

Structural Calculations

Client:

LK Architecture, Inc

Project:

Panera Bread – Bakery Café# 2406

1410 Douglas St.

Lee Summit, MO 64086

Project # LKA-MO-01-22

Date: July 05, 2022



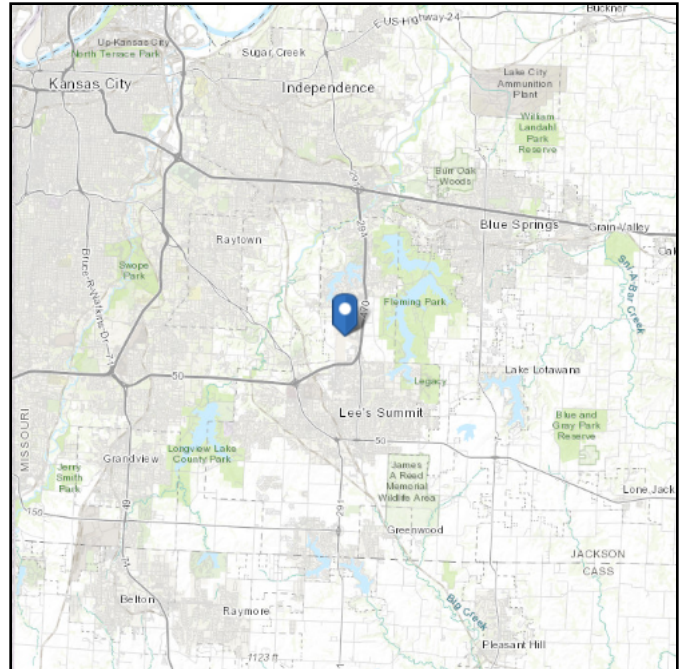
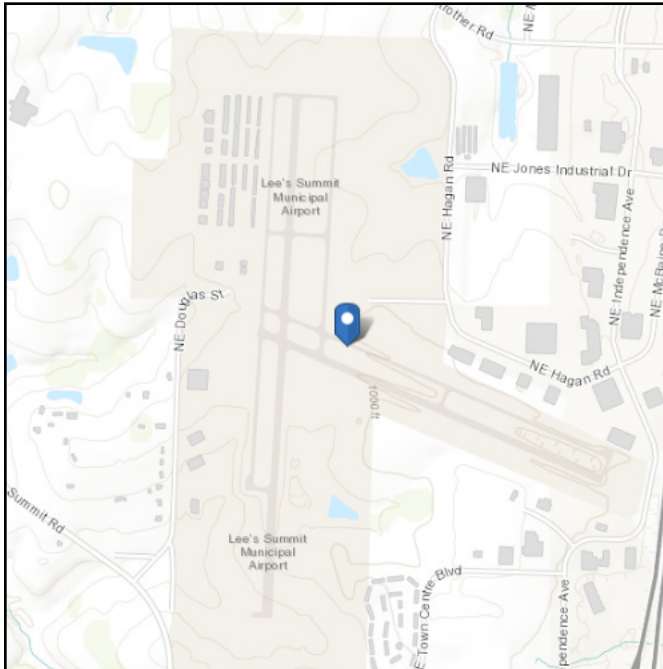
7/5/22

ASCE 7 Hazards Report

Address:
Lee's Summit

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 998.48 ft (NAVD 88)
Latitude: 38.95972
Longitude: -94.37167



Wind

Results:

Wind Speed	109 Vmph
10-year MRI	76 Vmph
25-year MRI	83 Vmph
50-year MRI	88 Vmph
100-year MRI	94 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Tue Jun 21 2022

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

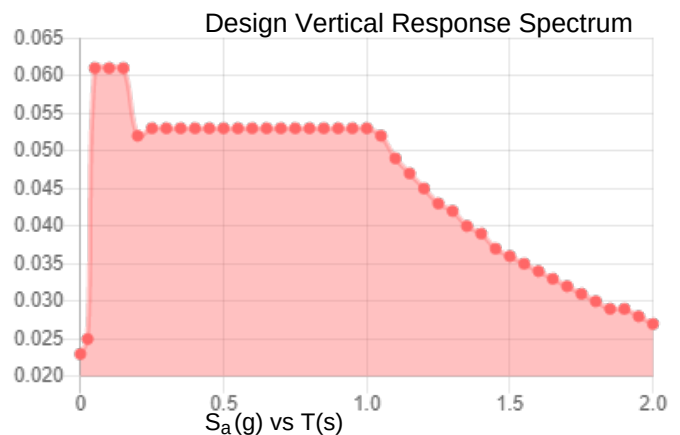
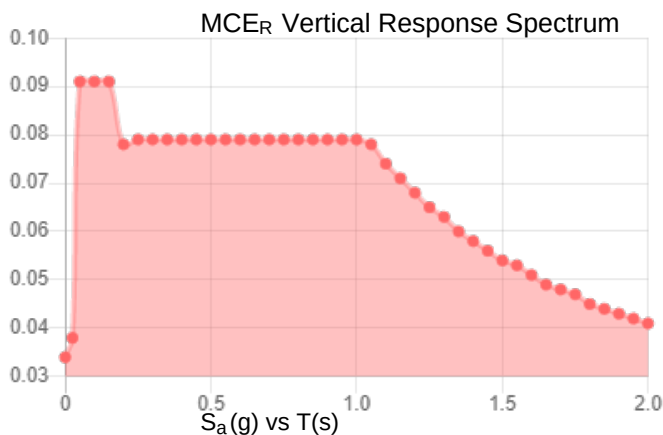
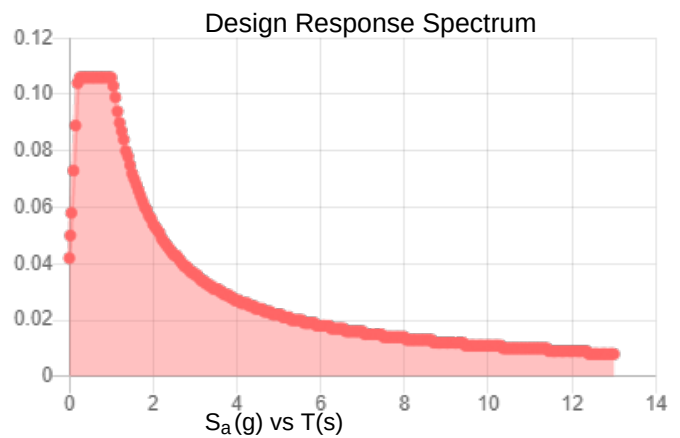
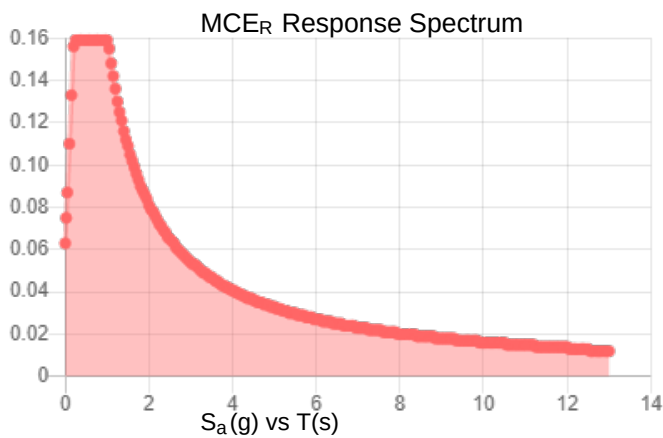
Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

Site Soil Class: D - Stiff Soil

Results:

S_S :	0.099	S_{D1} :	0.109
S_1 :	0.068	T_L :	12
F_a :	1.6	PGA :	0.047
F_v :	2.4	PGA _M :	0.075
S_{MS} :	0.159	F_{PGA} :	1.6
S_{M1} :	0.163	I_e :	1
S_{DS} :	0.106	C_v :	0.7

Seismic Design Category B



Data Accessed: Tue Jun 21 2022

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Results:

Ground Snow Load, p_g :	20 lb/ft ²
Elevation:	998.5 ft
Data Source:	ASCE/SEI 7-16, Table 7.2-8
Date Accessed:	Tue Jun 21 2022

Values provided are ground snow loads. In areas designated "case study required," extreme local variations in ground snow loads preclude mapping at this scale. Site-specific case studies are required to establish ground snow loads at elevations not covered.

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided "as is" and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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St. Louis, MO
636-349-1600

JOB TITLE Panera - Lee's Summit

JOB NO.	LKA-MO-01-22	SHEET NO.	
CALCULATED BY	AC	DATE	6/21/22
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www.struware.com

Code Search

Code: International Building Code 2018

Occupancy:

Occupancy Group = B Business

Risk Category & Importance Factors:

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

Type of Construction:

Fire Rating:
Roof = 0.0 hr
Floor = 0.0 hr

Building Geometry:

Roof angle (θ) 0.25 / 12 1.2 deg
Building length 70.0 ft
Least width 52.0 ft
Mean Roof Ht (h) 16.0 ft
Parapet ht above grd 22.0 ft
Minimum parapet ht 6.0 ft

Live Loads:

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

Floor:

Typical Floor 100 psf
Partitions 15 psf

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Wind Loads :

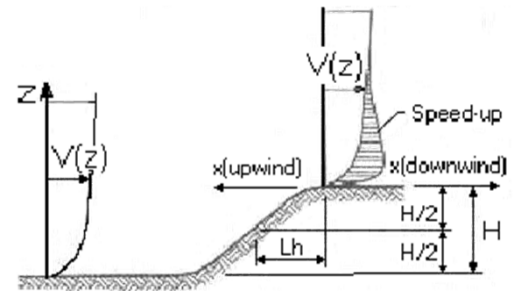
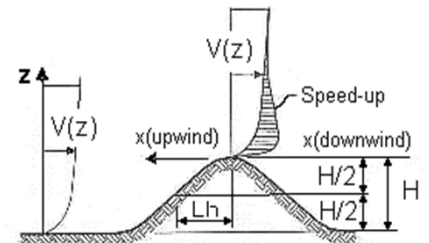
ASCE 7- 16

Ultimate Wind Speed	115 mph
Nominal Wind Speed	89.1 mph
Risk Category	II
Exposure Category	C
Enclosure Classif.	Enclosed Building
Internal pressure	+/-0.18
Directionality (Kd)	0.85
Kh case 1	0.860
Kh case 2	0.860
Type of roof	Monoslope

Topographic Factor (Kzt)

Topography	Flat
Hill Height (H)	0.0 ft
Half Hill Length (Lh)	0.0 ft
Actual H/Lh =	0.00
Use H/Lh =	0.00
Modified Lh =	0.0 ft
From top of crest: x =	0.0 ft
Bldg up/down wind?	downwind
H/Lh = 0.00	K ₁ = 0.000
x/Lh = 0.00	K ₂ = 0.000
z/Lh = 0.00	K ₃ = 1.000
At Mean Roof Ht:	
	Kzt = (1+K ₁ K ₂ K ₃) ² = 1.00

H < 15ft; exp C
∴ Kzt = 1.0

**ESCARPMENT****2D RIDGE or 3D AXISYMMETRICAL HILL****Gust Effect Factor**

h =	16.0 ft
B =	52.0 ft
/z (0.6h) =	15.0 ft

Flexible structure if natural frequency < 1 Hz (T > 1 second).

If building h/B > 4 then may be flexible and should be investigated.

h/B = 0.31 Rigid structure (low rise bldg)

G = 0.85 Using rigid structure formula**Rigid Structure**

$\bar{e}$ =	0.20
ℓ =	500 ft
z_{min} =	15 ft
c =	0.20
g_Q, g_v =	3.4
L_z =	427.1 ft
Q =	0.91
I_z =	0.23
G =	0.88 use G = 0.85

Flexible or Dynamically Sensitive Structure

Natural Frequency (η_1) =	0.0 Hz		
Damping ratio (β) =	0		
γ/b =	0.65		
γ/α =	0.15		
Vz =	97.1		
N ₁ =	0.00		
R _n =	0.000		
R _n =	28.282	η =	0.000
R _B =	28.282	η =	0.000
R _L =	28.282	η =	0.000
g_R =	0.000		
R =	0.000		
Gf =	0.000		
		h =	16.0 ft

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

$K_z = K_h$ (case 1) = 0.86
Base pressure (q_h) = **24.8 psf**
 $G C_{pi}$ = +/-0.18

Edge Strip (a) = 5.2 ft
End Zone (2a) = 10.4 ft
Zone 2 length = 26.0 ft

Wind Pressure Coefficients

Surface	CASE A			CASE B		
	$G C_{pf}$	$\theta = 1.2 \text{ deg}$ $w/-G C_{pi}$	$w/+G C_{pi}$	$G C_{pf}$	$w/-G C_{pi}$	$w/+G C_{pi}$
1	0.40	0.58	0.22	-0.45	-0.27	-0.63
2	-0.69	-0.51	-0.87	-0.69	-0.51	-0.87
3	-0.37	-0.19	-0.55	-0.37	-0.19	-0.55
4	-0.29	-0.11	-0.47	-0.45	-0.27	-0.63
5				0.40	0.58	0.22
6				-0.29	-0.11	-0.47
1E	0.61	0.79	0.43	-0.48	-0.30	-0.66
2E	-1.07	-0.89	-1.25	-1.07	-0.89	-1.25
3E	-0.53	-0.35	-0.71	-0.53	-0.35	-0.71
4E	-0.43	-0.25	-0.61	-0.48	-0.30	-0.66
5E				0.61	0.79	0.43
6E				-0.43	-0.25	-0.61

Ultimate Wind Surface Pressures (psf)

1	14.4	5.4	-6.7	-15.6
2	-12.6	-21.5	-12.6	-21.5
3	-4.7	-13.6	-4.7	-13.6
4	-2.7	-11.6	-6.7	-15.6
5			14.4	5.4
6			-2.7	-11.6
1E	19.6	10.6	-7.4	-16.3
2E	-22.0	-31.0	-22.0	-31.0
3E	-8.7	-17.6	-8.7	-17.6
4E	-6.2	-15.1	-7.4	-16.3
5E			19.6	10.6
6E			-6.2	-15.1

Parapet

Windward parapet = 39.7 psf ($G C_{pn} = +1.5$)
Leeward parapet = -26.5 psf ($G C_{pn} = -1.0$)

Windward roof

overhangs = 17.3 psf (upward) add to windward roof pressure

Horizontal MWFRS Simple Diaphragm Pressures (psf)**Transverse direction (normal to L)**

