

PRRRSF20231342

City of Puyallup Development & Permitting Services ISSUED PERMIT	
Building	Planning
Engineering	Public Works
Fire	Traffic



Structural Calculations

PREPARED FOR:

InSite Architects
1000 University Ave W
Suite 130
St. Paul, MN 55104

PROJECT:

Wesley Bradley Park
Phase II – Care Center
2220236.20

PREPARED BY:

Kyle Gysler, PE
Senior Engineer

REVIEWED BY:

Drew McEachern, PE, SE
Principal

DATE:

December 2024

Structural Calculations

For



Wesley Bradley Park Phase II – Care Center Puyallup, WA

Project # 2220236.20

**Project Principal
Project Engineer**

Drew McEachern, PE, SE
Kyle Gysler, PE

Design Criteria

Design Codes and Standards

Codes and Standards: Structural design and construction shall be in accordance with the applicable sections of the following codes and standards as adopted and amended by the local building authority: International Building Code, 2021 Edition.

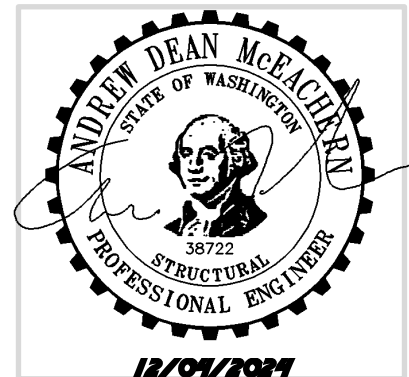
Structural Design Criteria:

Live Load Criteria:

Roof (Min Blanket Snow)	25 psf
Residential (Private Rooms and Corridors)	40 psf
Residential (Public Rooms and Corridors)	100 psf
Stairs and Exits	100 psf
Decks and Balconies (1.5x Occupancy Served, not exceeding 100 psf)	60 psf
Mechanical Mezzanine	50 psf
Light Storage	125 psf
Handrails and Guards	50 plf or 200 lbs concentrated

Wind Load Criteria:

Basic Wind Speed	98 mph
Risk Category	II
Wind Exposure	B
Topographic Factor	1.0



Seismic Criteria:

Risk Category	II
Seismic Importance Factor	1.00
$S_s = 1.257$	$S_1 = 0.434$
$S_{ds} = 1.006$	$S_{d1} = 0.434$
Site Class	= C
Seismic Design Category	= D
Response Modification Coeff. (R):	6 ½ (Light-Frame Wood Shear Wall) 5 (Special Reinforced Concrete Shear Wall)
Seismic Response Coeff. (C_s):	0.193 (Light-Frame Wood Shear Wall) 0.251 (Special Reinforced Concrete Shear Wall)

Soil Criteria:

Based on Geotechnical Engineering Report by: Terra Associates, Inc., dated November 14, 2016.

Allowable Soil Bearing Capacity: 3,000 psf allow 33% increase for loads from wind or seismic origin.

Active Earth Pressure	=	35 pcf
At Rest Earth Pressure	=	100 psf (uniform)
Seismic Earth Pressure	=	8H psf
Friction Coefficient	=	0.35
Passive Pressure	=	350 pcf

Project Description

The project consists of an addition to the Wesley Bradley Park Campus. The new building will be located adjacent to The Lodge building and will include catered living and amenities. The new structure will include one story of conventional wood framing over a crawl space and basement. The gravity system will consist of pre-engineered wood trusses spanning between wood beams and stud bearing walls. The lateral system will consist of plywood diaphragms spanning between wood sheathed shear walls. Conventional shallow foundations will be used to support the structure.

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1.0 - DESIGN CRITERIA

AHBL Inc.
2215 N. 30th St.
Tacoma, WA 98403
253-383-2422

JOB TITLE Wesley Bradley Park Ph2	
Care Center	
JOB NO. 2220236.20	SHEET NO.
CALCULATED BY KBG	DATE
CHECKED BY ADM	DATE

www.struware.com

Code Search

Code: International Building Code 2018

Occupancy:

Occupancy Group = R Residential

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)	1.00 / 12	4.8 deg
Building length (L)	424.0 ft	
Least width (B)	85.0 ft	
Mean Roof Ht (h)	24.0 ft	
Parapet ht above grd	27.5 ft	
Minimum parapet ht	3.5 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	40 psf
Partitions	15 psf
Dining rooms and restaurants	100 psf
Public rooms & corridors serving them	100 psf

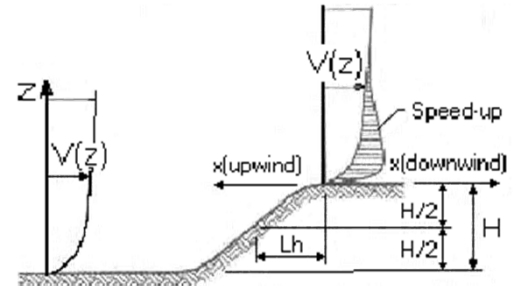
Wind Loads : ASCE 7- 16

Ultimate Wind Speed	98 mph
Nominal Wind Speed	75.9 mph
Risk Category	II
Exposure Category	B
Enclosure Classif.	Enclosed Building
Internal pressure	+/-0.18
Directionality (Kd)	0.85
Kh case 1	0.701
Kh case 2	0.657
Type of roof	Gable

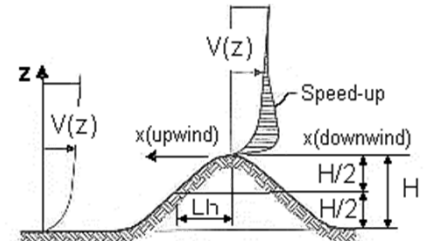
Topographic Factor (Kzt)

Topography	2D Escarpment
Hill Height (H)	350.0 ft
Half Hill Length (Lh)	1760.0 ft
Actual H/Lh	= 0.20
Use H/Lh	= 0.00
Modified Lh	= 1760.0 ft
From top of crest: x =	5069.0 ft
Bldg up/down wind?	downwind
H/Lh = 0.00	K ₁ = 0.000
x/Lh = 2.88	K ₂ = 0.280
z/Lh = 0.01	K ₃ = 0.966
At Mean Roof Ht:	K _{zt} = (1+K ₁ K ₂ K ₃) ² = 1.00

$H/L_h < 0.2$
 $\therefore K_{zt} = 1.0$



ESCARPMENT



2D RIDGE or 3D AXISYMMETRICAL HILL

Gust Effect Factor

h =	24.0 ft
B =	85.0 ft
/z (0.6h) =	30.0 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 = 0.28 Rigid structure (low rise bldg)

G = 0.85 Using rigid structure default

Rigid Structure

$\bar{e}$ =	0.33
l =	320 ft
z_{min} =	30 ft
c =	0.30
g_Q, g_v =	3.4
L_z =	310.0 ft
Q =	0.87
I_z =	0.30
G =	0.85

Flexible or Dynamically Sensitive Structure

34 rcy (η_1) =	0.0 Hz		
Damping ratio (β) =	0		
$/b$ =	0.45		
$/\alpha$ =	0.25		
V_z =	63.2		
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		
G_f =	0.000		
		h =	24.0 ft

Enclosure Classification

Wind Loads - MWFRS all h (Except for Open Buildings)

Kh (case 2) =	0.66	h =	24.0 ft	GCpi =	+/-0.18
Base pressure (qh) =	13.7 psf	ridge ht =	27.5 ft	G =	0.85
Roof Angle (θ) =	4.8 deg	L =	424.0 ft	qi = qh	
Roof tributary area - (h/2)*L:	5088 sf	B =	85.0 ft		
(h/2)*B:	1020 sf				

Ultimate Wind Surface Pressures (psf)

Surface	Wind Normal to Ridge				Wind Parallel to Ridge			
	B/L = 0.20		h/L = 0.28		L/B = 4.99		h/L = 0.06	
	Cp	qhGCp	w/+qiGCpi	w/-qhGCpi	Dist.*	Cp	qhGCp	w/+qiGCpi w/-qhGCpi
Windward Wall (WW)	0.80	9.3	see table below			0.80	9.3	see table below
Leeward Wall (LW)	-0.50	-5.8	-8.3	-3.4		-0.20	-2.3	-4.8 0.1
Side Wall (SW)	-0.70	-8.2	-10.6	-5.7		-0.70	-8.2	-10.6 -5.7
Leeward Roof (LR)		**				Included in windward roof		
Neg Windward Roof: 0 to h/2*	-0.90	-10.5	-13.0	-8.0	0 to h/2*	-0.90	-10.5	-13.0 -8.0
h/2 to h*	-0.90	-10.5	-13.0	-8.0	h/2 to h*	-0.90	-10.5	-13.0 -8.0
h to 2h*	-0.50	-5.84	-8.31	-3.37	h to 2h*	-0.50	-5.8	-8.3 -3.4
> 2h*	-0.30	-3.50	-5.98	-1.03	> 2h*	-0.30	-3.5	-6.0 -1.0
Pos/min windward roof press.	-0.18	-2.1	-4.6	0.4	Min press.	-0.18	-2.1	-4.6 0.4

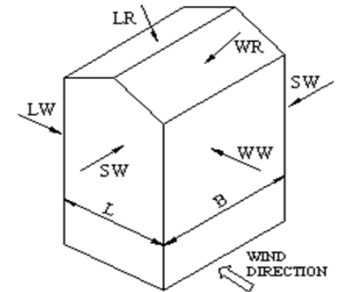
**Roof angle < 10 degrees. Therefore, leeward roof is included in windward roof pressure zones.

*Horizontal distance from windward edge

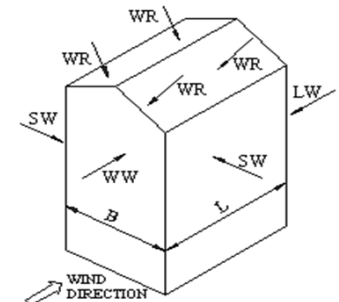
NOTE: The code requires the MWFRS be designed for minimum ultimate force of 16 psf multiplied by the wall area plus an 8 psf force applied to the vertical projection of the roof.

Windward Wall Pressures at "z" (psf)

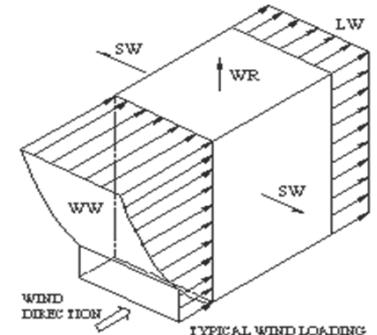
z	Kz	Kzt	Windward Wall			Combined WW + LW	
			qzGCp	w/+qiGCpi	w/-qhGCpi	Normal to Ridge	Parallel to Ridge
0 to 15'	0.57	1.00	8.2	5.7	10.6	14.0	10.5
20.0 ft	0.62	1.00	8.9	6.4	11.3	14.7	11.2
h= 24.0 ft	0.66	1.00	9.3	6.9	11.8	15.2	11.7
ridge = 27.5 ft	0.68	1.00	9.7	7.2	12.2	15.5	12.0



WIND NORMAL TO RIDGE



WIND PARALLEL TO RIDGE



TYPICAL WIND LOADING

NOTE:

See figure in ASCE7 for the application of full and partial loading of the above wind pressures. There are 4 different loading cases.

Parapet

z	Kz	Kzt	qp (psf)
27.5 ft	0.68	1.00	14.3

Windward parapet: 21.4 psf (GCpn = +1.5)

Leeward parapet: -14.3 psf (GCpn = -1.0)

Windward roof overhangs (add to windward roof pressure) : 9.3 psf (upward)

Ultimate Wind Pressures

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

Kh (case 1) = 0.70 h = 24.0 ft 0.2h = 4.8 ft
Base pressure (qh) = **14.6 psf** 0.6h = 14.4 ft
Minimum parapet ht = 3.5 ft GCpi = +/-0.18
Roof Angle (θ) = 4.8 deg qi = qh = 14.6 psf
Type of roof = Gable

Roof

Area	Surface Pressure (psf)							
	10 sf	20 sf	50 sf	100 sf	200 sf	350 sf	500 sf	1000 sf
Negative Zone 1	-27.5	-25.7	-23.3	-21.5	-19.7	-18.2	-17.3	-17.3
Negative Zone 1'	-16	-16	-16	-16	-16.0	-16.0	-16.0	-16.0
Negative Zone 2	-36.3	-34	-30.9	-28.6	-26.2	-24.3	-23.1	-23.1
Negative Zone 3	-36.3	-34	-30.9	-28.6	-26.2	-24.3	-23.1	-23.1
Positive Zone 1 & 1'	16	16	16	16	16.0	16.0	16.0	16.0
Positive Zones 2 & 3	16	16	16	16	16.0	16.0	16.0	16.0
Overhang Zone 1&1'	-24.9	-24.4	-23.9	-23.4	-19.6	-16.6	-16.0	-16.0
Overhang Zone 2	-33.7	-30.6	-26.4	-23.3	-20.2	-17.7	-16.1	-16.1
Overhang Zone 3	-33.7	-30.6	-26.4	-23.3	-20.2	-17.7	-16.1	-16.1

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 2.6 psf)

Parapet

qp = 14.6 psf

Solid Parapet Pressure	Surface Pressure (psf)					
	10 sf	20 sf	50 sf	100 sf	200 sf	500 sf
CASE A: Zone 2 :	46.9	43.8	39.8	36.8	33.7	29.7
Zone 3 :	46.9	43.8	39.8	36.8	33.7	29.7
CASE B : Interior zone :	-27.7	-26.3	-24.4	-23.0	-21.6	-19.8
Corner zone :	-31.6	-29.5	-26.7	-24.6	-22.5	-19.8

User input	
25 sf	50 sf
-25.1	-23.3
-16.0	-16.0
-33.2	-30.9
-33.2	-30.9
16.0	16.0
16.0	16.0
-24.3	-23.9
-29.6	-26.4
-29.6	-26.4

User input	
50 sf	
39.8	
39.8	
-24.4	
-26.7	

wall a = 8.5 ft

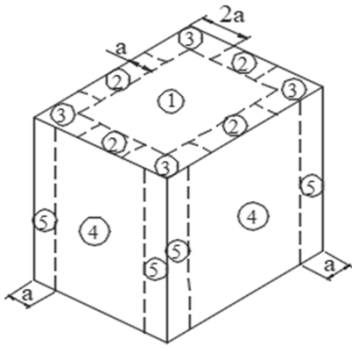
Walls

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	-17.1	-16.0	-16.0	-16.0
Negative Zone 5	-1.44	-1.12	-1.03	-0.90	-21.1	-16.4	-16.0	-16.0
Positive Zone 4 & 5	1.08	0.92	0.87	0.81	16.0	16.0	16.0	16.0

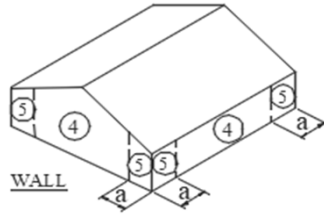
Note: GCp reduced by 10% due to roof angle $\leq$ 10 deg.

User input	
10 sf	200 sf
-17.1	-16.0
-21.1	-16.0
16.0	16.0

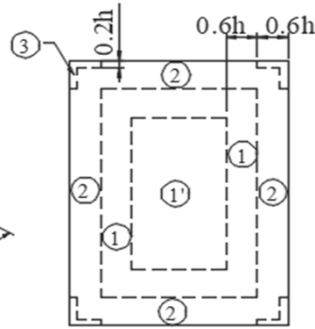
Location of C&C Wind Pressure Zones - ASCE 7-16



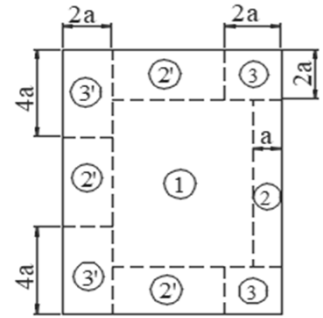
Roofs w/ $\theta \leq 10^\circ$
and all walls
 $h > 60'$



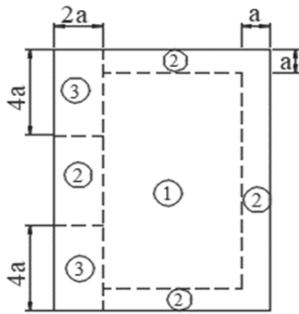
Walls $h \leq 60'$
& alt design $h < 90'$



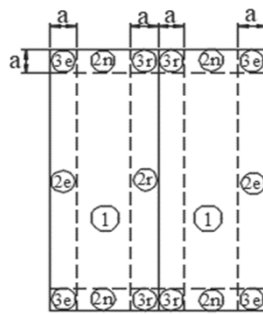
Gable, Sawtooth and
Multispan Gable $\theta \leq 7$ degrees &
Monoslope ≤ 3 degrees
 $h \leq 60'$ & alt design $h < 90'$



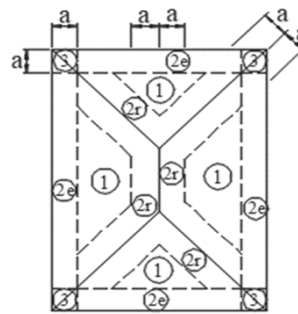
Monoslope roofs
 $3^\circ < \theta \leq 10^\circ$
 $h \leq 60'$ & alt design $h < 90'$



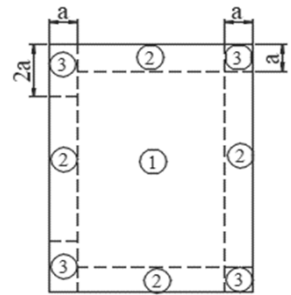
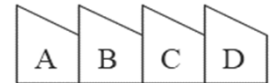
Monoslope roofs
 $10^\circ < \theta \leq 30^\circ$
 $h \leq 60'$ & alt design $h < 90'$



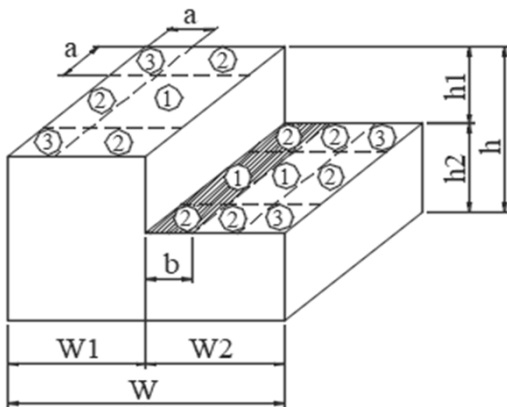
Multispan Gable &
Gable $7^\circ < \theta \leq 45^\circ$



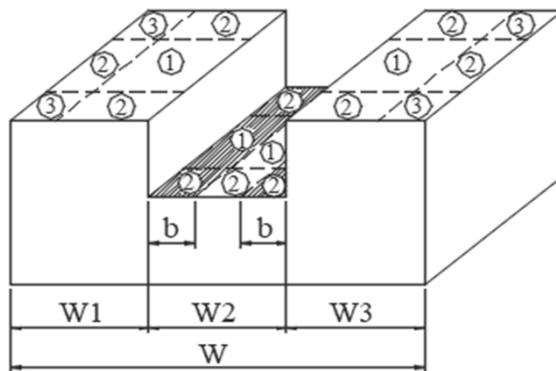
Hip $7^\circ < \theta \leq 27^\circ$



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 $h < 90'$



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CALCULATED BY KBG
CHECKED BY ADM

SHEET NO.
DATE
DATE

Wind Loads - Rooftop Structures & Canopies

Ultimate Wind Pressures

Building (L) = 424.0 ft
Building (B) = 85.0 ft
Directionality (Kd) = 0.85

Rooftop Structures & Equipment #1

Equipment length parallel to L = 75.0 ft
Equipment length parallel to B = 11.5 ft
Height of equipment = 7.0 ft
~~40.0~~

Base pressure (qh) = **16.5 psf**

Vertical wind pressure

Ar = 862.5 sf
GCr = 1.500
F = qhGCr Ar = **24.7** Ar (psf)
Fv = **21.3** kips

Wind normal to building B

Af = 80.5 sf
GCr = 1.90
F = qhGCr Af = **31.3** Af (psf)
Fh = **2.5** kips

Wind normal to building L

Af = 525.0 sf
GCr = 1.90
F = qhGCr Af = **31.3** Af (psf)
Fh = **16.4** kips

Rooftop Structures & Equipment #2

Equipment length parallel to L = 23.5 ft
Equipment length parallel to B = 8.0 ft
Height of equipment = 10.0 ft
~~40.0~~

Base pressure (qh) = **16.5 psf**

Vertical wind pressure

Ar = 188.0 sf
GCr = 1.500
F = qhGCr Ar = **24.7** Ar (psf)
Fv = **4.6** kips

Wind normal to building B

Af = 80.0 sf
GCr = 1.90
F = qhGCr Af = **31.3** Af (psf)
Fh = **2.5** kips

Wind normal to building L

Af = 235.0 sf
GCr = 1.90
F = qhGCr Af = **31.3** Af (psf)
Fh = **7.4** kips

Attached Canopies on Buildings with $h \leq 60$ ft (ASCE 7-16 procedure)

Mean roof eave height (he) = 24.0 ft
Mean Canopy roof height (hc) = 15.0 ft

hc/he = 0.63

Base pressure (qh) = **16.5 psf**

Area	C&C Surface Pressure (psf)			
	10 sf	20 sf	50 sf	100 sf
Separate Individual Surfaces:				
Upper surface negative pressure	-18.6	-17.9	-15.6	-11.9
Lower surface negative pressure	-13.2	-12.9	-12.1	-10.7
Upper or Lower surface pos pressure	13.2	12.8	11.7	9.9
Combined Upper & Lower Surfaces (net):				
Negative pressure	-14.4	-14.0	-12.9	-10.9
Positive pressure	14.4	14.0	12.6	10.4

User input
75 sf
-13.7
-11.4
10.8
-11.9
11.5

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	Care Center		
JOB NO.	2220236.20	SHEET NO.	
CALCULATED BY	KBG	DATE	
CHECKED BY	ADM	DATE	

Seismic Loads:

IBC 2018

Strength Level Forces

Risk Category : II
Importance Factor (I) : 1.00
Site Class : C

Ss (0.2 sec) = 125.70 %g
S1 (1.0 sec) = 43.40 %g

A site specific ground motion analysis is required for seismically isolated structures or with damping systems

Fa = 1.200	Sms = 1.508	S _{DS} = 1.006	Design Category = D
Fv = 1.500	Sm1 = 0.651	S _{D1} = 0.434	Design Category = D

Seismic Design Category = **D**

Redundancy Coefficient p = 1.00 Code exception must be met for p to equal 1.0
Number of Stories: 1

Structure Type: All other building system:

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: **65 ft**

Actual Structural Height (hn) = 27.5 ft

See ASCE7 Section 12.2.5 for exceptions and other system limitations

DESIGN COEFFICIENTS AND FACTORS

Response Modification Coefficient (R) =	6.5	
Over-Strength Factor (Ωo) =	2.5	
Deflection Amplification Factor (Cd) :	4	
S _{DS} =	1.000	(Sds modified for Cs & Ev calculation since
S _{D1} =	0.434	meets ASCE 7 section 12.8.1.3)

Seismic Load Effect (E) =	Eh +/- Ev =	p C _E +/- 0.2S _{DS} D	=	Q _E +/- 0.200D	Q _E = horizontal seismic force
Special Seismic Load Effect (Em) :	Emh +/- Ev =	Ωo C _E +/- 0.2S _{DS} D	=	2.5Q _E +/- 0.201D	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 = 1.40
Approx fundamental period (Ta) :	C _T h _n ^{1/4} =	0.240 sec	x = 0.75 Tmax = CuTa = 0.336
User calculated fundamental period (T) =		sec	Use T = 0.240
Long Period Transition Period (TL) =	ASCE7 map =	6	
Seismic response coef. (Cs) =	S _{ds} /R =	0.154	
need not exceed Cs =	S _{d1} I / RT =	0.278	
but not less than Cs =	0.044S _{ds} I =	0.044	
USE Cs =		0.154	
		Design Base Shear V = 0.154W	

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

ALLOWABLE STORY DRIFT

Structure Type: All other structures

Allowable story drift Δa = 0.020hsx where hsx is the story height below level x

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Seismic Loads - cont. :

Strength Level Forces

Seismic Design Category (SDC)= D

$I_e = 1.00$

$S_{ds} = 1.006$

CONNECTIONS

Force to connect smaller portions of structure to remainder of structure

$$F_p = 0.133 S_{ds} w_p = 0.134 w_p$$

$$\text{or } F_p = 0.05 w_p = 0.05 w_p \quad \text{Use } F_p = 0.13 w_p \quad w_p = \text{weight of smaller portion}$$

Beam, girder or truss connection for resisting horizontal force parallel to member

F_p = no less than 0.05 times dead plus live load vertical reaction

Anchorage of Structural Walls to elements providing lateral support

$$F_p = \text{not less than } 0.2 K_a w_p$$

$$\text{Flexible diaphragm span } L_f = 56.00 \text{ ft}$$

$$F_p = 0.4 S_{ds} K_a w_p = 0.627 W_p, \text{ but not less than } 0.312 W_p \text{ (flexible diaphragm)} \quad K_a = 1.56 \quad F_p = 0.627 W_p$$

$$F_p = 0.4 S_{ds} K_a w_p = 0.402 W_p, \text{ but not less than } 0.2 W_p \text{ (rigid diaphragm)} \quad K_a = 1 \quad F_p = 0.402 W_p$$

but F_p shall not be less than 5 psf

MEMBER DESIGN

Bearing Walls and Shear Walls (out of plane force)

$$F_p = 0.4 S_{ds} l_e W_w = 0.402 w_w$$

$$\text{but not less than } 0.10 w_w \quad \text{Use } F_p = 0.40 w_w$$

Diaphragms

$$F_p = (\sum F_i / \sum W_i) W_{px} + V_{px} = (\sum F_i / \sum W_i) W_{px} + V_{px}$$

$$\text{need not exceed } 0.4 S_{ds} l_e W_{px} + V_{px} = 0.402 W_{px} + V_{px}$$

$$\text{but not less than } 0.2 S_{ds} l_e W_{px} + V_{px} = 0.201 W_{px} + V_{px}$$

ARCHITECTURAL COMPONENTS SEISMIC COEFFICIENTS

Architectural Component : Cantilever Elements (Unbraced or Braced to Structural Frame Below Its Center of Mass):

Parapets and cantilever interior nonstructural walls

$$\text{Importance Factor } (I_p) : 1.0$$

$$\text{Component Amplification Factor } (a_p) = 2.5$$

$$h = 27.5 \text{ feet}$$

$$\text{Comp Response Modification Factor } (R_p) = 2.5$$

$$z = 27.5 \text{ feet}$$

$$z/h = 1.00$$

$$\text{Over-Strength Factor } (Q_o) = 2$$

$$F_p = 0.4 a_p S_{ds} I_p W_p (1 + 2z/h) / R_p = 1.207 W_p$$

$$\text{not greater than } F_p = 1.6 S_{ds} I_p W_p = 1.609 W_p$$

$$\text{but not less than } F_p = 0.3 S_{ds} I_p W_p = 0.302 W_p$$

$$\text{use } F_p = 1.207 W_p$$

MECH AND ELEC COMPONENTS SEISMIC COEFFICIENTS

Seismic Design Category D & $I_p=1.0$, therefore

see ASCE7 Section 13.1.4 for exceptions

Mech or Electrical Component : Air-side HVAC, fans, air handlers, ac units, cabinet heaters, air distribution boxes, and other mechanical components constructed of sheet metal framing.

$$\text{Importance Factor } (I_p) : 1.0$$

$$\text{Component Amplification Factor } (a_p) = 2.5$$

$$h = 27.5 \text{ feet}$$

$$\text{Comp Response Modification Factor } (R_p) = 6$$

$$z = 27.5 \text{ feet}$$

$$z/h = 1.00$$

$$\text{Over-Strength Factor } (Q_o) = 2$$

$$F_p = 0.4 a_p S_{ds} I_p W_p (1 + 2z/h) / R_p = 0.503 W_p$$

$$\text{not greater than } F_p = 1.6 S_{ds} I_p W_p = 1.609 W_p$$

$$\text{but not less than } F_p = 0.3 S_{ds} I_p W_p = 0.302 W_p$$

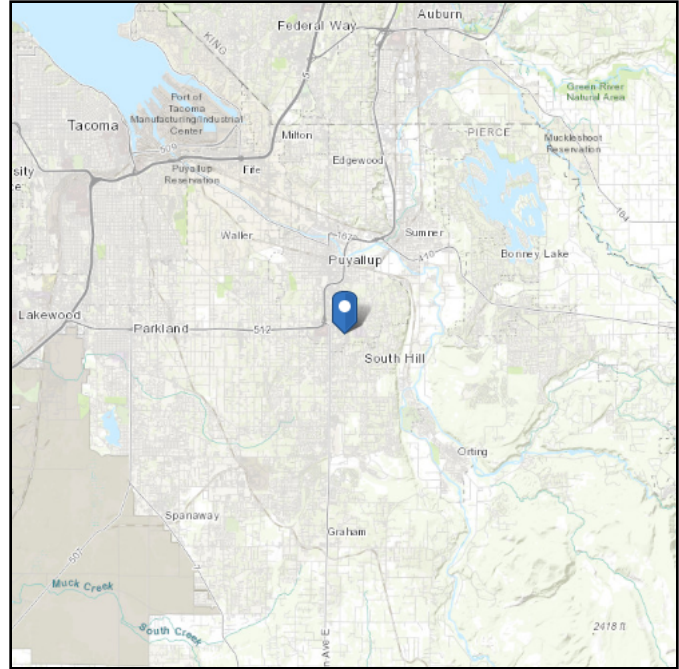
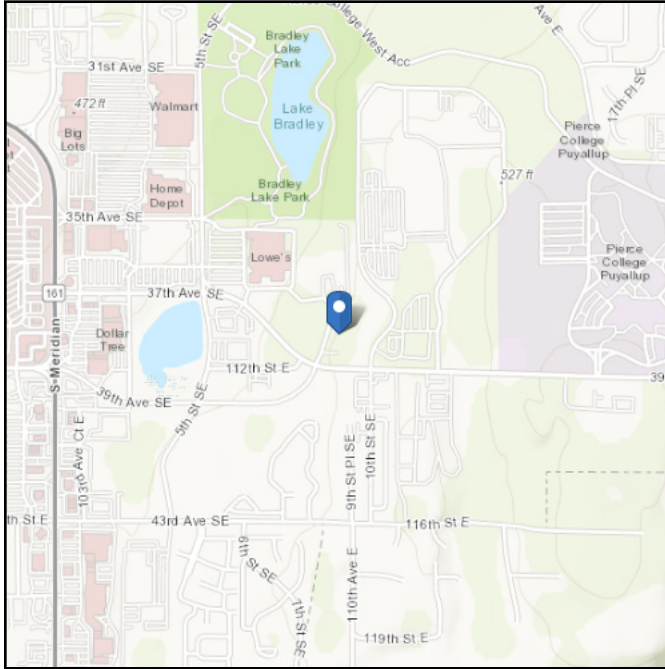
$$\text{use } F_p = 0.503 W_p$$

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: C - Very Dense Soil and Soft Rock

Latitude: 47.155637
Longitude: -122.282849
Elevation: 474.48 ft (NAVD 88)



Wind

Results:

Wind Speed	98 Vmph
10-year MRI	67 Vmph
25-year MRI	73 Vmph
50-year MRI	78 Vmph
100-year MRI	83 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: Wed Dec 07 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).

