



DRC

PZ23-12000026

12/04/2024

STRUCTURAL CALCULATIONS **FOR** **Townhouses**

NW 15th St / 19 Ave, Pompano Beach, FL

The following software's were used in the design of this structure:

- Mecawind - Wind Calculations Software
- Enercalc - Structural Library Software

Table of Contents:

	<u>Pages</u>
• Wind Calculations - Mecawind	01 - 08
• Masonry Walls Design - Enercalc	09 - 11
• Concrete Beams Design - Enercalc	12 - 32
• Steel Columns Design - Enercalc	33 - 35
• Footings Design - Enercalc	36 - 43

In accordance with the Florida Building Code 2023 8th Edition High-Velocity Hurricane Zone, Chapters 16,17,18,19,20,21,22,23 & 31. And Florida Building Code Residential 2023 8th Edition High-Velocity Hurricane Zone, Chapters 3 & 44

Submitted By:
Unison Structural Design, LLC.



Kervin Ventura, P.E.
Florida License No. 74146

DRC

PZ23-12000026

12/04/2024

WIND CALCULATIONS

Calculations Prepared by:

Date: Aug 26, 2024

Designer: K.V.

Calculations Prepared For:

Client: Miami Architect Inc. 12/04/2024

Project #: 240057

Location: NW 15th St / 19 Ave, Pompano Beach, FL

Description: Residential

PZ23-12000026

File Location: C:\Users\arian\Desktop\Unison\001_Projects\

Townhouses NW 15 St, 19 Ave (07-17-24)\Calcs\Townhouses NW 15 St, 19 Ave 08-26-24.wnd

General:

Wind Load Standard	= ASCE 7-22	Basic Wind Speed	= 170.0 mph
Exposure Classification	= C	Risk Category	= II
Structure Type	= Building	Design Basis for Wind Pressures	= ASD
MWFRS Analysis Method	= Ch 28	C&C Analysis Method	= Ch 30 Pt 1
Dynamic Type of Structure	= Flexible	Natural Frequency of Structure,	= 10.000 Hz
Structural Damping	= 0.0100	Show Advanced Options	= 0
Reset Advanced Options to Default Values	= Defaults	Simple Diaphragm Building	= False
Show Base Reactions in Output	= 0	MWFRS Pressure Elevations	= Automatic
Topographic Effects	= None	Override Directionality Factor K_d	= True
Manually Specified Directionality Factor K_d	= 0.8500	Override the Gust Factor G	= False
Number of Stories for Building	= 1	Building has a flexible diaphragm	= False
Building is Light Frame Construction	= False		

Building:

Roof = Roof Type	= Flat	Encl = Enclosure Classification	= Enclosed
Help = Help on Building Roof Type	= Help	RfHt = Roof Height	= 21.420 ft
W = Building Width	= 46.670 ft	L = Building Length	= 74.670 ft
OH = Type of Overhang	= All Overhang	Par = Parapet	= Solid
P_{ht} = Parapet Height	= 2.58 ft	HT_{over} = Override Mean Roof Height	= False
H_{tman} = Mean Roof Height	= 21.420 ft	RA_{over} = Override Roof Area	= False
GC_{pi_o} = Override GC_{pi} value	= False	IsElev = Building is Elevated	= False

Exposure Constants [Tbl 26.11-1]:

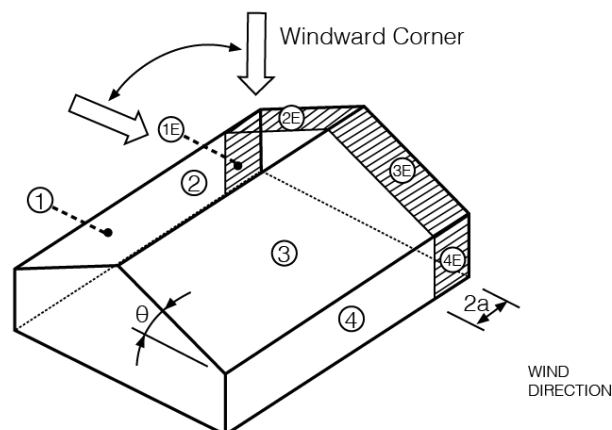
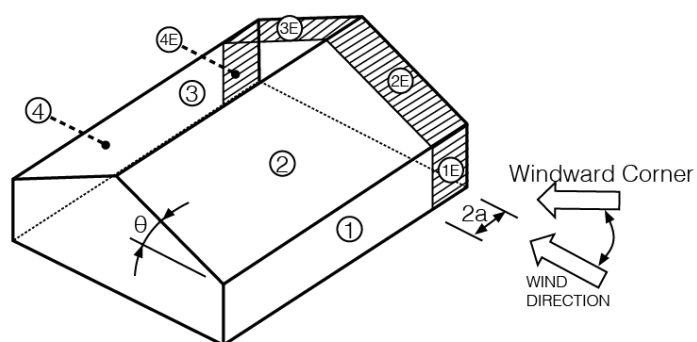
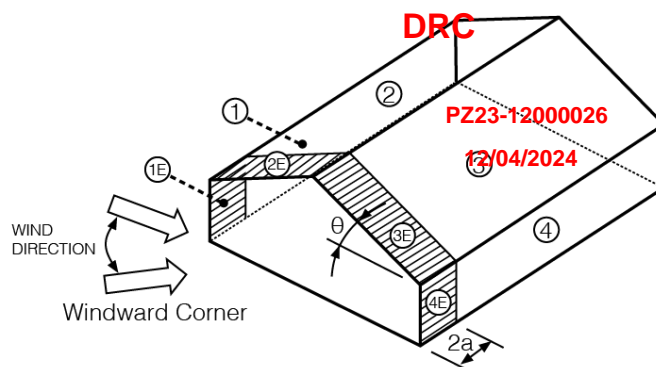
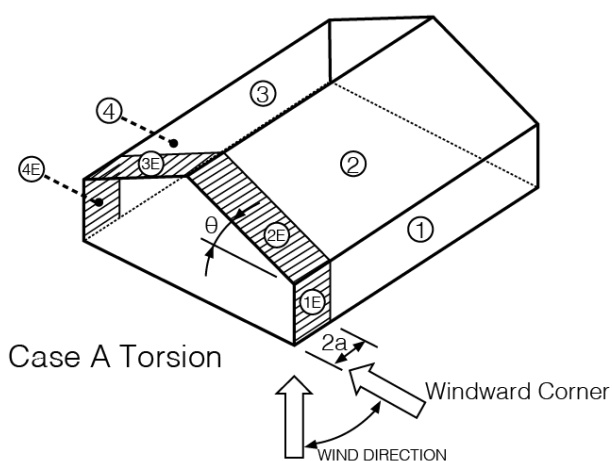
α = 3-s Gust-speed exponent	= 9.800	Z_g = Nominal Ht of Boundary Layer	= 2460.000 ft
$\hat{\alpha}$ = Reciprocal of α	= 0.102	b = 3 sec gust speed factor	= 1.000
α_m = Mean hourly Wind-Speed Exponent	= 0.156	b_m = Mean hourly Windspeed Exponent	= 0.660
c = Turbulence Intensity Factor	= 0.200	ε = Integral Length Scale Exponent	= 0.2000

Overhang Inputs:

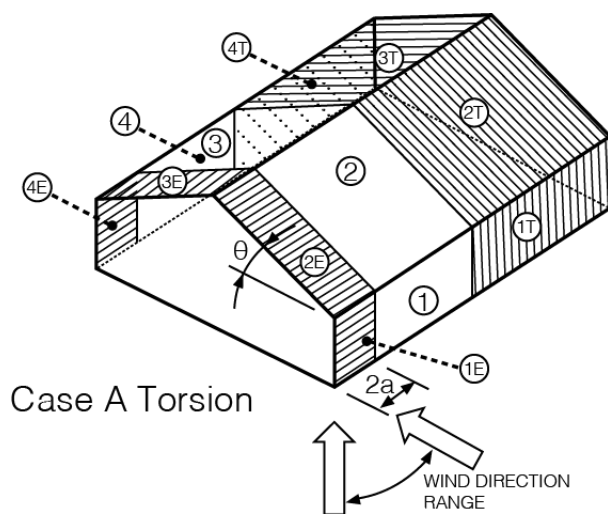
Std	= Overhangs on all sides are the same	= True
OHType	= Type of Roof Wall Intersections	= Overhang
OH	= Overhang of Roof Beyond Wall	= 2.000 ft

Main Wind Force Resisting System (MWFRS) Calculations per Ch 28

h	= Mean structure height	= 21.420 ft
K_h	= $2.41 \cdot (Z/Z_g)^{2/\alpha}$ [Tbl 26.10-1]	= 0.915
K_{zt}	= Topographic: $(1+K_1 \cdot K_2 \cdot K_3)^{1/2}$ [Eq 26.8-1]	= 1.000
K_d	= Wind Directionality Factor Manually Specified by Designer	= 0.85
+ GC_{pi}	= Enclosed Positive Internal Pressure Tbl 26.13-1	= +0.18
- GC_{pi}	= Enclosed Negative Internal Pressure Tbl 26.13-1	= -0.18
LF	= Load Factor based upon ASD Design	= 0.60
K_e	= Ground Elev Factor [Tbl 26.10-1]	= 1.000
q_h	= $0.00256 \cdot K_h \cdot K_{zt} \cdot K_e \cdot V^2 \cdot LF$ [Eq 26.10-1]	= 40.63 psf
Slope	= Slope of Roof	= 0.0 Deg
q_h	= $0.00256 \cdot K_h \cdot K_{zt} \cdot K_e \cdot V^2 \cdot LF$ [Eq 26.10-1]	= 40.63 psf
q_p	= $0.00256 \cdot K_h \cdot K_{zt} \cdot K_e \cdot V^2 \cdot LF$ [Eq 26.10-1]	= 41.59 psf
LHD	= Least Horizontal Dimension: Min(B, L)	= 46.670 ft
a_1	= Min($0.1 \cdot LHD$, $0.4 \cdot h$)	= 4.667 ft
a	= Max(a_1 , $0.04 \cdot LHD$, 3 ft [0.9 m])	= 4.667 ft
2a	= 2 x a dimension used for E zones	= 9.334 ft



Load Case A



TRANSVERSE DIRECTION

Wind Pressures per Ch 28 [Transverse]
All wind pressures include a Load Factor (LF) of 0.6

Building Surface	GCpf	GCpi ±	p +GCpi psf	p -GCpi psf
1	0.400	0.180	7.60	20.03
2	-0.690	0.180	-30.05	-17.61
3	-0.370	0.180	-19.00	-6.56
4	-0.290	0.180	-16.23	-3.80
1E	0.610	0.180	14.85	27.28
2E	-1.070	0.180	-43.17	-30.74
3E	-0.530	0.180	-24.52	-12.09
4E	-0.430	0.180	-21.07	-8.63
Parapet Windward	1.500	0.000	53.02	53.02
Parapet Leeward	-1.000	0.000	-35.35	-35.35
1T	0.100	0.000	-2.76	9.67
2T	-0.173	0.000	-12.17	0.26
3T	-0.093	0.000	-9.41	3.02
4T	-0.073	0.000	-8.72	3.71
2 OH End	-0.690	±0.00	-23.83	-23.83

2 OH End Bottom	0.700	±0.00	24.18	24.18
2 OH Side	-0.690	±0.00	-30.05	-17.61
2 OH Side Bottom	0.700	±0.00	24.18	24.18
3 OH End	-0.370	±0.00	-12.78	-12.78
3 OH Side	-0.370	±0.00	-19.00	-6.56
2E OH End	-1.070	±0.00	-36.96	-36.96
2E OH End Bottom	0.700	±0.00	24.18	24.18
2E OH Side	-1.070	±0.00	-43.17	-30.74
2E OH Side Bottom	0.700	±0.00	24.18	24.18
3E OH End	-0.530	±0.00	-18.30	-18.30
3E OH End Bottom	0.700	±0.00	24.18	24.18
3E OH Side	-0.530	±0.00	-24.52	-12.09
3E OH Side Bottom	0.700	±0.00	24.18	24.18
2T OH End	-0.173	±0.00	-5.96	-5.96
2T OH End Bottom	0.700	±0.00	24.18	24.18
2T OH Side	-0.173	±0.00	-12.17	0.26
2T OH Side Bottom	0.700	±0.00	24.18	24.18
3T OH End	-0.093	±0.00	-3.19	-3.19
3T OH Side	-0.093	±0.00	-9.41	3.02

DRC

PZ23-12000026

12/04/2024

Notes:

$p = [\text{Walls and Roof}] q_h \cdot K_d \cdot (GC_{pe} - GC_{pi})$ [Eq 28.3-1]

[Parapet] $q_p \cdot K_d \cdot (GC_{pe})$ [Eq 28.3-1]

GCpf = External Pressure coefficient from Ch 28

OH = Overhang, End = End of Building, Side = Side of Building, Bottom = Bottom of Overhang

Per Section 28.3.3 the pressure on 'Bottom' is combined with Pressure on Top of Overhang

Since GCPf for Zone 2 and 2E are both negative, follow note in Ch 28:

L = Length Parallel to Wind

L1a = $0.5 \cdot L$

L1b = $2.5 \cdot EHt$

L2 = Lessor of L1a or L1b

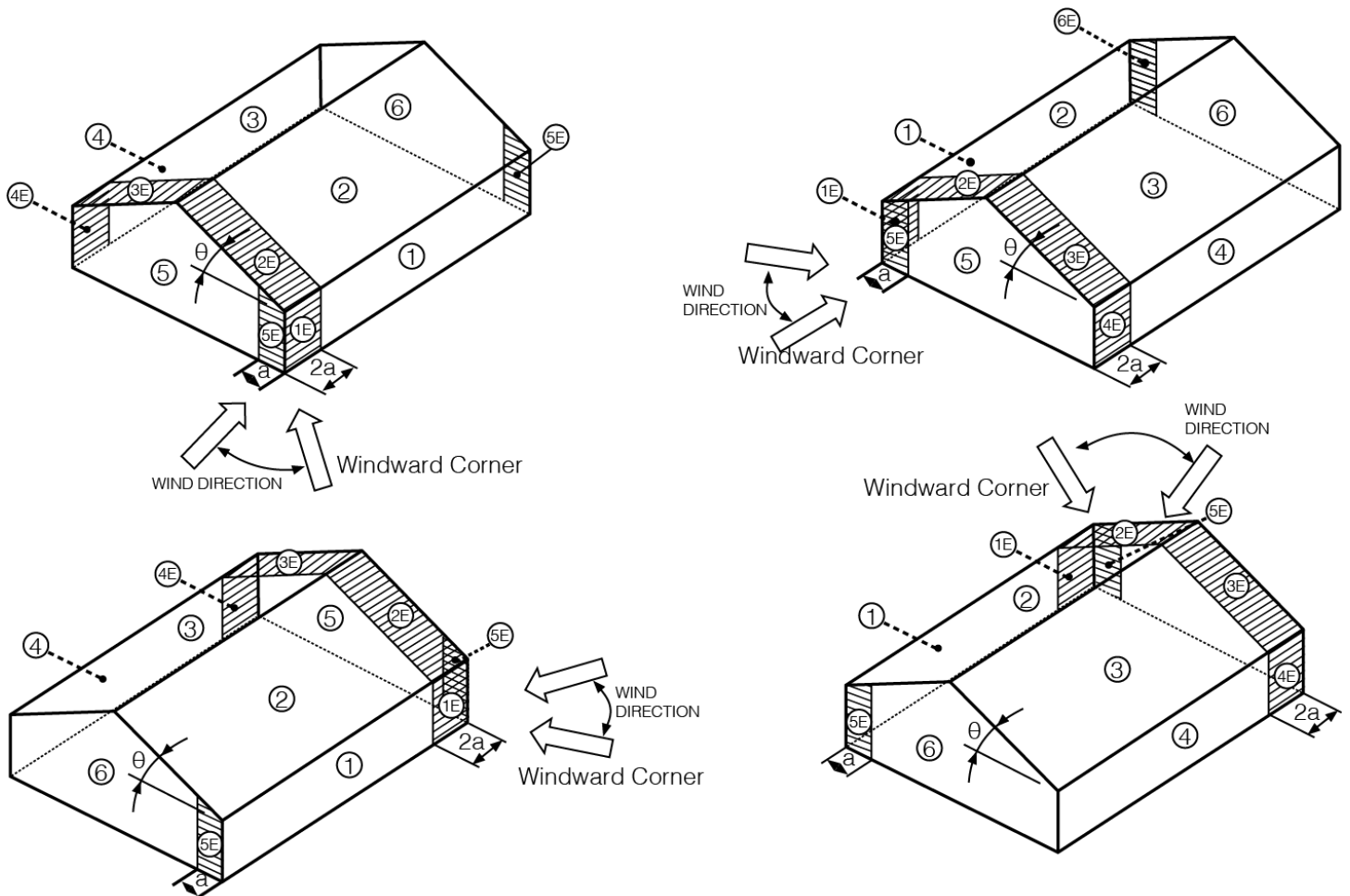
Zone 2/2E to extend a distance 'L2' from Roof Edge and the remainder to Ridge is Zone 3/3E

= 46.670 ft

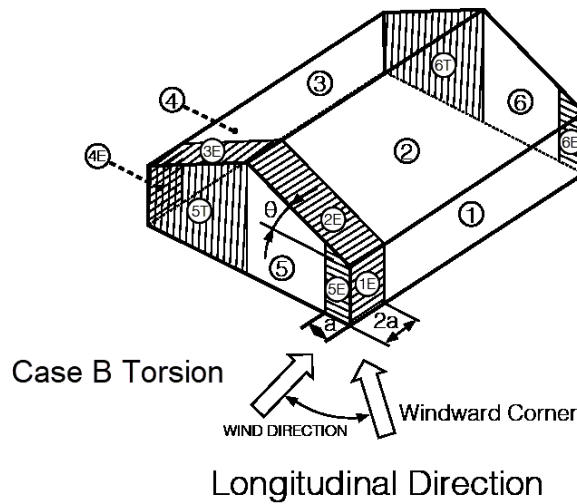
= 23.335 ft

= 53.550 ft

= 23.335 ft



Load Case B



Wind Pressures per Ch 28 [Longitudinal]
All wind pressures include a Load Factor (LF) of 0.6

Building Surface	GCPf	GCpi ±	p +GCPi psf	p -GCPi psf
1	-0.450	0.000	-21.76	-9.33
2	-0.690	0.000	-30.05	-17.61
3	-0.370	0.000	-19.00	-6.56
4	-0.450	0.000	-21.76	-9.33
5	0.400	0.000	7.60	20.03
6	-0.290	0.000	-16.23	-3.80
1E	-0.480	0.000	-22.79	-10.36
2E	-1.070	0.000	-43.17	-30.74
3E	-0.530	0.000	-24.52	-12.09
4E	-0.480	0.000	-22.79	-10.36
5E	0.610	0.000	14.85	27.28
6E	-0.430	0.000	-21.07	-8.63
Parapet Windward	1.500	±0.00	53.02	53.02
Parapet Leeward	-1.000	±0.00	-35.35	-35.35
1T	-0.113	0.000	-10.10	2.33
2T	-0.173	0.000	-12.17	0.26
3T	-0.093	0.000	-9.41	3.02
4T	-0.113	0.000	-10.10	2.33
5T	0.100	0.000	-2.76	9.67
6T	-0.073	0.000	-8.72	3.71
2 OH End	-0.690	±0.00	-23.83	-23.83
2 OH End Bottom	0.700	±0.00	24.18	24.18
2 OH Side	-0.690	±0.00	-23.83	-23.83
2 OH Side Bottom	0.700	±0.00	24.18	24.18
3 OH End	-0.370	±0.00	-12.78	-12.78
3 OH Side	-0.370	±0.00	-12.78	-12.78
2E OH End	-1.070	±0.00	-36.96	-36.96
2E OH End Bottom	0.700	±0.00	24.18	24.18
2E OH Side	-1.070	±0.00	-36.96	-36.96
2E OH Side Bottom	0.700	±0.00	24.18	24.18
3E OH End	-0.530	±0.00	-18.30	-18.30
3E OH End Bottom	0.700	±0.00	24.18	24.18
3E OH Side	-0.530	±0.00	-18.30	-18.30
3E OH Side Bottom	0.700	±0.00	24.18	24.18
2T OH End	-0.173	±0.00	-5.96	-5.96
2T OH End Bottom	0.700	±0.00	24.18	24.18
2T OH Side	-0.173	±0.00	-5.96	-5.96
2T OH Side Bottom	0.700	±0.00	24.18	24.18
3T OH End	-0.093	±0.00	-3.19	-3.19
3T OH Side	-0.093	±0.00	-3.19	-3.19

Notes:

$p = [Walls and Roof] q_h \cdot K_d \cdot (GC_{pf} - GC_{pi})$ [Eq 28.3-1]

[Parapet] $q_p \cdot K_d \cdot (GC_{pn})$ [Eq 28.3-1]

GCPf = External Pressure coefficient from Ch 28

OH = Overhang, End = End of Building, Side = Side of Building, Bottom = Bottom of Overhang

Per Section 28.3.3 the pressure on 'Bottom' is combined with Pressure on Top of Overhang

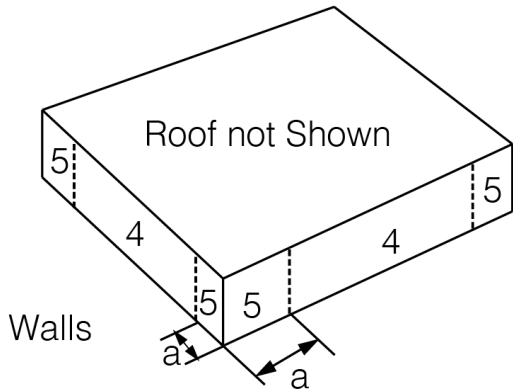
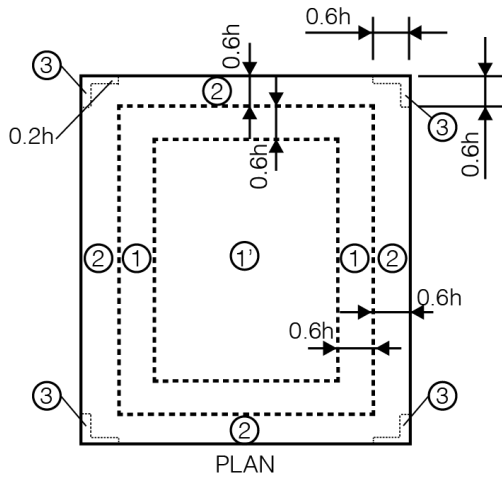
Since GCPf for Zone 2 and 2E are both negative, then the Note in Ch 28 is applicable; however, it is unclear how it would be applied in the longitudinal case. Meca has reviewed the code and in ASCE 7 Zones 2/2E were configured differently, and the note was logical in the layout of these zones. Meca believes the note is no longer applicable to the longitudinal

case in ASCE 7, and so it has not been applied.