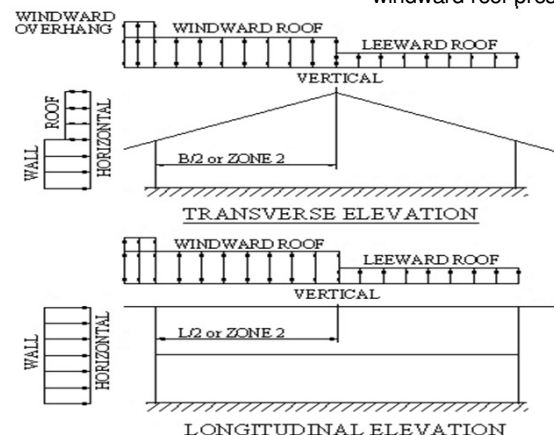
Interior Zone: Wall 17.1 psf
Roof -7.9 psf **
End Zone: Wall 25.8 psf
Roof -13.4 psf **

Longitudinal direction (parallel to L)

Interior Zone: Wall 17.1 psf
End Zone: Wall 25.8 psf

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

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



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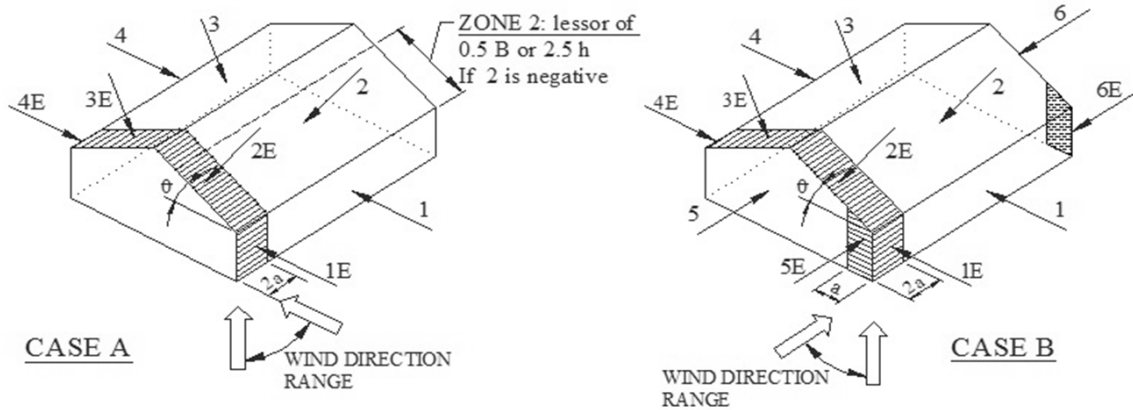
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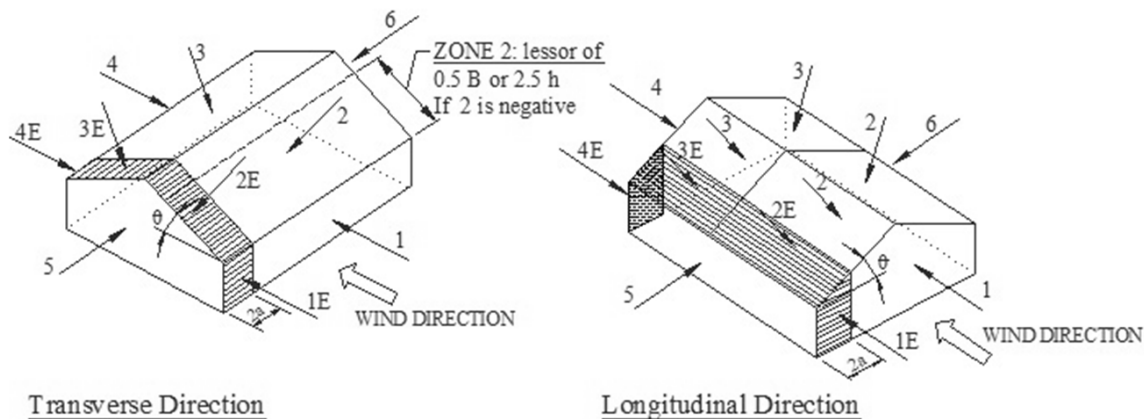
DATE



NOTE: Torsional loads are 25% of zones 1 - 6. See code for loading diagram.

Exception: One story buildings $h < 30'$ and 1 to 2 story buildings framed with light-frame construction or with flexible diaphragms need not be designed for the torsional load case.

ASCE 7-98 & ASCE 7-10 (& later) - MWFRS wind pressure zones



NOTE: Torsional loads are 25% of zones 1 - 4. See code for loading diagram.

Exception: One story buildings $h < 30'$ and 1 to 2 story buildings framed with light-frame construction or with flexible diaphragms need not be designed for the torsional load case.

ASCE 7-02 and ASCE 7-05 - MWFRS wind pressure zones

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Ultimate Wind Pressures**Wind Loads - Components & Cladding : $h \leq 60'$**

Kh (case 2) = 0.86 h = 16.0 ft 0.2h = 3.2 ft
Base pressure (qh) = **24.8 psf** 0.6h = 9.6 ft
Minimum parapet ht = 6.0 ft GCpi = +/-0.18
Roof Angle (θ) = 1.2 deg qi = qh = 24.8 psf
Type of roof = Monoslope

Roof

Area	Surface Pressure (psf)							
	10 sf	20 sf	50 sf	100 sf	200 sf	350 sf	500 sf	1000 sf
Negative Zone 1	-46.6	-43.5	-39.4	-36.4	-33.3	-30.8	-29.2	-29.2
Negative Zone 1'	-26.7	-26.7	-26.7	-26.7	-23.0	-20.0	-18.1	-16.0
Negative Zone 2	-61.4	-57.5	-52.2	-48.3	-44.3	-41.2	-39.1	-39.1
Negative Zone 3	-61.4	-57.5	-52.2	-48.3	-44.3	-41.2	-39.1	-39.1
Positive Zone 1 & 1'	16	16	16	16	16.0	16.0	16.0	16.0
Positive Zones 2 & 3	26.7	25.6	24	22.8	21.6	20.7	20.1	18.9
Overhang Zone 1&1'	-42.1	-41.4	-40.4	-39.6	-33.2	-28.1	-24.8	-24.8
Overhang Zone 2	-57	-51.7	-44.7	-39.5	-34.2	-29.9	-27.2	-27.2
Overhang Zone 3	-57	-51.7	-44.7	-39.5	-34.2	-29.9	-27.2	-27.2

Negative zone 3 = zone 2, since parapet $\geq$ 3ft.

Overhang pressures in the table above assume an internal pressure coefficient (Gcpi) of 0.0

Overhang soffit pressure equals adj wall pressure (which includes internal pressure of 4.5 psf)

Parapet

qp = 26.5 psf

Solid Parapet Pressure	Surface Pressure (psf)					
	10 sf	20 sf	50 sf	100 sf	200 sf	500 sf
CASE A: Zone 2 :	84.7	79.2	72.0	66.5	61.0	53.8
Zone 3 :	84.7	79.2	72.0	66.5	61.0	53.8
CASE B: Interior zone :	-50.0	-47.5	-44.2	-41.6	-39.1	-35.7
Corner zone :	-57.2	-53.4	-48.4	-44.6	-40.8	-35.7

User input	
20 sf	
	79.2
	79.2
	-47.5
	-53.4

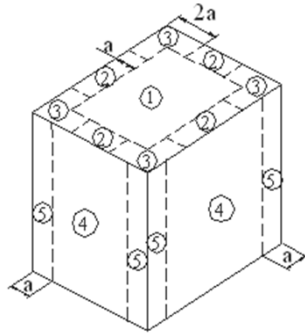
wall a = 5.2 ft

Walls

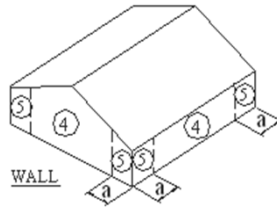
Area	GCp +/- GCpi				Surface Pressure at h			
	10 sf	100 sf	200 sf	500 sf	10 sf	100 sf	200 sf	500 sf
Negative Zone 4	-1.17	-1.01	-0.96	-0.90	-29.0	-25.0	-23.9	-22.3
Negative Zone 5	-1.44	-1.12	-1.03	-0.90	-35.7	-27.8	-25.4	-22.3
Positive Zone 4 & 5	1.08	0.92	0.87	0.81	26.7	22.8	21.6	20.1

Note: GCp reduced by 10% due to roof angle $\leq$ 10 deg.

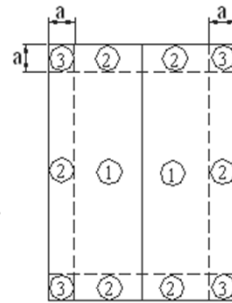
User input	
20 sf	55 sf
-27.8	-26.1
-33.3	-29.8
25.6	23.8

Location of C&C Wind Pressure Zones - ASCE 7-10 & earlier

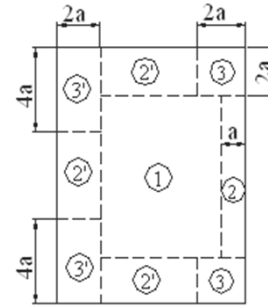
Roofs w/ $\theta \leq 10^\circ$
and all walls
 $h > 60'$



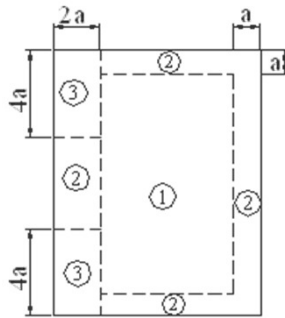
Walls $h \leq 60'$
& alt design $h < 90'$



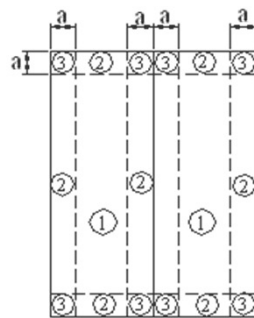
Gable, Sawtooth and
Multispan Gable $\theta \leq 7$ degrees &
Monoslope ≤ 3 degrees
 $h \leq 60'$ & alt design $h < 90'$



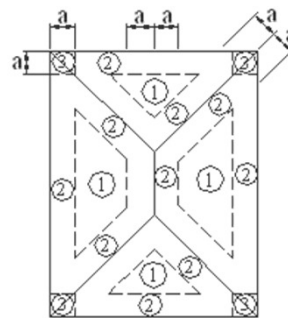
Monoslope roofs
 $3^\circ < \theta \leq 10^\circ$
 $h \leq 60'$ & alt design $h < 90'$



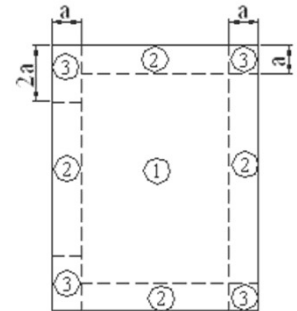
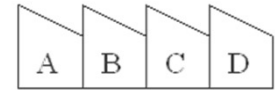
Monoslope roofs
 $10^\circ < \theta \leq 30^\circ$
 $h \leq 60'$ & alt design $h < 90'$



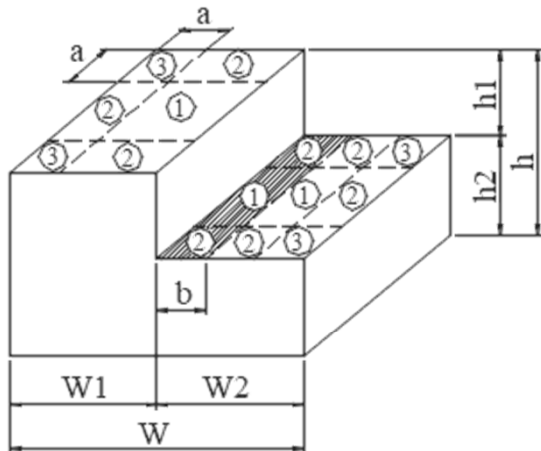
Multispan Gable &
Gable $7^\circ < \theta \leq 45^\circ$



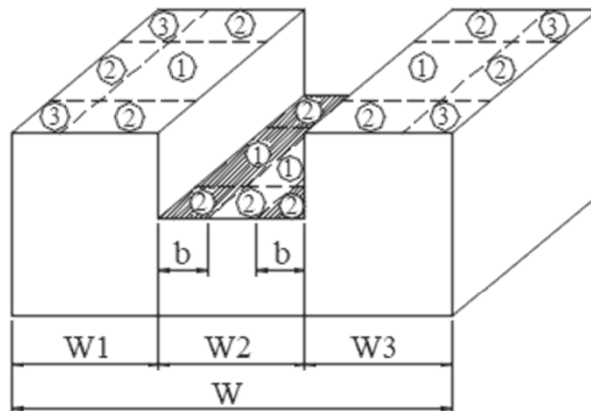
Hip $7^\circ < \theta \leq 27^\circ$



Sawtooth $10^\circ < \theta \leq 45^\circ$
 $h \leq 60'$ & alt design $h < 90'$



Stepped roofs $\theta \leq 3^\circ$
 $h \leq 60'$ & alt design $h < 90'$



plf

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Seismic Loads:

IBC 2018

Strength Level Forces

Risk Category : II
Importance Factor (I_e) : 1.00
Site Class : D

S_s (0.2 sec) = 9.90 %g
S₁ (1.0 sec) = 6.80 %g

F_a = 1.600 S_{ms} = 0.163
F_v = 2.400 S_{m1} = 0.163

Site specific ground motion analysis performed:

S_{DS} = 0.109 Design Category = A
S_{D1} = 0.109 Design Category = B

S_{ds} to determine Design Cat = 0.106
Seismic Design Category = **B**
Redundancy Coefficient ρ = 1.30
Number of Stories: 1

Structure Type: All other building systems

Horizontal Struct Irregularities: No plan Irregularity
Vertical Structural Irregularities: No vertical Irregularity

Flexible Diaphragms: Yes

Building System: **Bearing Wall Systems**

Seismic resisting system: **Light frame (wood) walls with structural wood shear panels**

System Structural Height Limit: **Height not limited**

Actual Structural Height (h_n) = 16.0 ft

DESIGN COEFFICIENTS AND FACTORS

Response Modification Coefficient (R) = 6.5
Over-Strength Factor (Ω_o) = 2.5
Deflection Amplification Factor (C_d) = 4
S_{DS} = 0.109
S_{D1} = 0.109

Seismic Load Effect (E) = E_h +/- E_v = ρ Q_E +/- 0.2 S_{DS} D = 1.3 Q_E +/- 0.000 D Q_E = horizontal seismic force
Special Seismic Load Effect (E_m) = E_{mh} +/- E_{mv} = Ω_o Q_E +/- 0.2 S_{DS} D = 2.5 Q_E +/- 0.022 D D = dead load

