	Span 1	0.145	0.956
+1.20D	3.99	Span 1	0.126	0.997
+1.20D	4.29	Span 1	0.107	1.033
+1.20D	4.60	Span 1	0.087	1.062
+1.20D	4.91	Span 1	0.068	1.086
+1.20D	5.21	Span 1	0.049	1.104
+1.20D	5.52	Span 1	0.030	1.116
+1.20D	5.82	Span 1	0.011	1.123
+1.20D	6.13	Span 1	-0.008	1.123
+1.20D	6.44	Span 1	-0.027	1.118
+1.20D	6.74	Span 1	-0.046	1.106
+1.20D	7.05	Span 1	-0.066	1.089
+1.20D	7.36	Span 1	-0.085	1.066
+1.20D	7.66	Span 1	-0.104	1.037
+1.20D	7.97	Span 1	-0.123	1.002
+1.20D	8.28	Span 1	-0.142	0.962
+1.20D	8.58	Span 1	-0.161	0.915
+1.20D	8.89	Span 1	-0.180	0.863
+1.20D	9.20	Span 1	-0.200	0.805

Wood Beam

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DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D	9.50	Span 1	-0.219	0.741
+1.20D	9.81	Span 1	-0.238	0.671
+1.20D	10.12	Span 1	-0.257	0.595
+1.20D	10.42	Span 1	-0.276	0.513
+1.20D	10.73	Span 1	-0.295	0.425
+1.20D	11.04	Span 1	-0.314	0.332
+1.20D	11.34	Span 1	-0.334	0.233
+1.20D	11.65	Span 1	-0.353	0.127
+1.20D	11.96	Span 1	-0.372	0.016
+1.20D+1.60Lr	0.00	Span 1	0.999	0.000
+1.20D+1.60Lr	0.31	Span 1	0.948	0.298
+1.20D+1.60Lr	0.61	Span 1	0.897	0.581
+1.20D+1.60Lr	0.92	Span 1	0.846	0.848
+1.20D+1.60Lr	1.23	Span 1	0.794	1.099
+1.20D+1.60Lr	1.53	Span 1	0.743	1.335
+1.20D+1.60Lr	1.84	Span 1	0.692	1.555
+1.20D+1.60Lr	2.15	Span 1	0.641	1.760
+1.20D+1.60Lr	2.45	Span 1	0.590	1.949
+1.20D+1.60Lr	2.76	Span 1	0.539	2.122
+1.20D+1.60Lr	3.07	Span 1	0.488	2.279
+1.20D+1.60Lr	3.37	Span 1	0.437	2.421
+1.20D+1.60Lr	3.68	Span 1	0.386	2.547
+1.20D+1.60Lr	3.99	Span 1	0.335	2.658
+1.20D+1.60Lr	4.29	Span 1	0.284	2.753
+1.20D+1.60Lr	4.60	Span 1	0.233	2.832
+1.20D+1.60Lr	4.91	Span 1	0.182	2.896
+1.20D+1.60Lr	5.21	Span 1	0.131	2.944
+1.20D+1.60Lr	5.52	Span 1	0.080	2.976
+1.20D+1.60Lr	5.82	Span 1	0.029	2.993
+1.20D+1.60Lr	6.13	Span 1	-0.022	2.994
+1.20D+1.60Lr	6.44	Span 1	-0.073	2.980
+1.20D+1.60Lr	6.74	Span 1	-0.124	2.950
+1.20D+1.60Lr	7.05	Span 1	-0.175	2.904
+1.20D+1.60Lr	7.36	Span 1	-0.226	2.842
+1.20D+1.60Lr	7.66	Span 1	-0.277	2.765
+1.20D+1.60Lr	7.97	Span 1	-0.328	2.672
+1.20D+1.60Lr	8.28	Span 1	-0.379	2.564
+1.20D+1.60Lr	8.58	Span 1	-0.430	2.440
+1.20D+1.60Lr	8.89	Span 1	-0.481	2.300
+1.20D+1.60Lr	9.20	Span 1	-0.532	2.145
+1.20D+1.60Lr	9.50	Span 1	-0.583	1.974
+1.20D+1.60Lr	9.81	Span 1	-0.634	1.788
+1.20D+1.60Lr	10.12	Span 1	-0.685	1.585
+1.20D+1.60Lr	10.42	Span 1	-0.736	1.368
+1.20D+1.60Lr	10.73	Span 1	-0.787	1.134

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DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+1.60Lr	11.04	Span 1	-0.838	0.885
+1.20D+1.60Lr	11.34	Span 1	-0.889	0.620
+1.20D+1.60Lr	11.65	Span 1	-0.940	0.340
+1.20D+1.60Lr	11.96	Span 1	-0.991	0.044
+1.20D+1.60Lr+0.50W	0.00	Span 1	1.584	0.000
+1.20D+1.60Lr+0.50W	0.31	Span 1	1.503	0.473
+1.20D+1.60Lr+0.50W	0.61	Span 1	1.422	0.921
+1.20D+1.60Lr+0.50W	0.92	Span 1	1.341	1.345
+1.20D+1.60Lr+0.50W	1.23	Span 1	1.260	1.743
+1.20D+1.60Lr+0.50W	1.53	Span 1	1.179	2.117
+1.20D+1.60Lr+0.50W	1.84	Span 1	1.098	2.466
+1.20D+1.60Lr+0.50W	2.15	Span 1	1.017	2.791
+1.20D+1.60Lr+0.50W	2.45	Span 1	0.936	3.090
+1.20D+1.60Lr+0.50W	2.76	Span 1	0.855	3.365
+1.20D+1.60Lr+0.50W	3.07	Span 1	0.774	3.614
+1.20D+1.60Lr+0.50W	3.37	Span 1	0.694	3.839
+1.20D+1.60Lr+0.50W	3.68	Span 1	0.613	4.040
+1.20D+1.60Lr+0.50W	3.99	Span 1	0.532	4.215
+1.20D+1.60Lr+0.50W	4.29	Span 1	0.451	4.366
+1.20D+1.60Lr+0.50W	4.60	Span 1	0.370	4.492
+1.20D+1.60Lr+0.50W	4.91	Span 1	0.289	4.593
+1.20D+1.60Lr+0.50W	5.21	Span 1	0.208	4.669
+1.20D+1.60Lr+0.50W	5.52	Span 1	0.127	4.720
+1.20D+1.60Lr+0.50W	5.82	Span 1	0.046	4.747
+1.20D+1.60Lr+0.50W	6.13	Span 1	-0.035	4.748
+1.20D+1.60Lr+0.50W	6.44	Span 1	-0.116	4.725
+1.20D+1.60Lr+0.50W	6.74	Span 1	-0.197	4.678
+1.20D+1.60Lr+0.50W	7.05	Span 1	-0.277	4.605
+1.20D+1.60Lr+0.50W	7.36	Span 1	-0.358	4.507
+1.20D+1.60Lr+0.50W	7.66	Span 1	-0.439	4.385
+1.20D+1.60Lr+0.50W	7.97	Span 1	-0.520	4.238
+1.20D+1.60Lr+0.50W	8.28	Span 1	-0.601	4.066
+1.20D+1.60Lr+0.50W	8.58	Span 1	-0.682	3.870
+1.20D+1.60Lr+0.50W	8.89	Span 1	-0.763	3.648
+1.20D+1.60Lr+0.50W	9.20	Span 1	-0.844	3.402
+1.20D+1.60Lr+0.50W	9.50	Span 1	-0.925	3.131
+1.20D+1.60Lr+0.50W	9.81	Span 1	-1.006	2.835
+1.20D+1.60Lr+0.50W	10.12	Span 1	-1.087	2.514
+1.20D+1.60Lr+0.50W	10.42	Span 1	-1.167	2.169
+1.20D+1.60Lr+0.50W	10.73	Span 1	-1.248	1.798
+1.20D+1.60Lr+0.50W	11.04	Span 1	-1.329	1.403
+1.20D+1.60Lr+0.50W	11.34	Span 1	-1.410	0.983
+1.20D+1.60Lr+0.50W	11.65	Span 1	-1.491	0.539
+1.20D+1.60Lr+0.50W	11.96	Span 1	-1.572	0.069

Wood Beam

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DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+0.50W	0.00	Span 1	0.960	0.000
+1.20D+0.50W	0.31	Span 1	0.911	0.287
+1.20D+0.50W	0.61	Span 1	0.862	0.558
+1.20D+0.50W	0.92	Span 1	0.812	0.815
+1.20D+0.50W	1.23	Span 1	0.763	1.056
+1.20D+0.50W	1.53	Span 1	0.714	1.283
+1.20D+0.50W	1.84	Span 1	0.665	1.494
+1.20D+0.50W	2.15	Span 1	0.616	1.691
+1.20D+0.50W	2.45	Span 1	0.567	1.872
+1.20D+0.50W	2.76	Span 1	0.518	2.039
+1.20D+0.50W	3.07	Span 1	0.469	2.190
+1.20D+0.50W	3.37	Span 1	0.420	2.327
+1.20D+0.50W	3.68	Span 1	0.371	2.448
+1.20D+0.50W	3.99	Span 1	0.322	2.554
+1.20D+0.50W	4.29	Span 1	0.273	2.645
+1.20D+0.50W	4.60	Span 1	0.224	2.722
+1.20D+0.50W	4.91	Span 1	0.175	2.783
+1.20D+0.50W	5.21	Span 1	0.126	2.829
+1.20D+0.50W	5.52	Span 1	0.077	2.860
+1.20D+0.50W	5.82	Span 1	0.028	2.876
+1.20D+0.50W	6.13	Span 1	-0.021	2.877
+1.20D+0.50W	6.44	Span 1	-0.070	2.863
+1.20D+0.50W	6.74	Span 1	-0.119	2.834
+1.20D+0.50W	7.05	Span 1	-0.168	2.790
+1.20D+0.50W	7.36	Span 1	-0.217	2.731
+1.20D+0.50W	7.66	Span 1	-0.266	2.657
+1.20D+0.50W	7.97	Span 1	-0.315	2.568
+1.20D+0.50W	8.28	Span 1	-0.364	2.464
+1.20D+0.50W	8.58	Span 1	-0.413	2.345
+1.20D+0.50W	8.89	Span 1	-0.462	2.211
+1.20D+0.50W	9.20	Span 1	-0.511	2.061
+1.20D+0.50W	9.50	Span 1	-0.560	1.897
+1.20D+0.50W	9.81	Span 1	-0.609	1.718
+1.20D+0.50W	10.12	Span 1	-0.658	1.523
+1.20D+0.50W	10.42	Span 1	-0.707	1.314
+1.20D+0.50W	10.73	Span 1	-0.756	1.090
+1.20D+0.50W	11.04	Span 1	-0.805	0.850
+1.20D+0.50W	11.34	Span 1	-0.855	0.596
+1.20D+0.50W	11.65	Span 1	-0.904	0.326
+1.20D+0.50W	11.96	Span 1	-0.953	0.042
+1.20D+0.50Lr+W	0.00	Span 1	1.740	0.000
+1.20D+0.50Lr+W	0.31	Span 1	1.651	0.520
+1.20D+0.50Lr+W	0.61	Span 1	1.562	1.012
+1.20D+0.50Lr+W	0.92	Span 1	1.473	1.477
+1.20D+0.50Lr+W	1.23	Span 1	1.384	1.915

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+0.50Lr+W	1.53	Span 1	1.295	2.326
+1.20D+0.50Lr+W	1.84	Span 1	1.206	2.709
+1.20D+0.50Lr+W	2.15	Span 1	1.117	3.065
+1.20D+0.50Lr+W	2.45	Span 1	1.029	3.394
+1.20D+0.50Lr+W	2.76	Span 1	0.940	3.696
+1.20D+0.50Lr+W	3.07	Span 1	0.851	3.971
+1.20D+0.50Lr+W	3.37	Span 1	0.762	4.218
+1.20D+0.50Lr+W	3.68	Span 1	0.673	4.438
+1.20D+0.50Lr+W	3.99	Span 1	0.584	4.630
+1.20D+0.50Lr+W	4.29	Span 1	0.495	4.796
+1.20D+0.50Lr+W	4.60	Span 1	0.406	4.934
+1.20D+0.50Lr+W	4.91	Span 1	0.317	5.045
+1.20D+0.50Lr+W	5.21	Span 1	0.229	5.129
+1.20D+0.50Lr+W	5.52	Span 1	0.140	5.185
+1.20D+0.50Lr+W	5.82	Span 1	0.051	5.214
+1.20D+0.50Lr+W	6.13	Span 1	-0.038	5.216
+1.20D+0.50Lr+W	6.44	Span 1	-0.127	5.191
+1.20D+0.50Lr+W	6.74	Span 1	-0.216	5.138
+1.20D+0.50Lr+W	7.05	Span 1	-0.305	5.059
+1.20D+0.50Lr+W	7.36	Span 1	-0.394	4.951
+1.20D+0.50Lr+W	7.66	Span 1	-0.483	4.817
+1.20D+0.50Lr+W	7.97	Span 1	-0.571	4.656
+1.20D+0.50Lr+W	8.28	Span 1	-0.660	4.467
+1.20D+0.50Lr+W	8.58	Span 1	-0.749	4.251
+1.20D+0.50Lr+W	8.89	Span 1	-0.838	4.008
+1.20D+0.50Lr+W	9.20	Span 1	-0.927	3.737
+1.20D+0.50Lr+W	9.50	Span 1	-1.016	3.439
+1.20D+0.50Lr+W	9.81	Span 1	-1.105	3.114
+1.20D+0.50Lr+W	10.12	Span 1	-1.194	2.762
+1.20D+0.50Lr+W	10.42	Span 1	-1.282	2.382
+1.20D+0.50Lr+W	10.73	Span 1	-1.371	1.976
+1.20D+0.50Lr+W	11.04	Span 1	-1.460	1.542
+1.20D+0.50Lr+W	11.34	Span 1	-1.549	1.080
+1.20D+0.50Lr+W	11.65	Span 1	-1.638	0.592
+1.20D+0.50Lr+W	11.96	Span 1	-1.727	0.076
+1.20D+W	0.00	Span 1	1.545	0.000
+1.20D+W	0.31	Span 1	1.466	0.461
+1.20D+W	0.61	Span 1	1.387	0.899
+1.20D+W	0.92	Span 1	1.308	1.312
+1.20D+W	1.23	Span 1	1.229	1.701
+1.20D+W	1.53	Span 1	1.150	2.065
+1.20D+W	1.84	Span 1	1.071	2.406
+1.20D+W	2.15	Span 1	0.992	2.722
+1.20D+W	2.45	Span 1	0.913	3.014
+1.20D+W	2.76	Span 1	0.834	3.282

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+W	3.07	Span 1	0.755	3.525
+1.20D+W	3.37	Span 1	0.676	3.745
+1.20D+W	3.68	Span 1	0.598	3.940
+1.20D+W	3.99	Span 1	0.519	4.111
+1.20D+W	4.29	Span 1	0.440	4.258
+1.20D+W	4.60	Span 1	0.361	4.381
+1.20D+W	4.91	Span 1	0.282	4.479
+1.20D+W	5.21	Span 1	0.203	4.554
+1.20D+W	5.52	Span 1	0.124	4.604
+1.20D+W	5.82	Span 1	0.045	4.630
+1.20D+W	6.13	Span 1	-0.034	4.631
+1.20D+W	6.44	Span 1	-0.113	4.609
+1.20D+W	6.74	Span 1	-0.192	4.562
+1.20D+W	7.05	Span 1	-0.271	4.491
+1.20D+W	7.36	Span 1	-0.350	4.396
+1.20D+W	7.66	Span 1	-0.428	4.277
+1.20D+W	7.97	Span 1	-0.507	4.134
+1.20D+W	8.28	Span 1	-0.586	3.966
+1.20D+W	8.58	Span 1	-0.665	3.774
+1.20D+W	8.89	Span 1	-0.744	3.558
+1.20D+W	9.20	Span 1	-0.823	3.318
+1.20D+W	9.50	Span 1	-0.902	3.054
+1.20D+W	9.81	Span 1	-0.981	2.765
+1.20D+W	10.12	Span 1	-1.060	2.452
+1.20D+W	10.42	Span 1	-1.139	2.115
+1.20D+W	10.73	Span 1	-1.218	1.754
+1.20D+W	11.04	Span 1	-1.297	1.369
+1.20D+W	11.34	Span 1	-1.375	0.959
+1.20D+W	11.65	Span 1	-1.454	0.525
+1.20D+W	11.96	Span 1	-1.533	0.067
+0.90D+W	0.00	Span 1	1.451	0.000
+0.90D+W	0.31	Span 1	1.377	0.433
+0.90D+W	0.61	Span 1	1.303	0.844
+0.90D+W	0.92	Span 1	1.229	1.232
+0.90D+W	1.23	Span 1	1.154	1.597
+0.90D+W	1.53	Span 1	1.080	1.940
+0.90D+W	1.84	Span 1	1.006	2.260
+0.90D+W	2.15	Span 1	0.932	2.557
+0.90D+W	2.45	Span 1	0.858	2.831
+0.90D+W	2.76	Span 1	0.784	3.083
+0.90D+W	3.07	Span 1	0.710	3.312
+0.90D+W	3.37	Span 1	0.635	3.518
+0.90D+W	3.68	Span 1	0.561	3.701
+0.90D+W	3.99	Span 1	0.487	3.862
+0.90D+W	4.29	Span 1	0.413	4.000

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+0.90D+W	4.60	Span 1	0.339	4.115
+0.90D+W	4.91	Span 1	0.265	4.208
+0.90D+W	5.21	Span 1	0.191	4.278
+0.90D+W	5.52	Span 1	0.116	4.325
+0.90D+W	5.82	Span 1	0.042	4.349
+0.90D+W	6.13	Span 1	-0.032	4.351
+0.90D+W	6.44	Span 1	-0.106	4.330
+0.90D+W	6.74	Span 1	-0.180	4.286
+0.90D+W	7.05	Span 1	-0.254	4.219
+0.90D+W	7.36	Span 1	-0.328	4.130
+0.90D+W	7.66	Span 1	-0.402	4.018
+0.90D+W	7.97	Span 1	-0.477	3.883
+0.90D+W	8.28	Span 1	-0.551	3.726
+0.90D+W	8.58	Span 1	-0.625	3.545
+0.90D+W	8.89	Span 1	-0.699	3.343
+0.90D+W	9.20	Span 1	-0.773	3.117
+0.90D+W	9.50	Span 1	-0.847	2.869
+0.90D+W	9.81	Span 1	-0.921	2.597
+0.90D+W	10.12	Span 1	-0.996	2.304
+0.90D+W	10.42	Span 1	-1.070	1.987
+0.90D+W	10.73	Span 1	-1.144	1.648
+0.90D+W	11.04	Span 1	-1.218	1.286
+0.90D+W	11.34	Span 1	-1.292	0.901
+0.90D+W	11.65	Span 1	-1.366	0.494
+0.90D+W	11.96	Span 1	-1.440	0.063
+0.90D	0.00	Span 1	0.281	0.000
+0.90D	0.31	Span 1	0.267	0.084
+0.90D	0.61	Span 1	0.252	0.163
+0.90D	0.92	Span 1	0.238	0.239
+0.90D	1.23	Span 1	0.224	0.309
+0.90D	1.53	Span 1	0.209	0.376
+0.90D	1.84	Span 1	0.195	0.438
+0.90D	2.15	Span 1	0.180	0.495
+0.90D	2.45	Span 1	0.166	0.548
+0.90D	2.76	Span 1	0.152	0.597
+0.90D	3.07	Span 1	0.137	0.641
+0.90D	3.37	Span 1	0.123	0.681
+0.90D	3.68	Span 1	0.109	0.717
+0.90D	3.99	Span 1	0.094	0.748
+0.90D	4.29	Span 1	0.080	0.774
+0.90D	4.60	Span 1	0.066	0.797
+0.90D	4.91	Span 1	0.051	0.815
+0.90D	5.21	Span 1	0.037	0.828
+0.90D	5.52	Span 1	0.023	0.837
+0.90D	5.82	Span 1	0.008	0.842

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+0.90D	6.13	Span 1	-0.006	0.842
+0.90D	6.44	Span 1	-0.021	0.838
+0.90D	6.74	Span 1	-0.035	0.830
+0.90D	7.05	Span 1	-0.049	0.817
+0.90D	7.36	Span 1	-0.064	0.800
+0.90D	7.66	Span 1	-0.078	0.778
+0.90D	7.97	Span 1	-0.092	0.752
+0.90D	8.28	Span 1	-0.107	0.721
+0.90D	8.58	Span 1	-0.121	0.686
+0.90D	8.89	Span 1	-0.135	0.647
+0.90D	9.20	Span 1	-0.150	0.603
+0.90D	9.50	Span 1	-0.164	0.555
+0.90D	9.81	Span 1	-0.178	0.503
+0.90D	10.12	Span 1	-0.193	0.446
+0.90D	10.42	Span 1	-0.207	0.385
+0.90D	10.73	Span 1	-0.221	0.319
+0.90D	11.04	Span 1	-0.236	0.249
+0.90D	11.34	Span 1	-0.250	0.174
+0.90D	11.65	Span 1	-0.265	0.096
+0.90D	11.96	Span 1	-0.279	0.012

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
Overall MAXimum Envelope	0.00	Span 1	0.000
Overall MAXimum Envelope	0.31	Span 1	0.023
Overall MAXimum Envelope	0.61	Span 1	0.046
Overall MAXimum Envelope	0.92	Span 1	0.069
Overall MAXimum Envelope	1.23	Span 1	0.091
Overall MAXimum Envelope	1.53	Span 1	0.113
Overall MAXimum Envelope	1.84	Span 1	0.133
Overall MAXimum Envelope	2.15	Span 1	0.153
Overall MAXimum Envelope	2.45	Span 1	0.172
Overall MAXimum Envelope	2.76	Span 1	0.190
Overall MAXimum Envelope	3.07	Span 1	0.206
Overall MAXimum Envelope	3.37	Span 1	0.221
Overall MAXimum Envelope	3.68	Span 1	0.235
Overall MAXimum Envelope	3.99	Span 1	0.247
Overall MAXimum Envelope	4.29	Span 1	0.258
Overall MAXimum Envelope	4.60	Span 1	0.267
Overall MAXimum Envelope	4.91	Span 1	0.274
Overall MAXimum Envelope	5.21	Span 1	0.279
Overall MAXimum Envelope	5.52	Span 1	0.283
Overall MAXimum Envelope	5.82	Span 1	0.285
Overall MAXimum Envelope	6.13	Span 1	0.286

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DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
Overall MAXimum Envelope	6.44	Span 1	0.284
Overall MAXimum Envelope	6.74	Span 1	0.281
Overall MAXimum Envelope	7.05	Span 1	0.276
Overall MAXimum Envelope	7.36	Span 1	0.269
Overall MAXimum Envelope	7.66	Span 1	0.260
Overall MAXimum Envelope	7.97	Span 1	0.250
Overall MAXimum Envelope	8.28	Span 1	0.239
Overall MAXimum Envelope	8.58	Span 1	0.225
Overall MAXimum Envelope	8.89	Span 1	0.211
Overall MAXimum Envelope	9.20	Span 1	0.195
Overall MAXimum Envelope	9.50	Span 1	0.177
Overall MAXimum Envelope	9.81	Span 1	0.159
Overall MAXimum Envelope	10.12	Span 1	0.139
Overall MAXimum Envelope	10.42	Span 1	0.119
Overall MAXimum Envelope	10.73	Span 1	0.097
Overall MAXimum Envelope	11.04	Span 1	0.075
Overall MAXimum Envelope	11.34	Span 1	0.053
Overall MAXimum Envelope	11.65	Span 1	0.030
Overall MAXimum Envelope	11.96	Span 1	0.007
Overall MAXimum Envelope	12.00	Span 1	0.003
D Only	0.00	Span 1	0.000
D Only	0.31	Span 1	0.006
D Only	0.61	Span 1	0.012
D Only	0.92	Span 1	0.018
D Only	1.23	Span 1	0.024
D Only	1.53	Span 1	0.030
D Only	1.84	Span 1	0.036
D Only	2.15	Span 1	0.041
D Only	2.45	Span 1	0.046
D Only	2.76	Span 1	0.051
D Only	3.07	Span 1	0.055
D Only	3.37	Span 1	0.059
D Only	3.68	Span 1	0.063
D Only	3.99	Span 1	0.066
D Only	4.29	Span 1	0.069
D Only	4.60	Span 1	0.071
D Only	4.91	Span 1	0.073
D Only	5.21	Span 1	0.075
D Only	5.52	Span 1	0.076
D Only	5.82	Span 1	0.076
D Only	6.13	Span 1	0.076
D Only	6.44	Span 1	0.076

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
D Only	6.74	Span 1	0.075
D Only	7.05	Span 1	0.074
D Only	7.36	Span 1	0.072
D Only	7.66	Span 1	0.069
D Only	7.97	Span 1	0.067
D Only	8.28	Span 1	0.064
D Only	8.58	Span 1	0.060
D Only	8.89	Span 1	0.056
D Only	9.20	Span 1	0.052
D Only	9.50	Span 1	0.047
D Only	9.81	Span 1	0.042
D Only	10.12	Span 1	0.037
D Only	10.42	Span 1	0.032
D Only	10.73	Span 1	0.026
D Only	11.04	Span 1	0.020
D Only	11.34	Span 1	0.014
D Only	11.65	Span 1	0.008
D Only	11.96	Span 1	0.002
D Only	12.00	Span 1	0.001
+D+Lr	0.00	Span 1	0.000
+D+Lr	0.31	Span 1	0.014
+D+Lr	0.61	Span 1	0.028
+D+Lr	0.92	Span 1	0.041
+D+Lr	1.23	Span 1	0.055
+D+Lr	1.53	Span 1	0.068
+D+Lr	1.84	Span 1	0.080
+D+Lr	2.15	Span 1	0.092
+D+Lr	2.45	Span 1	0.103
+D+Lr	2.76	Span 1	0.114
+D+Lr	3.07	Span 1	0.124
+D+Lr	3.37	Span 1	0.133
+D+Lr	3.68	Span 1	0.141
+D+Lr	3.99	Span 1	0.148
+D+Lr	4.29	Span 1	0.155
+D+Lr	4.60	Span 1	0.160
+D+Lr	4.91	Span 1	0.164
+D+Lr	5.21	Span 1	0.168
+D+Lr	5.52	Span 1	0.170
+D+Lr	5.82	Span 1	0.171
+D+Lr	6.13	Span 1	0.171
+D+Lr	6.44	Span 1	0.170
+D+Lr	6.74	Span 1	0.168

Wood Beam

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DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+D+Lr	7.05	Span 1	0.165
+D+Lr	7.36	Span 1	0.161
+D+Lr	7.66	Span 1	0.156
+D+Lr	7.97	Span 1	0.150
+D+Lr	8.28	Span 1	0.143
+D+Lr	8.58	Span 1	0.135
+D+Lr	8.89	Span 1	0.126
+D+Lr	9.20	Span 1	0.117
+D+Lr	9.50	Span 1	0.106
+D+Lr	9.81	Span 1	0.095
+D+Lr	10.12	Span 1	0.084
+D+Lr	10.42	Span 1	0.071
+D+Lr	10.73	Span 1	0.058
+D+Lr	11.04	Span 1	0.045
+D+Lr	11.34	Span 1	0.032
+D+Lr	11.65	Span 1	0.018
+D+Lr	11.96	Span 1	0.004
+D+Lr	12.00	Span 1	0.002
+D+0.750Lr	0.00	Span 1	0.000
+D+0.750Lr	0.31	Span 1	0.012
+D+0.750Lr	0.61	Span 1	0.024
+D+0.750Lr	0.92	Span 1	0.036
+D+0.750Lr	1.23	Span 1	0.047
+D+0.750Lr	1.53	Span 1	0.058
+D+0.750Lr	1.84	Span 1	0.069
+D+0.750Lr	2.15	Span 1	0.079
+D+0.750Lr	2.45	Span 1	0.089
+D+0.750Lr	2.76	Span 1	0.098
+D+0.750Lr	3.07	Span 1	0.107
+D+0.750Lr	3.37	Span 1	0.114
+D+0.750Lr	3.68	Span 1	0.121
+D+0.750Lr	3.99	Span 1	0.128
+D+0.750Lr	4.29	Span 1	0.133
+D+0.750Lr	4.60	Span 1	0.138
+D+0.750Lr	4.91	Span 1	0.142
+D+0.750Lr	5.21	Span 1	0.144
+D+0.750Lr	5.52	Span 1	0.146
+D+0.750Lr	5.82	Span 1	0.147
+D+0.750Lr	6.13	Span 1	0.148
+D+0.750Lr	6.44	Span 1	0.147
+D+0.750Lr	6.74	Span 1	0.145
+D+0.750Lr	7.05	Span 1	0.142

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+D+0.750Lr	7.36	Span 1	0.139
+D+0.750Lr	7.66	Span 1	0.135
+D+0.750Lr	7.97	Span 1	0.129
+D+0.750Lr	8.28	Span 1	0.123
+D+0.750Lr	8.58	Span 1	0.116
+D+0.750Lr	8.89	Span 1	0.109
+D+0.750Lr	9.20	Span 1	0.101
+D+0.750Lr	9.50	Span 1	0.092
+D+0.750Lr	9.81	Span 1	0.082
+D+0.750Lr	10.12	Span 1	0.072
+D+0.750Lr	10.42	Span 1	0.061
+D+0.750Lr	10.73	Span 1	0.050
+D+0.750Lr	11.04	Span 1	0.039
+D+0.750Lr	11.34	Span 1	0.027
+D+0.750Lr	11.65	Span 1	0.015
+D+0.750Lr	11.96	Span 1	0.003
+D+0.750Lr	12.00	Span 1	0.002
+D+0.60W	0.00	Span 1	0.000
+D+0.60W	0.31	Span 1	0.020
+D+0.60W	0.61	Span 1	0.040
+D+0.60W	0.92	Span 1	0.060
+D+0.60W	1.23	Span 1	0.079
+D+0.60W	1.53	Span 1	0.098
+D+0.60W	1.84	Span 1	0.116
+D+0.60W	2.15	Span 1	0.133
+D+0.60W	2.45	Span 1	0.149
+D+0.60W	2.76	Span 1	0.165
+D+0.60W	3.07	Span 1	0.179
+D+0.60W	3.37	Span 1	0.192
+D+0.60W	3.68	Span 1	0.204
+D+0.60W	3.99	Span 1	0.214
+D+0.60W	4.29	Span 1	0.223
+D+0.60W	4.60	Span 1	0.231
+D+0.60W	4.91	Span 1	0.237
+D+0.60W	5.21	Span 1	0.242
+D+0.60W	5.52	Span 1	0.246
+D+0.60W	5.82	Span 1	0.247
+D+0.60W	6.13	Span 1	0.248
+D+0.60W	6.44	Span 1	0.246
+D+0.60W	6.74	Span 1	0.243
+D+0.60W	7.05	Span 1	0.239
+D+0.60W	7.36	Span 1	0.233