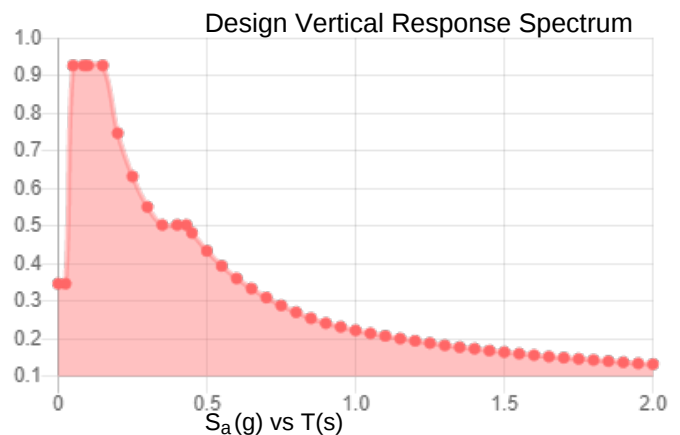
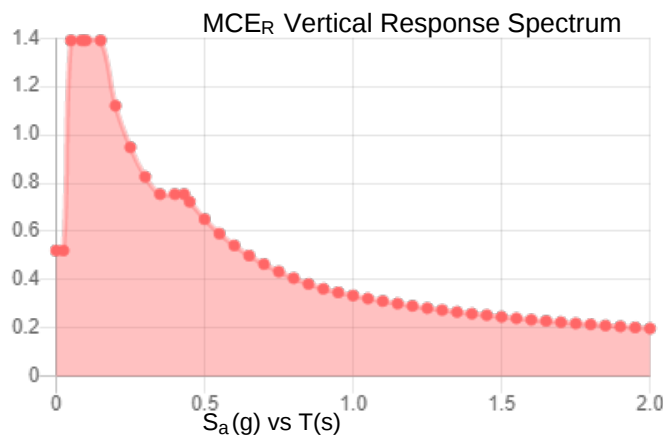
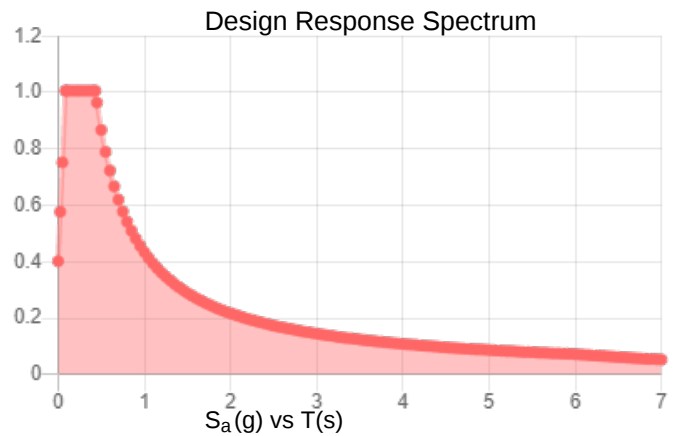
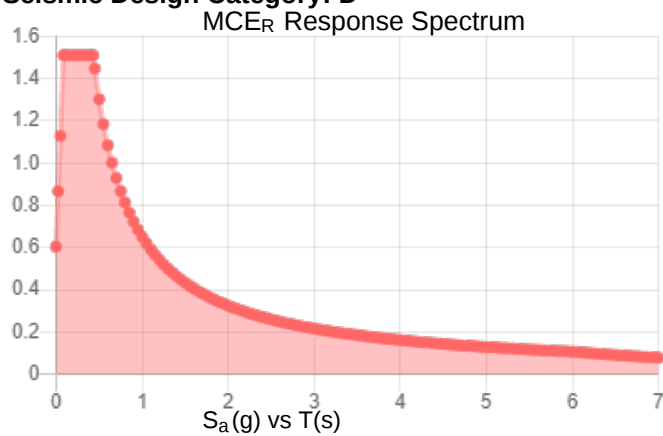
Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

Site Soil Class:

Results:

S_S :	1.257	S_{D1} :	0.434
S_1 :	0.434	T_L :	6
F_a :	1.2	PGA :	0.5
F_v :	1.5	PGA _M :	0.6
S_{MS} :	1.509	F_{PGA} :	1.2
S_{M1} :	0.651	I_e :	1
S_{DS} :	1.006	C_v :	1.151

Seismic Design Category: D



Data Accessed:

Wed Dec 07 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.

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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Wesley Bradley Park Phase 2: K_{zt} Analysis

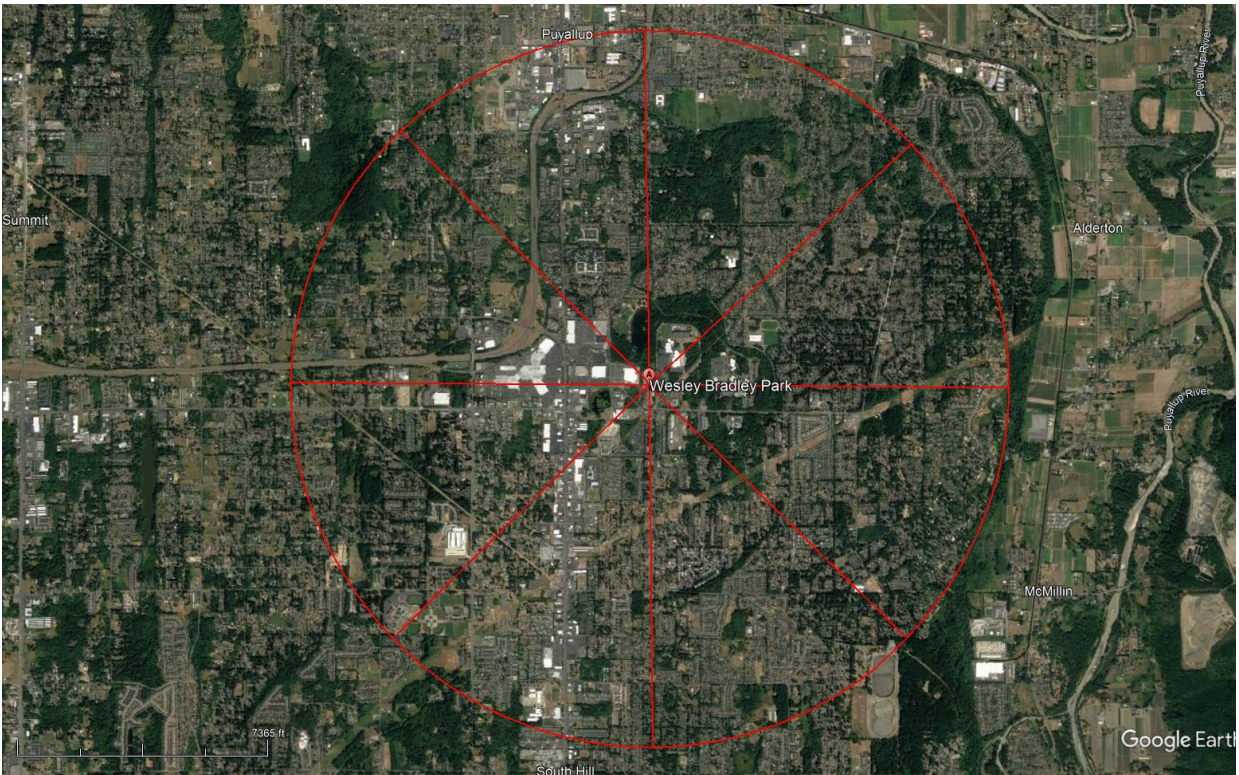


Figure 1: 2-mile radius used for topographic factor, K_{zt} , analysis

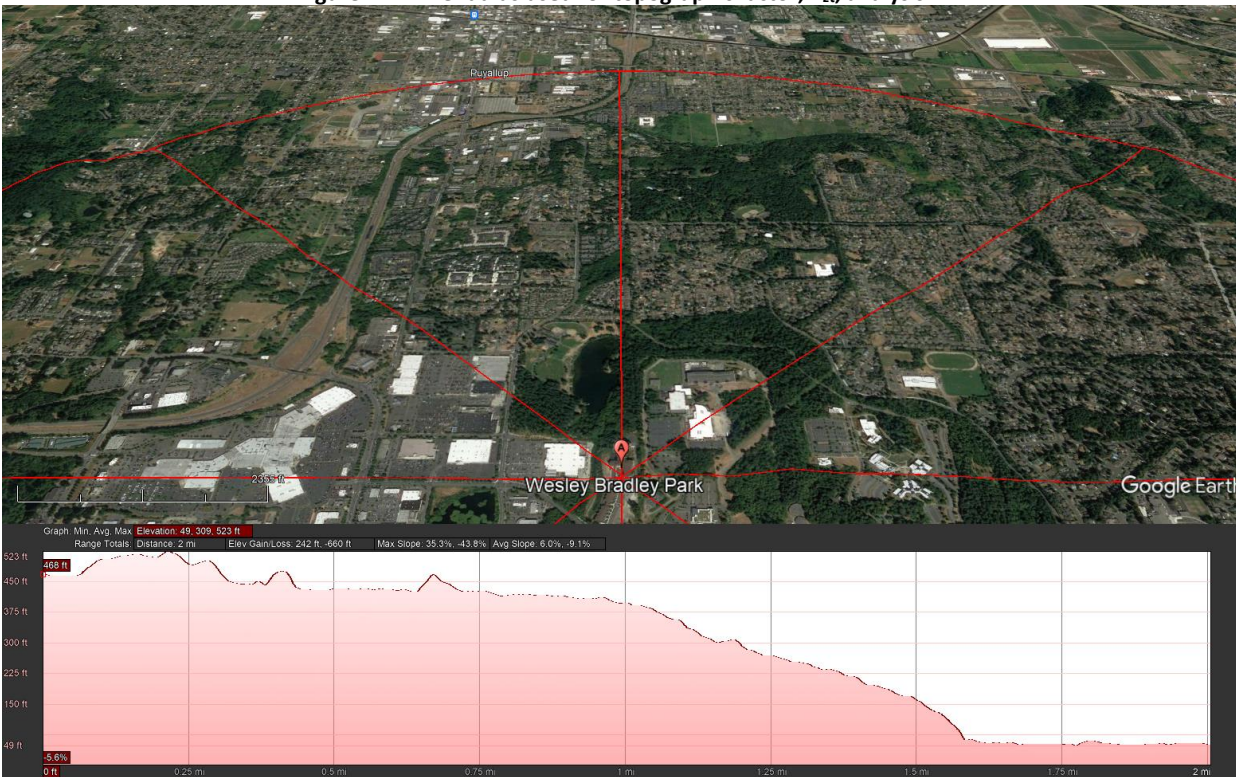


Figure 2: Northerly wind, 350 ft (H) escarpment rises over 3520 ft ($L_h = 1760$ ft), $H/L_h < 0.2$ therefore $K_{zt} = 1.00$

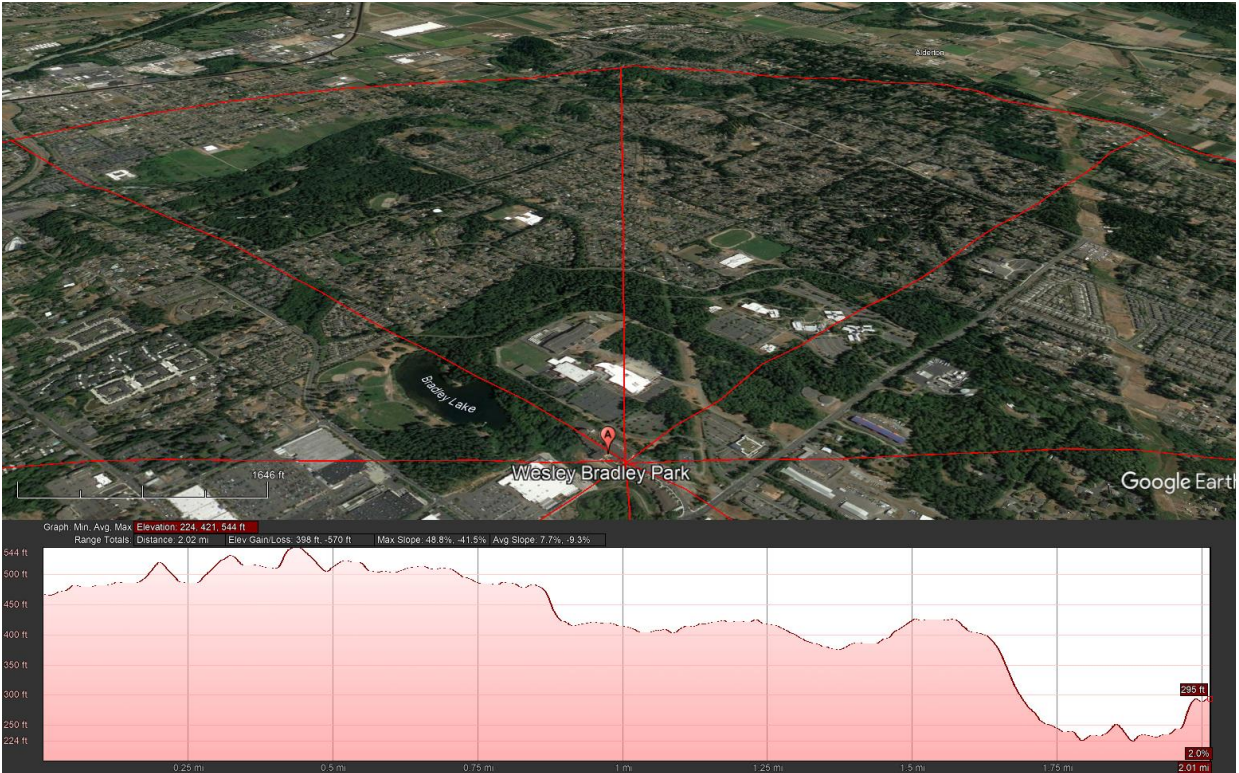


Figure 3: Northeasterly wind, escarpment is not an isolated feature therefore $K_{zt} = 1.00$

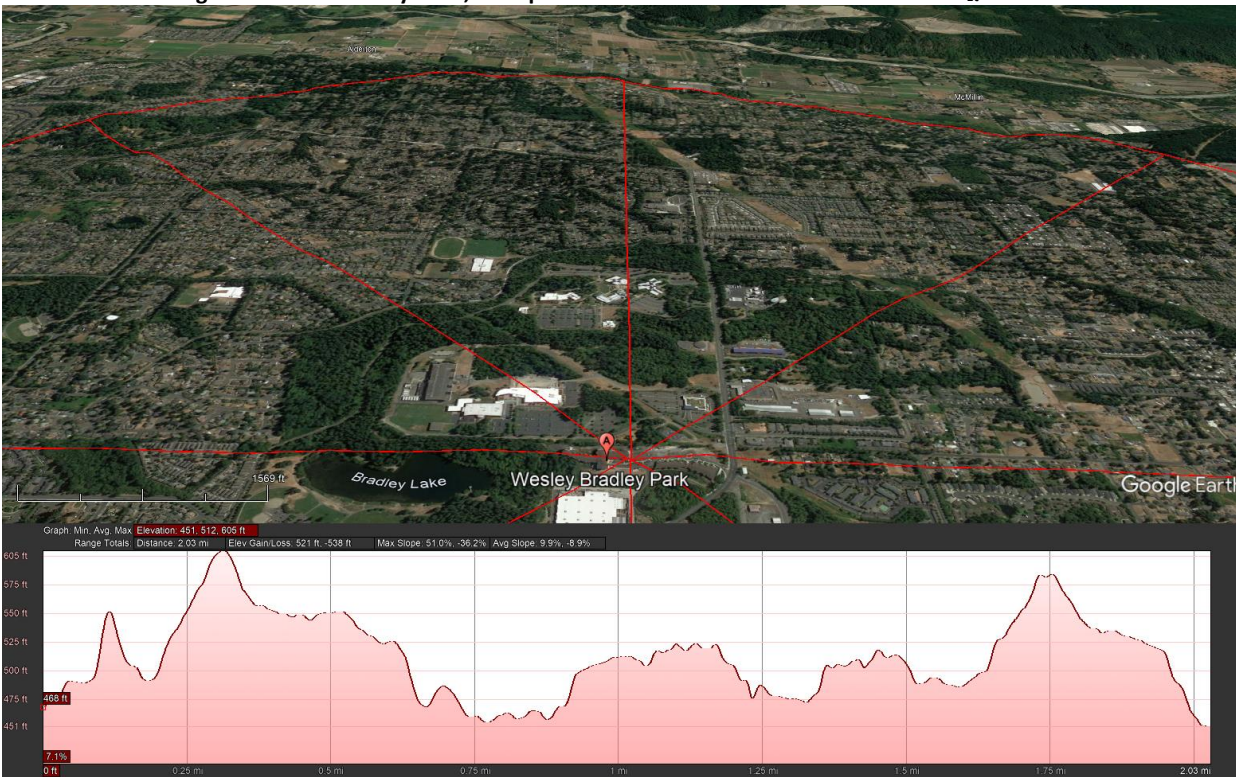


Figure 4: Easterly wind, escarpment is not an isolated feature therefore $K_{zt} = 1.00$



Figure 5: Southeasterly wind, escarpment is not an isolated feature therefore $K_{zt} = 1.00$

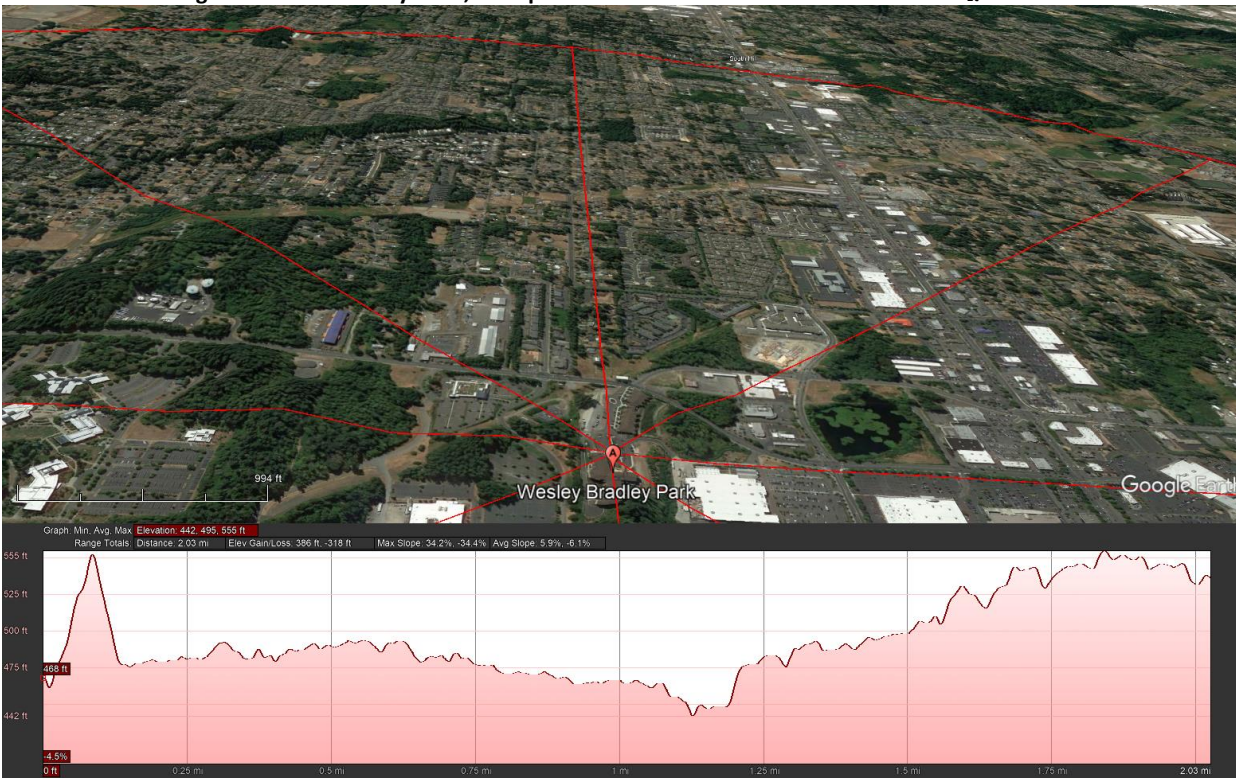


Figure 6: Southerly wind, escarpment is not an isolated feature therefore $K_{zt} = 1.00$

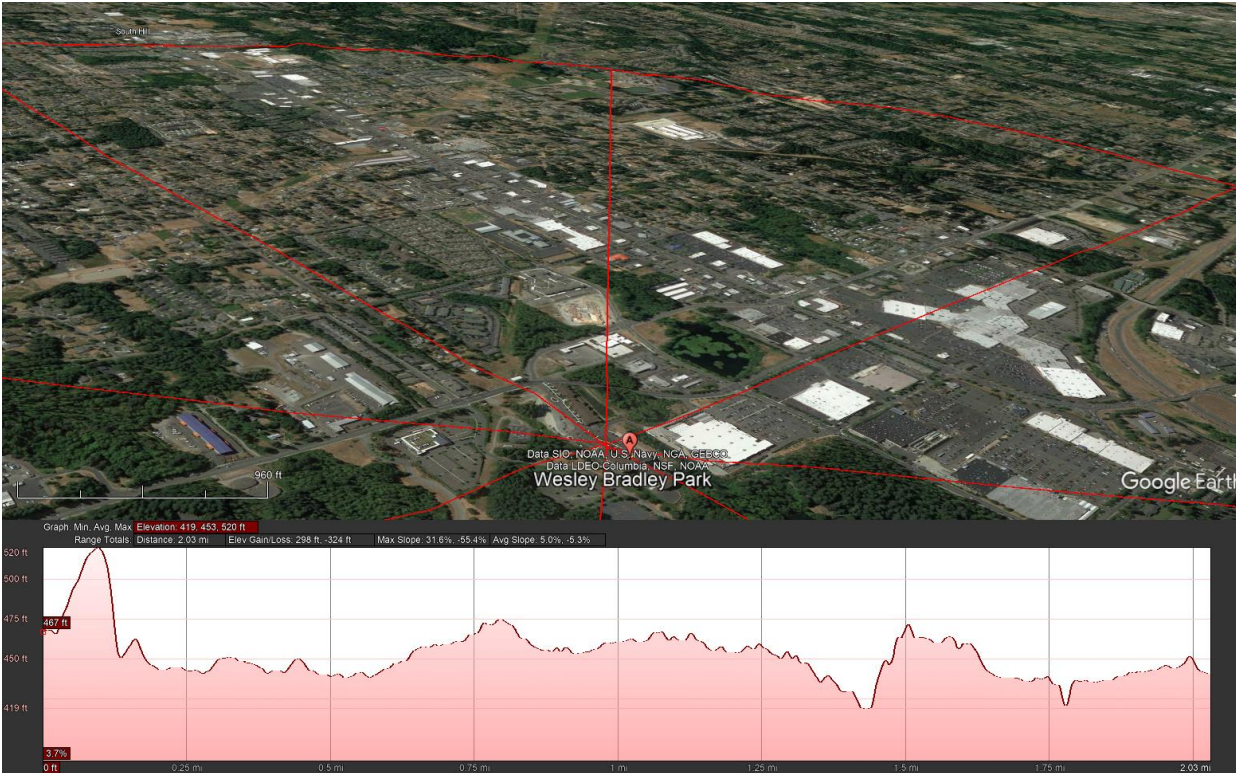


Figure 7: , Southwesterly wind, escarpment is not an isolated feature therefore $K_{zt} = 1.00$

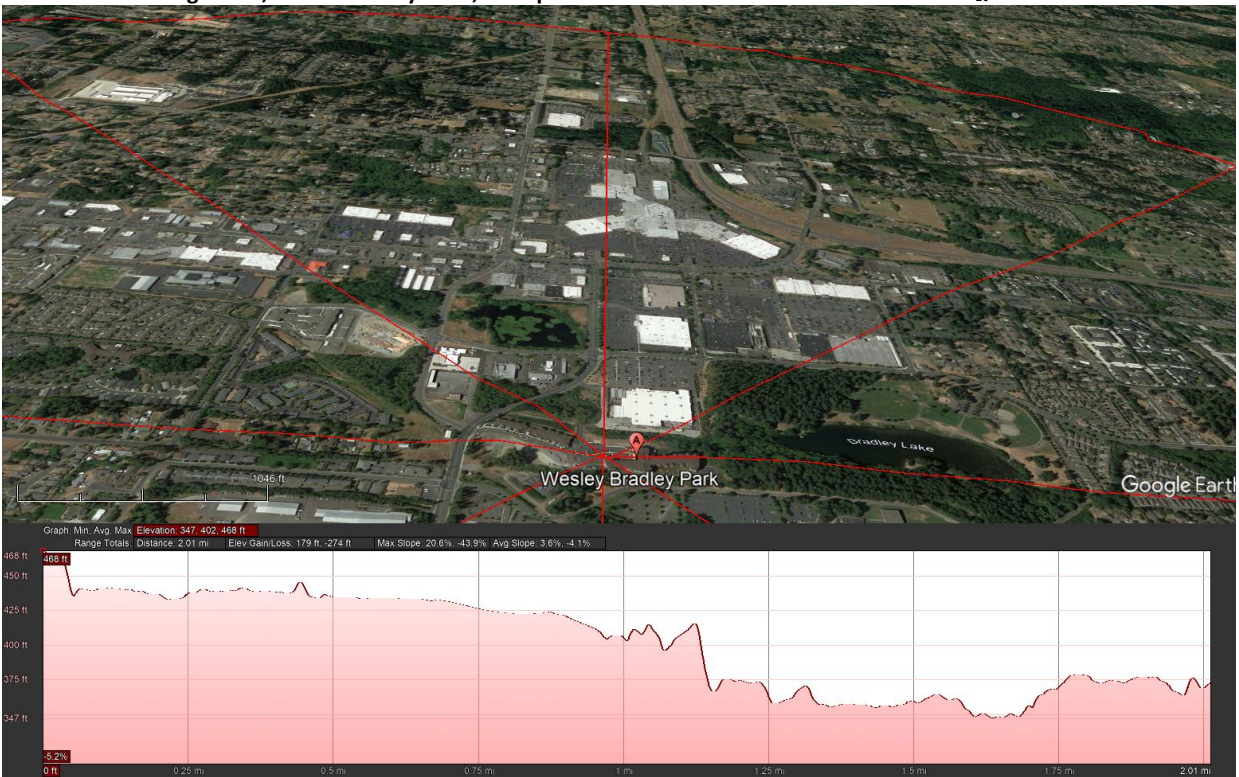


Figure 8: Westerly wind, escarpment is not an isolated feature therefore $K_{zt} = 1.00$

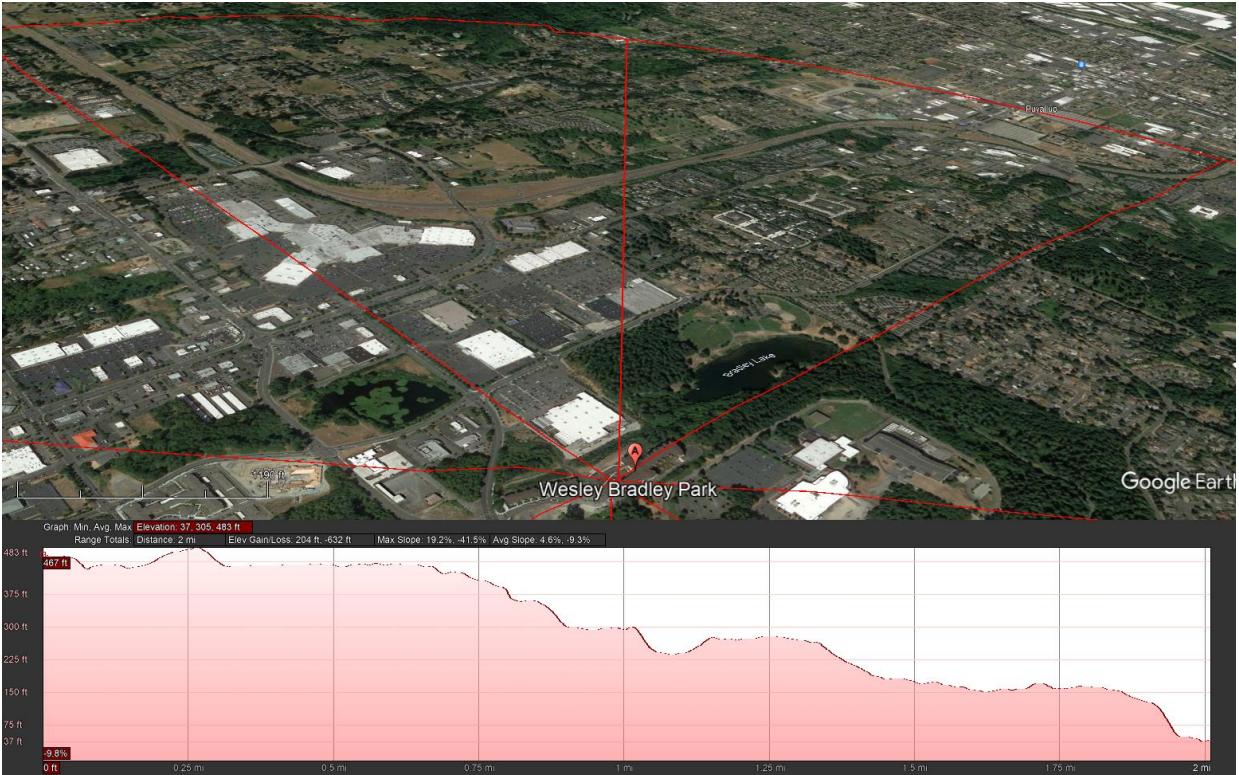


Figure 9: Northwestern wind, 390 ft (H) escarpment rises over 6970 ft ($L_h = 3480$ ft), $H/L_h < 0.2$ therefore $K_{zt} = 1.00$