DRC

Components and Cladding (C&C) Wind Loads per Ch 30 Part 1 Roof & Wall

12/04/2024



h/W	=	Ratio of mean roof height to building width	=	0.459
h/L	=	Ratio of mean roof height to building length	=	0.287
h	=	Mean structure height	=	21.420 ft
K_h	=	$2.41 \cdot (Z/Z_g)^{2/\alpha}$	=	0.915
K_{zt}	=	Topographic: $(1+K_1 \cdot K_2 \cdot K_3)^2$ [Eq 26.8-1]	=	1.000
K_d	=	Wind Directionality Factor Manually Specified by Designer	=	0.85
+GC _{pi}	=	Enclosed Positive Internal Pressure Tbl 26.13-1	=	+0.18
-GC _{pi}	=	Enclosed Negative Internal Pressure Tbl 26.13-1	=	-0.18
LF	=	Load Factor based upon ASD Design	=	0.60
K_e	=	Ground Elev Factor [Tbl 26.10-1]	=	1.000
q_h	=	$0.00256 \cdot K_h \cdot K_{zt} \cdot K_e \cdot V^2 \cdot LF$ [Eq 26.10-1]	=	40.63 psf
LHD	=	Least Horizontal Dimension: Min(B, L)	=	46.670 ft
a_1	=	Min($0.1 \cdot LHD$, $0.4 \cdot h$)	=	4.667 ft
a	=	Max(a_1 , $0.04 \cdot LHD$, 3 ft [0.9 m])	=	4.667 ft
h/B	=	Ratio of mean roof height to least horizontal dim: h/B	=	0.459
0.2*h	=	Parameter used to define Zone 3	=	4.284 ft
0.6*h	=	Parameter used to define Zones 1 and 2	=	12.852 ft

Wind Pressures for C&C Ch 30 Pt 1 Roof & Wall
All wind pressures include a Load Factor (LF) of 0.6

Description	Zone	Width ft	Span ft	Area ft ²	1/3 Rule	Figure	GCp Max	GCp Min	p Max psf	p Min psf
10 SQFT	1'	3.160	3.160	9.99	No	30.3-2A	0.300	-0.900	16.58	-37.30
20 SQFT	1'	4.470	4.470	19.98	No	30.3-2A	0.270	-0.900	15.54	-37.30
50 SQFT	1'	7.070	7.070	49.98	No	30.3-2A	0.230	-0.900	14.16	-37.30
100 SQFT	1'	10.000	10.000	100.00	No	30.3-2A	0.200	-0.900	13.12	-37.30
10 SQFT	1	3.160	3.160	9.99	No	30.3-2A	0.300	-1.700	16.58	-64.93
20 SQFT	1	4.470	4.470	19.98	No	30.3-2A	0.270	-1.576	15.54	-60.65
50 SQFT	1	7.070	7.070	49.98	No	30.3-2A	0.230	-1.412	14.16	-54.99
100 SQFT	1	10.000	10.000	100.00	No	30.3-2A	0.200	-1.288	13.12	-50.70
10 SQFT	2	3.160	3.160	9.99	No	30.3-2A	0.300	-2.300	16.58	-85.65
20 SQFT	2	4.470	4.470	19.98	No	30.3-2A	0.270	-2.141	15.54	-80.15
50 SQFT	2	7.070	7.070	49.98	No	30.3-2A	0.230	-1.930	14.16	-72.87
100 SQFT	2	10.000	10.000	100.00	No	30.3-2A	0.200	-1.770	13.12	-67.36
10 SQFT	3	3.160	3.160	9.99	No	30.3-2A	0.300	-3.200	16.58	-116.74
20 SQFT	3	4.470	4.470	19.98	No	30.3-2A	0.270	-2.882	15.54	-105.74
50 SQFT	3	7.070	7.070	49.98	No	30.3-2A	0.230	-2.460	14.16	-91.17
100 SQFT	3	10.000	10.000	100.00	No	30.3-2A	0.200	-2.141	13.12	-80.15
10 SQFT	4	3.160	3.160	9.99	No	30.3-1	0.900	-0.990	37.30	-40.41
20 SQFT	4	4.470	4.470	19.98	No	30.3-1	0.852	-0.942	35.65	-38.76
50 SQFT	4	7.070	7.070	49.98	No	30.3-1	0.789	-0.879	33.46	-36.57
100 SQFT	4	10.000	10.000	100.00	No	30.3-1	0.741	-0.831	31.81	-34.92
10 SQFT	5	3.160	3.160	9.99	No	30.3-1	0.900	-1.260	37.30	-49.73
20 SQFT	5	4.470	4.470	19.98	No	30.3-1	0.852	-1.164	35.65	-46.43
50 SQFT	5	7.070	7.070	49.98	No	30.3-1	0.789	-1.038	33.46	-42.06
100 SQFT	5	10.000	10.000	100.00	No	30.3-1	0.741	-0.942	31.81	-38.76

Area = Span Length x Effective Width

1/3 Rule = Effective width need not be less than 1/3 of the span length

GCp = External Pressure Coefficients taken from Figures 30.3-1 through 30.3-7

p = Wind Pressure: $q_h \cdot K_d \cdot [GC_p - GC_{pi}]$ [Eq 30.3-1]

* Per § 30.2.2 the Minimum Pressure for C&C is 9.60 psf [0.460 kPa] {Includes LF}

Since Roof Slope= 10°, the Wall GCp values for Zone 4 & 5 are reduced by 10%

Parapet Components and Cladding (C&C) Wind Loads per Ch 30 Pt 4:

DRC

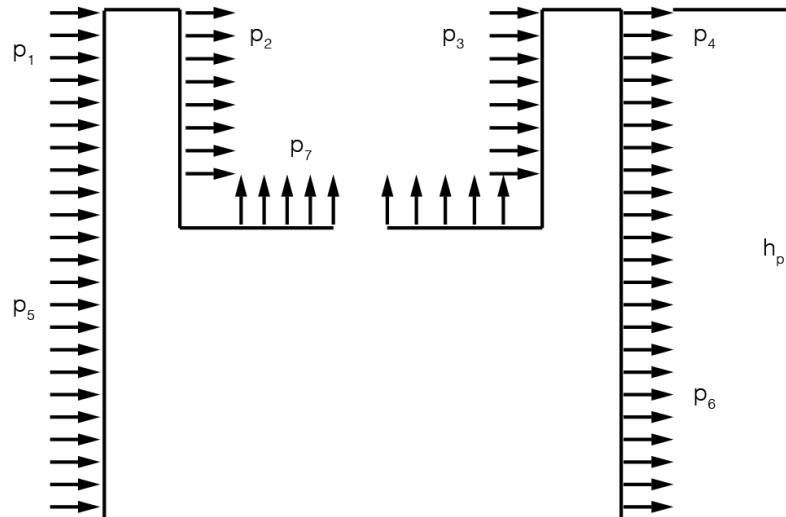
Windward Parapet
Load Case A

Leeward Parapet
Load Case B

Top of Parapet

PZ23-12000026

12/04/2024



hp	=	Elevation of top of Parapet above grade: Rht+Pht	=	24.0 ft
h	=	Mean structure height	=	21.420 ft
K_h	=	$2.41 \cdot (Z/Z_g)^{2/\alpha}$	=	0.915
K_{zt}	=	Topographic: $(1+K_1 \cdot K_2 \cdot K_3)^2$ [Eq 26.8-1]	=	1.000
K_d	=	Wind Directionality Factor Manually Specified by Designer	=	0.85
+GC _{pi}	=	Enclosed Positive Internal Pressure Tbl 26.13-1	=	+0.00
-GC _{pi}	=	Enclosed Negative Internal Pressure Tbl 26.13-1	=	0.00
LF	=	Load Factor based upon ASD Design	=	0.60
K_e	=	Ground Elev Factor [Tbl 26.10-1]	=	1.000
q _h	=	$0.00256 \cdot K_h \cdot K_{zt} \cdot K_e \cdot V^2 \cdot LF$ [Eq 26.10-1]	=	40.63 psf
GCPip	=	Internal Pressure for Parapet: Solid	=	0.00
q _p	=	$0.00256 \cdot K_2 \cdot K_{zt} \cdot K_e \cdot V^2 \cdot LF$ [Eq 26.10-1]	=	41.59 psf

Wind Pressures for Parapet C&C per Ch 30 Pt 4 - Load Case A
All wind pressures include a Load Factor (LF) of 0.6

Description	Zone	Roof Zone	Reference	Width ft	Span ft	Area ft	1/3 Rule	GCp1 GCp5	GCp2 GCp7	P1 P5 psf	P2 P7 psf	Pnet psf
10 SQFT (Zone 2 Region)	4_P	2	30.3-1/30.3-2A	3.16	3.16	9.9856	No	0.900	-2.300	31.81	-81.30	113.12
20 SQFT (Zone 2 Region)	4_P	2	30.3-1/30.3-2A	4.47	4.47	19.9809	No	0.852	-2.141	30.13	-75.67	105.80
50 SQFT (Zone 2 Region)	4_P	2	30.3-1/30.3-2A	7.07	7.07	49.9849	No	0.789	-1.930	27.89	-68.22	96.10
10 SQFT (Zone 3 Region)	5_P	3	30.3-1/30.3-2A	3.16	3.16	9.9856	No	0.900	-3.200	31.81	-113.12	144.93
20 SQFT (Zone 3 Region)	5_P	3	30.3-1/30.3-2A	4.47	4.47	19.9809	No	0.852	-2.882	30.13	-101.86	131.98
50 SQFT (Zone 3 Region)	5_P	3	30.3-1/30.3-2A	7.07	7.07	49.9849	No	0.789	-2.460	27.89	-86.94	114.83

GCp = External Pressure Coefficients taken from Fig 30.3-1 to Fig 30.3-7

Zone = 4_P (Edges) --> Wall Zone = 4 and Roof Zone Indicated

= 5_P (Corners) --> Wall Zone = 5 and Roof Zone Indicated

p = Wind Pressure: $q_p \cdot K_d \cdot [GC_p - GC_{pi}]$ [Eq 30.6-1]

GCp1/5 = GCp Coef for Surface 1 & 5 based upon Positive Wall Pressure (Load Case A)

P1/5 = Pressure for Surface 1 & 5 based upon Positive Wall Pressure (Load Case A)

GCp2/7 = GCp Coef for Surface 2 & 7 based upon Negative Roof Pressure (Load Case A)

P2/7 = Pressure for Surface 2 & 7 based upon Negative Roof Pressure (Load Case A)

Pnet = Net wind pressure on Upwind Parapet: P1-P2

Wind Pressures for Parapet C&C per Ch 30 Pt 4 - Load Case B
All wind pressures include a Load Factor (LF) of 0.6

Description	Zone	Reference	Width ft	Span ft	Area ft	1/3 Rule	GCp3 GCp5	GCp4 GCp6	P3 P5 psf	P4 P6 psf	Pnet psf
10 SQFT (Zone 2 Region)	4_P	30.3-1/30.3-2A	3.16	3.16	9.9856	No	0.900	-0.990	31.81	-35.00	66.81
20 SQFT (Zone 2 Region)	4_P	30.3-1/30.3-2A	4.47	4.47	19.9809	No	0.852	-0.942	30.13	-33.31	63.43

50 SQFT (Zone 2 Region)	4_P	30.3-1/30.3-2A	7.07	7.07	49.9849	No	0.789	-0.000	27.89	-31.07	58.96
10 SQFT (Zone 3 Region)	5_P	30.3-1/30.3-2A	3.16	3.16	9.9856	No	0.900	-1.260	31.81	-44.54	76.35
20 SQFT (Zone 3 Region)	5_P	30.3-1/30.3-2A	4.47	4.47	19.9809	No	0.852	-1.164	30.13	-41.16	71.29
50 SQFT (Zone 3 Region)	5_P	30.3-1/30.3-2A	7.07	7.07	49.9849	No	0.789	-1.038	27.89	-36.69	64.58

G_{Cp} = External Pressure Coefficients taken from Fig 30.3-1 to Fig 30.3-7
 Zone = 4_P (Edges) --> Wall Zone = 4 and Roof Zone Indicated
 = 5_P (Corners) --> Wall Zone = 5 and Roof Zone Indicated
 p = Wind Pressure: $q_p \cdot (G_{Cp} - G_{Cpi})$ [Eq 30.6-1]
 $G_{Cp3/5}$ = G_{Cp} Coef for Surface 3 & 5 based upon Positive Wall Pressure (Load Case B)
 $P3/5$ = Pressure for Surface 3 & 5 based upon Positive Wall Pressure (Load Case B)
 $G_{Cp4/6}$ = G_{Cp} Coef for Surface 4 & 6 based upon Negative Roof Pressure (Load Case B)
 $P4/6$ = Pressure for Surface 4 & 6 based upon Negative Roof Pressure (Load Case B)
 P_{net} = Net wind pressure on Downwind Parapet: $P3 - P4$

Components and Cladding (C&C) Wind Overhang Calculations per Ch 30 Pt 4: [Roof & Wall]

h = Mean structure height = 21.420 ft
 K_h = $2.41 \cdot (Z/Z_g)^{2/\alpha}$ = 0.915
 K_{zt} = Topographic: $(1 + K_1 \cdot K_2 \cdot K_3)^2$ [Eq 26.8-1] = 1.000
 K_d = Wind Directionality Factor Manually Specified by Designer = 0.85
 $+G_{Cpi}$ = Enclosed Positive Internal Pressure Tbl 26.13-1 = +0.18
 $-G_{Cpi}$ = Enclosed Negative Internal Pressure Tbl 26.13-1 = -0.18
 LF = Load Factor based upon ASD Design = 0.60
 K_e = Ground Elev Factor [Tbl 26.10-1] = 1.000
 q_h = $0.00256 \cdot K_h \cdot K_{zt} \cdot K_e \cdot V^2 \cdot LF$ [Eq 26.10-1] = 40.63 psf

Wind Pressures for Overhangs per Section Ch 30 Pt 4 [Roof & Wall] All wind pressures include a Load Factor (LF) of 0.6

Description	Zone	Width ft	Span ft	Area ft ²	1/3 Rule	Figure	G_{Cpi} ±	G_{Cp} Max	G_{Cp} Min	p Max psf	p Min psf
10 SQFT	2_OH	3.160	3.160	9.99	No	30.3-2A	0.00	0.000	-2.300	9.60	-79.44
20 SQFT	2_OH	4.470	4.470	19.98	No	30.3-2A	0.00	0.000	-2.088	9.60	-72.10
50 SQFT	2_OH	7.070	7.070	49.98	No	30.3-2A	0.00	0.000	-1.806	9.60	-62.39
10 SQFT	3_OH	3.160	3.160	9.99	No	30.3-2A	0.00	0.000	-3.200	9.60	-110.52
20 SQFT	3_OH	4.470	4.470	19.98	No	30.3-2A	0.00	0.000	-2.828	9.60	-97.69
50 SQFT	3_OH	7.070	7.070	49.98	No	30.3-2A	0.00	0.000	-2.336	9.60	-80.69

$\#_{OH}$ = Zone # on Overhang with Zero Internal Pressure ($G_{Cpi} = 0$)
 Area = Span Length x Effective Width
 1/3 Rule = Effective width need not be less than 1/3 of the span length
 p = Wind Pressure: $q_h \cdot K_d \cdot [G_{Cp} - G_{Cpi}]$ [Eq 30.7-1]
 * Per § 30.2.2 the Minimum Pressure for C&C is 9.60 psf [0.460 kPa] {Includes LF}
 Values of G_{Cp} for overhangs include contributions from both upper and lower surfaces.

DRC

PZ23-12000026

12/04/2024

MASONRY WALLS DESIGN

Title Block Line 1
Job #
Title :
Dsgnr:
Project Desc.:
Project Notes :
Title Block Line 6

Masonry Slender Wall

License :

skatantDesktop\Unison001_Project\slr\townhouses NW\15 Slr_19 Ave (07.17.24)\Calc\slr\Townhouses.ecd.BKUP2
Description : Masonry wall H1=10.5ft, H2=11ft w/ (1)46 @48"o.c
Printed: 18 JUL 2024 10:30AM
ENGERCALC, INC. 1983-2011, Build6.11.6.23, Ver6.11.6.23

General Information

Calculations per ACI 530-13, IBC 2022, CBC 2022, ASCE 7-22

Construction Type : Grouted Hollow Concrete Masonry

F'm = 1.50 ksi

Fy - Yield = 60.0 ksi

Fr - Rupture = 61.0 psi

Em = 1m" = 900.0

Max % of p bal. = 0.50

Grout Density = 140 pcf

Block Weight = Normal Weight

Wall Weight = 56.0 psf

Wall is grouted at rebar cells only

Two-Story Wall Dimensions

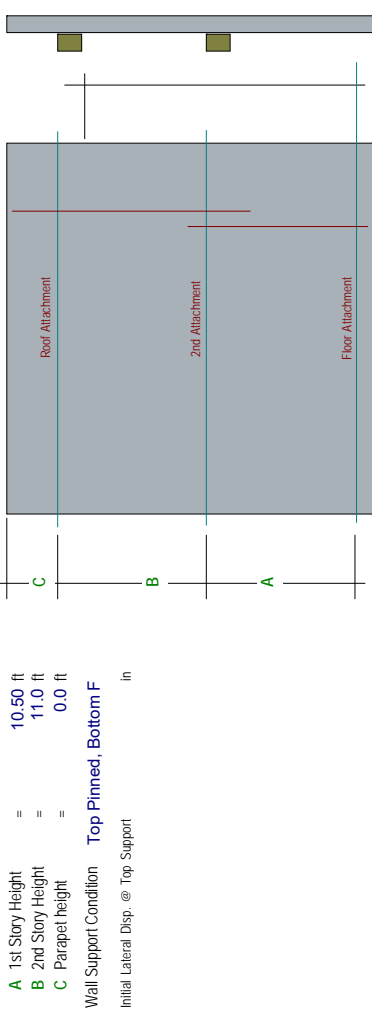
A 1st Story Height = 10.50 ft

B 2nd Story Height = 11.0 ft

C Parapet height = 0.0 ft

Wall Support Condition Top Pinned, Bottom F

Initial Lateral Disp. @ Top Support in



Vertical Loads

Vertical Uniform Loads... (Applied per foot of Strip Width)

Ledger Load

Concentric Load

DL : Dead Load

LL : Roof Live Load

LL : Floor Live Load

S : Snow Load

1.480

1.680

Lateral Loads

Full area WIND load

Fp = 1.0 = 52.70 psf

Direct entry of Lateral Wall Weight

Seismic Wall Lateral Load

psf

Title Block Line 1
Job #
Title :
Dsgnr:
Project Desc.:
Project Notes :
Title Block Line 6

Masonry Slender Wall

License :

skatantDesktop\Unison001_Project\slr\townhouses NW\15 Slr_19 Ave (07.17.24)\Calc\slr\Townhouses.ecd.BKUP2
Description : Masonry wall H1=10.5ft, H2=11ft w/ (1)46 @48"o.c
Printed: 18 JUL 2024 10:30AM
ENGERCALC, INC. 1983-2011, Build6.11.6.23, Ver6.11.6.23

DESIGN SUMMARY

Results reported for "Strip Width" of 12.0 in

Governing Load Combination ...

PASS

Moment Capacity Check

+0.90D+W

Max Mu

-0.5842 k-ft

Phi * Mn

2.442 k-ft

PASS

Service Deflection Check

D + L + W

Min. Defl. Ratio

1.124-16

Max Allow Ratio

480.0

PASS

Axial Load Check

+1.20D+0.50L+1.60L at 16.37 to 16.73

Max Pu / Ag

84.840 psi

0.06 * fc

300.0 psi

PASS

Reinforcing Limit Check

+1.40D

Controlling As/bd

0.002839

As/bd = 0.50 rho bal

0.005345

PASS

Minimum Moment Check

+1.40D

Mracking

0.4475 k-ft

Minimum Phi Mn

2.148 k-ft

Maximum Reactions ... for Load Combination...

Top Horizontal W Only

Base Horizontal W Only

Mid-Ht Horizontal D + L + W + S2

Vertical Reaction D + L + Lr

Design Maximum Combinations - Moments

Design Maximum Combinations - Deflections

Load Combination	Axial Load Pu k	Moment Values Mc k-ft	Phi Mu k-ft	Phi Mn k-ft	As in^2	As Eff in^2	As Ratio	Deflections Defl. in	Ratio
+1.40D at 16.00 to 16.37	2.475	16.920	0.45	0.83	3.23	0.132	0.187	0.0028	0.0053
+1.20D+0.50L+1.60L at 16.37 to 16.73	4.785	16.920	0.45	0.76	3.76	0.132	0.224	0.0028	0.0053
+1.20D+1.60L+0.50S at 16.37 to 16.73	4.785	16.920	0.45	0.76	3.76	0.132	0.224	0.0028	0.0053
+1.20D+1.60L+L at 16.37 to 16.73	3.777	16.920	0.45	0.79	3.54	0.132	0.207	0.0028	0.0053
+1.20D+1.60L+0.50W at 10.15 to 10.50	2.515	16.920	0.45	0.33	0.90	0.132	0.174	0.0028	0.0053
+1.20D+L+1.60S at 16.37 to 16.73	3.777	16.920	0.45	0.79	3.54	0.132	0.207	0.0028	0.0053
+1.20D+1.60S+0.50W at 10.15 to 10.50	2.515	16.920	0.45	0.33	0.90	0.132	0.174	0.0028	0.0053
+1.20D+0.50L+L+W at 10.15 to 10.50	4.195	16.920	0.45	0.60	4.07	0.132	0.202	0.0028	0.0053
+1.20D+L+0.50S+W at 10.15 to 10.50	4.195	16.920	0.45	0.60	4.07	0.132	0.202	0.0028	0.0053
+0.90D+W at 10.15 to 10.50	1.886	16.920	0.45	0.60	4.07	0.132	0.163	0.0028	0.0053
+1.20D+L+0.20S+E at 16.37 to 16.73	3.777	16.920	0.45	0.79	3.54	0.132	0.207	0.0028	0.0053
+0.90D+E at 16.00 to 16.37	1.591	16.920	0.45	0.85	2.89	0.132	0.168	0.0028	0.0053

DRC
PZ23-12000026
12/04/2024

Reactions - Vertical & Horizontal

Load Combination

Load Combination	Base Horizontal	Mid Horizontal	Top Horizontal	Vertical @ Wall Base
D Only	0.0 lbs	0.00 lbs	0.00 lbs	2.664 k
S Only	0.0 lbs	0.00 lbs	0.00 lbs	0.000 k
W Only	0.3 lbs	0.642 lbs	0.23 lbs	0.000 k
E Only	0.0 lbs	0.00 lbs	0.00 lbs	0.000 k
D + L + Lr	0.0 lbs	0.00 lbs	0.00 lbs	4.344 k

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.