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+D+0.60W	7.66	Span 1	0.226
+D+0.60W	7.97	Span 1	0.217
+D+0.60W	8.28	Span 1	0.207
+D+0.60W	8.58	Span 1	0.195
+D+0.60W	8.89	Span 1	0.183
+D+0.60W	9.20	Span 1	0.169
+D+0.60W	9.50	Span 1	0.154
+D+0.60W	9.81	Span 1	0.138
+D+0.60W	10.12	Span 1	0.121
+D+0.60W	10.42	Span 1	0.103
+D+0.60W	10.73	Span 1	0.084
+D+0.60W	11.04	Span 1	0.065
+D+0.60W	11.34	Span 1	0.046
+D+0.60W	11.65	Span 1	0.026
+D+0.60W	11.96	Span 1	0.006
+D+0.60W	12.00	Span 1	0.003
+D+0.750Lr+0.450W	0.00	Span 1	0.000
+D+0.750Lr+0.450W	0.31	Span 1	0.022
+D+0.750Lr+0.450W	0.61	Span 1	0.045
+D+0.750Lr+0.450W	0.92	Span 1	0.067
+D+0.750Lr+0.450W	1.23	Span 1	0.088
+D+0.750Lr+0.450W	1.53	Span 1	0.109
+D+0.750Lr+0.450W	1.84	Span 1	0.129
+D+0.750Lr+0.450W	2.15	Span 1	0.148
+D+0.750Lr+0.450W	2.45	Span 1	0.166
+D+0.750Lr+0.450W	2.76	Span 1	0.184
+D+0.750Lr+0.450W	3.07	Span 1	0.199
+D+0.750Lr+0.450W	3.37	Span 1	0.214
+D+0.750Lr+0.450W	3.68	Span 1	0.227
+D+0.750Lr+0.450W	3.99	Span 1	0.239
+D+0.750Lr+0.450W	4.29	Span 1	0.249
+D+0.750Lr+0.450W	4.60	Span 1	0.258
+D+0.750Lr+0.450W	4.91	Span 1	0.265
+D+0.750Lr+0.450W	5.21	Span 1	0.270
+D+0.750Lr+0.450W	5.52	Span 1	0.274
+D+0.750Lr+0.450W	5.82	Span 1	0.276
+D+0.750Lr+0.450W	6.13	Span 1	0.276
+D+0.750Lr+0.450W	6.44	Span 1	0.275
+D+0.750Lr+0.450W	6.74	Span 1	0.271
+D+0.750Lr+0.450W	7.05	Span 1	0.267
+D+0.750Lr+0.450W	7.36	Span 1	0.260
+D+0.750Lr+0.450W	7.66	Span 1	0.252

Wood Beam

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DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+D+0.750Lr+0.450W	7.97	Span 1	0.242
+D+0.750Lr+0.450W	8.28	Span 1	0.231
+D+0.750Lr+0.450W	8.58	Span 1	0.218
+D+0.750Lr+0.450W	8.89	Span 1	0.204
+D+0.750Lr+0.450W	9.20	Span 1	0.188
+D+0.750Lr+0.450W	9.50	Span 1	0.171
+D+0.750Lr+0.450W	9.81	Span 1	0.154
+D+0.750Lr+0.450W	10.12	Span 1	0.135
+D+0.750Lr+0.450W	10.42	Span 1	0.115
+D+0.750Lr+0.450W	10.73	Span 1	0.094
+D+0.750Lr+0.450W	11.04	Span 1	0.073
+D+0.750Lr+0.450W	11.34	Span 1	0.051
+D+0.750Lr+0.450W	11.65	Span 1	0.029
+D+0.750Lr+0.450W	11.96	Span 1	0.006
+D+0.750Lr+0.450W	12.00	Span 1	0.003
+D+0.450W	0.00	Span 1	0.000
+D+0.450W	0.31	Span 1	0.017
+D+0.450W	0.61	Span 1	0.033
+D+0.450W	0.92	Span 1	0.049
+D+0.450W	1.23	Span 1	0.065
+D+0.450W	1.53	Span 1	0.081
+D+0.450W	1.84	Span 1	0.096
+D+0.450W	2.15	Span 1	0.110
+D+0.450W	2.45	Span 1	0.123
+D+0.450W	2.76	Span 1	0.136
+D+0.450W	3.07	Span 1	0.148
+D+0.450W	3.37	Span 1	0.159
+D+0.450W	3.68	Span 1	0.168
+D+0.450W	3.99	Span 1	0.177
+D+0.450W	4.29	Span 1	0.185
+D+0.450W	4.60	Span 1	0.191
+D+0.450W	4.91	Span 1	0.196
+D+0.450W	5.21	Span 1	0.200
+D+0.450W	5.52	Span 1	0.203
+D+0.450W	5.82	Span 1	0.204
+D+0.450W	6.13	Span 1	0.205
+D+0.450W	6.44	Span 1	0.204
+D+0.450W	6.74	Span 1	0.201
+D+0.450W	7.05	Span 1	0.198
+D+0.450W	7.36	Span 1	0.193
+D+0.450W	7.66	Span 1	0.187
+D+0.450W	7.97	Span 1	0.179

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+D+0.450W	8.28	Span 1	0.171
+D+0.450W	8.58	Span 1	0.162
+D+0.450W	8.89	Span 1	0.151
+D+0.450W	9.20	Span 1	0.140
+D+0.450W	9.50	Span 1	0.127
+D+0.450W	9.81	Span 1	0.114
+D+0.450W	10.12	Span 1	0.100
+D+0.450W	10.42	Span 1	0.085
+D+0.450W	10.73	Span 1	0.070
+D+0.450W	11.04	Span 1	0.054
+D+0.450W	11.34	Span 1	0.038
+D+0.450W	11.65	Span 1	0.021
+D+0.450W	11.96	Span 1	0.005
+D+0.450W	12.00	Span 1	0.002
+0.60D+0.60W	0.00	Span 1	0.000
+0.60D+0.60W	0.31	Span 1	0.018
+0.60D+0.60W	0.61	Span 1	0.035
+0.60D+0.60W	0.92	Span 1	0.052
+0.60D+0.60W	1.23	Span 1	0.069
+0.60D+0.60W	1.53	Span 1	0.086
+0.60D+0.60W	1.84	Span 1	0.101
+0.60D+0.60W	2.15	Span 1	0.117
+0.60D+0.60W	2.45	Span 1	0.131
+0.60D+0.60W	2.76	Span 1	0.144
+0.60D+0.60W	3.07	Span 1	0.157
+0.60D+0.60W	3.37	Span 1	0.168
+0.60D+0.60W	3.68	Span 1	0.179
+0.60D+0.60W	3.99	Span 1	0.188
+0.60D+0.60W	4.29	Span 1	0.196
+0.60D+0.60W	4.60	Span 1	0.203
+0.60D+0.60W	4.91	Span 1	0.208
+0.60D+0.60W	5.21	Span 1	0.212
+0.60D+0.60W	5.52	Span 1	0.215
+0.60D+0.60W	5.82	Span 1	0.217
+0.60D+0.60W	6.13	Span 1	0.217
+0.60D+0.60W	6.44	Span 1	0.216
+0.60D+0.60W	6.74	Span 1	0.213
+0.60D+0.60W	7.05	Span 1	0.210
+0.60D+0.60W	7.36	Span 1	0.204
+0.60D+0.60W	7.66	Span 1	0.198
+0.60D+0.60W	7.97	Span 1	0.190
+0.60D+0.60W	8.28	Span 1	0.181

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DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+0.60D+0.60W	8.58	Span 1	0.171
+0.60D+0.60W	8.89	Span 1	0.160
+0.60D+0.60W	9.20	Span 1	0.148
+0.60D+0.60W	9.50	Span 1	0.135
+0.60D+0.60W	9.81	Span 1	0.121
+0.60D+0.60W	10.12	Span 1	0.106
+0.60D+0.60W	10.42	Span 1	0.090
+0.60D+0.60W	10.73	Span 1	0.074
+0.60D+0.60W	11.04	Span 1	0.057
+0.60D+0.60W	11.34	Span 1	0.040
+0.60D+0.60W	11.65	Span 1	0.023
+0.60D+0.60W	11.96	Span 1	0.005
+0.60D+0.60W	12.00	Span 1	0.003
+0.60D	0.00	Span 1	0.000
+0.60D	0.31	Span 1	0.004
+0.60D	0.61	Span 1	0.007
+0.60D	0.92	Span 1	0.011
+0.60D	1.23	Span 1	0.015
+0.60D	1.53	Span 1	0.018
+0.60D	1.84	Span 1	0.021
+0.60D	2.15	Span 1	0.025
+0.60D	2.45	Span 1	0.028
+0.60D	2.76	Span 1	0.030
+0.60D	3.07	Span 1	0.033
+0.60D	3.37	Span 1	0.035
+0.60D	3.68	Span 1	0.038
+0.60D	3.99	Span 1	0.040
+0.60D	4.29	Span 1	0.041
+0.60D	4.60	Span 1	0.043
+0.60D	4.91	Span 1	0.044
+0.60D	5.21	Span 1	0.045
+0.60D	5.52	Span 1	0.045
+0.60D	5.82	Span 1	0.046
+0.60D	6.13	Span 1	0.046
+0.60D	6.44	Span 1	0.045
+0.60D	6.74	Span 1	0.045
+0.60D	7.05	Span 1	0.044
+0.60D	7.36	Span 1	0.043
+0.60D	7.66	Span 1	0.042
+0.60D	7.97	Span 1	0.040
+0.60D	8.28	Span 1	0.038
+0.60D	8.58	Span 1	0.036

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DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+0.60D	8.89	Span 1	0.034
+0.60D	9.20	Span 1	0.031
+0.60D	9.50	Span 1	0.028
+0.60D	9.81	Span 1	0.025
+0.60D	10.12	Span 1	0.022
+0.60D	10.42	Span 1	0.019
+0.60D	10.73	Span 1	0.016
+0.60D	11.04	Span 1	0.012
+0.60D	11.34	Span 1	0.008
+0.60D	11.65	Span 1	0.005
+0.60D	11.96	Span 1	0.001
+0.60D	12.00	Span 1	0.001
Lr Only	0.00	Span 1	0.000
Lr Only	0.31	Span 1	0.008
Lr Only	0.61	Span 1	0.015
Lr Only	0.92	Span 1	0.023
Lr Only	1.23	Span 1	0.030
Lr Only	1.53	Span 1	0.038
Lr Only	1.84	Span 1	0.044
Lr Only	2.15	Span 1	0.051
Lr Only	2.45	Span 1	0.057
Lr Only	2.76	Span 1	0.063
Lr Only	3.07	Span 1	0.069
Lr Only	3.37	Span 1	0.074
Lr Only	3.68	Span 1	0.078
Lr Only	3.99	Span 1	0.082
Lr Only	4.29	Span 1	0.086
Lr Only	4.60	Span 1	0.089
Lr Only	4.91	Span 1	0.091
Lr Only	5.21	Span 1	0.093
Lr Only	5.52	Span 1	0.094
Lr Only	5.82	Span 1	0.095
Lr Only	6.13	Span 1	0.095
Lr Only	6.44	Span 1	0.095
Lr Only	6.74	Span 1	0.094
Lr Only	7.05	Span 1	0.092
Lr Only	7.36	Span 1	0.090
Lr Only	7.66	Span 1	0.087
Lr Only	7.97	Span 1	0.083
Lr Only	8.28	Span 1	0.080
Lr Only	8.58	Span 1	0.075
Lr Only	8.89	Span 1	0.070

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DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
Lr Only	9.20	Span 1	0.065
Lr Only	9.50	Span 1	0.059
Lr Only	9.81	Span 1	0.053
Lr Only	10.12	Span 1	0.046
Lr Only	10.42	Span 1	0.040
Lr Only	10.73	Span 1	0.032
Lr Only	11.04	Span 1	0.025
Lr Only	11.34	Span 1	0.018
Lr Only	11.65	Span 1	0.010
Lr Only	11.96	Span 1	0.002
Lr Only	12.00	Span 1	0.001
W Only	0.00	Span 1	0.000
W Only	0.31	Span 1	0.023
W Only	0.61	Span 1	0.046
W Only	0.92	Span 1	0.069
W Only	1.23	Span 1	0.091
W Only	1.53	Span 1	0.113
W Only	1.84	Span 1	0.133
W Only	2.15	Span 1	0.153
W Only	2.45	Span 1	0.172
W Only	2.76	Span 1	0.190
W Only	3.07	Span 1	0.206
W Only	3.37	Span 1	0.221
W Only	3.68	Span 1	0.235
W Only	3.99	Span 1	0.247
W Only	4.29	Span 1	0.258
W Only	4.60	Span 1	0.267
W Only	4.91	Span 1	0.274
W Only	5.21	Span 1	0.279
W Only	5.52	Span 1	0.283
W Only	5.82	Span 1	0.285
W Only	6.13	Span 1	0.286
W Only	6.44	Span 1	0.284
W Only	6.74	Span 1	0.281
W Only	7.05	Span 1	0.276
W Only	7.36	Span 1	0.269
W Only	7.66	Span 1	0.260
W Only	7.97	Span 1	0.250
W Only	8.28	Span 1	0.239
W Only	8.58	Span 1	0.225
W Only	8.89	Span 1	0.211
W Only	9.20	Span 1	0.195

Wood Beam

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DESCRIPTION: 12' perimeter bouble beam (2x12works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
W Only	9.50	Span 1	0.177
W Only	9.81	Span 1	0.159
W Only	10.12	Span 1	0.139
W Only	10.42	Span 1	0.119
W Only	10.73	Span 1	0.097
W Only	11.04	Span 1	0.075
W Only	11.34	Span 1	0.053
W Only	11.65	Span 1	0.030
W Only	11.96	Span 1	0.007
W Only	12.00	Span 1	0.003

Wood Beam

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Load Resistance Factor D
Load Combination : ASCE 7-16

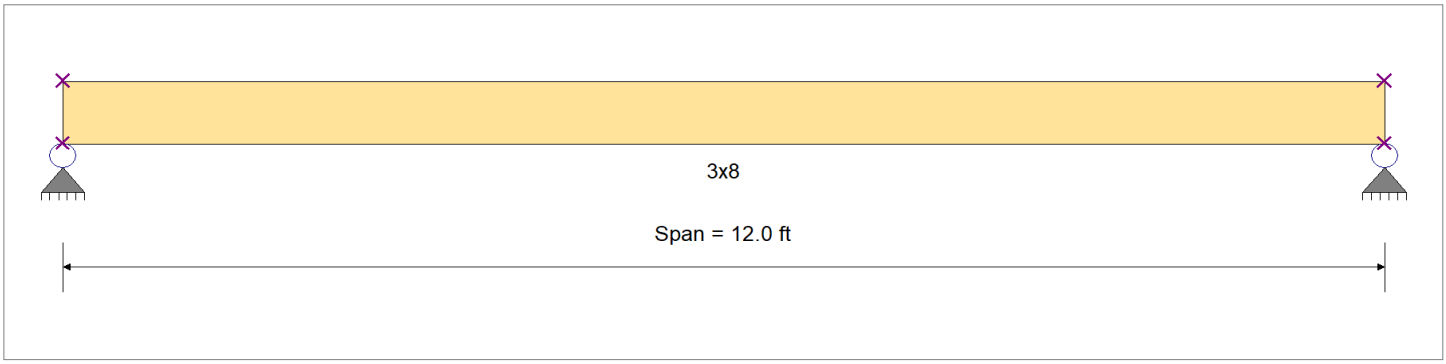
Wood Species : Southern Pine
Wood Grade : No.1 Non-Dense: 2"-4" Thick: 8" Wide

Beam Bracing : Completely Unbraced

Fb +	1,100.0 psi
Fb -	1,100.0 psi
Fc - Prll	1,400.0 psi
Fc - Perp	480.0 psi
Fv	175.0 psi
Ft	700.0 psi

E : Modulus of Elasticity

Ebend- xx	1,400.0 ksi
Eminbend - xx	510.0 ksi
Density	34.330 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.928 : 1	Maximum Shear Stress Ratio	=	0.305 : 1
Section used for this span		3x8	Section used for this span		3x8
fb: Actual	=	1,644.80 psi	fv: Actual	=	92.14 psi
Fb: Allowable	=	1,771.65 psi	Fv: Allowable	=	302.40 psi
Load Combination		+1.20D+1.60Lr+0.50W	Load Combination		+1.20D+1.60Lr+0.50W
Location of maximum on span	=	5.080 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.180 in	Ratio =	800 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.487 in	Ratio =	295 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	λ	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values Mu	fb	Fb	Shear Values Vu	fv	Fv
+1.40D													0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.265	0.088	0.60	1.000	1.00	1.00	1.00	1.00	0.96	0.66	363.15	1367.82	0.24	19.88	226.80
+1.20D+0.50Lr					1.000	1.00	1.00	1.00	1.00	0.96			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.297	0.096	0.80	1.000	1.00	1.00	1.00	1.00	0.93	0.96	526.30	1771.65	0.35	29.15	302.40
+1.20D					1.000	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.176	0.056	0.80	1.000	1.00	1.00	1.00	1.00	0.93	0.57	311.27	1771.65	0.21	17.04	302.40
+1.20D+1.60Lr					1.000	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.564	0.185	0.80	1.000	1.00	1.00	1.00	1.00	0.93	1.82	999.50	1771.65	0.67	55.80	302.40
+1.20D+1.60Lr+0.50W					1.000	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.928	0.305	0.80	1.000	1.00	1.00	1.00	1.00	0.93	3.00	1,644.80	1771.65	1.11	92.14	302.40
+1.20D+1.60Lr-0.50W					1.000	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.200	0.064	0.80	1.000	1.00	1.00	1.00	1.00	0.93	0.65	354.27	1771.65	0.24	19.46	302.40
+1.20D+0.50W					1.000	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.540	0.177	0.80	1.000	1.00	1.00	1.00	1.00	0.93	1.75	956.48	1771.65	0.65	53.38	302.40

Wood Beam

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	λ	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values Mu	fb	Fb	Shear Values Vu	fv	Fv
+1.20D-0.50W					1.000	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.189	0.064	0.80	1.000	1.00	1.00	1.00	1.00	0.93	0.61	334.41	1771.65	0.23	19.30	302.40
+1.20D+0.50Lr+W					1.000	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.858	0.269	1.00	1.000	1.00	1.00	1.00	1.00	0.89	3.32	1,816.89	2117.89	1.23	101.84	378.00
+1.20D+0.50Lr-W					1.000	1.00	1.00	1.00	1.00	0.89			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.361	0.115	1.00	1.000	1.00	1.00	1.00	1.00	0.89	1.40	764.54	2117.89	0.53	43.53	378.00
+1.20D+W					1.000	1.00	1.00	1.00	1.00	0.89			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.756	0.237	1.00	1.000	1.00	1.00	1.00	1.00	0.89	2.92	1,601.78	2117.89	1.08	89.72	378.00
+1.20D-W					1.000	1.00	1.00	1.00	1.00	0.89			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.463	0.147	1.00	1.000	1.00	1.00	1.00	1.00	0.89	1.79	979.64	2117.89	0.67	55.65	378.00
+0.90D+W					1.000	1.00	1.00	1.00	1.00	0.89			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.720	0.226	1.00	1.000	1.00	1.00	1.00	1.00	0.89	2.78	1,524.00	2117.89	1.03	85.46	378.00
+0.90D-W					1.000	1.00	1.00	1.00	1.00	0.89			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.499	0.158	1.00	1.000	1.00	1.00	1.00	1.00	0.89	1.93	1,057.39	2117.89	0.72	59.91	378.00
+0.90D					1.000	1.00	1.00	1.00	1.00	0.89			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.110	0.034	1.00	1.000	1.00	1.00	1.00	1.00	0.89	0.43	233.45	2117.89	0.15	12.78	378.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.450W	1	0.4868	5.781		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span		Max. Upward Defl		Location in Span	
D Only	1	0.1092	in	5.825	ft	0.0000	in	0.000	ft
+D+Lr	1	0.2890	in	5.825	ft	0.0000	in	0.000	ft
+D+0.750Lr	1	0.2441	in	5.825	ft	0.0000	in	0.000	ft
+D+0.60W	1	0.4329	in	5.781	ft	0.0000	in	0.000	ft
+D+0.750Lr+0.450W	1	0.4868	in	5.781	ft	0.0000	in	0.000	ft
+D+0.450W	1	0.3520	in	5.781	ft	0.0000	in	0.000	ft
+0.60D+0.60W	1	0.3892	in	5.781	ft	0.0000	in	0.000	ft
+0.60D	1	0.0655	in	5.825	ft	0.0000	in	0.000	ft
Lr Only	1	0.1798	in	5.781	ft	0.0000	in	0.000	ft

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	-1.020	-0.510
Overall MINimum	-1.020	-0.510
D Only	0.198	0.112
+D+Lr	0.538	0.282
+D+0.750Lr	0.453	0.239
+D+0.60W	0.810	0.418
+D-0.60W	-0.414	-0.194
+D+0.750Lr+0.450W	0.912	0.469
+D+0.750Lr-0.450W	-0.006	0.010
+D+0.450W	0.657	0.341
+D-0.450W	-0.261	-0.118
+0.60D+0.60W	0.731	0.373
+0.60D-0.60W	-0.493	-0.239
+0.60D	0.119	0.067
Lr Only	0.340	0.170
W Only	1.020	0.510
-W	-1.020	-0.510

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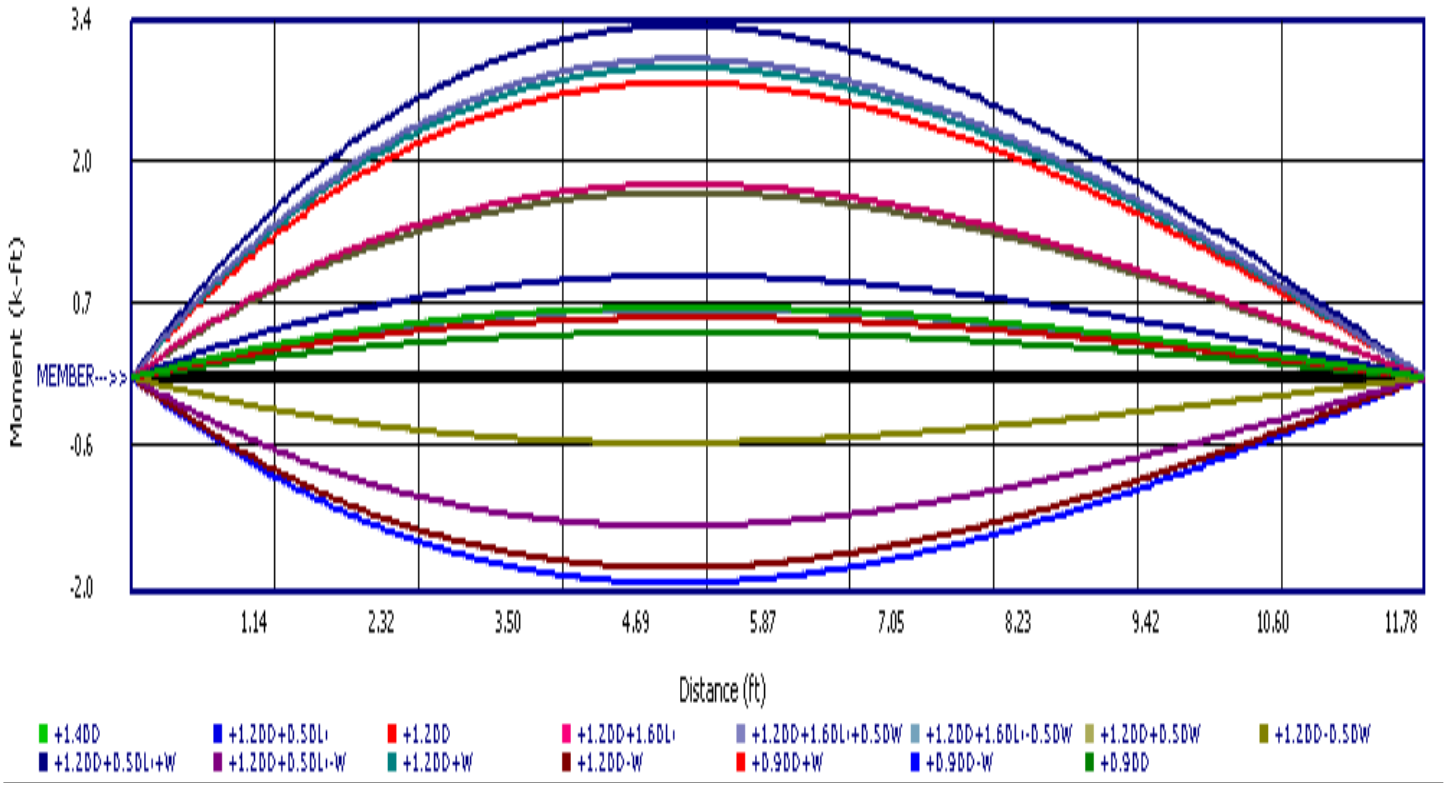
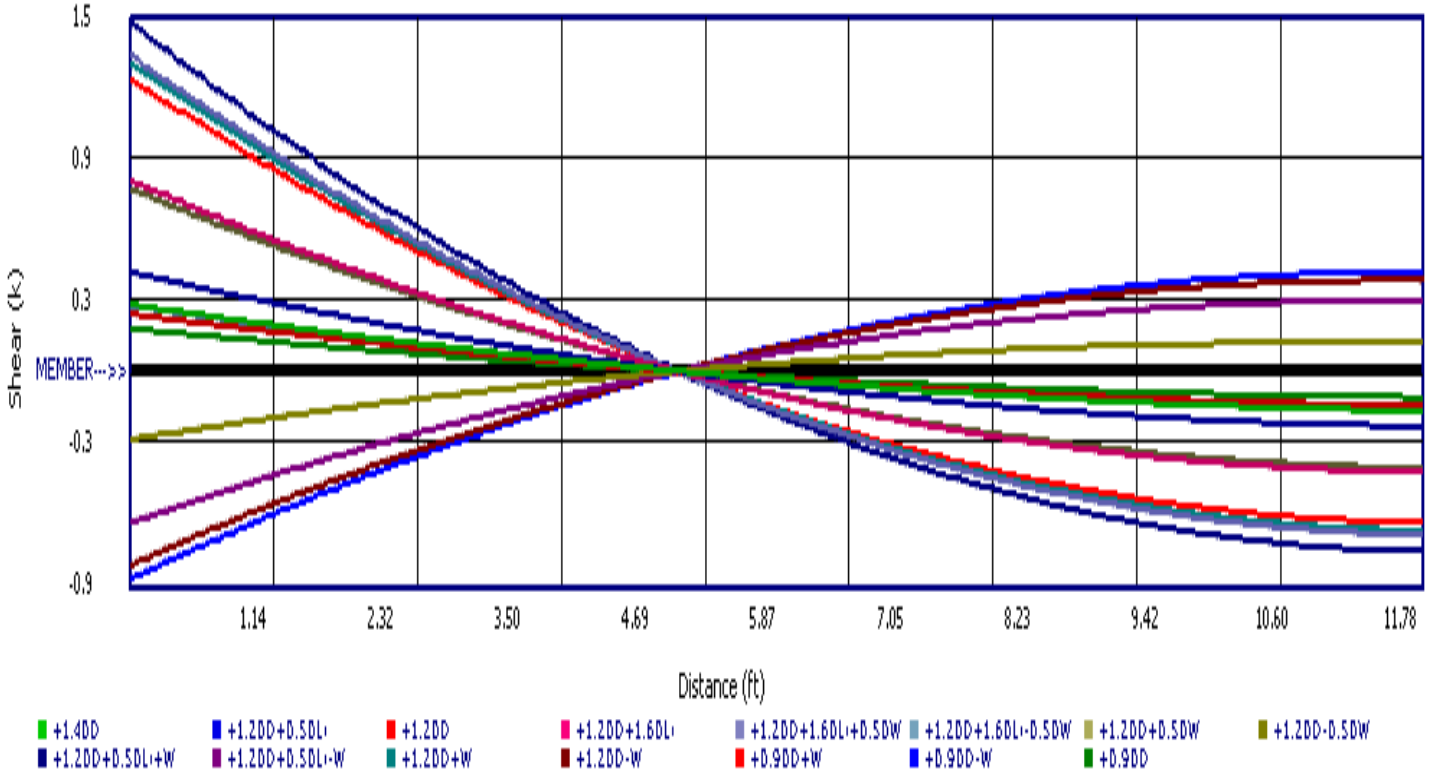
Wood Beam

DESCRIPTION: 12'builtup beam triang load (2-3x8works)