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



<u>Typical Roof Unit Dead Load</u>	(psf)	Roof Slope:		0.25 in.	per 12 in.	Seismic
		Decking	Joists	Beams	Girders	
Asphalt Shingles		2.0	2.0	2.0	2.0	2.0
19/32" APA Rated Sheathing		2.1	2.1	2.1	2.1	2.1
Batt Insulation		1.5	1.5	1.5	1.5	1.5
MEP		1.5	1.5	1.5	1.5	1.5
Wood Trusses at 24" o.c.		--	2.5	2.5	2.5	2.5
(2) 5/8" Gypsum Drywall (1 hr. Rated)		--	5.6	5.6	5.6	5.6
Miscellaneous		1.5	1.5	1.5	1.5	1.5
		--	--	--	--	--
		--	--	--	--	--
		--	--	--	--	--
		--	--	--	--	--
2x Interior and Exterior Walls (projected in plan)		--	--	--	--	7.0
Total Roof Dead Load		8.6	16.7	16.7	16.7	23.7
Total Roof Dead Load (w. Slope)		8.6	16.7	16.7	16.7	23.7
Total Roof Design Dead Load		9.0	17.0	17.0	17.0	24.0
Total Roof Design Dead Load (Solar Readiness + 4 psf)		13.0	21.0	21.0	21.0	28.0

<u>Roof Live Loads per IBC Chapter 16</u>	(psf)
Typical Roof Live Load	20.0
Minimum Snow Load per WABO	25.0
Calculated Snow Load	17.0
Roof Areas Used for Assembly Purposes	100.0

Notes

- 1)
- 2)
- 3)
- 4)
- 5)

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Typical Floor Unit Dead Load

(psf)

	Decking	Joists	Beams	Girders	Seismic
Carpet / Flooring	1.5	1.5	1.5	1.5	1.5
1 1/4" Gypcrete Floor Topping (110 pcf)	11.5	11.5	11.5	11.5	11.5
3/4" T&G Sturdi-Floor Plywood Sheathing	2.3	2.3	2.3	2.3	2.3
MEP	1.5	1.5	1.5	1.5	1.5
Batt Insulation	0.5	0.5	0.5	0.5	0.5
Wood Trusses at 24" o.c.	--	2.5	2.5	2.5	2.5
5½" x 15" Glulam Support Beams ¹	--	--	0.5	0.5	0.5
(2) 5/8" Gypsum Drywall (1 hr. Rated)		5.6	5.6	5.6	5.6
Miscellaneous	1.5	1.5	1.5	1.5	1.5
	--	--	--	--	--
	--	--	--	--	--
2x Interior and Exterior Walls (projected in plan)	--	--	--	--	14.0
Total Floor Dead Load	18.8	26.9	27.4	27.4	41.4
Total Floor Design Dead Load	19.0	27.0	28.0	28.0	42.0

Floor Live Loads per IBC Chapter 16

(psf)

Residential (Private)	40.0
Public Corridors / Stairs and Exits	100.0
Mechanical Rooms	50.0
Light Storage Rooms	125.0

Notes

- 1) Beams consider self-weight for gravity calculations, this is for seismic purposes only.
- 2)
- 3)
- 4)
- 5)

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Typical Deck Unit Dead Load

(psf)

	Decking	Joists	Beams	Girders	Seismic
2" Concrete Topping	25.0	25.0	25.0	25.0	25.0
23/32" APA Rated Sheathing	2.3	2.3	2.3	2.3	2.3
MEP	1.5	1.5	1.5	1.5	1.5
Batt Insulation	0.5	0.5	0.5	0.5	0.5
11 $\frac{7}{8}$ " TJI 360 Joists at 16" o.c.	--	2.5	2.5	2.5	2.5
3 $\frac{1}{2}$ " x 1.55E LSL Support Beams ¹	--	--	0.5	0.5	0.5
(2) 5/8" Gypsum Drywall (1 hr. Rated)	--	5.6	5.6	5.6	5.6
Miscellaneous	1.5	1.5	1.5	1.5	1.5
	--	--	--	--	--
	--	--	--	--	--
	--	--	--	--	--
2x Interior and Exterior Walls (projected in plan)	--	--	--	--	--
Total Deck Dead Load	30.8	38.9	39.4	39.4	39.4
Total Deck Design Dead Load	31.0	39.0	40.0	40.0	40.0

Deck Live Loads per IBC Chapter 16

(psf)

Public Corridors / Stairs and Exits	100.0
Decks and Balconies (150% Area Served)	60.0
Mechanical Rooms	50.0
Light Storage Rooms	125.0
Minimum Snow Load per WABO	25.0
Calculated Snow Load	17.0

Notes

- 1) Beams consider self-weight for gravity calculations, this is for seismic purposes only.
- 2)
- 3)
- 4)
- 5)

Project: Wesley Bradley Park 2 Care Center
Project No.: 2220236.20
Date: 11/18/2024
By: KBG
Code: IBC 2021, ref. ASCE 7 (2016)



Typical Exterior Wall Unit Dead Load (psf)

	Wall
2x Studs at 16" oc	1.7
(2) 5/8" Gypsum Drywall (1 hr. Rated)	5.6
15/32" APA Rated Structural I Sheathing	1.5
Cement Fiber Board Finish	2.5
Weather Proofing Membrane	0.5
Batt Insulation	0.5
Miscellaneous	0.5
Total Exterior Wall Dead Load	13.0

Typical Interior Wall Unit Dead Load (psf)

	Wall
2x Studs at 16" oc	1.7
(2) 5/8" Gypsum Drywall (1 hr. Rated)	5.6
15/32" APA Rated Structural I Sheathing	1.5
Batt Insulation	0.5
Miscellaneous	0.5
Total Interior Wall Dead Load	10.0

2.0 - FOUNDATION DESIGN



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: F3.0

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : IBC 2021

General Information

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	=	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
Min. Sliding 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	=	3.0 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	350.0 pcf
Soil/Concrete Friction Coeff.	=	0.350

Increases based on footing Depth

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

Increases based on footing plan dimension

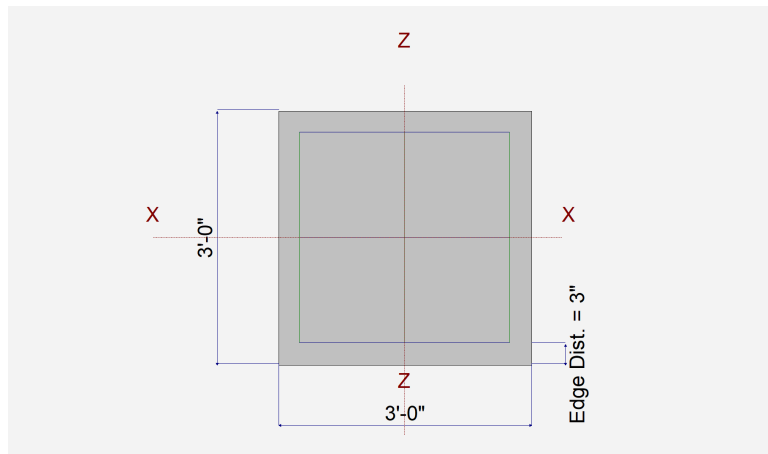
Allowable pressure increase per foot of depth	=	ksf
when max. length or width is greater than	=	ft

Dimensions

Width parallel to X-X Axis	=	3.0 ft
Length parallel to Z-Z Axis	=	3.0 ft
Footing Thickness	=	12.0 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...	=	3.0 in
at Bottom of footing	=	



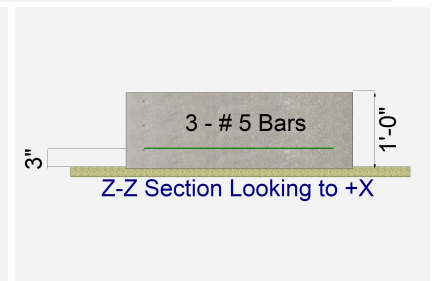
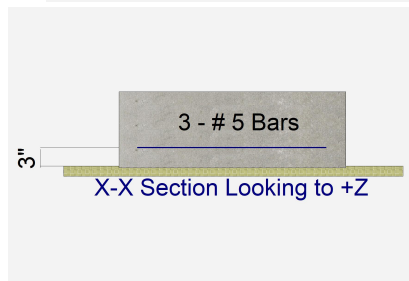
Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	3
Reinforcing Bar Size	=	# 5

Bars parallel to Z-Z Axis	=	
Number of Bars	=	3.0
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

	D	Lr	L	S	W	E	H
P : Column Load	=	25.0					k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: F3.0

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9743	Soil Bearing	2.923 ksf	3.0 ksf	D Only 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	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.3606	Z Flexure (+X)	4.375 k-ft/ft	12.131 k-ft/ft	+1.40D
PASS	0.3606	Z Flexure (-X)	4.375 k-ft/ft	12.131 k-ft/ft	+1.40D
PASS	0.3606	X Flexure (+Z)	4.375 k-ft/ft	12.131 k-ft/ft	+1.40D
PASS	0.3606	X Flexure (-Z)	4.375 k-ft/ft	12.131 k-ft/ft	+1.40D
PASS	0.5782	1-way Shear (+X)	27.006 psi	46.704 psi	+1.40D
PASS	0.5782	1-way Shear (-X)	27.006 psi	46.704 psi	+1.40D
PASS	0.5782	1-way Shear (+Z)	27.006 psi	46.704 psi	+1.40D
PASS	0.5782	1-way Shear (-Z)	27.006 psi	46.704 psi	+1.40D
PASS	0.6163	2-way Punching	101.273 psi	164.317 psi	+1.40D

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	3.0	n/a	0.0			2.923	2.923	n/a	n/a	0.974
X-X, +0.60D	3.0	n/a	0.0			1.754	1.754	n/a	n/a	0.585
Z-Z, D Only	3.0	0.0	n/a			n/a	n/a	2.923	2.923	0.974
Z-Z, +0.60D	3.0	0.0	n/a			n/a	n/a	1.754	1.754	0.585

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 Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	4.375	+Z	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
X-X, +1.40D	4.375	-Z	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
X-X, +1.20D	3.750	+Z	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
X-X, +1.20D	3.750	-Z	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
X-X, +0.90D	2.813	+Z	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
X-X, +0.90D	2.813	-Z	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
Z-Z, +1.40D	4.375	-X	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
Z-Z, +1.40D	4.375	+X	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
Z-Z, +1.20D	3.750	-X	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
Z-Z, +1.20D	3.750	+X	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
Z-Z, +0.90D	2.813	-X	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
Z-Z, +0.90D	2.813	+X	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	27.01 psi	27.01 psi	27.01 psi	46.70 psi	0.58	OK
+1.20D	23.15 psi	23.15 psi	23.15 psi	46.70 psi	0.50	OK
+0.90D	17.36 psi	17.36 psi	17.36 psi	46.70 psi	0.37	OK



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: F3.0

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	27.01 psi	27.01 psi	27.01 psi	46.70 psi	0.58	OK
+1.20D	23.15 psi	23.15 psi	23.15 psi	46.70 psi	0.50	OK
+0.90D	17.36 psi	17.36 psi	17.36 psi	46.70 psi	0.37	OK

All units k

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	101.27 psi	164.32 psi	0.6163	OK
+1.20D	86.81 psi	164.32 psi	0.5283	OK
+0.90D	65.10 psi	164.32 psi	0.3962	OK



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Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: F4.0

Code References

Calculations per ACI 318-19, IBC 2021
Load Combinations Used : IBC 2021

General Information

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	=	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
Min. Sliding 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	=	3.0 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	350.0 pcf
Soil/Concrete Friction Coeff.	=	0.350

Increases based on footing Depth

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

Increases based on footing plan dimension

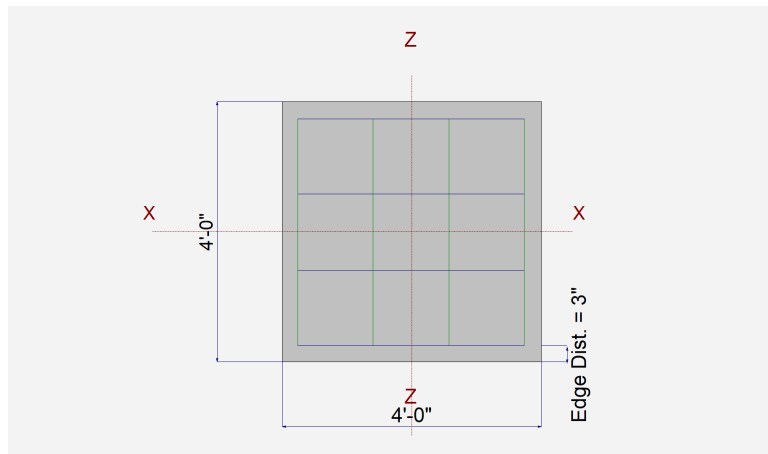
Allowable pressure increase per foot of depth	=	ksf
when max. length or width is greater than	=	ft

Dimensions

Width parallel to X-X Axis	=	4.0 ft
Length parallel to Z-Z Axis	=	4.0 ft
Footing Thickness	=	12.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	6.0 in
pz : parallel to Z-Z Axis	=	6.0 in
Height	=	in
Rebar Centerline to Edge of Concrete...	=	3.0 in
at Bottom of footing	=	



Reinforcing

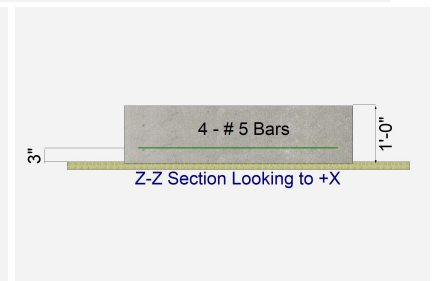
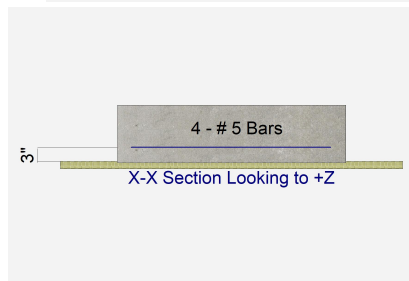
Bars parallel to X-X Axis	=	
Number of Bars	=	4
Reinforcing Bar Size	=	# 5

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

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	=	45.0					k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: F4.0

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9860	Soil Bearing	2.958 ksf	3.0 ksf	D Only 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	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.4970	Z Flexure (+X)	6.029 k-ft/ft	12.131 k-ft/ft	+1.40D
PASS	0.4970	Z Flexure (-X)	6.029 k-ft/ft	12.131 k-ft/ft	+1.40D
PASS	0.4970	X Flexure (+Z)	6.029 k-ft/ft	12.131 k-ft/ft	+1.40D
PASS	0.4970	X Flexure (-Z)	6.029 k-ft/ft	12.131 k-ft/ft	+1.40D
PASS	0.7806	1-way Shear (+X)	36.458 psi	46.704 psi	+1.40D
PASS	0.7806	1-way Shear (-X)	36.458 psi	46.704 psi	+1.40D
PASS	0.7806	1-way Shear (+Z)	36.458 psi	46.704 psi	+1.40D
PASS	0.7806	1-way Shear (-Z)	36.458 psi	46.704 psi	+1.40D
PASS	0.6373	2-way Punching	104.720 psi	164.317 psi	+1.40D

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	3.0	n/a	0.0			2.958	2.958	n/a	n/a	0.986
X-X, +0.60D	3.0	n/a	0.0			1.775	1.775	n/a	n/a	0.592
Z-Z, D Only	3.0	0.0	n/a			n/a	n/a	2.958	2.958	0.986
Z-Z, +0.60D	3.0	0.0	n/a			n/a	n/a	1.775	1.775	0.592

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 Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	6.029	+Z	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
X-X, +1.40D	6.029	-Z	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
X-X, +1.20D	5.168	+Z	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
X-X, +1.20D	5.168	-Z	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
X-X, +0.90D	3.876	+Z	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
X-X, +0.90D	3.876	-Z	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
Z-Z, +1.40D	6.029	-X	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
Z-Z, +1.40D	6.029	+X	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
Z-Z, +1.20D	5.168	-X	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
Z-Z, +1.20D	5.168	+X	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
Z-Z, +0.90D	3.876	-X	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK
Z-Z, +0.90D	3.876	+X	Bottom	0.2592	ACI 7.6.1.1	0.310	12.131	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	36.46 psi	36.46 psi	36.46 psi	46.70 psi	0.78	OK
+1.20D	31.25 psi	31.25 psi	31.25 psi	46.70 psi	0.67	OK
+0.90D	23.44 psi	23.44 psi	23.44 psi	46.70 psi	0.50	OK



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: F4.0

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	36.46 psi	36.46 psi	36.46 psi	46.70 psi	0.78	OK
+1.20D	31.25 psi	31.25 psi	31.25 psi	46.70 psi	0.67	OK
+0.90D	23.44 psi	23.44 psi	23.44 psi	46.70 psi	0.50	OK

All units k

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	104.72 psi	164.32 psi	0.6373	OK
+1.20D	89.76 psi	164.32 psi	0.5463	OK
+0.90D	67.32 psi	164.32 psi	0.4097	OK



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General Footing

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: F5.0

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : IBC 2021

General Information

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	=	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
Min. Sliding 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	=	3.0 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	350.0 pcf
Soil/Concrete Friction Coeff.	=	0.350

Increases based on footing Depth

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

Increases based on footing plan dimension

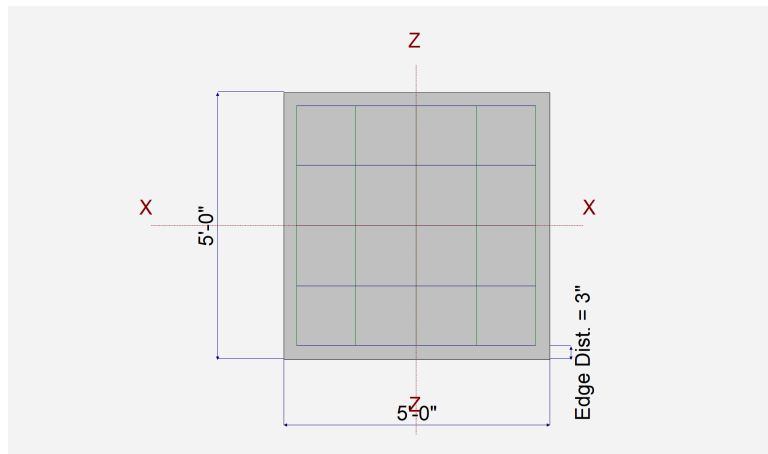
Allowable pressure increase per foot of depth	=	ksf
when max. length or width is greater than	=	ft

Dimensions

Width parallel to X-X Axis	=	5.0 ft
Length parallel to Z-Z Axis	=	5.0 ft
Footing Thickness	=	14.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	6.0 in
pz : parallel to Z-Z Axis	=	6.0 in
Height	=	in
Rebar Centerline to Edge of Concrete...	=	3.0 in
at Bottom of footing	=	



Reinforcing

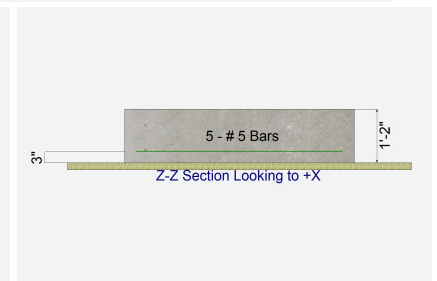
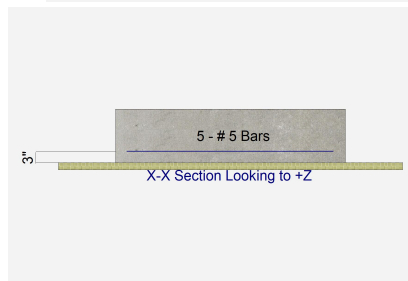
Bars parallel to X-X Axis	=	
Number of Bars	=	5
Reinforcing Bar Size	=	# 5

Bars parallel to Z-Z Axis	=	
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	=	70.0					k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k



AHBL, INC.
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Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: F5.0

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9897	Soil Bearing	2.969 ksf	3.0 ksf	D Only 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	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.6650	Z Flexure (+X)	9.923 k-ft/ft	14.921 k-ft/ft	+1.40D
PASS	0.6650	Z Flexure (-X)	9.923 k-ft/ft	14.921 k-ft/ft	+1.40D
PASS	0.6650	X Flexure (+Z)	9.923 k-ft/ft	14.921 k-ft/ft	+1.40D
PASS	0.6650	X Flexure (-Z)	9.923 k-ft/ft	14.921 k-ft/ft	+1.40D
PASS	0.9178	1-way Shear (+X)	40.091 psi	43.683 psi	+1.40D
PASS	0.9178	1-way Shear (-X)	40.091 psi	43.683 psi	+1.40D
PASS	0.9178	1-way Shear (+Z)	40.091 psi	43.683 psi	+1.40D
PASS	0.9178	1-way Shear (-Z)	40.091 psi	43.683 psi	+1.40D
PASS	0.7348	2-way Punching	120.744 psi	164.317 psi	+1.40D

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	3.0	n/a	0.0			2.969	2.969	n/a	n/a	0.990
X-X, +0.60D	3.0	n/a	0.0			1.782	1.782	n/a	n/a	0.594
Z-Z, D Only	3.0	0.0	n/a			n/a	n/a	2.969	2.969	0.990
Z-Z, +0.60D	3.0	0.0	n/a			n/a	n/a	1.782	1.782	0.594

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 Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	9.923	+Z	Bottom	0.3024	ACI 7.6.1.1	0.310	14.921	OK
X-X, +1.40D	9.923	-Z	Bottom	0.3024	ACI 7.6.1.1	0.310	14.921	OK
X-X, +1.20D	8.505	+Z	Bottom	0.3024	ACI 7.6.1.1	0.310	14.921	OK
X-X, +1.20D	8.505	-Z	Bottom	0.3024	ACI 7.6.1.1	0.310	14.921	OK
X-X, +0.90D	6.379	+Z	Bottom	0.3024	ACI 7.6.1.1	0.310	14.921	OK
X-X, +0.90D	6.379	-Z	Bottom	0.3024	ACI 7.6.1.1	0.310	14.921	OK
Z-Z, +1.40D	9.923	-X	Bottom	0.3024	ACI 7.6.1.1	0.310	14.921	OK
Z-Z, +1.40D	9.923	+X	Bottom	0.3024	ACI 7.6.1.1	0.310	14.921	OK
Z-Z, +1.20D	8.505	-X	Bottom	0.3024	ACI 7.6.1.1	0.310	14.921	OK
Z-Z, +1.20D	8.505	+X	Bottom	0.3024	ACI 7.6.1.1	0.310	14.921	OK
Z-Z, +0.90D	6.379	-X	Bottom	0.3024	ACI 7.6.1.1	0.310	14.921	OK
Z-Z, +0.90D	6.379	+X	Bottom	0.3024	ACI 7.6.1.1	0.310	14.921	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	40.09 psi	40.09 psi	40.09 psi	43.68 psi	0.92	OK
+1.20D	34.36 psi	34.36 psi	34.36 psi	43.68 psi	0.79	OK
+0.90D	25.77 psi	25.77 psi	25.77 psi	43.68 psi	0.59	OK



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: F5.0

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	40.09 psi	40.09 psi	40.09 psi	43.68 psi	0.92	OK
+1.20D	34.36 psi	34.36 psi	34.36 psi	43.68 psi	0.79	OK
+0.90D	25.77 psi	25.77 psi	25.77 psi	43.68 psi	0.59	OK

All units k

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	120.74 psi	164.32psi	0.7348	OK
+1.20D	103.50 psi	164.32psi	0.6299	OK
+0.90D	77.62 psi	164.32psi	0.4724	OK



AHBL, INC.
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Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wall Footing

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typ Stud Wall Footing

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : IBC 2021

General Information

Material Properties

f'_c : Concrete 28 day strength	=	3.0 ksi
f_y : Rebar Yield	=	60.0 ksi
E_c : Concrete Elastic Modulus	=	3,122.0 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
Min. Sliding Safety Factor	=	1.0 : 1
AutoCalc Footing Weight as DL :	=	Yes

Soil Design Values

Allowable Soil Bearing	=	3.0 ksf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	350.0 pcf
Soil/Concrete Friction Coeff.	=	0.350

Increases based on footing Depth

Reference Depth below Surface	=	ft
Allow. Pressure Increase per foot of depth	=	ksf
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

Adjusted Allowable Bearing Pressure

= 3.0 ksf

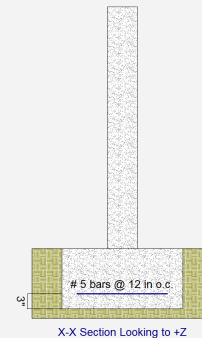
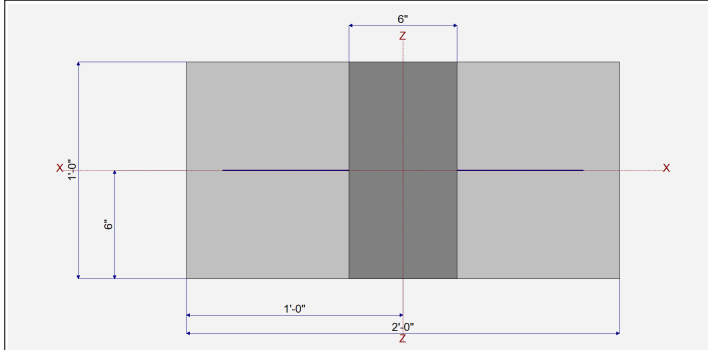
Dimensions

Footing Width	=	2.0 ft
Wall Thickness	=	6.0 in
Wall center offset from center of footing	=	0 in

Footing Thickness	=	12.0 in
Rebar Centerline to Edge of Concrete...		
at Bottom of footing	=	3.0 in

Reinforcing

Bars along X-X Axis		
Bar spacing	=	12.00
Reinforcing Bar Size	=	# 5



Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	5.70					k
OB : Overburden	=						ksf
V-x	=						k
M-zz	=						k-ft
Vx applied	=						in above top of footing



AHBL, INC.
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Project Title:
Engineer:
Project ID:
Project Descr:

Wall Footing

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typ Stud Wall Footing

DESIGN SUMMARY

Design OK

Factor of Safety	Item	Applied	Capacity	Governing Load Combination
PASS	n/a	Overturning - Z-Z	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	No Uplift
Utilization Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9983	Soil Bearing	2.995 ksf	D Only
PASS	0.09721	Z Flexure (+X)	12.131 k-ft	+1.40D
PASS	0.06249	Z Flexure (-X)	12.131 k-ft	+0.90D
PASS	N/A	1-way Shear (+X)	N/A psi	N/A
PASS	N/A	1-way Shear (-X)	N/A psi	N/A

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Actual Soil Bearing Stress -X	Actual Soil Bearing Stress +X	Actual / Allowable Ratio
D Only	3.0 ksf	0.0 in	2.995 ksf	2.995 ksf	0.998
+0.60D	3.0 ksf	0.0 in	1.797 ksf	1.797 ksf	0.599

Units : k-ft

Overturning Stability

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 SafetyRatio	Status
--	---------------	-----------------	---------------------	--------

Footing Has NO Sliding

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
+1.40D	1.179	-X	Bottom	0.2592	Min Temp %	0.31	12.131	OK
+1.40D	1.179	+X	Bottom	0.2592	Min Temp %	0.31	12.131	OK
+1.20D	1.011	-X	Bottom	0.2592	Min Temp %	0.31	12.131	OK
+1.20D	1.011	+X	Bottom	0.2592	Min Temp %	0.31	12.131	OK
+0.90D	0.7581	-X	Bottom	0.2592	Min Temp %	0.31	12.131	OK
+0.90D	0.7581	+X	Bottom	0.2592	Min Temp %	0.31	12.131	OK

Units : k

One Way Shear

Load Combination...	vu @ -X	vu @ +X	vu:Max	Φ vn	vu / Φ vn	Status
+1.40D	0.0 psi	0.0 psi	0.0 psi	46.7 psi	0.000	OK
+1.20D	0.0 psi	0.0 psi	0.0 psi	46.7 psi	0.000	OK
+0.90D	0.0 psi	0.0 psi	0.0 psi	46.7 psi	0.000	OK



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Project Descr:

Cantilevered Retaining Wall

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Basement Wall - Temporary Construction Cantilever

Code Reference:

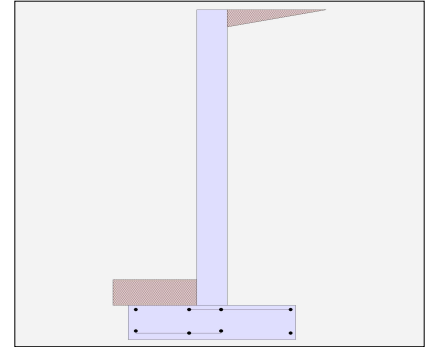
Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	11.50 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	525.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing Soil Friction	=	0.525
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Strength Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300



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DESCRIPTION: Basement Wall - Temporary Construction Cantilever

Design Summary

Wall Stability Ratios

Overturning	=	1.66	OK
Sliding	=	1.48	Ratio < 1.5!
Global Stability	=	1.67	

Total Bearing Load	=	7,191	lbs
...resultant ecc.	=	16.44	in

Eccentricity outside middle third

Soil Pressure @ Toe	=	2,858	psf	OK
Soil Pressure @ Heel	=	0	psf	OK
Allowable	=	3,000	psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	4,002 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	24.2 psi	OK
Footing Shear @ Heel	=	22.0 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	2,882.2 lbs	
less 100% Passive Force	-	1,166.7 lbs	
less 100% Friction Force	= -	3,107.3 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	49.2 lbs	NG

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

Wall Material Above "Ht"	=	Concrete
Design Method	=	SD
Thickness	=	12.00
Rebar Size	=	# 6
Rebar Spacing	=	12.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.770
---------------	---	-------

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	3,703.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	14,194.8

Moment.....Allowable

	=	18,415.0
--	---	----------

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	32.1

Shear.....Allowable

	psi =	59.3
--	-------	------

Anet (Masonry)

	in2 =	
--	-------	--

Wall Weight

	psf =	150.0
--	-------	-------

Rebar Depth 'd'

	in =	9.63
--	------	------

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	4,000.0
Fy	psi =	60,000.0

Bottom

Stem OK			
ft =	0.00		
Concrete			
SD		SD	SD



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Cantilevered Retaining Wall

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LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Basement Wall - Temporary Construction Cantilever

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.339 in ² /ft	
0.0018bh : 0.0018(12)(12) :	0.2592 in ² /ft	Horizontal Reinforcing Options :
	=====	One layer of : Two layers of :
Required Area :	0.339 in ² /ft	#4@ 9.26 in #4@ 18.52 in
Provided Area :	0.44 in ² /ft	#5@ 14.35 in #5@ 28.70 in
Maximum Area :	2.0862 in ² /ft	#6@ 20.37 in #6@ 40.74 in

Footing Data

Toe Width	=	2.25 ft
Heel Width	=	3.25
Total Footing Width	=	5.50
Footing Thickness	=	16.00 in

f'c =	3,000 psi	Fy =	60,000 psi
Footing Concrete Density	=	150.00 pcf	
Min. As %	=	0.0018	
Cover @ Top	2.00	@ Btm.=	3.00 in

Footing Design Results

	Toe	Heel	
Factored Pressure	=	4,002	0 psf
Mu' : Upward	=	8,295	114 ft-#
Mu' : Downward	=	942	4,450 ft-#
Mu: Design	=	7,353	4,336 ft-#
φ Mn	=	24,143	26,123 ft-#
Actual 1-Way Shear	=	24.18	22.05 psi
Allow 1-Way Shear	=	46.89	45.71 psi
Toe Reinforcing	=	# 6 @ 12.00 in	
Heel Reinforcing	=	# 6 @ 12.00 in	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, φ Tn	=		0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 6.94 in, #5@ 10.76 in, #6@ 15.27 in, #7@ 20.83 in, #8@ 27.43 in, #9@ 34.72 in, #10@ 44.09 in

Heel: #4@ 6.94 in, #5@ 10.76 in, #6@ 15.27 in, #7@ 20.83 in, #8@ 27.43 in, #9@ 34.72 in, #10@ 44.09 in

Key: No key defined

Min footing T&S reinf Area	1.90 in ²
Min footing T&S reinf Area per foot	0.35 in ² /ft

If one layer of horizontal bars:

#4@ 6.94 in
#5@ 10.76 in
#6@ 15.28 in

If two layers of horizontal bars:

#4@ 13.89 in
#5@ 21.53 in
#6@ 30.56 in



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Cantilevered Retaining Wall

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LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Basement Wall - Temporary Construction Cantilever

Summary of Overturning & Resisting Forces & Moments

Item	OVERTURNING.....				RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	2,882.2	4.28	12,329.2	Soil Over HL (ab. water tbl)	2,846.3	4.38	12,452.3
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		4.38	12,452.3
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=		
Added Lateral Load	=			* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=			Soil Over Toe	=	247.5	278.4
	=			Surcharge Over Toe	=		
				Stem Weight(s)	=	1,725.0	4,743.8
				Earth @ Stem Transitions	=		
				Footing Weight	=	1,100.0	3,025.0
				Key Weight	=		
				Vert. Component	=		
Total	=	2,882.2	O.T.M. = 12,329.2				
Resisting/Overturning Ratio			= 1.66				
Vertical Loads used for Soil Pressure =		7,191.0	lbs				
					Total = 5,918.8	lbs	R.M.= 20,499.5

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.166 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe.
because the wall would then tend to rotate into the retained soil.