PERMITTED ANALYTICAL PROCEDURES

Simplified Analysis - Use Equivalent Lateral Force Analysis

Equivalent Lateral-Force Analysis - Permitted

Building period coef. (C_T) = 0.020 Cu = 1.68
Approx fundamental period (T_a) = C_T h_n^{1/4} = 0.160 sec x = 0.75 T_{max} = C_u T_a = 0.269 sec
User calculated fundamental period = 12.000 s T = 0.269 sec
Long Period Transition Period (T_L) = ASCE7 map = 12 sec
Seismic response coef. (C_s) = S_{ds}/R = 0.017
need not exceed C_s = S_{d1} I/RT = 0.062
but not less than C_s = 0.010
USE C_s = 0.017

Design Base Shear V = 0.017W

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

ALLOWABLE STORY DRIFT

Structure Type: All other structures

Allowable story drift Δ_a = 0.020 h_{sx} where h_{sx} is the story height below level x

Date *07/05/22*

Project No *LKA-MO-01-22*

By *AC*

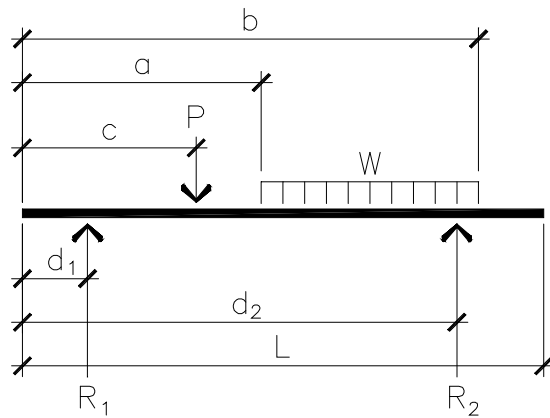
Description *Diaphragm Design*

Checked

Long Side

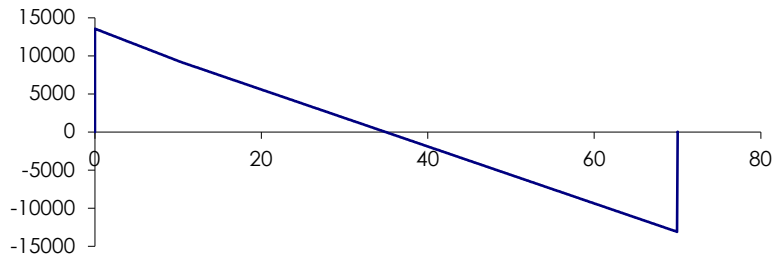
Element: **Roof Diaphragm Wind Forces - Long Side**

Diaphragm type: **Roof**



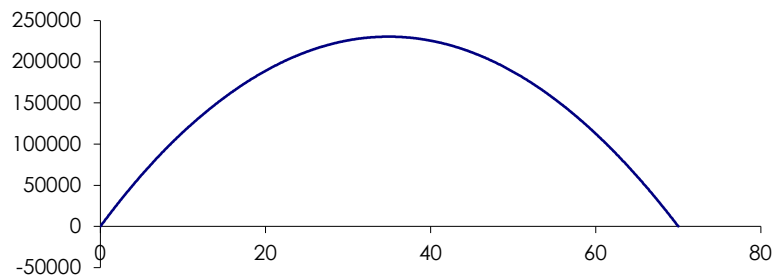
$P_1 =$	$c_1 =$	$L = 70.00 \text{ ft}$
$P_2 =$	$c_2 =$	
$P_3 =$	$c_3 =$	
$P_4 =$	$c_4 =$	
$W_1 = 423 \text{ plf}$	$a_1 = 0.00 \text{ ft}$	$b_1 = 10.40 \text{ ft}$
$W_2 = 374 \text{ plf}$	$a_2 = 10.40 \text{ ft}$	$b_2 = 70.00 \text{ ft}$
$W_3 =$	$a_3 =$	$b_3 =$
$W_4 =$	$a_4 =$	$b_4 =$
$d_1 = 0.00 \text{ ft}$		$d_2 = 70.00 \text{ ft}$
$R_1 = 13\,562 \text{ lbs}$		$R_2 = 13\,128 \text{ lbs}$
$n_1 = 260.8 \text{ plf}$		$n_2 = 252.5 \text{ plf}$

Shear Diagram



Max. Shear = 13 562 lbs

Moment Diagram



Max. Moment = 230 450 ft-lbs

Diaphragm

Diaphragm chord depth = 52.00 ft

Mark	Sheathing	Bndry Nailing	Blk'g.	Case	Capacity
-1-	15/32"	8d @ 6"	No	1	335 plf
-2-	15/32"	8d @ 6"	Yes	1	378 plf
-3-	15/32"	8d @ 4"	Yes	1	505 plf
-4-	15/32"	8d @ 2 1/2"	Yes	1	743 plf

Capacities above are for sheathing applied to 2x nominal members.

Nailing transition points:

Operator notes:

Max. Unit Shear = 261 plf
Chord Force = 4 432 lbs

Use Mark -1- Roof Sheathing for Roof
Diaphragm Wind Forces - Long Side

Date *07/05/22*

Project No *LKA-MO-01-21*

By *EAD*

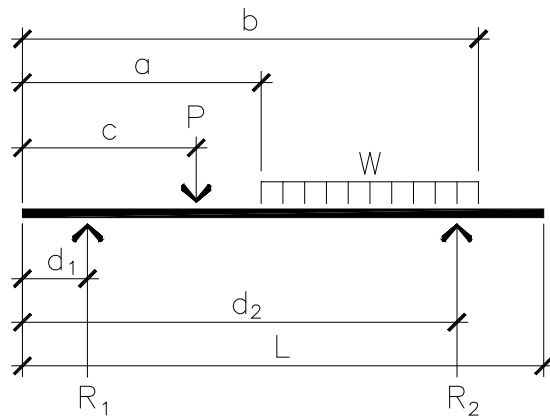
Description *Diaphragm Design*

Checked

Short Side

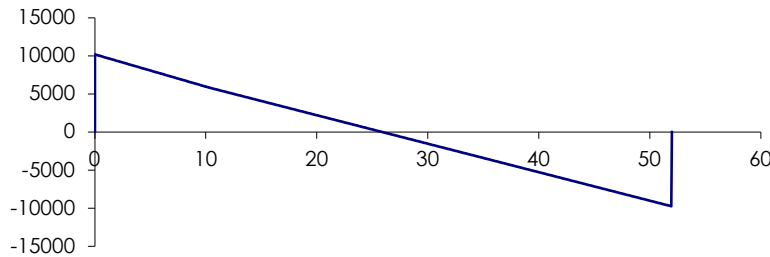
Element: **Roof Diaphragm Wind Forces - Short Side**

Diaphragm type: **Roof**



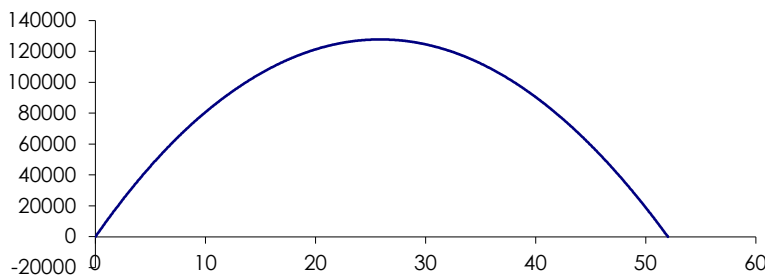
$P_1 =$	$c_1 =$	$L =$ 52.00 ft
$P_2 =$	$c_2 =$	
$P_3 =$	$c_3 =$	
$P_4 =$	$c_4 =$	
$W_1 =$ 423 plf	$a_1 =$ 0.00 ft	$b_1 =$ 10.40 ft
$W_2 =$ 374 plf	$a_2 =$ 10.40 ft	$b_2 =$ 52.00 ft
$W_3 =$	$a_3 =$	$b_3 =$
$W_4 =$	$a_4 =$	$b_4 =$
$d_1 =$ 0.00 ft		$d_2 =$ 52.00 ft
$R_1 =$ 10 183 lbs		$R_2 =$ 9 775 lbs
$n_1 =$ 145.5 plf		$n_2 =$ 139.6 plf

Shear Diagram



Max. Shear = 10 183 lbs

Moment Diagram



Max. Moment = 127 780 ft-lbs

Diaphragm

Diaphragm chord depth = 70.00 ft

Mark	Sheathing	Bndry Nailing	Blk'g.	Case	Capacity
-1-	15/32"	8d @ 6"	No	1	335 plf
-2-	15/32"	8d @ 6"	Yes	1	378 plf
-3-	15/32"	8d @ 4"	Yes	1	505 plf
-4-	15/32"	8d @ 2 1/2"	Yes	1	743 plf

Capacities above are for sheathing applied to 2x nominal members.

Nailing transition points:

Operator notes:

Max. Unit Shear = 145 plf
Chord Force = 1 825 lbs

Use Mark -1- Roof Sheathing for Roof
Diaphragm Wind Forces - Short Side

Wall Mark	Seismic Force (lbs)	Wind Force (lbs)	ρ	Length (ft)	v (lbs/ft)	Height (ft)	O.T.M.* (ft-lbs)	DL (lbs)	R.M. x Factor** (ft-lbs)	Max. O.T. T/C (lbs)	Holdown Force (lbs)	Holdown	Co	Sht'g. Mark
1	800	9 907	1.00	11.00	901	16.5	163 466	1 815	5 990	15 421	14 856	DESIGN	1.00	-3-
2	800	13 209	1.00	21.00	629	15.5	204 740	3 255	20 507	9 939	8 943	HDU14	1.00	-4-
3	800	8 000	1.00	50.00	160	15.5	124 000	7 750	116 250	2 500	156	HDU2	1.00	-6-
4	800	10 229	1.00	28.83	355	16.5	168 779	4 757	41 143	5 937	4 489	HDU8	1.00	-6-

Simpson Holdown Capacities:

Edge Studs

HDU2	3,075#	2-2x
HDU8	5,980#	2-2x
HDU14	14,445#	6x
HD19	19,070#	6x

Wall Sheathing Capacities (Structural I grade):

-6-	340 #/ft	- 15/32" sht'g. w/ 10d @ 6" o.c.
-4-	510 #/ft	- 15/32" sht'g. w/ 10d @ 4" o.c.
-3-	665 #/ft	- 15/32" sht'g. w/ 10d @ 3" o.c.

Values listed above are for 2x studs spaced at 24" o.c. max. with long dimension of sheathing applied across studs. Use 3x framing for sole/sill plates and joint studs for Marks -4- and -3- and when sheathing is applied both sides of wall.

* The overturning moment is calculated using the applied lateral force.

** The factor applied to the DL in calculating the resisting moment is 0.60 for ASD.

Project: **Panera - Lee Summit, MO**

Page

Date: **7/05/22**

Project No. **LKA-MO-01-22**

By: **A. Carrillo**

Description: **Shearwall Footing Design**

Checked: _____

SHEAR WALL FOUNDATIONS AT GRID LINE E-W

Wall Stud Height, Roof =	15.50 ft	Footing	
Wall Stud Height, Second Floor =	0.00 ft	Depth	Width
Wall Height, Basement =	0.00 ft	2	2
Wall Length =	52.00 ft		
Footing Length =	54.00 ft		

ROOF LEVEL

290 plf

2nd STORY WALL

D = 0 psf x 0' = 0 plf

2nd FLOOR LEVEL

0 plf

1st STORY WALL

D = 10 psf x 0' x 16' = 160 plf

1st FLOOR LEVEL

0 plf

FOUNDATION WALL

D = 0 psf x 0' = 0 plf

SHEARWALL FOOTING

D = 150 pcf x 2' DEEP x 2' WIDE = 600 plf

ALLOWABLE SOIL BEARING

q = 1500psf = 1500 psf

CHECK ASD LOAD COMBINATIONS PER IBC 1605.3

D LOAD COMBINATIONS PER	Wall Dead	Footing	Total DL	Roof Wind	Second	q max	Allowable
	Load (lb)	Dead Load (lb)	(lb)		Floor Wind	(psf)	
0.6D + W	14310	19440	33750	14485	0	552	1500
							37%

Note: Resultant is Inside Kern

Project: **Panera - Lee Summit, MO**

Page

Date: **7/05/22**

Project No. **LKA-MO-01-22**

By: **A. Carrillo**

Description: **Shearwall Footing Design**

Checked: _____

SHEAR WALL FOUNDATIONS AT GRID LINE N-S

Wall Stud Height, Roof =	15.50 ft	Footing	
Wall Stud Height, Second Floor =	0.00 ft	Depth	Width
Wall Height, Basement =	0.00 ft	2	2
Wall Length =	28.50 ft		
Footing Length =	30.00 ft		

ROOF LEVEL

290 plf

2nd STORY WALL

D = 0 psf x 0' = 0 plf

2nd FLOOR LEVEL

0 plf

1st STORY WALL

D = 10 psf x 0' x 16' = 160 plf

1st FLOOR LEVEL

0 plf

FOUNDATION WALL

D = 0 psf x 0' = 0 plf

SHEARWALL FOOTING

D = 150 pcf x 2' DEEP x 2' WIDE = 600 plf

ALLOWABLE SOIL BEARING

q = 1500psf = 1500 psf

CHECK ASD LOAD COMBINATIONS PER IBC 1605.3

D LOAD COMBINATIONS PER	Wall Dead	Footing	Total DL	Roof Wind	Second	q max	Allowable
	Load (lb)	Dead Load (lb)	(lb)		Floor Wind	(psf)	
0.6D + W	7965	10800	18765	10220	0	1002	1500
							67%

Note: Resultant is Outside Kern

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Column

Project File: Headers.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

(c) ENERCALC INC 1983-2022

DESCRIPTION: Typical Bearing Stud Wall

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combinations Used : ASCE 7-16

General Information

Analysis Method	Allowable Stress Design			Wood Section Name	2x6	
End Fixities	Top & Bottom Pinned			Wood Grading/Manuf.	Graded Lumber	
Overall Column Height	17 ft			Wood Member Type	Sawn	
(Used for non-slender calculations)						
Wood Species	Southern Pine			Exact Width	1.50 in	Allow Stress Modification Factors
Wood Grade	No.2: 2"-4" Thick: 5"-6" Wide			Exact Depth	5.50 in	
Fb +	1,000.0 psi	Fv	175.0 psi	Area	8.250 in^2	Cf or Cv for Bending 1.0
Fb -	1,000.0 psi	Ft	600.0 psi	Ix	20.797 in^4	Cf or Cv for Compression 1.0
Fc - Prll	1,400.0 psi	Density	34.330 pcf	Iy	1.547 in^4	Cf or Cv for Tension 1.0
Fc - Perp	565.0 psi					Cm : Wet Use Factor 1.0
						Ct : Temperature Fact 1.0
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial			Cfu : Flat Use Factor 1.0
	Basic	1,400.0	1,400.0	1,400.0 ksi		Kf : Built-up columns 1.0
	Minimum	510.0	510.0			Use Cr : Repetitive ? Yes
Brace condition for deflection (buckling) along columns :						
				X-X (width) axis :	Fully braced against buckling ABOUT Y-Y Axis	
				Y-Y (depth) axis :	Unbraced Length for buckling ABOUT X-X Axis = 17 ft, k	

Applied Loads

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

Column self weight included : 33.436 lbs * Dead Load Factor

AXIAL LOADS . . .