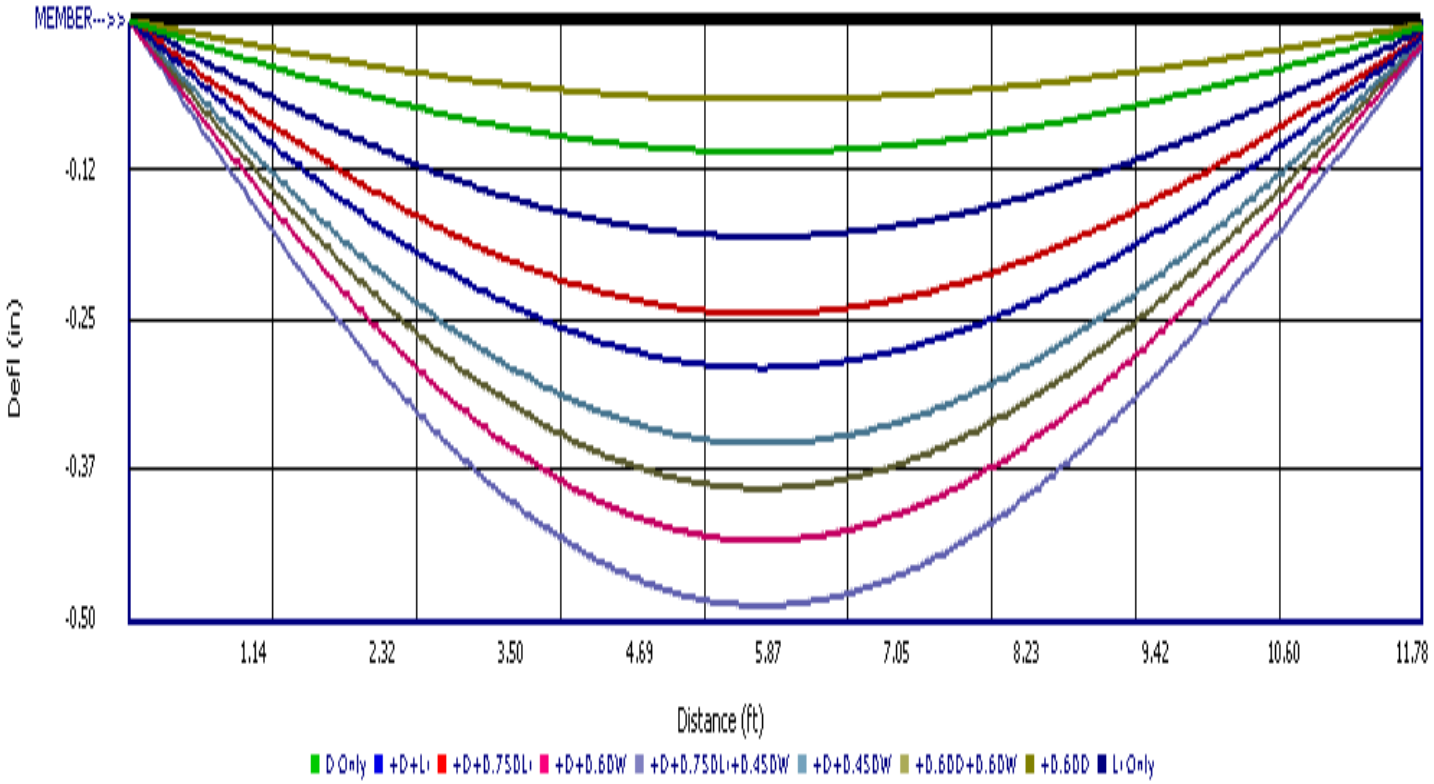




Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12'builtup beam triang load (2-3x8works)



Summary of Values per Beam Span

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.40D	0.00	Span 1	0.277	0.000
+1.40D	0.31	Span 1	0.257	0.082
+1.40D	0.61	Span 1	0.237	0.158
+1.40D	0.92	Span 1	0.218	0.227
+1.40D	1.23	Span 1	0.200	0.292
+1.40D	1.53	Span 1	0.181	0.350
+1.40D	1.84	Span 1	0.164	0.403
+1.40D	2.15	Span 1	0.146	0.450
+1.40D	2.45	Span 1	0.130	0.493
+1.40D	2.76	Span 1	0.113	0.530
+1.40D	3.07	Span 1	0.098	0.562
+1.40D	3.37	Span 1	0.082	0.590
+1.40D	3.68	Span 1	0.067	0.613
+1.40D	3.99	Span 1	0.053	0.631
+1.40D	4.29	Span 1	0.039	0.645
+1.40D	4.60	Span 1	0.025	0.655
+1.40D	4.91	Span 1	0.012	0.661
+1.40D	5.21	Span 1	-0.000	0.663
+1.40D	5.52	Span 1	-0.012	0.661
+1.40D	5.82	Span 1	-0.024	0.655

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12'builtup beam triang load (2-3x8works)

+1.40D	6.13	Span 1	-0.035	0.646

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.40D	6.44	Span 1	-0.045	0.634
+1.40D	6.74	Span 1	-0.056	0.619
+1.40D	7.05	Span 1	-0.065	0.600
+1.40D	7.36	Span 1	-0.075	0.579
+1.40D	7.66	Span 1	-0.083	0.554
+1.40D	7.97	Span 1	-0.092	0.528
+1.40D	8.28	Span 1	-0.099	0.498
+1.40D	8.58	Span 1	-0.107	0.467
+1.40D	8.89	Span 1	-0.114	0.433
+1.40D	9.20	Span 1	-0.120	0.397
+1.40D	9.50	Span 1	-0.126	0.359
+1.40D	9.81	Span 1	-0.131	0.320
+1.40D	10.12	Span 1	-0.136	0.279
+1.40D	10.42	Span 1	-0.141	0.236
+1.40D	10.73	Span 1	-0.145	0.192
+1.40D	11.04	Span 1	-0.149	0.147
+1.40D	11.34	Span 1	-0.152	0.101
+1.40D	11.65	Span 1	-0.154	0.054
+1.40D	11.96	Span 1	-0.156	0.007
+1.20D+0.50Lr	0.00	Span 1	0.408	0.000
+1.20D+0.50Lr	0.31	Span 1	0.377	0.120
+1.20D+0.50Lr	0.61	Span 1	0.348	0.231
+1.20D+0.50Lr	0.92	Span 1	0.320	0.334
+1.20D+0.50Lr	1.23	Span 1	0.292	0.427
+1.20D+0.50Lr	1.53	Span 1	0.265	0.513
+1.20D+0.50Lr	1.84	Span 1	0.238	0.590
+1.20D+0.50Lr	2.15	Span 1	0.213	0.659
+1.20D+0.50Lr	2.45	Span 1	0.188	0.720
+1.20D+0.50Lr	2.76	Span 1	0.163	0.774
+1.20D+0.50Lr	3.07	Span 1	0.140	0.820
+1.20D+0.50Lr	3.37	Span 1	0.117	0.860
+1.20D+0.50Lr	3.68	Span 1	0.095	0.892
+1.20D+0.50Lr	3.99	Span 1	0.074	0.918
+1.20D+0.50Lr	4.29	Span 1	0.054	0.938
+1.20D+0.50Lr	4.60	Span 1	0.034	0.951
+1.20D+0.50Lr	4.91	Span 1	0.015	0.959
+1.20D+0.50Lr	5.21	Span 1	-0.003	0.960
+1.20D+0.50Lr	5.52	Span 1	-0.021	0.957
+1.20D+0.50Lr	5.82	Span 1	-0.038	0.948
+1.20D+0.50Lr	6.13	Span 1	-0.054	0.934
+1.20D+0.50Lr	6.44	Span 1	-0.069	0.915
+1.20D+0.50Lr	6.74	Span 1	-0.084	0.891
+1.20D+0.50Lr	7.05	Span 1	-0.098	0.863
+1.20D+0.50Lr	7.36	Span 1	-0.111	0.831
+1.20D+0.50Lr	7.66	Span 1	-0.123	0.796

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+0.50Lr	7.97	Span 1	-0.135	0.756
+1.20D+0.50Lr	8.28	Span 1	-0.146	0.713
+1.20D+0.50Lr	8.58	Span 1	-0.156	0.667
+1.20D+0.50Lr	8.89	Span 1	-0.165	0.618
+1.20D+0.50Lr	9.20	Span 1	-0.174	0.566
+1.20D+0.50Lr	9.50	Span 1	-0.182	0.511
+1.20D+0.50Lr	9.81	Span 1	-0.189	0.454
+1.20D+0.50Lr	10.12	Span 1	-0.196	0.395
+1.20D+0.50Lr	10.42	Span 1	-0.201	0.334
+1.20D+0.50Lr	10.73	Span 1	-0.206	0.272
+1.20D+0.50Lr	11.04	Span 1	-0.211	0.208
+1.20D+0.50Lr	11.34	Span 1	-0.214	0.143
+1.20D+0.50Lr	11.65	Span 1	-0.217	0.076
+1.20D+0.50Lr	11.96	Span 1	-0.219	0.010
+1.20D	0.00	Span 1	0.238	0.000
+1.20D	0.31	Span 1	0.220	0.070
+1.20D	0.61	Span 1	0.204	0.135
+1.20D	0.92	Span 1	0.187	0.195
+1.20D	1.23	Span 1	0.171	0.250
+1.20D	1.53	Span 1	0.156	0.300
+1.20D	1.84	Span 1	0.140	0.345
+1.20D	2.15	Span 1	0.126	0.386
+1.20D	2.45	Span 1	0.111	0.422
+1.20D	2.76	Span 1	0.097	0.454
+1.20D	3.07	Span 1	0.084	0.482
+1.20D	3.37	Span 1	0.070	0.506
+1.20D	3.68	Span 1	0.058	0.525
+1.20D	3.99	Span 1	0.045	0.541
+1.20D	4.29	Span 1	0.033	0.553
+1.20D	4.60	Span 1	0.022	0.561
+1.20D	4.91	Span 1	0.011	0.566
+1.20D	5.21	Span 1	-0.000	0.568
+1.20D	5.52	Span 1	-0.010	0.566
+1.20D	5.82	Span 1	-0.020	0.562
+1.20D	6.13	Span 1	-0.030	0.554
+1.20D	6.44	Span 1	-0.039	0.544
+1.20D	6.74	Span 1	-0.048	0.530
+1.20D	7.05	Span 1	-0.056	0.514
+1.20D	7.36	Span 1	-0.064	0.496
+1.20D	7.66	Span 1	-0.071	0.475
+1.20D	7.97	Span 1	-0.079	0.452
+1.20D	8.28	Span 1	-0.085	0.427
+1.20D	8.58	Span 1	-0.092	0.400
+1.20D	8.89	Span 1	-0.097	0.371
+1.20D	9.20	Span 1	-0.103	0.340

Wood Beam

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D	9.50	Span 1	-0.108	0.308
+1.20D	9.81	Span 1	-0.113	0.274
+1.20D	10.12	Span 1	-0.117	0.239
+1.20D	10.42	Span 1	-0.121	0.203
+1.20D	10.73	Span 1	-0.124	0.165
+1.20D	11.04	Span 1	-0.127	0.126
+1.20D	11.34	Span 1	-0.130	0.087
+1.20D	11.65	Span 1	-0.132	0.047
+1.20D	11.96	Span 1	-0.134	0.006
+1.20D+1.60Lr	0.00	Span 1	0.782	0.000
+1.20D+1.60Lr	0.31	Span 1	0.723	0.231
+1.20D+1.60Lr	0.61	Span 1	0.666	0.444
+1.20D+1.60Lr	0.92	Span 1	0.611	0.639
+1.20D+1.60Lr	1.23	Span 1	0.557	0.818
+1.20D+1.60Lr	1.53	Span 1	0.504	0.981
+1.20D+1.60Lr	1.84	Span 1	0.453	1.128
+1.20D+1.60Lr	2.15	Span 1	0.404	1.259
+1.20D+1.60Lr	2.45	Span 1	0.356	1.375
+1.20D+1.60Lr	2.76	Span 1	0.309	1.477
+1.20D+1.60Lr	3.07	Span 1	0.264	1.565
+1.20D+1.60Lr	3.37	Span 1	0.220	1.639
+1.20D+1.60Lr	3.68	Span 1	0.178	1.700
+1.20D+1.60Lr	3.99	Span 1	0.137	1.749
+1.20D+1.60Lr	4.29	Span 1	0.098	1.785
+1.20D+1.60Lr	4.60	Span 1	0.060	1.809
+1.20D+1.60Lr	4.91	Span 1	0.024	1.822
+1.20D+1.60Lr	5.21	Span 1	-0.011	1.824
+1.20D+1.60Lr	5.52	Span 1	-0.044	1.815
+1.20D+1.60Lr	5.82	Span 1	-0.076	1.797
+1.20D+1.60Lr	6.13	Span 1	-0.107	1.769
+1.20D+1.60Lr	6.44	Span 1	-0.136	1.731
+1.20D+1.60Lr	6.74	Span 1	-0.163	1.686
+1.20D+1.60Lr	7.05	Span 1	-0.189	1.631
+1.20D+1.60Lr	7.36	Span 1	-0.214	1.570
+1.20D+1.60Lr	7.66	Span 1	-0.237	1.501
+1.20D+1.60Lr	7.97	Span 1	-0.259	1.425
+1.20D+1.60Lr	8.28	Span 1	-0.279	1.342
+1.20D+1.60Lr	8.58	Span 1	-0.297	1.254
+1.20D+1.60Lr	8.89	Span 1	-0.315	1.160
+1.20D+1.60Lr	9.20	Span 1	-0.330	1.061
+1.20D+1.60Lr	9.50	Span 1	-0.345	0.958
+1.20D+1.60Lr	9.81	Span 1	-0.357	0.850
+1.20D+1.60Lr	10.12	Span 1	-0.369	0.739
+1.20D+1.60Lr	10.42	Span 1	-0.379	0.624
+1.20D+1.60Lr	10.73	Span 1	-0.387	0.507

Wood Beam

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+1.60Lr	11.04	Span 1	-0.394	0.387
+1.20D+1.60Lr	11.34	Span 1	-0.400	0.265
+1.20D+1.60Lr	11.65	Span 1	-0.404	0.142
+1.20D+1.60Lr	11.96	Span 1	-0.406	0.018
+1.20D+1.60Lr+0.50W	0.00	Span 1	1.292	0.000
+1.20D+1.60Lr+0.50W	0.31	Span 1	1.195	0.381
+1.20D+1.60Lr+0.50W	0.61	Span 1	1.100	0.733
+1.20D+1.60Lr+0.50W	0.92	Span 1	1.008	1.056
+1.20D+1.60Lr+0.50W	1.23	Span 1	0.918	1.351
+1.20D+1.60Lr+0.50W	1.53	Span 1	0.831	1.619
+1.20D+1.60Lr+0.50W	1.84	Span 1	0.747	1.861
+1.20D+1.60Lr+0.50W	2.15	Span 1	0.665	2.077
+1.20D+1.60Lr+0.50W	2.45	Span 1	0.585	2.269
+1.20D+1.60Lr+0.50W	2.76	Span 1	0.508	2.436
+1.20D+1.60Lr+0.50W	3.07	Span 1	0.433	2.580
+1.20D+1.60Lr+0.50W	3.37	Span 1	0.361	2.702
+1.20D+1.60Lr+0.50W	3.68	Span 1	0.291	2.802
+1.20D+1.60Lr+0.50W	3.99	Span 1	0.224	2.881
+1.20D+1.60Lr+0.50W	4.29	Span 1	0.159	2.939
+1.20D+1.60Lr+0.50W	4.60	Span 1	0.096	2.978
+1.20D+1.60Lr+0.50W	4.91	Span 1	0.036	2.998
+1.20D+1.60Lr+0.50W	5.21	Span 1	-0.021	3.001
+1.20D+1.60Lr+0.50W	5.52	Span 1	-0.076	2.986
+1.20D+1.60Lr+0.50W	5.82	Span 1	-0.129	2.954
+1.20D+1.60Lr+0.50W	6.13	Span 1	-0.179	2.907
+1.20D+1.60Lr+0.50W	6.44	Span 1	-0.226	2.845
+1.20D+1.60Lr+0.50W	6.74	Span 1	-0.271	2.769
+1.20D+1.60Lr+0.50W	7.05	Span 1	-0.314	2.679
+1.20D+1.60Lr+0.50W	7.36	Span 1	-0.354	2.576
+1.20D+1.60Lr+0.50W	7.66	Span 1	-0.392	2.462
+1.20D+1.60Lr+0.50W	7.97	Span 1	-0.427	2.336
+1.20D+1.60Lr+0.50W	8.28	Span 1	-0.460	2.200
+1.20D+1.60Lr+0.50W	8.58	Span 1	-0.490	2.054
+1.20D+1.60Lr+0.50W	8.89	Span 1	-0.518	1.900
+1.20D+1.60Lr+0.50W	9.20	Span 1	-0.544	1.737
+1.20D+1.60Lr+0.50W	9.50	Span 1	-0.567	1.567
+1.20D+1.60Lr+0.50W	9.81	Span 1	-0.587	1.390
+1.20D+1.60Lr+0.50W	10.12	Span 1	-0.605	1.207
+1.20D+1.60Lr+0.50W	10.42	Span 1	-0.620	1.019
+1.20D+1.60Lr+0.50W	10.73	Span 1	-0.634	0.827
+1.20D+1.60Lr+0.50W	11.04	Span 1	-0.644	0.631
+1.20D+1.60Lr+0.50W	11.34	Span 1	-0.652	0.432
+1.20D+1.60Lr+0.50W	11.65	Span 1	-0.658	0.231
+1.20D+1.60Lr+0.50W	11.96	Span 1	-0.661	0.029

Wood Beam

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+1.60Lr-0.50W	0.00	Span 1	0.272	0.000
+1.20D+1.60Lr-0.50W	0.31	Span 1	0.252	0.080
+1.20D+1.60Lr-0.50W	0.61	Span 1	0.232	0.154
+1.20D+1.60Lr-0.50W	0.92	Span 1	0.214	0.223
+1.20D+1.60Lr-0.50W	1.23	Span 1	0.195	0.285
+1.20D+1.60Lr-0.50W	1.53	Span 1	0.177	0.342
+1.20D+1.60Lr-0.50W	1.84	Span 1	0.160	0.394
+1.20D+1.60Lr-0.50W	2.15	Span 1	0.143	0.441
+1.20D+1.60Lr-0.50W	2.45	Span 1	0.126	0.482
+1.20D+1.60Lr-0.50W	2.76	Span 1	0.110	0.518
+1.20D+1.60Lr-0.50W	3.07	Span 1	0.095	0.550
+1.20D+1.60Lr-0.50W	3.37	Span 1	0.080	0.576
+1.20D+1.60Lr-0.50W	3.68	Span 1	0.065	0.599
+1.20D+1.60Lr-0.50W	3.99	Span 1	0.051	0.616
+1.20D+1.60Lr-0.50W	4.29	Span 1	0.037	0.630
+1.20D+1.60Lr-0.50W	4.60	Span 1	0.024	0.639
+1.20D+1.60Lr-0.50W	4.91	Span 1	0.012	0.645
+1.20D+1.60Lr-0.50W	5.21	Span 1	-0.001	0.647
+1.20D+1.60Lr-0.50W	5.52	Span 1	-0.012	0.645
+1.20D+1.60Lr-0.50W	5.82	Span 1	-0.024	0.639
+1.20D+1.60Lr-0.50W	6.13	Span 1	-0.035	0.630
+1.20D+1.60Lr-0.50W	6.44	Span 1	-0.045	0.618
+1.20D+1.60Lr-0.50W	6.74	Span 1	-0.055	0.602
+1.20D+1.60Lr-0.50W	7.05	Span 1	-0.064	0.584
+1.20D+1.60Lr-0.50W	7.36	Span 1	-0.073	0.563
+1.20D+1.60Lr-0.50W	7.66	Span 1	-0.082	0.539
+1.20D+1.60Lr-0.50W	7.97	Span 1	-0.090	0.513
+1.20D+1.60Lr-0.50W	8.28	Span 1	-0.097	0.484
+1.20D+1.60Lr-0.50W	8.58	Span 1	-0.104	0.453
+1.20D+1.60Lr-0.50W	8.89	Span 1	-0.111	0.420
+1.20D+1.60Lr-0.50W	9.20	Span 1	-0.117	0.385
+1.20D+1.60Lr-0.50W	9.50	Span 1	-0.123	0.349
+1.20D+1.60Lr-0.50W	9.81	Span 1	-0.128	0.310
+1.20D+1.60Lr-0.50W	10.12	Span 1	-0.133	0.270
+1.20D+1.60Lr-0.50W	10.42	Span 1	-0.137	0.229
+1.20D+1.60Lr-0.50W	10.73	Span 1	-0.141	0.186
+1.20D+1.60Lr-0.50W	11.04	Span 1	-0.144	0.143
+1.20D+1.60Lr-0.50W	11.34	Span 1	-0.147	0.098
+1.20D+1.60Lr-0.50W	11.65	Span 1	-0.149	0.053
+1.20D+1.60Lr-0.50W	11.96	Span 1	-0.151	0.007
+1.20D+0.50W	0.00	Span 1	0.748	0.000
+1.20D+0.50W	0.31	Span 1	0.692	0.221
+1.20D+0.50W	0.61	Span 1	0.637	0.424
+1.20D+0.50W	0.92	Span 1	0.584	0.611
+1.20D+0.50W	1.23	Span 1	0.533	0.783

Wood Beam

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+0.50W	1.53	Span 1	0.483	0.938
+1.20D+0.50W	1.84	Span 1	0.434	1.079
+1.20D+0.50W	2.15	Span 1	0.386	1.204
+1.20D+0.50W	2.45	Span 1	0.340	1.316
+1.20D+0.50W	2.76	Span 1	0.296	1.413
+1.20D+0.50W	3.07	Span 1	0.253	1.497
+1.20D+0.50W	3.37	Span 1	0.211	1.568
+1.20D+0.50W	3.68	Span 1	0.171	1.627
+1.20D+0.50W	3.99	Span 1	0.132	1.673
+1.20D+0.50W	4.29	Span 1	0.094	1.708
+1.20D+0.50W	4.60	Span 1	0.058	1.731
+1.20D+0.50W	4.91	Span 1	0.023	1.743
+1.20D+0.50W	5.21	Span 1	-0.010	1.745
+1.20D+0.50W	5.52	Span 1	-0.042	1.737
+1.20D+0.50W	5.82	Span 1	-0.073	1.719
+1.20D+0.50W	6.13	Span 1	-0.102	1.693
+1.20D+0.50W	6.44	Span 1	-0.130	1.657
+1.20D+0.50W	6.74	Span 1	-0.156	1.613
+1.20D+0.50W	7.05	Span 1	-0.181	1.562
+1.20D+0.50W	7.36	Span 1	-0.204	1.503
+1.20D+0.50W	7.66	Span 1	-0.227	1.436
+1.20D+0.50W	7.97	Span 1	-0.247	1.364
+1.20D+0.50W	8.28	Span 1	-0.267	1.285
+1.20D+0.50W	8.58	Span 1	-0.285	1.200
+1.20D+0.50W	8.89	Span 1	-0.301	1.111
+1.20D+0.50W	9.20	Span 1	-0.316	1.016
+1.20D+0.50W	9.50	Span 1	-0.330	0.917
+1.20D+0.50W	9.81	Span 1	-0.342	0.814
+1.20D+0.50W	10.12	Span 1	-0.353	0.707
+1.20D+0.50W	10.42	Span 1	-0.363	0.598
+1.20D+0.50W	10.73	Span 1	-0.371	0.485
+1.20D+0.50W	11.04	Span 1	-0.377	0.370
+1.20D+0.50W	11.34	Span 1	-0.383	0.254
+1.20D+0.50W	11.65	Span 1	-0.387	0.136
+1.20D+0.50W	11.96	Span 1	-0.389	0.017
+1.20D-0.50W	0.00	Span 1	-0.272	0.000
+1.20D-0.50W	0.31	Span 1	-0.251	-0.080
+1.20D-0.50W	0.61	Span 1	-0.230	-0.154
+1.20D-0.50W	0.92	Span 1	-0.210	-0.222
+1.20D-0.50W	1.23	Span 1	-0.191	-0.283
+1.20D-0.50W	1.53	Span 1	-0.172	-0.338
+1.20D-0.50W	1.84	Span 1	-0.153	-0.388
+1.20D-0.50W	2.15	Span 1	-0.135	-0.432
+1.20D-0.50W	2.45	Span 1	-0.118	-0.471
+1.20D-0.50W	2.76	Span 1	-0.101	-0.505

Wood Beam

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D-0.50W	3.07	Span 1	-0.085	-0.533
+1.20D-0.50W	3.37	Span 1	-0.070	-0.557
+1.20D-0.50W	3.68	Span 1	-0.055	-0.576
+1.20D-0.50W	3.99	Span 1	-0.041	-0.591
+1.20D-0.50W	4.29	Span 1	-0.027	-0.602
+1.20D-0.50W	4.60	Span 1	-0.014	-0.608
+1.20D-0.50W	4.91	Span 1	-0.002	-0.610
+1.20D-0.50W	5.21	Span 1	0.010	-0.609
+1.20D-0.50W	5.52	Span 1	0.021	-0.604
+1.20D-0.50W	5.82	Span 1	0.032	-0.596
+1.20D-0.50W	6.13	Span 1	0.042	-0.584
+1.20D-0.50W	6.44	Span 1	0.052	-0.570
+1.20D-0.50W	6.74	Span 1	0.061	-0.553
+1.20D-0.50W	7.05	Span 1	0.069	-0.533
+1.20D-0.50W	7.36	Span 1	0.077	-0.511
+1.20D-0.50W	7.66	Span 1	0.084	-0.486
+1.20D-0.50W	7.97	Span 1	0.090	-0.459
+1.20D-0.50W	8.28	Span 1	0.096	-0.431
+1.20D-0.50W	8.58	Span 1	0.101	-0.401
+1.20D-0.50W	8.89	Span 1	0.106	-0.369
+1.20D-0.50W	9.20	Span 1	0.110	-0.335
+1.20D-0.50W	9.50	Span 1	0.114	-0.301
+1.20D-0.50W	9.81	Span 1	0.117	-0.266
+1.20D-0.50W	10.12	Span 1	0.119	-0.229
+1.20D-0.50W	10.42	Span 1	0.121	-0.193
+1.20D-0.50W	10.73	Span 1	0.122	-0.155
+1.20D-0.50W	11.04	Span 1	0.123	-0.118
+1.20D-0.50W	11.34	Span 1	0.123	-0.080
+1.20D-0.50W	11.65	Span 1	0.122	-0.043
+1.20D-0.50W	11.96	Span 1	0.121	-0.005
+1.20D+0.50Lr+W	0.00	Span 1	1.428	0.000
+1.20D+0.50Lr+W	0.31	Span 1	1.320	0.421
+1.20D+0.50Lr+W	0.61	Span 1	1.216	0.810
+1.20D+0.50Lr+W	0.92	Span 1	1.114	1.167
+1.20D+0.50Lr+W	1.23	Span 1	1.015	1.493
+1.20D+0.50Lr+W	1.53	Span 1	0.919	1.789
+1.20D+0.50Lr+W	1.84	Span 1	0.825	2.057
+1.20D+0.50Lr+W	2.15	Span 1	0.734	2.296
+1.20D+0.50Lr+W	2.45	Span 1	0.646	2.507
+1.20D+0.50Lr+W	2.76	Span 1	0.561	2.692
+1.20D+0.50Lr+W	3.07	Span 1	0.478	2.851
+1.20D+0.50Lr+W	3.37	Span 1	0.398	2.985
+1.20D+0.50Lr+W	3.68	Span 1	0.321	3.096
+1.20D+0.50Lr+W	3.99	Span 1	0.247	3.183
+1.20D+0.50Lr+W	4.29	Span 1	0.175	3.247

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+0.50Lr+W	4.60	Span 1	0.106	3.290
+1.20D+0.50Lr+W	4.91	Span 1	0.040	3.312
+1.20D+0.50Lr+W	5.21	Span 1	-0.024	3.315
+1.20D+0.50Lr+W	5.52	Span 1	-0.085	3.298
+1.20D+0.50Lr+W	5.82	Span 1	-0.143	3.263
+1.20D+0.50Lr+W	6.13	Span 1	-0.198	3.211
+1.20D+0.50Lr+W	6.44	Span 1	-0.250	3.142
+1.20D+0.50Lr+W	6.74	Span 1	-0.300	3.057
+1.20D+0.50Lr+W	7.05	Span 1	-0.347	2.958
+1.20D+0.50Lr+W	7.36	Span 1	-0.392	2.845
+1.20D+0.50Lr+W	7.66	Span 1	-0.433	2.718
+1.20D+0.50Lr+W	7.97	Span 1	-0.472	2.579
+1.20D+0.50Lr+W	8.28	Span 1	-0.508	2.429
+1.20D+0.50Lr+W	8.58	Span 1	-0.542	2.268
+1.20D+0.50Lr+W	8.89	Span 1	-0.573	2.097
+1.20D+0.50Lr+W	9.20	Span 1	-0.601	1.917
+1.20D+0.50Lr+W	9.50	Span 1	-0.626	1.729
+1.20D+0.50Lr+W	9.81	Span 1	-0.648	1.534
+1.20D+0.50Lr+W	10.12	Span 1	-0.668	1.332
+1.20D+0.50Lr+W	10.42	Span 1	-0.685	1.124
+1.20D+0.50Lr+W	10.73	Span 1	-0.699	0.912
+1.20D+0.50Lr+W	11.04	Span 1	-0.711	0.696
+1.20D+0.50Lr+W	11.34	Span 1	-0.720	0.477
+1.20D+0.50Lr+W	11.65	Span 1	-0.726	0.255
+1.20D+0.50Lr+W	11.96	Span 1	-0.729	0.032
+1.20D+0.50Lr-W	0.00	Span 1	-0.612	0.000
+1.20D+0.50Lr-W	0.31	Span 1	-0.565	-0.181
+1.20D+0.50Lr-W	0.61	Span 1	-0.520	-0.347
+1.20D+0.50Lr-W	0.92	Span 1	-0.475	-0.499
+1.20D+0.50Lr-W	1.23	Span 1	-0.432	-0.638
+1.20D+0.50Lr-W	1.53	Span 1	-0.390	-0.764
+1.20D+0.50Lr-W	1.84	Span 1	-0.349	-0.877
+1.20D+0.50Lr-W	2.15	Span 1	-0.309	-0.978
+1.20D+0.50Lr-W	2.45	Span 1	-0.271	-1.067
+1.20D+0.50Lr-W	2.76	Span 1	-0.234	-1.144
+1.20D+0.50Lr-W	3.07	Span 1	-0.198	-1.210
+1.20D+0.50Lr-W	3.37	Span 1	-0.164	-1.266
+1.20D+0.50Lr-W	3.68	Span 1	-0.130	-1.311
+1.20D+0.50Lr-W	3.99	Span 1	-0.098	-1.346
+1.20D+0.50Lr-W	4.29	Span 1	-0.068	-1.371
+1.20D+0.50Lr-W	4.60	Span 1	-0.038	-1.387
+1.20D+0.50Lr-W	4.91	Span 1	-0.010	-1.395
+1.20D+0.50Lr-W	5.21	Span 1	0.017	-1.394
+1.20D+0.50Lr-W	5.52	Span 1	0.043	-1.385
+1.20D+0.50Lr-W	5.82	Span 1	0.067	-1.368