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AHBL, INC

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DESCRIPTION: Basement Wall - Temporary Construction Cantilever

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #6 bar specified in this stem design segment (25.4.2.4a) = 22.20 in

Development length for #6 bar specified in this stem design segment = 17.08 in

Hooked embedment length into footing for #6 bar specified in this stem design segment = 10.35 in

As Provided = 0.4400 in²/ft

As Required = 0.3850 in²/ft



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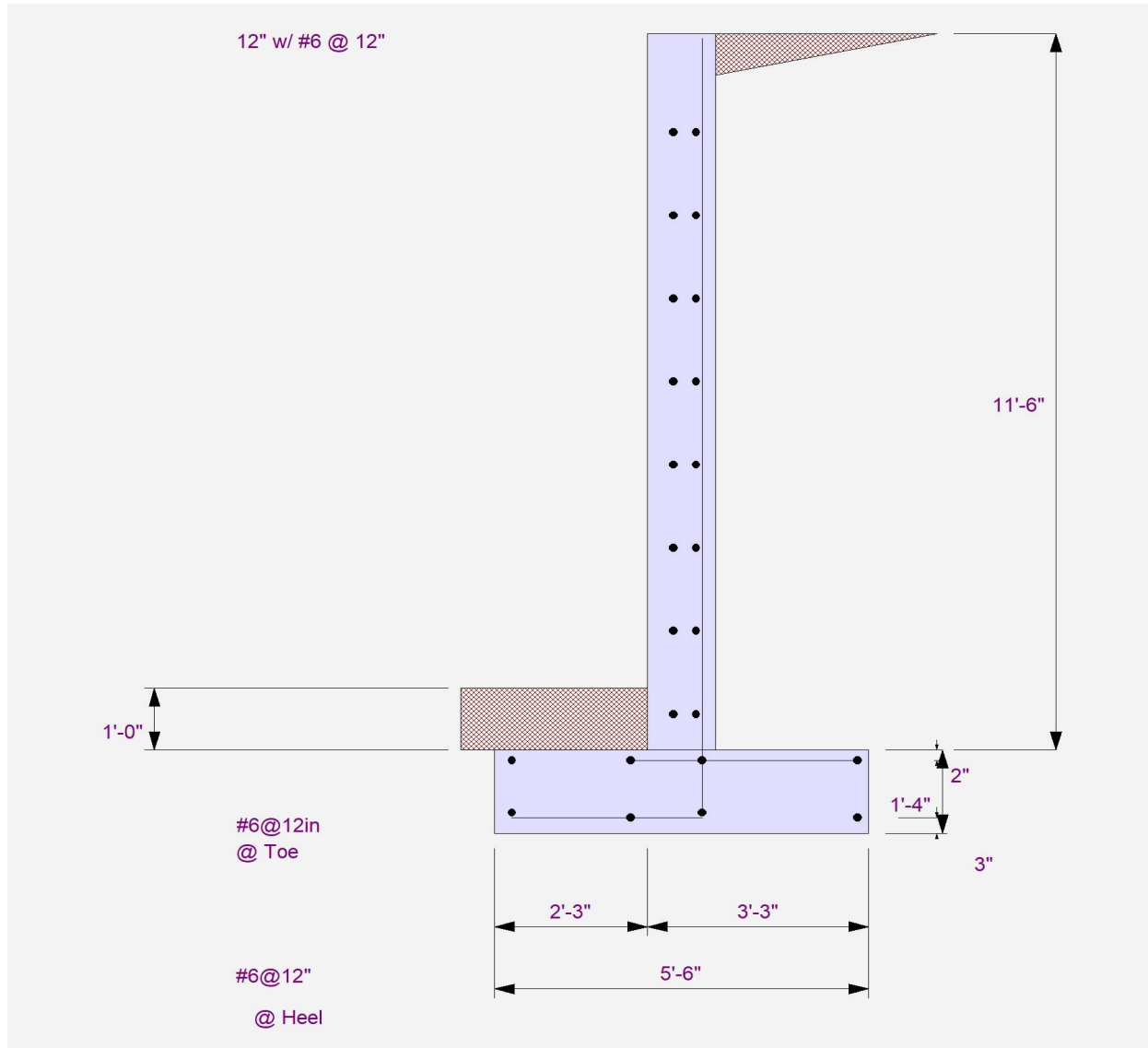
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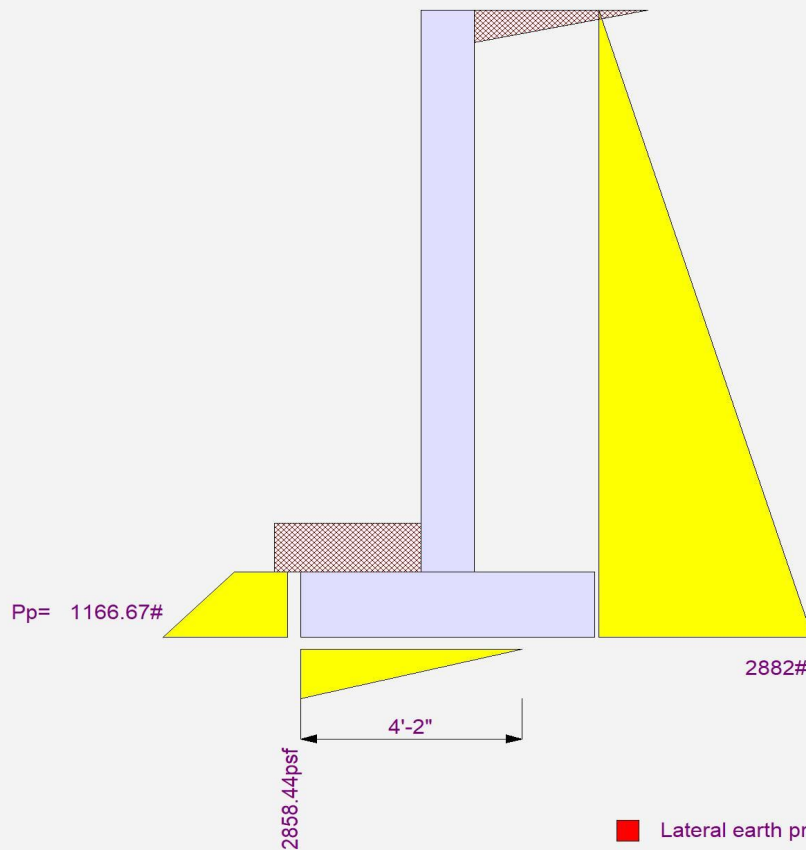
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DESCRIPTION: Basement Wall - Temporary Construction Cantilever



■ Lateral earth pressure due to the soil BELOW water table



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Project Descr:

Restrained Retaining Wall

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Basement Wall - Restrained 12', SOG

Code References

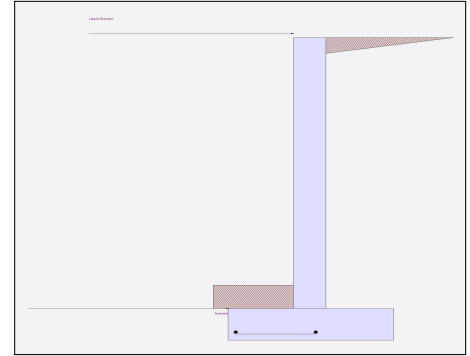
Calculations per IBC 2021, ACI 318-14

Criteria

Retained Height	=	11.50 ft
Wall height above soil	=	ft
Total Wall Height	=	11.50 ft
Top Support Height	=	11.50 ft
Slope Behind Wall	=	0
Height of Soil over Toe	=	12.0 in

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
At-Rest Heel Pressure	=	35.0 psf/ft
	=	0.0 psf/ft
Passive Pressure	=	350.0 psf/ft
Soil Density	=	110 pcf
Footing Soil Friction	=	0.4 psf
Soil height to ignore for passive pressure	=	12 in



Surcharge Loads

Surcharge Over Heel	=	100.0 psf
>>>Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	60.0 lbs
Axial Live Load	=	lbs
Axial Load Eccentricity	=	in

Earth Pressure Seismic Load

Uniform Lateral Load Applied to Stem

Lateral Load	=	100.0 #/ft
...Height to Top	=	11.50 ft
...Height to Bottom	=	ft
Load Type	=	Earth (H)
		(Service Level)
Wind on Exposed Stem	=	0.00 psf
		(Strength Level)
Wind acts left-to-right toward retention side.		
K_h Soil Density Multiplier	=	0.2 g

Adjacent Footing Load

Adjacent Footing Load	=	lbs
Footing Width	=	ft
Eccentricity	=	in
Wall to Ftg CL Dist	=	ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	ft
Poisson's Ratio	=	0.3
Added seismic per unit area	=	0.0 psf

Design Summary

Total Bearing Load	=	6,203.75 lbs
...resultant ecc.	=	0.0 in
Soil Pressure @ Toe	=	1,127.96 psf OK
Soil Pressure @ Heel	=	1,127.96 psf OK
Allowable	=	psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,353.55 psf
ACI Factored @ Heel	=	1,353.55 psf
Footing Shear @ Toe	=	7.834 psi OK
Footing Shear @ Heel	=	-7.560 psi OK
Allowable	=	82.158 psi
Reaction at Top	=	1,030.30 lbs
Reaction at Bottom	=	3,409.15 lbs

Sliding Calcs	
Lateral Sliding Force	= 3,409.15 lbs

Concrete Stem Construction

Thickness	=	12.00 in
Fy	=	60000 psi
Wall Weight	=	150.0 psf
f'c	=	4,000.0 psi
Stem is FIXED to top of footing		

	@ Top Support	Mmax Between Top & Base	@ Base of Wall
	Stem OK	Stem OK	Stem OK
Design Height Above Ftg	= 11.50 ft	6.697 ft	0.00 ft
Rebar Size	= # 6	# 6	# 6
Rebar Spacing	= 12.00 in	12.00 in	12.00 in
Rebar Placed at	= Edge	Edge	Edge
Rebar Depth 'd'	= 9.625 in	10.125 in	9.625 in
Design Data			
fb/FB + fa/Fa	=	0.208	0.462
Mu.....Actual	= 0.0 ft-#	4,039.40 ft-#	8,503.39 ft-#
Mn * Phi.....Allowable	= 18,415.0 ft-#	19,405.0 ft-#	18,415.0 ft-#
Shear Force @ this height	= 1,485.53 lbs		4,190.82 lbs
Shear.....Actual	= 12.862 psi		36.284 psi
Shear.....Allowable	= 59.266 psi		59.266 psi

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000



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Project Title:
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Project ID:
Project Descr:

Restrained Retaining Wall

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Basement Wall - Restrained 12', SOG

Footing Strengths & Dimensions

Toe Width	=	2.25 ft
Heel Width	=	3.25
Total Footing Width	=	5.50
Footing Thickness	=	16.0 in

f'_c = 3,000 psi F_y = 60000 psi
Footing Concrete Density = 150 pcf
Min. As % = 0.0018
Cover @ Top = 2 in @ Btm. = 3 in

Footing Design Results

	Toe	Heel	
Factored Pressure	= 1,353.55	1,353.55	psf
μ_u : Upward	= 3,426.16		ft-#
μ_u : Downward	= 941.63		ft-#
μ_u : Design	= 2,485	1,429	ft-#
Actual 1-Way Shear	= 7.834	-7.560	psi
Allow 1-Way Shear	= 43.818	43.818	psi

Other Acceptable Sizes & Spacings:

Toe: # 7 @ 18.00 in -or- $\phi M_n = \phi * 5 * \lambda * \sqrt{f'_c} * S_m$
Heel: None Spec'd -or- $\phi M_n = \phi * 5 * \lambda * \sqrt{f'_c} * S_m$

Min footing T&S reinf Area 1.90 in²
Min footing T&S reinf Area per foot 0.35 in² /ft
If one layer of horizontal bars: If two layers of horizontal bars:
#4@ 6.94 in #4@ 13.89 in
#5@ 10.76 in #5@ 21.53 in
#6@ 15.28 in #6@ 30.56 in

Summary of Forces on Footing : Slab RESISTS sliding, stem is FIXED at footing

Forces acting on footing for soil pressure

>>> Sliding Forces are restrained by the adjacent slab

Load & Moment Summary For Footing : For Soil Pressure Calcs

Moment @ Top of Footing Applied from Stem	=	-5,727.90 ft-#
Surcharge Over Heel	= 225.0 lbs 4.375 ft	984.38 ft-#
Adjacent Footing Load	= 0.0 lbs 0.0 ft	0.0 ft-#
Axial Dead Load on Stem	= 60.0 lbs 2.750 ft	165.0 ft-#
Soil Over Toe	= 247.50 lbs 1.125 ft	278.438 ft-#
Surcharge Over Toe	= 0.0 lbs 0.0 ft	0.0 ft-#
Stem Weight	= 1,725.0 lbs 2.750 ft	4,743.75 ft-#
Soil Over Heel	= 2,846.25 lbs 4.375 ft	12,452.3 ft-#
Footing Weight	= 1,100.0 lbs 2.750 ft	3,025.0 ft-#
Total Vertical Force	= 6,203.75 lbs Base Moment =	15,921.0 ft-#

Stem is specified to be fixed to footing, and top restraint is assumed to react out any tendency for moment at the footing/soil interface, so uniform soil pressure is assumed.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.



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Restrained Retaining Wall

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AHBL, INC

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DESCRIPTION: Basement Wall - Restrained 12', SOG

Rebar Lap & Embedment Lengths Information

Restrained Retaining Wall

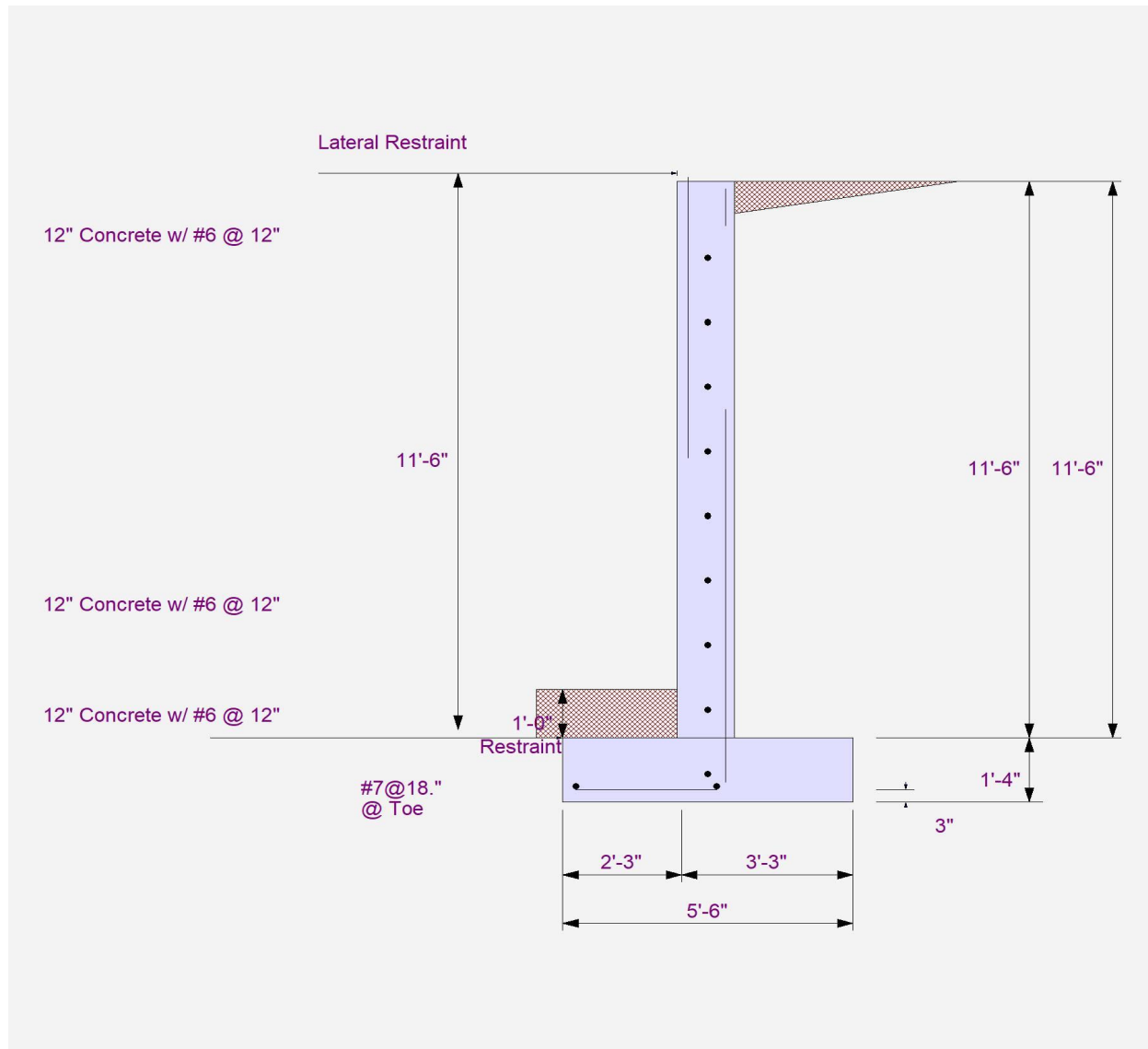
Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Basement Wall - Restrained 12', SOG





AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

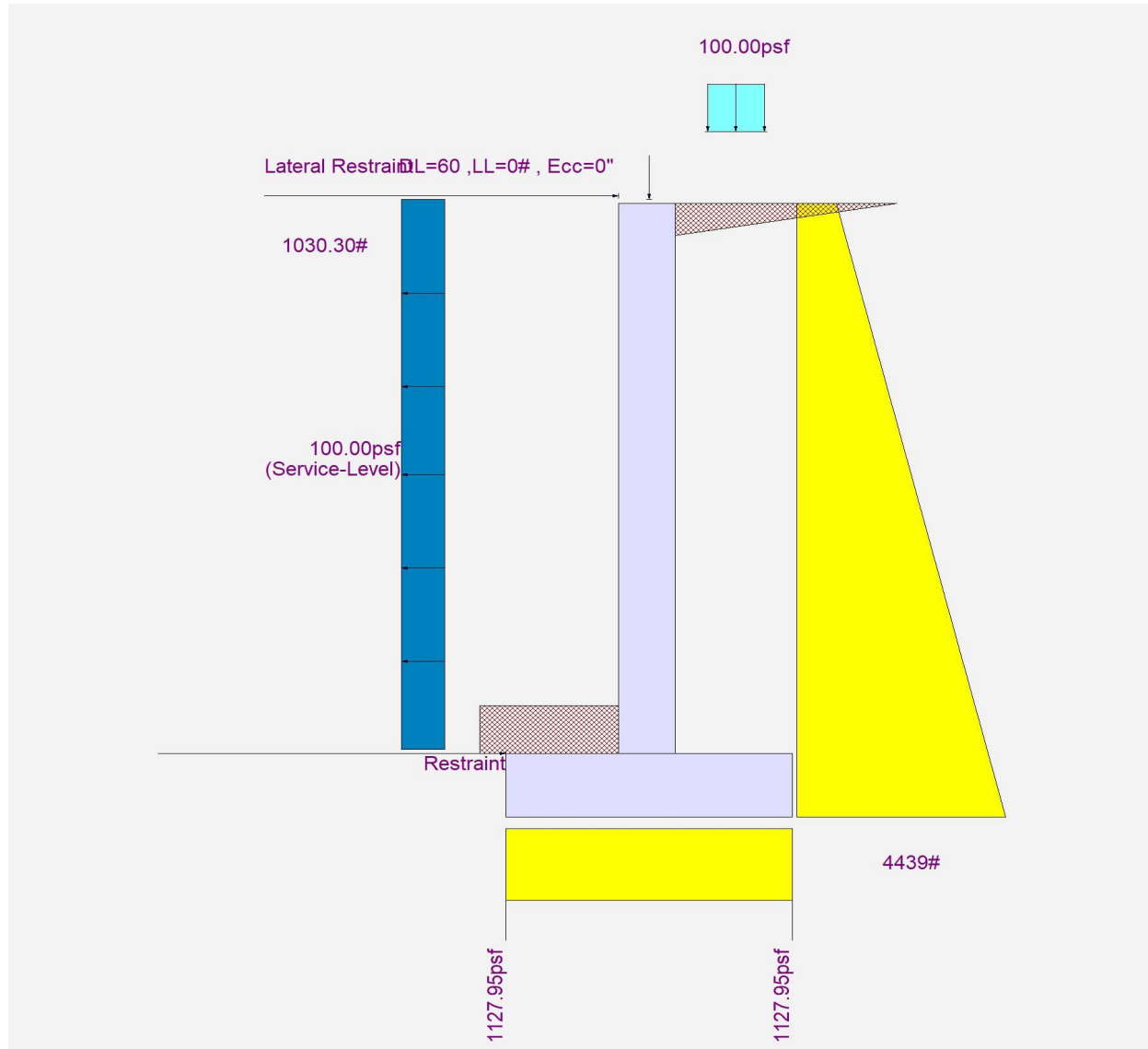
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LIC# : KW-06014847, Build:20.24.10.30

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DESCRIPTION: Basement Wall - Restrained 12', SOG





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Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Basement Wall - Restrained 12', SOG (EQ)

Code References

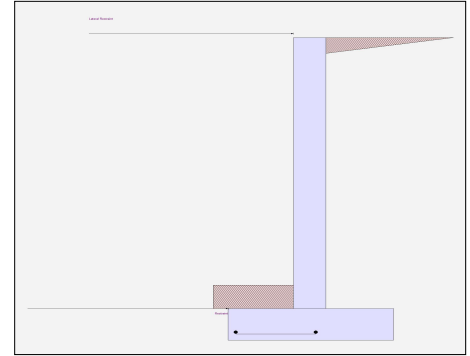
Calculations per IBC 2021, ACI 318-14

Criteria

Retained Height	=	11.50 ft
Wall height above soil	=	ft
Total Wall Height	=	11.50 ft
Top Support Height	=	11.50 ft
Slope Behind Wall	=	0
Height of Soil over Toe	=	12.0 in

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
At-Rest Heel Pressure	=	35.0 psf/ft
	=	0.0 psf/ft
Passive Pressure	=	350.0 psf/ft
Soil Density	=	110 pcf
Footing Soil Friction	=	0.4 psf
Soil height to ignore for passive pressure	=	12 in



Surcharge Loads

Surcharge Over Heel	=	100.0 psf
>>>Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	60.0 lbs
Axial Live Load	=	lbs
Axial Load Eccentricity	=	in

Earth Pressure Seismic Load

Uniform Lateral Load Applied to Stem

Lateral Load	=	100.0 #/ft
...Height to Top	=	11.50 ft
...Height to Bottom	=	ft
Load Type	=	Earth (H)
		(Service Level)
Wind on Exposed Stem	=	0.00 psf
		(Strength Level)
Wind acts left-to-right toward retention side.		
K_h Soil Density Multiplier	=	0.07273 g

Adjacent Footing Load

Adjacent Footing Load	=	lbs
Footing Width	=	ft
Eccentricity	=	in
Wall to Ftg CL Dist	=	ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	ft
Poisson's Ratio	=	0.3
Added seismic per unit area	=	71.869 psf

Design Summary

Total Bearing Load	=	6,203.75 lbs
...resultant ecc.	=	0.0 in
Soil Pressure @ Toe	=	1,127.96 psf OK
Soil Pressure @ Heel	=	1,127.96 psf OK
Allowable	=	psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,353.55 psf
ACI Factored @ Heel	=	1,353.55 psf
Footing Shear @ Toe	=	7.834 psi OK
Footing Shear @ Heel	=	-7.560 psi OK
Allowable	=	82.158 psi
Reaction at Top	=	1,336.91 lbs
Reaction at Bottom	=	3,925.71 lbs

Sliding Calcs	
Lateral Sliding Force	= 3,925.71 lbs

Concrete Stem Construction

Thickness	=	12.00 in
Fy	=	60000 psi
Wall Weight	=	150.0 psf
f'c	=	4,000.0 psi
Stem is FIXED to top of footing		

	@ Top Support	Mmax Between Top & Base	@ Base of Wall
	Stem OK	Stem OK	Stem OK
Design Height Above Ftg	= 11.50 ft	6.789 ft	0.00 ft
Rebar Size	= # 6	# 6	# 6
Rebar Spacing	= 12.00 in	12.00 in	12.00 in
Rebar Placed at	= Edge	Edge	Edge
Rebar Depth 'd'	= 9.625 in	10.125 in	9.625 in
Design Data			
fb/FB + fa/Fa	=	0.257	0.554
Mu.....Actual	= 0.0 ft-#	4,982.25 ft-#	10,200.7 ft-#
Mn * Phi.....Allowable	= 18,415.0 ft-#	19,405.0 ft-#	18,415.0 ft-#
Shear Force @ this height	= 1,928.29 lbs		4,928.77 lbs
Shear.....Actual	= 16.695 psi		42.673 psi
Shear.....Allowable	= 59.266 psi		59.266 psi

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Basement Wall - Restrained 12', SOG (EQ)

Footing Strengths & Dimensions

Toe Width	=	2.25 ft
Heel Width	=	3.25
Total Footing Width	=	5.50
Footing Thickness	=	16.0 in

$f'c$ = 3,000 psi F_y = 60000 psi
Footing Concrete Density = 150 pcf
Min. As % = 0.0018
Cover @ Top = 2 in @ Btm. = 3 in

Footing Design Results

	Toe	Heel	
Factored Pressure	= 1,353.55	1,353.55	psf
μ_u : Upward	= 3,426.16		ft-#
μ_u : Downward	= 941.63		ft-#
μ_u : Design	= 2,485	1,429	ft-#
Actual 1-Way Shear	= 7.834	-7.560	psi
Allow 1-Way Shear	= 43.818	43.818	psi

Other Acceptable Sizes & Spacings:

Toe: # 7 @ 18.00 in -or- $\phi M_n = \phi * 5 * \lambda * \sqrt{f'c} * S_m$
Heel: None Spec'd -or- $\phi M_n = \phi * 5 * \lambda * \sqrt{f'c} * S_m$

Min footing T&S reinf Area 1.90 in²
Min footing T&S reinf Area per foot 0.35 in² /ft
If one layer of horizontal bars: If two layers of horizontal bars:
#4@ 6.94 in #4@ 13.89 in
#5@ 10.76 in #5@ 21.53 in
#6@ 15.28 in #6@ 30.56 in

Summary of Forces on Footing : Slab RESISTS sliding, stem is FIXED at footing

Forces acting on footing for soil pressure

>>> Sliding Forces are restrained by the adjacent slab

Load & Moment Summary For Footing : For Soil Pressure Calcs

Moment @ Top of Footing Applied from Stem	=	-6,916.0 ft-#
Surcharge Over Heel	= 225.0 lbs 4.375 ft	984.38 ft-#
Adjacent Footing Load	= 0.0 lbs 0.0 ft	0.0 ft-#
Axial Dead Load on Stem	= 60.0 lbs 2.750 ft	165.0 ft-#
Soil Over Toe	= 247.50 lbs 1.125 ft	278.438 ft-#
Surcharge Over Toe	= 0.0 lbs 0.0 ft	0.0 ft-#
Stem Weight	= 1,725.0 lbs 2.750 ft	4,743.75 ft-#
Soil Over Heel	= 2,846.25 lbs 4.375 ft	12,452.3 ft-#
Footing Weight	= 1,100.0 lbs 2.750 ft	3,025.0 ft-#
Total Vertical Force	= 6,203.75 lbs Base Moment =	14,732.9 ft-#

Stem is specified to be fixed to footing, and top restraint is assumed to react out any tendency for moment at the footing/soil interface, so uniform soil pressure is assumed.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.