Title Block Line 6

Printed: 18 JUL 2024 10:30AM

slatantDesktop\unison001_Projects\Townhouses NW\15 St_19 Ave (07-17-24)\CalculTownhouses.ecd.BKUP2
ENERCALC, INC. 1983-2011 Build 6.11.6.23 Ver 6.11.6.23

Licensee :

Title :

Dsgnr:

Project Desc.:

Project Notes :

Job #

Description : Masonry wall HT=10.5ft, H2=11ft w/ (1)6 @40"o.c

Reactions - Vertical & Horizontal

Load Combination	Base Horizontal	Mid Horizontal	Top Horizontal	Vertical @ Wall Base
D + L + S	0.0 lbs	0.000 lbs	0.00 lbs	4,344 k
D + L + W + S/2	0.3 lbs	0.647 lbs	0.23 lbs	4,344 k
D + L + S + W/2	0.1 lbs	0.331 lbs	0.11 lbs	4,344 k
D + L + S + E/1.4	0.0 lbs	0.000 lbs	0.00 lbs	4,344 k

DRC

PZ23-12000026

12/04/2024

DRC

PZ23-12000026

12/04/2024

CONCRETE BEAMS DESIGN

Material Properties

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22

f_c

=

4.0 ksi

f_r

=

$f_c \cdot 1/2 \cdot 7.50$

ψ Density

=

474.34 psi

λ LW/F Factor

=

150.0 pcf

Elastic Modulus

=

3,122.0 ksi

f_y - Main Rebar

=

60.0 ksi

E - Main Rebar

=

29,000.0 ksi

Number of Resisting Legs Per Stirrup

=

2

ϕ Phi Values

Flexure :

0.90

Shear :

0.750

β_1

=

0.850

Fy - Stirrups

=

40.0 ksi

E - Stirrups

=

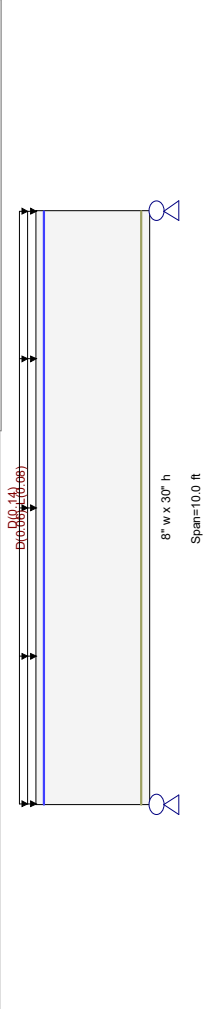
29,000.0 ksi

Stirrup Bar Size #

=

3

Load Combination: ASCE 7-22



Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 30.0 in

Span #1 Reinforcing...
2-#6 at 2.210 in from Top, from 0.0 to 10.0 ft in this span

2-#7 at 2.310 in from Bottom, from 0.0 to 6.670 ft in this span

2-#6 at 2.210 in from Bottom, from 0.0 to 10.0 ft in this span

Service loads entered. Load Factors will be applied for calculation:

Applied Loads

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 2.0 ft

Uniform Load : D = 0.070 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio =	0.079 : 1	Maximum Deflection	
Section used for this span	Typical Section	Max Downward L+Lr+S Deflection	0.000 in Ratio = 0 < 360
Mu : Applied	8.350 k-ft	Max Upward L+Lr+S Deflection	0.000 in Ratio = 0 < 360
Mn * Phi : Allowable	106.18 k-ft	Max Downward Total Deflection	0.002 in Ratio = 56603
Load Combination	+1.20D+0.50L+1.60L+1.60H	Max Upward Total Deflection	0.000 in Ratio = 999 < 180
Location of maximum on span	5.000 ft		
Span # where maximum occurs	Span # 1		

Vertical Reactions - Unfactored

Load Combination	Support 1	Support 2
Overall Maximum	2.650	2.650
D Only	2.250	2.250
L Only	0.400	0.400
D+L	2.650	2.650

Shear Stirrup Requirements

Entire Beam Span Length : Vu < PhiVc/2, Req'd Vs = Not Req'd, use stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Location (ft) In Span	Mu : Max	Phi*Mn	Stress Ratio
MAXimum BENDING Envelope						
Span # 1	1	5.000		8.35	106.18	0.08
+1.20D+0.50Lr+1.60L+1.60H						
Span # 1	1	5.000		8.35	106.18	0.08
+1.20D+1.60L+0.50S+1.60H						
Span # 1	1	5.000		8.35	106.18	0.08
+1.20D+1.60Lr+1.60H						

Load Combination

Segment Length	Span #	Location (ft) In Span	Mu : Max	Phi*Mn	Stress Ratio
Span # 1	1	5.000	7.75	106.18	0.07
+1.20D+L+1.60S+1.60H					
Span # 1	1	5.000	7.75	106.18	0.07
+1.20D+0.50Lr+L+W+1.60H					
Span # 1	1	5.000	7.75	106.18	0.07
+1.20D+L+0.50S+W+1.60H					
Span # 1	1	5.000	7.75	106.18	0.07
+1.20D+L+0.20S+E+1.60H					
Span # 1	1	5.000	7.75	106.18	0.07

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. :+ Defl	Location in Span	Load Combination	Max. :+ Defl	Location in Span
D+L	1	0.0021	4.900		0.0000	0.000

DRC

PZ23-12000026
12/04/2024

Description: 2B-2 (EL.+ 10'-6")

Material Properties

fc = 4.0 ksi

fr = 7.50

ψ Density = 150.0 pcf

λ LWf Factor = 1.0

Elastic Modulus = 3,122.0 ksi

Fy - Stirrups = 40.0 ksi

E - Stirrups = 29,000.0 ksi

fy - Main Rebar = 60.0 ksi

E - Main Rebar = 29,000.0 ksi

Number of Resisting Legs Per Stirrup = 3

2

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22

ϕ Phi Values

Flexure : 0.90

Shear : 0.750

β_1 = 0.850

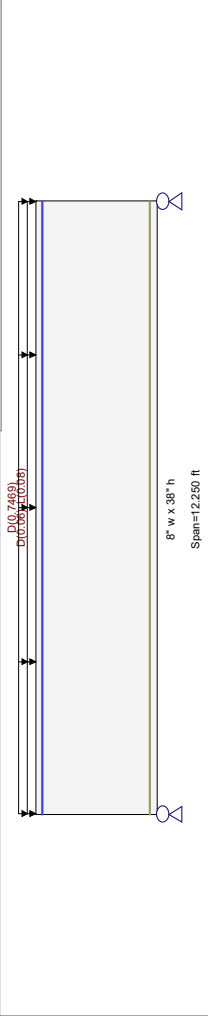
Load Combination: ASCE 7-22

ϕ Phi Values

Flexure : 0.90

Shear : 0.750

β_1 = 0.850



Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 38.0 in

Span #1 Reinforcing...

2-#6 at 2.210 in from Top, from 0.0 to 12.250 ft in this span

2-#6 at 2.210 in from Bottom, from 0.0 to 10.0 ft in this span

2-#7 at 2.210 in from Bottom, from 0.0 to 12.250 ft in this span

Service loads entered. Load Factors will be applied for calculation:

Applied Loads

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 2.0 ft

Uniform Load : D = 0.070 ksf, Tributary Width = 10.670 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio = 0.149 : 1

Section used for this span

Mu : Applied

Mn * Phi : Allowable

Load Combination

Location of maximum on span

Span # where maximum occurs

Typical Section

27.692 k-ft

186.31 k-ft

+1.20D+0.50L+1.60L+1.60H

6.125 ft

Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection

Max Upward L+Lr+S Deflection

Max Downward Total Deflection

Max Upward Total Deflection

0.000 in

Ratio = 0.360

0.000 in

Ratio = 0.360

0.005 in

Ratio = 27556

0.000 in

Ratio = 999

<180

Vertical Reactions - Unfactored				Support notation : Far left is #1	
Load Combination	Support 1	Support 2			
Overall Maximum	7.372	7.372			
D Only	6.882	6.882			
L Only	0.490	0.490			
D+L	7.372	7.372			

Shear Stirrup Requirements

Entire Beam Span Length : Vu < PhiVc/2, Req'd Vs = Not Req'd, use stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations				Bending Stress Results (k-ft)	
Load Combination	Segment Length	Span #	Location (ft) In Span	Mu : Max	Phi*Mnx Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	6.125	27.69	186.31	0.15
+1.20D+0.50Lr+1.60L+1.60H					
Span # 1	1	6.125	27.69	186.31	0.15
+1.20D+1.60L+0.50S+1.60H					
Span # 1	1	6.125	27.69	186.31	0.15
+1.20D+1.60Lr+L+1.60H					

Description: 2B-2 (EL.+ 10'-6")

Overall Maximum Deflections - Unfactored Loads				Bending Stress Results (k-ft)	
Load Combination	Segment Length	Span #	Location (ft) In Span	Mu : Max	Phi*Mnx Stress Ratio
Span # 1	1	6.125	186.31	0.14	
+1.20D+L+1.60S+1.60H					
Span # 1	1	6.125	186.31	0.14	
+1.20D+0.50Lr+L+W+1.60H					
Span # 1	1	6.125	186.31	0.14	
+1.20D+L+0.50S+W+1.60H					
Span # 1	1	6.125	186.31	0.14	
+1.20D+L+0.20S+E+1.60H					
Span # 1	1	6.125	186.31	0.14	

Overall Maximum Deflections - Unfactored Loads				Bending Stress Results (k-ft)	
Load Combination	Segment Length	Span #	Location (ft) In Span	Mu : Max	Phi*Mnx Stress Ratio
D+L	1	6.125	6.003	0.000	0.000

DRC

PZ23-12000026
12/04/2024

Title Block Line 1
You can change this area using the "Settings" menu item and then using the "Priting & Title Block" selection.

Title Block Line 6

Title :
Dsgnr:
Project Desc.:
Project Notes :

Job #

Printed: 25 JUL 2024 9:55AM

stairanDesktop\Unison\001_Project\stairtownhouses ec66.BKUP2

ENERCALC, INC. 1983-2011, Build6.11.6.23, Ver6.11.6.23

Licensee :

Description : 2B-3 (EL:++ 10'-6")

Concrete Beam

Lic. # :

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22

$f_c = f_c^{1/2} \times 7.50 = 4.0 \text{ ksi}$

$w \text{ Density} = 150.0 \text{ pcf}$

$\lambda, \text{ LWI Factor} = 1.0$

$E, \text{ Elastic Modulus} = 3,122.0 \text{ ksi}$

$f_y - \text{Main Rebar} = 60.0 \text{ ksi}$

$E - \text{Main Rebar} = 29,000.0 \text{ ksi}$

ϕ Phi Values

Flexure : 0.90

Shear : 0.750

$\beta_1 = 0.850$

$F_y - \text{Sirlups}$

$E - \text{Sirlups}$

Sirlup Bar Size # = 3

Number of Resisting Legs Per Sirlup = 2

ϕ Phi Values

Flexure : 0.90

Shear : 0.750

$\beta_1 = 0.850$

$F_y - \text{Sirlups}$

$E - \text{Sirlups}$

Sirlup Bar Size # = 3

Number of Resisting Legs Per Sirlup = 2

Load Combination: ASCE 7-22

Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 30.0 in

Span #1 Reinforcing...

2 #6 at 2.210 in from Top, from 0.0 to 9.060 ft in this span

2 #6 at 2.210 in from Bottom, from 0.0 to 9.060 ft in this span

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

Applied Loads

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 2.0 ft

Uniform Load : D = 0.1250, L = 0.060 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio = 0.096 < 1

Section used for this span

Mu : Applied

Mn * Phi : Allowable

Load Combination

Location of maximum on span

Span # where maximum occurs

Typical Section

10.178 k-ft

106.18 k-ft

+1.20D+0.50Lr+1.60L+1.60H

4.530 ft

Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection

Max Upward L+Lr+S Deflection

Max Downward Total Deflection

Max Upward Total Deflection

0.000 in

Ratio = 0 < 360

0.000 in

Ratio = 0 < 360

0.002 in

Ratio = 53079

0.000 in

Ratio = 999 < 180

Design OK

Vertical Reactions - Unfactored				Support notation : Far left is #1			
Load Combination		Support 1	Support 2				
Overall Maximum		3.443	3.443				
D Only		2.537	2.537				
L Only		0.906	0.906				
D+L		3.443	3.443				

Shear Sirlup Requirements			
Entire Beam Span Length : Vu < PHN/2, Reqd Vs = Not Req'd, use sirlups spaced at 0.000 in			
Maximum Forces & Stresses for Load Combinations			
Load Combination		Location (ft) in Span	Bending Stress Results (k-ft)
		Span #	Mu : Max Phi*Max Stress Ratio

MAXimum BENDING Envelope			
Span # 1		1	4.530
+1.20D+0.50Lr+1.60L+1.60H		1	10.18
Span # 1		1	4.530
+1.20D+1.60L+0.50S+1.60H		1	10.18
Span # 1		1	4.530
+1.20D+1.60Lr+1.60H		1	10.18

Title Block Line 1
You can change this area using the "Settings" menu item and then using the "Priting & Title Block" selection.

Title Block Line 6

Title :
Dsgnr:
Project Desc.:
Project Notes :

Job #

Printed: 25 JUL 2024 9:55AM

stairanDesktop\Unison\001_Project\stairtownhouses ec66.BKUP2

ENERCALC, INC. 1983-2011, Build6.11.6.23, Ver6.11.6.23

Licensee :

Description : 2B-3 (EL:++ 10'-6")

Concrete Beam

Lic. # :

Load Combination		Segment Length	Span #	Location (ft) in Span	Bending Stress Results (k-ft)	Max. "+" Defl	Max. "-" Defl	Location in Span	Location in Span
					Mu : Max Phi*Max Stress Ratio				
Span # 1		1	1	4.530	8.95	106.18	0.08		
+1.20D+L+1.60S+1.60H									
Span # 1		1	1	4.530	8.95	106.18	0.08		
+1.20D+0.50Lr+L+W+1.60H									
Span # 1		1	1	4.530	8.95	106.18	0.08		
+1.20D+L+0.50S+W+1.60H									
Span # 1		1	1	4.530	8.95	106.18	0.08		
+1.20D+L+0.20S+E+1.60H									
Span # 1		1	1	4.530	8.95	106.18	0.08		

Overall Maximum Deflections - Unfactored Loads

Load Combination

Span

1

0.0020

4.621

0.0000

0.000

DRC

PZ23-12000026

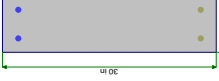
12/04/2024

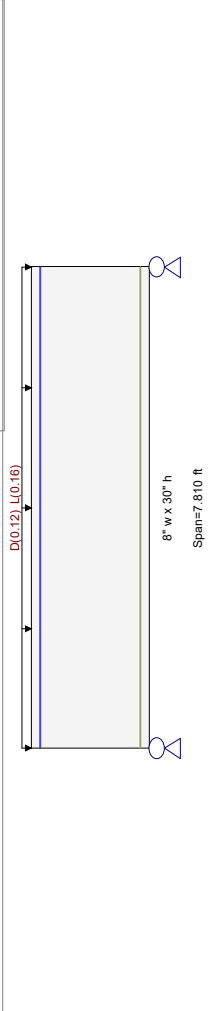
15/43

Concrete Beam

Description: 2B-4 (EL.+ 10'-6")

Lic. # :
Licensee :

Material Properties									
Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22									
f_c	=	4.0 ksi	ϕ	Phi Values	Flexure :	0.90			
f_r	=	$f_c / 2 = 7.50$			Shear :	0.750			
ψ	Density	= 150.0 pcf	β_1	=	0.850				
λ	LWIF Factor	= 1.0							
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups	=	40.0 ksi				
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi				
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #	=	3				
Number of Resisting Legs Per Stirrup			=	2					
Load Combination :ASCE 7-22									



Cross Section & Reinforcing Details	
Rectangular Section, Width = 8.0 in, Height = 30.0 in	2-#6 at 2.210 in from Bottom, from 0.0 to 9.060 ft in this span
Span #1 Reinforcing...	2-#6 at 2.210 in from Bottom, from 0.0 to 7.810 ft in this span
Service loads entered. Load Factors will be applied for calculation:	

Applied Loads	
Beam self weight calculated and added to loads	
Load for Span Number 1	
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 4.0 ft	
DESIGN SUMMARY	
Maximum Bending Stress Ratio = 0.050 : 1	Maximum Deflection
Section used for this span	Typical Section
Mu : Applied	5.337 k-ft
Mn * Phi : Allowable	106.18 k-ft
Load Combination	+1.20D+0.50L+1.60L+1.60H
Location of maximum on span	3.905 ft
Span # where maximum occurs	Span # 1
Design OK	
0.000 in	Ratio = 0 < 360
0.000 in	Ratio = 0 < 360
0.000 in	Ratio = 999 < 180
0.000 in	Ratio = 999 < 180

Vertical Reactions - Unfactored	
Load Combination	Support 1 Support 2
Overall MAXimum	2.070 2.070
D Only	1.445 1.445
L Only	0.625 0.625
D+L	2.070 2.070
Support notation : Far left is #1	

Shear Stirrup Requirements	
Entire Beam Span Length : Vu < PhiVc/2, Req'd Vs = Not Req'd, use stirrups spaced at 0.000 in	
Maximum Forces & Stresses for Load Combinations	
Load Combination	Location (ft) In Span
Segment Length	Span #
Bending Stress Results (k-ft)	Phi*Mn/Mx Stress Ratio
Mu : Max	

MAXimum BENDING Envelope									
Span # 1	1	3.905	5.34	106.18	0.05				
+1.20D+0.50L+1.60L+1.60H	1	3.905	5.34	106.18	0.05				
+1.20D+1.60L+0.50S+1.60H	1	3.905	5.34	106.18	0.05				
Span # 1	1	3.905	5.34	106.18	0.05				
+1.20D+1.60L+1.60H	1	3.905	4.61	106.18	0.04				
Span # 1	1	3.905	4.61	106.18	0.04				

Concrete Beam

Description: 2B-4 (EL.+ 10'-6")

Lic. # :
Licensee :

Overall Maximum Deflections - Unfactored Loads									
Load Combination									
D+L	1	0.0008	3.827	0.0000	0.0000				

Overall Maximum Deflections - Unfactored Loads									
Load Combination									
D+L	1	0.0008	3.827	0.0000	0.0000				

DRC

PZ23-12000026

12/04/2024

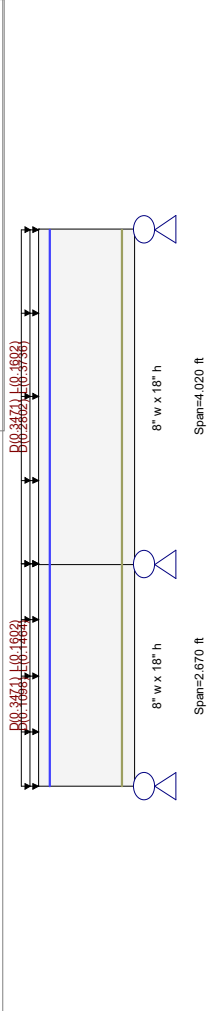
Material Properties

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22

$f_c = 1/2 \cdot 7.50 = 4.0$ ksi
 $f_r = f_c \cdot 7.50 = 474.34$ psi
 ψ Density = 150.0 pcf
 λ LWIF Factor = 1.0
Elastic Modulus = 3,122.0 ksi
 f_y - Main Rebar = 60.0 ksi
E - Main Rebar = 29,000.0 ksi
Number of Resisting Legs Per Stirrup = 2

ϕ Phi Values
Flexure : 0.90
Shear : 0.750
 $\beta_1 = 0.850$
 F_y - Stirrups = 40.0 ksi
E - Stirrups = 29,000.0 ksi
Stirrup Bar Size # = 3
Number of Resisting Legs Per Stirrup = 2

Load Combination: ASCE 7-22



Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 18.0 in

Span #1 Reinforcing...
2-#6 at 2.210 in from Top, from 0.0 to 2.670 ft in this span

Span #2 Reinforcing...
2-#6 at 2.210 in from Top, from 0.0 to 2.670 ft in this span

Applied Loads

Beam self weight calculated and added to loads

Load for Span Number 1
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 3.660 ft
Uniform Load : D = 0.130, L = 0.060 ksf, Tributary Width = 2.670 ft

Load for Span Number 2
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 9.340 ft
Uniform Load : D = 0.130, L = 0.060 ksf, Tributary Width = 2.670 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio = 0.044 : 1

Section used for this span

Mu : Applied

Mn * Phi : Allowable

Load Combination

Location of maximum on span

Span # where maximum occurs

DESIGN OK

Maximum Deflection

Max Downward L+L+S Deflection

Max Upward L+L+S Deflection

Max Downward Total Deflection

Max Upward Total Deflection

DRC

PZ23-12000026

12/04/2024

Load Combination	Segment Length	Span #	Location (ft) In Span	Bending Stress Results (k-ft)	
				Mu : Max	Phi/Mnx
+1.20D+1.60L+0.50S+1.60H	Span # 1	1	2.657	-2.57	58.69
	Span # 2	2	2.670	-2.60	58.69
+1.20D+1.60L+L+1.60H	Span # 1	1	2.657	-2.12	58.69
	Span # 2	2	2.670	-2.15	58.69
+1.20D+L+1.60S+1.60H	Span # 1	1	2.657	-2.12	58.69
	Span # 2	2	2.670	-2.15	58.69
+1.20D+0.50L+L+W+1.60H	Span # 1	1	2.657	-2.12	58.69
	Span # 2	2	2.670	-2.15	58.69
+1.20D+L+0.50S+W+1.60H	Span # 1	1	2.657	-2.12	58.69
	Span # 2	2	2.670	-2.15	58.69
+1.20D+L+0.20S+E+1.60H	Span # 1	1	2.657	-2.12	58.69
	Span # 2	2	2.670	-2.15	58.69

Overall Maximum Deflections - Unfactored Loads			
Load Combination	Span	Max. +/- Defl	Location in Span
D+L	1	0.0000	2.737
D+L	2	0.0004	2.211
			D+L
			Location in Span
			1.914
			1.914

Concrete Beam

License # : 2B-6 (EL: + 10'-6")

Description: 2B-6 (EL: + 10'-6")

Material Properties

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22

f_c

=

4.0 ksi

$f_r = f_c \cdot 7.50$

=

474.34 psi

ψ Density

=

150.0 pcf

λ LWf Factor

=

1.0

Elastic Modulus

=

3,122.0 ksi

f_y - Main Rebar

=

60.0 ksi

E - Main Rebar

=

29,000.0 ksi

Number of Resisting Legs Per Stirrup

=

2

ϕ Phi Values

Flexure :

0.90

Shear :

0.750

β_1

=

0.850

Fy - Stirrups

=

40.0 ksi

E - Stirrups

=

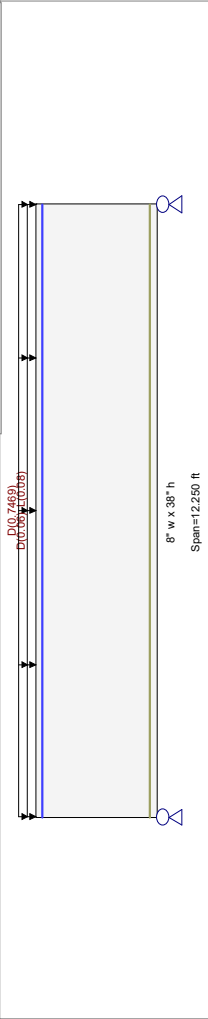
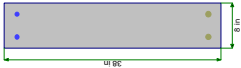
29,000.0 ksi