Wood Beam

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+0.50Lr-W	6.13	Span 1	0.090	-1.344
+1.20D+0.50Lr-W	6.44	Span 1	0.112	-1.313
+1.20D+0.50Lr-W	6.74	Span 1	0.133	-1.275
+1.20D+0.50Lr-W	7.05	Span 1	0.152	-1.231
+1.20D+0.50Lr-W	7.36	Span 1	0.170	-1.182
+1.20D+0.50Lr-W	7.66	Span 1	0.187	-1.127
+1.20D+0.50Lr-W	7.97	Span 1	0.203	-1.067
+1.20D+0.50Lr-W	8.28	Span 1	0.217	-1.003
+1.20D+0.50Lr-W	8.58	Span 1	0.230	-0.934
+1.20D+0.50Lr-W	8.89	Span 1	0.242	-0.862
+1.20D+0.50Lr-W	9.20	Span 1	0.253	-0.786
+1.20D+0.50Lr-W	9.50	Span 1	0.262	-0.707
+1.20D+0.50Lr-W	9.81	Span 1	0.270	-0.626
+1.20D+0.50Lr-W	10.12	Span 1	0.277	-0.542
+1.20D+0.50Lr-W	10.42	Span 1	0.282	-0.456
+1.20D+0.50Lr-W	10.73	Span 1	0.286	-0.369
+1.20D+0.50Lr-W	11.04	Span 1	0.289	-0.280
+1.20D+0.50Lr-W	11.34	Span 1	0.291	-0.191
+1.20D+0.50Lr-W	11.65	Span 1	0.292	-0.102
+1.20D+0.50Lr-W	11.96	Span 1	0.291	-0.013
+1.20D+W	0.00	Span 1	1.258	0.000
+1.20D+W	0.31	Span 1	1.163	0.371
+1.20D+W	0.61	Span 1	1.071	0.713
+1.20D+W	0.92	Span 1	0.982	1.028
+1.20D+W	1.23	Span 1	0.894	1.315
+1.20D+W	1.53	Span 1	0.810	1.577
+1.20D+W	1.84	Span 1	0.727	1.812
+1.20D+W	2.15	Span 1	0.647	2.023
+1.20D+W	2.45	Span 1	0.570	2.209
+1.20D+W	2.76	Span 1	0.495	2.372
+1.20D+W	3.07	Span 1	0.422	2.513
+1.20D+W	3.37	Span 1	0.351	2.631
+1.20D+W	3.68	Span 1	0.283	2.728
+1.20D+W	3.99	Span 1	0.218	2.805
+1.20D+W	4.29	Span 1	0.155	2.862
+1.20D+W	4.60	Span 1	0.094	2.900
+1.20D+W	4.91	Span 1	0.036	2.920
+1.20D+W	5.21	Span 1	-0.020	2.922
+1.20D+W	5.52	Span 1	-0.074	2.908
+1.20D+W	5.82	Span 1	-0.125	2.877
+1.20D+W	6.13	Span 1	-0.174	2.831
+1.20D+W	6.44	Span 1	-0.220	2.771
+1.20D+W	6.74	Span 1	-0.264	2.696
+1.20D+W	7.05	Span 1	-0.306	2.609
+1.20D+W	7.36	Span 1	-0.345	2.509

Wood Beam

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+W	7.66	Span 1	-0.382	2.398
+1.20D+W	7.97	Span 1	-0.416	2.275
+1.20D+W	8.28	Span 1	-0.448	2.143
+1.20D+W	8.58	Span 1	-0.478	2.001
+1.20D+W	8.89	Span 1	-0.505	1.850
+1.20D+W	9.20	Span 1	-0.529	1.692
+1.20D+W	9.50	Span 1	-0.552	1.526
+1.20D+W	9.81	Span 1	-0.572	1.354
+1.20D+W	10.12	Span 1	-0.589	1.176
+1.20D+W	10.42	Span 1	-0.604	0.993
+1.20D+W	10.73	Span 1	-0.617	0.805
+1.20D+W	11.04	Span 1	-0.627	0.615
+1.20D+W	11.34	Span 1	-0.635	0.421
+1.20D+W	11.65	Span 1	-0.641	0.225
+1.20D+W	11.96	Span 1	-0.644	0.028
+1.20D-W	0.00	Span 1	-0.782	0.000
+1.20D-W	0.31	Span 1	-0.723	-0.231
+1.20D-W	0.61	Span 1	-0.664	-0.443
+1.20D-W	0.92	Span 1	-0.607	-0.638
+1.20D-W	1.23	Span 1	-0.552	-0.816
+1.20D-W	1.53	Span 1	-0.499	-0.977
+1.20D-W	1.84	Span 1	-0.447	-1.122
+1.20D-W	2.15	Span 1	-0.396	-1.251
+1.20D-W	2.45	Span 1	-0.347	-1.365
+1.20D-W	2.76	Span 1	-0.300	-1.464
+1.20D-W	3.07	Span 1	-0.254	-1.549
+1.20D-W	3.37	Span 1	-0.210	-1.620
+1.20D-W	3.68	Span 1	-0.168	-1.678
+1.20D-W	3.99	Span 1	-0.127	-1.723
+1.20D-W	4.29	Span 1	-0.088	-1.756
+1.20D-W	4.60	Span 1	-0.050	-1.777
+1.20D-W	4.91	Span 1	-0.014	-1.787
+1.20D-W	5.21	Span 1	0.020	-1.786
+1.20D-W	5.52	Span 1	0.053	-1.775
+1.20D-W	5.82	Span 1	0.085	-1.754
+1.20D-W	6.13	Span 1	0.114	-1.723
+1.20D-W	6.44	Span 1	0.142	-1.684
+1.20D-W	6.74	Span 1	0.169	-1.636
+1.20D-W	7.05	Span 1	0.194	-1.580
+1.20D-W	7.36	Span 1	0.217	-1.517
+1.20D-W	7.66	Span 1	0.239	-1.447
+1.20D-W	7.97	Span 1	0.259	-1.371
+1.20D-W	8.28	Span 1	0.278	-1.289
+1.20D-W	8.58	Span 1	0.295	-1.201
+1.20D-W	8.89	Span 1	0.310	-1.108

Wood Beam

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D-W	9.20	Span 1	0.324	-1.011
+1.20D-W	9.50	Span 1	0.336	-0.910
+1.20D-W	9.81	Span 1	0.346	-0.805
+1.20D-W	10.12	Span 1	0.355	-0.698
+1.20D-W	10.42	Span 1	0.363	-0.588
+1.20D-W	10.73	Span 1	0.369	-0.476
+1.20D-W	11.04	Span 1	0.373	-0.362
+1.20D-W	11.34	Span 1	0.375	-0.247
+1.20D-W	11.65	Span 1	0.376	-0.132
+1.20D-W	11.96	Span 1	0.376	-0.016
+0.90D+W	0.00	Span 1	1.198	0.000
+0.90D+W	0.31	Span 1	1.108	0.353
+0.90D+W	0.61	Span 1	1.020	0.680
+0.90D+W	0.92	Span 1	0.935	0.979
+0.90D+W	1.23	Span 1	0.852	1.253
+0.90D+W	1.53	Span 1	0.771	1.502
+0.90D+W	1.84	Span 1	0.692	1.726
+0.90D+W	2.15	Span 1	0.616	1.926
+0.90D+W	2.45	Span 1	0.542	2.104
+0.90D+W	2.76	Span 1	0.470	2.259
+0.90D+W	3.07	Span 1	0.401	2.392
+0.90D+W	3.37	Span 1	0.334	2.505
+0.90D+W	3.68	Span 1	0.269	2.597
+0.90D+W	3.99	Span 1	0.206	2.670
+0.90D+W	4.29	Span 1	0.146	2.724
+0.90D+W	4.60	Span 1	0.088	2.760
+0.90D+W	4.91	Span 1	0.033	2.778
+0.90D+W	5.21	Span 1	-0.020	2.780
+0.90D+W	5.52	Span 1	-0.071	2.766
+0.90D+W	5.82	Span 1	-0.120	2.737
+0.90D+W	6.13	Span 1	-0.166	2.693
+0.90D+W	6.44	Span 1	-0.211	2.635
+0.90D+W	6.74	Span 1	-0.252	2.564
+0.90D+W	7.05	Span 1	-0.292	2.480
+0.90D+W	7.36	Span 1	-0.329	2.385
+0.90D+W	7.66	Span 1	-0.364	2.279
+0.90D+W	7.97	Span 1	-0.396	2.162
+0.90D+W	8.28	Span 1	-0.427	2.036
+0.90D+W	8.58	Span 1	-0.455	1.901
+0.90D+W	8.89	Span 1	-0.480	1.758
+0.90D+W	9.20	Span 1	-0.504	1.607
+0.90D+W	9.50	Span 1	-0.525	1.449
+0.90D+W	9.81	Span 1	-0.544	1.285
+0.90D+W	10.12	Span 1	-0.560	1.116
+0.90D+W	10.42	Span 1	-0.574	0.942

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+0.90D+W	10.73	Span 1	-0.586	0.764
+0.90D+W	11.04	Span 1	-0.596	0.583
+0.90D+W	11.34	Span 1	-0.603	0.399
+0.90D+W	11.65	Span 1	-0.608	0.214
+0.90D+W	11.96	Span 1	-0.611	0.027
+0.90D-W	0.00	Span 1	-0.842	0.000
+0.90D-W	0.31	Span 1	-0.778	-0.248
+0.90D-W	0.61	Span 1	-0.715	-0.477
+0.90D-W	0.92	Span 1	-0.654	-0.687
+0.90D-W	1.23	Span 1	-0.595	-0.878
+0.90D-W	1.53	Span 1	-0.537	-1.052
+0.90D-W	1.84	Span 1	-0.482	-1.208
+0.90D-W	2.15	Span 1	-0.428	-1.347
+0.90D-W	2.45	Span 1	-0.375	-1.470
+0.90D-W	2.76	Span 1	-0.324	-1.577
+0.90D-W	3.07	Span 1	-0.275	-1.669
+0.90D-W	3.37	Span 1	-0.228	-1.746
+0.90D-W	3.68	Span 1	-0.182	-1.809
+0.90D-W	3.99	Span 1	-0.138	-1.858
+0.90D-W	4.29	Span 1	-0.096	-1.894
+0.90D-W	4.60	Span 1	-0.056	-1.918
+0.90D-W	4.91	Span 1	-0.017	-1.929
+0.90D-W	5.21	Span 1	0.020	-1.928
+0.90D-W	5.52	Span 1	0.056	-1.916
+0.90D-W	5.82	Span 1	0.090	-1.894
+0.90D-W	6.13	Span 1	0.122	-1.862
+0.90D-W	6.44	Span 1	0.152	-1.820
+0.90D-W	6.74	Span 1	0.181	-1.769
+0.90D-W	7.05	Span 1	0.208	-1.709
+0.90D-W	7.36	Span 1	0.233	-1.641
+0.90D-W	7.66	Span 1	0.257	-1.566
+0.90D-W	7.97	Span 1	0.279	-1.484
+0.90D-W	8.28	Span 1	0.299	-1.396
+0.90D-W	8.58	Span 1	0.317	-1.301
+0.90D-W	8.89	Span 1	0.334	-1.201
+0.90D-W	9.20	Span 1	0.349	-1.096
+0.90D-W	9.50	Span 1	0.363	-0.987
+0.90D-W	9.81	Span 1	0.375	-0.874
+0.90D-W	10.12	Span 1	0.385	-0.758
+0.90D-W	10.42	Span 1	0.393	-0.638
+0.90D-W	10.73	Span 1	0.400	-0.517
+0.90D-W	11.04	Span 1	0.405	-0.393
+0.90D-W	11.34	Span 1	0.408	-0.269
+0.90D-W	11.65	Span 1	0.410	-0.144
+0.90D-W	11.96	Span 1	0.409	-0.018

Wood Beam

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

+0.90D	0.00	Span 1	0.178	0.000
+0.90D	0.31	Span 1	0.165	0.053
+0.90D	0.61	Span 1	0.153	0.101
+0.90D	0.92	Span 1	0.140	0.146
+0.90D	1.23	Span 1	0.128	0.187
+0.90D	1.53	Span 1	0.117	0.225
+0.90D	1.84	Span 1	0.105	0.259
+0.90D	2.15	Span 1	0.094	0.290
+0.90D	2.45	Span 1	0.083	0.317
+0.90D	2.76	Span 1	0.073	0.341
+0.90D	3.07	Span 1	0.063	0.361
+0.90D	3.37	Span 1	0.053	0.379
+0.90D	3.68	Span 1	0.043	0.394
+0.90D	3.99	Span 1	0.034	0.406
+0.90D	4.29	Span 1	0.025	0.415
+0.90D	4.60	Span 1	0.016	0.421
+0.90D	4.91	Span 1	0.008	0.425
+0.90D	5.21	Span 1	-0.000	0.426
+0.90D	5.52	Span 1	-0.008	0.425
+0.90D	5.82	Span 1	-0.015	0.421
+0.90D	6.13	Span 1	-0.022	0.416
+0.90D	6.44	Span 1	-0.029	0.408
+0.90D	6.74	Span 1	-0.036	0.398
+0.90D	7.05	Span 1	-0.042	0.386
+0.90D	7.36	Span 1	-0.048	0.372
+0.90D	7.66	Span 1	-0.054	0.356
+0.90D	7.97	Span 1	-0.059	0.339
+0.90D	8.28	Span 1	-0.064	0.320
+0.90D	8.58	Span 1	-0.069	0.300
+0.90D	8.89	Span 1	-0.073	0.278
+0.90D	9.20	Span 1	-0.077	0.255
+0.90D	9.50	Span 1	-0.081	0.231
+0.90D	9.81	Span 1	-0.084	0.206
+0.90D	10.12	Span 1	-0.088	0.179
+0.90D	10.42	Span 1	-0.091	0.152
+0.90D	10.73	Span 1	-0.093	0.124
+0.90D	11.04	Span 1	-0.095	0.095
+0.90D	11.34	Span 1	-0.097	0.065
+0.90D	11.65	Span 1	-0.099	0.035
+0.90D	11.96	Span 1	-0.101	0.004

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
Overall MAXimum Envelope	0.00	Span 1	0.000
Overall MAXimum Envelope	0.31	Span 1	0.042
Overall MAXimum Envelope	0.61	Span 1	0.084
Overall MAXimum Envelope	0.92	Span 1	0.124

Wood Beam

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
Overall MAXimum Envelope	1.23	Span 1	0.164
Overall MAXimum Envelope	1.53	Span 1	0.203
Overall MAXimum Envelope	1.84	Span 1	0.239
Overall MAXimum Envelope	2.15	Span 1	0.274
Overall MAXimum Envelope	2.45	Span 1	0.307
Overall MAXimum Envelope	2.76	Span 1	0.338
Overall MAXimum Envelope	3.07	Span 1	0.366
Overall MAXimum Envelope	3.37	Span 1	0.391
Overall MAXimum Envelope	3.68	Span 1	0.413
Overall MAXimum Envelope	3.99	Span 1	0.433
Overall MAXimum Envelope	4.29	Span 1	0.450
Overall MAXimum Envelope	4.60	Span 1	0.463
Overall MAXimum Envelope	4.91	Span 1	0.474
Overall MAXimum Envelope	5.21	Span 1	0.481
Overall MAXimum Envelope	5.52	Span 1	0.486
Overall MAXimum Envelope	5.82	Span 1	0.487
Overall MAXimum Envelope	6.13	Span 1	0.485
Overall MAXimum Envelope	6.44	Span 1	0.480
Overall MAXimum Envelope	6.74	Span 1	0.473
Overall MAXimum Envelope	7.05	Span 1	0.462
Overall MAXimum Envelope	7.36	Span 1	0.449
Overall MAXimum Envelope	7.66	Span 1	0.433
Overall MAXimum Envelope	7.97	Span 1	0.414
Overall MAXimum Envelope	8.28	Span 1	0.393
Overall MAXimum Envelope	8.58	Span 1	0.370
Overall MAXimum Envelope	8.89	Span 1	0.344
Overall MAXimum Envelope	9.20	Span 1	0.317
Overall MAXimum Envelope	9.50	Span 1	0.288
Overall MAXimum Envelope	9.81	Span 1	0.257
Overall MAXimum Envelope	10.12	Span 1	0.224
Overall MAXimum Envelope	10.42	Span 1	0.191
Overall MAXimum Envelope	10.73	Span 1	0.156
Overall MAXimum Envelope	11.04	Span 1	0.121
Overall MAXimum Envelope	11.34	Span 1	0.084
Overall MAXimum Envelope	11.65	Span 1	0.048
Overall MAXimum Envelope	11.96	Span 1	0.011
Overall MAXimum Envelope	12.00	Span 1	0.006
D Only	0.00	Span 1	0.000
D Only	0.31	Span 1	0.009
D Only	0.61	Span 1	0.019
D Only	0.92	Span 1	0.028
D Only	1.23	Span 1	0.037

DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
D Only	1.53	Span 1	0.045
D Only	1.84	Span 1	0.053
D Only	2.15	Span 1	0.061
D Only	2.45	Span 1	0.068
D Only	2.76	Span 1	0.075
D Only	3.07	Span 1	0.082
D Only	3.37	Span 1	0.087
D Only	3.68	Span 1	0.092
D Only	3.99	Span 1	0.097
D Only	4.29	Span 1	0.101
D Only	4.60	Span 1	0.104
D Only	4.91	Span 1	0.106
D Only	5.21	Span 1	0.108
D Only	5.52	Span 1	0.109
D Only	5.82	Span 1	0.109
D Only	6.13	Span 1	0.109
D Only	6.44	Span 1	0.108
D Only	6.74	Span 1	0.106
D Only	7.05	Span 1	0.104
D Only	7.36	Span 1	0.101
D Only	7.66	Span 1	0.097
D Only	7.97	Span 1	0.093
D Only	8.28	Span 1	0.089
D Only	8.58	Span 1	0.083
D Only	8.89	Span 1	0.078
D Only	9.20	Span 1	0.072
D Only	9.50	Span 1	0.065
D Only	9.81	Span 1	0.058
D Only	10.12	Span 1	0.051
D Only	10.42	Span 1	0.043
D Only	10.73	Span 1	0.035
D Only	11.04	Span 1	0.027
D Only	11.34	Span 1	0.019
D Only	11.65	Span 1	0.011
D Only	11.96	Span 1	0.002
D Only	12.00	Span 1	0.001
+D+Lr	0.00	Span 1	0.000
+D+Lr	0.31	Span 1	0.025
+D+Lr	0.61	Span 1	0.050
+D+Lr	0.92	Span 1	0.074
+D+Lr	1.23	Span 1	0.097
+D+Lr	1.53	Span 1	0.120

Wood Beam

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+D+Lr	1.84	Span 1	0.142
+D+Lr	2.15	Span 1	0.163
+D+Lr	2.45	Span 1	0.182
+D+Lr	2.76	Span 1	0.200
+D+Lr	3.07	Span 1	0.217
+D+Lr	3.37	Span 1	0.232
+D+Lr	3.68	Span 1	0.245
+D+Lr	3.99	Span 1	0.257
+D+Lr	4.29	Span 1	0.267
+D+Lr	4.60	Span 1	0.275
+D+Lr	4.91	Span 1	0.281
+D+Lr	5.21	Span 1	0.286
+D+Lr	5.52	Span 1	0.288
+D+Lr	5.82	Span 1	0.289
+D+Lr	6.13	Span 1	0.288
+D+Lr	6.44	Span 1	0.285
+D+Lr	6.74	Span 1	0.281
+D+Lr	7.05	Span 1	0.274
+D+Lr	7.36	Span 1	0.266
+D+Lr	7.66	Span 1	0.257
+D+Lr	7.97	Span 1	0.246
+D+Lr	8.28	Span 1	0.233
+D+Lr	8.58	Span 1	0.220
+D+Lr	8.89	Span 1	0.205
+D+Lr	9.20	Span 1	0.188
+D+Lr	9.50	Span 1	0.171
+D+Lr	9.81	Span 1	0.153
+D+Lr	10.12	Span 1	0.133
+D+Lr	10.42	Span 1	0.113
+D+Lr	10.73	Span 1	0.093
+D+Lr	11.04	Span 1	0.072
+D+Lr	11.34	Span 1	0.050
+D+Lr	11.65	Span 1	0.028
+D+Lr	11.96	Span 1	0.007
+D+Lr	12.00	Span 1	0.003
+D+0.750Lr	0.00	Span 1	0.000
+D+0.750Lr	0.31	Span 1	0.021
+D+0.750Lr	0.61	Span 1	0.042
+D+0.750Lr	0.92	Span 1	0.062
+D+0.750Lr	1.23	Span 1	0.082
+D+0.750Lr	1.53	Span 1	0.101
+D+0.750Lr	1.84	Span 1	0.120

Wood Beam

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+D+0.750Lr	2.15	Span 1	0.137
+D+0.750Lr	2.45	Span 1	0.154
+D+0.750Lr	2.76	Span 1	0.169
+D+0.750Lr	3.07	Span 1	0.183
+D+0.750Lr	3.37	Span 1	0.196
+D+0.750Lr	3.68	Span 1	0.207
+D+0.750Lr	3.99	Span 1	0.217
+D+0.750Lr	4.29	Span 1	0.225
+D+0.750Lr	4.60	Span 1	0.232
+D+0.750Lr	4.91	Span 1	0.237
+D+0.750Lr	5.21	Span 1	0.241
+D+0.750Lr	5.52	Span 1	0.243
+D+0.750Lr	5.82	Span 1	0.244
+D+0.750Lr	6.13	Span 1	0.243
+D+0.750Lr	6.44	Span 1	0.241
+D+0.750Lr	6.74	Span 1	0.237
+D+0.750Lr	7.05	Span 1	0.232
+D+0.750Lr	7.36	Span 1	0.225
+D+0.750Lr	7.66	Span 1	0.217
+D+0.750Lr	7.97	Span 1	0.208
+D+0.750Lr	8.28	Span 1	0.197
+D+0.750Lr	8.58	Span 1	0.186
+D+0.750Lr	8.89	Span 1	0.173
+D+0.750Lr	9.20	Span 1	0.159
+D+0.750Lr	9.50	Span 1	0.144
+D+0.750Lr	9.81	Span 1	0.129
+D+0.750Lr	10.12	Span 1	0.113
+D+0.750Lr	10.42	Span 1	0.096
+D+0.750Lr	10.73	Span 1	0.078
+D+0.750Lr	11.04	Span 1	0.061
+D+0.750Lr	11.34	Span 1	0.042
+D+0.750Lr	11.65	Span 1	0.024
+D+0.750Lr	11.96	Span 1	0.005
+D+0.750Lr	12.00	Span 1	0.003
+D+0.60W	0.00	Span 1	0.000
+D+0.60W	0.31	Span 1	0.037
+D+0.60W	0.61	Span 1	0.074
+D+0.60W	0.92	Span 1	0.111
+D+0.60W	1.23	Span 1	0.146
+D+0.60W	1.53	Span 1	0.180
+D+0.60W	1.84	Span 1	0.213
+D+0.60W	2.15	Span 1	0.244

Wood Beam

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+D+0.60W	2.45	Span 1	0.273
+D+0.60W	2.76	Span 1	0.300
+D+0.60W	3.07	Span 1	0.325
+D+0.60W	3.37	Span 1	0.347
+D+0.60W	3.68	Span 1	0.367
+D+0.60W	3.99	Span 1	0.385
+D+0.60W	4.29	Span 1	0.400
+D+0.60W	4.60	Span 1	0.412
+D+0.60W	4.91	Span 1	0.421
+D+0.60W	5.21	Span 1	0.428
+D+0.60W	5.52	Span 1	0.432
+D+0.60W	5.82	Span 1	0.433
+D+0.60W	6.13	Span 1	0.431
+D+0.60W	6.44	Span 1	0.427
+D+0.60W	6.74	Span 1	0.420
+D+0.60W	7.05	Span 1	0.411
+D+0.60W	7.36	Span 1	0.399
+D+0.60W	7.66	Span 1	0.385
+D+0.60W	7.97	Span 1	0.368
+D+0.60W	8.28	Span 1	0.349
+D+0.60W	8.58	Span 1	0.329
+D+0.60W	8.89	Span 1	0.306
+D+0.60W	9.20	Span 1	0.282
+D+0.60W	9.50	Span 1	0.256
+D+0.60W	9.81	Span 1	0.228
+D+0.60W	10.12	Span 1	0.200
+D+0.60W	10.42	Span 1	0.170
+D+0.60W	10.73	Span 1	0.139
+D+0.60W	11.04	Span 1	0.107
+D+0.60W	11.34	Span 1	0.075
+D+0.60W	11.65	Span 1	0.043
+D+0.60W	11.96	Span 1	0.010
+D+0.60W	12.00	Span 1	0.005
+D+0.750Lr+0.450W	0.00	Span 1	0.000
+D+0.750Lr+0.450W	0.31	Span 1	0.042
+D+0.750Lr+0.450W	0.61	Span 1	0.084
+D+0.750Lr+0.450W	0.92	Span 1	0.124
+D+0.750Lr+0.450W	1.23	Span 1	0.164
+D+0.750Lr+0.450W	1.53	Span 1	0.203
+D+0.750Lr+0.450W	1.84	Span 1	0.239
+D+0.750Lr+0.450W	2.15	Span 1	0.274
+D+0.750Lr+0.450W	2.45	Span 1	0.307

Wood Beam

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+D+0.750Lr+0.450W	2.76	Span 1	0.338
+D+0.750Lr+0.450W	3.07	Span 1	0.366
+D+0.750Lr+0.450W	3.37	Span 1	0.391
+D+0.750Lr+0.450W	3.68	Span 1	0.413
+D+0.750Lr+0.450W	3.99	Span 1	0.433
+D+0.750Lr+0.450W	4.29	Span 1	0.450
+D+0.750Lr+0.450W	4.60	Span 1	0.463
+D+0.750Lr+0.450W	4.91	Span 1	0.474
+D+0.750Lr+0.450W	5.21	Span 1	0.481
+D+0.750Lr+0.450W	5.52	Span 1	0.486
+D+0.750Lr+0.450W	5.82	Span 1	0.487
+D+0.750Lr+0.450W	6.13	Span 1	0.485
+D+0.750Lr+0.450W	6.44	Span 1	0.480
+D+0.750Lr+0.450W	6.74	Span 1	0.473
+D+0.750Lr+0.450W	7.05	Span 1	0.462
+D+0.750Lr+0.450W	7.36	Span 1	0.449
+D+0.750Lr+0.450W	7.66	Span 1	0.433
+D+0.750Lr+0.450W	7.97	Span 1	0.414
+D+0.750Lr+0.450W	8.28	Span 1	0.393
+D+0.750Lr+0.450W	8.58	Span 1	0.370
+D+0.750Lr+0.450W	8.89	Span 1	0.344
+D+0.750Lr+0.450W	9.20	Span 1	0.317
+D+0.750Lr+0.450W	9.50	Span 1	0.288
+D+0.750Lr+0.450W	9.81	Span 1	0.257
+D+0.750Lr+0.450W	10.12	Span 1	0.224
+D+0.750Lr+0.450W	10.42	Span 1	0.191
+D+0.750Lr+0.450W	10.73	Span 1	0.156
+D+0.750Lr+0.450W	11.04	Span 1	0.121
+D+0.750Lr+0.450W	11.34	Span 1	0.084
+D+0.750Lr+0.450W	11.65	Span 1	0.048
+D+0.750Lr+0.450W	11.96	Span 1	0.011
+D+0.750Lr+0.450W	12.00	Span 1	0.006
+D+0.450W	0.00	Span 1	0.000
+D+0.450W	0.31	Span 1	0.030
+D+0.450W	0.61	Span 1	0.060
+D+0.450W	0.92	Span 1	0.090
+D+0.450W	1.23	Span 1	0.119
+D+0.450W	1.53	Span 1	0.146
+D+0.450W	1.84	Span 1	0.173
+D+0.450W	2.15	Span 1	0.198
+D+0.450W	2.45	Span 1	0.222
+D+0.450W	2.76	Span 1	0.244