AHBL, INC.
2215 N. 30th Street, Suite 300
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Project Title:
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Restrained Retaining Wall

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Basement Wall - Restrained 12', SOG (EQ)

Rebar Lap & Embedment Lengths Information

Restrained Retaining Wall

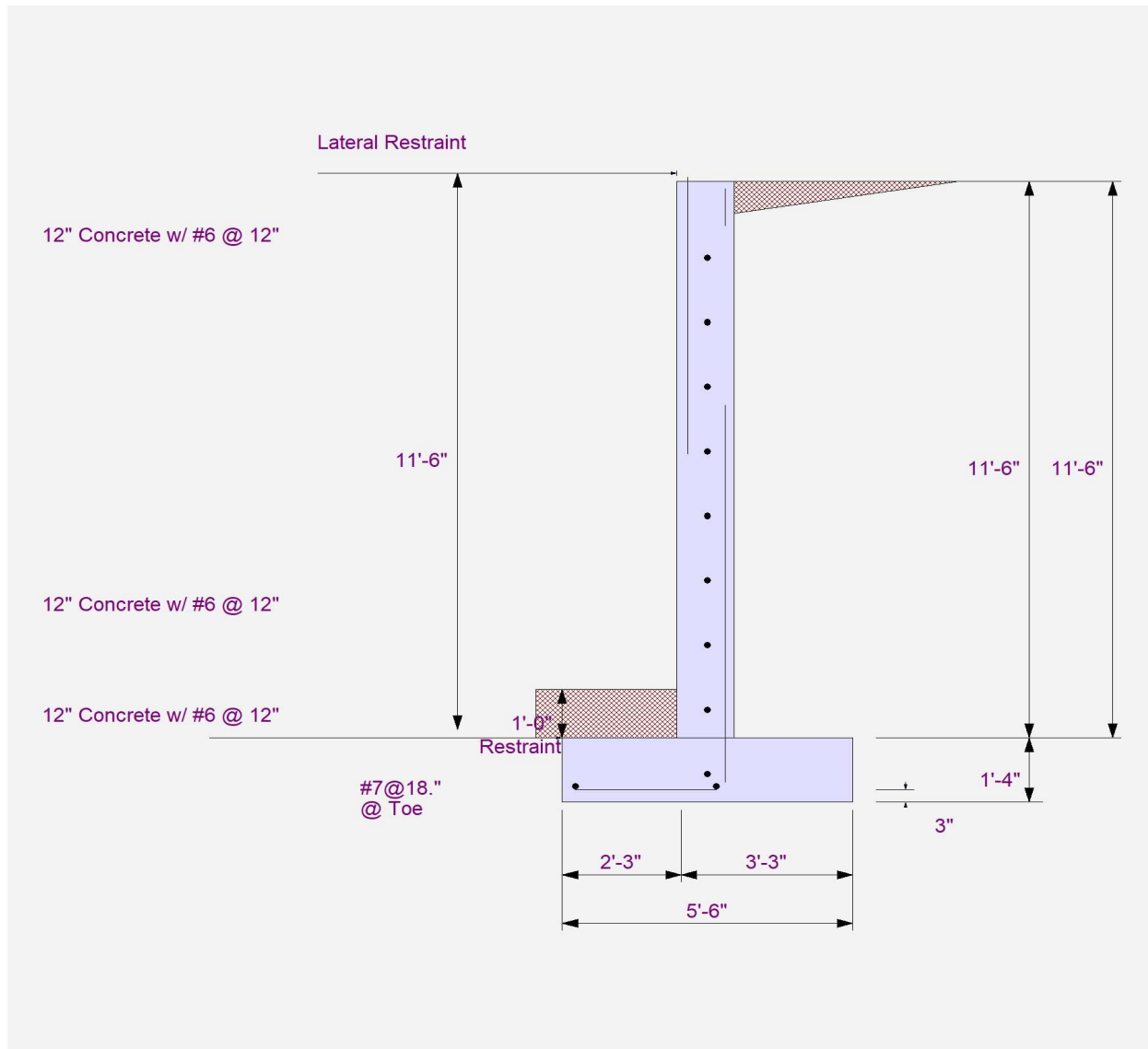
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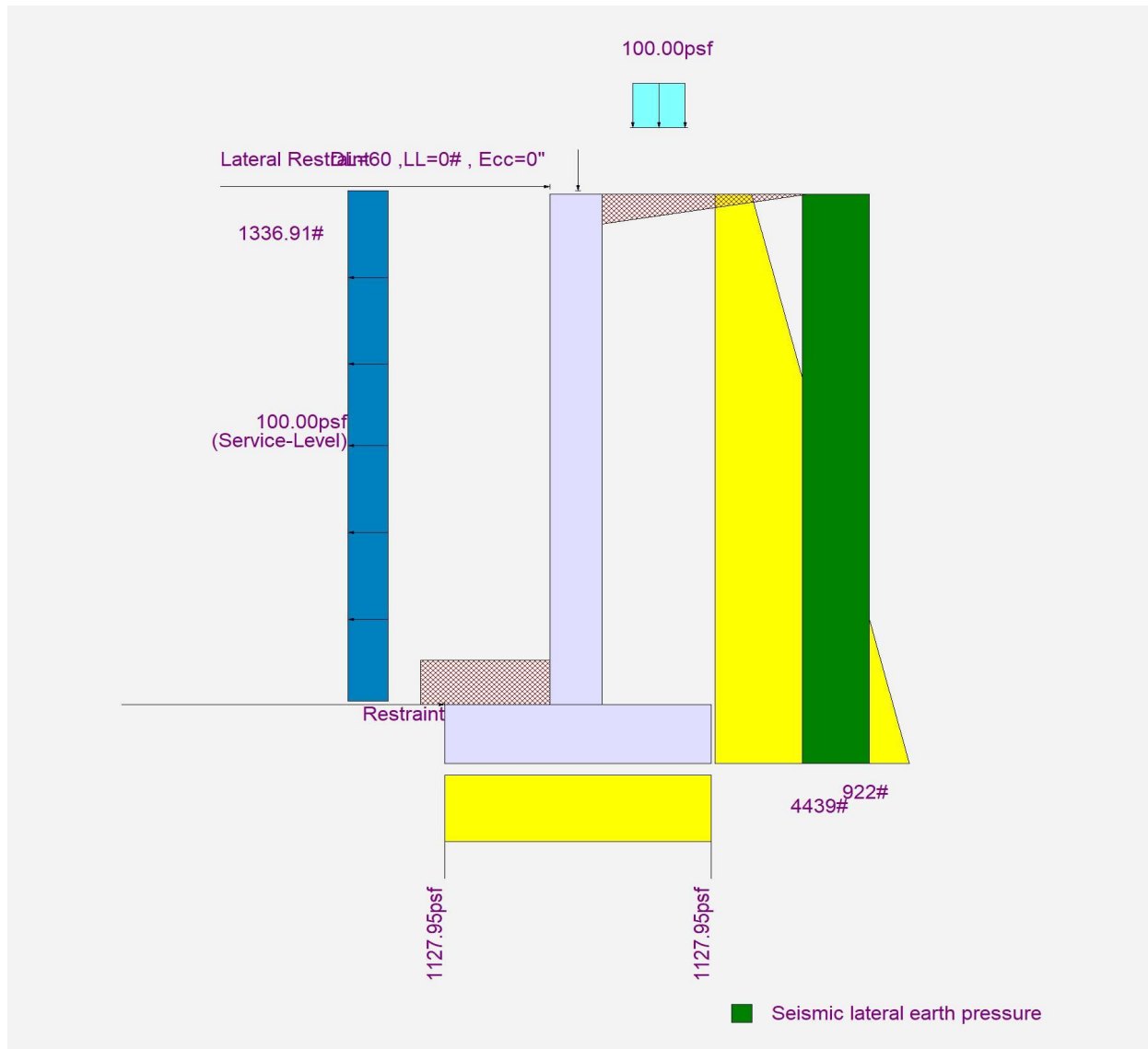
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DESCRIPTION: Basement Wall - Restrained 10', no SOG (EQ)

Code References

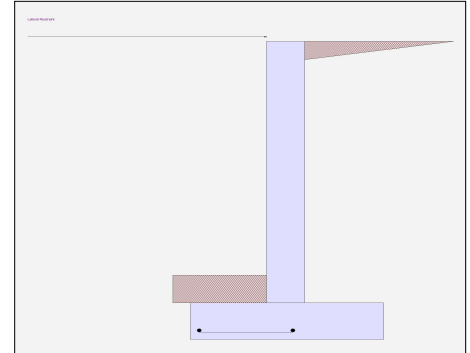
Calculations per IBC 2021, ACI 318-14

Criteria

Retained Height	=	9.50 ft
Wall height above soil	=	ft
Total Wall Height	=	9.50 ft
Top Support Height	=	9.5 ft
Slope Behind Wall	=	0
Height of Soil over Toe	=	12.0 in

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
At-Rest Heel Pressure	=	35.0 psf/ft
	=	0.0 psf/ft
Passive Pressure	=	525.0 psf/ft
Soil Density	=	110 pcf
Footing Soil Friction	=	0.5250 psf
Soil height to ignore for passive pressure	=	12 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
>>>Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	400.0 lbs
Axial Live Load	=	lbs
Axial Load Eccentricity	=	in

Earth Pressure Seismic Load

Uniform Lateral Load Applied to Stem

Lateral Load	=	100.0 #/ft
...Height to Top	=	11.50 ft
...Height to Bottom	=	ft
Load Type	=	Earth (H)
		(Service Level)
Wind on Exposed Stem	=	0.00 psf
		(Strength Level)
Wind acts left-to-right toward retention side.		
K_h Soil Density Multiplier	=	0.07273 g

Adjacent Footing Load

Adjacent Footing Load	=	lbs
Footing Width	=	ft
Eccentricity	=	in
Wall to Ftg CL Dist	=	ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	ft
Poisson's Ratio	=	0.3
Added seismic per unit area	=	60.669 psf

Design Summary

Total Bearing Load	=	5,523.75 lbs
...resultant ecc.	=	0.0 in
Soil Pressure @ Toe	=	1,004.32 psf OK
Soil Pressure @ Heel	=	1,004.32 psf OK
Allowable	=	psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,205.18 psf
ACI Factored @ Heel	=	1,205.18 psf
Footing Shear @ Toe	=	6.650 psi OK
Footing Shear @ Heel	=	-3.868 psi OK
Allowable	=	82.158 psi
Reaction at Top	=	1,162.81 lbs
Reaction at Bottom	=	2,654.03 lbs

Sliding Calcs	
Lateral Sliding Force	= 2,654.03 lbs

Concrete Stem Construction

Thickness	=	12.00 in
Fy	=	60000 psi
Wall Weight	=	150.0 psf
f'c	=	4,000.0 psi
Stem is FIXED to top of footing		

	@ Top Support	Mmax Between Top & Base	@ Base of Wall
	Stem OK	Stem OK	Stem OK
Design Height Above Ftg	= 9.5 ft	5.532 ft	0.00 ft
Rebar Size	= # 6	# 6	# 6
Rebar Spacing	= 12.00 in	12.00 in	12.00 in
Rebar Placed at	= Edge	Edge	Edge
Rebar Depth 'd'	= 9.625 in	10.125 in	9.625 in
Design Data			
fb/FB + fa/Fa	= 0.013	0.134	0.294
Mu.....Actual	= 240.0 ft-#	2,602.50 ft-#	5,412.43 ft-#
Mn * Phi.....Allowable	= 18,415.0 ft-#	19,405.0 ft-#	18,415.0 ft-#
Shear Force @ this height	= 1,284.13 lbs		3,210.82 lbs
Shear.....Actual	= 11.118 psi		27.799 psi
Shear.....Allowable	= 59.266 psi		59.266 psi

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Basement Wall - Restrained 10', no SOG (EQ)

Footing Strengths & Dimensions

Toe Width	=	2.25 ft
Heel Width	=	3.25
Total Footing Width	=	5.50
Footing Thickness	=	16.0 in

f'_c = 3,000 psi F_y = 60000 psi
Footing Concrete Density = 150 pcf
Min. As % = 0.0018
Cover @ Top = 2 in @ Btm. = 3 in

Footing Design Results

	Toe	Heel	
Factored Pressure	= 1,205.18	1,205.18	psf
M_u' : Upward	= 3,050.62		ft-#
M_u' : Downward	= 941.63		ft-#
M_u : Design	= 2,109	731	ft-#
Actual 1-Way Shear	= 6.650	-3.868	psi
Allow 1-Way Shear	= 43.818	43.818	psi

Other Acceptable Sizes & Spacings:

Toe: # 7 @ 18.00 in -or- $\phi M_n = \phi * 5 * \lambda * \sqrt{f'_c} * S_m$
Heel: None Spec'd -or- $\phi M_n = \phi * 5 * \lambda * \sqrt{f'_c} * S_m$

Min footing T&S reinf Area 1.90 in²
Min footing T&S reinf Area per foot 0.35 in² /ft
If one layer of horizontal bars: If two layers of horizontal bars:
#4@ 6.94 in #4@ 13.89 in
#5@ 10.76 in #5@ 21.53 in
#6@ 15.28 in #6@ 30.56 in

Summary of Forces on Footing : Slab is NOT providing sliding, stem is FIXED at footing

Forces acting on footing for sliding & soil pressure....

Sliding Forces

Stem Shear @ Top of Footing	=	2,179.58 lbs
Heel Active Pressure	=	474.444
Sliding Force	=	2,654.03 lbs

Stem is specified to be fixed to footing, and top restraint is assumed to react out any tendency for moment at the footing/soil interface, so uniform soil pressure is assumed.

Load & Moment Summary For Footing : For Soil Pressure Calcs

Moment @ Top of Footing Applied from Stem	=	-3,693.13ft-#
Surcharge Over Heel	0.0	0.0
Adjacent Footing Load	= 0.0 lbs	0.0ft
Axial Dead Load on Stem	= 400.0 lbs	2.750 ft
Soil Over Toe	= 247.50 lbs	1.125 ft
Surcharge Over Toe	= 0.0 lbs	0.0ft
Stem Weight	= 1,425.0 lbs	2.750 ft
Soil Over Heel	= 2,351.25 lbs	4.375 ft
Footing Weight	= 1,100.0 lbs	2.750 ft
Total Vertical Force	= 5,523.75 lbs	Base Moment = 14,915.8ft-#

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.



AHBL, INC.
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Tacoma, WA 98403

Project Title:
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Project Descr:

Restrained Retaining Wall

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LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Basement Wall - Restrained 10', no SOG (EQ)

Rebar Lap & Embedment Lengths Information

Restrained Retaining Wall

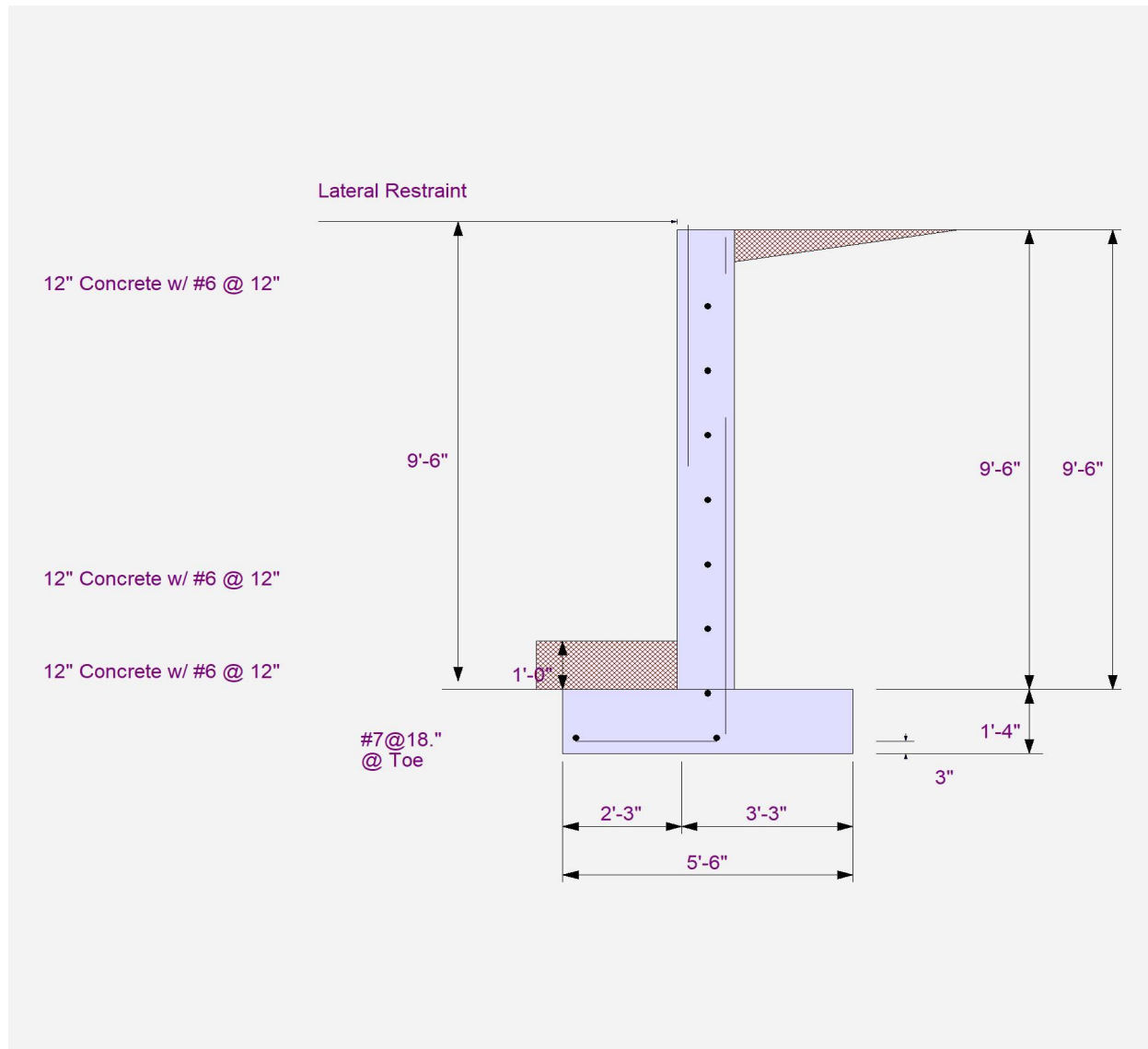
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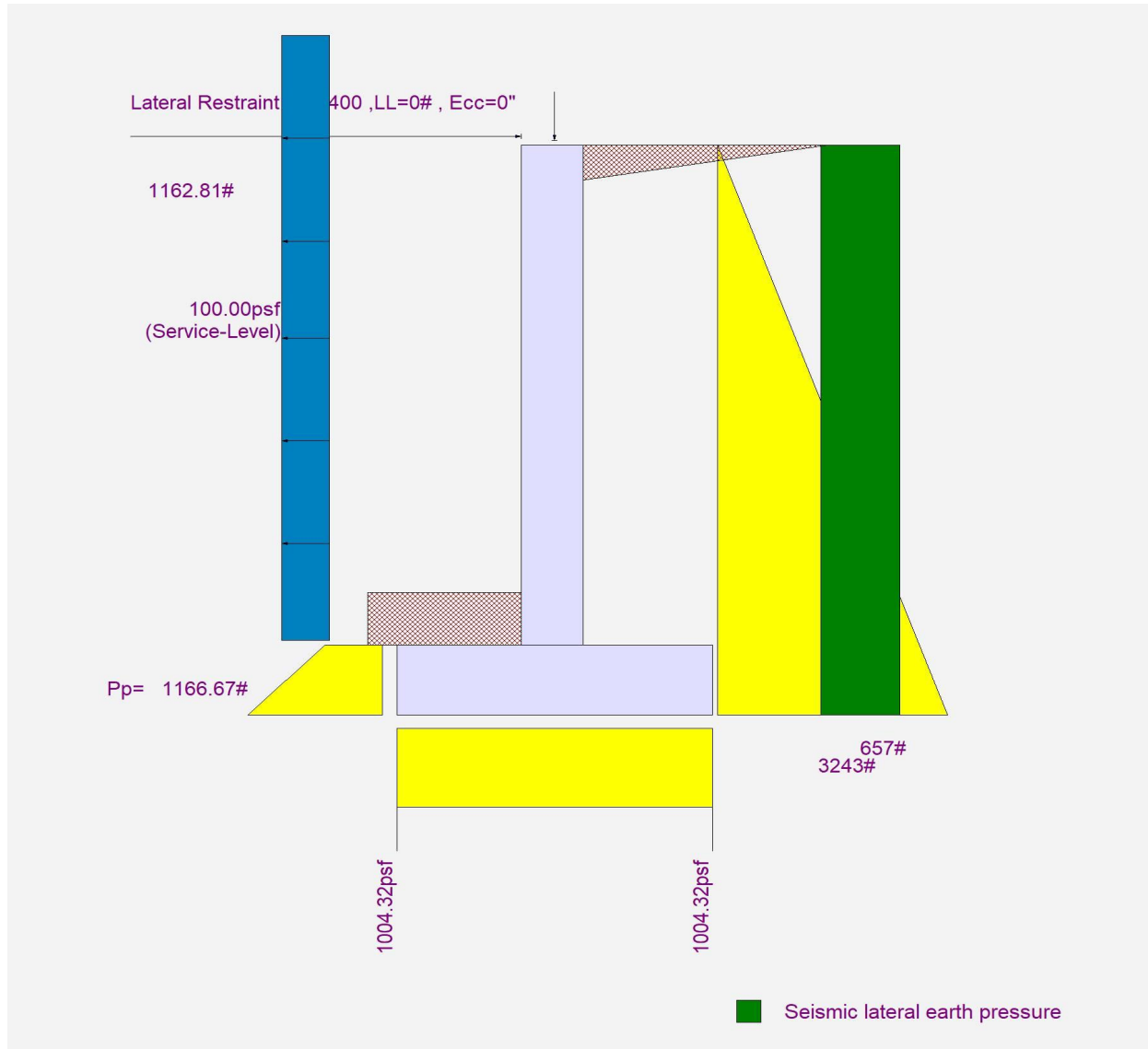
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DESCRIPTION: Basement Wall - Restrained 10', no SOG (EQ)





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LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Crawl Space Wall - Restrained 16', no SOG (EQ)

Code References

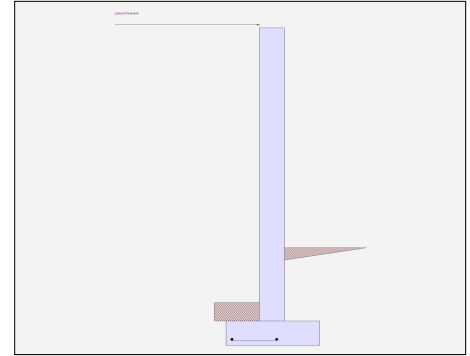
Calculations per IBC 2021, ACI 318-14

Criteria

Retained Height	=	4.0 ft
Wall height above soil	=	12.0 ft
Total Wall Height	=	16.0 ft
Top Support Height	=	16.0 ft
Slope Behind Wall	=	0
Height of Soil over Toe	=	12.0 in

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
At-Rest Heel Pressure	=	35.0 psf/ft
	=	0.0 psf/ft
Passive Pressure	=	525.0 psf/ft
Soil Density	=	110 pcf
Footing Soil Friction	=	0.5250 psf
Soil height to ignore for passive pressure	=	12 in



Surcharge Loads

Surcharge Over Heel	=	psf
>>>Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	400.0 lbs
Axial Live Load	=	lbs
Axial Load Eccentricity	=	in

Earth Pressure Seismic Load

Uniform Lateral Load Applied to Stem

Lateral Load	=	60.0 #/ft
...Height to Top	=	16.0 ft
...Height to Bottom	=	ft
Load Type	=	Seismic (E) (Strength Level)
Wind on Exposed Stem	=	0.00 psf (Strength Level)
Wind acts left-to-right toward retention side.		
K_h Soil Density Multiplier	=	0.07273 g

Adjacent Footing Load

Adjacent Footing Load	=	lbs
Footing Width	=	ft
Eccentricity	=	in
Wall to Ftg CL Dist	=	ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	ft
Poisson's Ratio	=	0.3
Added seismic per unit area	=	29.868 psf

Design Summary

Total Bearing Load	=	4,425.0 lbs
...resultant ecc.	=	0.0 in
Soil Pressure @ Toe	=	1,106.25 psf OK
Soil Pressure @ Heel	=	1,106.25 psf OK
Allowable	=	psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,327.50 psf
ACI Factored @ Heel	=	1,327.50 psf
Footing Shear @ Toe	=	2.872 psi OK
Footing Shear @ Heel	=	4.996 psi OK
Allowable	=	82.158 psi
Reaction at Top	=	222.656 lbs
Reaction at Bottom	=	969.59 lbs

Sliding Calcs	
Lateral Sliding Force	= 969.59 lbs

Concrete Stem Construction

Thickness	=	12.00 in	F_y	=	60000 psi
Wall Weight	=	150.0 psf	f'_c	=	4,000.0 psi
Stem is FIXED to top of footing					

	@ Top Support	Mmax Between Top & Base	@ Base of Wall
	Stem OK	Stem OK	Stem OK
Design Height Above Ftg	= 16.0 ft	9.831 ft	0.00 ft
Rebar Size	= # 6	# 6	# 6
Rebar Spacing	= 12.00 in	12.00 in	12.00 in
Rebar Placed at	= Edge	Edge	Edge
Rebar Depth 'd'	= 9.625 in	10.125 in	9.625 in
Design Data			
$f_b/FB + f_a/Fa$	=	0.068	0.166
M_uActual	= 0.0 ft-#	1,321.71 ft-#	3,056.28 ft-#
$M_n * \Phi$Allowable	= 18,415.0 ft-#	19,405.0 ft-#	18,415.0 ft-#
Shear Force @ this height	= 448.276 lbs		1,327.02 lbs
Shear.....Actual	= 3.881 psi		11.489 psi
Shear.....Allowable	= 59.266 psi		59.266 psi

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000



AHBL, INC.
2215 N. 30th Street, Suite 300
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Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Crawl Space Wall - Restrained 16', no SOG (EQ)

Footing Strengths & Dimensions

Toe Width	=	1.5 ft
Heel Width	=	2.5
Total Footing Width	=	4.0
Footing Thickness	=	16.0 in

f'_c = 3,000 psi F_y = 60000 psi
Footing Concrete Density = 150 pcf
Min. As % = 0.0018
Cover @ Top = 2 in @ Btm. = 3 in

Footing Design Results

	Toe	Heel	
Factored Pressure	= 1,327.50	1,327.50	psf
M_u' : Upward	= 1,493.44		ft-#
M_u' : Downward	= 418.50		ft-#
M_u : Design	= 1,075	-629	ft-#
Actual 1-Way Shear	= 2.872	4.996	psi
Allow 1-Way Shear	= 43.818	43.818	psi

Other Acceptable Sizes & Spacings:

Toe: # 7 @ 18.00 in -or- $\phi M_n = \phi * 5 * \lambda * \sqrt{f'_c} * S_m$
Heel: None Spec'd -or- $\phi M_n = \phi * 5 * \lambda * \sqrt{f'_c} * S_m$

Min footing T&S reinf Area 1.38 in²
Min footing T&S reinf Area per foot 0.35 in² /ft
If one layer of horizontal bars: If two layers of horizontal bars:
#4@ 6.94 in #4@ 13.89 in
#5@ 10.76 in #5@ 21.53 in
#6@ 15.28 in #6@ 30.56 in

Summary of Forces on Footing : Slab is NOT providing sliding, stem is FIXED at footing

Forces acting on footing for sliding & soil pressure....

Sliding Forces

Stem Shear @ Top of Footing	=	751.82 lbs
Heel Active Pressure	=	217.778
Sliding Force	=	969.59 lbs

Stem is specified to be fixed to footing, and top restraint is assumed to react out any tendency for moment at the footing/soil interface, so uniform soil pressure is assumed.