Stirrup Bar Size #

=

3

Load Combination: ASCE 7-22



Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 38.0 in

Span #1 Reinforcing...
2-#6 at 2.210 in from Top, from 0.0 to 12.250 ft in this span

Span #2 Reinforcing...
2-#6 at 2.210 in from Bottom, from 0.0 to 9.060 ft in this span

2-#7 at 2.210 in from Bottom, from 0.0 to 12.250 ft in this span

Service loads entered. Load Factors will be applied for calculation:

Applied Loads

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 2.0 ft

Uniform Load : D = 0.070 ksf, Tributary Width = 10.670 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio = 0.149 : 1

Section used for this span

Typical Section

Mu : Applied

Mn * Phi : Allowable

Load Combination

Location of maximum on span

Span # where maximum occurs

Maximum Deflection

Max Downward L+Lr+S Deflection

Max Upward L+Lr+S Deflection

Max Downward Total Deflection

Max Upward Total Deflection

Design OK

Vertical Reactions - Unfactored		Support notation : Far left is #1	
Load Combination		Support 1	Support 2
Overall Maximum		7.372	7.372
D Only		6.882	6.882
L Only		0.490	0.490
D+L		7.372	7.372

Shear Stirrup Requirements

Entire Beam Span Length : Vu < PhiVc/2, Req'd Vs = Not Req'd, use stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations					
Load Combination	Segment Length	Span #	Location (ft) In Span	Bending Stress Results (k-ft)	
				Mu : Max	Phi*Max
Maximum BENDING Envelope					
Span # 1		1	6.125	27.69	186.31
+1.20D+0.50L+1.60L+1.60H					0.15
Span # 1		1	6.125	27.69	186.31
+1.20D+1.60L+0.50S+1.60H					0.15
Span # 1		1	6.125	27.69	186.31
+1.20D+1.60Lr+1.60H					0.15

Concrete Beam

License # : 2B-6 (EL: + 10'-6")

Description: 2B-6 (EL: + 10'-6")

Load Combination		Segment Length	Span #	Location (ft) in Span	Bending Stress Results (k-ft)		
					Mu : Max	Phi*Mnx	Stress Ratio
Span # 1	+1.20D+L+1.60S+1.60H	1	1	6.125	26.79	186.31	0.14
Span # 1	+1.20D+0.50Lr+W+1.60H	1	1	6.125	26.79	186.31	0.14
Span # 1	+1.20D+L+0.50S+W+1.60H	1	1	6.125	26.79	186.31	0.14
Span # 1	+1.20D+L+0.20S+E+1.60H	1	1	6.125	26.79	186.31	0.14
Span # 1		1	1	6.125	26.79	186.31	0.14

Overall Maximum Deflections - Unfactored Loads				
Load Combination	Span	Max. "Δ" Defl	Location in Span	Load Combination
D+L	1	0.0053	6.003	Max. "Δ" Defl
				0.0000
				0.000

Overall Maximum Deflections - Unfactored Loads

Load Combination		Span		Location in Span		Max. +,- Defl		Location in Span	
D+L		1	0.0053	6.003		0.0000			0.000

DRC

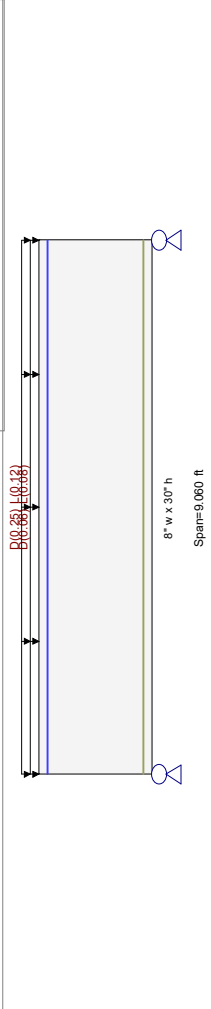
PZ23-12000026
12/04/2024

Concrete Beam

Description: 2B-7 (EL.+ 10'-6")

Lic. # :
Licensee :

Material Properties				Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22			
f_c	=	4.0 ksi	ϕ Phi Values	Flexure :	0.90		
f_r	=	474.34 psi		Shear :	0.750		
ψ Density	=	150.0 pcf	β_1	=	0.850		
λ LWI Factor	=	1.0					
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups	=	40.0 ksi		
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi		
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #	=	3		
			Number of Resisting Legs Per Stirrup	=	2		
Load Combination: ASCE 7-22							



Cross Section & Reinforcing Details	
Rectangular Section, Width = 8.0 in, Height = 30.0 in	2-#7 at 2.210 in from Bottom, from 0.0 to 12.250 ft in this span
Span #1 Reinforcing...	2-#6 at 2.210 in from Bottom, from 0.0 to 9.060 ft in this span
Applied Loads	Service loads entered. Load Factors will be applied for calculation:

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 2.0 ft
Uniform Load : D = 0.1250, L = 0.060 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY		Design OK	
Maximum Bending Stress Ratio	=	0.096 : 1	Maximum Deflection
Section used for this span		Typical Section	
Mu : Applied		10.178 k-ft	Max Downward L+Lr+S Deflection
Mn * Phi : Allowable		106.18 k-ft	Max Upward L+Lr+S Deflection
Load Combination		+1.20D+0.50L+1.60L+1.60H	Max Downward Total Deflection
Location of maximum on span		4.530 ft	Max Upward Total Deflection
Span # where maximum occurs		Span # 1	

Vertical Reactions - Unfactored				Support notation : Far left is #1	
Load Combination	Support 1	Support 2			
Overall Maximum	3.443	3.443			
D Only	2.537	2.537			
L Only	0.906	0.906			
D+L	3.443	3.443			

Shear Stirrup Requirements
Entire Beam Span Length : Vu < PhiVc/2, Req'd Vs = Not Req'd, use stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations					
Load Combination	Segment Length	Span #	Location (ft) in Span	Bending Stress Results (k-ft)	
				Mu : Max	Phi*Max Stress Ratio
MAXimum BENDING Envelope	Span # 1	1	4.530	106.18	0.10
	+1.20D+0.50Lr+1.60L+1.60H				
	Span # 1	1	4.530	106.18	0.10
	+1.20D+1.60L+0.50S+1.60H				
Span # 1	1	4.530	106.18	0.10	
	+1.20D+1.60Lr+1.60H				

Concrete Beam

Description: 2B-7 (EL.+ 10'-6")

Lic. # :
Licensee :

Load Combination				Bending Stress Results (k-ft)			
Segment Length	Span #	Location (ft) In Span	Mu : Max	Phi*Mnx	Stress Ratio		
Span # 1	1	4.530	8.95	106.18	0.08		
+1.20D+L+1.60S+1.60H							
Span # 1	1	4.530	8.95	106.18	0.08		
+1.20D+0.50Lr+L+W+1.60H							
Span # 1	1	4.530	8.95	106.18	0.08		
+1.20D+L+0.50S+W+1.60H							
Span # 1	1	4.530	8.95	106.18	0.08		
+1.20D+L+0.20S+E+1.60H							
Span # 1	1	4.530	8.95	106.18	0.08		
Overall Maximum Deflections - Unfactored Loads							
Load Combination	Span	Max. :+ Defl	Location in Span	Load Combination	Max. :+ Defl	Location in Span	
D+L	1	0.0020	4.621		0.0000		0.0000

DRC

PZ23-12000026

12/04/2024

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22

f_c

=

4.0 ksi

$f_r = f_c \cdot 1/2 \cdot 7.50$

=

474.34 psi

ψ Density

=

150.0 pcf

λ LWIF Factor

=

1.0

Elastic Modulus

=

3,122.0 ksi

f_y - Main Rebar

=

60.0 ksi

E - Main Rebar

=

29,000.0 ksi

Number of Resisting Legs Per Stirrup

=

2

ϕ Phi Values

Flexure :

0.90

Shear :

0.750

β_1

=

0.850

Fy - Stirrups

=

40.0 ksi

E - Stirrups

=

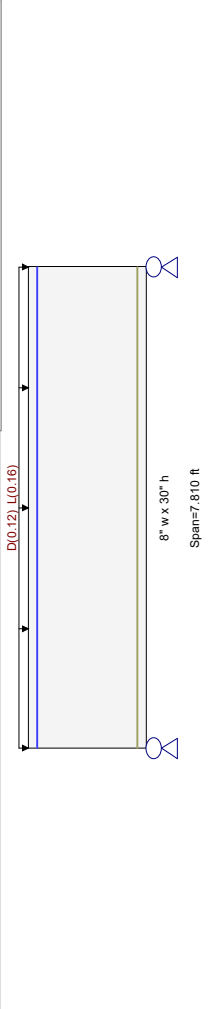
29,000.0 ksi

Stirrup Bar Size #

=

3

Load Combination: ASCE 7-22



Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 30.0 in

Span #1 Reinforcing...
2-#6 at 2.210 in from Top, from 0.0 to 7.810 ft in this span

Span #2 Reinforcing...
2-#6 at 2.210 in from Bottom, from 0.0 to 7.810 ft in this span

Service loads entered. Load Factors will be applied for calculation:

Applied Loads

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 4.0 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio = 0.050 : 1

Typical Section

Section used for this span

Mu : Applied

Mn * Phi : Allowable

Load Combination

Location of maximum on span

Span # where maximum occurs

Maximum Deflection

Max Downward L+L+S Deflection

Max Upward L+L+S Deflection

Max Downward Total Deflection

Max Upward Total Deflection

Vertical Reactions - Unfactored						Support notation : Far left is #1	
Load Combination		Support 1	Support 2				
Shear Stirrup Requirements							
Entire Beam Span Length : Vu < PhiVc2, Req'd Vs = Not Req'd, use stirrups spaced at 0.000 in							
Maximum Forces & Stresses for Load Combinations							
Load Combination	Segment Length	Span #	Location (ft) In Span	Bending Stress Results : (ksi)			
				Mu : Max	Phi*Minx Stress Ratio		
MAXimum BENDING Envelope							
Span # 1	1	3.905	5.34	106.18	0.05		
+1.20D+0.50Lr+1.60L+1.60H	1	3.905	5.34	106.18	0.05		
Span # 1	1	3.905	5.34	106.18	0.05		
+1.20D+1.60L+0.50S+1.60H	1	3.905	5.34	106.18	0.05		
Span # 1	1	3.905	5.34	106.18	0.05		
+1.20D+1.60Lr+L+1.60H	1	3.905	4.61	106.18	0.04		
Span # 1	1	3.905	4.61	106.18	0.04		
+1.20D+L+1.60S+1.60H	1	3.905	4.61	106.18	0.04		
Span # 1	1	3.905	4.61	106.18	0.04		
+1.20D+0.50Lr+L+W+1.60H	1	3.905	4.61	106.18	0.04		
Span # 1	1	3.905	4.61	106.18	0.04		
+1.20D+L+0.50S+W+1.60H	1	3.905	4.61	106.18	0.04		

20/43

Load Combination		Segment Length	Span #	Location (ft) In Span	Mu : Max	Phi*Mnx Stress Ratio
Span # 1		1	3.905	5.34	106.18	0.04
+1.20D+L+0.20S+E+1.60H		1	3.905	5.34	106.18	0.04
Span # 1		1	3.905	5.34	106.18	0.04
+1.20D+1.60L+0.50S+1.60H		1	3.905	4.61	106.18	0.04
Span # 1		1	3.905	4.61	106.18	0.04
+1.20D+L+1.60S+1.60H		1	3.905	4.61	106.18	0.04
Span # 1		1	3.905	4.61	106.18	0.04
+1.20D+0.50Lr+L+W+1.60H		1	3.905	4.61	106.18	0.04
Span # 1		1	3.905	4.61	106.18	0.04
+1.20D+L+0.50S+W+1.60H		1	3.905	4.61	106.18	0.04

Overall Maximum Deflections - Unfactored Loads					
Load Combination	Span	Max. +/- Defl	Location in Span	Load Combination	Max. +/- Defl
D+L	1	0.0008	3.827		0.0000
					0.0000

DRC

PZ23-12000026
12/04/2024

Material Properties

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22

$f_c = f_c^{1/2} \cdot 7.50 = 4.0 \text{ ksi}$

$f_r = f_c^{1/2} \cdot 7.50 = 474.34 \text{ psi}$

$\psi \text{ Density} = 150.0 \text{ pcf}$

$\lambda \text{ LWIF Factor} = 1.0$

$E \text{ Elastic Modulus} = 3,122.0 \text{ ksi}$

$f_y \text{ - Main Rebar} = 60.0 \text{ ksi}$

$E \text{ - Main Rebar} = 29,000.0 \text{ ksi}$

$\text{Number of Resisting Legs Per Stirrup} = 2$

$\phi \text{ Phi Values}$

$\text{Flexure} : 0.90$

$\text{Shear} : 0.750$

$\beta_1 = 0.850$

$F_y \text{ - Stirrups} = 40.0 \text{ ksi}$

$E \text{ - Stirrups} = 29,000.0 \text{ ksi}$

$\text{Stirrup Bar Size \#} = 3$

$\text{Number of Resisting Legs Per Stirrup} = 2$

Load Combination: ASCE 7-22

Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 18.0 in

Span #1 Reinforcing... 2-#6 at 2.210 in from Top, from 0.0 to 2.670 ft in this span

Span #2 Reinforcing... 2-#6 at 2.210 in from Top, from 0.0 to 2.670 ft in this span

Applied Loads

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 3.660 ft

Uniform Load : D = 0.130, L = 0.060 ksf, Tributary Width = 2.670 ft

Load for Span Number 2

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 9.340 ft

Uniform Load : D = 0.130, L = 0.060 ksf, Tributary Width = 2.670 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio = 0.044 : 1

Typical Section

Maximum Deflection

Section used for this span

Mu : Applied

Mn * Phi : Allowable

Load Combination

Location of maximum on span

Span # where maximum occurs

Max Downward L+L+R+S Deflection

Max Upward L+L+R+S Deflection

Max Downward Total Deflection

Max Upward Total Deflection

0.000 in

Ratio = 0<360

0.000 in

Ratio = 0<360

0.000 in

Ratio = 999<180

0.000 in

Ratio = 999<180

Vertical Reactions - Unfactored				Support notation : Far left is #1						
Load Combination		Support 1	Support 2	Support 3						
Shear Stirrup Requirements										
Entire Beam Span Length : Vu < PNU/2, Req'd Vs = Not Req'd, use stirrups spaced at 0.000 in										
Maximum Forces & Stresses for Load Combinations										
Load Combination		Bending Stress Results (k-ft)								
		Location (ft) In Span	Mu : Max	Phi*MnX	Stress Ratio					
Segment Length		Span #								
MAXimum BENDING Envelope										
Span # 1		1	2.657	-2.57	58.69	0.04				
Span # 2		2	2.670	-2.60	58.69	0.04				
+1.20D+0.50Lr+1.60L+1.60H										
Span # 1		1	2.657	-2.57	58.69	0.04				
Span # 2		2	2.670	-2.60	58.69	0.04				

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.

Title Block Line 6

Title :
Dsgnr:
Project Desc.:
Project Notes :

Job #

Printed: 25 JUL 2024 8:51AM
s:\arimDesktop\Unison001_Projects\Townhouses NW 15 St, 19 Ave (07-17-24)\Calcs\Townhouses.ec6, BKUP2
ENERCALC, INC. 1983-2011 Build 6.11.6.23

Concrete Beam

Lic. # :
Description: 2B-9 (EL.+ 10'-6")

Licensee :

Load Combination		Segment Length		Span #		Location (ft) In Span		Bending Stress Results (k-ft)		Stress Ratio	
								Mu : Max		Phi*MnX	
+1.20D+1.60L+0.50S+1.60H		Span # 1		1		2.657		-2.57		58.69	
		Span # 2		2		2.670		-2.60		58.69	
+1.20D+1.60Lr+L+1.60H		Span # 1		1		2.657		-2.12		58.69	
		Span # 2		2		2.670		-2.15		58.69	
+1.20D+L+1.60S+1.60H		Span # 1		1		2.657		-2.12		58.69	
		Span # 2		2		2.670		-2.15		58.69	
+1.20D+0.50Lr+L+W+1.60H		Span # 1		1		2.657		-2.12		58.69	
		Span # 2		2		2.670		-2.15		58.69	
+1.20D+L+0.50S+W+1.60H		Span # 1		1		2.657		-2.12		58.69	
		Span # 2		2		2.670		-2.15		58.69	
+1.20D+L+0.20S+E+1.60H		Span # 1		1		2.657		-2.12		58.69	
		Span # 2		2		2.670		-2.15		58.69	

Overall Maximum Deflections - Unfactored Loads					
Load Combination		Span		Location in Span	
				Max. +/- Defl	
D+L		1		0.0000	
D+L		2		0.0004	
				D+L	
				2.737	
				2.211	
				D+L	
				1.914	
				1.914	

DRC

PZ23-12000026

12/04/2024

21/43

Material Properties

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22

f_c

=

4.0 ksi

f_r

=

$f_c \cdot 1/2 \cdot 7.50$

ψ Density

=

474.34 psi

λ LWf Factor

=

150.0 pcf

Elastic Modulus

=

1.0

f_y - Main Rebar

=

60.0 ksi

E - Main Rebar

=

29,000.0 ksi

Number of Resisting Legs Per Stirrup

=

2

ϕ Phi Values

Flexure :

0.90

Shear :

0.750

β_1

=

0.850

Fy - Stirrups

=

40.0 ksi

E - Stirrups

=

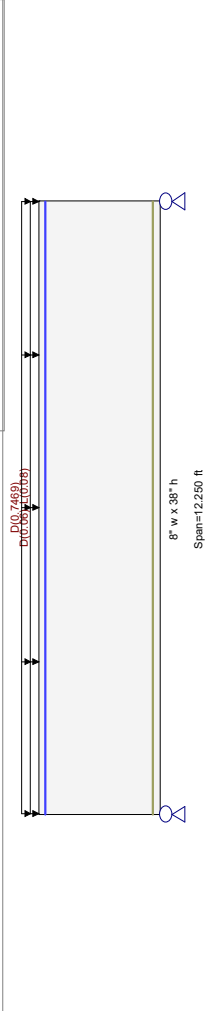
29,000.0 ksi

Stirrup Bar Size #

=

3

Load Combination: ASCE 7-22



Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 38.0 in

Span #1 Reinforcing...
2-#6 at 2.210 in from Top, from 0.0 to 12.250 ft in this span

2-#7 at 2.210 in from Bottom, from 0.0 to 12.250 ft in this span

2-#7 at 2.210 in from Bottom, from 0.0 to 12.250 ft in this span

Service loads entered. Load Factors will be applied for calculation:

Applied Loads

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 2.0 ft

Uniform Load : D = 0.070 ksf, Tributary Width = 10.670 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio = 0.149 : 1

Section used for this span

Typical Section

Mu : Applied

Mn * Phi : Allowable

Load Combination

Location of maximum on span

Span # where maximum occurs

Maximum Deflection

Max Downward L+Lr+S Deflection

Max Upward L+Lr+S Deflection

Max Downward Total Deflection

Max Upward Total Deflection

Design OK

Vertical Reactions - Unfactored		Support notation : Far left is #1	
Load Combination	Support 1	Support 2	
Overall Maximum	7.372	7.372	
D Only	6.882	6.882	
L Only	0.490	0.490	
D+L	7.372	7.372	

Shear Stirrup Requirements

Entire Beam Span Length : Vu < PhiVc/2, Req'd Vs = Not Req'd, use stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations		Bending Stress Results (k-ft)	
Load Combination	Location (ft) In Span	Mu : Max	Phi*Mnx Stress Ratio
MAXimum BENDING Envelope			
Span # 1	1	6.125	186.31
+1.20D+0.50Lr+1.60L+1.60H			
Span # 1	1	6.125	186.31
+1.20D+1.60L+0.50S+1.60H			
Span # 1	1	6.125	186.31
+1.20D+1.60Lr+L+1.60H			

Load Combination		Segment Length		Span #		Location (ft) In Span		Bending Stress Results (k-ft)	
								Mu : Max	
								Phi*Mnx	
								Stress Ratio	
Span # 1		+1.20D+L+1.60S+1.60H		1		6.125		186.31	
								0.14	
Span # 1		+1.20D+0.50Lr+L+W+1.60H		1		6.125		186.31	
								0.14	
Span # 1		+1.20D+L+0.50S+W+1.60H		1		6.125		186.31	
								0.14	
Span # 1		+1.20D+L+0.20S+E+1.60H		1		6.125		186.31	
								0.14	
Span # 1				1		6.125		186.31	
								0.14	

Overall Maximum Deflections - Unfactored Loads

Load Combination

Span

Max. +: Defl

Location in Span

Load Combination

Max. -: Defl

Location in Span

D+L

0.0053

6.003

0.0000

0.000

DRC

PZ23-12000026

12/04/2024

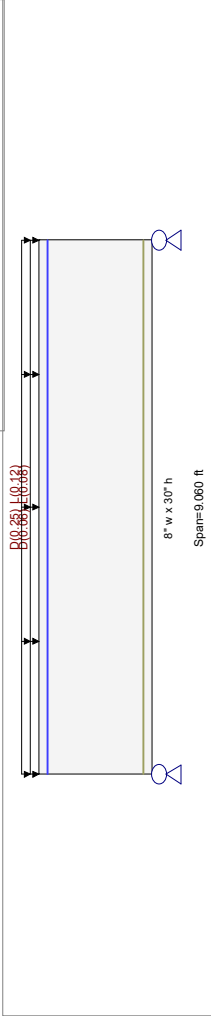
Concrete Beam

Description: 2B+11 (EL.+ 10'-6")

Lic. # :
Licensee :

Material Properties				Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22			
f_c	=	4.0 ksi	ϕ Phi Values	Flexure :	0.90		
f_r	=	474.34 psi	Shear :	0.750			
ψ Density	=	150.0 pcf	β_1	=	0.850		
λ LW/F Factor	=	1.0	Fy - Stirrups	40.0 ksi			
Elastic Modulus	=	3,122.0 ksi	E - Stirrups	=	29,000.0 ksi		
fy - Main Rebar	=	60.0 ksi	Stirrup Bar Size # =	#	3		
E - Main Rebar	=	29,000.0 ksi	Number of Resisting Legs Per Stirrup =	2			

Load Combination: ASCE 7-22



Cross Section & Reinforcing Details	
Rectangular Section, Width = 8.0 in, Height = 30.0 in	2-#6 at 2.210 in from Bottom, from 0.0 to 9.060 ft in this span
Span #1 Reinforcing...	2-#6 at 2.210 in from Bottom, from 0.0 to 9.060 ft in this span
2-#6 at 2.210 in from Top, from 0.0 to 9.060 ft in this span	Service loads entered. Load Factors will be applied for calculation:

Applied Loads	
Beam self weight calculated and added to loads	
Load for Span Number 1	
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 2.0 ft	
Uniform Load : D = 0.1250, L = 0.060 ksf, Tributary Width = 2.0 ft	

DESIGN SUMMARY	
Maximum Bending Stress Ratio =	0.096 : 1
Section used for this span	Typical Section
Mu : Applied	10.178 k-ft
Mn * Phi : Allowable	106.18 k-ft
Load Combination	+1.20D+0.50L+1.60L+1.60H
Location of maximum on span	4.530 ft
Span # where maximum occurs	Span # 1

Design OK	
Maximum Deflection	
Max Downward L+Lr+S Deflection	0.000 in Ratio = 0 < 360
Max Upward L+Lr+S Deflection	0.000 in Ratio = 0 < 360
Max Downward Total Deflection	0.002 in Ratio = 53079
Max Upward Total Deflection	0.000 in Ratio = 999 < 180

Vertical Reactions - Unfactored	
Load Combination	Support 1 Support 2
Overall Maximum	3.443 3.443
D Only	2.537 2.537
L Only	0.906 0.906
D+L	3.443 3.443

Shear Stirrup Requirements	
Entire Beam Span Length : Vu < PhiVc/2, Req'd Vs = Not Req'd, use stirrups spaced at	0.000 in

Maximum Forces & Stresses for Load Combinations			
Load Combination	Location (ft) In Span	Mu : Max	Phi*Mnx Stress Ratio
Segment Length	Span #		
MAXimum BENDING Envelope			
Span # 1	1	4.530	10.18 106.18 0.10
+1.20D+0.50Lr+1.60L+1.60H			
Span # 1	1	4.530	10.18 106.18 0.10
+1.20D+1.60L+0.50S+1.60H			
Span # 1	1	4.530	10.18 106.18 0.10
+1.20D+1.60Lr+L+1.60H			

Concrete Beam

Description: 2B+11 (EL.+ 10'-6")

Lic. # :
Licensee :

Load Combination				Bending Stress Results (k-ft)			
Segment Length	Span #	Location (ft) In Span	Mu : Max	Phi*Mnx	Stress Ratio		
Span # 1	1	4.530	8.95	106.18	0.08		
+1.20D+L+1.60S+1.60H							
Span # 1	1	4.530	8.95	106.18	0.08		
+1.20D+0.50Lr+L+W+1.60H							
Span # 1	1	4.530	8.95	106.18	0.08		
+1.20D+L+0.50S+W+1.60H							
Span # 1	1	4.530	8.95	106.18	0.08		
+1.20D+L+0.20S+E+1.60H							
Span # 1	1	4.530	8.95	106.18	0.08		

Overall Maximum Deflections - Unfactored Loads

Load Combination		Span	Max. :+ Defl	Location in Span	Load Combination	Max. :+ Defl	Location in Span
D+L		1	0.0020	4.621		0.0000	0.000

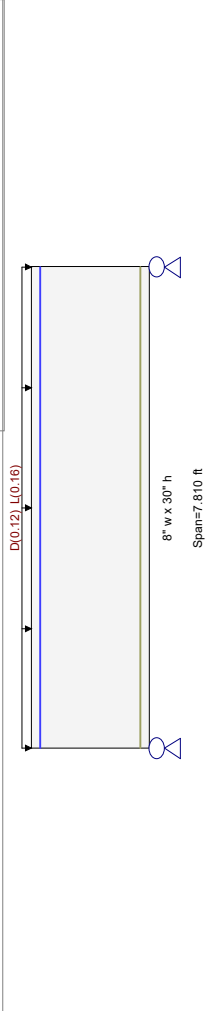
DRC

PZ23-12000026

12/04/2024

Material Properties				Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22			
f'c	=	4.0 ksi	φ	Phi Values	Flexure :	0.90	
f'r	=	474.34 psi			Shear :	0.750	
ψ	Density	= 150.0 pcf	β ₁	=	0.850		
λ	LWVF Factor	= 1.0					
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups	=	40.0 ksi		
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi		
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #	=	3		
			Number of Resisting Legs Per Stirrup	=	2		

Load Combination: ASCE 7-22



Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 30.0 in

Span #1 Reinforcing...

2-#6 at 2.210 in from Top, from 0.0 to 7.810 ft in this span

2-#6 at 2.210 in from Bottom, from 0.0 to 7.810 ft in this span

Service loads entered. Load Factors will be applied for calculation:

Applied Loads			
Beam self weight calculated and added to loads			
Load for Span Number 1			
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 4.0 ft			
DESIGN SUMMARY			
Maximum Bending Stress Ratio	=	0.050 : 1	Maximum Deflection
Section used for this span			
Mu : Applied	Typical Section		
Mn * Phi : Allowable	5.337 k-ft		
Load Combination	106.18 k-ft		
Location of maximum on span	+1.20D+0.50L+1.60L+1.60H		
Span # where maximum occurs	3.905 ft		
	Span # 1		

Vertical Reactions - Unfactored			
Load Combination	Support 1	Support 2	Support notation : Far left is #1
Overall MAXimum	2.070	2.070	
D Only	1.445	1.445	
L Only	0.625	0.625	
D+L	2.070	2.070	

Shear Stirrup Requirements

Entire Beam Span Length : Vu < PhiVc/2, Req'd Vs = Not Req'd, use stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations			
Load Combination	Location (ft) In Span	Bending Stress Results (k-ft)	Stress Ratio
		Mu : Max	Phi*Mnx
MAXimum BENDING Envelope	Span #		
Span # 1	1	3.905	106.18
+1.20D+0.50Lr+1.60L+1.60H			0.05
Span # 1	1	3.905	106.18
+1.20D+1.60L+0.50S+1.60H			0.05
Span # 1	1	3.905	106.18
+1.20D+1.60Lr+L+1.60H			0.05
Span # 1	1	3.905	106.18
			0.04

Overall Maximum Deflections - Unfactored Loads			
Load Combination	Span	Max. ** Defl	Location in Span
D+L	1	0.0008	3.827
			Max. ** Defl
		0.0000	Location in Span
			0.000

DRC

PZ23-12000026

12/04/2024

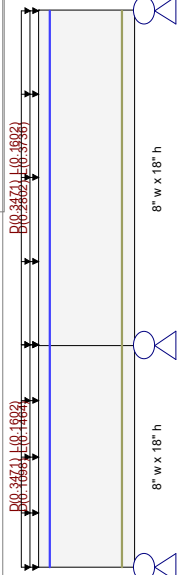
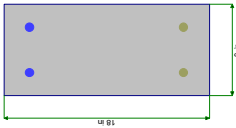
Material Properties

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22

$f_c = 4.0 \text{ ksi}$
 $f_r = 474.34 \text{ psi}$
 $\psi \text{ Density} = 150.0 \text{ pcf}$
 $\lambda \text{ LWIF Factor} = 1.0$
 $E \text{ Elastic Modulus} = 3,122.0 \text{ ksi}$
 $f_y \text{ - Main Rebar} = 60.0 \text{ ksi}$
 $E \text{ - Main Rebar} = 29,000.0 \text{ ksi}$
Number of Resisting Legs Per Stirrup = 2

$\phi \text{ Phi Values}$
Flexure : 0.90
Shear : 0.750
 $\beta_1 = 0.850$
 $F_y \text{ - Stirrups} = 40.0 \text{ ksi}$
 $E \text{ - Stirrups} = 29,000.0 \text{ ksi}$
Stirrup Bar Size # = 3
Stirrup = 2

Load Combination: ASCE 7-22



Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 18.0 in

Span #1 Reinforcing...
2-#6 at 2.210 in from Top, from 0.0 to 2.670 ft in this span

Span #2 Reinforcing...
2-#6 at 2.210 in from Top, from 0.0 to 2.670 ft in this span

Span #3 Reinforcing...
2-#6 at 2.310 in from Bottom, from 0.0 to 2.670 ft in this span

Service loads entered. Load Factors will be applied for calculation:

Applied Loads

Beam self weight calculated and added to loads

Load for Span Number 1
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 3.660 ft
Uniform Load : D = 0.130, L = 0.060 ksf, Tributary Width = 2.670 ft

Load for Span Number 2
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 9.340 ft
Uniform Load : D = 0.130, L = 0.060 ksf, Tributary Width = 2.670 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio = 0.044 : 1

Section used for this span

Mu : Applied

Mn * Phi : Allowable

Load Combination

Location of maximum on span

Span # where maximum occurs

Maximum Deflection

Max Downward L+Lr+S Deflection

Max Upward L+Lr+S Deflection

Max Downward Total Deflection

Max Upward Total Deflection

Vertical Reactions - Unfactored

Load Combination

Support 1

Support 2

Support 3

Support notation : Far left is #1

Shear Stirrup Requirements

Entire Beam Span Length : Vu < PNU/2, Req'd Vs = Not Req'd, use stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations

Load Combination

Segment Length

Span #

Location (ft) In Span

Mu : Max

Phi/Mnx

Stress Ratio

Segment Length	Span #	Location (ft) In Span	Mu : Max	Phi/Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	2.657	-2.57	58.69	0.04
Span # 2	2	2.670	-2.60	58.69	0.04
+1.20D+0.50Lr+1.60L+1.60H					
Span # 1	1	2.657	-2.57	58.69	0.04
Span # 2	2	2.670	-2.60	58.69	0.04

Load Combination	Segment Length	Span #	Location (ft) In Span	Mu : Max	Phi/Mnx	Stress Ratio
+1.20D+1.60L+0.50S+1.60H						
Span # 1	1	2.657	-2.57	58.69	0.04	0.04
Span # 2	2	2.670	-2.60	58.69	0.04	0.04
+1.20D+1.60Lr+L+1.60H						
Span # 1	1	2.657	-2.12	58.69	0.04	0.04
Span # 2	2	2.670	-2.15	58.69	0.04	0.04
+1.20D+L+1.60S+1.60H						
Span # 1	1	2.657	-2.12	58.69	0.04	0.04
Span # 2	2	2.670	-2.15	58.69	0.04	0.04
+1.20D+0.50Lr+L+W+1.60H						
Span # 1	1	2.657	-2.12	58.69	0.04	0.04
Span # 2	2	2.670	-2.15	58.69	0.04	0.04
+1.20D+L+0.50S+W+1.60H						
Span # 1	1	2.657	-2.12	58.69	0.04	0.04
Span # 2	2	2.670	-2.15	58.69	0.04	0.04
+1.20D+L+0.20S+E+1.60H						
Span # 1	1	2.657	-2.12	58.69	0.04	0.04
Span # 2	2	2.670	-2.15	58.69	0.04	0.04

Overall Maximum Deflections - Unfactored Loads	Span	Max. +/- Defl	Load Combination	Location in Span	Max. +/- Defl	Location in Span
D+L	1	0.0000	D+L	2.737	-0.0000	1.914
D+L	2	0.0004	D+L	2.211	0.0000	1.914

DRC

PZ23-12000026

12/04/2024

Title Block Line 1
Job #

Title :
Dsgnr:
Project Desc.:
Project Notes :

Title Block Line 1
Job #

Title :
Dsgnr:
Project Desc.:
Project Notes :

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22

Material Properties

f_c

=

4.0 ksi

$f_r = f_c / 2$

=

7.50

ψ Density

=

150.0 pcf

λ , LWH Factor

=

1.0

Elastic Modulus

=

3,122.0 ksi

Fy - Stirrups

=

40.0 ksi

E - Stirrups

=

29,000.0 ksi

Sirrup Bar Size #

=

3

E - Main Rebar

=

29,000.0 ksi

Number of Resisting Legs Per Slirrup

=

2

ϕ Phi Values

Flexure :

0.90

Shear :

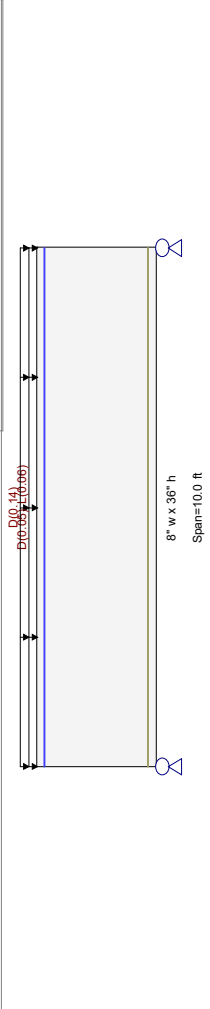
0.750

β_1

=

0.850

Load Combination : ASCE 7-22



Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 36.0 in

Span #1 Reinforcing...

2 #6 at 2.210 in from Top, from 0.0 to 10.0 ft in this span

2 #6 at 2.310 in from Bottom, from 0.0 to 10.0 ft in this span

Service loads entered. Load Factors will be applied for calculation:

Applied Loads

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.0250, L = 0.030 ksi, Tributary Width = 2.0 ft

Uniform Load : D = 0.070 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio = 0.066 : 1

Section used for this span

Mu : Applied

Mn * Phi : Allowable

Load Combination

Location of maximum on span

Span # where maximum occurs

Typical Section

8.550 k-ft

129.55 k-ft

+1.20D+0.50L+1.60L+1.60H

5.000 ft

Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection

Max Upward L+Lr+S Deflection

Max Downward Total Deflection

Max Upward Total Deflection

0.000 in

Ratio = 0 < 360

0.001 in

Ratio = 0 < 360

94254

0.000 in

Ratio = 999 < 180

Vertical Reactions - Unfactored			Support notation : Far left is #1
Load Combination	Support 1	Support 2	
Overall MAXimum	2.750	2.750	
D Only	2.450	2.450	
L Only	0.300	0.300	
D+L	2.750	2.750	

Shear Slirrup Requirements					Entire Beam Span Length : Vu < PNI/c2, Reqd Vs = Not Req'd, use stirrups spaced at 0.000 in		
Load Combination	Segment Length	Span #	Location (ft) in Span	Bending Stress Results (k-ft)	Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope							
Span # 1	1	5,000	8.55	129.55			0.07
+1.20D+0.50Lr+1.60L+1.60H	1	5,000	8.55	129.55			0.07
+1.20D+1.60L+0.50S+1.60H	1	5,000	8.55	129.55			0.07
+1.20D+1.60Lr+L+1.60H	1	5,000	8.55	129.55			0.07

DRC

PZ23-12000026
12/04/2024

Title Block Line 1
Job #

Title :
Dsgnr:
Project Desc.:
Project Notes :

Title Block Line 1
Job #

Title :
Dsgnr:
Project Desc.:
Project Notes :

Concrete Beam

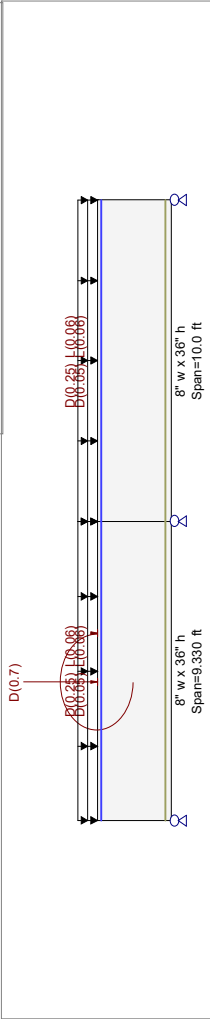
Description: 38-2 (E.L.+ 21'-6")

Material Properties

f_c = 4.0 ksi
 $f_r = f_c^{1/2} \cdot 7.50 = 474.34$ psi
 ψ Density = 150.0 pcf
 λ LWI Factor = 1.0
Elastic Modulus = 3,122.0 ksi
Fy - Stirrups = 40.0 ksi
E - Stirrups = 29,000.0 ksi
fy - Main Rebar = 60.0 ksi
E - Main Rebar = 29,000.0 ksi
Stirrup Bar Size # = 3
Number of Resisting Legs Per Stirrup = 2

Load Combination - ASCE 7-22

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22



Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 36.0 in
Span #1 Reinforcing... 2-#6 at 2.310 in from Bottom, from 0.0 to 10.0 ft in this span
Span #2 Reinforcing... 2-#7 at 2.210 in from Top, from 0.0 to 9.330 ft in this span
Span #2 Reinforcing... 2-#7 at 2.210 in from Bottom, from 0.0 to 9.330 ft in this span
Service loads entered. Load Factors will be applied for calculation:

Applied Loads

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.0250, L = 0.030 ksf, Tributary Width = 2.0 ft
Point Load : D = 0.70 K @ 4.330 ft
Uniform Load : D = 0.1250, L = 0.030 ksf, Tributary Width = 2.0 ft
Moment : D = 2.362 k-ft, Location = 4.330 ft from left end of this span
Load for Span Number 2
Uniform Load : D = 0.0250, L = 0.030 ksf, Tributary Width = 2.0 ft
Uniform Load : D = 0.1250, L = 0.030 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio = 0.066	1	Maximum Deflection
Section used for this span	Typical Section	Max Downward L+L+R-S Deflection
Mu : Applied	-11.618 k-ft	0.000 in Ratio = 0<360
Mn * Phi : Allowable	175.43 k-ft	0.000 in Ratio = 0<360
Load Combination	+1.20D+0.50L+1.60L+1.60H	0.000 in Ratio = 999<180
Location of maximum on span	0.000 ft	0.000 in Ratio = 999<180
Span # where maximum occurs	Span # 2	

Vertical Reactions - Unfactored

Load Combination	Support 1	Support 2	Support 3
Overall MAXIMUM	2.493	9.446	2.679
D Only	2.084	7.994	2.219
L Only	0.409	1.451	0.459
D+L	2.493	9.446	2.679

Shear Stirrup Requirements

Entire Beam Span Length : Vu < PHWG2, Req'd Vs = Not Req'd, use stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations

Concrete Beam

Description: 38-2 (E.L.+ 21'-6")

Load Combination Segment Length Span # Location (ft) in Span Mu : Max Phi/Max Stress Ratio

MAXIMUM BENDING Envelope						
Span # 1	1	9.286	-11.34	175.43	0.06	
Span # 2	2	9.330	-11.62	175.43	0.07	
+1.20D+0.50L+1.60L+1.60H						
Span # 1	1	9.286	-11.34	175.43	0.06	
Span # 2	2	9.330	-11.62	175.43	0.07	
+1.20D+1.60L+0.50S+1.60H						
Span # 1	1	9.286	-11.34	175.43	0.06	
Span # 2	2	9.330	-11.62	175.43	0.07	
+1.20D+1.60L+L+1.60H						
Span # 1	1	9.286	-10.52	175.43	0.06	
Span # 2	2	9.330	-10.77	175.43	0.06	
+1.20D+L+1.60S+1.60H						
Span # 1	1	9.286	-10.52	175.43	0.06	
Span # 2	2	9.330	-10.77	175.43	0.06	
+1.20D+0.50L+L+W+1.60H						
Span # 1	1	9.286	-10.52	175.43	0.06	
Span # 2	2	9.330	-10.77	175.43	0.06	
+1.20D+L+0.50S+W+1.60H						
Span # 1	1	9.286	-10.52	175.43	0.06	
Span # 2	2	9.330	-10.77	175.43	0.06	
+1.20D+L+0.20S+E+1.60H						

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. +/- Defl	Location in Span	Load Combination	Max. +/- Defl	Location in Span
D+L	1	0.0006	4.199		0.0000	0.000
D+L	2	0.0007	5.833		0.0000	0.000

DRC

PZ23-12000026

12/04/2024

Title Block Line 1
You can change this area using the "Settings" menu item and then using the "Printing & Title Block" selection.

Title Block Line 6

Title :
Dsgnr:
Project Desc.:
Project Notes :

Job #

Concrete Beam

Description : 3B-4 (EL.:+ 21'-6")

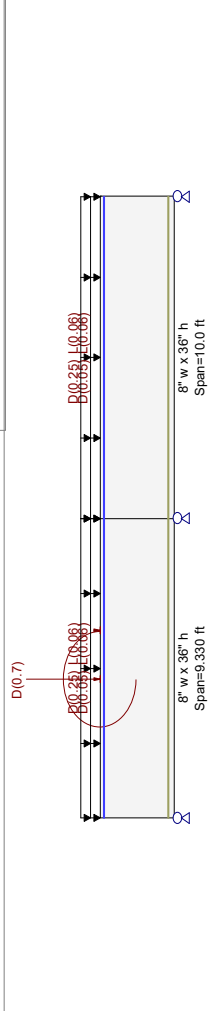
Licensee :

Material Properties

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22

f_c = 4.0 ksi
 $f_r = f_c \cdot 1/2 \cdot 7.50 = 474.34$ psi
 ψ Density = 150.0 pcf
 λ LW Factor = 1.0
Elastic Modulus = 3,122.0 ksi
Fy - Stirrups = 40.0 ksi
E - Stirrups = 29,000.0 ksi
fy - Main Rebar = 60.0 ksi
E - Main Rebar = 29,000.0 ksi
Number of Resisting Legs Per Stirrup = 3
2

Load Combination: ASCE 7-22



Gross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 36.0 in
Span #1 Reinforcing...
Span #2 Reinforcing...
Span #1 at 2.210 in from Top, from 0.0 to 9.330 ft in this span
Span #2 at 2.210 in from Top, from 0.0 to 9.330 ft in this span

Applied Loads

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.0250, L = 0.030 ksf, Tributary Width = 2.0 ft
Point Load : D = 0.70 k @ 4.330 ft
Uniform Load : D = 0.1250, L = 0.030 ksf, Tributary Width = 2.0 ft
Moment : D = 2.362 k-ft, Location = 4.330 ft from left end of this span
Load for Span Number 2
Uniform Load : D = 0.0250, L = 0.030 ksf, Tributary Width = 2.0 ft
Uniform Load : D = 0.1250, L = 0.030 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio = 0.066 : 1
Section used for this span
Mu : Applied
Mn * Phi : Allowable
Load Combination
Location of maximum on span
Span # where maximum occurs

Typical Section
-11.618 k-ft
175.43 k-ft
+1.20D+0.50L+1.60L+1.60H
0.000 ft
Span # 2

Maximum Deflection
Max Downward L+L+R+S Deflection
Max Upward L+L+R+S Deflection
Max Downward Total Deflection
Max Upward Total Deflection

0.000 in
0.000 in
0.000 in
0.000 in
Ratio = 0
Ratio = 0
Ratio = 999
Ratio = 999

Vertical Reactions - Unfactored

Load Combination	Support 1	Support 2	Support 3
Overall Maximum	2.493	9.446	2.679
D Only	2.084	7.994	2.219
L Only	0.409	1.451	0.459
D+L	2.493	9.446	2.679

Shear Stirrup Requirements

Entire Beam Span Length : Vu < PhiVc2, Reqd Vs = Not Reqd, use stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Location (ft) in Span	Mu : Max	Phi*Mmx	Stress Ratio
Bending Stress Results (k-ft)						

Title Block Line 1
You can change this area using the "Settings" menu item and then using the "Printing & Title Block" selection.