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+D+0.450W	3.07	Span 1	0.264
+D+0.450W	3.37	Span 1	0.282
+D+0.450W	3.68	Span 1	0.299
+D+0.450W	3.99	Span 1	0.313
+D+0.450W	4.29	Span 1	0.325
+D+0.450W	4.60	Span 1	0.335
+D+0.450W	4.91	Span 1	0.342
+D+0.450W	5.21	Span 1	0.348
+D+0.450W	5.52	Span 1	0.351
+D+0.450W	5.82	Span 1	0.352
+D+0.450W	6.13	Span 1	0.351
+D+0.450W	6.44	Span 1	0.347
+D+0.450W	6.74	Span 1	0.342
+D+0.450W	7.05	Span 1	0.334
+D+0.450W	7.36	Span 1	0.324
+D+0.450W	7.66	Span 1	0.313
+D+0.450W	7.97	Span 1	0.299
+D+0.450W	8.28	Span 1	0.284
+D+0.450W	8.58	Span 1	0.267
+D+0.450W	8.89	Span 1	0.249
+D+0.450W	9.20	Span 1	0.229
+D+0.450W	9.50	Span 1	0.208
+D+0.450W	9.81	Span 1	0.186
+D+0.450W	10.12	Span 1	0.162
+D+0.450W	10.42	Span 1	0.138
+D+0.450W	10.73	Span 1	0.113
+D+0.450W	11.04	Span 1	0.087
+D+0.450W	11.34	Span 1	0.061
+D+0.450W	11.65	Span 1	0.035
+D+0.450W	11.96	Span 1	0.008
+D+0.450W	12.00	Span 1	0.004
+0.60D+0.60W	0.00	Span 1	0.000
+0.60D+0.60W	0.31	Span 1	0.034
+0.60D+0.60W	0.61	Span 1	0.067
+0.60D+0.60W	0.92	Span 1	0.100
+0.60D+0.60W	1.23	Span 1	0.131
+0.60D+0.60W	1.53	Span 1	0.162
+0.60D+0.60W	1.84	Span 1	0.192
+0.60D+0.60W	2.15	Span 1	0.219
+0.60D+0.60W	2.45	Span 1	0.246
+0.60D+0.60W	2.76	Span 1	0.270
+0.60D+0.60W	3.07	Span 1	0.292

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+0.60D+0.60W	3.37	Span 1	0.313
+0.60D+0.60W	3.68	Span 1	0.331
+0.60D+0.60W	3.99	Span 1	0.346
+0.60D+0.60W	4.29	Span 1	0.360
+0.60D+0.60W	4.60	Span 1	0.370
+0.60D+0.60W	4.91	Span 1	0.379
+0.60D+0.60W	5.21	Span 1	0.385
+0.60D+0.60W	5.52	Span 1	0.388
+0.60D+0.60W	5.82	Span 1	0.389
+0.60D+0.60W	6.13	Span 1	0.388
+0.60D+0.60W	6.44	Span 1	0.384
+0.60D+0.60W	6.74	Span 1	0.378
+0.60D+0.60W	7.05	Span 1	0.369
+0.60D+0.60W	7.36	Span 1	0.359
+0.60D+0.60W	7.66	Span 1	0.346
+0.60D+0.60W	7.97	Span 1	0.331
+0.60D+0.60W	8.28	Span 1	0.314
+0.60D+0.60W	8.58	Span 1	0.295
+0.60D+0.60W	8.89	Span 1	0.275
+0.60D+0.60W	9.20	Span 1	0.253
+0.60D+0.60W	9.50	Span 1	0.230
+0.60D+0.60W	9.81	Span 1	0.205
+0.60D+0.60W	10.12	Span 1	0.179
+0.60D+0.60W	10.42	Span 1	0.152
+0.60D+0.60W	10.73	Span 1	0.125
+0.60D+0.60W	11.04	Span 1	0.096
+0.60D+0.60W	11.34	Span 1	0.067
+0.60D+0.60W	11.65	Span 1	0.038
+0.60D+0.60W	11.96	Span 1	0.009
+0.60D+0.60W	12.00	Span 1	0.005
+0.60D	0.00	Span 1	0.000
+0.60D	0.31	Span 1	0.006
+0.60D	0.61	Span 1	0.011
+0.60D	0.92	Span 1	0.017
+0.60D	1.23	Span 1	0.022
+0.60D	1.53	Span 1	0.027
+0.60D	1.84	Span 1	0.032
+0.60D	2.15	Span 1	0.037
+0.60D	2.45	Span 1	0.041
+0.60D	2.76	Span 1	0.045
+0.60D	3.07	Span 1	0.049
+0.60D	3.37	Span 1	0.052

Wood Beam

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+0.60D	3.68	Span 1	0.055
+0.60D	3.99	Span 1	0.058
+0.60D	4.29	Span 1	0.060
+0.60D	4.60	Span 1	0.062
+0.60D	4.91	Span 1	0.064
+0.60D	5.21	Span 1	0.065
+0.60D	5.52	Span 1	0.065
+0.60D	5.82	Span 1	0.066
+0.60D	6.13	Span 1	0.065
+0.60D	6.44	Span 1	0.065
+0.60D	6.74	Span 1	0.064
+0.60D	7.05	Span 1	0.062
+0.60D	7.36	Span 1	0.061
+0.60D	7.66	Span 1	0.058
+0.60D	7.97	Span 1	0.056
+0.60D	8.28	Span 1	0.053
+0.60D	8.58	Span 1	0.050
+0.60D	8.89	Span 1	0.047
+0.60D	9.20	Span 1	0.043
+0.60D	9.50	Span 1	0.039
+0.60D	9.81	Span 1	0.035
+0.60D	10.12	Span 1	0.030
+0.60D	10.42	Span 1	0.026
+0.60D	10.73	Span 1	0.021
+0.60D	11.04	Span 1	0.016
+0.60D	11.34	Span 1	0.011
+0.60D	11.65	Span 1	0.006
+0.60D	11.96	Span 1	0.001
+0.60D	12.00	Span 1	0.001
Lr Only	0.00	Span 1	0.000
Lr Only	0.31	Span 1	0.016
Lr Only	0.61	Span 1	0.031
Lr Only	0.92	Span 1	0.046
Lr Only	1.23	Span 1	0.061
Lr Only	1.53	Span 1	0.075
Lr Only	1.84	Span 1	0.089
Lr Only	2.15	Span 1	0.102
Lr Only	2.45	Span 1	0.114
Lr Only	2.76	Span 1	0.125
Lr Only	3.07	Span 1	0.135
Lr Only	3.37	Span 1	0.145
Lr Only	3.68	Span 1	0.153

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DESCRIPTION: 12'builtup beam triang load (2-3x8works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
Lr Only	3.99	Span 1	0.160
Lr Only	4.29	Span 1	0.166
Lr Only	4.60	Span 1	0.171
Lr Only	4.91	Span 1	0.175
Lr Only	5.21	Span 1	0.178
Lr Only	5.52	Span 1	0.179
Lr Only	5.82	Span 1	0.180
Lr Only	6.13	Span 1	0.179
Lr Only	6.44	Span 1	0.177
Lr Only	6.74	Span 1	0.174
Lr Only	7.05	Span 1	0.171
Lr Only	7.36	Span 1	0.166
Lr Only	7.66	Span 1	0.160
Lr Only	7.97	Span 1	0.153
Lr Only	8.28	Span 1	0.145
Lr Only	8.58	Span 1	0.136
Lr Only	8.89	Span 1	0.127
Lr Only	9.20	Span 1	0.117
Lr Only	9.50	Span 1	0.106
Lr Only	9.81	Span 1	0.095
Lr Only	10.12	Span 1	0.083
Lr Only	10.42	Span 1	0.070
Lr Only	10.73	Span 1	0.058
Lr Only	11.04	Span 1	0.044
Lr Only	11.34	Span 1	0.031
Lr Only	11.65	Span 1	0.018
Lr Only	11.96	Span 1	0.004
Lr Only	12.00	Span 1	0.002

Wood Beam

File: wood joist.ec6
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DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Load Resistance Factor D
Load Combination : ASCE 7-16

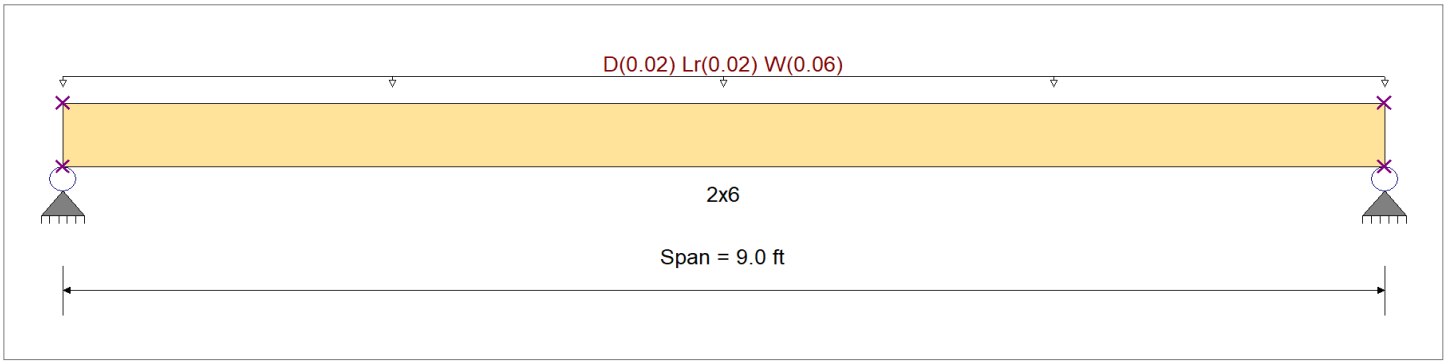
Wood Species : Southern Pine
Wood Grade : No.2 Dense: 2"-4" Thick: 5"-6" Wide

Beam Bracing : Completely Unbraced

Fb +	1,050.0 psi
Fb -	1,050.0 psi
Fc - Prll	1,450.0 psi
Fc - Perp	660.0 psi
Fv	175.0 psi
Ft	650.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	34.330 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.020, Lr = 0.020, W = 0.060 ksf, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.893 : 1	Maximum Shear Stress Ratio	=	0.239 : 1
Section used for this span		2x6	Section used for this span		2x6
fb: Actual	=	1,419.60 psi	fv: Actual	=	72.29 psi
Fb: Allowable	=	1,589.03 psi	Fv: Allowable	=	302.40 psi
Load Combination		+1.20D+1.60Lr+0.50W	Load Combination		+1.20D+1.60Lr+0.50W
Location of maximum on span	=	4.500 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.268 in	Ratio =	403 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.285 in	Ratio =	378 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	λ	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values Mu	fb	Fb	Shear Values Vu	fv	Fv
+1.40D													0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.389	0.111	0.60	1.000	1.00	1.00	1.00	1.00	0.93	0.31	494.09	1269.26	0.14	25.16	226.80
+1.20D+0.50Lr					1.000	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.368	0.098	0.80	1.000	1.00	1.00	1.00	1.00	0.88	0.37	584.17	1589.03	0.16	29.75	302.40
+1.20D					1.000	1.00	1.00	1.00	1.00	0.88			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.267	0.071	0.80	1.000	1.00	1.00	1.00	1.00	0.88	0.27	423.51	1589.03	0.12	21.57	302.40
+1.20D+1.60Lr					1.000	1.00	1.00	1.00	1.00	0.88			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.590	0.158	0.80	1.000	1.00	1.00	1.00	1.00	0.88	0.59	937.62	1589.03	0.26	47.75	302.40
+1.20D+1.60Lr+0.50W					1.000	1.00	1.00	1.00	1.00	0.88			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.893	0.239	0.80	1.000	1.00	1.00	1.00	1.00	0.88	0.89	1,419.60	1589.03	0.40	72.29	302.40
+1.20D+1.60Lr-0.50W					1.000	1.00	1.00	1.00	1.00	0.88			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.287	0.077	0.80	1.000	1.00	1.00	1.00	1.00	0.88	0.29	455.64	1589.03	0.13	23.20	302.40
+1.20D+0.50W					1.000	1.00	1.00	1.00	1.00	0.88			0.00	0.00	0.00	0.00

Wood Beam

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DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	λ	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values Mu	fb	Fb	Shear Values Vu	fv	Fv
Length = 9.0 ft	1	0.570	0.152	0.80	1.000	1.00	1.00	1.00	1.00	0.88	0.57	905.49	1589.03	0.25	46.11	302.40
+1.20D-0.50W					1.000	1.00	1.00	1.00	1.00	0.88			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.037	0.010	0.80	1.000	1.00	1.00	1.00	1.00	0.88	0.04	58.48	1589.03	0.02	2.98	302.40
+1.20D+0.50Lr+W					1.000	1.00	1.00	1.00	1.00	0.88			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.859	0.209	1.00	1.000	1.00	1.00	1.00	1.00	0.79	0.98	1,548.13	1801.44	0.43	78.84	378.00
+1.20D+0.50Lr-W					1.000	1.00	1.00	1.00	1.00	0.79			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.211	0.051	1.00	1.000	1.00	1.00	1.00	1.00	0.79	0.24	379.80	1801.44	0.11	19.34	378.00
+1.20D+W					1.000	1.00	1.00	1.00	1.00	0.79			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.770	0.187	1.00	1.000	1.00	1.00	1.00	1.00	0.79	0.87	1,387.47	1801.44	0.39	70.66	378.00
+1.20D-W					1.000	1.00	1.00	1.00	1.00	0.79			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.300	0.073	1.00	1.000	1.00	1.00	1.00	1.00	0.79	0.34	540.46	1801.44	0.15	27.52	378.00
+0.90D+W					1.000	1.00	1.00	1.00	1.00	0.79			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.711	0.173	1.00	1.000	1.00	1.00	1.00	1.00	0.79	0.81	1,281.60	1801.44	0.36	65.27	378.00
+0.90D-W					1.000	1.00	1.00	1.00	1.00	0.79			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.359	0.087	1.00	1.000	1.00	1.00	1.00	1.00	0.79	0.41	646.34	1801.44	0.18	32.92	378.00
+0.90D					1.000	1.00	1.00	1.00	1.00	0.79			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.176	0.043	1.00	1.000	1.00	1.00	1.00	1.00	0.79	0.20	317.63	1801.44	0.09	16.18	378.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.450W	1	0.2854	4.533		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span		Max. Upward Defl		Location in Span	
D Only	1	0.0980	in	4.533	ft	0.0000	in	0.000	ft
+D+Lr	1	0.1873	in	4.533	ft	0.0000	in	0.000	ft
+D+0.750Lr	1	0.1650	in	4.533	ft	0.0000	in	0.000	ft
+D+0.60W	1	0.2587	in	4.533	ft	0.0000	in	0.000	ft
+D+0.750Lr+0.450W	1	0.2854	in	4.533	ft	0.0000	in	0.000	ft
+D+0.450W	1	0.2185	in	4.533	ft	0.0000	in	0.000	ft
+0.60D+0.60W	1	0.2195	in	4.533	ft	0.0000	in	0.000	ft
+0.60D	1	0.0588	in	4.533	ft	0.0000	in	0.000	ft
Lr Only	1	0.0892	in	4.533	ft	0.0000	in	0.000	ft
W Only	1	0.2677	in	4.533	ft	0.0000	in	0.000	ft

Vertical Reactions

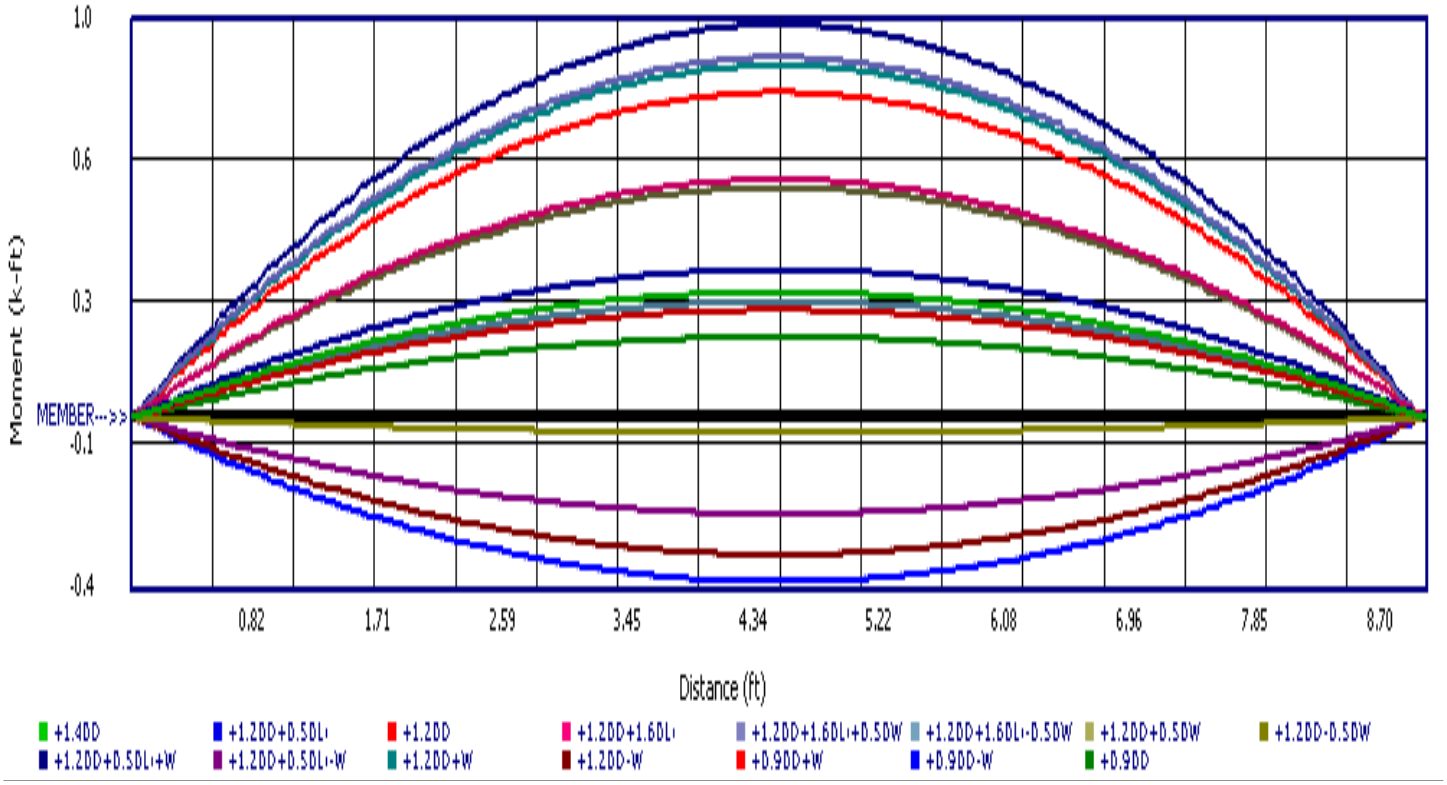
Support notation : Far left is #1 Values in KIPS

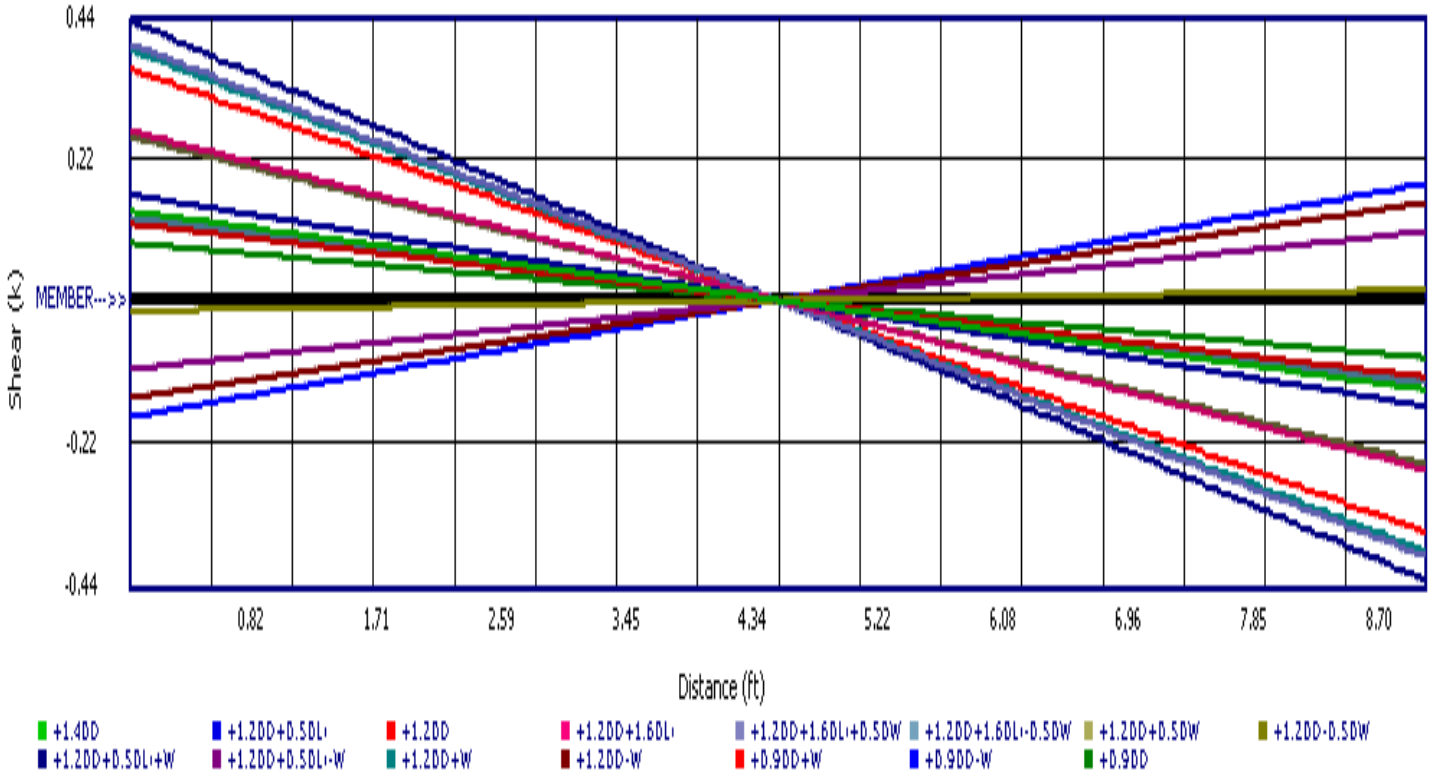
Load Combination	Support 1	Support 2
Overall MAXimum	0.288	0.288
Overall MINimum	0.270	0.270
D Only	0.099	0.099
+D+Lr	0.189	0.189
+D+0.750Lr	0.166	0.166
+D+0.60W	0.261	0.261
+D+0.750Lr+0.450W	0.288	0.288
+D+0.450W	0.220	0.220
+0.60D+0.60W	0.221	0.221
+0.60D	0.059	0.059
Lr Only	0.090	0.090
W Only	0.270	0.270

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

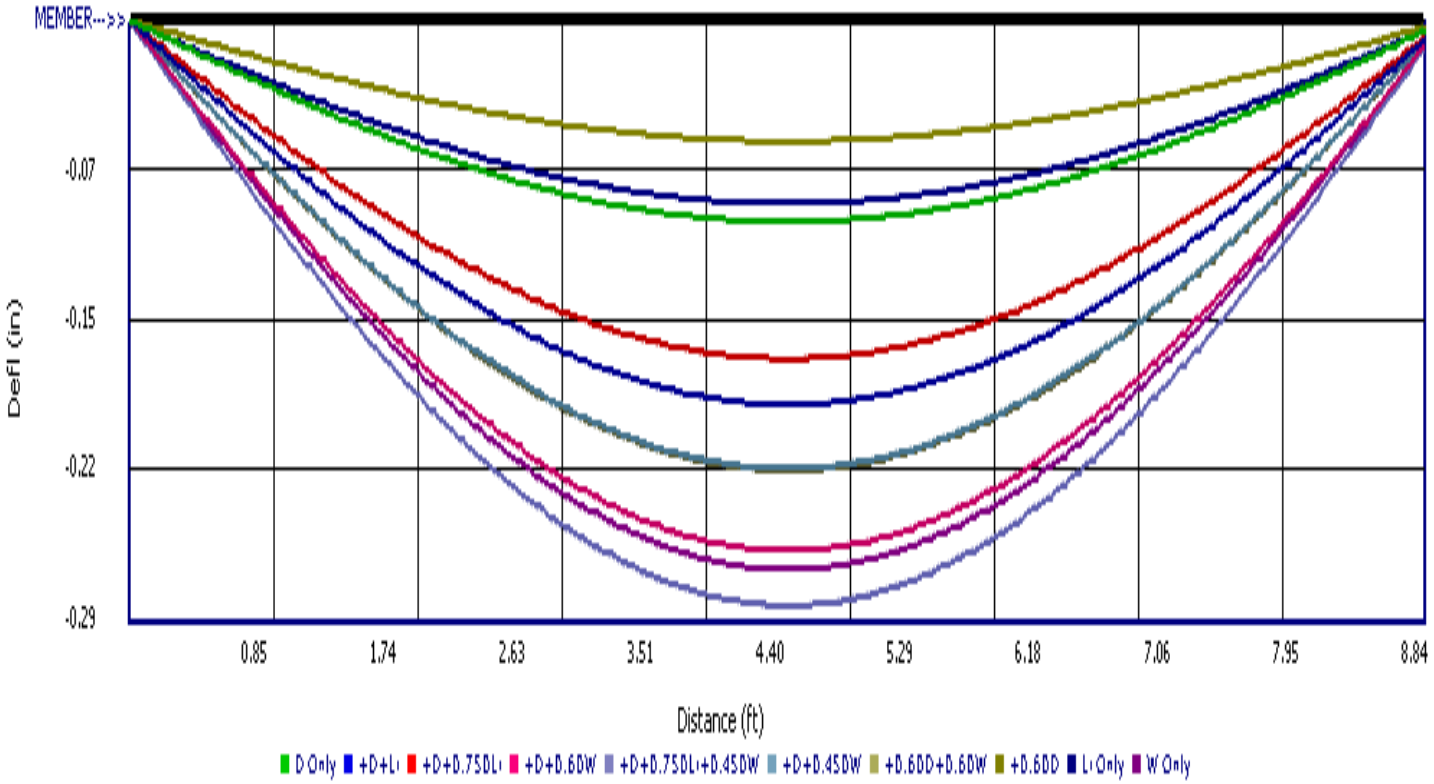




Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)



Summary of Values per Beam Span

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.40D	0.00	Span 1	0.138	0.000
+1.40D	0.23	Span 1	0.131	0.031
+1.40D	0.46	Span 1	0.124	0.060
+1.40D	0.69	Span 1	0.117	0.088
+1.40D	0.92	Span 1	0.110	0.114
+1.40D	1.15	Span 1	0.103	0.139
+1.40D	1.38	Span 1	0.096	0.162
+1.40D	1.61	Span 1	0.089	0.183
+1.40D	1.84	Span 1	0.082	0.203
+1.40D	2.07	Span 1	0.075	0.221
+1.40D	2.30	Span 1	0.068	0.237
+1.40D	2.53	Span 1	0.061	0.252
+1.40D	2.76	Span 1	0.054	0.265
+1.40D	2.99	Span 1	0.046	0.276
+1.40D	3.22	Span 1	0.039	0.286
+1.40D	3.45	Span 1	0.032	0.294
+1.40D	3.68	Span 1	0.025	0.301
+1.40D	3.91	Span 1	0.018	0.306
+1.40D	4.14	Span 1	0.011	0.309
+1.40D	4.37	Span 1	0.004	0.311

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

+1.40D	4.60	Span 1	-0.003	0.311

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.40D	4.83	Span 1	-0.010	0.310
+1.40D	5.06	Span 1	-0.017	0.307
+1.40D	5.29	Span 1	-0.024	0.302
+1.40D	5.52	Span 1	-0.031	0.295
+1.40D	5.75	Span 1	-0.038	0.287
+1.40D	5.98	Span 1	-0.045	0.278
+1.40D	6.21	Span 1	-0.053	0.267
+1.40D	6.44	Span 1	-0.060	0.254
+1.40D	6.67	Span 1	-0.067	0.239
+1.40D	6.90	Span 1	-0.074	0.223
+1.40D	7.13	Span 1	-0.081	0.205
+1.40D	7.36	Span 1	-0.088	0.186
+1.40D	7.59	Span 1	-0.095	0.165
+1.40D	7.82	Span 1	-0.102	0.142
+1.40D	8.05	Span 1	-0.109	0.118
+1.40D	8.28	Span 1	-0.116	0.092
+1.40D	8.51	Span 1	-0.123	0.064
+1.40D	8.74	Span 1	-0.130	0.035
+1.40D	8.97	Span 1	-0.137	0.005
+1.20D+0.50Lr	0.00	Span 1	0.164	0.000
+1.20D+0.50Lr	0.23	Span 1	0.155	0.037
+1.20D+0.50Lr	0.46	Span 1	0.147	0.071
+1.20D+0.50Lr	0.69	Span 1	0.139	0.104
+1.20D+0.50Lr	0.92	Span 1	0.130	0.135
+1.20D+0.50Lr	1.15	Span 1	0.122	0.164
+1.20D+0.50Lr	1.38	Span 1	0.113	0.191
+1.20D+0.50Lr	1.61	Span 1	0.105	0.216
+1.20D+0.50Lr	1.84	Span 1	0.097	0.239
+1.20D+0.50Lr	2.07	Span 1	0.088	0.261
+1.20D+0.50Lr	2.30	Span 1	0.080	0.280
+1.20D+0.50Lr	2.53	Span 1	0.072	0.298
+1.20D+0.50Lr	2.76	Span 1	0.063	0.313
+1.20D+0.50Lr	2.99	Span 1	0.055	0.327
+1.20D+0.50Lr	3.22	Span 1	0.047	0.338
+1.20D+0.50Lr	3.45	Span 1	0.038	0.348
+1.20D+0.50Lr	3.68	Span 1	0.030	0.356
+1.20D+0.50Lr	3.91	Span 1	0.021	0.362
+1.20D+0.50Lr	4.14	Span 1	0.013	0.366
+1.20D+0.50Lr	4.37	Span 1	0.005	0.368
+1.20D+0.50Lr	4.60	Span 1	-0.004	0.368
+1.20D+0.50Lr	4.83	Span 1	-0.012	0.366
+1.20D+0.50Lr	5.06	Span 1	-0.020	0.362
+1.20D+0.50Lr	5.29	Span 1	-0.029	0.357
+1.20D+0.50Lr	5.52	Span 1	-0.037	0.349
+1.20D+0.50Lr	5.75	Span 1	-0.045	0.340