Load & Moment Summary For Footing : For Soil Pressure Calcs

Moment @ Top of Footing Applied from Stem	=	-1,641.78ft-#
Surcharge Over Heel	0.0	0.0
Adjacent Footing Load	= 0.0 lbs	0.0ft-#
Axial Dead Load on Stem	= 400.0 lbs	800.0ft-#
Soil Over Toe	= 165.0 lbs	123.750ft-#
Surcharge Over Toe	= 0.0 lbs	0.0ft-#
Stem Weight	= 2,400.0 lbs	4,800.0ft-#
Soil Over Heel	= 660.0 lbs	2,145.0ft-#
Footing Weight	= 800.0 lbs	1,600.0ft-#
Total Vertical Force	= 4,425.0 lbs	Base Moment = 7,826.97ft-#

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Crawl Space Wall - Restrained 16', no SOG (EQ)

Rebar Lap & Embedment Lengths Information

Restrained Retaining Wall

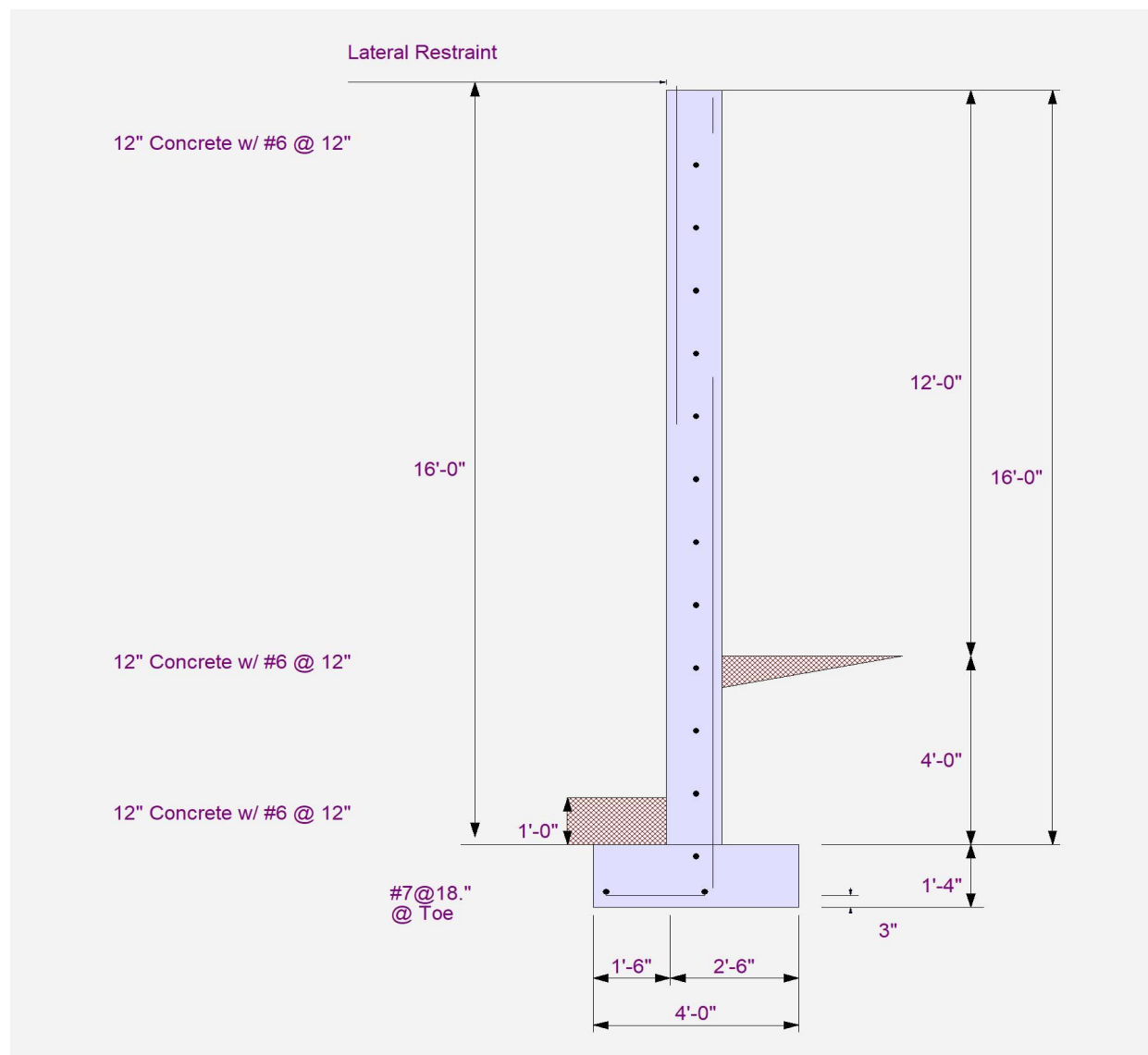
Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Crawl Space Wall - Restrained 16', no SOG (EQ)





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Restrained Retaining Wall

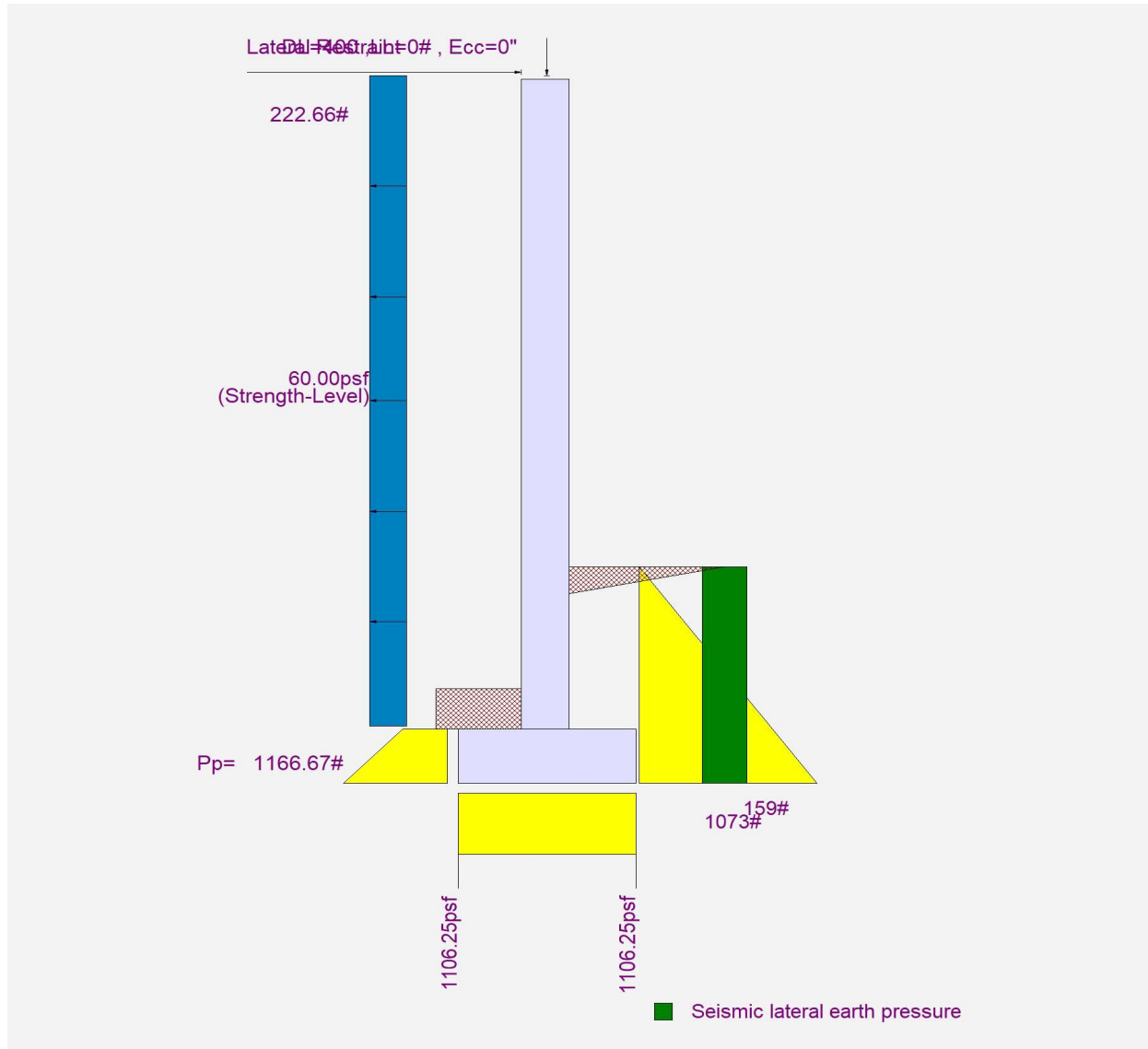
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(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Crawl Space Wall - Restrained 22', no SOG (EQ)

Code References

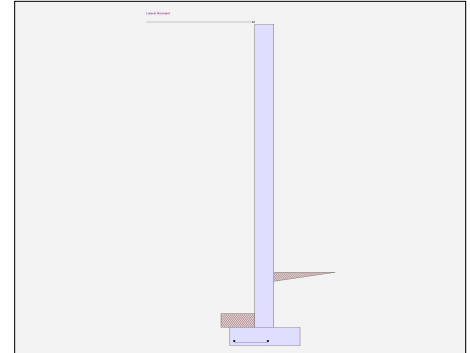
Calculations per IBC 2021, ACI 318-14

Criteria

Retained Height	=	4.0 ft
Wall height above soil	=	18.0 ft
Total Wall Height	=	22.0 ft
Top Support Height	=	22.0 ft
Slope Behind Wall	=	0
Height of Soil over Toe	=	12.0 in

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
At-Rest Heel Pressure	=	35.0 psf/ft
	=	0.0 psf/ft
Passive Pressure	=	525.0 psf/ft
Soil Density	=	110 pcf
Footing Soil Friction	=	0.5250 psf
Soil height to ignore for passive pressure	=	12 in



Surcharge Loads

Surcharge Over Heel	=	psf
>>>Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	400.0 lbs
Axial Live Load	=	lbs
Axial Load Eccentricity	=	in

Earth Pressure Seismic Load

Uniform Lateral Load Applied to Stem

Lateral Load	=	60.0 #/ft
...Height to Top	=	22.0 ft
...Height to Bottom	=	ft
Load Type	=	Seismic (E) (Strength Level)
Wind on Exposed Stem	=	0.00 psf (Strength Level)
Wind acts left-to-right toward retention side.		
K_h Soil Density Multiplier	=	0.07273 g

Adjacent Footing Load

Adjacent Footing Load	=	lbs
Footing Width	=	ft
Eccentricity	=	in
Wall to Ftg CL Dist	=	ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	ft
Poisson's Ratio	=	0.3
Added seismic per unit area	=	29.868 psf

Design Summary

Total Bearing Load	=	5,325.0 lbs
...resultant ecc.	=	0.0 in
Soil Pressure @ Toe	=	1,331.25 psf OK
Soil Pressure @ Heel	=	1,331.25 psf OK
Allowable	=	psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,597.50 psf
ACI Factored @ Heel	=	1,597.50 psf
Footing Shear @ Toe	=	3.684 psi OK
Footing Shear @ Heel	=	7.406 psi OK
Allowable	=	82.158 psi
Reaction at Top	=	300.115 lbs
Reaction at Bottom	=	1,108.13 lbs

Sliding Calcs	
Lateral Sliding Force	= 1,108.13 lbs

Concrete Stem Construction

Thickness	=	12.00 in	F_y	=	60000 psi
Wall Weight	=	150.0 psf	f'_c	=	4,000.0 psi
Stem is FIXED to top of footing					

	@ Top Support	Mmax Between Top & Base	@ Base of Wall
	Stem OK	Stem OK	Stem OK
Design Height Above Ftg	= 22.0 ft	13.695 ft	0.00 ft
Rebar Size	= # 6	# 6	# 6
Rebar Spacing	= 12.00 in	12.00 in	12.00 in
Rebar Placed at	= Edge	Edge	Edge
Rebar Depth 'd'	= 9.625 in	10.125 in	9.625 in
Design Data			
$f_b/FB + f_a/Fa$	=	0.125	0.280
μ_uActual	=	0.0 ft-#	2,415.96 ft-#
$M_n * \Phi$Allowable	=	18,415.0 ft-#	19,405.0 ft-#
Shear Force @ this height	=	606.62 lbs	1,602.41 lbs
Shear.....Actual	=	5.252 psi	13.874 psi
Shear.....Allowable	=	59.266 psi	59.266 psi

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000



AHBL, INC.
2215 N. 30th Street, Suite 300
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Project Title:
Engineer:
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Project Descr:

Restrained Retaining Wall

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Crawl Space Wall - Restrained 22', no SOG (EQ)

Footing Strengths & Dimensions

Toe Width	=	1.5 ft
Heel Width	=	2.5
Total Footing Width	=	4.0
Footing Thickness	=	16.0 in

f'c =	3,000 psi	Fy =	60000 psi
Footing Concrete Density	=	150 pcf	
Min. As %	=	0.0018	
Cover @ Top	=	2 in	@ Btm.= 3 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	1,597.50	1,597.50	psf
Mu' : Upward	=	1,797.19		ft-#
Mu' : Downward	=	418.50		ft-#
Mu: Design	=	1,379	-933	ft-#
Actual 1-Way Shear	=	3.684	7.406	psi
Allow 1-Way Shear	=	43.818	43.818	psi

Other Acceptable Sizes & Spacings:

Toe: # 7 @ 18.00 in	-or-	$\phi Mn = \phi * 5 * \lambda * \sqrt{f'c} * S_m$
Heel: None Spec'd	-or-	$\phi Mn = \phi * 5 * \lambda * \sqrt{f'c} * S_m$

Min footing T&S reinf Area	1.38	in2
Min footing T&S reinf Area per foot	0.35	in2 /ft
If one layer of horizontal bars:	If two layers of horizontal bars:	
#4@ 6.94 in	#4@	13.89 in
#5@ 10.76 in	#5@	21.53 in
#6@ 15.28 in	#6@	30.56 in

Summary of Forces on Footing : Slab is NOT providing sliding, stem is FIXED at footing

Forces acting on footing for sliding & soil pressure....

Sliding Forces

Stem Shear @ Top of Footing	=	890.36 lbs
Heel Active Pressure	=	217.778
Sliding Force	=	1,108.13 lbs

Stem is specified to be fixed to footing, and top restraint is assumed to react out any tendency for moment at the footing/soil interface, so uniform soil pressure is assumed.

Load & Moment Summary For Footing : For Soil Pressure Calcs

Moment @ Top of Footing Applied from Stem	=	-2,699.75ft-#
Surcharge Over Heel	0.0	0.0
Adjacent Footing Load	=	0.0 lbs
Axial Dead Load on Stem	=	400.0 lbs
Soil Over Toe	=	165.0 lbs
Surcharge Over Toe	=	0.0 lbs
Stem Weight	=	3,300.0 lbs
Soil Over Heel	=	660.0 lbs
Footing Weight	=	800.0 lbs
Total Vertical Force	=	5,325.0 lbs
Base Moment	=	8,569.0ft-#

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.



AHBL, INC.
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Tacoma, WA 98403

Project Title:
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Project ID:
Project Descr:

Restrained Retaining Wall

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Crawl Space Wall - Restrained 22', no SOG (EQ)

Rebar Lap & Embedment Lengths Information



AHBL, INC.
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Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

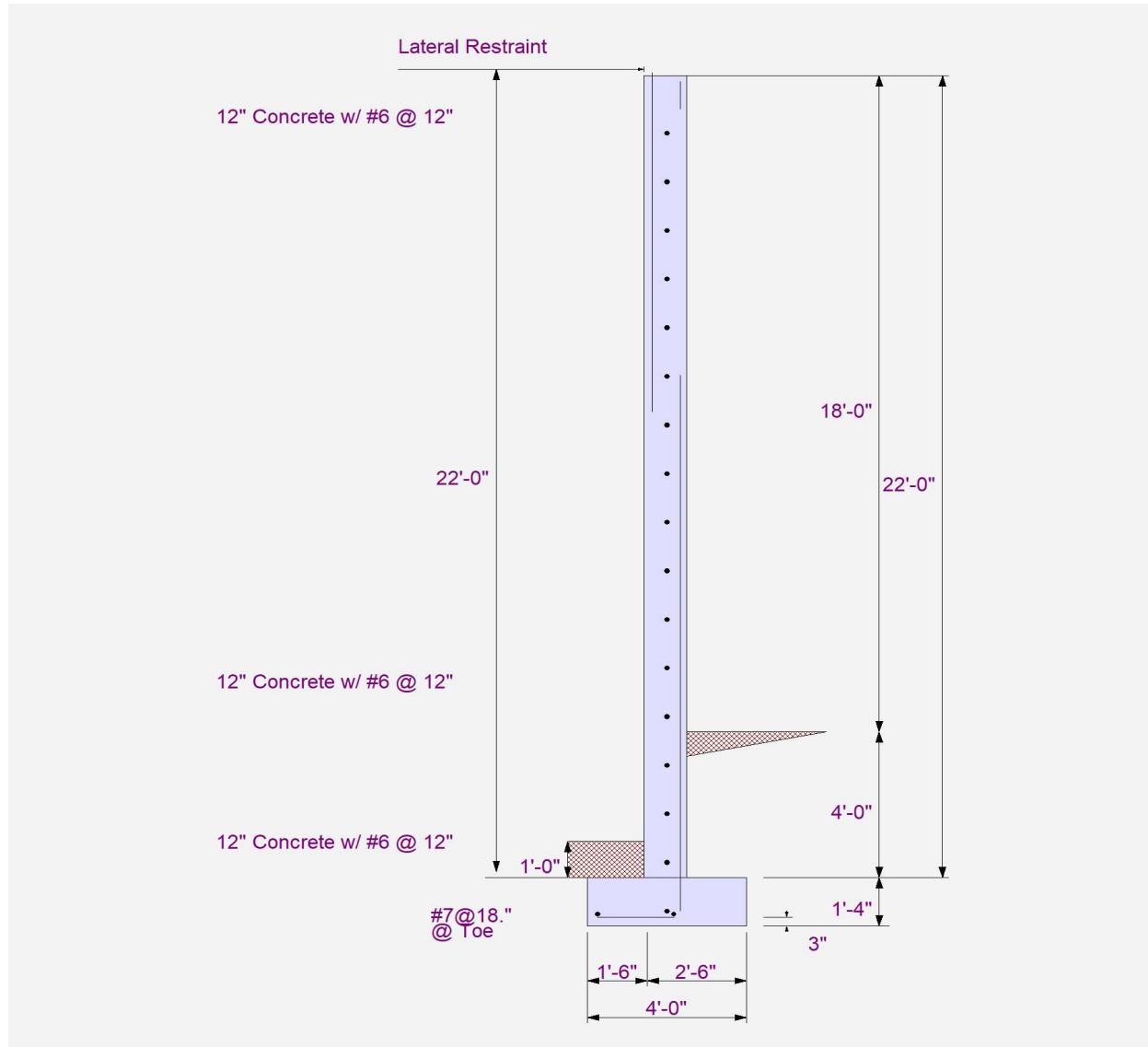
Project File: 2220236_care center redesign.ec6

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Restrained Retaining Wall

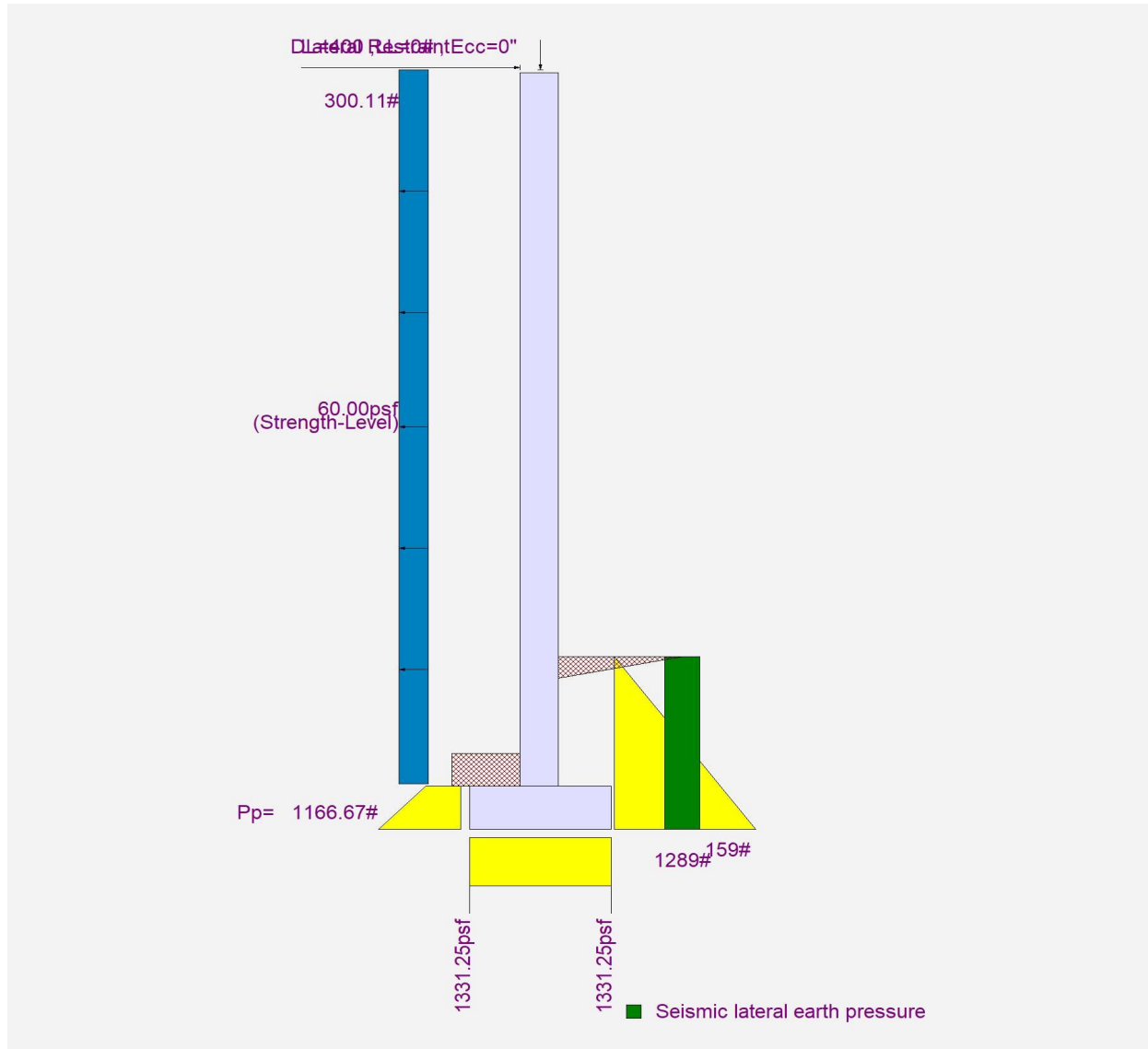
Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Crawl Space Wall - Restrained 22', no SOG (EQ)



3.0 - ROOF AND FLOOR FRAMING DESIGN



AHBL, INC.
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Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typ Crawl Space Beam

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : DF/DF

Wood Grade : 24F-V4

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

Fb + 2,400.0 psi

Fb - 1,850.0 psi

Fc - Prll 1,650.0 psi

Fc - Perp 650.0 psi

Fv 265.0 psi

Ft 1,100.0 psi

E : Modulus of Elasticity

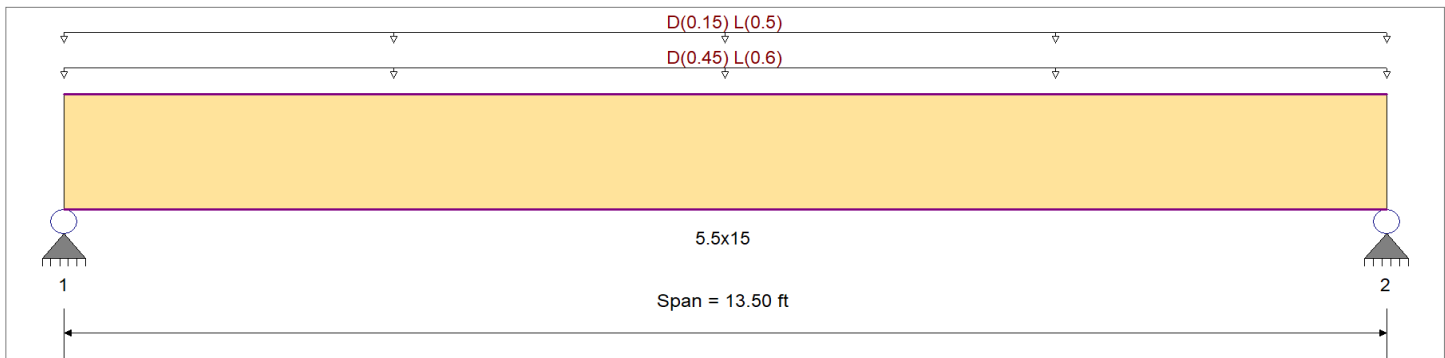
Ebend- xx 1,800.0 ksi

Eminbend - xx 950.0 ksi

Ebend- yy 1,600.0 ksi

Eminbend - yy 850.0 ksi

Density 31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 15.0 ft

Uniform Load : D = 0.030, L = 0.10 ksf, Tributary Width = 5.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.949	1	Maximum Shear Stress Ratio	=	0.650	1
Section used for this span		5.5x15		Section used for this span		5.5x15	
fb: Actual	=	2,276.97 psi		fv: Actual	=	172.36 psi	
F'b	=	2,400.00 psi		F'v	=	265.00 psi	
Load Combination				Load Combination			
			+D+L				+D+L
Location of maximum on span	=	6.750 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	0.297 in	Ratio =	545 >= 360	Span: 1 : L Only			
Max Upward Transient Deflection	0 in	Ratio =	0 < 360	n/a			
Max Downward Total Deflection	0.464 in	Ratio =	349 >= 180	Span: 1 : +D+L			
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	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only														0.0			
Length = 13.451 ft	1	0.379	0.260	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	14.08	819.0	2,160.0	3.41	62.0	238.5
Length = 0.04927 ft	1	0.006	0.260	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.20	11.9	2,160.0	3.41	62.0	238.5
+D+L														0.0			
Length = 13.451 ft	1	0.949	0.650	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	39.14	2,277.0	2,400.0	9.48	172.4	265.0
Length = 0.04927 ft	1	0.014	0.650	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.57	33.1	2,400.0	9.48	172.4	265.0
+D+0.750L														0.0			
Length = 13.451 ft	1	0.637	0.437	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	32.87	1,912.5	3,000.0	7.96	144.8	331.3



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typ Crawl Space Beam

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F ^b	V	f _v	F ^v
Length = 0.04927 ft	1		0.009	0.437	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.48	27.8	3,000.0	7.96	144.8	331.3
+0.60D						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.451 ft	1		0.128	0.088	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	8.45	491.4	3,840.0	2.05	37.2	424.0
Length = 0.04927 ft	1		0.002	0.088	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.12	7.1	3,840.0	2.05	37.2	424.0

Overall Maximum Deflections

Span	Load Combination	Max. "." Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.4638	6.799		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	11.596	11.596
Max Upward from Load Combinations	11.596	11.596
Max Upward from Load Cases	7.425	7.425
D Only	4.171	4.171
+D+L	11.596	11.596
+D+0.750L	9.739	9.739
+0.60D	2.502	2.502
L Only	7.425	7.425



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Wood Beam

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LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typ Roof Beam

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combination Set : IBC 2021

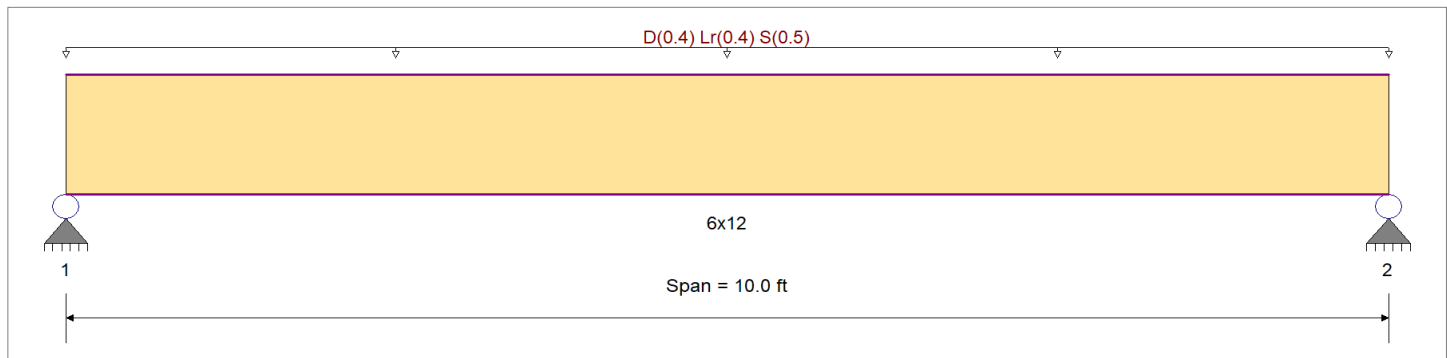
Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1350 psi	E : Modulus of Elasticity	
Fb -	1350 psi	Ebend- xx	1600ksi
Fc - Prll	925 psi	Eminbend - xx	580ksi
Fc - Perp	625 psi		
Fv	170 psi		
Ft	675 psi	Density	31.21pcf



Applied Loads

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

Beam self weight calculated and added to loading

Uniform Load : D = 0.020, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 20.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.728 1	Maximum Shear Stress Ratio	=	0.449 : 1
Section used for this span		6x12	Section used for this span		6x12
fb: Actual	=	1,130.56psi	fv: Actual	=	87.78 psi
F'b	=	1,552.50psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	5.000ft	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	0.101 in	Ratio = 1182 >=360	Span: 1 : S Only		n/a
Max Upward Transient Deflection	0 in	Ratio = 0 <360			
Max Downward Total Deflection	0.185 in	Ratio = 647 >=180	Span: 1 : +D+S		n/a
Max Upward Total Deflection	0 in	Ratio = 0 <180			

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.421	0.260	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.17	511.9	1,215.0	1.68	39.7	153.0
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.597	0.368	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	10.17	1,006.8	1,687.5	3.30	78.2	212.5
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.728	0.449	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.42	1,130.6	1,552.5	3.70	87.8	195.5
+D+0.750Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.523	0.323	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	8.92	883.1	1,687.5	2.89	68.6	212.5
+D+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typ Roof Beam

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
Length = 10.0 ft		1	0.629	0.388	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	9.86	975.9	1,552.5	3.20	75.8	195.5
+0.60D							1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft		1	0.142	0.088	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.10	307.1	2,160.0	1.01	23.8	272.0

Overall Maximum Deflections

Span	Load Combination	Max. "." Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+S	0.1854	5.036		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	4.569	4.569
Max Upward from Load Combinations	4.569	4.569
Max Upward from Load Cases	2.500	2.500
D Only	2.069	2.069
+D+Lr	4.069	4.069
+D+S	4.569	4.569
+D+0.750Lr	3.569	3.569
+D+0.750S	3.944	3.944
+0.60D	1.241	1.241
Lr Only	2.000	2.000
S Only	2.500	2.500