Roof Load: Axial Load at 17.0 ft, D = 0.3150, Lr = 0.420, S = 0.630 k

BENDING LOADS . . .

C&C Wind: Lat. Uniform Load creating Mx-x, W = 0.0320 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.7793 : 1**
 Load Combination +D+0.750S+0.450W
 Governing NDS Formula Comp + Mxx, NDS Eq. 3.9-3
 Location of max.above base 8.443 ft
 At maximum location values are .
 Applied Axial 0.8209 k
 Applied Mx 0.5202 k-ft
 Applied My 0.0 k-ft
 Fc : Allowable 295.728 psi

Maximum SERVICE Lateral Load Reactions . .
 Top along Y-Y 0.2720 k Bottom along Y-Y 0.2720 k
 Top along X-X 0.0 k Bottom along X-X 0.0 k

Maximum SERVICE Load Lateral Deflections . . .
 Along Y-Y 2.088 in at 8.557 ft above base
 for load combination : W Only
 Along X-X 0.0 in at 0.0 ft above base
 for load combination : n/a

Other Factors used to calculate allowable stresses . . .
 Bending Compression Tension

PASS Maximum Shear Stress Ratio = **0.1060 : 1**
 Load Combination +D+0.60W
 Location of max.above base 0.0 ft
 Applied Design Shear 29.673 psi
 Allowable Shear 280.0 psi

Load Combination Results

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.228	0.1468	PASS	0.0 ft	0.0	PASS	17.0 ft
+D+Lr	1.250	0.167	0.3180	PASS	0.0 ft	0.0	PASS	17.0 ft
+D+S	1.150	0.181	0.4064	PASS	0.0 ft	0.0	PASS	17.0 ft
+D+0.750Lr	1.250	0.167	0.2745	PASS	0.0 ft	0.0	PASS	17.0 ft
+D+0.750S	1.150	0.181	0.3410	PASS	0.0 ft	0.0	PASS	17.0 ft
+D+0.60W	1.600	0.132	0.7148	PASS	8.443 ft	0.1060	PASS	0.0 ft
+D+0.750Lr+0.450W	1.600	0.132	0.6834	PASS	8.443 ft	0.07948	PASS	0.0 ft
+D+0.750S+0.450W	1.600	0.132	0.7793	PASS	8.443 ft	0.07948	PASS	0.0 ft
+0.60D+0.60W	1.600	0.132	0.6597	PASS	8.443 ft	0.1060	PASS	0.0 ft

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Column

Project File: Headers.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

(c) ENERCALC INC 1983-2022

DESCRIPTION: Typical Bearing Stud Wall

Load Combination Results

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
+0.60D	1.600	0.132	0.08569	PASS	0.0 ft	0.0	PASS	17.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		k-ft	Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top	@ Base	@ Base	@ Top		@ Base	@ Top
D Only						0.348					
+D+Lr						0.768					
+D+S						0.978					
+D+0.750Lr						0.663					
+D+0.750S						0.821					
+D+0.60W				0.163	0.163	0.348					
+D+0.750Lr+0.450W				0.122	0.122	0.663					
+D+0.750S+0.450W				0.122	0.122	0.821					
+0.60D+0.60W				0.163	0.163	0.209					
+0.60D						0.209					
Lr Only						0.420					
S Only						0.630					
W Only				0.272	0.272						

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000 in	0.000ft		0.000 in	0.000 ft	
+D+Lr	0.0000 in	0.000ft		0.000 in	0.000 ft	
+D+S	0.0000 in	0.000ft		0.000 in	0.000 ft	
+D+0.750Lr	0.0000 in	0.000ft		0.000 in	0.000 ft	
+D+0.750S	0.0000 in	0.000ft		0.000 in	0.000 ft	
+D+0.60W	0.0000 in	0.000ft		1.253 in	8.557 ft	
+D+0.750Lr+0.450W	0.0000 in	0.000ft		0.939 in	8.557 ft	
+D+0.750S+0.450W	0.0000 in	0.000ft		0.939 in	8.557 ft	
+0.60D+0.60W	0.0000 in	0.000ft		1.253 in	8.557 ft	
+0.60D	0.0000 in	0.000ft		0.000 in	0.000 ft	
Lr Only	0.0000 in	0.000ft		0.000 in	0.000 ft	
S Only	0.0000 in	0.000ft		0.000 in	0.000 ft	
W Only	0.0000 in	0.000ft		2.088 in	8.557 ft	

Wood Column

Project File: Headers.ec6

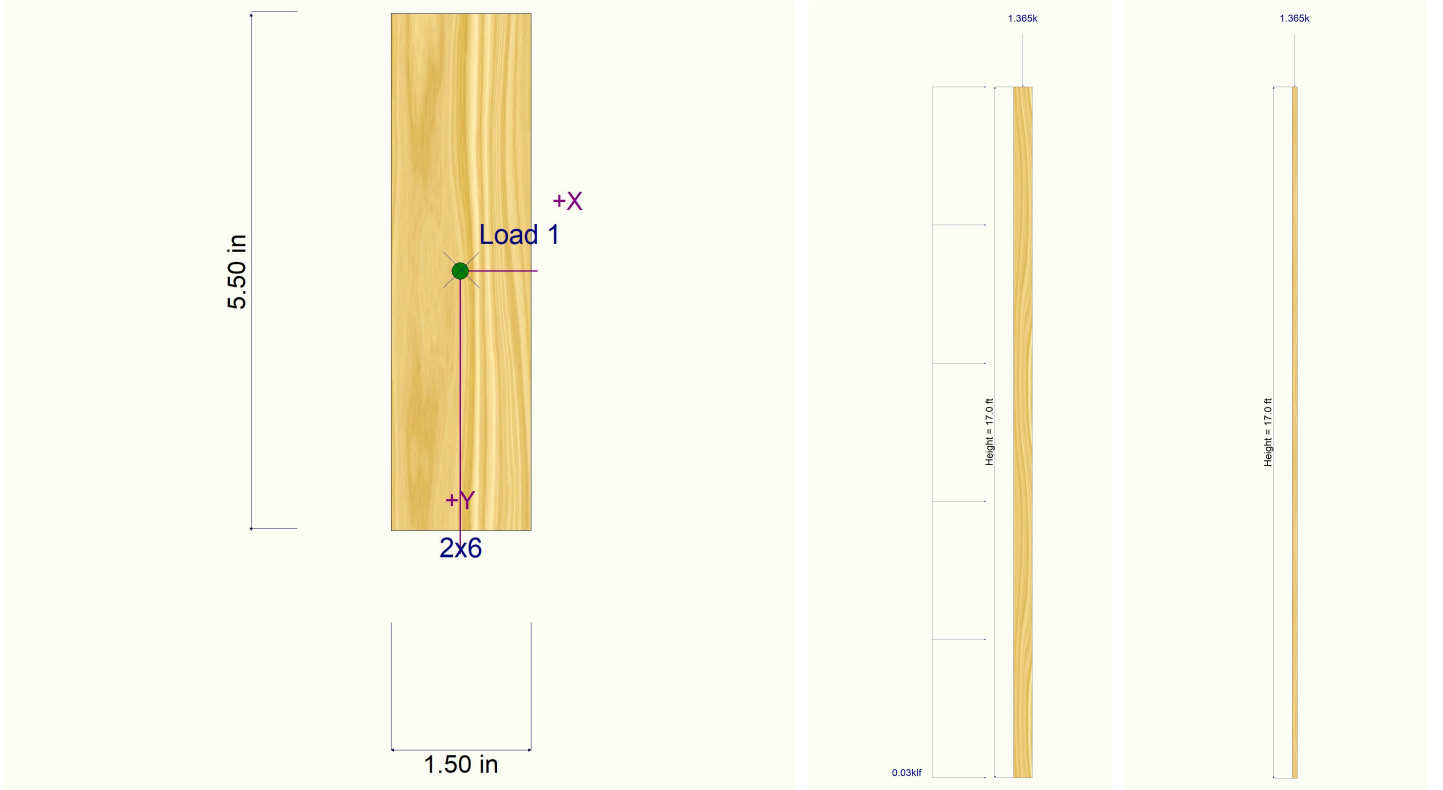
LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

(c) ENERCALC INC 1983-2022

DESCRIPTION: Typical Bearing Stud Wall

Sketches



Project Title: Panera - Joplin, MO
Engineer: AEM
Project ID:
Project Descr:

Wood Beam

Project File: Headers.ec6

LIC#: KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

(c) ENERCALC INC 1983-2022

DESCRIPTION: Header Type H1

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : ASCE 7-16

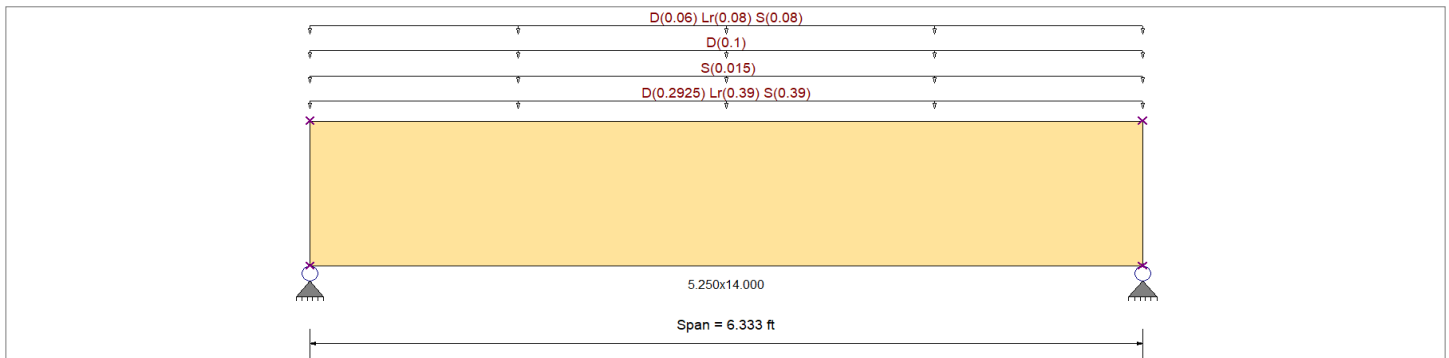
Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-16

Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

Beam Bracing : Completely Unbraced

Fb +	2600 psi	E : Modulus of Elasticity	
Fb -	2600 psi	Ebend- xx	1900ksi
Fc - Prll	2510 psi	Eminbend - xx	965.71ksi
Fc - Perp	750 psi		
Fv	285 psi		
Ft	1555 psi	Density	42.01pcf



Applied Loads

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

Beam self weight calculated and added to loading

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.020 ksf, Tributary Width = 19.50 ft, (Roof Load)

Uniform Load : S = 0.0150, Tributary Width = 1.0 ft, (Drift Load)

Uniform Load : D = 0.010 ksf, Tributary Width = 10.0 ft, (Wall Load)

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.020 ksf, Tributary Width = 4.0 ft, (Canopy Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.114 1	Maximum Shear Stress Ratio	=	0.120 : 1
Section used for this span		5.250x14.000	Section used for this span		5.250x14.000
fb: Actual	=	336.42psi	fv: Actual	=	39.35 psi
Fb: Allowable	=	2,952.66psi	Fv: Allowable	=	327.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	3.167ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.008 in	Ratio = 9816 >=360	Span: 1 : S Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.015 in	Ratio = 4964 >=180	Span: 1 : +D+S		
Max Upward Total Deflection	0 in	Ratio = 0 <180	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
D Only																
Length = 6.310 ft	1	0.072	0.076	0.90	1.000	1.00	1.00	1.00	1.00	0.99	2.38	166.27	2318.17	0.00	0.00	0.00
Length = 0.02311 ft	1	0.001	0.076	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.03	2.42	2339.93	0.95	19.45	256.50
+D+Lr																
Length = 6.310 ft	1	0.103	0.109	1.25	1.000	1.00	1.00	1.00	1.00	0.99	4.73	331.16	3205.03	1.90	38.74	356.25
Length = 0.02311 ft	1	0.001	0.109	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.07	4.82	3249.87	1.90	38.74	356.25
+D+S																
Length = 6.310 ft	1	0.114	0.120	1.15	1.000	1.00	1.00	1.00	1.00	0.99	4.81	336.42	2952.66	0.00	0.00	0.00
Length = 0.02311 ft	1	0.002	0.120	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.07	4.89	2989.89	1.93	39.35	327.75
+D+0.750Lr																
					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Project Title: Panera - Joplin, MO
 Engineer: AEM
 Project ID:
 Project Descr:

Wood Beam

Project File: Headers.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

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DESCRIPTION: Header Type H1

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L		M	fb	F'b	V	fv	F'v
Length = 6.310 ft	1	0.090	0.095	1.25	1.000	1.00	1.00	1.00	1.00	0.99		4.14	289.93	3205.03	1.66	33.92	356.25
Length = 0.02311 ft	1	0.001	0.095	1.25	1.000	1.00	1.00	1.00	1.00	1.00		0.06	4.22	3249.87	1.66	33.92	356.25
+D+0.750S				1.000	1.00	1.00	1.00	1.00	1.00	1.00				0.00	0.00	0.00	0.00
Length = 6.310 ft	1	0.100	0.105	1.15	1.000	1.00	1.00	1.00	1.00	0.99		4.20	293.88	2952.66	1.68	34.38	327.75
Length = 0.02311 ft	1	0.001	0.105	1.15	1.000	1.00	1.00	1.00	1.00	1.00		0.06	4.27	2989.89	1.68	34.38	327.75
+0.60D				1.000	1.00	1.00	1.00	1.00	1.00	1.00				0.00	0.00	0.00	0.00
Length = 6.310 ft	1	0.024	0.026	1.60	1.000	1.00	1.00	1.00	1.00	0.98		1.43	99.76	4081.03	0.57	11.67	456.00
Length = 0.02311 ft	1	0.000	0.026	1.60	1.000	1.00	1.00	1.00	1.00	1.00		0.02	1.45	4159.78	0.57	11.67	456.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0153	3.190		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
D Only	1	0.0076 in	3.190 ft	0.0000 in	0.000 ft
+D+Lr	1	0.0151 in	3.190 ft	0.0000 in	0.000 ft
+D+S	1	0.0153 in	3.190 ft	0.0000 in	0.000 ft
+D+0.750Lr	1	0.0132 in	3.190 ft	0.0000 in	0.000 ft
+D+0.750S	1	0.0134 in	3.190 ft	0.0000 in	0.000 ft
+0.60D	1	0.0045 in	3.190 ft	0.0000 in	0.000 ft
Lr Only	1	0.0075 in	3.190 ft	0.0000 in	0.000 ft
S Only	1	0.0077 in	3.190 ft	0.0000 in	0.000 ft