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+0.50Lr	5.98	Span 1	-0.054	0.328
+1.20D+0.50Lr	6.21	Span 1	-0.062	0.315
+1.20D+0.50Lr	6.44	Span 1	-0.070	0.300
+1.20D+0.50Lr	6.67	Span 1	-0.079	0.283
+1.20D+0.50Lr	6.90	Span 1	-0.087	0.264
+1.20D+0.50Lr	7.13	Span 1	-0.096	0.243
+1.20D+0.50Lr	7.36	Span 1	-0.104	0.220
+1.20D+0.50Lr	7.59	Span 1	-0.112	0.195
+1.20D+0.50Lr	7.82	Span 1	-0.121	0.168
+1.20D+0.50Lr	8.05	Span 1	-0.129	0.139
+1.20D+0.50Lr	8.28	Span 1	-0.137	0.109
+1.20D+0.50Lr	8.51	Span 1	-0.146	0.076
+1.20D+0.50Lr	8.74	Span 1	-0.154	0.042
+1.20D+0.50Lr	8.97	Span 1	-0.162	0.005
+1.20D	0.00	Span 1	0.119	0.000
+1.20D	0.23	Span 1	0.113	0.027
+1.20D	0.46	Span 1	0.106	0.052
+1.20D	0.69	Span 1	0.100	0.076
+1.20D	0.92	Span 1	0.094	0.098
+1.20D	1.15	Span 1	0.088	0.119
+1.20D	1.38	Span 1	0.082	0.139
+1.20D	1.61	Span 1	0.076	0.157
+1.20D	1.84	Span 1	0.070	0.174
+1.20D	2.07	Span 1	0.064	0.189
+1.20D	2.30	Span 1	0.058	0.203
+1.20D	2.53	Span 1	0.052	0.216
+1.20D	2.76	Span 1	0.046	0.227
+1.20D	2.99	Span 1	0.040	0.237
+1.20D	3.22	Span 1	0.034	0.245
+1.20D	3.45	Span 1	0.028	0.252
+1.20D	3.68	Span 1	0.022	0.258
+1.20D	3.91	Span 1	0.016	0.262
+1.20D	4.14	Span 1	0.010	0.265
+1.20D	4.37	Span 1	0.003	0.267
+1.20D	4.60	Span 1	-0.003	0.267
+1.20D	4.83	Span 1	-0.009	0.265
+1.20D	5.06	Span 1	-0.015	0.263
+1.20D	5.29	Span 1	-0.021	0.259
+1.20D	5.52	Span 1	-0.027	0.253
+1.20D	5.75	Span 1	-0.033	0.246
+1.20D	5.98	Span 1	-0.039	0.238
+1.20D	6.21	Span 1	-0.045	0.228
+1.20D	6.44	Span 1	-0.051	0.217
+1.20D	6.67	Span 1	-0.057	0.205
+1.20D	6.90	Span 1	-0.063	0.191

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D	7.13	Span 1	-0.069	0.176
+1.20D	7.36	Span 1	-0.075	0.159
+1.20D	7.59	Span 1	-0.081	0.141
+1.20D	7.82	Span 1	-0.087	0.122
+1.20D	8.05	Span 1	-0.094	0.101
+1.20D	8.28	Span 1	-0.100	0.079
+1.20D	8.51	Span 1	-0.106	0.055
+1.20D	8.74	Span 1	-0.112	0.030
+1.20D	8.97	Span 1	-0.118	0.004
+1.20D+1.60Lr	0.00	Span 1	0.263	0.000
+1.20D+1.60Lr	0.23	Span 1	0.249	0.059
+1.20D+1.60Lr	0.46	Span 1	0.236	0.115
+1.20D+1.60Lr	0.69	Span 1	0.222	0.167
+1.20D+1.60Lr	0.92	Span 1	0.209	0.217
+1.20D+1.60Lr	1.15	Span 1	0.196	0.263
+1.20D+1.60Lr	1.38	Span 1	0.182	0.307
+1.20D+1.60Lr	1.61	Span 1	0.169	0.347
+1.20D+1.60Lr	1.84	Span 1	0.155	0.384
+1.20D+1.60Lr	2.07	Span 1	0.142	0.418
+1.20D+1.60Lr	2.30	Span 1	0.128	0.450
+1.20D+1.60Lr	2.53	Span 1	0.115	0.478
+1.20D+1.60Lr	2.76	Span 1	0.102	0.502
+1.20D+1.60Lr	2.99	Span 1	0.088	0.524
+1.20D+1.60Lr	3.22	Span 1	0.075	0.543
+1.20D+1.60Lr	3.45	Span 1	0.061	0.559
+1.20D+1.60Lr	3.68	Span 1	0.048	0.571
+1.20D+1.60Lr	3.91	Span 1	0.035	0.581
+1.20D+1.60Lr	4.14	Span 1	0.021	0.587
+1.20D+1.60Lr	4.37	Span 1	0.008	0.590
+1.20D+1.60Lr	4.60	Span 1	-0.006	0.591
+1.20D+1.60Lr	4.83	Span 1	-0.019	0.588
+1.20D+1.60Lr	5.06	Span 1	-0.033	0.582
+1.20D+1.60Lr	5.29	Span 1	-0.046	0.573
+1.20D+1.60Lr	5.52	Span 1	-0.059	0.561
+1.20D+1.60Lr	5.75	Span 1	-0.073	0.545
+1.20D+1.60Lr	5.98	Span 1	-0.086	0.527
+1.20D+1.60Lr	6.21	Span 1	-0.100	0.506
+1.20D+1.60Lr	6.44	Span 1	-0.113	0.481
+1.20D+1.60Lr	6.67	Span 1	-0.127	0.454
+1.20D+1.60Lr	6.90	Span 1	-0.140	0.423
+1.20D+1.60Lr	7.13	Span 1	-0.153	0.389
+1.20D+1.60Lr	7.36	Span 1	-0.167	0.353
+1.20D+1.60Lr	7.59	Span 1	-0.180	0.313
+1.20D+1.60Lr	7.82	Span 1	-0.194	0.270
+1.20D+1.60Lr	8.05	Span 1	-0.207	0.224

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+1.60Lr	8.28	Span 1	-0.220	0.175
+1.20D+1.60Lr	8.51	Span 1	-0.234	0.122
+1.20D+1.60Lr	8.74	Span 1	-0.247	0.067
+1.20D+1.60Lr	8.97	Span 1	-0.261	0.009
+1.20D+1.60Lr+0.50W	0.00	Span 1	0.398	0.000
+1.20D+1.60Lr+0.50W	0.23	Span 1	0.377	0.089
+1.20D+1.60Lr+0.50W	0.46	Span 1	0.357	0.174
+1.20D+1.60Lr+0.50W	0.69	Span 1	0.337	0.253
+1.20D+1.60Lr+0.50W	0.92	Span 1	0.316	0.328
+1.20D+1.60Lr+0.50W	1.15	Span 1	0.296	0.399
+1.20D+1.60Lr+0.50W	1.38	Span 1	0.276	0.464
+1.20D+1.60Lr+0.50W	1.61	Span 1	0.255	0.526
+1.20D+1.60Lr+0.50W	1.84	Span 1	0.235	0.582
+1.20D+1.60Lr+0.50W	2.07	Span 1	0.215	0.634
+1.20D+1.60Lr+0.50W	2.30	Span 1	0.194	0.681
+1.20D+1.60Lr+0.50W	2.53	Span 1	0.174	0.723
+1.20D+1.60Lr+0.50W	2.76	Span 1	0.154	0.761
+1.20D+1.60Lr+0.50W	2.99	Span 1	0.134	0.794
+1.20D+1.60Lr+0.50W	3.22	Span 1	0.113	0.822
+1.20D+1.60Lr+0.50W	3.45	Span 1	0.093	0.846
+1.20D+1.60Lr+0.50W	3.68	Span 1	0.073	0.865
+1.20D+1.60Lr+0.50W	3.91	Span 1	0.052	0.879
+1.20D+1.60Lr+0.50W	4.14	Span 1	0.032	0.889
+1.20D+1.60Lr+0.50W	4.37	Span 1	0.012	0.894
+1.20D+1.60Lr+0.50W	4.60	Span 1	-0.009	0.894
+1.20D+1.60Lr+0.50W	4.83	Span 1	-0.029	0.890
+1.20D+1.60Lr+0.50W	5.06	Span 1	-0.049	0.881
+1.20D+1.60Lr+0.50W	5.29	Span 1	-0.070	0.867
+1.20D+1.60Lr+0.50W	5.52	Span 1	-0.090	0.849
+1.20D+1.60Lr+0.50W	5.75	Span 1	-0.110	0.826
+1.20D+1.60Lr+0.50W	5.98	Span 1	-0.131	0.798
+1.20D+1.60Lr+0.50W	6.21	Span 1	-0.151	0.766
+1.20D+1.60Lr+0.50W	6.44	Span 1	-0.171	0.729
+1.20D+1.60Lr+0.50W	6.67	Span 1	-0.192	0.687
+1.20D+1.60Lr+0.50W	6.90	Span 1	-0.212	0.641
+1.20D+1.60Lr+0.50W	7.13	Span 1	-0.232	0.590
+1.20D+1.60Lr+0.50W	7.36	Span 1	-0.253	0.534
+1.20D+1.60Lr+0.50W	7.59	Span 1	-0.273	0.473
+1.20D+1.60Lr+0.50W	7.82	Span 1	-0.293	0.408
+1.20D+1.60Lr+0.50W	8.05	Span 1	-0.313	0.339
+1.20D+1.60Lr+0.50W	8.28	Span 1	-0.334	0.264
+1.20D+1.60Lr+0.50W	8.51	Span 1	-0.354	0.185
+1.20D+1.60Lr+0.50W	8.74	Span 1	-0.374	0.101
+1.20D+1.60Lr+0.50W	8.97	Span 1	-0.395	0.013

Wood Beam

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DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+1.60Lr-0.50W	0.00	Span 1	0.128	0.000
+1.20D+1.60Lr-0.50W	0.23	Span 1	0.121	0.029
+1.20D+1.60Lr-0.50W	0.46	Span 1	0.115	0.056
+1.20D+1.60Lr-0.50W	0.69	Span 1	0.108	0.081
+1.20D+1.60Lr-0.50W	0.92	Span 1	0.102	0.105
+1.20D+1.60Lr-0.50W	1.15	Span 1	0.095	0.128
+1.20D+1.60Lr-0.50W	1.38	Span 1	0.088	0.149
+1.20D+1.60Lr-0.50W	1.61	Span 1	0.082	0.169
+1.20D+1.60Lr-0.50W	1.84	Span 1	0.075	0.187
+1.20D+1.60Lr-0.50W	2.07	Span 1	0.069	0.203
+1.20D+1.60Lr-0.50W	2.30	Span 1	0.062	0.218
+1.20D+1.60Lr-0.50W	2.53	Span 1	0.056	0.232
+1.20D+1.60Lr-0.50W	2.76	Span 1	0.049	0.244
+1.20D+1.60Lr-0.50W	2.99	Span 1	0.043	0.255
+1.20D+1.60Lr-0.50W	3.22	Span 1	0.036	0.264
+1.20D+1.60Lr-0.50W	3.45	Span 1	0.030	0.271
+1.20D+1.60Lr-0.50W	3.68	Span 1	0.023	0.278
+1.20D+1.60Lr-0.50W	3.91	Span 1	0.017	0.282
+1.20D+1.60Lr-0.50W	4.14	Span 1	0.010	0.285
+1.20D+1.60Lr-0.50W	4.37	Span 1	0.004	0.287
+1.20D+1.60Lr-0.50W	4.60	Span 1	-0.003	0.287
+1.20D+1.60Lr-0.50W	4.83	Span 1	-0.009	0.286
+1.20D+1.60Lr-0.50W	5.06	Span 1	-0.016	0.283
+1.20D+1.60Lr-0.50W	5.29	Span 1	-0.022	0.278
+1.20D+1.60Lr-0.50W	5.52	Span 1	-0.029	0.272
+1.20D+1.60Lr-0.50W	5.75	Span 1	-0.035	0.265
+1.20D+1.60Lr-0.50W	5.98	Span 1	-0.042	0.256
+1.20D+1.60Lr-0.50W	6.21	Span 1	-0.048	0.246
+1.20D+1.60Lr-0.50W	6.44	Span 1	-0.055	0.234
+1.20D+1.60Lr-0.50W	6.67	Span 1	-0.061	0.221
+1.20D+1.60Lr-0.50W	6.90	Span 1	-0.068	0.206
+1.20D+1.60Lr-0.50W	7.13	Span 1	-0.075	0.189
+1.20D+1.60Lr-0.50W	7.36	Span 1	-0.081	0.171
+1.20D+1.60Lr-0.50W	7.59	Span 1	-0.088	0.152
+1.20D+1.60Lr-0.50W	7.82	Span 1	-0.094	0.131
+1.20D+1.60Lr-0.50W	8.05	Span 1	-0.101	0.109
+1.20D+1.60Lr-0.50W	8.28	Span 1	-0.107	0.085
+1.20D+1.60Lr-0.50W	8.51	Span 1	-0.114	0.059
+1.20D+1.60Lr-0.50W	8.74	Span 1	-0.120	0.033
+1.20D+1.60Lr-0.50W	8.97	Span 1	-0.127	0.004
+1.20D+0.50W	0.00	Span 1	0.254	0.000
+1.20D+0.50W	0.23	Span 1	0.241	0.057
+1.20D+0.50W	0.46	Span 1	0.228	0.111
+1.20D+0.50W	0.69	Span 1	0.215	0.162
+1.20D+0.50W	0.92	Span 1	0.202	0.209

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+0.50W	1.15	Span 1	0.189	0.254
+1.20D+0.50W	1.38	Span 1	0.176	0.296
+1.20D+0.50W	1.61	Span 1	0.163	0.335
+1.20D+0.50W	1.84	Span 1	0.150	0.371
+1.20D+0.50W	2.07	Span 1	0.137	0.404
+1.20D+0.50W	2.30	Span 1	0.124	0.434
+1.20D+0.50W	2.53	Span 1	0.111	0.461
+1.20D+0.50W	2.76	Span 1	0.098	0.485
+1.20D+0.50W	2.99	Span 1	0.085	0.506
+1.20D+0.50W	3.22	Span 1	0.072	0.524
+1.20D+0.50W	3.45	Span 1	0.059	0.540
+1.20D+0.50W	3.68	Span 1	0.046	0.552
+1.20D+0.50W	3.91	Span 1	0.033	0.561
+1.20D+0.50W	4.14	Span 1	0.020	0.567
+1.20D+0.50W	4.37	Span 1	0.007	0.570
+1.20D+0.50W	4.60	Span 1	-0.006	0.570
+1.20D+0.50W	4.83	Span 1	-0.019	0.568
+1.20D+0.50W	5.06	Span 1	-0.031	0.562
+1.20D+0.50W	5.29	Span 1	-0.044	0.553
+1.20D+0.50W	5.52	Span 1	-0.057	0.541
+1.20D+0.50W	5.75	Span 1	-0.070	0.527
+1.20D+0.50W	5.98	Span 1	-0.083	0.509
+1.20D+0.50W	6.21	Span 1	-0.096	0.488
+1.20D+0.50W	6.44	Span 1	-0.109	0.465
+1.20D+0.50W	6.67	Span 1	-0.122	0.438
+1.20D+0.50W	6.90	Span 1	-0.135	0.409
+1.20D+0.50W	7.13	Span 1	-0.148	0.376
+1.20D+0.50W	7.36	Span 1	-0.161	0.341
+1.20D+0.50W	7.59	Span 1	-0.174	0.302
+1.20D+0.50W	7.82	Span 1	-0.187	0.260
+1.20D+0.50W	8.05	Span 1	-0.200	0.216
+1.20D+0.50W	8.28	Span 1	-0.213	0.169
+1.20D+0.50W	8.51	Span 1	-0.226	0.118
+1.20D+0.50W	8.74	Span 1	-0.239	0.065
+1.20D+0.50W	8.97	Span 1	-0.252	0.008
+1.20D-0.50W	0.00	Span 1	-0.016	0.000
+1.20D-0.50W	0.23	Span 1	-0.016	-0.004
+1.20D-0.50W	0.46	Span 1	-0.015	-0.007
+1.20D-0.50W	0.69	Span 1	-0.014	-0.010
+1.20D-0.50W	0.92	Span 1	-0.013	-0.014
+1.20D-0.50W	1.15	Span 1	-0.012	-0.016
+1.20D-0.50W	1.38	Span 1	-0.011	-0.019
+1.20D-0.50W	1.61	Span 1	-0.011	-0.022
+1.20D-0.50W	1.84	Span 1	-0.010	-0.024
+1.20D-0.50W	2.07	Span 1	-0.009	-0.026

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D-0.50W	2.30	Span 1	-0.008	-0.028
+1.20D-0.50W	2.53	Span 1	-0.007	-0.030
+1.20D-0.50W	2.76	Span 1	-0.006	-0.031
+1.20D-0.50W	2.99	Span 1	-0.005	-0.033
+1.20D-0.50W	3.22	Span 1	-0.005	-0.034
+1.20D-0.50W	3.45	Span 1	-0.004	-0.035
+1.20D-0.50W	3.68	Span 1	-0.003	-0.036
+1.20D-0.50W	3.91	Span 1	-0.002	-0.036
+1.20D-0.50W	4.14	Span 1	-0.001	-0.037
+1.20D-0.50W	4.37	Span 1	-0.000	-0.037
+1.20D-0.50W	4.60	Span 1	0.000	-0.037
+1.20D-0.50W	4.83	Span 1	0.001	-0.037
+1.20D-0.50W	5.06	Span 1	0.002	-0.036
+1.20D-0.50W	5.29	Span 1	0.003	-0.036
+1.20D-0.50W	5.52	Span 1	0.004	-0.035
+1.20D-0.50W	5.75	Span 1	0.005	-0.034
+1.20D-0.50W	5.98	Span 1	0.005	-0.033
+1.20D-0.50W	6.21	Span 1	0.006	-0.032
+1.20D-0.50W	6.44	Span 1	0.007	-0.030
+1.20D-0.50W	6.67	Span 1	0.008	-0.028
+1.20D-0.50W	6.90	Span 1	0.009	-0.026
+1.20D-0.50W	7.13	Span 1	0.010	-0.024
+1.20D-0.50W	7.36	Span 1	0.010	-0.022
+1.20D-0.50W	7.59	Span 1	0.011	-0.020
+1.20D-0.50W	7.82	Span 1	0.012	-0.017
+1.20D-0.50W	8.05	Span 1	0.013	-0.014
+1.20D-0.50W	8.28	Span 1	0.014	-0.011
+1.20D-0.50W	8.51	Span 1	0.015	-0.008
+1.20D-0.50W	8.74	Span 1	0.015	-0.004
+1.20D-0.50W	8.97	Span 1	0.016	-0.001
+1.20D+0.50Lr+W	0.00	Span 1	0.434	0.000
+1.20D+0.50Lr+W	0.23	Span 1	0.411	0.097
+1.20D+0.50Lr+W	0.46	Span 1	0.389	0.189
+1.20D+0.50Lr+W	0.69	Span 1	0.367	0.276
+1.20D+0.50Lr+W	0.92	Span 1	0.345	0.358
+1.20D+0.50Lr+W	1.15	Span 1	0.323	0.435
+1.20D+0.50Lr+W	1.38	Span 1	0.301	0.507
+1.20D+0.50Lr+W	1.61	Span 1	0.279	0.573
+1.20D+0.50Lr+W	1.84	Span 1	0.256	0.635
+1.20D+0.50Lr+W	2.07	Span 1	0.234	0.691
+1.20D+0.50Lr+W	2.30	Span 1	0.212	0.742
+1.20D+0.50Lr+W	2.53	Span 1	0.190	0.789
+1.20D+0.50Lr+W	2.76	Span 1	0.168	0.830
+1.20D+0.50Lr+W	2.99	Span 1	0.146	0.866
+1.20D+0.50Lr+W	3.22	Span 1	0.123	0.897

Wood Beam

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DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+0.50Lr+W	3.45	Span 1	0.101	0.922
+1.20D+0.50Lr+W	3.68	Span 1	0.079	0.943
+1.20D+0.50Lr+W	3.91	Span 1	0.057	0.959
+1.20D+0.50Lr+W	4.14	Span 1	0.035	0.969
+1.20D+0.50Lr+W	4.37	Span 1	0.013	0.975
+1.20D+0.50Lr+W	4.60	Span 1	-0.009	0.975
+1.20D+0.50Lr+W	4.83	Span 1	-0.032	0.970
+1.20D+0.50Lr+W	5.06	Span 1	-0.054	0.961
+1.20D+0.50Lr+W	5.29	Span 1	-0.076	0.946
+1.20D+0.50Lr+W	5.52	Span 1	-0.098	0.926
+1.20D+0.50Lr+W	5.75	Span 1	-0.120	0.901
+1.20D+0.50Lr+W	5.98	Span 1	-0.142	0.870
+1.20D+0.50Lr+W	6.21	Span 1	-0.165	0.835
+1.20D+0.50Lr+W	6.44	Span 1	-0.187	0.795
+1.20D+0.50Lr+W	6.67	Span 1	-0.209	0.749
+1.20D+0.50Lr+W	6.90	Span 1	-0.231	0.699
+1.20D+0.50Lr+W	7.13	Span 1	-0.253	0.643
+1.20D+0.50Lr+W	7.36	Span 1	-0.275	0.582
+1.20D+0.50Lr+W	7.59	Span 1	-0.298	0.516
+1.20D+0.50Lr+W	7.82	Span 1	-0.320	0.445
+1.20D+0.50Lr+W	8.05	Span 1	-0.342	0.369
+1.20D+0.50Lr+W	8.28	Span 1	-0.364	0.288
+1.20D+0.50Lr+W	8.51	Span 1	-0.386	0.202
+1.20D+0.50Lr+W	8.74	Span 1	-0.408	0.111
+1.20D+0.50Lr+W	8.97	Span 1	-0.430	0.014
+1.20D+0.50Lr-W	0.00	Span 1	-0.106	0.000
+1.20D+0.50Lr-W	0.23	Span 1	-0.101	-0.024
+1.20D+0.50Lr-W	0.46	Span 1	-0.096	-0.046
+1.20D+0.50Lr-W	0.69	Span 1	-0.090	-0.068
+1.20D+0.50Lr-W	0.92	Span 1	-0.085	-0.088
+1.20D+0.50Lr-W	1.15	Span 1	-0.079	-0.107
+1.20D+0.50Lr-W	1.38	Span 1	-0.074	-0.124
+1.20D+0.50Lr-W	1.61	Span 1	-0.068	-0.141
+1.20D+0.50Lr-W	1.84	Span 1	-0.063	-0.156
+1.20D+0.50Lr-W	2.07	Span 1	-0.057	-0.170
+1.20D+0.50Lr-W	2.30	Span 1	-0.052	-0.182
+1.20D+0.50Lr-W	2.53	Span 1	-0.047	-0.193
+1.20D+0.50Lr-W	2.76	Span 1	-0.041	-0.204
+1.20D+0.50Lr-W	2.99	Span 1	-0.036	-0.212
+1.20D+0.50Lr-W	3.22	Span 1	-0.030	-0.220
+1.20D+0.50Lr-W	3.45	Span 1	-0.025	-0.226
+1.20D+0.50Lr-W	3.68	Span 1	-0.019	-0.231
+1.20D+0.50Lr-W	3.91	Span 1	-0.014	-0.235
+1.20D+0.50Lr-W	4.14	Span 1	-0.009	-0.238
+1.20D+0.50Lr-W	4.37	Span 1	-0.003	-0.239

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+0.50Lr-W	4.60	Span 1	0.002	-0.239
+1.20D+0.50Lr-W	4.83	Span 1	0.008	-0.238
+1.20D+0.50Lr-W	5.06	Span 1	0.013	-0.236
+1.20D+0.50Lr-W	5.29	Span 1	0.019	-0.232
+1.20D+0.50Lr-W	5.52	Span 1	0.024	-0.227
+1.20D+0.50Lr-W	5.75	Span 1	0.030	-0.221
+1.20D+0.50Lr-W	5.98	Span 1	0.035	-0.214
+1.20D+0.50Lr-W	6.21	Span 1	0.040	-0.205
+1.20D+0.50Lr-W	6.44	Span 1	0.046	-0.195
+1.20D+0.50Lr-W	6.67	Span 1	0.051	-0.184
+1.20D+0.50Lr-W	6.90	Span 1	0.057	-0.171
+1.20D+0.50Lr-W	7.13	Span 1	0.062	-0.158
+1.20D+0.50Lr-W	7.36	Span 1	0.068	-0.143
+1.20D+0.50Lr-W	7.59	Span 1	0.073	-0.127
+1.20D+0.50Lr-W	7.82	Span 1	0.078	-0.109
+1.20D+0.50Lr-W	8.05	Span 1	0.084	-0.091
+1.20D+0.50Lr-W	8.28	Span 1	0.089	-0.071
+1.20D+0.50Lr-W	8.51	Span 1	0.095	-0.050
+1.20D+0.50Lr-W	8.74	Span 1	0.100	-0.027
+1.20D+0.50Lr-W	8.97	Span 1	0.106	-0.003
+1.20D+W	0.00	Span 1	0.389	0.000
+1.20D+W	0.23	Span 1	0.369	0.087
+1.20D+W	0.46	Span 1	0.349	0.170
+1.20D+W	0.69	Span 1	0.329	0.248
+1.20D+W	0.92	Span 1	0.309	0.321
+1.20D+W	1.15	Span 1	0.289	0.390
+1.20D+W	1.38	Span 1	0.269	0.454
+1.20D+W	1.61	Span 1	0.250	0.514
+1.20D+W	1.84	Span 1	0.230	0.569
+1.20D+W	2.07	Span 1	0.210	0.619
+1.20D+W	2.30	Span 1	0.190	0.665
+1.20D+W	2.53	Span 1	0.170	0.707
+1.20D+W	2.76	Span 1	0.150	0.744
+1.20D+W	2.99	Span 1	0.130	0.776
+1.20D+W	3.22	Span 1	0.111	0.804
+1.20D+W	3.45	Span 1	0.091	0.827
+1.20D+W	3.68	Span 1	0.071	0.845
+1.20D+W	3.91	Span 1	0.051	0.859
+1.20D+W	4.14	Span 1	0.031	0.869
+1.20D+W	4.37	Span 1	0.011	0.874
+1.20D+W	4.60	Span 1	-0.009	0.874
+1.20D+W	4.83	Span 1	-0.028	0.870
+1.20D+W	5.06	Span 1	-0.048	0.861
+1.20D+W	5.29	Span 1	-0.068	0.848
+1.20D+W	5.52	Span 1	-0.088	0.830

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D+W	5.75	Span 1	-0.108	0.807
+1.20D+W	5.98	Span 1	-0.128	0.780
+1.20D+W	6.21	Span 1	-0.148	0.748
+1.20D+W	6.44	Span 1	-0.167	0.712
+1.20D+W	6.67	Span 1	-0.187	0.671
+1.20D+W	6.90	Span 1	-0.207	0.626
+1.20D+W	7.13	Span 1	-0.227	0.576
+1.20D+W	7.36	Span 1	-0.247	0.522
+1.20D+W	7.59	Span 1	-0.267	0.463
+1.20D+W	7.82	Span 1	-0.287	0.399
+1.20D+W	8.05	Span 1	-0.306	0.331
+1.20D+W	8.28	Span 1	-0.326	0.258
+1.20D+W	8.51	Span 1	-0.346	0.181
+1.20D+W	8.74	Span 1	-0.366	0.099
+1.20D+W	8.97	Span 1	-0.386	0.013
+1.20D-W	0.00	Span 1	-0.151	0.000
+1.20D-W	0.23	Span 1	-0.144	-0.034
+1.20D-W	0.46	Span 1	-0.136	-0.066
+1.20D-W	0.69	Span 1	-0.128	-0.096
+1.20D-W	0.92	Span 1	-0.120	-0.125
+1.20D-W	1.15	Span 1	-0.113	-0.152
+1.20D-W	1.38	Span 1	-0.105	-0.177
+1.20D-W	1.61	Span 1	-0.097	-0.200
+1.20D-W	1.84	Span 1	-0.090	-0.222
+1.20D-W	2.07	Span 1	-0.082	-0.241
+1.20D-W	2.30	Span 1	-0.074	-0.259
+1.20D-W	2.53	Span 1	-0.066	-0.275
+1.20D-W	2.76	Span 1	-0.059	-0.290
+1.20D-W	2.99	Span 1	-0.051	-0.302
+1.20D-W	3.22	Span 1	-0.043	-0.313
+1.20D-W	3.45	Span 1	-0.035	-0.322
+1.20D-W	3.68	Span 1	-0.028	-0.329
+1.20D-W	3.91	Span 1	-0.020	-0.335
+1.20D-W	4.14	Span 1	-0.012	-0.338
+1.20D-W	4.37	Span 1	-0.004	-0.340
+1.20D-W	4.60	Span 1	0.003	-0.340
+1.20D-W	4.83	Span 1	0.011	-0.339
+1.20D-W	5.06	Span 1	0.019	-0.335
+1.20D-W	5.29	Span 1	0.027	-0.330
+1.20D-W	5.52	Span 1	0.034	-0.323
+1.20D-W	5.75	Span 1	0.042	-0.314
+1.20D-W	5.98	Span 1	0.050	-0.304
+1.20D-W	6.21	Span 1	0.057	-0.292
+1.20D-W	6.44	Span 1	0.065	-0.277
+1.20D-W	6.67	Span 1	0.073	-0.262