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Floor Joist - Public

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

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

Fb + 900 psi

Fb - 900 psi

Fc - Prll 1350 psi

Fc - Perp 625 psi

Fv 180 psi

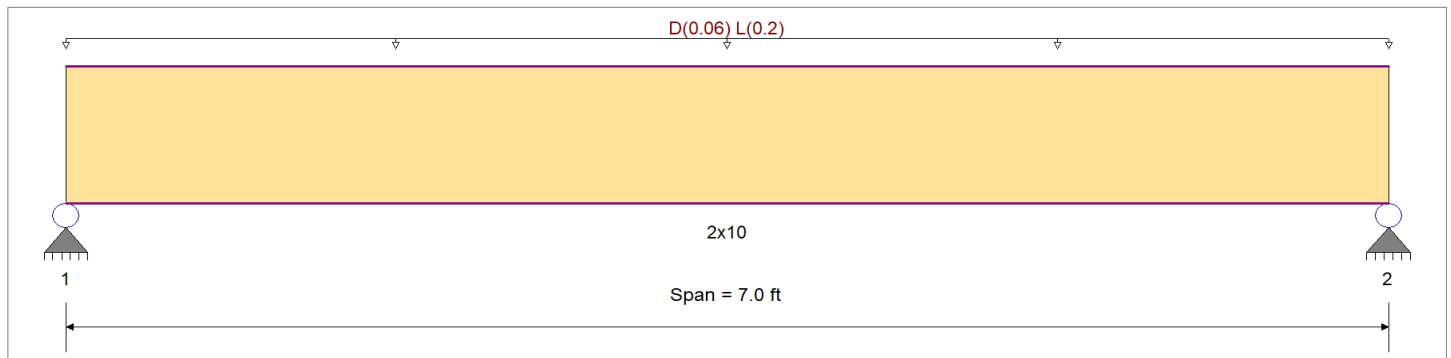
Ft 575 psi

E : Modulus of Elasticity

Ebend- xx 1600ksi

Eminbend - xx 580ksi

Density 31.21 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.030, L = 0.10 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.902 1	Maximum Shear Stress Ratio	=	0.427 : 1
Section used for this span		2x10	Section used for this span		2x10
fb: Actual	=	893.38psi	fv: Actual	=	76.84 psi
F'b	=	990.00psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.500ft	Location of maximum on span	=	6.234 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.069 in	Ratio = 1223 >=360	Span: 1 : L Only		n/a
Max Upward Transient Deflection	0 in	Ratio = 0 <360			
Max Downward Total Deflection	0.089 in	Ratio = 941 >=180	Span: 1 : +D+L		n/a
Max Upward Total Deflection	0 in	Ratio = 0 <180			

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 7.0 ft	1	0.231	0.109	0.90	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.37	206.2	891.0	0.16	17.7	162.0
+D+L														0.0	0.00	0.0	0.0
Length = 7.0 ft	1	0.902	0.427	1.00	1.00	1.00	1.00	1.100	1.00	1.00	1.00	1.59	893.4	990.0	0.71	76.8	180.0
+D+0.750L														0.0	0.00	0.0	0.0
Length = 7.0 ft	1	0.583	0.276	1.25	1.00	1.00	1.00	1.100	1.00	1.00	1.00	1.29	721.6	1,237.5	0.57	62.1	225.0
+0.60D														0.0	0.00	0.0	0.0
Length = 7.0 ft	1	0.078	0.037	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.22	123.7	1,584.0	0.10	10.6	288.0



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Floor Joist - Public

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.0893	3.526		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.910	0.910
Max Upward from Load Combinations	0.910	0.910
Max Upward from Load Cases	0.700	0.700
D Only	0.210	0.210
+D+L	0.910	0.910
+D+0.750L	0.735	0.735
+0.60D	0.126	0.126
L Only	0.700	0.700



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Floor Joist - Private

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

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

Fb + 900.0 psi

Fb - 900.0 psi

Fc - Prll 1,350.0 psi

Fc - Perp 625.0 psi

Fv 180.0 psi

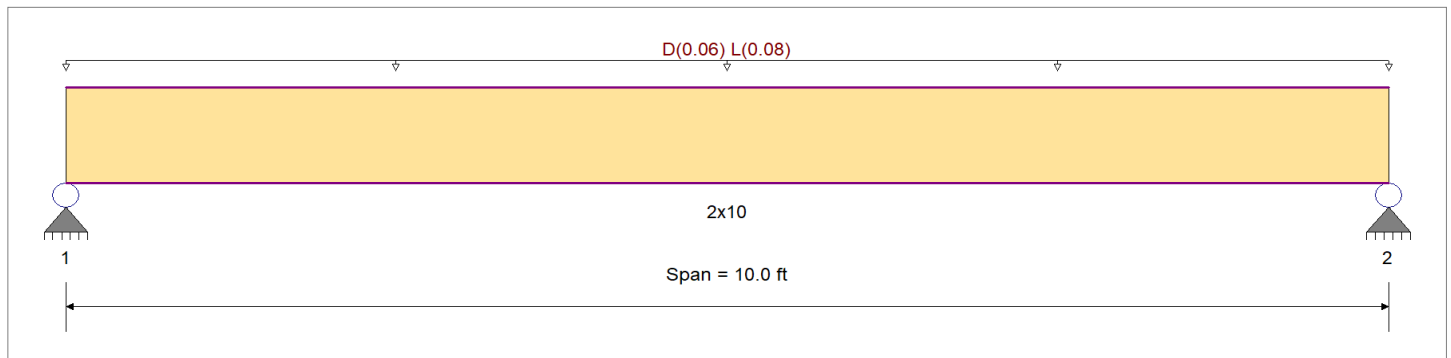
Ft 575.0 psi

E : Modulus of Elasticity

Ebend- xx 1,600.0ksi

Eminbend - xx 580.0ksi

Density 31.210pcf



Applied Loads

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

Beam self weight NOT internally calculated and added

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

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.992	1	Maximum Shear Stress Ratio	=	0.356	: 1
Section used for this span		2x10		Section used for this span		2x10	
fb: Actual	=	981.74psi		fv: Actual	=	64.08 psi	
F'b	=	990.00psi		F'v	=	180.00 psi	
Load Combination				Load Combination			
			+D+L				+D+L
Location of maximum on span	=	5.000ft		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	0.114 in	Ratio =	1049 >=360	Span: 1 : L Only			
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a			
Max Downward Total Deflection	0.200 in	Ratio =	599 >=180	Span: 1 : +D+L			
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	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.472	0.170	0.90	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.75	420.7	891.0	0.25	27.5	162.0
+D+L														0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.992	0.356	1.00	1.00	1.00	1.00	1.100	1.00	1.00	1.00	1.75	981.7	990.0	0.59	64.1	180.0
+D+0.750L														0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.680	0.244	1.25	1.00	1.00	1.00	1.100	1.00	1.00	1.00	1.50	841.5	1,237.5	0.51	54.9	225.0
+0.60D														0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.159	0.057	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.45	252.4	1,584.0	0.15	16.5	288.0



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Floor Joist - Private

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.2002	5.036		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.700	0.700
Max Upward from Load Combinations	0.700	0.700
Max Upward from Load Cases	0.400	0.400
D Only	0.300	0.300
+D+L	0.700	0.700
+D+0.750L	0.600	0.600
+0.60D	0.180	0.180
L Only	0.400	0.400



AHBL, INC.
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Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Exterior Beam at Unit 1039

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : iLevel Truss Joist

Wood Grade : MicroLam LVL 2.0 E

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

Fb + 2600 psi

Fb - 2600 psi

Fc - Prll 2510 psi

Fc - Perp 750 psi

Fv 285 psi

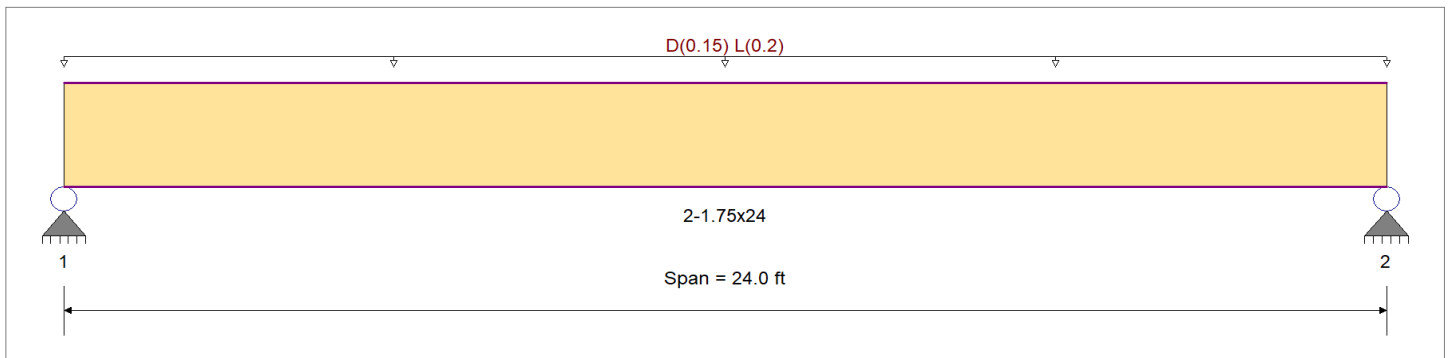
Ft 1555 psi

E : Modulus of Elasticity

Ebend- xx 2000 ksi

Eminbend - xx 1016.535 ksi

Density 42.01 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 5.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.380 : 1	Maximum Shear Stress Ratio	=	0.221 : 1
Section used for this span		2-1.75x24	Section used for this span		2-1.75x24
fb: Actual	=	900.00psi	fv: Actual	=	62.96 psi
F'b	=	2,366.10psi	F'v	=	285.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	12.000ft	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	0.186 in	Ratio = 1546 >=360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.326 in	Ratio = 883 >=180	Span: 1 : +D+L		
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	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.181	0.105	0.90	1.00	1.00	1.00	0.910	1.00	1.00	1.00	10.80	385.7	2,129.5	1.51	27.0	256.5
+D+L														0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.380	0.221	1.00	1.00	1.00	1.00	0.910	1.00	1.00	1.00	25.20	900.0	2,366.1	3.53	63.0	285.0
+D+0.750L														0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.261	0.151	1.25	1.00	1.00	1.00	0.910	1.00	1.00	1.00	21.60	771.4	2,957.6	3.02	54.0	356.3
+0.60D														0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.061	0.036	1.60	1.00	1.00	1.00	0.910	1.00	1.00	1.00	6.48	231.4	3,785.8	0.91	16.2	456.0



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Exterior Beam at Unit 1039

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.3259	12.088		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	4.200	4.200
Max Upward from Load Combinations	4.200	4.200
Max Upward from Load Cases	2.400	2.400
D Only	1.800	1.800
+D+L	4.200	4.200
+D+0.750L	3.600	3.600
+0.60D	1.080	1.080
L Only	2.400	2.400



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Cantilevered Beam at Unit 1039

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combination Set : IBC 2021

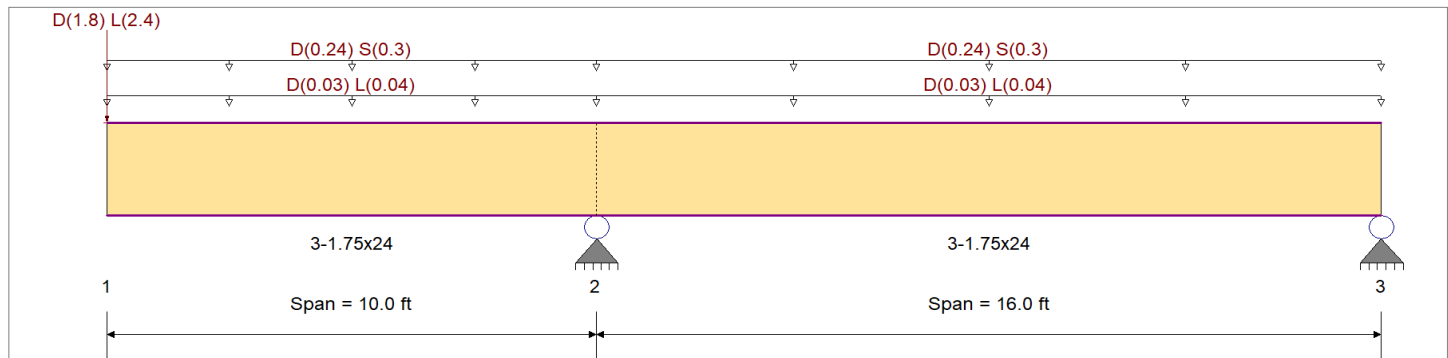
Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 2.0 E

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

Fb +	2600 psi	E : Modulus of Elasticity	
Fb -	2600 psi	Ebend- xx	2000 ksi
Fc - Prll	2510 psi	Eminbend - xx	1016.535 ksi
Fc - Perp	750 psi		
Fv	285 psi		
Ft	1555 psi	Density	42.01 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added

Load for Span Number 1

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 1.0 ft, (Floor)
Uniform Load : D = 0.020, S = 0.0250 ksf, Tributary Width = 12.0 ft, (Roof)
Point Load : D = 1.80, L = 2.40 k @ 0.0 ft, (Exterior Beam)

Load for Span Number 2

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 1.0 ft, (Floor)
Uniform Load : D = 0.020, S = 0.0250 ksf, Tributary Width = 12.0 ft, (Roof)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio			=	0.579 : 1			Maximum Shear Stress Ratio			=	0.284 : 1		
Section used for this span				3-1.75x24			Section used for this span				3-1.75x24		
fb: Actual			=	1,369.05psi			fv: Actual			=	93.14 psi		
F'b			=	2,366.10psi			F'v			=	327.75 psi		
Load Combination				+D+L			Load Combination				+D+0.750L+0.750S		
Location of maximum on span			=	10.000ft			Location of maximum on span			=	8.045 ft		
Span # where maximum occurs			=	Span # 1			Span # where maximum occurs			=	Span # 1		
Maximum Deflection													
Max Downward Transient Deflection			0.310 in	Ratio = 772 >=360			Span: 1 : L Only						
Max Upward Transient Deflection			-0.057 in	Ratio = 3361 >=360			Span: 2 : L Only						
Max Downward Total Deflection			0.619 in	Ratio = 386 >=180			Span: 1 : +D+L						
Max Upward Total Deflection			-0.100 in	Ratio = 1915 >=180			Span: 2 : +D+L						

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values			
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only															0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.352	0.184	0.90	1.00	1.00	1.00	0.910	1.00	1.00	1.00	31.50	750.0	2,129.5	3.97	47.3	256.5	
Length = 16.0 ft	2	0.352	0.184	0.90	1.00	1.00	1.00	0.910	1.00	1.00	1.00	31.50	750.0	2,129.5	3.60	47.3	256.5	



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Cantilevered Beam at Unit 1039

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values			
Segment	Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F ^b	V	f _v	F ^v
+D+L						1.00	1.00	1.00	0.910	1.00	1.00	1.00	0.0			0.00	0.0	0.0
Length = 10.0 ft		1	0.579	0.280	1.00	1.00	1.00	1.00	0.910	1.00	1.00	1.00	57.50	1,369.0	2,366.1	6.69	79.7	285.0
Length = 16.0 ft		2	0.579	0.280	1.00	1.00	1.00	1.00	0.910	1.00	1.00	1.00	57.50	1,369.0	2,366.1	5.46	79.7	285.0
+D+S						1.00	1.00	1.00	0.910	1.00	1.00	1.00	0.0			0.00	0.0	0.0
Length = 10.0 ft		1	0.407	0.232	1.15	1.00	1.00	1.00	0.910	1.00	1.00	1.00	46.50	1,107.1	2,721.0	6.39	76.0	327.8
Length = 16.0 ft		2	0.407	0.232	1.15	1.00	1.00	1.00	0.910	1.00	1.00	1.00	46.50	1,107.1	2,721.0	6.35	76.0	327.8
+D+0.750L						1.00	1.00	1.00	0.910	1.00	1.00	1.00	0.0			0.00	0.0	0.0
Length = 10.0 ft		1	0.411	0.201	1.25	1.00	1.00	1.00	0.910	1.00	1.00	1.00	51.00	1,214.3	2,957.6	6.01	71.6	356.3
Length = 16.0 ft		2	0.411	0.201	1.25	1.00	1.00	1.00	0.910	1.00	1.00	1.00	51.00	1,214.3	2,957.6	5.00	71.6	356.3
+D+0.750L+0.750S						1.00	1.00	1.00	0.910	1.00	1.00	1.00	0.0			0.00	0.0	0.0
Length = 10.0 ft		1	0.545	0.284	1.15	1.00	1.00	1.00	0.910	1.00	1.00	1.00	62.25	1,482.1	2,721.0	7.82	93.1	327.8
Length = 16.0 ft		2	0.545	0.284	1.15	1.00	1.00	1.00	0.910	1.00	1.00	1.00	62.25	1,482.1	2,721.0	7.06	93.1	327.8
+0.60D						1.00	1.00	1.00	0.910	1.00	1.00	1.00	0.0			0.00	0.0	0.0
Length = 10.0 ft		1	0.119	0.062	1.60	1.00	1.00	1.00	0.910	1.00	1.00	1.00	18.90	450.0	3,785.8	2.38	28.4	456.0
Length = 16.0 ft		2	0.119	0.062	1.60	1.00	1.00	1.00	0.910	1.00	1.00	1.00	18.90	450.0	3,785.8	2.16	28.4	456.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.6189	0.000		0.0000	0.000
2		0.0000	0.000	+D+L	-0.1003	6.346

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	16.941	1.654	
Max Upward from Load Combinations	16.941	1.654	
Max Upward from Load Cases	8.629	1.463	
Max Downward from all Load Conditions (Resisting Uplift)		-1.305	
Max Downward from Load Combinations (Resisting Uplift)		-1.114	
Max Downward from Load Cases (Resisting Uplift)		-1.305	
D Only	8.629	0.191	
+D+L	13.374	-1.114	
+D+S	14.966	1.654	
+D+0.750L	12.188	-0.788	
+D+0.750L+0.750S	16.941	0.309	
+0.60D	5.177	0.115	
L Only	4.745	-1.305	
S Only	6.338	1.463	



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Pool Roof Beam

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : AC/AC

Wood Grade : 20F-V12

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

Fb + 2000 psi

Fb - 1400 psi

Fc - Prll 1500 psi

Fc - Perp 560 psi

Fv 265 psi

Ft 925 psi

E : Modulus of Elasticity

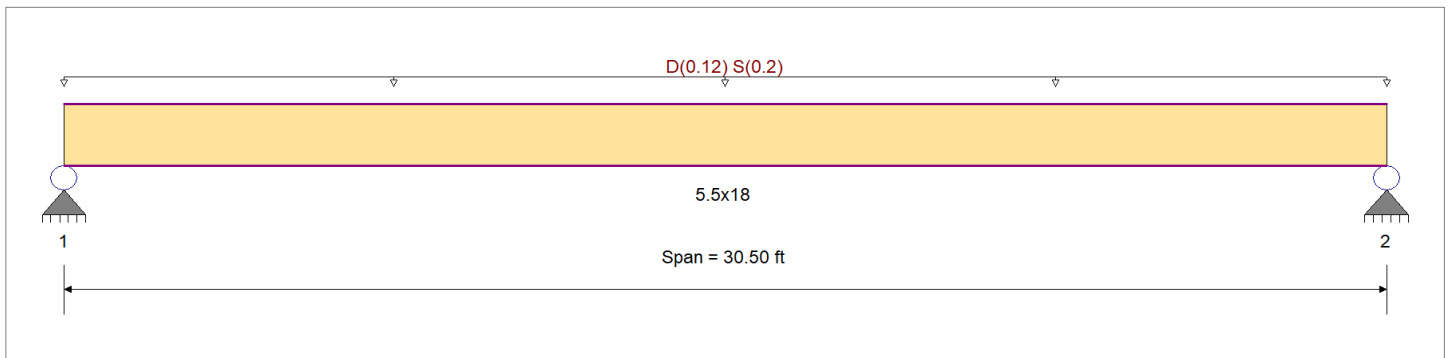
Ebend- xx 1500ksi

Eminbend - xx 790ksi

Ebend- yy 1400ksi

Eminbend - yy 740ksi

Density 28.72pcf



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 8.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.712 1	Maximum Shear Stress Ratio	=	0.220 : 1
Section used for this span		5.5x18	Section used for this span		5.5x18
fb: Actual	=	1,503.43psi	fv: Actual	=	66.92 psi
F'b	=	2,112.73psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	15.250ft	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	0.977 in	Ratio = 374 >=360	Span: 1 : S Only		n/a
Max Upward Transient Deflection	0 in	Ratio = 0 <360			
Max Downward Total Deflection	1.563 in	Ratio = 234 >=180	Span: 1 : +D+S		n/a
Max Upward Total Deflection	0 in	Ratio = 0 <180			

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _v	Cfu	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only															0.0	0.00	0.0	0.0
Length = 30.50 ft		1	0.341	0.105	0.90	1.00	1.00	1.00	0.919	1.00	1.00	1.00	13.95	563.8	1,653.4	1.66	25.1	238.5
+D+S															0.0	0.00	0.0	0.0
Length = 30.50 ft		1	0.712	0.220	1.15	1.00	1.00	1.00	0.919	1.00	1.00	1.00	37.21	1,503.4	2,112.7	4.42	66.9	304.8
+D+0.750S															0.0	0.00	0.0	0.0
Length = 30.50 ft		1	0.600	0.185	1.15	1.00	1.00	1.00	0.919	1.00	1.00	1.00	31.40	1,268.5	2,112.7	3.73	56.5	304.8
+0.60D															0.0	0.00	0.0	0.0
Length = 30.50 ft		1	0.115	0.036	1.60	1.00	1.00	1.00	0.919	1.00	1.00	1.00	8.37	338.3	2,939.4	0.99	15.1	424.0



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Pool Roof Beam

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+S	1.5630	15.361		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	4.880	4.880
Max Upward from Load Combinations	4.880	4.880
Max Upward from Load Cases	3.050	3.050
D Only	1.830	1.830
+D+S	4.880	4.880
+D+0.750S	4.118	4.118
+0.60D	1.098	1.098
S Only	3.050	3.050



AHBL, INC.
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Tacoma, WA 98403

Project Title:
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Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Covered Walk Joist

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

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

Fb + 900.0 psi

Fb - 900.0 psi

Fc - Prll 1,350.0 psi

Fc - Perp 625.0 psi

Fv 180.0 psi

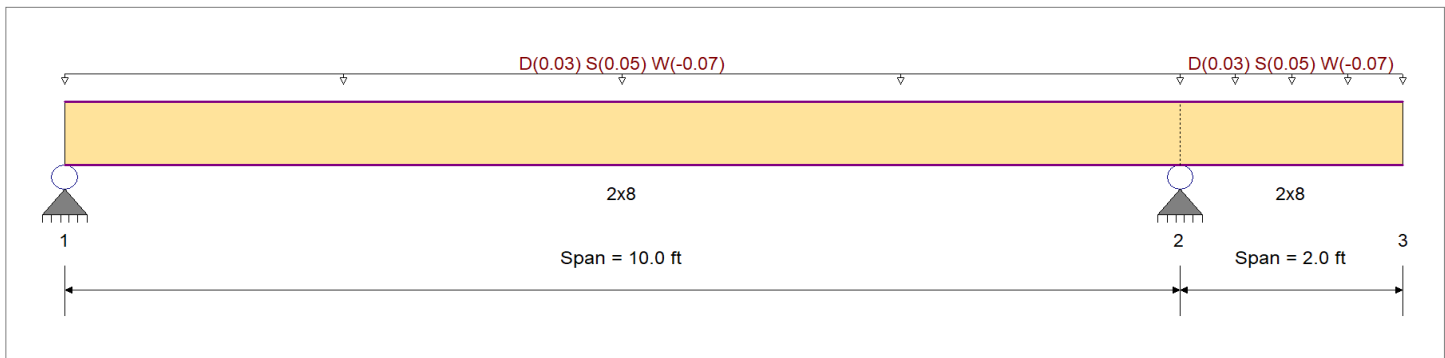
Ft 575.0 psi

E : Modulus of Elasticity

Ebend- xx 1,600.0ksi

Eminbend - xx 580.0ksi

Density 31.210pcf



Applied Loads

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

Beam self weight NOT internally calculated and added

Load for Span Number 1

Uniform Load : D = 0.0150, S = 0.0250, W = -0.0350 ksf, Tributary Width = 2.0 ft

Load for Span Number 2

Uniform Load : D = 0.0150, S = 0.0250, W = -0.0350 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.678	1	Maximum Shear Stress Ratio	=	0.247	1
Section used for this span		2x8		Section used for this span		2x8	
fb: Actual	=	841.60psi		fv: Actual	=	51.21 psi	
F'b	=	1,242.00psi		F'v	=	207.00 psi	
Load Combination				Load Combination			
			+D+S				+D+S
Location of maximum on span	=	4.804ft		Location of maximum on span	=	9.441 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection	0.108 in	Ratio =	444 >=360	Span: 2 : W Only			
Max Upward Transient Deflection	-0.077 in	Ratio =	622 >=360	Span: 2 : S Only			
Max Downward Total Deflection	0.216 in	Ratio =	556 >=180	Span: 1 : +D+S			
Max Upward Total Deflection	-0.123 in	Ratio =	388 >=180	Span: 2 : +D+S			

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.325	0.119	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.35	315.6	972.0	0.14	19.2	162.0
Length = 2.0 ft	2	0.056	0.119	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.06	54.8	972.0	0.04	19.2	162.0
+D+S														0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.678	0.247	1.15	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.92	841.6	1,242.0	0.37	51.2	207.0
Length = 2.0 ft	2	0.118	0.247	1.15	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.16	146.1	1,242.0	0.11	51.2	207.0



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Covered Walk Joist

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
+D+0.750S					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.572	0.209	1.15	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.78	710.1	1,242.0	0.31	43.2	207.0
Length = 2.0 ft	2	0.099	0.209	1.15	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.14	123.3	1,242.0	0.09	43.2	207.0
+D+0.60W					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.073	0.027	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.14	126.2	1,728.0	0.06	7.7	288.0
Length = 2.0 ft	2	0.013	0.027	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.02	21.9	1,728.0	0.02	7.7	288.0
+D+0.450W					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.009	0.003	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.02	15.8	1,728.0	0.01	1.0	288.0
Length = 2.0 ft	2	0.002	0.003	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.00	2.7	1,728.0	0.00	1.0	288.0
+D+0.750S+0.450W					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.219	0.080	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.41	378.7	1,728.0	0.17	23.0	288.0
Length = 2.0 ft	2	0.038	0.080	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.07	65.8	1,728.0	0.05	23.0	288.0
+0.60D+0.60W					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.146	0.053	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.28	252.5	1,728.0	0.11	15.4	288.0
Length = 2.0 ft	2	0.025	0.053	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.05	43.8	1,728.0	0.03	15.4	288.0
+0.60D					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.110	0.040	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.21	189.4	1,728.0	0.08	11.5	288.0
Length = 2.0 ft	2	0.019	0.040	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.04	32.9	1,728.0	0.03	11.5	288.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+S	0.2155	4.972		0.0000	0.000
2		0.0000	4.972	+D+S	-0.1234	2.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.384	0.576	
Max Upward from Load Combinations	0.384	0.576	
Max Upward from Load Cases	0.240	0.360	
Max Downward from all Load Conditions (Resisting Uplift)	-0.336	-0.504	
Max Downward from Load Combinations (Resisting Uplift)	-0.115	-0.173	
Max Downward from Load Cases (Resisting Uplift)	-0.336	-0.504	
D Only	0.144	0.216	
+D+S	0.384	0.576	
+D+0.750S	0.324	0.486	
+D+0.60W	-0.058	-0.086	
+D+0.450W	-0.007	-0.011	
+D+0.750S+0.450W	0.173	0.259	
+0.60D+0.60W	-0.115	-0.173	
+0.60D	0.086	0.130	
S Only	0.240	0.360	
W Only	-0.336	-0.504	



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Covered Walk Corner Beam - on diagonal

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

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

Fb + 900.0 psi

Fb - 900.0 psi

Fc - Prll 1,350.0 psi

Fc - Perp 625.0 psi

Fv 180.0 psi

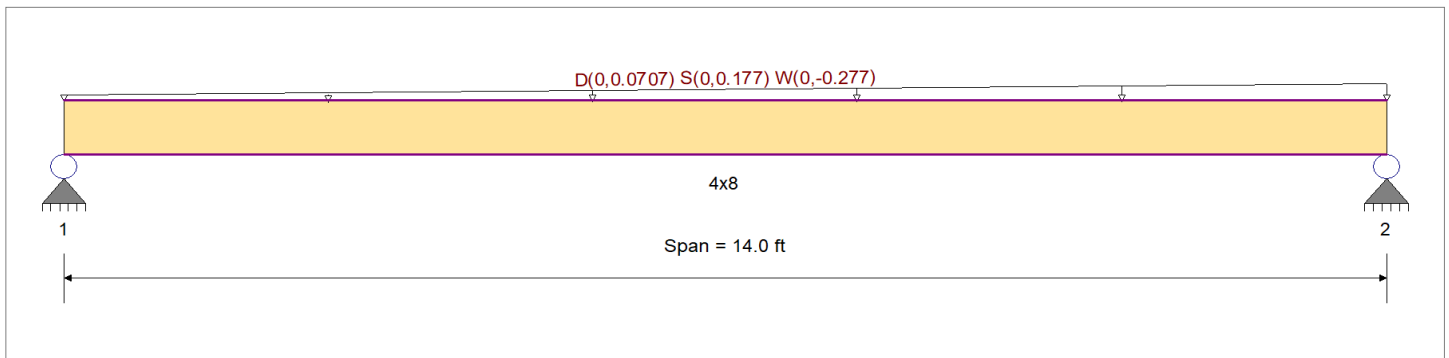
Ft 575.0 psi

E : Modulus of Elasticity

Ebend- xx 1,600.0ksi

Eminbend - xx 580.0ksi

Density 31.210pcf



Applied Loads

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

Beam self weight NOT internally calculated and added

Load for Span Number 1

Varying Uniform Load : D= 0.0->0.07070, S= 0.0->0.1770, W= 0.0->-0.2770 k/ft, Extent = 0.0 -->> 14.0 ft, Trib Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.906	1	Maximum Shear Stress Ratio	=	0.291	1
Section used for this span		4x8		Section used for this span		4x8	
fb: Actual	=	1,218.90psi		fv: Actual	=	60.27 psi	
F'b	=	1,345.50psi		F'v	=	207.00 psi	
Load Combination				Load Combination			
			+D+S				+D+S
Location of maximum on span	=	8.073ft		Location of maximum on span	=	13.438 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection	0.433 in	Ratio =	387 >=240	Span: 1 : S Only			
Max Upward Transient Deflection	-0.678 in	Ratio =	247 >=240	Span: 1 : W Only			
Max Downward Total Deflection	0.606 in	Ratio =	277 >=180	Span: 1 : +D+S			
Max Upward Total Deflection	-0.303 in	Ratio =	554 >=180	Span: 1 : +0.60D+0.60W			