Title Block Line 6

Job #

Concrete Beam

Description : 3B-4 (EL.:+ 21'-6")

Licensee :

MAXIMUM BENDING ENVELOPE		Span		Max. +, - Defl		Location in Span		Load Combination		Max. +, - Defl		Location in Span	
Span # 1	1	9.286	11.34	175.43	0.06								
Span # 2	2	9.330	-11.62	175.43	0.07								
+1.20D+0.50L+1.60L+1.60H	1	9.286	-11.34	175.43	0.06								
Span # 1	2	9.330	-11.62	175.43	0.07								
+1.20D+1.60L+0.50S+1.60H	1	9.286	-11.34	175.43	0.06								
Span # 1	2	9.330	-11.62	175.43	0.07								
+1.20D+1.60L+L+1.60H	1	9.286	-10.52	175.43	0.06								
Span # 1	2	9.330	-10.77	175.43	0.06								
+1.20D+L+1.60S+1.60H	1	9.286	-10.52	175.43	0.06								
Span # 1	2	9.330	-10.77	175.43	0.06								
+1.20D+0.50L+L+W+1.60H	1	9.286	-10.52	175.43	0.06								
Span # 1	2	9.330	-10.77	175.43	0.06								
+1.20D+L+0.50S+W+1.60H	1	9.286	-10.52	175.43	0.06								
Span # 1	2	9.330	-10.77	175.43	0.06								
+1.20D+L+0.20S+E+1.60H	1	9.286	-10.52	175.43	0.06								
Span # 1	2	9.330	-10.77	175.43	0.06								

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. +, - Defl	Location in Span	Max. +, - Defl	Location in Span
D+L	1	0.0006	4.199	0.0000	0.000
D+L	2	0.0007	5.833	0.0000	0.000

DRC

PZ23-12000026

12/04/2024

Title Block Line 1
Job #

Title :
Dsgnr:
Project Desc.:
Project Notes :

Title Block Line 1
Job #

Title :
Dsgnr:
Project Desc.:
Project Notes :

Concrete Beam

Concrete Beam

Description: 3B-5 (EL.+ 21'-4")

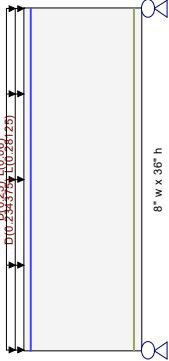
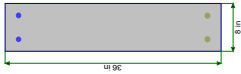
Description: 3B-5 (EL.+ 21'-4")

Material Properties

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22

f_c = 4.0 ksi
 $f_r = f_c \cdot \frac{1}{2} \cdot 7.50 = 474.34$ psi
 ψ Density = 150.0 pcf
 β_1 = 0.850
 λ , LWIF Factor = 1.0
Elastic Modulus = 3,122.0 ksi
Fy - Stirrups = 40.0 ksi
E - Stirrups = 29,000.0 ksi
fy - Main Rebar = 60.0 ksi
E - Main Rebar = 29,000.0 ksi
Stirrup Bar Size # = 3
Number of Resisting Legs Per Stirrup = 2

Load Combination: ASCE 7-22



Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 36.0 in
Span #1 Reinforcing...
2-#6 at 2.210 in from Top, from 0.0 to 6.670 ft in this span
2-#7 at 2.310 in from Bottom, from 0.0 to 9.330 ft in this span
2-#7 at 2.310 in from Bottom, from 0.0 to 6.670 ft in this span

Service loads entered. Load Factors will be applied for calculation:

Applied Loads

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.0250, L = 0.030 ksf, Tributary Width = 9.375 ft
Uniform Load : D = 0.1250, L = 0.030 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio = 0.047 : 1		Typical Section		Maximum Deflection	
Section used for this span	Mu : Applied	8.271 k-ft	Max Downward L+L+R Deflection	0.000 in	Ratio = 0 < 360
Mn * Phi : Allowable	174.97 k-ft	Max Upward L+L+R Deflection	0.000 in	Ratio = 0 < 360	
Load Combination	+1.20D+0.50L+1.60L+1.60H	Max Downward Total Deflection	0.000 in	Ratio = 999 < 180	
Location of maximum on span	3.335 ft	Max Upward Total Deflection	0.000 in	Ratio = 999 < 180	
Span # where maximum occurs	Span # 1				

Vertical Reactions - Unfactored

Load Combination	Support 1	Support 2
Overall Maximum	3.754	3.754
D Only	2.616	2.616
L Only	1.138	1.138
D+L	3.754	3.754

Shear Stirrup Requirements

Entire Beam Span Length : Vu < PhiVc/2, Reqd Vs = Not Reqd, use stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Location (ft) In Span	Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope						
Span # 1	1	3.335	8.27	174.97	0.05	
+1.20D+0.50L+1.60L+1.60H	1	3.335	8.27	174.97	0.05	
+1.20D+1.60L+0.50S+1.60H	1	3.335	8.27	174.97	0.05	
+1.20D+1.60L+L+1.60H	1	3.335	8.27	174.97	0.05	

DRC

PZ23-12000026

12/04/2024

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. Defl	Location in Span	Load Combination	Max. *+ Defl	Location in Span
D+L	1	0.0005	3.268		0.0000	0.000

Title Block Line 1
Job #

Title :
Dsgnr:
Project Desc.:
Project Notes :

Title Block Line 1
Job #

Title :
Dsgnr:
Project Desc.:
Project Notes :

Printed: 26 AUG 2024, 10:11AM
s:\skop\Unison\001_Projects\Townhouses NW 15 St, 19 Ave (07-17-24)\Calc\Townhouses 07-25-24.ec6.BKUP2
ENR.CALC, INC. 1983-2011 Build6.11.6.23, Ver:6.11.6.23
Licensee :
Description: 38-6 (EL+/- 21'-6")

Concrete Beam
Lic. #: 38-6 (EL+/- 21'-6")

Printed: 26 AUG 2024, 10:11AM
s:\skop\Unison\001_Projects\Townhouses NW 15 St, 19 Ave (07-17-24)\Calc\Townhouses 07-25-24.ec6.BKUP2
ENR.CALC, INC. 1983-2011 Build6.11.6.23, Ver:6.11.6.23
Licensee :
Description: 38-6 (EL+/- 21'-6")

Concrete Beam
Lic. #: 38-6 (EL+/- 21'-6")

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22

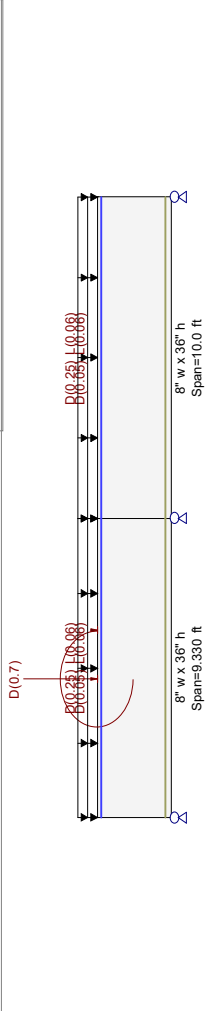
Material Properties

$f_c = f_c^{1/2} \cdot 7.50 = 4.0 \text{ ksi}$
 $f_r = f_c^{1/2} \cdot 7.50 = 474.34 \text{ psi}$
 $\psi \text{ Density} = 150.0 \text{ pcf}$
 $\lambda, \text{ LWI Factor} = 1.0$
 $\text{Elastic Modulus} = 3,122.0 \text{ ksi}$
 $f_y - \text{Main Rebar} = 60.0 \text{ ksi}$
 $E - \text{Main Rebar} = 29,000.0 \text{ ksi}$
 $\text{Number of Resisting Legs Per Stirrup} = 2$

$\phi \text{ Phi Values}$
 $\text{Flexure} : 0.90$
 $\text{Shear} : 0.750$
 $\beta_1 = 0.850$
 $F_y - \text{Stirrups} = 40.0 \text{ ksi}$
 $E - \text{Stirrups} = 29,000.0 \text{ ksi}$
 $\text{Stirrup Bar Size} \# = 3$
 $\text{Number of Resisting Legs Per Stirrup} = 2$

Load Combination - ASCE 7-22

Load Combination	Segment Length	Span #	Location (ft) in Span	Bending Stress Results (k-ft)	
				Mu : Max	Phi/Mu
MAXIMUM BENDING ENVELOPE	Span # 1	1	9.286	-11.34	175.43
	Span # 2	2	9.330	-11.62	175.43
+1.20D+0.50Lr+1.60L+1.60H	Span # 1	1	9.286	-11.34	175.43
	Span # 2	2	9.330	-11.62	175.43
+1.20D+1.60L+0.50S+1.60H	Span # 1	1	9.286	-11.34	175.43
	Span # 2	2	9.330	-11.62	175.43
+1.20D+1.60Lr+1.60H	Span # 1	1	9.286	-10.52	175.43
	Span # 2	2	9.330	-10.77	175.43
+1.20D+L+1.60S+1.60H	Span # 1	1	9.286	-10.52	175.43
	Span # 2	2	9.330	-10.77	175.43
+1.20D+0.50Lr+L-W+1.60H	Span # 1	1	9.286	-10.52	175.43
	Span # 2	2	9.330	-10.77	175.43
+1.20D+L+0.50S-W+1.60H	Span # 1	1	9.286	-10.52	175.43
	Span # 2	2	9.330	-10.77	175.43
+1.20D+L+0.20S-E+1.60H	Span # 1	1	9.286	-10.52	175.43
	Span # 2	2	9.330	-10.77	175.43
Overall Maximum Deflections - Unfactored Loads					
D+L			1	0.0006	4.199
D-L			2	0.0007	5.833
				Max. "+/-" Defl	Location in Span
				0.0000	0.000
				0.0000	0.000



Cross Section & Reinforcing Details	
Rectangular Section, Width = 8.0 in, Height = 36.0 in	2-#7 at 2.310 in from Bottom, from 0.0 to 9.330 ft in this span
Span #1 Reinforcing...	2-#7 at 2.310 in from Bottom, from 0.0 to 9.330 ft in this span
Span #2 Reinforcing...	2-#7 at 2.310 in from Bottom, from 0.0 to 9.330 ft in this span
Service loads entered. Load Factors will be applied for calculation:	

Applied Loads

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.0250, L = 0.030 ksf, Tributary Width = 2.0 ft

Point Load : D = 0.70 K @ 4.330 ft

Uniform Load : D = 0.1250, L = 0.030 ksf, Tributary Width = 2.0 ft

Moment : D = 2.362 k-ft, Location = 4.330 ft from left end of this span

Load for Span Number 2

Uniform Load : D = 0.0250, L = 0.030 ksf, Tributary Width = 2.0 ft

Uniform Load : D = 0.1250, L = 0.030 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio = 0.066 : 1

Section used for this span

Typical Section

Mu : Applied

Mn * Phi : Allowable

Location of maximum on span

Span # where maximum occurs

Maximum Deflection

Max Downward L+Lr+S Deflection

Max Upward L+Lr+S Deflection

Max Downward Total Deflection

Max Upward Total Deflection

Ratio = 0.000 in

Ratio = 0.000 in

Ratio = 999 < 180

Ratio = 999 < 180

Vertical Reactions - Unfactored			
Load Combination	Support 1	Support 2	Support 3
Overall MAXIMUM	2.493	9.446	2.679
D Only	2.084	7.994	2.219
L Only	0.409	1.451	0.459
D+L	2.493	9.446	2.679

Shear Stirrup Requirements

Entire Beam Span Length : Vu < PHVGZ, Req'd Vs = Not Req'd, use stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations

DRC

PZ23-12000026

12/04/2024

Title Block Line 1
Job #

Title :
Dsgnr:
Project Desc.:
Project Notes :

Title Block Line 1
Job #

Title :
Dsgnr:
Project Desc.:
Project Notes :

Concrete Beam

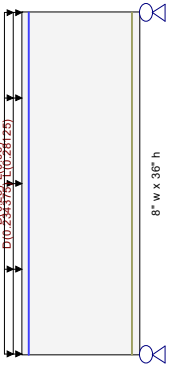
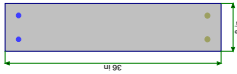
Description: 3B-7 (EL.-+ 21'-6")

Description: 3B-7 (EL.-+ 21'-6")

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22

f_c	$=$	4.0 ksi	ϕ Phi Values	Flexure :	0.90
f_r	$= f_c \cdot \frac{1}{2} \cdot 7.50$	$= 474.34$ psi		Shear :	0.750
ψ Density	$=$	150.0 pcf	β_1	$=$	0.850
λ , LWIF Factor	$=$	1.0			
Elastic Modulus	$=$	3,122.0 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	$=$	60.0 ksi	E - Stirrups	$=$	29,000.0 ksi
E - Main Rebar	$=$	29,000.0 ksi	Stirrup Bar Size #	$=$	3
			Number of Resisting Legs Per Stirrup	$=$	2

Load Combination :ASCE 7-22



Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 36.0 in
Span #1 Reinforcing...
2-#6 at 2.210 in from Top, from 0.0 to 6.670 ft in this span
2-#7 at 2.310 in from Bottom, from 0.0 to 9.330 ft in this span
2-#7 at 2.310 in from Bottom, from 0.0 to 6.670 ft in this span
Service loads entered. Load Factors will be applied for calculation:

Applied Loads

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.0250, L = 0.030 ksf, Tributary Width = 9.375 ft
Uniform Load : D = 0.1250, L = 0.030 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio	$=$	0.047 : 1	Maximum Deflection	
Section used for this span		Typical Section	Max Downward L+Lr+S Deflection	0.000 in Ratio = 0 <360
Mu : Applied		8.271 k-ft	Max Upward L+Lr+S Deflection	0.000 in Ratio = 0 <360
Mn * Phi : Allowable		174.97 k-ft	Max Downward Total Deflection	0.000 in Ratio = 999 <180
Load Combination		+1.20D+0.50Lr+1.60L+1.60H	Max Upward Total Deflection	0.000 in Ratio = 999 <180
Location of maximum on span		3.335 ft		
Span # where maximum occurs		Span # 1		

Vertical Reactions - Unfactored

Load Combination	Support 1	Support 2
Overall Maximum	3.754	3.754
D Only	2.616	2.616
L Only	1.138	1.138
D+L	3.754	3.754

Shear Stirrup Requirements

Entire Beam Span Length : Vu < PhiVc/2, Req'd Vs = Not Req'd, use stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Location (ft) In Span	Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope						
Span # 1	1	3.335	8.27	174.97	0.05	
+1.20D+0.50Lr+1.60L+1.60H	1	3.335	8.27	174.97	0.05	
+1.20D+1.60L+0.50S+1.60H	1	3.335	8.27	174.97	0.05	
+1.20D+1.60Lr+L+1.60H	1	3.335	8.27	174.97	0.05	

DRC

PZ23-12000026

12/04/2024

DRC

PZ23-12000026

12/04/2024

STEEL COLUMNS DESIGN

Title Block Line 1 Job #

Title: Job #

You can change this area using the "Settings" menu item and then using the "Printing & Title Block" selection.

Dsgnr: Project Desc.: Project Notes:

Printed: 22 JUL 2024, 4:17PM

Printed: 22 JUL 2024, 4:17PM

Steel Column

VariantDesktop\Unison001_Projects\Townhouses NW 15 St, 19 Ave (07:17:29)\Calc\Townhouses.ec6.BKUP2

Licensee :

Licensee :

Description :

Description :

General Information

Steel Section Properties

Steel Section Name : HSS4X4X1/4
Analysis Method : ASCE 7-22
Steel Stress Grade :
Fy : Steel Yield : 46.0 ksi
E : Elastic Bending Modulus : 29,000.0 ksi
Load Combination : Allowable Stress

Depth : 4.00 in
Web Thick : 0.00 in
Flange Width : 4.00 in
Flange Thick : 0.250 in
Area : 3.370 in²
Weight : 12.181 plf
I xx : 7.80 in⁴
S xx : 3.90 in³
R xx : 1.520 in
I yy : 7.80 in⁴
S yy : 3.90 in³
R yy : 1.520 in
Ycg : 0.000 in

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

Ycg : 0.000 in

Applied Loads
Column self weight included : 127.90 lbs * Dead Load Factor
AXIAL LOADS :
Axial Load at 10.50 ft, D = 3.0, L = 3.50 k

J = 12.800 in⁴

DESIGN SUMMARY

Bending & Shear Check Results
PASS Max. Axial-Bending Stress Ratio =
Load Combination
Location of max above base :
At maximum location values are :
Pu : Axial : 6.628 k
Pn / Omega : Allowable : 58.517 k
Mu-x / Omega : Applied : 0.0 k-ft
Mn-x / Omega : Allowable : 10.765 k-ft
Mu-y : Applied : 0.0 k-ft
Mn-y / Omega : Allowable : 10.765 k-ft
Maximum Shear Stress Ratio =
Load Combination
Location of max above base :
At maximum location values are :
Vu : Applied : 0.0 k
Vn / Omega : Allowable : 0.0 k

Maximum SERVICE Load Reactions :
Top along X-X : 0.0 k
Bottom along X-X : 0.0 k
Top along Y-Y : 0.0 k
Bottom along Y-Y : 0.0 k
Maximum SERVICE Load Deflections :
Along Y-Y : 0.0 in at
for load combination :
Along X-X : 0.0 in at
for load combination :
0.0 ft above base
0.0 ft above base

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
	Stress Ratio	Status	Location	Stress Ratio	Status	Location
+D+L+H	0.113	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750L+0.750L+H	0.098	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750L+0.750S+H	0.098	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750L+0.750L+0.450W+H	0.098	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750L+0.750S+0.450W+H	0.098	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750L+0.750S+0.5250E+H	0.098	PASS	0.00 ft	0.000	PASS	0.00 ft

Note: Only non-zero reactions are listed

Note: Only non-zero reactions are listed

Load Combination	X-X Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Axial Reaction @ Base
D Only			
L Only	k	k	3.128 k
D+L	k	k	3.500 k
	k	k	6.628 k

Maximum Deflections for Load Combinations - Unfactored Loads

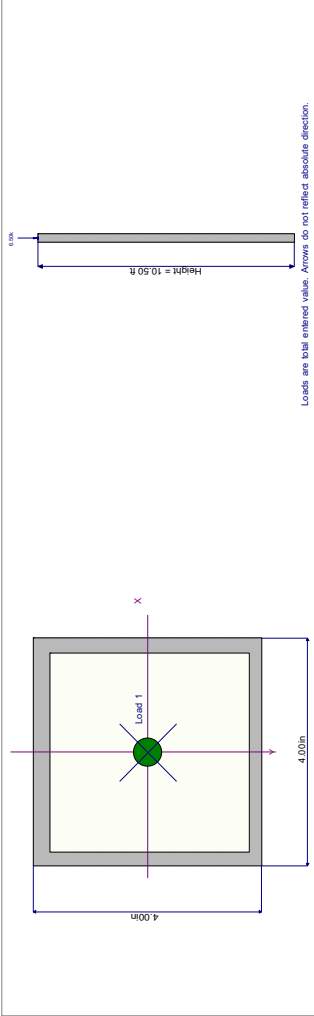
Load Combination	Max. X-X Deflection	Max. Y-Y Deflection	Distance
D Only	0.000 in	0.000 in	0.000 ft
L Only	0.000 in	0.000 in	0.000 ft
D+L	0.000 in	0.000 in	0.000 ft

Steel Section Properties : HSS4X4X1/4

DRC

PZ23-12000026

12/04/2024



Title Block Line 1
You can change this area using the "Settings" menu item and then using the "Printing & Title Block" selection.
Title Block Line 6

Title :
Dsgnr:
Project Desc.:
Project Notes :

Job #

Calculations per **ASCE 360-17, IBC 2022, CBC 2022, ASCE 7-22**

Steel Section Name : **HSS4X4X1/4**
Analysis Method : **ASCE 7-22**
Steel Stress Grade :
Fy : Steel Yield : **46.0 ksi**
E : Elastic Bending Modulus : **29,000.0 ksi**
Load Combination : **Allowable Stress**

Overall Column Height : **11.0 ft**
Top & Bottom Fixity : **Top & Bottom Pinned**

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 11 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 11 ft, K = 1.0

Applied Loads
Column self weight included : 133.99 lbs * Dead Load Factor
AXIAL LOADS :
Axial Load at 11.0 ft, D = 5.0, L = 5.250 k
BENDING LOADS :
Lat. Uniform Load creating Mx-x, W = 0.30 k/ft

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

DESIGN SUMMARY

Bending & Shear Check Results
PASS Max. Axial-Bending Stress Ratio = **0.2988** : 1
Load Combination : **+D+0.60W+H**
Location of max above base : **5.463 ft**
At maximum location values are :
Pu : Axial : **5.134 k**
Pn / Omega : Allowable : **55.943 k**
Mu-x / Omega : Allowable : **-2.722 k-ft**
Mu-y / Omega : Allowable : **10.765 k-ft**
Mn-x / Omega : Allowable : **10.765 k-ft**
Mu-y / Omega : Allowable : **10.765 k-ft**
for load combination : **W Only**
Along X-X : **0.0 in** at **0.0 ft** above base
Along Y-Y : **-0.4416 in** at **5.537 ft** above base

PASS Maximum Shear Stress Ratio = **0.03894** : 1
Load Combination : **+D+0.60W+H**
Location of max above base : **0.0 ft**
At maximum location values are :
Vu : Applied : **0.990 k**
Vn / Omega : Allowable : **25.423 K**

Maximum SERVICE Load Reactions :
Top along X-X : **0.0 k**
Bottom along X-X : **0.0 k**
Top along Y-Y : **1.650 k**
Bottom along Y-Y : **1.650 k**

Maximum SERVICE Load Deflections :
Along Y-Y : **-0.4416 in** at **5.537 ft** above base
for load combination : **W Only**
Along X-X : **0.0 in** at **0.0 ft** above base
for load combination :

Load Combination	Maximum Axial + Bending Stress Ratios		Maximum Shear Ratios	
	Stress Ratio	Status	Stress Ratio	Status
+D+L+H	0.186	PASS	0.000	PASS
+D+0.750L+0.750L+H	0.162	PASS	0.000	PASS
+D+0.750L+0.750S+H	0.162	PASS	0.000	PASS
+D+0.60W+H	0.299	PASS	0.039	PASS
+D+0.750L+0.750L+0.450W+H	0.271	PASS	0.029	PASS
+D+0.750L+0.750S+0.450W+H	0.271	PASS	0.029	PASS
+0.60D+0.60W+0.60H	0.280	PASS	0.039	PASS
+D+0.750L+0.750S+0.5250E+H	0.162	PASS	0.000	PASS

Note: Only non-zero reactions are listed

Load Combination	X-X Axis Reaction @ Base		Y-Y Axis Reaction @ Base		Axial Reaction @ Base	
	Stress Ratio	Status	Stress Ratio	Status	Stress Ratio	Status
D Only						
L Only						
W Only						
D+L						
D+W						
D+L+W						

Title Block Line 1
You can change this area using the "Settings" menu item and then using the "Printing & Title Block" selection.
Title Block Line 6

Title :
Dsgnr:
Project Desc.:
Project Notes :