Wood Beam

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DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+1.20D-W	6.90	Span 1	0.081	-0.244
+1.20D-W	7.13	Span 1	0.088	-0.224
+1.20D-W	7.36	Span 1	0.096	-0.203
+1.20D-W	7.59	Span 1	0.104	-0.180
+1.20D-W	7.82	Span 1	0.112	-0.155
+1.20D-W	8.05	Span 1	0.119	-0.129
+1.20D-W	8.28	Span 1	0.127	-0.101
+1.20D-W	8.51	Span 1	0.135	-0.071
+1.20D-W	8.74	Span 1	0.143	-0.039
+1.20D-W	8.97	Span 1	0.150	-0.005
+0.90D+W	0.00	Span 1	0.359	0.000
+0.90D+W	0.23	Span 1	0.341	0.080
+0.90D+W	0.46	Span 1	0.322	0.157
+0.90D+W	0.69	Span 1	0.304	0.229
+0.90D+W	0.92	Span 1	0.286	0.296
+0.90D+W	1.15	Span 1	0.267	0.360
+0.90D+W	1.38	Span 1	0.249	0.419
+0.90D+W	1.61	Span 1	0.231	0.474
+0.90D+W	1.84	Span 1	0.212	0.525
+0.90D+W	2.07	Span 1	0.194	0.572
+0.90D+W	2.30	Span 1	0.176	0.615
+0.90D+W	2.53	Span 1	0.157	0.653
+0.90D+W	2.76	Span 1	0.139	0.687
+0.90D+W	2.99	Span 1	0.121	0.717
+0.90D+W	3.22	Span 1	0.102	0.742
+0.90D+W	3.45	Span 1	0.084	0.764
+0.90D+W	3.68	Span 1	0.066	0.781
+0.90D+W	3.91	Span 1	0.047	0.794
+0.90D+W	4.14	Span 1	0.029	0.802
+0.90D+W	4.37	Span 1	0.010	0.807
+0.90D+W	4.60	Span 1	-0.008	0.807
+0.90D+W	4.83	Span 1	-0.026	0.803
+0.90D+W	5.06	Span 1	-0.045	0.795
+0.90D+W	5.29	Span 1	-0.063	0.783
+0.90D+W	5.52	Span 1	-0.081	0.766
+0.90D+W	5.75	Span 1	-0.100	0.746
+0.90D+W	5.98	Span 1	-0.118	0.721
+0.90D+W	6.21	Span 1	-0.136	0.691
+0.90D+W	6.44	Span 1	-0.155	0.658
+0.90D+W	6.67	Span 1	-0.173	0.620
+0.90D+W	6.90	Span 1	-0.191	0.578
+0.90D+W	7.13	Span 1	-0.210	0.532
+0.90D+W	7.36	Span 1	-0.228	0.482
+0.90D+W	7.59	Span 1	-0.246	0.427
+0.90D+W	7.82	Span 1	-0.265	0.369

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Moments & Shears at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Shear (k)	Moment (ft-k)
+0.90D+W	8.05	Span 1	-0.283	0.306
+0.90D+W	8.28	Span 1	-0.301	0.239
+0.90D+W	8.51	Span 1	-0.320	0.167
+0.90D+W	8.74	Span 1	-0.338	0.092
+0.90D+W	8.97	Span 1	-0.356	0.012
+0.90D-W	0.00	Span 1	-0.181	0.000
+0.90D-W	0.23	Span 1	-0.172	-0.041
+0.90D-W	0.46	Span 1	-0.163	-0.079
+0.90D-W	0.69	Span 1	-0.153	-0.115
+0.90D-W	0.92	Span 1	-0.144	-0.149
+0.90D-W	1.15	Span 1	-0.135	-0.182
+0.90D-W	1.38	Span 1	-0.126	-0.211
+0.90D-W	1.61	Span 1	-0.116	-0.239
+0.90D-W	1.84	Span 1	-0.107	-0.265
+0.90D-W	2.07	Span 1	-0.098	-0.288
+0.90D-W	2.30	Span 1	-0.089	-0.310
+0.90D-W	2.53	Span 1	-0.079	-0.329
+0.90D-W	2.76	Span 1	-0.070	-0.346
+0.90D-W	2.99	Span 1	-0.061	-0.361
+0.90D-W	3.22	Span 1	-0.052	-0.374
+0.90D-W	3.45	Span 1	-0.042	-0.385
+0.90D-W	3.68	Span 1	-0.033	-0.394
+0.90D-W	3.91	Span 1	-0.024	-0.400
+0.90D-W	4.14	Span 1	-0.015	-0.405
+0.90D-W	4.37	Span 1	-0.005	-0.407
+0.90D-W	4.60	Span 1	0.004	-0.407
+0.90D-W	4.83	Span 1	0.013	-0.405
+0.90D-W	5.06	Span 1	0.022	-0.401
+0.90D-W	5.29	Span 1	0.032	-0.395
+0.90D-W	5.52	Span 1	0.041	-0.386
+0.90D-W	5.75	Span 1	0.050	-0.376
+0.90D-W	5.98	Span 1	0.059	-0.363
+0.90D-W	6.21	Span 1	0.069	-0.349
+0.90D-W	6.44	Span 1	0.078	-0.332
+0.90D-W	6.67	Span 1	0.087	-0.313
+0.90D-W	6.90	Span 1	0.096	-0.292
+0.90D-W	7.13	Span 1	0.106	-0.268
+0.90D-W	7.36	Span 1	0.115	-0.243
+0.90D-W	7.59	Span 1	0.124	-0.216
+0.90D-W	7.82	Span 1	0.133	-0.186
+0.90D-W	8.05	Span 1	0.143	-0.154
+0.90D-W	8.28	Span 1	0.152	-0.120
+0.90D-W	8.51	Span 1	0.161	-0.084
+0.90D-W	8.74	Span 1	0.170	-0.046
+0.90D-W	8.97	Span 1	0.180	-0.006

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+0.90D	0.00	Span 1	0.089	0.000
+0.90D	0.23	Span 1	0.084	0.020
+0.90D	0.46	Span 1	0.080	0.039
+0.90D	0.69	Span 1	0.075	0.057
+0.90D	0.92	Span 1	0.071	0.073
+0.90D	1.15	Span 1	0.066	0.089
+0.90D	1.38	Span 1	0.062	0.104
+0.90D	1.61	Span 1	0.057	0.118
+0.90D	1.84	Span 1	0.053	0.130
+0.90D	2.07	Span 1	0.048	0.142
+0.90D	2.30	Span 1	0.044	0.152
+0.90D	2.53	Span 1	0.039	0.162
+0.90D	2.76	Span 1	0.034	0.170
+0.90D	2.99	Span 1	0.030	0.178
+0.90D	3.22	Span 1	0.025	0.184
+0.90D	3.45	Span 1	0.021	0.189
+0.90D	3.68	Span 1	0.016	0.194
+0.90D	3.91	Span 1	0.012	0.197
+0.90D	4.14	Span 1	0.007	0.199
+0.90D	4.37	Span 1	0.003	0.200
+0.90D	4.60	Span 1	-0.002	0.200
+0.90D	4.83	Span 1	-0.006	0.199
+0.90D	5.06	Span 1	-0.011	0.197
+0.90D	5.29	Span 1	-0.016	0.194
+0.90D	5.52	Span 1	-0.020	0.190
+0.90D	5.75	Span 1	-0.025	0.185
+0.90D	5.98	Span 1	-0.029	0.179
+0.90D	6.21	Span 1	-0.034	0.171
+0.90D	6.44	Span 1	-0.038	0.163
+0.90D	6.67	Span 1	-0.043	0.154
+0.90D	6.90	Span 1	-0.047	0.143
+0.90D	7.13	Span 1	-0.052	0.132
+0.90D	7.36	Span 1	-0.056	0.119
+0.90D	7.59	Span 1	-0.061	0.106
+0.90D	7.82	Span 1	-0.066	0.091
+0.90D	8.05	Span 1	-0.070	0.076
+0.90D	8.28	Span 1	-0.075	0.059
+0.90D	8.51	Span 1	-0.079	0.041
+0.90D	8.74	Span 1	-0.084	0.023
+0.90D	8.97	Span 1	-0.088	0.003

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
Overall MAXimum Envelope	0.00	Span 1	0.000
Overall MAXimum Envelope	0.23	Span 1	0.023
Overall MAXimum Envelope	0.46	Span 1	0.046
Overall MAXimum Envelope	0.69	Span 1	0.069

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DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
Overall MAXimum Envelope	0.92	Span 1	0.091
Overall MAXimum Envelope	1.15	Span 1	0.113
Overall MAXimum Envelope	1.38	Span 1	0.133
Overall MAXimum Envelope	1.61	Span 1	0.153
Overall MAXimum Envelope	1.84	Span 1	0.172
Overall MAXimum Envelope	2.07	Span 1	0.190
Overall MAXimum Envelope	2.30	Span 1	0.206
Overall MAXimum Envelope	2.53	Span 1	0.221
Overall MAXimum Envelope	2.76	Span 1	0.235
Overall MAXimum Envelope	2.99	Span 1	0.247
Overall MAXimum Envelope	3.22	Span 1	0.258
Overall MAXimum Envelope	3.45	Span 1	0.266
Overall MAXimum Envelope	3.68	Span 1	0.274
Overall MAXimum Envelope	3.91	Span 1	0.279
Overall MAXimum Envelope	4.14	Span 1	0.283
Overall MAXimum Envelope	4.37	Span 1	0.285
Overall MAXimum Envelope	4.60	Span 1	0.285
Overall MAXimum Envelope	4.83	Span 1	0.284
Overall MAXimum Envelope	5.06	Span 1	0.281
Overall MAXimum Envelope	5.29	Span 1	0.275
Overall MAXimum Envelope	5.52	Span 1	0.269
Overall MAXimum Envelope	5.75	Span 1	0.260
Overall MAXimum Envelope	5.98	Span 1	0.250
Overall MAXimum Envelope	6.21	Span 1	0.238
Overall MAXimum Envelope	6.44	Span 1	0.225
Overall MAXimum Envelope	6.67	Span 1	0.211
Overall MAXimum Envelope	6.90	Span 1	0.195
Overall MAXimum Envelope	7.13	Span 1	0.177
Overall MAXimum Envelope	7.36	Span 1	0.159
Overall MAXimum Envelope	7.59	Span 1	0.139
Overall MAXimum Envelope	7.82	Span 1	0.119
Overall MAXimum Envelope	8.05	Span 1	0.097
Overall MAXimum Envelope	8.28	Span 1	0.075
Overall MAXimum Envelope	8.51	Span 1	0.053
Overall MAXimum Envelope	8.74	Span 1	0.030
Overall MAXimum Envelope	8.97	Span 1	0.007
Overall MAXimum Envelope	9.00	Span 1	0.003
D Only	0.00	Span 1	0.000
D Only	0.23	Span 1	0.008
D Only	0.46	Span 1	0.016
D Only	0.69	Span 1	0.024
D Only	0.92	Span 1	0.031

Wood Beam

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DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
D Only	1.15	Span 1	0.039
D Only	1.38	Span 1	0.046
D Only	1.61	Span 1	0.053
D Only	1.84	Span 1	0.059
D Only	2.07	Span 1	0.065
D Only	2.30	Span 1	0.071
D Only	2.53	Span 1	0.076
D Only	2.76	Span 1	0.081
D Only	2.99	Span 1	0.085
D Only	3.22	Span 1	0.088
D Only	3.45	Span 1	0.092
D Only	3.68	Span 1	0.094
D Only	3.91	Span 1	0.096
D Only	4.14	Span 1	0.097
D Only	4.37	Span 1	0.098
D Only	4.60	Span 1	0.098
D Only	4.83	Span 1	0.097
D Only	5.06	Span 1	0.096
D Only	5.29	Span 1	0.095
D Only	5.52	Span 1	0.092
D Only	5.75	Span 1	0.089
D Only	5.98	Span 1	0.086
D Only	6.21	Span 1	0.082
D Only	6.44	Span 1	0.077
D Only	6.67	Span 1	0.072
D Only	6.90	Span 1	0.067
D Only	7.13	Span 1	0.061
D Only	7.36	Span 1	0.055
D Only	7.59	Span 1	0.048
D Only	7.82	Span 1	0.041
D Only	8.05	Span 1	0.033
D Only	8.28	Span 1	0.026
D Only	8.51	Span 1	0.018
D Only	8.74	Span 1	0.010
D Only	8.97	Span 1	0.002
D Only	9.00	Span 1	0.001
+D+Lr	0.00	Span 1	0.000
+D+Lr	0.23	Span 1	0.015
+D+Lr	0.46	Span 1	0.030
+D+Lr	0.69	Span 1	0.045
+D+Lr	0.92	Span 1	0.060
+D+Lr	1.15	Span 1	0.074

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DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+D+Lr	1.38	Span 1	0.087
+D+Lr	1.61	Span 1	0.101
+D+Lr	1.84	Span 1	0.113
+D+Lr	2.07	Span 1	0.124
+D+Lr	2.30	Span 1	0.135
+D+Lr	2.53	Span 1	0.145
+D+Lr	2.76	Span 1	0.154
+D+Lr	2.99	Span 1	0.162
+D+Lr	3.22	Span 1	0.169
+D+Lr	3.45	Span 1	0.175
+D+Lr	3.68	Span 1	0.180
+D+Lr	3.91	Span 1	0.183
+D+Lr	4.14	Span 1	0.186
+D+Lr	4.37	Span 1	0.187
+D+Lr	4.60	Span 1	0.187
+D+Lr	4.83	Span 1	0.186
+D+Lr	5.06	Span 1	0.184
+D+Lr	5.29	Span 1	0.181
+D+Lr	5.52	Span 1	0.176
+D+Lr	5.75	Span 1	0.171
+D+Lr	5.98	Span 1	0.164
+D+Lr	6.21	Span 1	0.156
+D+Lr	6.44	Span 1	0.148
+D+Lr	6.67	Span 1	0.138
+D+Lr	6.90	Span 1	0.128
+D+Lr	7.13	Span 1	0.116
+D+Lr	7.36	Span 1	0.104
+D+Lr	7.59	Span 1	0.091
+D+Lr	7.82	Span 1	0.078
+D+Lr	8.05	Span 1	0.064
+D+Lr	8.28	Span 1	0.049
+D+Lr	8.51	Span 1	0.035
+D+Lr	8.74	Span 1	0.020
+D+Lr	8.97	Span 1	0.004
+D+Lr	9.00	Span 1	0.002
+D+0.750Lr	0.00	Span 1	0.000
+D+0.750Lr	0.23	Span 1	0.013
+D+0.750Lr	0.46	Span 1	0.027
+D+0.750Lr	0.69	Span 1	0.040
+D+0.750Lr	0.92	Span 1	0.053
+D+0.750Lr	1.15	Span 1	0.065
+D+0.750Lr	1.38	Span 1	0.077

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DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+D+0.750Lr	1.61	Span 1	0.089
+D+0.750Lr	1.84	Span 1	0.099
+D+0.750Lr	2.07	Span 1	0.110
+D+0.750Lr	2.30	Span 1	0.119
+D+0.750Lr	2.53	Span 1	0.128
+D+0.750Lr	2.76	Span 1	0.136
+D+0.750Lr	2.99	Span 1	0.143
+D+0.750Lr	3.22	Span 1	0.149
+D+0.750Lr	3.45	Span 1	0.154
+D+0.750Lr	3.68	Span 1	0.158
+D+0.750Lr	3.91	Span 1	0.161
+D+0.750Lr	4.14	Span 1	0.164
+D+0.750Lr	4.37	Span 1	0.165
+D+0.750Lr	4.60	Span 1	0.165
+D+0.750Lr	4.83	Span 1	0.164
+D+0.750Lr	5.06	Span 1	0.162
+D+0.750Lr	5.29	Span 1	0.159
+D+0.750Lr	5.52	Span 1	0.155
+D+0.750Lr	5.75	Span 1	0.150
+D+0.750Lr	5.98	Span 1	0.145
+D+0.750Lr	6.21	Span 1	0.138
+D+0.750Lr	6.44	Span 1	0.130
+D+0.750Lr	6.67	Span 1	0.122
+D+0.750Lr	6.90	Span 1	0.112
+D+0.750Lr	7.13	Span 1	0.102
+D+0.750Lr	7.36	Span 1	0.092
+D+0.750Lr	7.59	Span 1	0.080
+D+0.750Lr	7.82	Span 1	0.069
+D+0.750Lr	8.05	Span 1	0.056
+D+0.750Lr	8.28	Span 1	0.044
+D+0.750Lr	8.51	Span 1	0.030
+D+0.750Lr	8.74	Span 1	0.017
+D+0.750Lr	8.97	Span 1	0.004
+D+0.750Lr	9.00	Span 1	0.002
+D+0.60W	0.00	Span 1	0.000
+D+0.60W	0.23	Span 1	0.021
+D+0.60W	0.46	Span 1	0.042
+D+0.60W	0.69	Span 1	0.062
+D+0.60W	0.92	Span 1	0.083
+D+0.60W	1.15	Span 1	0.102
+D+0.60W	1.38	Span 1	0.121
+D+0.60W	1.61	Span 1	0.139

Wood Beam

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DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+D+0.60W	1.84	Span 1	0.156
+D+0.60W	2.07	Span 1	0.172
+D+0.60W	2.30	Span 1	0.187
+D+0.60W	2.53	Span 1	0.200
+D+0.60W	2.76	Span 1	0.213
+D+0.60W	2.99	Span 1	0.224
+D+0.60W	3.22	Span 1	0.233
+D+0.60W	3.45	Span 1	0.241
+D+0.60W	3.68	Span 1	0.248
+D+0.60W	3.91	Span 1	0.253
+D+0.60W	4.14	Span 1	0.256
+D+0.60W	4.37	Span 1	0.258
+D+0.60W	4.60	Span 1	0.259
+D+0.60W	4.83	Span 1	0.257
+D+0.60W	5.06	Span 1	0.254
+D+0.60W	5.29	Span 1	0.250
+D+0.60W	5.52	Span 1	0.244
+D+0.60W	5.75	Span 1	0.236
+D+0.60W	5.98	Span 1	0.227
+D+0.60W	6.21	Span 1	0.216
+D+0.60W	6.44	Span 1	0.204
+D+0.60W	6.67	Span 1	0.191
+D+0.60W	6.90	Span 1	0.176
+D+0.60W	7.13	Span 1	0.161
+D+0.60W	7.36	Span 1	0.144
+D+0.60W	7.59	Span 1	0.126
+D+0.60W	7.82	Span 1	0.108
+D+0.60W	8.05	Span 1	0.088
+D+0.60W	8.28	Span 1	0.068
+D+0.60W	8.51	Span 1	0.048
+D+0.60W	8.74	Span 1	0.027
+D+0.60W	8.97	Span 1	0.006
+D+0.60W	9.00	Span 1	0.003
+D+0.750Lr+0.450W	0.00	Span 1	0.000
+D+0.750Lr+0.450W	0.23	Span 1	0.023
+D+0.750Lr+0.450W	0.46	Span 1	0.046
+D+0.750Lr+0.450W	0.69	Span 1	0.069
+D+0.750Lr+0.450W	0.92	Span 1	0.091
+D+0.750Lr+0.450W	1.15	Span 1	0.113
+D+0.750Lr+0.450W	1.38	Span 1	0.133
+D+0.750Lr+0.450W	1.61	Span 1	0.153
+D+0.750Lr+0.450W	1.84	Span 1	0.172

Wood Beam

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DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+D+0.750Lr+0.450W	2.07	Span 1	0.190
+D+0.750Lr+0.450W	2.30	Span 1	0.206
+D+0.750Lr+0.450W	2.53	Span 1	0.221
+D+0.750Lr+0.450W	2.76	Span 1	0.235
+D+0.750Lr+0.450W	2.99	Span 1	0.247
+D+0.750Lr+0.450W	3.22	Span 1	0.258
+D+0.750Lr+0.450W	3.45	Span 1	0.266
+D+0.750Lr+0.450W	3.68	Span 1	0.274
+D+0.750Lr+0.450W	3.91	Span 1	0.279
+D+0.750Lr+0.450W	4.14	Span 1	0.283
+D+0.750Lr+0.450W	4.37	Span 1	0.285
+D+0.750Lr+0.450W	4.60	Span 1	0.285
+D+0.750Lr+0.450W	4.83	Span 1	0.284
+D+0.750Lr+0.450W	5.06	Span 1	0.281
+D+0.750Lr+0.450W	5.29	Span 1	0.275
+D+0.750Lr+0.450W	5.52	Span 1	0.269
+D+0.750Lr+0.450W	5.75	Span 1	0.260
+D+0.750Lr+0.450W	5.98	Span 1	0.250
+D+0.750Lr+0.450W	6.21	Span 1	0.238
+D+0.750Lr+0.450W	6.44	Span 1	0.225
+D+0.750Lr+0.450W	6.67	Span 1	0.211
+D+0.750Lr+0.450W	6.90	Span 1	0.195
+D+0.750Lr+0.450W	7.13	Span 1	0.177
+D+0.750Lr+0.450W	7.36	Span 1	0.159
+D+0.750Lr+0.450W	7.59	Span 1	0.139
+D+0.750Lr+0.450W	7.82	Span 1	0.119
+D+0.750Lr+0.450W	8.05	Span 1	0.097
+D+0.750Lr+0.450W	8.28	Span 1	0.075
+D+0.750Lr+0.450W	8.51	Span 1	0.053
+D+0.750Lr+0.450W	8.74	Span 1	0.030
+D+0.750Lr+0.450W	8.97	Span 1	0.007
+D+0.750Lr+0.450W	9.00	Span 1	0.003
+D+0.450W	0.00	Span 1	0.000
+D+0.450W	0.23	Span 1	0.018
+D+0.450W	0.46	Span 1	0.035
+D+0.450W	0.69	Span 1	0.053
+D+0.450W	0.92	Span 1	0.070
+D+0.450W	1.15	Span 1	0.086
+D+0.450W	1.38	Span 1	0.102
+D+0.450W	1.61	Span 1	0.117
+D+0.450W	1.84	Span 1	0.132
+D+0.450W	2.07	Span 1	0.145

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DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+D+0.450W	2.30	Span 1	0.158
+D+0.450W	2.53	Span 1	0.169
+D+0.450W	2.76	Span 1	0.180
+D+0.450W	2.99	Span 1	0.189
+D+0.450W	3.22	Span 1	0.197
+D+0.450W	3.45	Span 1	0.204
+D+0.450W	3.68	Span 1	0.210
+D+0.450W	3.91	Span 1	0.214
+D+0.450W	4.14	Span 1	0.217
+D+0.450W	4.37	Span 1	0.218
+D+0.450W	4.60	Span 1	0.218
+D+0.450W	4.83	Span 1	0.217
+D+0.450W	5.06	Span 1	0.215
+D+0.450W	5.29	Span 1	0.211
+D+0.450W	5.52	Span 1	0.206
+D+0.450W	5.75	Span 1	0.199
+D+0.450W	5.98	Span 1	0.191
+D+0.450W	6.21	Span 1	0.183
+D+0.450W	6.44	Span 1	0.172
+D+0.450W	6.67	Span 1	0.161
+D+0.450W	6.90	Span 1	0.149
+D+0.450W	7.13	Span 1	0.136
+D+0.450W	7.36	Span 1	0.121
+D+0.450W	7.59	Span 1	0.107
+D+0.450W	7.82	Span 1	0.091
+D+0.450W	8.05	Span 1	0.074
+D+0.450W	8.28	Span 1	0.058
+D+0.450W	8.51	Span 1	0.040
+D+0.450W	8.74	Span 1	0.023
+D+0.450W	8.97	Span 1	0.005
+D+0.450W	9.00	Span 1	0.003
+0.60D+0.60W	0.00	Span 1	0.000
+0.60D+0.60W	0.23	Span 1	0.018
+0.60D+0.60W	0.46	Span 1	0.036
+0.60D+0.60W	0.69	Span 1	0.053
+0.60D+0.60W	0.92	Span 1	0.070
+0.60D+0.60W	1.15	Span 1	0.087
+0.60D+0.60W	1.38	Span 1	0.103
+0.60D+0.60W	1.61	Span 1	0.118
+0.60D+0.60W	1.84	Span 1	0.132
+0.60D+0.60W	2.07	Span 1	0.146
+0.60D+0.60W	2.30	Span 1	0.158

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+0.60D+0.60W	2.53	Span 1	0.170
+0.60D+0.60W	2.76	Span 1	0.181
+0.60D+0.60W	2.99	Span 1	0.190
+0.60D+0.60W	3.22	Span 1	0.198
+0.60D+0.60W	3.45	Span 1	0.205
+0.60D+0.60W	3.68	Span 1	0.210
+0.60D+0.60W	3.91	Span 1	0.215
+0.60D+0.60W	4.14	Span 1	0.218
+0.60D+0.60W	4.37	Span 1	0.219
+0.60D+0.60W	4.60	Span 1	0.219
+0.60D+0.60W	4.83	Span 1	0.218
+0.60D+0.60W	5.06	Span 1	0.216
+0.60D+0.60W	5.29	Span 1	0.212
+0.60D+0.60W	5.52	Span 1	0.207
+0.60D+0.60W	5.75	Span 1	0.200
+0.60D+0.60W	5.98	Span 1	0.192
+0.60D+0.60W	6.21	Span 1	0.183
+0.60D+0.60W	6.44	Span 1	0.173
+0.60D+0.60W	6.67	Span 1	0.162
+0.60D+0.60W	6.90	Span 1	0.150
+0.60D+0.60W	7.13	Span 1	0.136
+0.60D+0.60W	7.36	Span 1	0.122
+0.60D+0.60W	7.59	Span 1	0.107
+0.60D+0.60W	7.82	Span 1	0.091
+0.60D+0.60W	8.05	Span 1	0.075
+0.60D+0.60W	8.28	Span 1	0.058
+0.60D+0.60W	8.51	Span 1	0.041
+0.60D+0.60W	8.74	Span 1	0.023
+0.60D+0.60W	8.97	Span 1	0.005
+0.60D+0.60W	9.00	Span 1	0.003
+0.60D	0.00	Span 1	0.000
+0.60D	0.23	Span 1	0.005
+0.60D	0.46	Span 1	0.010
+0.60D	0.69	Span 1	0.014
+0.60D	0.92	Span 1	0.019
+0.60D	1.15	Span 1	0.023
+0.60D	1.38	Span 1	0.027
+0.60D	1.61	Span 1	0.032
+0.60D	1.84	Span 1	0.035
+0.60D	2.07	Span 1	0.039
+0.60D	2.30	Span 1	0.042
+0.60D	2.53	Span 1	0.046

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
+0.60D	2.76	Span 1	0.048
+0.60D	2.99	Span 1	0.051
+0.60D	3.22	Span 1	0.053
+0.60D	3.45	Span 1	0.055
+0.60D	3.68	Span 1	0.056
+0.60D	3.91	Span 1	0.058
+0.60D	4.14	Span 1	0.058
+0.60D	4.37	Span 1	0.059
+0.60D	4.60	Span 1	0.059
+0.60D	4.83	Span 1	0.058
+0.60D	5.06	Span 1	0.058
+0.60D	5.29	Span 1	0.057
+0.60D	5.52	Span 1	0.055
+0.60D	5.75	Span 1	0.054
+0.60D	5.98	Span 1	0.052
+0.60D	6.21	Span 1	0.049
+0.60D	6.44	Span 1	0.046
+0.60D	6.67	Span 1	0.043
+0.60D	6.90	Span 1	0.040
+0.60D	7.13	Span 1	0.037
+0.60D	7.36	Span 1	0.033
+0.60D	7.59	Span 1	0.029
+0.60D	7.82	Span 1	0.024
+0.60D	8.05	Span 1	0.020
+0.60D	8.28	Span 1	0.016
+0.60D	8.51	Span 1	0.011
+0.60D	8.74	Span 1	0.006
+0.60D	8.97	Span 1	0.001
+0.60D	9.00	Span 1	0.001
Lr Only	0.00	Span 1	0.000
Lr Only	0.23	Span 1	0.007
Lr Only	0.46	Span 1	0.014
Lr Only	0.69	Span 1	0.022
Lr Only	0.92	Span 1	0.028
Lr Only	1.15	Span 1	0.035
Lr Only	1.38	Span 1	0.042
Lr Only	1.61	Span 1	0.048
Lr Only	1.84	Span 1	0.054
Lr Only	2.07	Span 1	0.059
Lr Only	2.30	Span 1	0.064
Lr Only	2.53	Span 1	0.069
Lr Only	2.76	Span 1	0.073

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
Lr Only	2.99	Span 1	0.077
Lr Only	3.22	Span 1	0.081
Lr Only	3.45	Span 1	0.083
Lr Only	3.68	Span 1	0.086
Lr Only	3.91	Span 1	0.087
Lr Only	4.14	Span 1	0.088
Lr Only	4.37	Span 1	0.089
Lr Only	4.60	Span 1	0.089
Lr Only	4.83	Span 1	0.089
Lr Only	5.06	Span 1	0.088
Lr Only	5.29	Span 1	0.086
Lr Only	5.52	Span 1	0.084
Lr Only	5.75	Span 1	0.081
Lr Only	5.98	Span 1	0.078
Lr Only	6.21	Span 1	0.075
Lr Only	6.44	Span 1	0.070
Lr Only	6.67	Span 1	0.066
Lr Only	6.90	Span 1	0.061
Lr Only	7.13	Span 1	0.055
Lr Only	7.36	Span 1	0.050
Lr Only	7.59	Span 1	0.044
Lr Only	7.82	Span 1	0.037
Lr Only	8.05	Span 1	0.030
Lr Only	8.28	Span 1	0.024
Lr Only	8.51	Span 1	0.016
Lr Only	8.74	Span 1	0.009
Lr Only	8.97	Span 1	0.002
Lr Only	9.00	Span 1	0.001
W Only	0.00	Span 1	0.000
W Only	0.23	Span 1	0.022
W Only	0.46	Span 1	0.043
W Only	0.69	Span 1	0.065
W Only	0.92	Span 1	0.085
W Only	1.15	Span 1	0.106
W Only	1.38	Span 1	0.125
W Only	1.61	Span 1	0.144
W Only	1.84	Span 1	0.161
W Only	2.07	Span 1	0.178
W Only	2.30	Span 1	0.193
W Only	2.53	Span 1	0.207
W Only	2.76	Span 1	0.220
W Only	2.99	Span 1	0.232