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.037	3.037
Overall MINimum	1.536	1.536
D Only	1.501	1.501
+D+Lr	2.989	2.989
+D+S	3.037	3.037
+D+0.750Lr	2.617	2.617
+D+0.750S	2.653	2.653
+0.60D	0.900	0.900
Lr Only	1.488	1.488
S Only	1.536	1.536

Project Title: Panera - Joplin, MO
Engineer: AEM
Project ID:
Project Descr:

Wood Beam

Project File: Headers.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

(c) ENERCALC INC 1983-2022

DESCRIPTION: Header Type H2

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : ASCE 7-16

Wood Species : Southern Pine

Wood Grade : No.2: 2"-4" Thick: 12" Wide

Beam Bracing : Completely Unbraced

Fb + 750.0 psi

Fb - 750.0 psi

Fc - Prll 1,250.0 psi

Fc - Perp 565.0 psi

Fv 175.0 psi

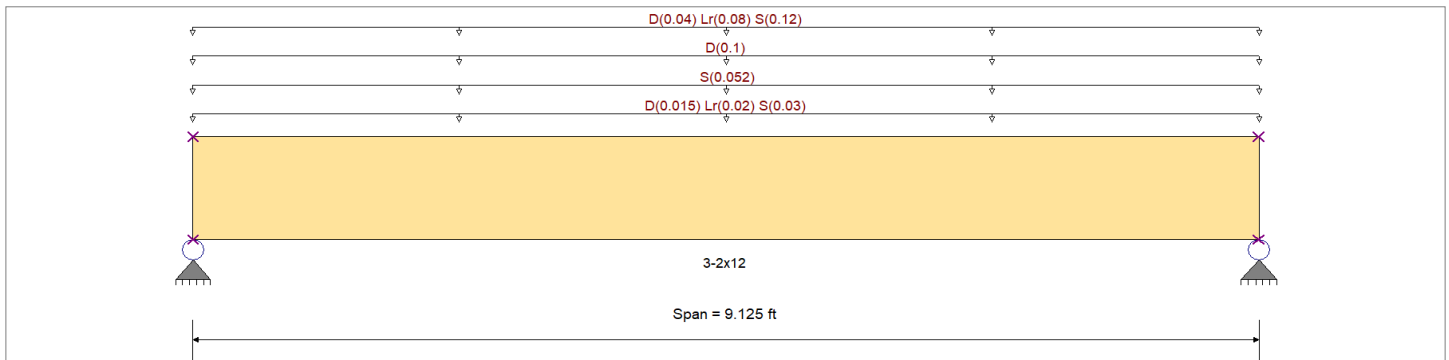
Ft 450.0 psi

E : Modulus of Elasticity

Ebend- xx 1,400.0ksi

Eminbend - xx 510.0ksi

Density 34.330pcf



Applied Loads

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

Beam self weight calculated and added to loading

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.030 ksf, Tributary Width = 1.0 ft, (Roof Load)

Uniform Load : S = 0.0520, Tributary Width = 1.0 ft, (Drift Load)

Uniform Load : D = 0.010 ksf, Tributary Width = 10.0 ft, (Wall Load)

Uniform Load : D = 0.010, Lr = 0.020, S = 0.030 ksf, Tributary Width = 4.0 ft, (Canopy Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.569 1	Maximum Shear Stress Ratio	=	0.197 : 1
Section used for this span		3-2x12	Section used for this span		3-2x12
fb: Actual	=	485.62psi	fv: Actual	=	39.70 psi
Fb: Allowable	=	854.09psi	Fv: Allowable	=	201.25 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.563ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.042 in	Ratio = 2582 >=360	Span: 1 : S Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.077 in	Ratio = 1413 >=180	Span: 1 : +D+S		
Max Upward Total Deflection	0 in	Ratio = 0 <180	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
D Only													0.00			
Length = 9.125 ft	1	0.328	0.114	0.90	1.000	1.00	1.00	1.00	1.00	0.99	1.74	219.83	670.03	0.61	17.97	157.50
+D+Lr					1.000	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 9.125 ft	1	0.379	0.131	1.25	1.000	1.00	1.00	1.00	1.00	0.99	2.78	351.41	927.41	0.97	28.72	218.75
+D+S					1.000	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 9.125 ft	1	0.569	0.197	1.15	1.000	1.00	1.00	1.00	1.00	0.99	3.84	485.62	854.09	1.34	39.70	201.25
+D+0.750Lr					1.000	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 9.125 ft	1	0.343	0.119	1.25	1.000	1.00	1.00	1.00	1.00	0.99	2.52	318.52	927.41	0.88	26.04	218.75
+D+0.750S					1.000	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 9.125 ft	1	0.491	0.170	1.15	1.000	1.00	1.00	1.00	1.00	0.99	3.32	419.17	854.09	1.16	34.26	201.25

Project Title: Panera - Joplin, MO
 Engineer: AEM
 Project ID:
 Project Descr:

Wood Beam

Project File: Headers.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

(c) ENERCALC INC 1983-2022

DESCRIPTION: Header Type H2

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
+0.60D						1.000	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 9.125 ft	1		0.112	0.039	1.60	1.000	1.00	1.00	1.00	1.00	0.99	1.04	131.90	1182.55	0.36	10.78	280.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0775	4.596		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
D Only	1	0.0351 in	4.596 ft	0.0000 in	0.000 ft
+D+Lr	1	0.0561 in	4.596 ft	0.0000 in	0.000 ft
+D+S	1	0.0775 in	4.596 ft	0.0000 in	0.000 ft
+D+0.750Lr	1	0.0508 in	4.596 ft	0.0000 in	0.000 ft
+D+0.750S	1	0.0669 in	4.596 ft	0.0000 in	0.000 ft
+0.60D	1	0.0210 in	4.596 ft	0.0000 in	0.000 ft
Lr Only	1	0.0210 in	4.596 ft	0.0000 in	0.000 ft
S Only	1	0.0424 in	4.596 ft	0.0000 in	0.000 ft

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.684	1.684
Overall MINimum	0.922	0.922
D Only	0.762	0.762
+D+Lr	1.219	1.219
+D+S	1.684	1.684
+D+0.750Lr	1.104	1.104
+D+0.750S	1.453	1.453
+0.60D	0.457	0.457
Lr Only	0.456	0.456
S Only	0.922	0.922

Project Title: Panera - Joplin, MO
Engineer: AEM
Project ID:
Project Descr:

Wood Beam

Project File: Headers.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

(c) ENERCALC INC 1983-2022

DESCRIPTION: Header Type H2: No Canopy

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : ASCE 7-16

Wood Species : Southern Pine

Wood Grade : No.2: 2"-4" Thick: 12" Wide

Beam Bracing : Completely Unbraced

Fb + 750.0 psi

Fb - 750.0 psi

Fc - Prll 1,250.0 psi

Fc - Perp 565.0 psi

Fv 175.0 psi

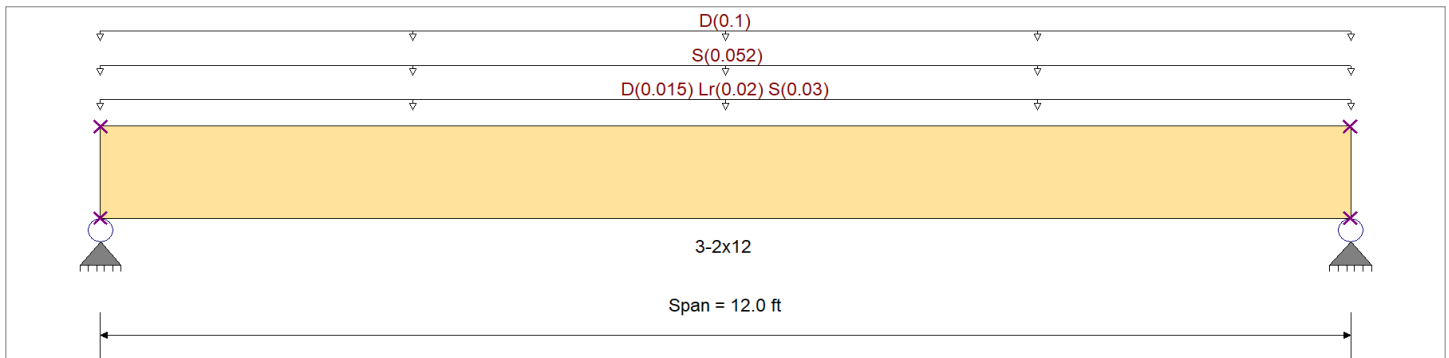
Ft 450.0 psi

E : Modulus of Elasticity

Ebend- xx 1,400.0ksi

Eminbend - xx 510.0ksi

Density 34.330pcf



Applied Loads

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

Beam self weight calculated and added to loading

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.030 ksf, Tributary Width = 1.0 ft, (Roof Load)

Uniform Load : S = 0.0520, Tributary Width = 1.0 ft, (Drift Load)

Uniform Load : D = 0.010 ksf, Tributary Width = 10.0 ft, (Wall Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.559	1	Maximum Shear Stress Ratio	=	0.156	: 1
Section used for this span		3-2x12		Section used for this span		3-2x12	
fb: Actual	=	475.75psi		fv: Actual	=	31.47 psi	
Fb: Allowable	=	851.36psi		Fv: Allowable	=	201.25 psi	
Load Combination		+D+S		Load Combination		+D+S	
Location of maximum on span	=	6.000ft		Location of maximum on span	=	0.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.051 in	Ratio =	2797	>=360	Span: 1 : S Only	
Max Upward Transient Deflection		0 in	Ratio =	0	<360	n/a	
Max Downward Total Deflection		0.131 in	Ratio =	1097	>=180	Span: 1 : +D+S	
Max Upward Total Deflection		0 in	Ratio =	0	<180	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
D Only													0.00			
Length = 12.0 ft	1	0.433	0.121	0.90	1.000	1.00	1.00	1.00	1.00	0.99	2.29	289.15	668.49	0.65	19.13	157.50
+D+Lr					1.000	1.00	1.00	1.00	1.00	0.99			0.00			
Length = 12.0 ft	1	0.362	0.101	1.25	1.000	1.00	1.00	1.00	1.00	0.99	2.65	334.66	924.07	0.75	22.14	218.75
+D+S					1.000	1.00	1.00	1.00	1.00	0.99			0.00			
Length = 12.0 ft	1	0.559	0.156	1.15	1.000	1.00	1.00	1.00	1.00	0.99	3.76	475.75	851.36	1.06	31.47	201.25
+D+0.750Lr					1.000	1.00	1.00	1.00	1.00	0.99			0.00			
Length = 12.0 ft	1	0.350	0.098	1.25	1.000	1.00	1.00	1.00	1.00	0.99	2.56	323.29	924.07	0.72	21.39	218.75
+D+0.750S					1.000	1.00	1.00	1.00	1.00	0.99			0.00			
Length = 12.0 ft	1	0.504	0.141	1.15	1.000	1.00	1.00	1.00	1.00	0.99	3.39	429.10	851.36	0.96	28.38	201.25
+0.60D					1.000	1.00	1.00	1.00	1.00	0.99			0.00			

Project Title: Panera - Joplin, MO
 Engineer: AEM
 Project ID:
 Project Descr:

Wood Beam

Project File: Headers.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

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DESCRIPTION: Header Type H2: No Canopy

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L		M	fb	F'b	V	fv	F'v
Length = 12.0 ft	1	0.147	0.041	1.60	1.000	1.00	1.00	1.00	1.00	0.98		1.37	173.49	1176.36	0.39	11.48	280.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.1313	6.044		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
D Only	1	0.0798 in	6.044 ft	0.0000 in	0.000 ft
+D+Lr	1	0.0923 in	6.044 ft	0.0000 in	0.000 ft
+D+S	1	0.1313 in	6.044 ft	0.0000 in	0.000 ft
+D+0.750Lr	1	0.0892 in	6.044 ft	0.0000 in	0.000 ft
+D+0.750S	1	0.1184 in	6.044 ft	0.0000 in	0.000 ft
+0.60D	1	0.0479 in	6.044 ft	0.0000 in	0.000 ft
Lr Only	1	0.0126 in	6.044 ft	0.0000 in	0.000 ft
S Only	1	0.0515 in	6.044 ft	0.0000 in	0.000 ft

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.254	1.254
Overall MINimum	0.492	0.492
D Only	0.762	0.762
+D+Lr	0.882	0.882
+D+S	1.254	1.254
+D+0.750Lr	0.852	0.852
+D+0.750S	1.131	1.131
+0.60D	0.457	0.457
Lr Only	0.120	0.120
S Only	0.492	0.492

Project Title: Panera - Joplin, MO
Engineer: AEM
Project ID:
Project Descr:

Wood Beam

Project File: Headers.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

(c) ENERCALC INC 1983-2022

DESCRIPTION: Header Type H2: Bearing

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : ASCE 7-16

Wood Species : Southern Pine

Wood Grade : No.2: 2"-4" Thick: 12" Wide

Beam Bracing : Completely Unbraced

Fb + 750.0 psi

Fb - 750.0 psi

Fc - Prll 1,250.0 psi

Fc - Perp 565.0 psi

Fv 175.0 psi

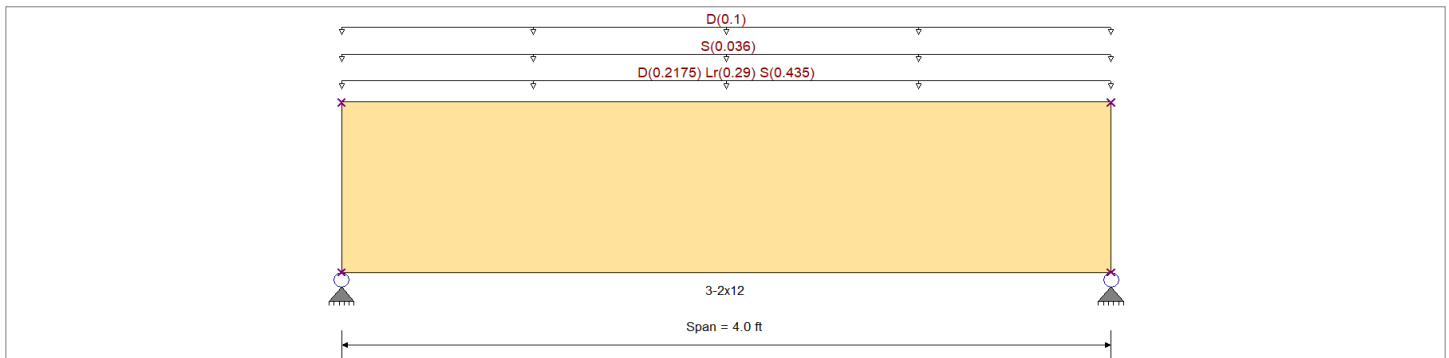
Ft 450.0 psi

E : Modulus of Elasticity

Ebend- xx 1,400.0ksi

Eminbend - xx 510.0ksi

Density 34.330pcf



Applied Loads

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

Beam self weight calculated and added to loading

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.030 ksf, Tributary Width = 14.50 ft, (Roof Load)

Uniform Load : S = 0.0360, Tributary Width = 1.0 ft, (Drift Load)

Uniform Load : D = 0.010 ksf, Tributary Width = 10.0 ft, (Wall Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.236	1	Maximum Shear Stress Ratio	=	0.126	: 1
Section used for this span		3-2x12		Section used for this span		3-2x12	
fb: Actual	=	202.42psi		fv: Actual	=	25.28 psi	
Fb: Allowable	=	858.91psi		Fv: Allowable	=	201.25 psi	
Load Combination		+D+S		Load Combination		+D+S	
Location of maximum on span	=	2.000ft		Location of maximum on span	=	3.066 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.004 in	Ratio = 13148	>=360	Span: 1 : S Only		
Max Upward Transient Deflection		0 in	Ratio = 0	<360	n/a		
Max Downward Total Deflection		0.006 in	Ratio = 7735	>=180	Span: 1 : +D+S		
Max Upward Total Deflection		0 in	Ratio = 0	<180	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment	Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
D Only														0.00		0.00	0.00
	Length = 4.0 ft	1	0.124	0.066	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.66	83.33	672.84	0.35	10.41	157.50
+D+Lr						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 4.0 ft	1	0.168	0.089	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.24	156.65	933.23	0.66	19.56	218.75
+D+S						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 4.0 ft	1	0.236	0.126	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.60	202.42	858.91	0.85	25.28	201.25
+D+0.750Lr						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 4.0 ft	1	0.148	0.079	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.09	138.32	933.23	0.58	17.27	218.75
+D+0.750S						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 4.0 ft	1	0.201	0.107	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.37	172.64	858.91	0.73	21.56	201.25
+0.60D						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Project Title: Panera - Joplin, MO
 Engineer: AEM
 Project ID:
 Project Descr:

Wood Beam

Project File: Headers.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

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DESCRIPTION: Header Type H2: Bearing

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L		M	fb	F'b	V	fv	F'v
Length = 4.0 ft	1	0.042	0.022	1.60	1.000	1.00	1.00	1.00	1.00	0.99		0.40	50.00	1192.85	0.21	6.24	280.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0062	2.015		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
D Only	1	0.0026 in	2.015 ft	0.0000 in	0.000 ft
+D+Lr	1	0.0048 in	2.015 ft	0.0000 in	0.000 ft
+D+S	1	0.0062 in	2.015 ft	0.0000 in	0.000 ft
+D+0.750Lr	1	0.0042 in	2.015 ft	0.0000 in	0.000 ft
+D+0.750S	1	0.0053 in	2.015 ft	0.0000 in	0.000 ft
+0.60D	1	0.0015 in	2.015 ft	0.0000 in	0.000 ft
Lr Only	1	0.0022 in	2.015 ft	0.0000 in	0.000 ft
S Only	1	0.0037 in	2.015 ft	0.0000 in	0.000 ft

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.601	1.601
Overall MINimum	0.942	0.942
D Only	0.659	0.659
+D+Lr	1.239	1.239
+D+S	1.601	1.601
+D+0.750Lr	1.094	1.094
+D+0.750S	1.366	1.366
+0.60D	0.395	0.395
Lr Only	0.580	0.580
S Only	0.942	0.942

Project Title: Panera - Joplin, MO
 Engineer: AEM
 Project ID:
 Project Descr:

Wood Beam

Project File: Headers.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

(c) ENERCALC INC 1983-2022

DESCRIPTION: King Stud @ H2

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : ASCE 7-16

Wood Species : Southern Pine

Wood Grade : No.2: 2"-4" Thick: 5"-6" Wide

Beam Bracing : Completely Unbraced

Fb + 1,000.0 psi

Fb - 1,000.0 psi

Fc - Prll 1,400.0 psi

Fc - Perp 565.0 psi

Fv 175.0 psi

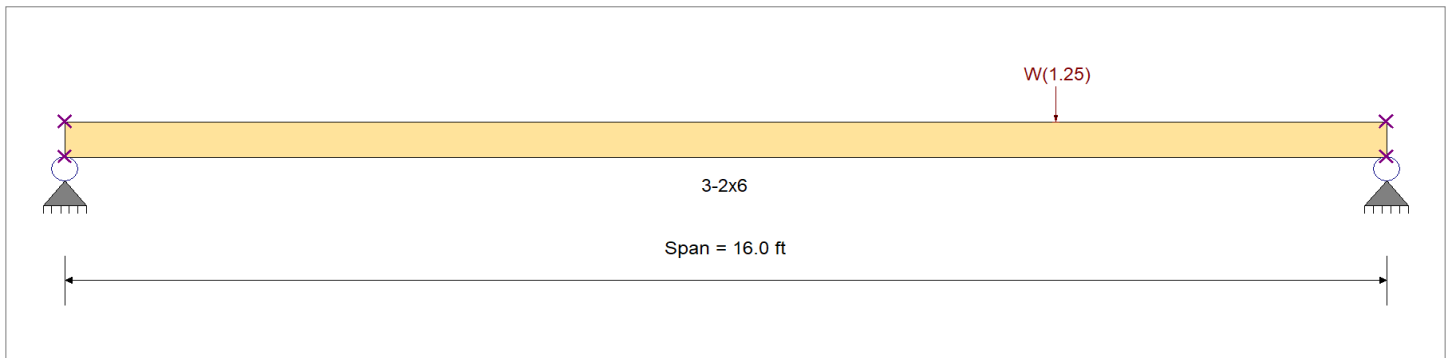
Ft 600.0 psi

E : Modulus of Elasticity

Ebend- xx 1,400.0ksi

Eminbend - xx 510.0ksi

Density 34.330pcf



Applied Loads

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

Beam self weight NOT internally calculated and added

Point Load : W = 1.250 k @ 12.0 ft, (Header Wind Load)

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	0.754	1	Maximum Shear Stress Ratio	=	0.122	1
Section used for this span		3-2x6		Section used for this span		3-2x6	
fb: Actual	=	1,187.19psi		fv: Actual	=	34.09 psi	
Fb: Allowable	=	1,574.21psi		Fv: Allowable	=	280.00 psi	
Load Combination		+0.60W		Load Combination		+0.60W	
Location of maximum on span	=	11.971ft		Location of maximum on span	=	12.029 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection	1.482 in	Ratio =	129 < 360	Span: 1 : W Only			
Max Upward Transient Deflection	0 in	Ratio =	0 < 360	n/a			
Max Downward Total Deflection	0.889 in	Ratio =	215 >= 180	Span: 1 : +0.60W			
Max Upward Total Deflection	0 in	Ratio =	0 < 180	n/a			

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
	Length = 16.0 ft	1			0.90	1.000	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
+0.60W						1.000	1.00	1.00	1.00	1.00	0.99			892.74	0.00	0.00	157.50
	Length = 16.0 ft	1	0.754	0.122	1.60	1.000	1.00	1.00	1.00	1.00	0.98	2.24	1,187.19	1574.21	0.56	34.09	280.00
+0.450W						1.000	1.00	1.00	1.00	1.00	0.98			0.00	0.00	0.00	0.00
	Length = 16.0 ft	1	0.566	0.091	1.60	1.000	1.00	1.00	1.00	1.00	0.98	1.68	890.39	1574.21	0.42	25.57	280.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	1.4818	8.993		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+0.60W	1	0.8891 in	8.993 ft	0.0000 in	0.000 ft

Project Title: Panera - Joplin, MO
Engineer: AEM
Project ID:
Project Descr:

Wood Beam

Project File: Headers.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

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DESCRIPTION: King Stud @ H2

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+0.450W	1	0.6668 in	8.993 ft	0.0000 in	0.000 ft
W Only	1	1.4818 in	8.993 ft	0.0000 in	0.000 ft

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.313	0.938
Overall MINimum	0.313	0.938
+0.60W	0.188	0.563
+0.450W	0.141	0.422
W Only	0.313	0.938

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: Panera - Lee Summit.ec6

LIC#: KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

(c) ENERCALC INC 1983-2022

DESCRIPTION: Middle Framing Support

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2018

Material Properties

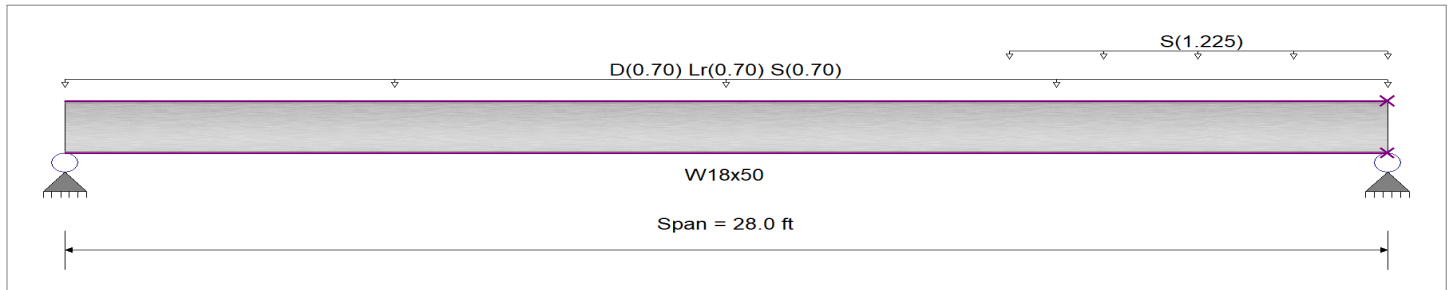
Analysis Method : Allowable Strength Design

Fy : Steel Yield : 50.0 ksi

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

E: Modulus : 29,000.0 ksi

Bending Axis : Major Axis Bending



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.020, Lr = 0.020, S = 0.020 ksf, Tributary Width = 35.0 ft

Uniform Load : S = 0.0350 ksf, Extent = 20.0 --> 28.0 ft, Tributary Width = 35.0 ft, (Snow Drift)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.625 : 1	Maximum Shear Stress Ratio =	0.219 : 1
Section used for this span	W18x50	Section used for this span	W18x50
Ma : Applied	157.499 k-ft	Va : Applied	28.0 k
Mn / Omega : Allowable	251.996 k-ft	Vn/Omega : Allowable	127.80 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Location of maximum on span	28.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.555 in	Ratio =	604 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.975 in	Ratio =	345 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 28.00 ft	1	0.272	0.077	68.60		68.60	420.83	252.00	1.00	1.00	9.80	191.70	127.80
+D+Lr													
Dsgn. L = 28.00 ft	1	0.544	0.153	137.20		137.20	420.83	252.00	1.00	1.00	19.60	191.70	127.80
+D+S													
Dsgn. L = 28.00 ft	1	0.625	0.219	157.50		157.50	420.83	252.00	1.00	1.00	28.00	191.70	127.80
+D+0.750Lr													
Dsgn. L = 28.00 ft	1	0.476	0.134	120.05		120.05	420.83	252.00	1.00	1.00	17.15	191.70	127.80
+D+0.750S													
Dsgn. L = 28.00 ft	1	0.537	0.183	135.20		135.20	420.83	252.00	1.00	1.00	23.45	191.70	127.80
+0.60D													
Dsgn. L = 28.00 ft	1	0.163	0.046	41.16		41.16	420.83	252.00	1.00	1.00	5.88	191.70	127.80

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.9745	14.320		0.0000	0.000

Vertical Reactions

Support notation : Far left is #:

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	21.000	28.000

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: Panera - Lee Summit.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

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DESCRIPTION: Middle Framing Support

Vertical Reactions			Support notation : Far left is #:	Values in KIPS
Load Combination	Support 1	Support 2		
Overall MINimum	5.880	5.880		
D Only	9.800	9.800		
+D+Lr	19.600	19.600		
+D+S	21.000	28.000		
+D+0.750Lr	17.150	17.150		
+D+0.750S	18.200	23.450		
+0.60D	5.880	5.880		
Lr Only	9.800	9.800		
S Only	11.200	18.200		

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Beam

Project File: Panera - Lee Summit.ec6

LIC#: KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

(c) ENERCALC INC 1983-2022

DESCRIPTION: HSS Exterior Framing Support

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2018

Material Properties

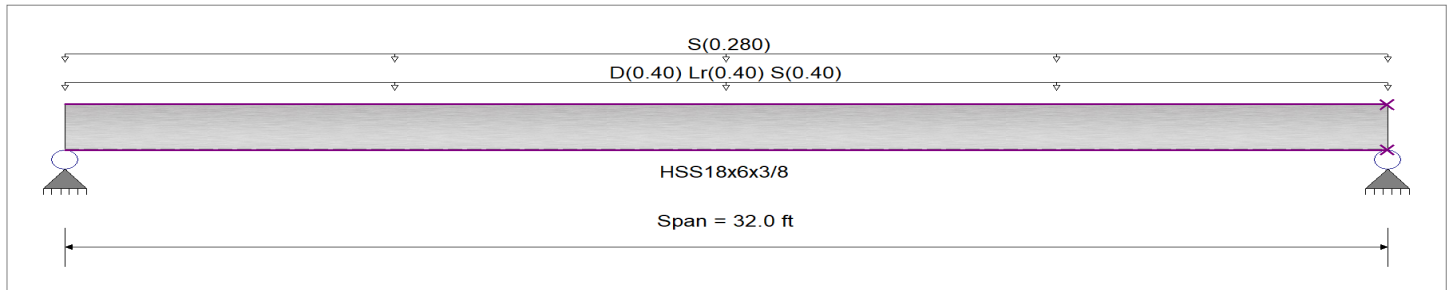
Analysis Method : Allowable Strength Design