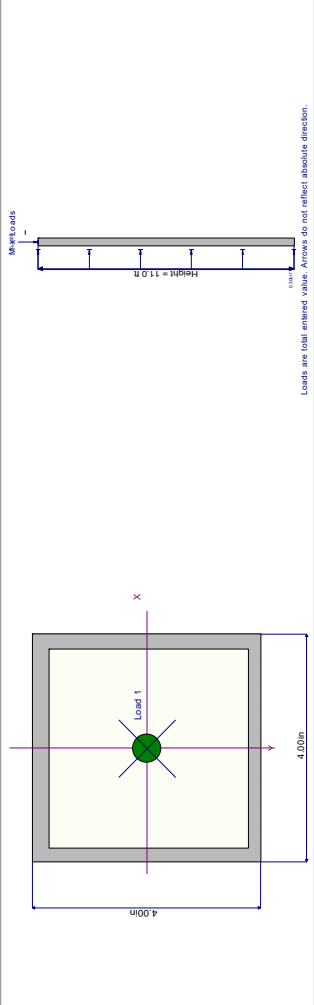
Job #

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.000 in	0.000 ft	-0.442 in	5.537 ft
D+L	0.000 in	0.000 ft	0.000 in	0.000 ft
D+W	0.000 in	0.000 ft	-0.442 in	5.537 ft
D+L+W	0.000 in	0.000 ft	-0.442 in	5.537 ft

Steel Section Properties : HSS4X4X1/4
Depth = 4.00 in I xx = 7.80 in⁴ J = 12.800 in⁴
Web Thick = 0.00 in S xx = 3.90 in³
Flange Width = 4.00 in R xx = 1.520 in
Flange Thick = 0.250 in I yy = 7.800 in⁴
Area = 3.370 in² S yy = 3.900 in³
Weight = 12.181 plf R yy = 1.520 in

Ycg = 0.000 in



DRC

PZ23-12000026

12/04/2024

DRC

PZ23-12000026

12/04/2024

FOOTINGS DESIGN

Job #

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Title :
Dsgnr:
Project Desc.:
Project Notes :

Printed: 25 JUL 2024 9:03AM
s:\ram\DiskOp\Unison001_Projects\Townhouses.ec6_BKLP2
ENERCALC, INC. 1983-2011, Build 6.11.6.23, Ver 6.11.6.23
Licensee :
Title Block Line 6

General Footing

Description : F-40

General Information		Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22		
Material Properties		Soil Design Values		
Tc : Concrete 28 day strength	=	3.0 ksi	Allowable Soil Bearing	2.50 ksf
fy : Rebar Yield	=	60.0 ksi	Increase Bearing By Footing Weight	No
Ec : Concrete Elastic Modulus	=	3,122.0 ksi	Soil Passive Resistance (for Sliding)	250.0 pcf
Concrete Density	=	145.0 pcf	Soil/Concrete Friction Coeff.	0.30
φ Values				
Flexure	=	0.90		
Shear	=	0.750		
Analysis Settings		Increases based on footing Depth		
Min Steel % Bending Reinf.	=	0.00140	Footing base depth below soil surface	ft
Min Allow % Temp Reinf.	=	0.00180	Allowable pressure increase per foot of depth=	ksf
Min. Overturning Safety Factor	=	1.0 : 1	when footing base is below	ft
Min. Sliding Safety Factor	=	1.0 : 1		
Add Fig Wt for Soil Pressure	:	Yes		
Use fig wt for stability, moments & shears :	:	Yes	Increases based on footing plan dimension	ksf
Include Pedestal Weight as DL	:	No	Allowable pressure increase per foot of depth =	ft
			when maximum length or width is greater than	
Dimensions				

Dimensions

Width parallel to X-X Axis	=	4.0 ft
Length parallel to Z-Z Axis	=	4.0 ft
Footing Thickness	=	16.0 in

Pedestal dimensions:		
px: parallel to X-X Axis	=	8.0 in
pz: parallel to Z-Z Axis	=	24.0 in
Height	=	12.0 in
Rebar Centerline to Edge of Concrete..		
at Bottom of footing	=	2.0 in

Reinforcing

Bars parallel to X-X Axis		
Number of Bars	=	5.0
Reinforcing Bar Size	=	# 5
Bars parallel to Z-Z Axis		
Number of Bars	=	5.0
Reinforcing Bar Size	=	# 5

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a

Applied Loads

P : Column Load	=								
OB : Overburden	=								
M-xx	=								
M-zz	=								
V-x	=								
V-z	=								

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Job #

Title :
Dsgnr:
Project Desc.:
Project Notes :

Printed: 25 JUL 2024 9:03AM
s:\ram\DiskOp\Unison001_Projects\Townhouses.ec6_BKLP2
ENERCALC, INC. 1983-2011, Build 6.11.6.23, Ver 6.11.6.23
Licensee :
Title Block Line 6

General Footing

Description : F-40

DESIGN SUMMARY		Governing Load Combination	
Min. Ratio	Item	Applied	Capacity
PASS	0.2523	0.6308 ksf	2.50 ksf
PASS	n/a	0.0 k-ft	0.0 k-ft
PASS	n/a	0.0 k-ft	0.0 k-ft
PASS	n/a	0.0 k	0.0 k
PASS	n/a	0.0 k	0.0 k
PASS	n/a	0.0 k	0.0 k
PASS	0.03655	0.8680 k-ft	23.750 k-ft
PASS	0.03655	0.8680 k-ft	23.750 k-ft
PASS	0.01316	0.3124 k-ft	23.750 k-ft
PASS	0.01316	0.3124 k-ft	23.750 k-ft
PASS	0.02174	1.786 psi	82.158 psi
PASS	0.02174	1.786 psi	82.158 psi
PASS	n/a	0.0 psi	82.158 psi
PASS	n/a	0.0 psi	82.158 psi
PASS	0.02751	3.767 psi	136.93 psi

Detailed Results

Soil Bearing		Actual Soil Bearing Stress		Actual / Allowable Ratio	
Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc	+Z	-X
Overturning Stability		Overturning Moment		Stability Ratio	
Rotation Axis & Load Combination...	Overturning Moment		Resisting Moment		Status
Footing Has NO Overturning					All units k
Sliding Stability		Sliding Force		Sliding Safety Ratio	
Force Application Axis Load Combination...	Sliding Force		Resisting Force		Status
Footing Has NO Sliding					
Footing Flexure		Mu		Phi/Mn	
Flexure Axis & Load Combination	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Actual As in^2	Status
One Way Shear		Vu @ -X		Vu @ +Z	
Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu / Phi/Vn
Punching Shear		Vu		Phi/Vn	
Load Combination...	Vu	Vu	Vu	Vu	All units k

DRC

PZ23-12000026

12/04/2024

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.

Title Block Line 6

Title :
Dsgnr:
Project Desc.:
Project Notes :

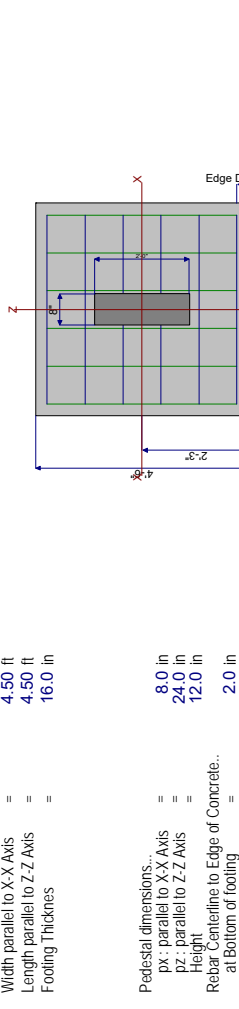
Job #

Printed: 25 JUL 2024 9:04AM
s:\arim\Desktop\Unison001_Projects\Townhouses.ec6.BKLP2
ENERCALC, INC. 1983-2011, BUILD 6.11.6.23, Ver 6.11.6.23

General Footing

License :
Description : F-46

Material Properties		Soil Design Values	
f'c : Concrete 28 day strength	= 3.0 ksi	Allowable Soil Bearing	= 2.50 ksf
fy : Rebar Yield	= 60.0 ksi	Increase Bearing By Footing Weight	= No
Ec : Concrete Elastic Modulus	= 3,122.0 ksi	Soil Passive Resistance (for Sliding)	= 250.0 pcf
Concrete Density	= 145.0 pcf	Soil Concrete Friction Coef.	= 0.30
φ Values	Flexure = 0.90 Shear = 0.750	Increases based on footing Depth	
Analysis Settings		Footing base depth below soil surface	
Min Steel % Bending Reinf.	= 0.00140	Allowable pressure increase per foot of depth =	
Min Allow % Temp Reinf.	= 0.00180	when footing base is below	
Min. Overturning Safety Factor	= 1.0 : 1	Increases based on footing plan dimension	
Min. Sliding Safety Factor	= 1.0 : 1	Allowable pressure increase per foot of depth =	
Add Ftg Wt for Soil Pressure	= Yes	when maximum length or width is greater 4	
Use fgt wrt for stability, moments & shears :	Yes		
Include Pedestal Weight as DL :	No		
Dimensions			
Width parallel to X-X Axis	= 4.50 ft		
Length parallel to Z-Z Axis	= 4.50 ft		
Footing Thickness	= 16.0 in		



Reinforcing		Reinforcing Bar Size	
Bars parallel to X-X Axis	=	6.0	
Number of Bars	=	# 5	
Reinforcing Bar Size	=		
Bars parallel to Z-Z Axis	=	6.0	
Number of Bars	=	# 5	
Reinforcing Bar Size	=		
Bandwidth Distribution Check (ACI 15.4.4.2)			
Direction Requiring Closer Separation	=	n/a	
# Bars required within zone	=	n/a	
# Bars required on each side of zone	=	n/a	
Applied Loads			
P : Column Load	=	D	Lr
OB : Overburden	=	11.0	0.0
	=	0.0	0.0
M-xx	=		
M-zz	=	0.0	0.0
V-x	=	0.0	0.0
V-z	=	0.0	0.0

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.

Title Block Line 6

Title :
Dsgnr:
Project Desc.:
Project Notes :

Job #

Printed: 25 JUL 2024 9:04AM
s:\arim\Desktop\Unison001_Projects\Townhouses.ec6.BKLP2
ENERCALC, INC. 1983-2011, BUILD 6.11.6.23, Ver 6.11.6.23

General Footing

License :
Description : F-46

DESIGN SUMMARY		Governing Load Combination	
Min. Ratio	Item	Applied	Capacity
PASS	Soil Bearing	0.8402 ksf	2.50 ksf
PASS	Overturning - X-X	0.0 k-ft	0.0 k-ft
PASS	Overturning - Z-Z	0.0 k-ft	0.0 k-ft
PASS	Sliding - X-X	0.0 k	0.0 k
PASS	Sliding - Z-Z	0.0 k	0.0 k
PASS	Uplift	0.0 k	0.0 k
PASS	Z Flexure (+X)	1.502 k-ft	25.286 k-ft
PASS	Z Flexure (-X)	1.502 k-ft	25.286 k-ft
PASS	X Flexure (+Z)	0.6388 k-ft	25.286 k-ft
PASS	X Flexure (-Z)	0.6388 k-ft	25.286 k-ft
PASS	1-way Shear (+X)	3.505 psi	82.158 psi
PASS	1-way Shear (-X)	3.797 psi	82.158 psi
PASS	1-way Shear (+Z)	0.2921 psi	82.158 psi
PASS	1-way Shear (-Z)	0.2921 psi	82.158 psi
PASS	2-way Punching	6.978 psi	136.93 psi
Detailed Results			
Soil Bearing		Actual Soil Bearing Stress	
Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc
Overturning Stability		+Z	-X
Rotation Axis & Load Combination...	Overturning Moment	Stability Ratio	Status
Footing Has NO Overturning		All units k	
Sliding Stability			
Force Application Axis Load Combination...		Resisting Force	
Footing Has NO Sliding		Sliding Safety Ratio	
Footing Flexure			
Flexure Axis & Load Combination	Mu	Which Side ?	Tension @ Bot. or Top ?
One Way Shear			
Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z
Punching Shear			
Load Combination...	Vu	Phi*Vu	Vu / Phi*Vu
		All units k	
		Status	

DRC

PZ23-12000026

12/04/2024

Title Block Line 1
You can change this area using the "Settings" menu item and then using the "Printing & Title Block" selection.

Title Block Line 6

Title: Job #
Dsgnr:
Project Desc.:
Project Notes :

s:\stadiumDesktop\unison001_P\Projects\Townhouses NW 15 St, 19 Ave (07-17-20)\Calc\Townhouses.ec6.BKUP2	
Printed: 25 JUL 2024, 10:50AM	
ENERCALC, INC. 1983-2011, Build 6.11.6.23, Ver 6.11.6.23	
Licensee :	
Uc. # :	MF-20

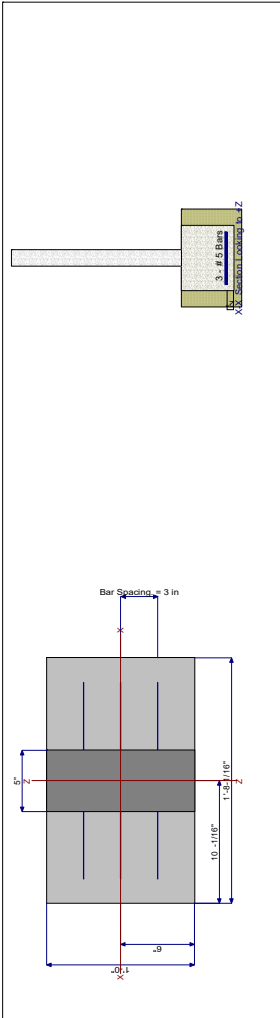
General Information

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22

Material Properties	
fc : Concrete 28 day strength	= 3.0 ksi
fy : Rebar Yield	= 60.0 ksi
Ec : Concrete Elastic Modulus	= 3,122.0 ksi
Concrete Density	= 150.0 pcf
φ Values	= 0.90
Flexure	= 0.750
Shear	= 0.00140
Analysis Settings	= 0.00180
Min Steel % Bending Reinf.	= 1.0 %
Min Allow % Temp Reinf.	= 1.0 %
Min. Overturning Safety Factor	= 1.0
Min. Sliding Safety Factor	= 1.0
AutoCalc Footing Weight as DL	= Yes

Dimensions

Footing Width	= 1.667 ft	Footing Thickness	= 16.0 in	Bars along X-X Axis	= 3
Wall Thickness	= 5.0 in	Rebar Centerline to Edge of Concrete..			
Wall center offset from center of footing	= 0 in	at Bottom of footing	= 2.0 in	Reinforcing Bar Size	= # 5



Applied Loads	
P : Column Load	= 0.270
OB : Overburden	= 0.0
V-x	= 0.0
M-zz	= 0.0
Vx applied	= 0.0 in above top of footing
DESIGN SUMMARY	
Min. Ratio	Item
PASS	0.1616 Soil Bearing
PASS	n/a Overturning - Z-Z
PASS	n/a Sliding - X-X
PASS	n/a Uplift
PASS	0.002646 Z Flexure (+X)
PASS	0.002646 Z Flexure (-X)
PASS	n/a 1-way Shear (+X)
PASS	0.0 1-way Shear (-X)

Governing Load Combination	
Capacity	+D+L+H
250 ksf	No Overturning
0.0 k-ft	No Sliding
0.0 k	No Uplift
0.0 k	+1.20D+0.50L+1.60L+
54,774 k-ft	+1.20D+0.50L+1.60L+
54,774 k-ft	n/a
82,158 psi	n/a
0.0 psi	

Title Block Line 1
You can change this area using the "Settings" menu item and then using the "Printing & Title Block" selection.

Title Block Line 6

Title: Job #
Dsgnr:
Project Desc.:
Project Notes :

s:\stadiumDesktop\unison001_P\Projects\Townhouses NW 15 St, 19 Ave (07-17-20)\Calc\Townhouses.ec6.BKUP2	
Printed: 25 JUL 2024, 10:50AM	
ENERCALC, INC. 1983-2011, Build 6.11.6.23, Ver 6.11.6.23	
Licensee :	
Uc. # :	MF-20

Detailed Results

Soil Bearing	
Rotation Axis & Load Combination...	
+D+L+H	
+D+0.750L+0.750L+H	
+D+0.750L+0.750S+H	
+D+0.750L+0.750L+0.450W+H	
+D+0.750L+0.750S+0.450W+H	
+D+0.750L+0.750S+0.5250E+H	
Overturning Stability	

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.

Title Block Line 6

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.

Title Block Line 6

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.

Title Block Line 6

Job #

Title :
Dsgnr:
Project Desc.:
Project Notes :

Printed: 25. JUL 2024, 9:10AM

staramDesktop\Unison001_Projects\Townhouses NW 15 St, 19 Ave (03-17-20)\Calc\Townhouses.ec6, BKLIP2

ENRCALC, INC. 1983-2011, Build 6.11.6.23, Ver 6.11.6.23

License :

MF-24

Wall Footing

Description :

Printed: 25. JUL 2024, 9:10AM

staramDesktop\Unison001_Projects\Townhouses NW 15 St, 19 Ave (03-17-20)\Calc\Townhouses.ec6, BKLIP2

ENRCALC, INC. 1983-2011, Build 6.11.6.23, Ver 6.11.6.23

License :

MF-24

Wall Footing

Description :

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22

Material Properties

f'c: Concrete 28 day strength = 3.0 ksi

fy: Rebar Yield = 60.0 ksi

Ec: Concrete Elastic Modulus = 3,122.0 ksi

Concrete Density = 150.0 pcf

φ Values

Flexure = 0.90

Shear = 0.750

Analysis Settings

Min Steel % Bending Reinf. = 0.00140

Min Allow % Temp Reinf. = 0.00180

Min. Overturning Safety Factor = 1.0 : 1

Min. Sliding Safety Factor = 1.0 : 1

AutoCalc Footing Weight as DL : Yes

Dimensions

Footing Width = 2.0 ft

Footing Thickness = 8.0 in

Wall Thickness = 8.0 in

Wall center offset from center of footing = 0 in

Reinforcing

Bars along X-X Axis = 16.0 in

of Bars in 12" Width = 3

Reinforcing Bar Size = 2.0 in

Reinforcing Bar Size = # 5

Soil Design Values

Allowable Soil Bearing = 2.50 ksf

Increase Bearing By Footing Weight = No

Soil Passive Resistance (for Sliding) = 250.0 pcf

Soil/Concrete Friction Coef. = 0.30

Increases based on footing Depth

Reference Depth below Surface = ft

Allow. Pressure Increase per foot of depth when base footing is below = ft

Increases based on footing Width

Allow. Pressure Increase per foot of width = ksf

when footing is wider than = ft

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...

Xecc

Zecc

+Z

-Z

Actual Soil Bearing Stress

+Z

-Z

Actual / Allowable Ratio

+D+L+H

2.50 ksf

0.0 in

1.639 ksf

1.639 ksf

0.656

+D+0.750L+0.750S+H

2.50 ksf

0.0 in

1.584 ksf

1.584 ksf

0.634

+D+0.750L+0.750S+0.450W+H

2.50 ksf

0.0 in

1.584 ksf

1.584 ksf

0.634

+D+0.750L+0.750S+0.450W+H

2.50 ksf

0.0 in

1.584 ksf

1.584 ksf

0.634

+D+0.750L+0.750S+0.5250E+H

2.50 ksf

0.0 in

1.584 ksf

1.584 ksf

0.634

Overturning Stability

Units : k-ft

Rotation Axis & Load Combination...

Overturning Moment

Resisting Moment

Stability Ratio

Status

Footing Has NO Overturning

Sliding Stability

Force Application Axis

Load Combination...

Sliding Force

Resisting Force

Sliding Safety Ratio

Status

Footing Has NO Sliding

Footing Flexure

Flexure Axis & Load Combination

Mu

Which Side ?

Tension @ Bot. or Top ?

As Req'd in'2

Gvrn. As in'2

Actual As in'2

Phi*Mu k-ft

Status

+1.20D+0.50L+1.60L+1.60H

0.5099

-X

Bottom

0.0108

Calc'd Bending

0.93

54.774

OK

+1.20D+0.50L+1.60L+1.60H

0.5099

-X

Bottom

0.0108

Calc'd Bending

0.93

54.774

OK

+1.20D+1.60L+0.50S+1.60H

0.5099

-X

Bottom

0.0108

Calc'd Bending

0.93

54.774

OK

+1.20D+1.60L+1.60H

0.4807

-X

Bottom

0.0102

Calc'd Bending

0.93

54.774

OK

+1.20D+1.60L+1.60H

0.4807

-X

Bottom

0.0102

Calc'd Bending

0.93

54.774

OK

+1.20D+L+1.60S+1.60H

0.4807

-X

Bottom

0.0102

Calc'd Bending

0.93

54.774

OK

+1.20D+0.50L+L+W+1.60H

0.4807

-X

Bottom

0.0102

Calc'd Bending

0.93

54.774

OK

+1.20D+0.50L+L+W+1.60H

0.4807

-X

Bottom

0.0102

Calc'd Bending

0.93

54.774

OK

+1.20D+L+0.50S+W+1.60H

0.4807

-X

Bottom

0.0102

Calc'd Bending

0.93

54.774

OK

+1.20D+L+0.50S+W+1.60H

0.4807

-X

Bottom

0.0102

Calc'd Bending

0.93

54.774

OK

+1.20D+L+0.20S+E+1.60H

0.4807

-X

Bottom

0.0102

Calc'd Bending

0.93

54.774

OK

One Way Shear

Units : k

Load Combination...

Vu @ -X

Vu @ +X

Vu/Max

Phi Vn

Vu / Phi*Vn

Status

+1.20D+0.50L+1.60L+1.60H

0 psi

0 psi

0 psi

0 psi

0

OK

+1.20D+1.60L+0.50S+1.60H

0 psi

0 psi

0 psi

0 psi

0

OK

+1.20D+1.60L+1.60H

0 psi

0 psi

0 psi

0 psi

0

OK

+1.20D+L+1.60S+1.60H

0 psi

0 psi

0 psi

0 psi

0

OK

+1.20D+0.50L+L+W+1.60H

0 psi

0 psi

0 psi

0 psi

0

OK

+1.20D+L+0.50S+W+1.60H

0 psi

0 psi

0 psi

0 psi

0

OK

+1.20D+L+0.20S+E+1.60H

0 psi

0 psi

0 psi

0 psi

0

OK

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...

Xecc

Zecc

+Z

-Z

Actual Soil Bearing Stress

+Z

-Z

Actual / Allowable Ratio

+D+L+H

2.50 ksf

0.0 in

1.639 ksf

1.639 ksf

0.656

+D+0.750L+0.750S+H

2.50 ksf

0.0 in

1.584 ksf

1.584 ksf

0.634

+D+0.750L+0.750S+0.450W+H

2.50 ksf

0.0 in

1.584 ksf

1.584 ksf

0.634

+D+0.750L+0.750S+0.450W+H

2.50 ksf

0.0 in

1.584 ksf

1.584 ksf

0.634

+D+0.750L+0.750S+0.5250E+H

2.50 ksf

0.0 in

1.584 ksf

1.584 ksf

0.634

Overturning Stability

Units : k-ft

Rotation Axis & Load Combination...