Wood Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 9'canopy rafter at12"c.c wdown 60psf ult (2x6works)

Beam Span Deflections at Incremental Locations

Load Type/ Combination	Span Location (ft)	Span ID	Deflection (in)
W Only	3.22	Span 1	0.242
W Only	3.45	Span 1	0.250
W Only	3.68	Span 1	0.257
W Only	3.91	Span 1	0.262
W Only	4.14	Span 1	0.265
W Only	4.37	Span 1	0.267
W Only	4.60	Span 1	0.268
W Only	4.83	Span 1	0.266
W Only	5.06	Span 1	0.263
W Only	5.29	Span 1	0.258
W Only	5.52	Span 1	0.252
W Only	5.75	Span 1	0.244
W Only	5.98	Span 1	0.235
W Only	6.21	Span 1	0.224
W Only	6.44	Span 1	0.211
W Only	6.67	Span 1	0.198
W Only	6.90	Span 1	0.182
W Only	7.13	Span 1	0.166
W Only	7.36	Span 1	0.149
W Only	7.59	Span 1	0.131
W Only	7.82	Span 1	0.111
W Only	8.05	Span 1	0.091
W Only	8.28	Span 1	0.071
W Only	8.51	Span 1	0.049
W Only	8.74	Span 1	0.028
W Only	8.97	Span 1	0.006
W Only	9.00	Span 1	0.003

Masonry Shear Wall

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 4' shear wall with 7k wind force

Code References

Calculations per ACI 530-11, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : ASCE 7-16

General Information

Wall Material	MASONRY		f'm	2.0	ksi	Block Class	
Total Wall Height		15.0 ft	Fy - Rebar	60.0	ksi	Concrete Density	150.0 pcf
Base Wall Length		4.0 ft	Fy - HJR	70.0	ksi	Min. Bending As %	0.00180
R: Resp. Mod Factor		5.0	Em	1,800.0	ksi		
Ie: Seismic Import. Factor		1.0	Phi - Shear	0.80		Phi : Axial & Flexure	0.90

Wall Data

	Bottom
Analysis Height	0.00 ft
Wall Offset	(datum) ft
Wall Length	4.0 ft
Effective Length 'd'	40.0 in
Nominal Block Thickness	8.0 in
Solid Grout?	Partial Groute

Reinforcing in Field of Wall

Vertical Bar Size #	5
Vertical Bar Spacing	48 in
Horiz. joint reinf. area (HJR)	in
HJR Spacing	24 in
Bond beam reinf. area	in
Spacing of bond beams	48 in

In each chord cell:

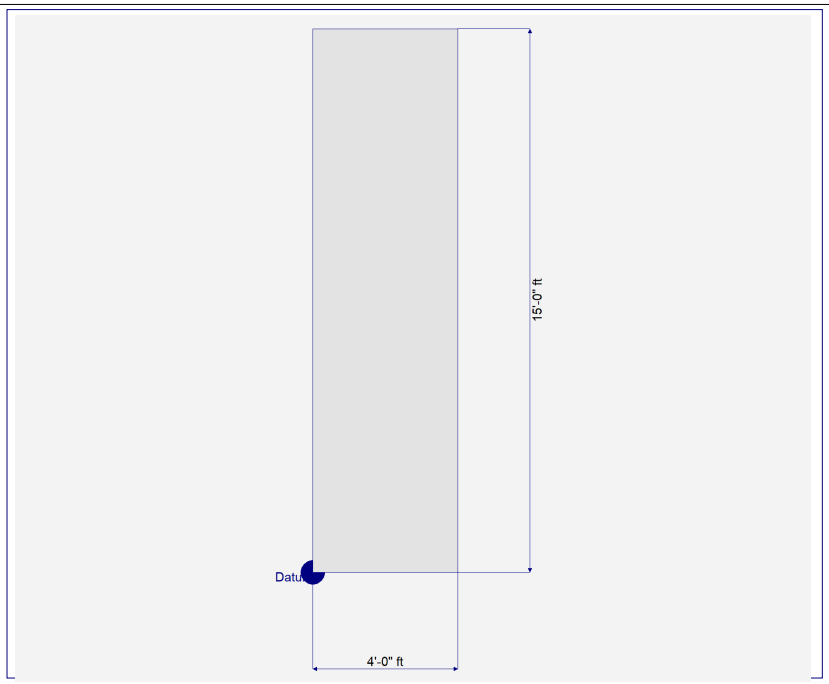
Vertical rebar size #	5
# Chord Cells @ Each End	2.0

Masonry Shear Wall

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 4' shear wall with 7k wind force

Wall Sketch



Applied Distributed Vertical Loads

Load Location (ft)			Load Magnitude (kips)				
Start Location	End Location	Height of Application	Dead Load	Roof Live Load	Live Load	Snow Load	Earth Load
0.0	4.0	13.0	0.280	0.270	0.0	0.0	0.0

Applied Concentrated Lateral Loads

	Load Magnitude (kips)					
Load "Y" Location (ft)	Dead Load	Roof Live Load	Floor Live Load	Wind Load	Seismic Load	Earth Load
15.0	0.0	0.0	0.0	7.0	0.0	0.0

SHEAR ANALYSIS

	Bottom Level
Special Boundary Elements Req'd?	Not Req'd
Vu : Story Shear	7.0 k
for Load Combination	+1.20D+0.50Lr+W
Controlling Mu/(Vud)	1.00
Vn Masonry	32.645 k
Vn Steel	0.0 k
Vn Masonry + Vn Steel	32.645 k
Vn Max	42.503 k
Phi Vn	26.116 k
Ratio: Vu/PhiVn (controlling)	0.2680
Vertical As >= Av/3	OK
Vertical Bar Spacing <= 96"	OK

Masonry Shear Wall

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 4' shear wall with 7k wind force

AXIAL ANALYSIS

	Bottom Level
H / d Ratio	4.50
Pu	3.072 k
for Load Combination	+1.20D+1.60Lr
Phi Pn	+1.20D+1.60Lr k
Ratio: Pu/PhiPn (controlling)	0.006486

BENDING ANALYSIS

	Bottom Level
"a" : Flexural compression	3.05 in
Length of defined chord zone is >= the "a" dimension of the masonry (the compression zone)	OK
"d" : Eff depth to tension reinf	40.0
As-flex < As-max ?	: 0.620 <= 3.604
Mu	105.0 k
for Load Combination	+1.20D+0.50Lr+W
Phi Mn	107.346 k
Ratio: Mu/PhiMn (controlling)	0.9781

Force Summary

Load Combination / Wall Level	Values for Wall section Vu (k)	Mu (k)	Pu (k)	Resultant Ecc (ft)	Overturning Ratio	Uplift (k) Left	Right
+1.40D							
Wall Level : 1			1.568				
+1.20D+0.50Lr							
Wall Level : 1			1.884				
+1.20D							
Wall Level : 1			1.344				
+1.20D+1.60Lr							
Wall Level : 1			3.072				
+1.20D+1.60Lr+0.50W							
Wall Level : 1	3.500	52.500	3.072	17.090	0.117	13.907	13.907
+1.20D+1.60Lr-0.50W							
Wall Level : 1	3.500	52.500	3.072	17.090	0.117	13.907	13.907
+1.20D+0.50W							
Wall Level : 1	3.500	52.500	1.344	39.063	0.051	14.944	14.944
+1.20D-0.50W							
Wall Level : 1	3.500	52.500	1.344	39.063	0.051	14.944	14.944
+1.20D+0.50Lr+W							
Wall Level : 1	7.000	105.000	1.884	55.732	0.036	30.370	30.370
+1.20D+0.50Lr-W							
Wall Level : 1	7.000	105.000	1.884	55.732	0.036	30.370	30.370
+1.20D+W							
Wall Level : 1	7.000	105.000	1.344	78.125	0.026	30.694	30.694
+1.20D-W							
Wall Level : 1	7.000	105.000	1.344	78.125	0.026	30.694	30.694
+0.90D+W							
Wall Level : 1	7.000	105.000	1.008	104.167	0.019	30.895	30.895
+0.90D-W							

Masonry Shear Wall

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 4' shear wall with 7k wind force

Force Summary

Load Combination / Wall Level	Values for Wall section Vu (k)	Mu (k)	Pu (k)	Resultant Ecc (ft)	Overturning Ratio	Uplift (k) Left	Right
Wall Level : 1	7.000	105.000	1.008	104.167	0.019	30.895	30.895
+0.90D							
Wall Level : 1			1.008				

Footing Information

Footing Dimensions

Dist. Left	5.0 ft	f'c	3.0 ksi	Rebar Cover	3.0 in
Wall Length	4.0 ft	Fy	60.0 ksi	Footing Thickness	24.0 in
Dist. Right	5.0 ft			Width	3.0 ft
Total Ftg Length	14.0 ft				

Max Factored Soil Pressures

@ Left Side of Footing	1,762,175 psf	
.... governing load comb	+1.20D+0.50Lr-W	
@ Right Side of Footing	1,762,175 psf	
.... governing load comb	+1.20D+0.50Lr+W	

Max UNfactored Soil Pressures

@ Left Side of Footing	352.405 psf	
.... governing load comb	+D+Lr	
@ Right Side of Footing	1,697.44 psf	
.... governing load comb	+D+0.60W	

Footing One-Way Shear Check...

vu @ Left End of Footing	26.463 psi
vu @ Right End of Footing	14.059 psi
vn * phi : Allowable	93.113 psi

Overturning Stability...

	@ Left End of Ftg	@ Right End of Ftg
Overturning Moment	71.40 k-ft	71.40 k-ft
Resisting Moment	47.040 k-ft	47.040 k-ft
Stability Ratio	0.6588 : 1	0.6588 : 1
.... governing load comb	+0.60D+0.60W	+0.60D+0.60W

Footing Bending Design...

	@ Left End	@ Right End
Mu	84.990 k-ft	34.596 k-ft
Ru	71.378 psi	29.055 psi
As % Req'd	0.00180 in^2	0.00180 in^2
As Req'd in Footing Width	1.555 in^2	1.555 in^2

Masonry Slender Wall

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 16 feet wall 7@24 works zone 4

Code References

Calculations per ACI 530-11, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : ASCE 7-16

General Information

Calculations per ACI 530-11, IBC 2012, CBC 2013, ASCE 7-10

Construction Type : Grouted Hollow Concrete Masonry

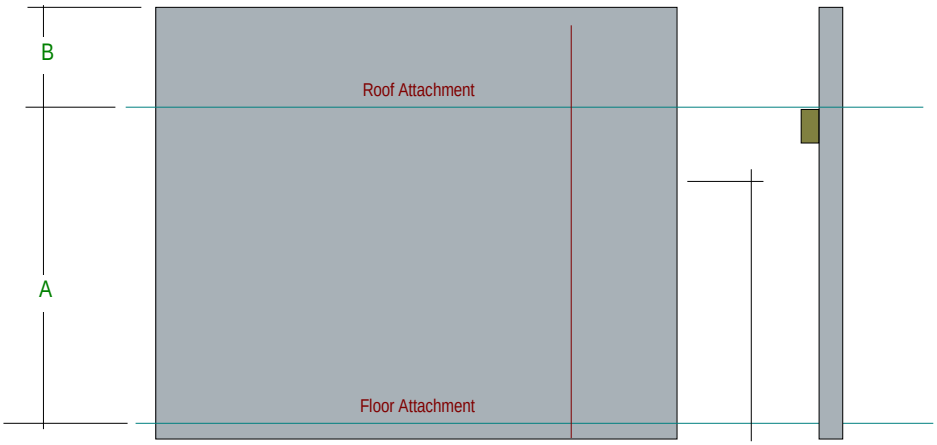
F'm	=	2.0 ksi	Nom. Wall Thickness	8	in	Temp Diff across thickness	=	deg F
Fy - Yield	=	60.0 ksi	Actual Thickness	7.625	in	Min Allow Out-of-plane Defl Ratio	=	0.0
Fr - Rupture	=	111.0 psi	Rebar "d" distance	3.8125	in			
Em = f'm *	=	1,800.0	Lower Level Rebar . . .			Minimum Vertical Steel %	=	0.0020
Max % of ρ bal.	=	0.01185	Bar Size	# 7				
Grout Density	=	140 pcf	Bar Spacing	24	in			
Block Weight		Normal Weight						
Wall Weight	=	61.0 psf						

Wall is grouted at rebar cells only

One-Story Wall Dimensions

A Clear Height = 16.0 ft
B Parapet height = ft

Wall Support Condition Top & Bottom Pinned



Vertical Loads

Vertical Uniform Loads . . . (Applied per foot of Strip Width)		DL : Dead	Lr : Roof Live	Lf : Floor Live	S : Snow	W : Wind
Ledger Load	Eccentricity in	0.10				k/ft
Concentric Load						k/ft

Lateral Loads

Wind Loads :
Full area WIND load 66.0 psf

Seismic Loads :
Wall Weight Seismic Load Input Method : Direct entry of Lateral Wall Weight
Seismic Wall Lateral Load psf

Fp 1.0 = 0.0 psf

Masonry Slender Wall

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 16 feet wall 7@24 works zone 4

DESIGN SUMMARY

Results reported for "Strip Width" of 12.0 in

Governing Load Combination . . .		Actual Values . . .		Allowable Values . . .	
PASS	Moment Capacity Check	Maximum Bending Stress Ratio =	**0.5017**		
	+0.90D+W	Max Mu	2.142 k-ft	Phi * Mn	4.269 k-ft
PASS	Service Deflection Check	Actual Defl. Ratio L/	241	Allowable Defl. Ratio	240.0
	W Only	Max. Deflection	0.7969 in		
PASS	Axial Load Check	Max Pu / Ag	11.933 psi	Max. Allow. Defl.	0.80 in
	+1.20D+W	Location	7.733 ft	0.2 * f'm	400.0 psi
PASS	Reinforcing Limit Check				
		Actual As/bd	0.006557	Max Allow As/bd	0.01186

Maximum Reactions . . .	*for Load Combination....*	
Top Horizontal	W Only	0.5280 k
Base Horizontal	W Only	0.5280 k
Vertical Reaction	+D+0.60W	1.076 k

Design Maximum Combinations - Moments

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu k	0.2*f'm*b*t k	Moment Values Mcr k-ft	Mu k-ft	Phi	Phi Mn k-ft	As in^2	As Ratio	0.6 * rho bal
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
+1.20D+0.50W at 7.47 to 8.00	0.745	24.960	0.86	1.06	0.90	4.32	0.300	0.0066	0.0116
+1.20D+W at 7.47 to 8.00	0.745	24.960	0.86	2.16	0.90	4.32	0.300	0.0066	0.0116
+0.90D+W at 7.47 to 8.00	0.558	24.960	0.86	2.14	0.90	4.28	0.300	0.0066	0.0117
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000

Design Maximum Combinations - Deflections

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu k	Moment Values Mcr k-ft	Mactual k-ft	Stiffness I gross in^4	I cracked in^4	I effective in^4	Deflections Deflection in	Defl. Ratio
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
+D+0.60W at 7.47 to 8.00	0.621	0.86	1.28	353.60	23.70	26.268	0.257	748.2
+D+0.450W at 7.47 to 8.00	0.621	0.86	0.95	353.60	23.70	36.942	0.065	2,936.5
+0.60D+0.60W at 7.47 to 8.00	0.372	0.86	1.27	353.60	23.45	26.036	0.256	750.5
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
W Only at 8.00 to 8.53	0.000	0.86	2.11	353.60	23.07	23.463	0.797	240.9
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0

Reactions - Vertical & Horizontal

Load Combination	Base Horizontal	Top Horizontal	Vertical @ Wall Base
D Only	0.0 k	0.00 k	1.076 k
+D+0.60W	0.3 k	0.32 k	1.076 k
+D+0.450W	0.2 k	0.24 k	1.076 k
+0.60D+0.60W	0.3 k	0.32 k	0.646 k
+D+0.70E	0.0 k	0.00 k	1.076 k
+D+0.5250E	0.0 k	0.00 k	1.076 k
+0.60D+0.70E	0.0 k	0.00 k	0.646 k
W Only	0.5 k	0.53 k	0.000 k

Masonry Slender Wall

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 16 feet wall 7@24 works zone 4

E Only	0.0 k	0.00 k	0.000 k

Masonry Slender Wall

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 11 feet wall 5@48 works zone 4&5

Code References

Calculations per ACI 530-11, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : ASCE 7-16

General Information

Calculations per ACI 530-11, IBC 2012, CBC 2013, ASCE 7-10

Construction Type : Grouted Hollow Concrete Masonry

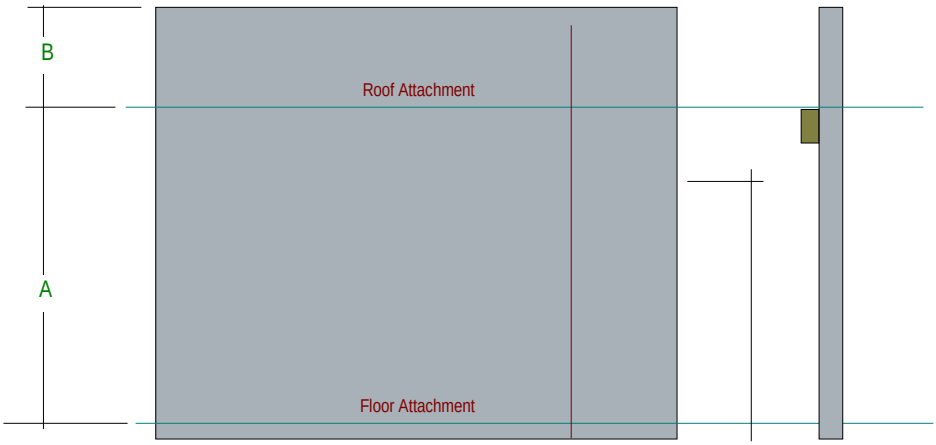
F'm	=	2.0 ksi	Nom. Wall Thickness	8	in	Temp Diff across thickness	=	deg F
Fy - Yield	=	60.0 ksi	Actual Thickness	7.625	in	Min Allow Out-of-plane Defl Ratio	=	0.0
Fr - Rupture	=	97.0 psi	Rebar "d" distance	3.8125	in			
Em = f'm *	=	1,800.0	Lower Level Rebar . . .			Minimum Vertical Steel %	=	0.0020
Max % of ρ bal.	=	0.01186	Bar Size	# 5				
Grout Density	=	140 pcf	Bar Spacing	48	in			
Block Weight		Normal Weight						
Wall Weight	=	55.0 psf						

Wall is grouted at rebar cells only

One-Story Wall Dimensions

A Clear Height = 11.0 ft
B Parapet height = ft

Wall Support Condition Top & Bottom Pinned



Vertical Loads

Vertical Uniform Loads . . . (Applied per foot of Strip Width)		DL : Dead	Lr : Roof Live	Lf : Floor Live	S : Snow	W : Wind
Ledger Load	Eccentricity in	0.10				k/ft
Concentric Load						k/ft

Lateral Loads

Wind Loads :
Full area WIND load 74.0 psf

Seismic Loads :
Wall Weight Seismic Load Input Method : Direct entry of Lateral Wall Weight
Seismic Wall Lateral Load psf

Fp 1.0 = 0.0 psf

Masonry Slender Wall

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 11 feet wall 5@48 works zone 4&5

DESIGN SUMMARY

Results reported for "Strip Width" of 12.0 in

Governing Load Combination . . .		Actual Values . . .		Allowable Values . . .	
PASS	Moment Capacity Check	Maximum Bending Stress Ratio =	**0.8925**		
	+0.90D+W	Max Mu	1.127 k-ft	Phi * Mn	1.262 k-ft
PASS	Service Deflection Check	Actual Defl. Ratio L/	360	Allowable Defl. Ratio	240.0
	W Only	Max. Deflection	0.3669 in		
PASS	Axial Load Check	Max Pu / Ag	9.188 psi	Max. Allow. Defl.	0.550 in
	+1.20D+W	Location	5.317 ft	0.2 * f'm	400.0 psi
PASS	Reinforcing Limit Check				
		Actual As/bd	0.001694	Max Allow As/bd	0.01186

Maximum Reactions . . .	*for Load Combination....*	
Top Horizontal	W Only	0.4070 k
Base Horizontal	W Only	0.4070 k
Vertical Reaction	D Only	0.7050 k

Design Maximum Combinations - Moments

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu k	0.2*f'm*b*t k	Moment Values Mcr k-ft	Mu k-ft	Phi	Phi Mn k-ft	As in^2	As Ratio	0.6 * rho bal
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
+1.20D+0.50W at 5.13 to 5.50	0.507	22.080	0.70	0.56	0.90	1.30	0.078	0.0017	0.0117
+1.20D+W at 5.13 to 5.50	0.507	22.080	0.70	1.13	0.90	1.30	0.078	0.0017	0.0117
+0.90D+W at 5.13 to 5.50	0.380	22.080	0.70	1.13	0.90	1.27	0.078	0.0017	0.0118
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000

Design Maximum Combinations - Deflections

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu k	Moment Values Mcr k-ft	Mactual k-ft	Stiffness I gross in^4	I cracked in^4	I effective in^4	Deflections Deflection in	Defl. Ratio
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
+D+0.60W at 5.13 to 5.50	0.423	0.70	0.67	331.10	7.89	331.100	0.012	10,774.7
+D+0.450W at 5.13 to 5.50	0.423	0.70	0.50	331.10	7.89	331.100	0.009	14,366.3
+0.60D+0.60W at 5.13 to 5.50	0.254	0.70	0.67	331.10	7.66	331.100	0.012	10,777.3
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
W Only at 5.50 to 5.87	0.000	0.70	1.12	331.10	7.30	7.935	0.367	359.8
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0

Reactions - Vertical & Horizontal

Load Combination	Base Horizontal	Top Horizontal	Vertical @ Wall Base
D Only	0.0 k	0.00 k	0.705 k
+D+0.60W	0.2 k	0.24 k	0.705 k
+D+0.450W	0.2 k	0.18 k	0.705 k
+0.60D+0.60W	0.2 k	0.24 k	0.423 k
+D+0.70E	0.0 k	0.00 k	0.705 k
+D+0.5250E	0.0 k	0.00 k	0.705 k
+0.60D+0.70E	0.0 k	0.00 k	0.423 k
W Only	0.4 k	0.41 k	0.000 k

Masonry Slender Wall

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

DESCRIPTION: 11 feet wall 5@48 works zone 4&5

E Only	0.0 k	0.00 k	0.000 k

\U Wall Partially Grouted. For 8" and 12" thick Block Walls.

NBV

Date: 10/17/2024 9:21
Design by: yr

nry — ***Axial Compresion and Flexure*** — ACI 530-11

4th floor 12ft jamb for3.5ft opening zone5(semienclosed)

400 lb/ft	Mparapet=	8448					Tie Column
0 lb/ft	Mwall=	2112	Wind Pr [psf]=	66 psf ultimate			width ft
6969.6 lb-ft/ft	M jamb=	6970	***Reinforcing***				2.00
84.0 lb/ft2	M jamb Triang=	4646	Fs [psi]=	32000			
2000.0 psi	M Trapezoid	6873	Es [ksi]=	29000			
1800 ksi	M general window	6970	Bar # =	6		Wall Reb Sp(in)	48
192 in			Spacing [in]=	8			
8 in		3	As [in/ft]=	0.66		trapz udl	85.8
91.5 in2/ft	**M jamb=**	6969.6 lb-ft	b [in]=	12		rect udl	132.0
443 in4 / ft			d [in]=	3.81			217.8
116 in3/ ft			h/r =	87.67		Eq. W. Prss.udl per ft	217.8
2 in			n =	16.11		Eq udl [plf]	435.6
60 ksi	$c=\frac{A_s f_y+P_u}{0.65 f_m' b}$		φ =	0.90			
2.61			Fr =	163.0 psi			
1689.94	$a=\frac{\frac{P_u}{\phi}+A_s f_y}{0.80 f_m' b}$		Ag=	91.50			
2.1227			H'/t=	24			

nts for Out-of-Plane Design

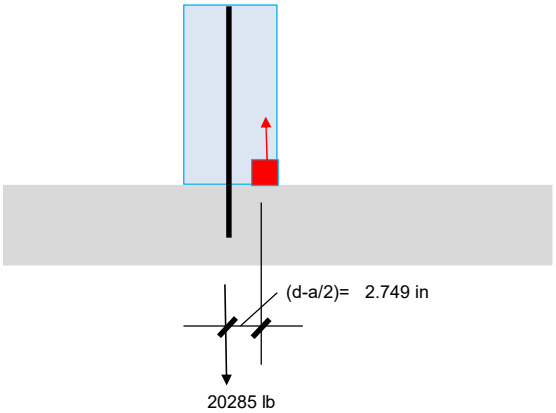
1387.2	lb / ft	Only 1. or 2. Must be satisfied		Window.Width ft	
			h=16.0 ft	5.2	r2= 686.4
	Pu <	9150.0		3.65	
0.20*f'm*Ag	9150.0	< Pu < 36600	8		p2= 1372.8
		OK			
Inertia Calculation			panel		2.6
					0
n(As+Pu/fy)((d-c)^2)+(bc^3)/3			0		p1= 686.4
86.56	in^4	86.58460064			r1= 1372.8

ith Moment Magnification Factor

(π² *Em*Ieff)/(h^2)	$P_e=\frac{\pi^2 E_m I_{eff}}{h^2}$ Euler bucking load	$P_w=\gamma_w\left(\frac{h}{2}+1\text{ ft}\right)b$	756 lb/ft
41.7 k			
1/(1-P/Pe)	$\psi=\frac{1}{1-\frac{P_u}{P_e}}$ Moment magnifier	$P=P_w+P_f=$	1156 lb/ft
1.02558		$P_u=0.9(P_w+P_f)$	1040 lb/ft
ψ*M			
7147.9	Lb - ft / ft		

Moment.

(As*fy+Pu/φ)(d-a/2)	$M_n=A_{se}f_y\left(d-\frac{a}{2}\right)$				
9335.317	Lb - ft / ft				
		Mu=			0.851
8401.786	Lb - ft / ft	>	7147.9	Lb - ft / ft	
		OK			



\U Wall Partially Grouted. For 8" and 12" thick Block Walls.

NBV

Date: 10/17/2024 9:10
Design by: yr

nry — ***Axial Compresion and Flexure*** — ACI 530-11

4th floor 12ft jamb for3.5ft opening zone5(semienclosed)

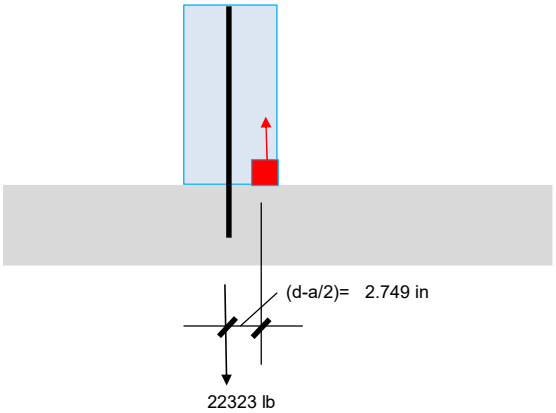
400 lb/ft	Mparapet=	8448					Tie Column
0 lb/ft	Mwall=	2112	Wind Pr [psf]=	66 psf ultimate			width ft
7669.9 lb-ft/ft	M jamb=	7670	***Reinforcing***				1.33
84.0 lb/ft2	M jamb Triang=	5113	Fs [psi]=	32000			
2000.0 psi	M Trapezoid	7642	Es [ksi]=	29000			
1800 ksi	M general window	7670	Bar # =	6		Wall Reb Sp(in)	48
192 in			Spacing [in]=	8			
8 in		3	As [in/ft]=	0.66		trapz udl	74.4
91.5 in2/ft	**M jamb=**	7669.9 lb-ft	b [in]=	12		rect udl	165.2
443 in4 / ft			d [in]=	3.81			239.7
116 in3/ ft			h/r =	87.67		Eq. W. Prss.udl per ft	239.7
2 in			n =	16.11		Eq udl [plf]	318.8
60 ksi	$c=\frac{A_s f_y+P_u}{0.65 f_m' b}$		φ =	0.90			
2.61			Fr =	163.0 psi			
1689.94	$a=\frac{\frac{P_u}{\phi}+A_s f_y}{0.80 f_m' b}$		Ag=	91.50			
2.1227			H'/t=	24			

nts for Out-of-Plane Design

1387.2	lb / ft	Only 1. or 2. Must be satisfied		Window.Width ft	
			h=16.0 ft	3.0	r2= 396.0
	Pu <	9150.0		3.65	
0.20*f'm*Ag	9150.0	< Pu < 36600	8		p2= 792.0
		OK			
Inertia Calculation			panel		1.5
					0
n(As+Pu/fy)((d-c)^2)+(bc^3)/3			0		p1= 396.0
86.56	in^4	86.58460064			r1= 792.0

ith Moment Magnification Factor

(π² *Em*Ieff)/(h^2)	$P_e=\frac{\pi^2 E_m I_{eff}}{h^2}$ Euler bucking load	$P_w=\gamma_w\left(\frac{h}{2}+1\text{ ft}\right)b$	756 lb/ft
41.7 k			
1/(1-P/Pe)	$\psi=\frac{1}{1-\frac{P_u}{P_e}}$ Moment magnifier	$P=P_w+P_f=$	1156 lb/ft
1.02558		$P_u=0.9(P_w+P_f)$	1040 lb/ft
ψ*M			
7866.1	Lb - ft / ft		

Moment.

(As*fy+Pu/φ)(d-a/2)	$M_n=A_{se}f_y\left(d-\frac{a}{2}\right)$				
9335.317	Lb - ft / ft				
		Mu=			0.936
8401.786	Lb - ft / ft	>	7866.1	Lb - ft / ft	
		OK