Fy : Steel Yield : 46.0 ksi

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

E: Modulus : 29,000.0 ksi

Bending Axis : Major Axis Bending



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.020, Lr = 0.020, S = 0.020 ksf, Tributary Width = 20.0 ft

Uniform Load : S = 0.0350 ksf, Tributary Width = 8.0 ft, (Snow Drift)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =		0.697 : 1	Maximum Shear Stress Ratio =		0.088 : 1
Section used for this span		HSS18x6x3/8	Section used for this span		HSS18x6x3/8
Ma : Applied		138.240 k-ft	Va : Applied		17.280 k
Mn / Omega : Allowable		198.323 k-ft	Vn/Omega : Allowable		195.567 k
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span		0.000 ft	Location of maximum on span		0.000 ft
Span # where maximum occurs		Span # 1	Span # where maximum occurs		Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.923 in	Ratio =	415	>=240.
Max Upward Transient Deflection		0.000 in	Ratio =	0	<240.0
				Span: 1 : S Only	
Max Downward Total Deflection		1.466 in	Ratio =	262	>=240.
				Span: 1 : +D+S	
Max Upward Total Deflection		0.000 in	Ratio =	0	<240.0

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	VnxVnx/Omega	
D Only													
Dsgn. L = 32.00 ft	1	0.258	0.033	51.20		51.20	331.20	198.32	1.00	1.00	6.40	326.60	195.57
+D+Lr													
Dsgn. L = 32.00 ft	1	0.516	0.065	102.40		102.40	331.20	198.32	1.00	1.00	12.80	326.60	195.57
+D+S													
Dsgn. L = 32.00 ft	1	0.697	0.088	138.24		138.24	331.20	198.32	1.00	1.00	17.28	326.60	195.57
+D+0.750Lr													
Dsgn. L = 32.00 ft	1	0.452	0.057	89.60		89.60	331.20	198.32	1.00	1.00	11.20	326.60	195.57
+D+0.750S													
Dsgn. L = 32.00 ft	1	0.587	0.074	116.48		116.48	331.20	198.32	1.00	1.00	14.56	326.60	195.57
+0.60D													
Dsgn. L = 32.00 ft	1	0.155	0.020	30.72		30.72	331.20	198.32	1.00	1.00	3.84	326.60	195.57

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	1.4662	16.091		0.0000	0.000

Vertical Reactions

Support notation : Far left is #:

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	17.280	17.280

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: Panera - Lee Summit.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

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DESCRIPTION: HSS Exterior Framing Support

Vertical Reactions			Support notation : Far left is #:	Values in KIPS
Load Combination	Support 1	Support 2		
Overall MINimum	3.840	3.840		
D Only	6.400	6.400		
+D+Lr	12.800	12.800		
+D+S	17.280	17.280		
+D+0.750Lr	11.200	11.200		
+D+0.750S	14.560	14.560		
+0.60D	3.840	3.840		
Lr Only	6.400	6.400		
S Only	10.880	10.880		

Project Title:
Engineer:
Project ID:
Project Descr:

Project File: Panera - Lee Summit.ec6

CASE ENGINEERING, INC.

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DESCRIPTION: HSS Column

Code References

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2018

General Information

Steel Section Name : **HSS5-1/2x5-1/2x3/8**
 Analysis Method : Allowable Strength
 Steel Stress Grade
 Fy : Steel Yield 46.0 ksi
 E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height 16.625 ft
 Top & Bottom Fixity Top & Bottom Pinned
 Brace condition for deflection (buckling) along columns :
 X-X (width) axis :
 Unbraced Length for buckling ABOUT Y-Y Axis = 16.625 ft, K = 1.0
 Y-Y (depth) axis :
 Unbraced Length for buckling ABOUT X-X Axis = 16.625 ft, K = 1.0

Applied Loads

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

Column self weight included : 414.461 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 16.625 ft, D = 6.40, LR = 6.40, S = 10.880 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS	Max. Axial+Bending Stress Ratio =	0.1734 : 1
	Load Combination	+D+S
	Location of max.above base	0.0 ft
	At maximum location values are . . .	
	Pa : Axial	17.694 k
	Pn / Omega : Allowable	102.065 k
	Ma-x : Applied	0.0 k-ft
	Mn-x / Omega : Allowable	30.070 k-ft
	Ma-y : Applied	0.0 k-ft
	Mn-y / Omega : Allowable	30.070 k-ft
PASS	Maximum Shear Stress Ratio	0.0 : 1
	Load Combination	0.0
	Location of max.above base	0.0 ft
	At maximum location values are . . .	
	Va : Applied	0.0 k
	Vn / Omega : Allowable	0.0 k

Maximum 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 Load Deflections . . .

Along Y-Y 0.0 in at 0.0ft above base
for load combination :

Along X-X 0.0 in at 0.0ft above base
for load combination :

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Maximum Shear Ratios					
	Stress Ratio	Status	Location	Cbx	Cby	KxLx/Ry	KyLy/Rx	Stress Ratio	Status	Location
D Only	0.067	PASS	0.00 ft	1.00	1.00	95.91	95.91	0.000	PASS	0.00 ft
+D+Lr	0.129	PASS	0.00 ft	1.00	1.00	95.91	95.91	0.000	PASS	0.00 ft
+D+S	0.173	PASS	0.00 ft	1.00	1.00	95.91	95.91	0.000	PASS	0.00 ft
+D+0.750Lr	0.114	PASS	0.00 ft	1.00	1.00	95.91	95.91	0.000	PASS	0.00 ft
+D+0.750S	0.147	PASS	0.00 ft	1.00	1.00	95.91	95.91	0.000	PASS	0.00 ft
+0.60D	0.040	PASS	0.00 ft	1.00	1.00	95.91	95.91	0.000	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

[illegible]

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Column

Project File: Panera - Lee Summit.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

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DESCRIPTION: HSS Column

Extreme Reactions

Item	Extreme Value	Axial Reaction	X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		k-ft	My - End Moments	
		@ Base	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top		@ Base	@ Top
Axial @ Base	Maximum	17.694										
"	Minimum	4.089										
Reaction, X-X Axis Base	Maximum	6.814										
"	Minimum	6.814										
Reaction, Y-Y Axis Base	Maximum	6.814										
"	Minimum	6.814										
Reaction, X-X Axis Top	Maximum	6.814										
"	Minimum	6.814										
Reaction, Y-Y Axis Top	Maximum	6.814										
"	Minimum	6.814										
Moment, X-X Axis Base	Maximum	6.814										
"	Minimum	6.814										
Moment, Y-Y Axis Base	Maximum	6.814										
"	Minimum	6.814										
Moment, X-X Axis Top	Maximum	6.814										
"	Minimum	6.814										
Moment, Y-Y Axis Top	Maximum	6.814										
"	Minimum	6.814										

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+Lr	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750S	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Steel Section Properties : HSS5-1/2x5-1/2x3/8

Depth	=	5.500 in	I xx	=	29.70 in^4	J	=	49.000 in^4
Design Thick	=	0.349 in	S xx	=	10.80 in^3			
Width	=	5.500 in	R xx	=	2.080 in			
Wall Thick	=	0.375 in	Zx	=	13.100 in^3			
Area	=	6.880 in^2	I yy	=	29.700 in^4	C	=	18.400 in^3
Weight	=	24.930 plf	S yy	=	10.800 in^3			
			R yy	=	2.080 in			

Ycg = 0.000 in

Steel Column

Project File: Panera - Lee Summit.ec6

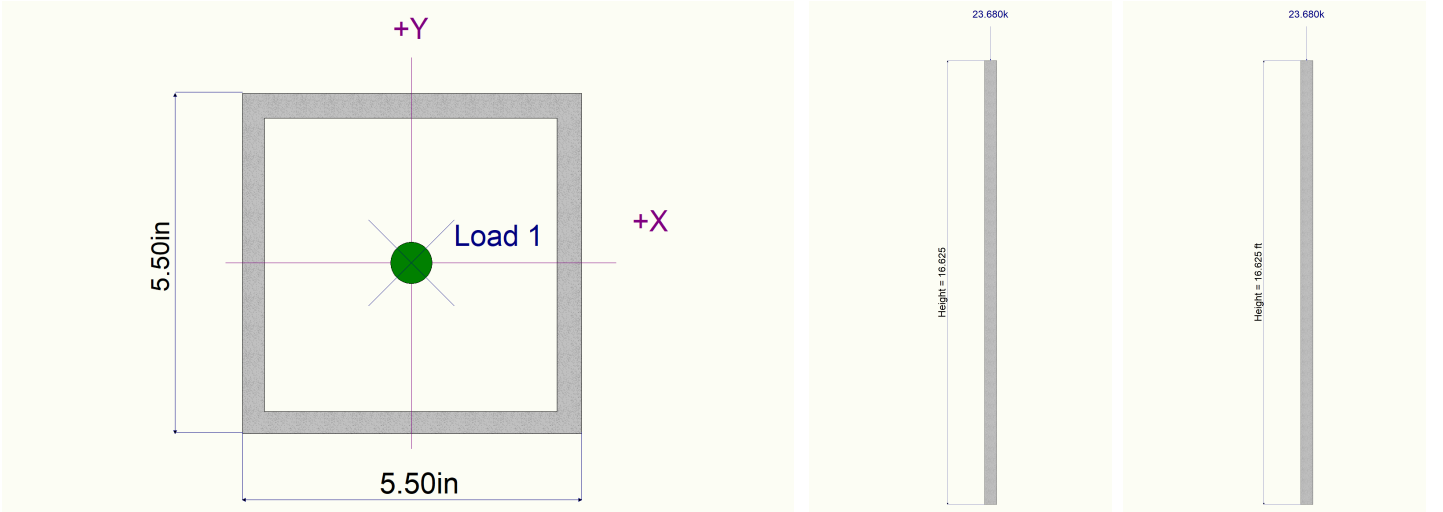
LIC# : KW-06014217, Build:20.22.5.16

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DESCRIPTION: HSS Column

Sketches



Project Title:
Engineer:
Project ID:
Project Descr:

Project File: Panera - Lee Summit.ec6

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DESCRIPTION: Interior HSS Column

Code References

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2018

General Information

Steel Section Name : **HSS6x6x1/4**
 Analysis Method : Allowable Strength
 Steel Stress Grade
 Fy : Steel Yield 46.0 ksi
 E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height 16.625 ft
 Top & Bottom Fixity Top & Bottom Pinned
 Brace condition for deflection (buckling) along columns :
 X-X (width) axis :
 Unbraced Length for buckling ABOUT Y-Y Axis = 16.625 ft, K = 1.0
 Y-Y (depth) axis :
 Unbraced Length for buckling ABOUT X-X Axis = 16.625 ft, K = 1.0

Applied Loads

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

Column self weight included : 316.208 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 16.625 ft, D = 25.50, LR = 21.0, S = 31.50 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS	Max. Axial+Bending Stress Ratio =	0.6475	: 1
	Load Combination	+D+S	
	Location of max.above base	0.0	ft
	At maximum location values are . . .		
	Pa : Axial	57.316	k
	Pn / Omega : Allowable	88.517	k
	Ma-x : Applied	0.0	k-ft
	Mn-x / Omega : Allowable	25.709	k-ft
	Ma-y : Applied	0.0	k-ft
	Mn-y / Omega : Allowable	25.709	k-ft

PASS	Maximum Shear Stress Ratio	0.0	: 1
	Load Combination	0.0	
	Location of max.above base	0.0	ft
	At maximum location values are . . .		
	Va : Applied	0.0	k
	Vn / Omega : Allowable	0.0	k

Maximum 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 Load Deflections . . .

Along Y-Y for load combination :	0.0 in	at	0.0ft	above base
Along X-X for load combination :	0.0 in	at	0.0ft	above base

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Maximum Shear Ratios					
	Stress Ratio	Status	Location	Cbx	Cby	KxLx/Ry	KyLy/Rx	Stress Ratio	Status	Location
D Only	0.292	PASS	0.00 ft	1.00	1.00	85.26	85.26	0.000	PASS	0.00 ft
+D+Lr	0.529	PASS	0.00 ft	1.00	1.00	85.26	85.26	0.000	PASS	0.00 ft
+D+S	0.648	PASS	0.00 ft	1.00	1.00	85.26	85.26	0.000	PASS	0.00 ft
+D+0.750Lr	0.470	PASS	0.00 ft	1.00	1.00	85.26	85.26	0.000	PASS	0.00 ft
+D+0.750S	0.559	PASS	0.00 ft	1.00	1.00	85.26	85.26	0.000	PASS	0.00 ft
+0.60D	0.175	PASS	0.00 ft	1.00	1.00	85.26	85.26	0.000	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction	X-X Axis Reaction	k	Y-Y Axis Reaction	Mx - End Moments	k-ft	My - End Moments
	@ Base	@ Base @ Top		@ Base @ Top	@ Base @ Top		@ Base @ Top
D Only	25.816						
+D+Lr	46.816						
+D+S	57.316						
+D+0.750Lr	41.566						
+D+0.750S	49.441						
+0.60D	15.490						
Lr Only	21.000						
S Only	31.500						

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Column

Project File: Panera - Lee Summit.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

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DESCRIPTION: Interior HSS Column

Extreme Reactions

Item	Extreme Value	Axial Reaction	X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		k-ft	My - End Moments	
		@ Base	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top		@ Base	@ Top
Axial @ Base	Maximum	57.316										
"	Minimum	15.490										
Reaction, X-X Axis Base	Maximum	25.816										
"	Minimum	25.816										
Reaction, Y-Y Axis Base	Maximum	25.816										
"	Minimum	25.816										
Reaction, X-X Axis Top	Maximum	25.816										
"	Minimum	25.816										
Reaction, Y-Y Axis Top	Maximum	25.816										
"	Minimum	25.816										
Moment, X-X Axis Base	Maximum	25.816										
"	Minimum	25.816										
Moment, Y-Y Axis Base	Maximum	25.816										
"	Minimum	25.816										
Moment, X-X Axis Top	Maximum	25.816										
"	Minimum	25.816										
Moment, Y-Y Axis Top	Maximum	25.816										
"	Minimum	25.816										