Overturning Moment

Resisting Moment

Stability Ratio

Status

Footing Has NO Overturning

Sliding Stability

Force Application Axis

Load Combination...

Sliding Force

Resisting Force

Sliding Safety Ratio

Status

Footing Has NO Sliding

Footing Flexure

Flexure Axis & Load Combination

Mu

Which Side ?

Tension @ Bot. or Top ?

As Req'd in'2

Gvrn. As in'2

Actual As in'2

Phi*Mu k-ft

Status

+1.20D+0.50L+1.60L+1.60H

0.5099

-X

Bottom

0.0108

Calc'd Bending

0.93

54.774

OK

+1.20D+0.50L+1.60L+1.60H

0.5099

-X

Bottom

0.0108

Calc'd Bending

0.93

54.774

OK

+1.20D+1.60L+0.50S+1.60H

0.5099

-X

Bottom

0.0108

Calc'd Bending

0.93

54.774

OK

+1.20D+1.60L+1.60H

0.4807

-X

Bottom

0.0102

Calc'd Bending

0.93

54.774

OK

+1.20D+1.60L+1.60H

0.4807

-X

Bottom

0.0102

Calc'd Bending

0.93

54.774

OK

+1.20D+L+1.60S+1.60H

0.4807

-X

Bottom

0.0102

Calc'd Bending

0.93

54.774

OK

+1.20D+0.50L+L+W+1.60H

0.4807

-X

Bottom

0.0102

Calc'd Bending

0.93

54.774

OK

+1.20D+0.50L+L+W+1.60H

0.4807

-X

Bottom

0.0102

Calc'd Bending

0.93

54.774

OK

+1.20D+L+0.50S+W+1.60H

0.4807

-X

Bottom

0.0102

Calc'd Bending

0.93

54.774

OK

+1.20D+L+0.50S+W+1.60H

0.4807

-X

Bottom

0.0102

Calc'd Bending

0.93

54.774

OK

+1.20D+L+0.20S+E+1.60H

0.4807

-X

Bottom

0.0102

Calc'd Bending

0.93

54.774

OK

One Way Shear

Units : k

Load Combination...

Vu @ -X

Vu @ +X

Vu/Max

Phi Vn

Vu / Phi*Vn

Status

+1.20D+0.50L+1.60L+1.60H

0 psi

0 psi

0 psi

0 psi

0

OK

+1.20D+1.60L+0.50S+1.60H

0 psi

0 psi

0 psi

0 psi

0

OK

+1.20D+1.60L+1.60H

0 psi

0 psi

0 psi

0 psi

0

OK

+1.20D+L+1.60S+1.60H

0 psi

0 psi

0 psi

0 psi

0

OK

+1.20D+0.50L+L+W+1.60H

0 psi

0 psi

0 psi

0 psi

0

OK

+1.20D+L+0.50S+W+1.60H

0 psi

0 psi

0 psi

0 psi

0

OK

+1.20D+L+0.20S+E+1.60H

0 psi

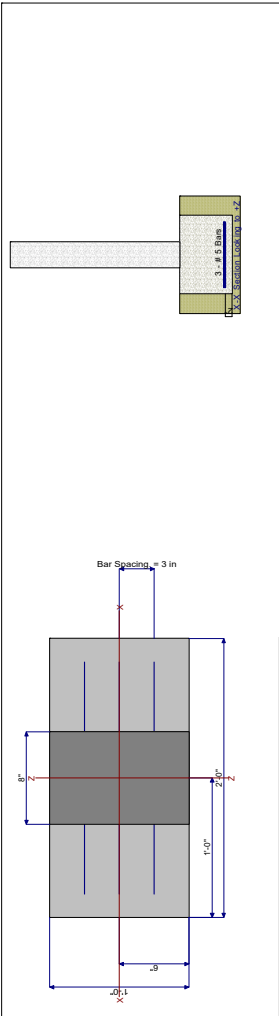
0 psi

0 psi

0 psi

0

OK



Applied Loads

P : Column Load

OB : Overburden

V-x

M-zz

Vx applied = in above top of footing

DESIGN SUMMARY

Min. Ratio

Item

Applied

Capacity

Governing Load Combination

PASS

0.657

Soil Bearing

1.639 ksf

2.50 ksf

+D+L+H

PASS

n/a

Overturning - Z-Z

0.0 k-ft

0.0 k-ft

No Overturning

PASS

n/a

Sliding - X-X

0.0 k

0.0 k

No Sliding

PASS

n/a

Uplift

0.0 k

0.0 k

No Uplift

PASS

0.009310

Z Flexure (+X)

0.5099 k-ft

54.774 k-ft

+1.20D+0.50L+1.60L+

PASS

0.009310

Z Flexure (-X)

0.5099 k-ft

54.774 k-ft

+1.20D+0.50L+1.60L+

PASS

n/a

1-way Shear (+X)

0.0 psi

82.158 psi

n/a

PASS

0.0

1-way Shear (-X)

0.0 psi

82.158 psi

n/a

Applied Loads

P : Column Load

OB : Overburden

V-x

M-zz

Vx applied = in above top of footing

DESIGN SUMMARY

Min. Ratio

Item

Applied

Capacity

Governing Load Combination

PASS

0.657

Soil Bearing

1.639 ksf

2.50 ksf

+D+L+H

PASS

n/a

Overturning - Z-Z

0.0 k-ft

0.0 k-ft

No Overturning

PASS

n/a

Sliding - X-X

0.0 k

0.0 k

No Sliding

PASS

n/a

Uplift

0.0 k

0.0 k

No Uplift

PASS

0.009310

Z Flexure (+X)

0.5099 k-ft

54.774 k-ft

+1.20D+0.50L+1.60L+

PASS

0.009310

Z Flexure (-X)

0.5099 k-ft

54.774 k-ft

+1.20D+0.50L+1.60L+

PASS

n/a

1-way Shear (+X)

0.0 psi

82.158 psi

n/a

PASS

0.0

1-way Shear (-X)

0.0 psi

82.158 psi

n/a

Applied Loads

P : Column Load

OB : Overburden

V-x

M-zz

Vx applied = in above top of footing

DESIGN SUMMARY

Min. Ratio

Item

Applied

Capacity

Governing Load Combination

PASS

0.657

Soil Bearing

1.639 ksf

2.50 ksf

+D+L+H

PASS

n/a

Overturning - Z-Z

0.0 k-ft

0.0 k-ft

No Overturning

PASS

n/a

Sliding - X-X

0.0 k

0.0 k

No Sliding

PASS

n/a

Uplift

0.0 k

0.0 k

No Uplift

PASS

0.009310

Z Flexure (+X)

0.5099 k-ft

54.774 k-ft

+1.20D+0.50L+1.60L+

PASS

0.009310

Z Flexure (-X)

0.5099 k-ft

54.774 k-ft

+1.20D+0.50L+1.60L+

PASS

n/a

1-way Shear (+X)

0.0 psi

82.158 psi

n/a

PASS

0.0

1-way Shear (-X)

0.0 psi

82.158 psi

n/a

Applied Loads

P : Column Load

OB : Overburden

V-x

M-zz

Vx applied = in above top of footing

DESIGN SUMMARY

Min. Ratio

Item

Applied

Capacity

Governing Load Combination

PASS

0.657

Soil Bearing

1.639 ksf

2.50 ksf

+D+L+H

PASS

n/a

Overturning - Z-Z

0.0 k-ft

0.0 k-ft

No Overturning

PASS

n/a

Sliding - X-X

0.0 k

0.0 k

No Sliding

PASS

n/a

Uplift

0.0 k

0.0 k

No Uplift

PASS

0.009310

Z Flexure (+X)

0.5099 k-ft

54.774 k-ft

+1.20D+0.50L+1.60L+

PASS

0.009310

Z Flexure (-X)

0.5099 k-ft

54.774 k-ft

+1.20D+0.50L+1.60L+

PASS

n/a

1-way Shear (+X)

0.0 psi

82.158 psi

n/a

PASS

0.0

1-way Shear (-X)

0.0 psi

82.158 psi

n/a

Applied Loads

P : Column Load

OB : Overburden

V-x

M-zz

Vx applied = in above top of footing

DESIGN SUMMARY

Min. Ratio

Item

Applied

Capacity

Governing Load Combination

PASS

0.657

Soil Bearing

1.639 ksf

2.50 ksf

+D+L+H

PASS

n/a

Overturning - Z-Z

0.0 k-ft

0.0 k-ft

No Overturning

PASS

n/a

Sliding - X-X

0.0 k

0.0 k

No Sliding

PASS

n/a

Uplift

0.0 k

0.0 k

No Uplift

PASS

0.009310

Z Flexure (+X)

0.5099 k-ft

54.774 k-ft

+1.20D+0.50L+1.60L+

PASS

0.009310

Z Flexure (-X)

0.5099 k-ft

54.774 k-ft

+1.20D+0.50L+1.60L+

PASS

n/a

1-way Shear (+X)

0.0 psi

82.158 psi

n/a

PASS

0.0

1-way Shear (-X)

0.0 psi

82.158 psi

n/a

Applied Loads

P : Column Load

OB : Overburden

V-x

M-zz

Vx applied = in above top of footing

DESIGN SUMMARY

Min. Ratio

Item

Applied

Capacity

Governing Load Combination

PASS

0.657

Soil Bearing

1.639 ksf

2.50 ksf

+D+L+H

PASS

n/a

Overturning - Z-Z

0.0 k-ft

0.0 k-ft

No Overturning

PASS

n/a

Sliding - X-X

0.0 k

0.0 k

No Sliding

PASS

n/a

Uplift

0.0 k

0.0 k

No Uplift

PASS

0.009310

Z Flexure (+X)

0.5099 k-ft

54.774 k-ft

+1.20D+0.50L+1.60L+

PASS

0.009310

Z Flexure (-X)

0.5099 k-ft

54.774 k-ft

+1.20D+0.50L+1.60L+

PASS

n/a

1-way Shear (+X)

0.0 psi

82.158 psi

n/a

PASS

0.0

1-way Shear (-X)

0.0 psi

82.158 psi

n/a

Applied Loads

P : Column Load

OB : Overburden

V-x

M-zz

Vx applied = in above top of footing

DESIGN SUMMARY

Min. Ratio

Item

Applied

Capacity

Governing Load Combination

PASS

0.657

Soil Bearing

1.639 ksf

2.50 ksf

+D+L+H

PASS

n/a

Overturning - Z-Z

0.0 k-ft

0.0 k-ft

No Overturning

PASS

n/a

Sliding - X-X

0.0 k

0.0 k

No Sliding

PASS

n/a

Uplift

0.0 k

0.0 k

No Uplift

PASS

0.009310

Z Flexure (+X)

0.5099 k-ft

54.774 k-ft

+1.20D+0.50L+1.60L+

PASS

0.009310

Z Flexure (-X)

0.5099 k-ft

54.774 k-ft

+1.20D+0.50L+1.60L+

PASS

n/a

1-way Shear (+X)

0.0 psi

82.158 psi

n/a

PASS

0.0

1-way Shear (-X)

0.0 psi

82.158 psi

n/a

Title Block Line 1
Job #
Title :
Dsgnr:
Project Desc.:
Project Notes :
Title Block Line 6

General Footing

License # :	MF-40
Description :	MF-40

General Information

Calculations per ACI 318-19, IBC 2022, CBC 2022, ASCE 7-22

Material Properties		
f'c : Concrete 28 day strength	= 3.0 ksi	2.50 ksf
f_y : Rebar Yield	= 60.0 ksi	No
E_c : Concrete Elastic Modulus	= 3,122.0 ksi	250.0 pcf
Concrete Density	= 150.0 pcf	0.30
φ Values		
Flexure	= 0.90	
Shear	= 0.750	
Analysis Settings		
Min Steel % Bending Reinf.	= 0.00140	0.0 ft
Min Allow % Temp Reinf.	= 0.00180	0.0 ft
Min. Overturning Safety Factor	= 1.0 : 1	
Min. Sliding Safety Factor	= 1.0 : 1	
Add Fig Wt for Soil Pressure	: Yes	
Use fig wt for stability, moments & shears :	Yes	
Include Pedestal Weight as DL	: No	

Dimensions

Width parallel to X-X Axis	= 3.330 ft
Length parallel to Z-Z Axis	= 5.50 ft
Footing Thickness	= 12.0 in

Pedestal dimensions:	
px : parallel to X-X Axis	= 8.0 in
pz : parallel to Z-Z Axis	= 66.0 in
Height	= 8.0 in
Rebar Centerline to Edge of Concrete..	
at Bottom of footing	= 3.0 in

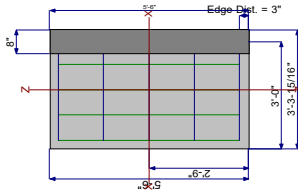
Reinforcing

Bars parallel to X-X Axis	
Number of Bars	= 5.0
Reinforcing Bar Size	= # 5
Bars parallel to Z-Z Axis	
Number of Bars	= 5.0
Reinforcing Bar Size	= # 4

Bandwidth Distribution Check (ACI 15.4.4.2)
Direction Requiring Closer Separationg X-X Axis
Bars required within zone 75.4 %
Bars required on each side of zone 24.6 %

Applied Loads

P : Column Load	D	Lr	L	S	W	E	H
OB : Overburden	= 2.305	0.0	0.840	0.0	0.0	0.0	0.0
M-xx	= 0.0	0.0	0.0	0.0	0.0	0.0	0.0 ksf
M-yy	= 0.0	0.0	0.0	0.0	0.0	0.0	0.0 k-ft
V-x	= 0.0	0.0	0.0	0.0	0.0	0.0	0.0 k
V-z	= 0.0	0.0	0.0	0.0	0.0	0.0	0.0 k



Title Block Line 1
Job #
Title :
Dsgnr:
Project Desc.:
Project Notes :
Title Block Line 6

General Footing

License # :	MF-40
Description :	MF-40

DESIGN SUMMARY

Design OK

Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	Soil Bearing	0.3217 ksf	2.50 ksf	+D+L+H
PASS	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	Uplift	0.0 k	0.0 k	No Uplift
PASS	Z Flexure (-X)	0.1990 k-ft	11.063 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	Z Flexure (-X)	0.1990 k-ft	11.063 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	X Flexure (+Z)	0.0 k-ft	0.0 k-ft	No Moment
PASS	X Flexure (-Z)	0.0 k-ft	0.0 k-ft	No Moment
PASS	1-way Shear (+X)	1.199 psi	82.158 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	1-way Shear (-X)	1.199 psi	82.158 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	1-way Shear (+Z)	0.0 psi	82.158 psi	n/a
PASS	1-way Shear (-Z)	0.0 psi	82.158 psi	n/a
PASS	2-way Punching	1.456 psi	102.08 psi	+1.20D+0.50Lr+1.60L+1.60H

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc	+Z	+Z	Actual Soil Bearing Stress	-X	-X	Actual / Allowable Ratio
X-X, +D	2.50	n/a	0.0	0.2759	0.2759	n/a	n/a	n/a	0.110
X-X, +D+L+H	2.50	n/a	0.0	0.3217	0.3217	n/a	n/a	n/a	0.129
X-X, +D+0.750Lr+0.750L+H	2.50	n/a	0.0	0.3103	0.3103	n/a	n/a	n/a	0.124
X-X, +D+0.750Lr+0.750S+H	2.50	n/a	0.0	0.3103	0.3103	n/a	n/a	n/a	0.124
X-X, +D+0.750Lr+0.750S+0.750W+H	2.50	n/a	0.0	0.3103	0.3103	n/a	n/a	n/a	0.124
X-X, +D+0.750Lr+0.750S+0.5250E+H	2.50	n/a	0.0	0.3103	0.3103	n/a	n/a	n/a	0.124
X-X, +D+0.750Lr+0.750S+0.5250E+H	2.50	n/a	0.0	0.3103	0.3103	n/a	n/a	n/a	0.124
Z-Z, +D	2.50	n/a	0.0	n/a	n/a	0.2759	0.2759	0.110	0.129
Z-Z, +D+L+H	2.50	0.0	n/a	n/a	n/a	0.3217	0.3217	0.124	0.124
Z-Z, +D+0.750Lr+0.750S+H	2.50	0.0	n/a	n/a	n/a	0.3103	0.3103	0.124	0.124
Z-Z, +D+0.750Lr+0.750S+0.750W+H	2.50	0.0	n/a	n/a	n/a	0.3103	0.3103	0.124	0.124
Z-Z, +D+0.750Lr+0.750S+0.5250E+H	2.50	0.0	n/a	n/a	n/a	0.3103	0.3103	0.124	0.124
Z-Z, +D+0.750Lr+0.750S+0.5250E+H	2.50	0.0	n/a	n/a	n/a	0.3103	0.3103	0.124	0.124
Z-Z, +D+0.750Lr+0.750S+0.5250E+H	2.50	0.0	n/a	n/a	n/a	0.3103	0.3103	0.124	0.124

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				All units k

Sliding Stability

Force Application Axis	Sliding Force	Resisting Force	Sliding SafetyRatio	Status
Load Combination...				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	Gvrn. As in^2	Actual As in^2	Status
X-X, +1.40D	0	+Z	Top	0.26	Bending	OK
X-X, +1.40D	0	-Z	Top	0.26	Bending	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	0	+Z	Top	0.26	Bending	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	0	-Z	Top	0.26	Bending	OK
X-X, +1.20D+1.60L+0.50S+1.60H	0	+Z	Top	0.26	Bending	OK
X-X, +1.20D+1.60L+0.50S+1.60H	0	-Z	Top	0.26	Bending	OK
X-X, +1.20D+1.60Lr+0.50L	0	+Z	Top	0.26	Bending	OK
X-X, +1.20D+1.60Lr+0.50L	0	-Z	Top	0.26	Bending	OK
X-X, +1.20D+0.50L+1.60S	0	+Z	Top	0.26	Bending	OK

DRC

PZ23-12000026

12/04/2024

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Title :
Dsgnr:
Project Desc.:
Project Notes :

Job #

Printed: 25 JUL 2024 11:50AM	
slairamDesktop\Unison001_Project\slairam\ownhouses NW 15 St, 19 Ave (07-17-24)\Calcs\ownhouses.ec6, BKUP2	
ENERCALC, INC. 1983-2011 Build6.11.6.23, Ver6.11.6.23	
License :	
Description : MF-40	

General Footing

FOOTING FLEXURE					License# :
Lea. # :	Description :		MF-40		
Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in'2	
X-X, +1.20D+0.50L+1.60S	0	-Z	Top	0.26	Bending
X-X, +1.20D+0.50L+0.50L+1.60W	0	+Z	Top	0.26	Bending
X-X, +1.20D+0.50L+0.50L+1.60W	0	-Z	Top	0.26	Bending

0.26 Bending
0.26 Bending
0.3 Bending

OK
OK
OK

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Title :
Dsgnr:
Project Desc.:
Project Notes :

Job #

Printed: 25 JUL 2024 11:50AM	
slairamDesktop\Unison001_Project\slairam\ownhouses NW 15 St, 19 Ave (07-17-24)\Calcs\ownhouses.ec6, BKUP2	
ENERCALC, INC. 1983-2011 Build6.11.6.23, Ver6.11.6.23	
License :	
Description : MF-40	

General Footing

Licensee	Lic. # :		MF-40					
Footing Flexure								
Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in'2	Gv'n AS in'2	Actual AS in'2	Phi*Mu k-ft	Status
X-X, +1.20D+0.50L+0.50S+1.60W	0	+Z	Top	0.26	Bending	0.3	11.764	OK
X-X, +1.20D+0.50L+0.50S+1.60W	0	-Z	Top	0.26	Bending	0.3	11.764	OK
X-X, +1.20D+0.50L+0.20S+E	0	+Z	Top	0.26	Bending	0.3	11.764	OK
X-X, +1.20D+0.50L+0.20S+E	0	-Z	Top	0.26	Bending	0.3	11.764	OK
Z-Z, +1.40D	0.1562	-X	Bottom	0.26	Bending	0.28	11.063	OK
Z-Z, +1.40D	0.1562	+X	Bottom	0.26	Bending	0.28	11.063	OK
Z-Z, +1.20D+0.50L+1.60L+1.60H	0.199	-X	Bottom	0.26	Bending	0.28	11.063	OK
Z-Z, +1.20D+0.50L+1.60L+1.60H	0.199	+X	Bottom	0.26	Bending	0.28	11.063	OK
Z-Z, +1.20D+1.60L+0.50S+1.60H	0.199	-X	Bottom	0.26	Bending	0.28	11.063	OK
Z-Z, +1.20D+1.60L+0.50S+1.60H	0.199	+X	Bottom	0.26	Bending	0.28	11.063	OK
Z-Z, +1.20D+1.60L+0.50L	0.1542	-X	Bottom	0.26	Bending	0.28	11.063	OK
Z-Z, +1.20D+1.60L+0.50L	0.1542	+X	Bottom	0.26	Bending	0.28	11.063	OK
Z-Z, +1.20D+0.50L+1.60S	0.1542	-X	Bottom	0.26	Bending	0.28	11.063	OK
Z-Z, +1.20D+0.50L+1.60S	0.1542	+X	Bottom	0.26	Bending	0.28	11.063	OK
Z-Z, +1.20D+0.50L+0.50L+1.60W	0.1542	-X	Bottom	0.26	Bending	0.28	11.063	OK
Z-Z, +1.20D+0.50L+0.50L+1.60W	0.1542	+X	Bottom	0.26	Bending	0.28	11.063	OK
Z-Z, +1.20D+0.50L+0.50S+1.60W	0.1542	-X	Bottom	0.26	Bending	0.28	11.063	OK
Z-Z, +1.20D+0.50L+0.50S+1.60W	0.1542	+X	Bottom	0.26	Bending	0.28	11.063	OK
Z-Z, +1.20D+0.50L+0.20S+E	0.1542	-X	Bottom	0.26	Bending	0.28	11.063	OK
Z-Z, +1.20D+0.50L+0.20S+E	0.1542	+X	Bottom	0.26	Bending	0.28	11.063	OK
One Way Shear								

0.3 Bending
0.3 Bending
0.3 Bending

OK
OK
OK

DRC

PZ23-12000026

12/04/2024

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+ 1.40D	1.143 psi	102.08psi	0.0112	OK
+ 1.20D+0.50L+1.60L+1.60H	1.456 psi	102.08psi	0.01426	OK
+ 1.20D+1.60L+0.50S+1.60H	1.456 psi	102.08psi	0.01426	OK
+ 1.20D+1.60L+0.50L	1.129 psi	102.08psi	0.01106	OK
+ 1.20D+0.50L+1.60S	1.129 psi	102.08psi	0.01106	OK
+ 1.20D+0.50L+0.50L+1.60W	1.129 psi	102.08psi	0.01106	OK
+ 1.20D+0.50L+0.50S+1.60W	1.129 psi	102.08psi	0.01106	OK
+ 1.20D+0.50L+0.20S+E	1.129 psi	102.08psi	0.01106	OK

0.3 Bending
0.3 Bending
0.3 Bending

OK
OK
OK