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+Lr	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750S	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Steel Section Properties : HSS6x6x1/4

Depth	=	6.000 in	I xx	=	28.60 in^4	J	=	45.600 in^4
Design Thick	=	0.233 in	S xx	=	9.54 in^3			
Width	=	6.000 in	R xx	=	2.340 in			
Wall Thick	=	0.250 in	Zx	=	11.200 in^3			
Area	=	5.240 in^2	I yy	=	28.600 in^4	C	=	15.400 in^3
Weight	=	19.020 plf	S yy	=	9.540 in^3			
			R yy	=	2.340 in			

Ycg = 0.000 in

Steel Column

Project File: Panera - Lee Summit.ec6

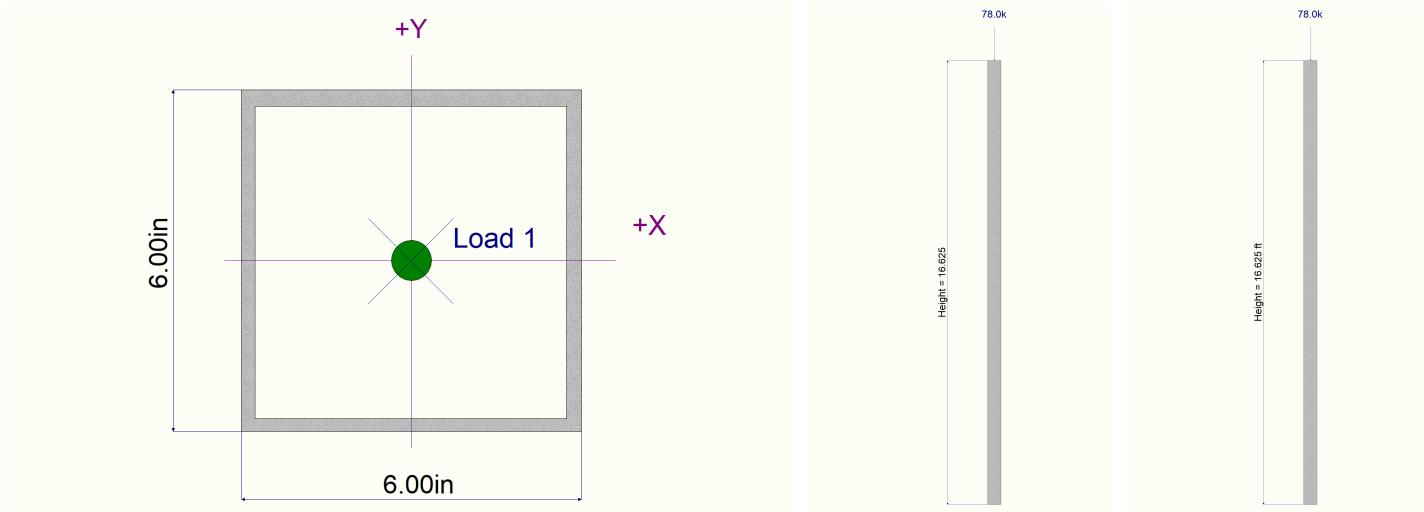
LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

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DESCRIPTION: Interior HSS Column

Sketches



Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: Panera - Lee Summit.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

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DESCRIPTION: Exterior Gravity Framing Support

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16

Load Combinations Used : IBC 2018

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,644.15 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1

Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	1.50 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth

Footing base depth below soil surface	=	2.50 ft
Allow press. increase per foot of depth when footing base is below	=	ksf ft

Increases based on footing plan dimension

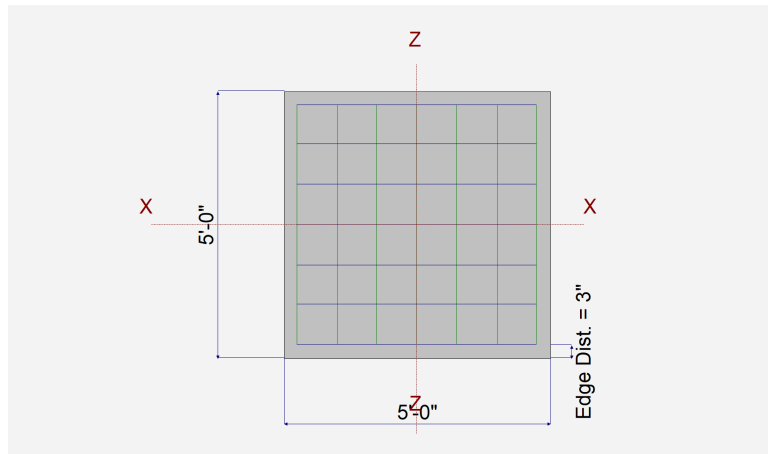
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf ft
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Dimensions

Width parallel to X-X Axis	=	5.0 ft
Length parallel to Z-Z Axis	=	5.0 ft
Footing Thickness	=	18.0 in

Pedestal dimensions...

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



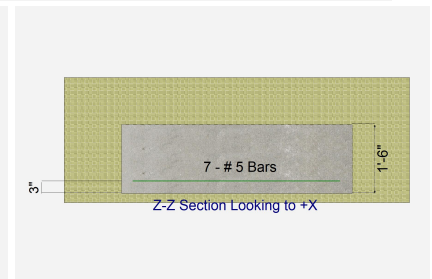
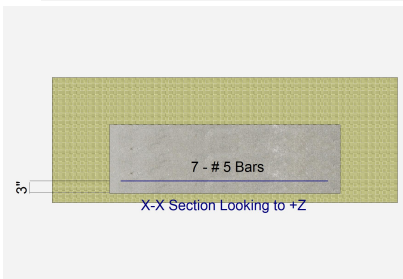
Reinforcing

Bars parallel to X-X Axis	=	7.0
Number of Bars	=	# 5
Reinforcing Bar Size	=	# 5

Bars parallel to Z-Z Axis	=	7.0
Number of Bars	=	# 5
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

	D	Lr	L	S	W	E	H
P : Column Load	=	12.750	10.50	15.750			k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

Project Title:
 Engineer:
 Project ID:
 Project Descr:

General Footing

Project File: Panera - Lee Summit.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

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DESCRIPTION: Exterior Gravity Framing Support

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9787	Soil Bearing	1.468 ksf	1.50 ksf	+D+S about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.1766	Z Flexure (+X)	5.063 k-ft/ft	28.672 k-ft/ft	+1.20D+1.60S
PASS	0.1766	Z Flexure (-X)	5.063 k-ft/ft	28.672 k-ft/ft	+1.20D+1.60S
PASS	0.1766	X Flexure (+Z)	5.063 k-ft/ft	28.672 k-ft/ft	+1.20D+1.60S
PASS	0.1766	X Flexure (-Z)	5.063 k-ft/ft	28.672 k-ft/ft	+1.20D+1.60S
PASS	0.1186	1-way Shear (+X)	11.250 psi	94.868 psi	+1.20D+1.60S
PASS	0.1186	1-way Shear (-X)	11.250 psi	94.868 psi	+1.20D+1.60S
PASS	0.1186	1-way Shear (+Z)	11.250 psi	94.868 psi	+1.20D+1.60S
PASS	0.1186	1-way Shear (-Z)	11.250 psi	94.868 psi	+1.20D+1.60S
PASS	0.2223	2-way Punching	42.188 psi	189.737 psi	+1.20D+1.60S

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc		Zecc		Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				(in)		Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	1.50	n/a	0.0			0.8375	0.8375	n/a	n/a	0.558
X-X, +D+Lr	1.50	n/a	0.0			1.258	1.258	n/a	n/a	0.839
X-X, +D+S	1.50	n/a	0.0			1.468	1.468	n/a	n/a	0.979
X-X, +D+0.750Lr	1.50	n/a	0.0			1.153	1.153	n/a	n/a	0.769
X-X, +D+0.750S	1.50	n/a	0.0			1.310	1.310	n/a	n/a	0.873
X-X, +0.60D	1.50	n/a	0.0			0.5025	0.5025	n/a	n/a	0.335
Z-Z, D Only	1.50	0.0	n/a			n/a	n/a	0.8375	0.8375	0.558
Z-Z, +D+Lr	1.50	0.0	n/a			n/a	n/a	1.258	1.258	0.839
Z-Z, +D+S	1.50	0.0	n/a			n/a	n/a	1.468	1.468	0.979
Z-Z, +D+0.750Lr	1.50	0.0	n/a			n/a	n/a	1.153	1.153	0.769
Z-Z, +D+0.750S	1.50	0.0	n/a			n/a	n/a	1.310	1.310	0.873
Z-Z, +0.60D	1.50	0.0	n/a			n/a	n/a	0.5025	0.5025	0.335

Overturning Stability

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

Project Title:
 Engineer:
 Project ID:
 Project Descr:

General Footing

Project File: Panera - Lee Summit.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

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DESCRIPTION: Interior Gravity Framing Support

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16

Load Combinations Used : IBC 2018

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,644.15 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1

Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	1.50 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth

Footing base depth below soil surface	=	2.50 ft
Allow press. increase per foot of depth when footing base is below	=	ksf

Increases based on footing plan dimension

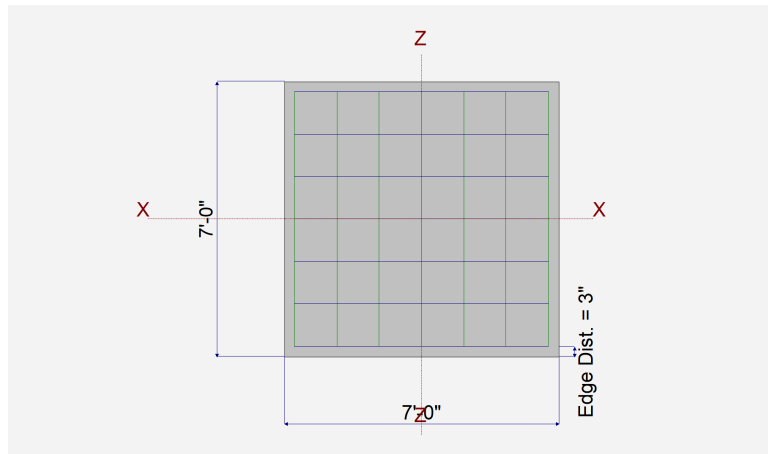
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf
	=	ft

Dimensions

Width parallel to X-X Axis	=	7.0 ft
Length parallel to Z-Z Axis	=	7.0 ft
Footing Thickness	=	18.0 in

Pedestal dimensions...

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



Reinforcing

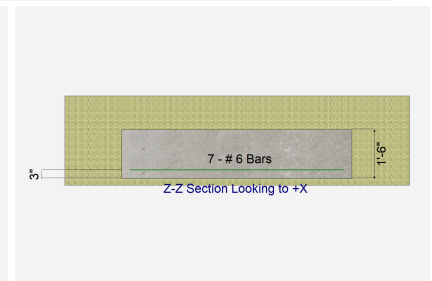
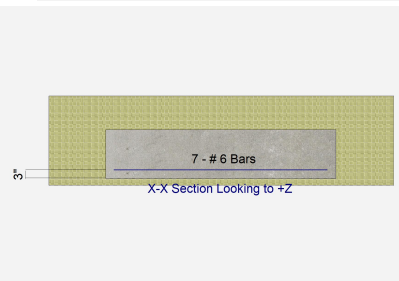
Bars parallel to X-X Axis	=	
Number of Bars	=	7
Reinforcing Bar Size	=	# 6

Bars parallel to Z-Z Axis	=	
Number of Bars	=	7.0
Reinforcing Bar Size	=	# 6

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Applied Loads

		D	Lr	L	S	W	E	H
P : Column Load	=	25.816	21.0		31.50			k
OB : Overburden	=							ksf
M-xx	=							k-ft
M-zz	=							k-ft
V-x	=							k
V-z	=							k

Project Title:
 Engineer:
 Project ID:
 Project Descr:

General Footing

Project File: Panera - Lee Summit.ec6

LIC# : KW-06014217, Build:20.22.5.16

CASE ENGINEERING, INC.

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DESCRIPTION: Interior Gravity Framing Support

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9980	Soil Bearing	1.497 ksf	1.50 ksf	+D+S about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.3501	Z Flexure (+X)	10.172 k-ft/ft	29.059 k-ft/ft	+1.20D+1.60S
PASS	0.3501	Z Flexure (-X)	10.172 k-ft/ft	29.059 k-ft/ft	+1.20D+1.60S
PASS	0.3501	X Flexure (+Z)	10.172 k-ft/ft	29.059 k-ft/ft	+1.20D+1.60S
PASS	0.3501	X Flexure (-Z)	10.172 k-ft/ft	29.059 k-ft/ft	+1.20D+1.60S
PASS	0.2179	1-way Shear (+X)	20.668 psi	94.868 psi	+1.20D+1.60S
PASS	0.2179	1-way Shear (-X)	20.668 psi	94.868 psi	+1.20D+1.60S
PASS	0.2179	1-way Shear (+Z)	20.668 psi	94.868 psi	+1.20D+1.60S
PASS	0.2179	1-way Shear (-Z)	20.668 psi	94.868 psi	+1.20D+1.60S
PASS	0.4611	2-way Punching	87.492 psi	189.737 psi	+1.20D+1.60S

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc		Zecc		Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				(in)		Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	1.50	n/a	0.0			0.8544	0.8544	n/a	n/a	0.570
X-X, +D+Lr	1.50	n/a	0.0			1.283	1.283	n/a	n/a	0.855
X-X, +D+S	1.50	n/a	0.0			1.497	1.497	n/a	n/a	0.998
X-X, +D+0.750Lr	1.50	n/a	0.0			1.176	1.176	n/a	n/a	0.784
X-X, +D+0.750S	1.50	n/a	0.0			1.337	1.337	n/a	n/a	0.891
X-X, +0.60D	1.50	n/a	0.0			0.5126	0.5126	n/a	n/a	0.342
Z-Z, D Only	1.50	0.0	n/a			n/a	n/a	0.8544	0.8544	0.570
Z-Z, +D+Lr	1.50	0.0	n/a			n/a	n/a	1.283	1.283	0.855
Z-Z, +D+S	1.50	0.0	n/a			n/a	n/a	1.497	1.497	0.998
Z-Z, +D+0.750Lr	1.50	0.0	n/a			n/a	n/a	1.176	1.176	0.784
Z-Z, +D+0.750S	1.50	0.0	n/a			n/a	n/a	1.337	1.337	0.891
Z-Z, +0.60D	1.50	0.0	n/a			n/a	n/a	0.5126	0.5126	0.342

Overturning Stability

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

CASE

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