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only														0.0			
Length = 14.0 ft	1	0.330	0.106	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.89	347.9	1,053.0	0.29	17.2	162.0
+D+S														0.0			
Length = 14.0 ft	1	0.906	0.291	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.00	3.11	1,218.9	1,345.5	1.02	60.3	207.0
+D+0.750S														0.0			
Length = 14.0 ft	1	0.744	0.239	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.00	2.56	1,001.1	1,345.5	0.84	49.5	207.0
+D+0.60W														0.0			
														0.0			



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Covered Walk Corner Beam - on diagonal

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
Length = 14.0 ft		1	0.251	0.081	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.20	469.9	1,872.0	0.39	23.2	288.0
+D+0.450W						1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 14.0 ft		1	0.142	0.046	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.68	265.5	1,872.0	0.22	13.1	288.0
+D+0.750S+0.450W						1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 14.0 ft		1	0.207	0.067	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.99	387.8	1,872.0	0.32	19.2	288.0
+0.60D+0.60W						1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 14.0 ft		1	0.325	0.105	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.56	609.1	1,872.0	0.51	30.1	288.0
+0.60D						1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 14.0 ft		1	0.112	0.036	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.53	208.7	1,872.0	0.17	10.3	288.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1		0.0000	0.000	W Only	-0.6781	7.307

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.578	1.156
Max Upward from Load Combinations	0.578	1.156
Max Upward from Load Cases	0.413	0.826
Max Downward from all Load Conditions (Resisting Uplift)	-0.646	-1.293
Max Downward from Load Combinations (Resisting Uplift)	-0.289	-0.578
Max Downward from Load Cases (Resisting Uplift)	-0.646	-1.293
D Only	0.165	0.330
+D+S	0.578	1.156
+D+0.750S	0.475	0.949
+D+0.60W	-0.223	-0.446
+D+0.450W	-0.126	-0.252
+D+0.750S+0.450W	0.184	0.368
+0.60D+0.60W	-0.289	-0.578
+0.60D	0.099	0.198
S Only	0.413	0.826
W Only	-0.646	-1.293



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Covered Walk Beam - Typ

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

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

Fb + 875 psi

Fb - 875 psi

Fc - Prll 600 psi

Fc - Perp 625 psi

Fv 170 psi

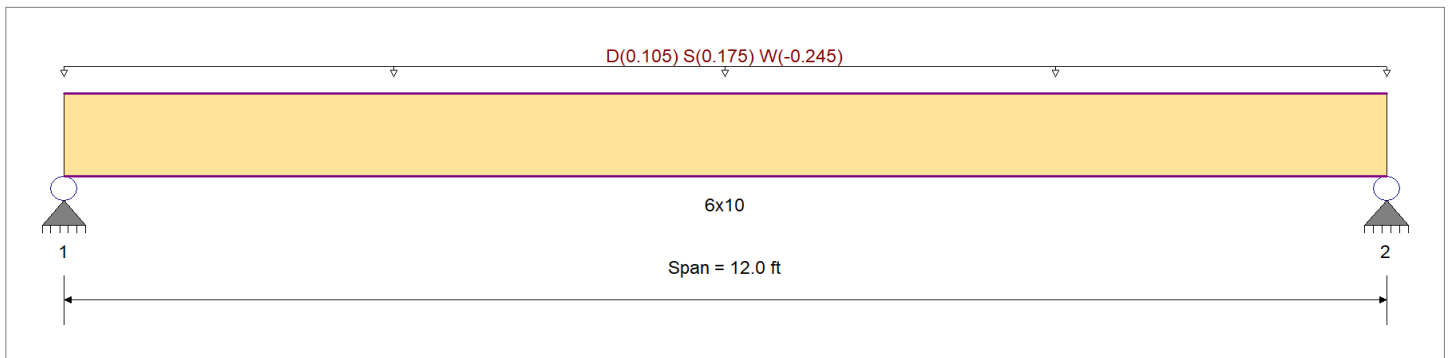
Ft 425 psi

E : Modulus of Elasticity

Ebend- xx 1300ksi

Eminbend - xx 470ksi

Density 31.21pcf



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, S = 0.0250, W = -0.0350 ksf, Tributary Width = 7.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.756 1	Maximum Shear Stress Ratio	=	0.223 : 1
Section used for this span		6x10	Section used for this span		6x10
fb: Actual	=	760.63psi	fv: Actual	=	43.59 psi
F'b	=	1,006.25psi	F'v	=	195.50 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	0.161 in	Ratio = 895 >=360	Span: 1 : S Only		
Max Upward Transient Deflection	-0.225 in	Ratio = 639 >=360	Span: 1 : W Only		
Max Downward Total Deflection	0.268 in	Ratio = 538 >=180	Span: 1 : +D+S		
Max Upward Total Deflection	-0.071 in	Ratio = 2030 >=180	Span: 1 : +0.60D+0.60W		

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.386	0.114	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.09	303.7	787.5	0.61	17.4	153.0
+D+S														0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.756	0.223	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.24	760.6	1,006.3	1.52	43.6	195.5
+D+0.750S														0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.642	0.189	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.46	646.4	1,006.3	1.29	37.0	195.5
+D+0.60W														0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.057	0.017	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.55	80.1	1,400.0	0.16	4.6	272.0
+D+0.450W														0.0	0.00	0.0	0.0



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Covered Walk Beam - Typ

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
Length = 12.0 ft		1	0.011	0.003	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.11	15.9	1,400.0	0.03	0.9	272.0
+D+0.750S+0.450W						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft		1	0.256	0.076	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.47	358.5	1,400.0	0.72	20.5	272.0
+0.60D+0.60W						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft		1	0.144	0.042	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.39	201.6	1,400.0	0.40	11.6	272.0
+0.60D						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft		1	0.130	0.038	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.26	182.2	1,400.0	0.36	10.4	272.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+S	0.2676	6.044		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.748	1.748
Max Upward from Load Combinations	1.748	1.748
Max Upward from Load Cases	1.050	1.050
Max Downward from all Load Conditions (Resisting Uplift)	-1.470	-1.470
Max Downward from Load Combinations (Resisting Uplift)	-0.463	-0.463
Max Downward from Load Cases (Resisting Uplift)	-1.470	-1.470
D Only	0.698	0.698
+D+S	1.748	1.748
+D+0.750S	1.485	1.485
+D+0.60W	-0.184	-0.184
+D+0.450W	0.036	0.036
+D+0.750S+0.450W	0.824	0.824
+0.60D+0.60W	-0.463	-0.463
+0.60D	0.419	0.419
S Only	1.050	1.050
W Only	-1.470	-1.470



AHBL, INC.
2215 N. 30th Street, Suite 300
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Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Covered Walk Beam - End Cantilevered

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

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

Fb + 875.0 psi

Fb - 875.0 psi

Fc - Prll 600.0 psi

Fc - Perp 625.0 psi

Fv 170.0 psi

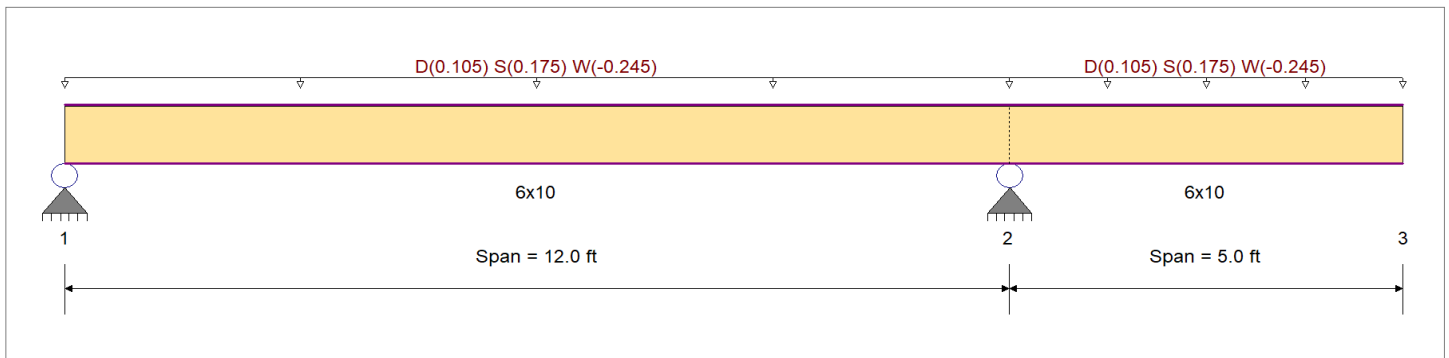
Ft 425.0 psi

E : Modulus of Elasticity

Ebend- xx 1,300.0ksi

Eminbend - xx 470.0ksi

Density 31.210pcf



Applied Loads

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

Beam self weight calculated and added to loading

Load for Span Number 1

Uniform Load : D = 0.0150, S = 0.0250, W = -0.0350 ksf, Tributary Width = 7.0 ft

Load for Span Number 2

Uniform Load : D = 0.0150, S = 0.0250, W = -0.0350 ksf, Tributary Width = 7.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.525 : 1	Maximum Shear Stress Ratio	=	0.270 : 1
Section used for this span		6x10	Section used for this span		6x10
fb: Actual	=	528.21 psi	fv: Actual	=	52.72 psi
F'b	=	1,006.25 psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	12.000ft	Location of maximum on span	=	11.263 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.095 in	Ratio = 1513 >=360	Span: 1 : S Only		
Max Upward Transient Deflection	-0.133 in	Ratio = 1081 >=360	Span: 1 : W Only		
Max Downward Total Deflection	0.158 in	Ratio = 909 >=180	Span: 1 : +D+S		
Max Upward Total Deflection	-0.042 in	Ratio = 3430 >=180	Span: 1 : +0.60D+0.60W		

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.268	0.138	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.45	210.9	787.5	0.73	21.1	153.0
Length = 5.0 ft	2	0.268	0.138	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.45	210.9	787.5	0.49	21.1	153.0
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.525	0.270	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.64	528.2	1,006.3	1.84	52.7	195.5
Length = 5.0 ft	2	0.525	0.270	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.64	528.2	1,006.3	1.23	52.7	195.5



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Covered Walk Beam - End Cantilevered

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F ^b	V	fv	F ^v
+D+0.750S						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft		1	0.446	0.229	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.09	448.9	1,006.3	1.56	44.8	195.5
Length = 5.0 ft		2	0.446	0.229	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.09	448.9	1,006.3	1.04	44.8	195.5
+D+0.60W						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft		1	0.040	0.020	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.38	55.6	1,400.0	0.19	5.6	272.0
Length = 5.0 ft		2	0.040	0.020	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.38	55.6	1,400.0	0.13	5.6	272.0
+D+0.450W						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft		1	0.008	0.004	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.08	11.0	1,400.0	0.04	1.1	272.0
Length = 5.0 ft		2	0.008	0.004	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.08	11.0	1,400.0	0.03	1.1	272.0
+D+0.750S+0.450W						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft		1	0.178	0.091	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.72	249.0	1,400.0	0.87	24.9	272.0
Length = 5.0 ft		2	0.178	0.091	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.72	249.0	1,400.0	0.58	24.9	272.0
+0.60D+0.60W						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft		1	0.100	0.051	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.97	140.0	1,400.0	0.49	14.0	272.0
Length = 5.0 ft		2	0.100	0.051	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.97	140.0	1,400.0	0.33	14.0	272.0
+0.60D						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft		1	0.090	0.046	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.87	126.5	1,400.0	0.44	12.6	272.0
Length = 5.0 ft		2	0.090	0.046	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.87	126.5	1,400.0	0.29	12.6	272.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+S	0.1584	5.497		0.0000	0.000
2		0.0000	5.497	+D+S	-0.0317	5.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	1.444	3.508	
Max Upward from Load Combinations	1.444	3.508	
Max Upward from Load Cases	0.868	2.107	
Max Downward from all Load Conditions (Resisting Uplift)	-1.215	-2.950	
Max Downward from Load Combinations (Resisting Uplift)	-0.383	-0.930	
Max Downward from Load Cases (Resisting Uplift)	-1.215	-2.950	
D Only	0.577	1.401	
+D+S	1.444	3.508	
+D+0.750S	1.228	2.981	
+D+0.60W	-0.152	-0.369	
+D+0.450W	0.030	0.073	
+D+0.750S+0.450W	0.681	1.654	
+0.60D+0.60W	-0.383	-0.930	
+0.60D	0.346	0.840	
S Only	0.868	2.107	
W Only	-1.215	-2.950	



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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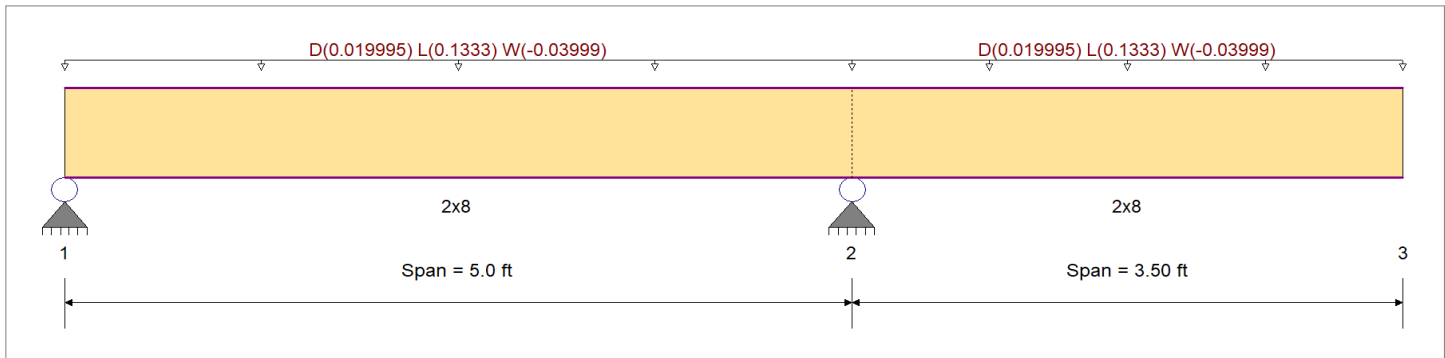
DESCRIPTION: SW Deck Joists

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	900 psi	E : Modulus of Elasticity	
Load Combination :	IBC 2021	Fb -	900 psi	Ebend- xx	1600ksi
		Fc - Prll	1350 psi	Eminbend - xx	580ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625 psi		
Wood Grade :	No.2	Fv	180 psi		
		Ft	575 psi	Density	31.21pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

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

Beam self weight NOT internally calculated and added

Load for Span Number 1

Uniform Load : D = 0.0150, L = 0.10, W = -0.030 ksf, Tributary Width = 1.333 ft

Load for Span Number 2

Uniform Load : D = 0.0150, L = 0.10, W = -0.030 ksf, Tributary Width = 1.333 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.863	1	Maximum Shear Stress Ratio	=	0.461	1
Section used for this span		2x8		Section used for this span		2x8	
fb: Actual	=	857.43psi		fv: Actual	=	66.36 psi	
F'b	=	993.60psi		F'v	=	144.00 psi	
Load Combination		+D+L+H, LL Comb Run (LL)		Load Combination		+D+L+H, LL Comb Run (LL)	
Location of maximum on span	=	5.000ft		Location of maximum on span	=	4.413 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection	0.173 in	Ratio =	484 >=360	Span: 2 : L Only, LL Comb Run (*L)			
Max Upward Transient Deflection	-0.058 in	Ratio =	1448 >=360	Span: 2 : L Only, LL Comb Run (L*)			
Max Downward Total Deflection	0.190 in	Ratio =	440 >=180	Span: 2 : +D+L+H, LL Comb Run (*L)			
Max Upward Total Deflection	-0.032 in	Ratio =	1851 >=180	Span: 1 : +D+L+H, LL Comb Run (*L)			

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
+D+H																	
Length = 5.0 ft	1	0.125	0.067	0.90	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.12	111.8	894.2	0.06	8.7	129.6
Length = 3.50 ft	2	0.125	0.067	0.90	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.12	111.8	894.2	0.06	8.7	129.6
+D+L+H, LL Comb Run (*L)																	
Length = 5.0 ft	1	0.863	0.428	1.00	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.94	857.4	993.6	0.45	61.6	144.0
Length = 3.50 ft	2	0.863	0.428	1.00	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.94	857.4	993.6	0.45	61.6	144.0



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Project Descr:

Wood Beam

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LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: SW Deck Joists

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F ^b	V	fv	F ^v
+D+L+H, LL Comb Run (L*)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.386	0.304	1.00	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.42	383.3	993.6	0.32	43.8	144.0
Length = 3.50 ft	2	0.113	0.304	1.00	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.12	111.8	993.6	0.06	43.8	144.0
+D+L+H, LL Comb Run (LL)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.863	0.461	1.00	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.94	857.4	993.6	0.48	66.4	144.0
Length = 3.50 ft	2	0.863	0.461	1.00	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.94	857.4	993.6	0.45	66.4	144.0
+D+Lr+H, LL Comb Run (*L)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.090	0.048	1.25	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.12	111.8	1,242.0	0.06	8.7	180.0
Length = 3.50 ft	2	0.090	0.048	1.25	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.12	111.8	1,242.0	0.06	8.7	180.0
+D+Lr+H, LL Comb Run (L*)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.090	0.048	1.25	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.12	111.8	1,242.0	0.06	8.7	180.0
Length = 3.50 ft	2	0.090	0.048	1.25	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.12	111.8	1,242.0	0.06	8.7	180.0
+D+Lr+H, LL Comb Run (LL)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.090	0.048	1.25	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.12	111.8	1,242.0	0.06	8.7	180.0
Length = 3.50 ft	2	0.090	0.048	1.25	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.12	111.8	1,242.0	0.06	8.7	180.0
+D+S+H					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.098	0.052	1.15	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.12	111.8	1,142.6	0.06	8.7	165.6
Length = 3.50 ft	2	0.098	0.052	1.15	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.12	111.8	1,142.6	0.06	8.7	165.6
+D+0.750Lr+0.750L+H, LL Comb Run (*L)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.540	0.268	1.25	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.73	671.0	1,242.0	0.35	48.2	180.0
Length = 3.50 ft	2	0.540	0.268	1.25	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.73	671.0	1,242.0	0.35	48.2	180.0
+D+0.750Lr+0.750L+H, LL Comb Run (L*)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.232	0.195	1.25	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.32	288.7	1,242.0	0.25	35.0	180.0
Length = 3.50 ft	2	0.090	0.195	1.25	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.12	111.8	1,242.0	0.06	35.0	180.0
+D+0.750Lr+0.750L+H, LL Comb Run (LL)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.540	0.289	1.25	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.73	671.0	1,242.0	0.38	51.9	180.0
Length = 3.50 ft	2	0.540	0.289	1.25	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.73	671.0	1,242.0	0.35	51.9	180.0
+D+0.750L+0.750S+H, LL Comb Run (*L)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.587	0.291	1.15	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.73	671.0	1,142.6	0.35	48.2	165.6
Length = 3.50 ft	2	0.587	0.291	1.15	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.73	671.0	1,142.6	0.35	48.2	165.6
+D+0.750L+0.750S+H, LL Comb Run (L*)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.253	0.212	1.15	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.32	288.7	1,142.6	0.25	35.0	165.6
Length = 3.50 ft	2	0.098	0.212	1.15	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.12	111.8	1,142.6	0.06	35.0	165.6
+D+0.750L+0.750S+H, LL Comb Run (LL)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.587	0.314	1.15	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.73	671.0	1,142.6	0.38	51.9	165.6
Length = 3.50 ft	2	0.587	0.314	1.15	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.73	671.0	1,142.6	0.35	51.9	165.6
+D+0.60W+H					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.014	0.008	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.02	22.4	1,589.8	0.01	1.7	230.4
Length = 3.50 ft	2	0.014	0.008	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.02	22.4	1,589.8	0.01	1.7	230.4
+D+0.70E+H					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.070	0.038	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.12	111.8	1,589.8	0.06	8.7	230.4
Length = 3.50 ft	2	0.070	0.038	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.12	111.8	1,589.8	0.06	8.7	230.4
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.359	0.178	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.62	570.4	1,589.8	0.30	41.0	230.4
Length = 3.50 ft	2	0.359	0.178	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.62	570.4	1,589.8	0.30	41.0	230.4
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.180	0.118	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.31	285.4	1,589.8	0.20	27.3	230.4



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: SW Deck Joists

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F ^b	V	fv	F ^v
Length = 3.50 ft	2	0.007	0.118	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.01	11.2	1,589.8	0.01	27.3	230.4
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.359	0.192	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.62	570.4	1,589.8	0.32	44.1	230.4
Length = 3.50 ft	2	0.359	0.192	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.62	570.4	1,589.8	0.30	44.1	230.4
+D+0.750L+0.750S+0.450W+H, LL Comb Run (*L)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.359	0.178	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.62	570.4	1,589.8	0.30	41.0	230.4
Length = 3.50 ft	2	0.359	0.178	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.62	570.4	1,589.8	0.30	41.0	230.4
+D+0.750L+0.750S+0.450W+H, LL Comb Run (L*)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.180	0.118	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.31	285.4	1,589.8	0.20	27.3	230.4
Length = 3.50 ft	2	0.007	0.118	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.01	11.2	1,589.8	0.01	27.3	230.4
+D+0.750L+0.750S+0.450W+H, LL Comb Run (LL)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.359	0.192	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.62	570.4	1,589.8	0.32	44.1	230.4
Length = 3.50 ft	2	0.359	0.192	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.62	570.4	1,589.8	0.30	44.1	230.4
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.422	0.209	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.73	671.0	1,589.8	0.35	48.2	230.4
Length = 3.50 ft	2	0.422	0.209	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.73	671.0	1,589.8	0.35	48.2	230.4
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.182	0.152	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.32	288.7	1,589.8	0.25	35.0	230.4
Length = 3.50 ft	2	0.070	0.152	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.12	111.8	1,589.8	0.06	35.0	230.4
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.422	0.225	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.73	671.0	1,589.8	0.38	51.9	230.4
Length = 3.50 ft	2	0.422	0.225	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.73	671.0	1,589.8	0.35	51.9	230.4
+0.60D+0.60W+0.60H					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.042	0.023	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.07	67.1	1,589.8	0.04	5.2	230.4
Length = 3.50 ft	2	0.042	0.023	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.07	67.1	1,589.8	0.03	5.2	230.4
+0.60D+0.70E+0.60H					1.00	1.00	1.00	1.200	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.042	0.023	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.07	67.1	1,589.8	0.04	5.2	230.4
Length = 3.50 ft	2	0.042	0.023	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.07	67.1	1,589.8	0.03	5.2	230.4

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L+H, LL Comb Run (L*)	0.0120	0.754	+D+L+H, LL Comb Run (*L)	-0.0324	2.961
2	+D+L+H, LL Comb Run (*L)	0.1904	3.500		0.0000	2.961

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.359	1.108	
Max Upward from Load Combinations	0.359	1.108	
Max Upward from Load Cases	0.333	0.963	
Max Downward from all Load Conditions (Resisting Uplift)	-0.163	-0.289	
Max Downward from Load Combinations (Resisting Uplift)	-0.138	-0.087	
Max Downward from Load Cases (Resisting Uplift)	-0.163	-0.289	
+D+H	0.025	0.144	
+D+L+H, LL Comb Run (*L)	-0.138	0.774	
+D+L+H, LL Comb Run (L*)	0.359	0.478	
+D+L+H, LL Comb Run (LL)	0.195	1.108	
+D+Lr+H, LL Comb Run (*L)	0.025	0.144	
+D+Lr+H, LL Comb Run (L*)	0.025	0.144	
+D+Lr+H, LL Comb Run (LL)	0.025	0.144	
+D+S+H	0.025	0.144	
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	-0.097	0.617	



AHBL, INC.
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Project Title:
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Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: SW Deck Joists

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	0.275	0.394	
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	0.153	0.867	
+D+0.750L+0.750S+H, LL Comb Run (L*)	-0.097	0.617	
+D+0.750L+0.750S+H, LL Comb Run (L*)	0.275	0.394	
+D+0.750L+0.750S+H, LL Comb Run (LL)	0.153	0.867	
+D+0.60W+H	-0.005	-0.029	
+D+0.70E+H	0.025	0.144	
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*)	-0.120	0.487	
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*)	0.252	0.264	
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL)	0.130	0.737	
+D+0.750L+0.750S+0.450W+H, LL Comb Run (L*)	-0.120	0.487	
+D+0.750L+0.750S+0.450W+H, LL Comb Run (L*)	0.252	0.264	
+D+0.750L+0.750S+0.450W+H, LL Comb Run (LL)	0.130	0.737	
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	-0.097	0.617	
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	0.275	0.394	
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)	0.153	0.867	
+0.60D+0.60W+0.60H	-0.015	-0.087	
+0.60D+0.70E+0.60H	0.015	0.087	
D Only	0.025	0.144	
L Only, LL Comb Run (L*)	-0.163	0.630	
L Only, LL Comb Run (L*)	0.333	0.333	
L Only, LL Comb Run (LL)	0.170	0.963	
W Only	-0.051	-0.289	
H Only			



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Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: SW Deck Beam

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : DF/DF

Wood Grade : 24F-V4

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

Fb + 2400 psi

Fb - 1850 psi

Fc - Prll 1650 psi

Fc - Perp 650 psi

Fv 265 psi

Ft 1100 psi

E : Modulus of Elasticity

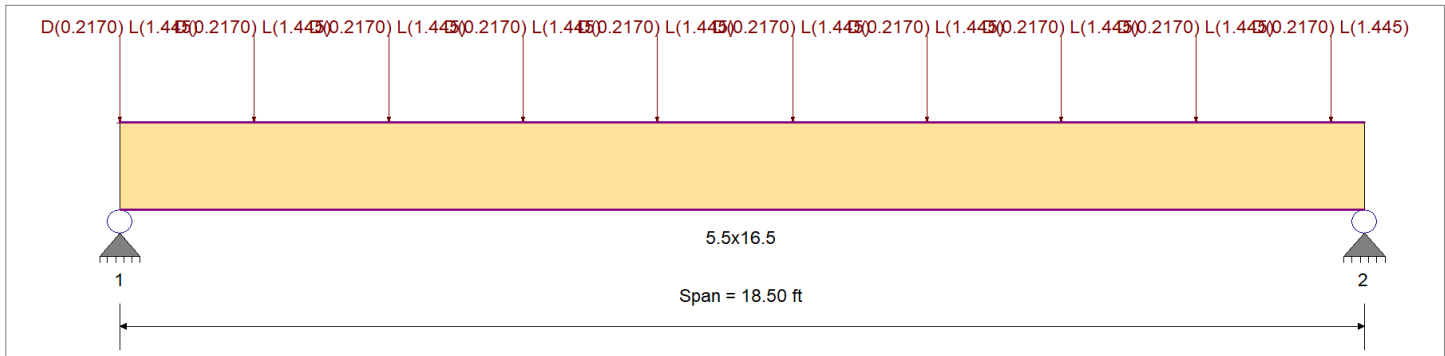
Ebend- xx 1800ksi

Eminbend - xx 950ksi

Ebend- yy 1600ksi

Eminbend - yy 850ksi

Density 31.21 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added

Loads on all spans...

Point Load : D = 0.2170, L = 1.445 k, Starting at : 0.0 ft and placed every 2.0 ft thereafter

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.730 : 1	Maximum Shear Stress Ratio	=	0.429 : 1
Section used for this span		5.5x16.5	Section used for this span		5.5x16.5
fb: Actual	=	1,706.23psi	fv: Actual	=	113.60 psi
F'b	=	2,337.86psi	F'v	=	265.00 psi
Load Combination			Load Combination		
		+D+L			+D+L
Location of maximum on span	=	9.993ft	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	0.542 in	Ratio = 409 >=360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.623 in	Ratio = 356 >=180	Span: 1 : +D+L		
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	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only														0.0			
Length = 18.50 ft	1	0.106	0.062	0.90	1.00	1.00	1.00	0.974	1.00	1.00	1.00	4.63	222.8	2,104.1	0.90	14.8	238.5
+D+L														0.0			
Length = 18.50 ft	1	0.730	0.429	1.00	1.00	1.00	1.00	0.974	1.00	1.00	1.00	35.48	1,706.2	2,337.9	6.87	113.6	265.0
+D+0.750L														0.0			
Length = 18.50 ft	1	0.457	0.268	1.25	1.00	1.00	1.00	0.974	1.00	1.00	1.00	27.77	1,335.4	2,922.3	5.38	88.9	331.3
+0.60D														0.0			
Length = 18.50 ft	1	0.036	0.021	1.60	1.00	1.00	1.00	0.974	1.00	1.00	1.00	2.78	133.7	3,740.6	0.54	8.9	424.0



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LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: SW Deck Beam

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.6231	9.318		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	8.535	8.085
Max Upward from Load Combinations	8.535	8.085
Max Upward from Load Cases	7.420	7.030
D Only	1.114	1.056
+D+L	8.535	8.085
+D+0.750L	6.680	6.328
+0.60D	0.669	0.633
L Only	7.420	7.030



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Wood Beam

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LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: SW Deck Cantilever Rim

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : iLevel Truss Joist

Wood Grade : MicroLam LVL 2.0 E

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

Fb + 2600 psi

Fb - 2600 psi

Fc - Prll 2510 psi

Fc - Perp 750 psi

Fv 285 psi

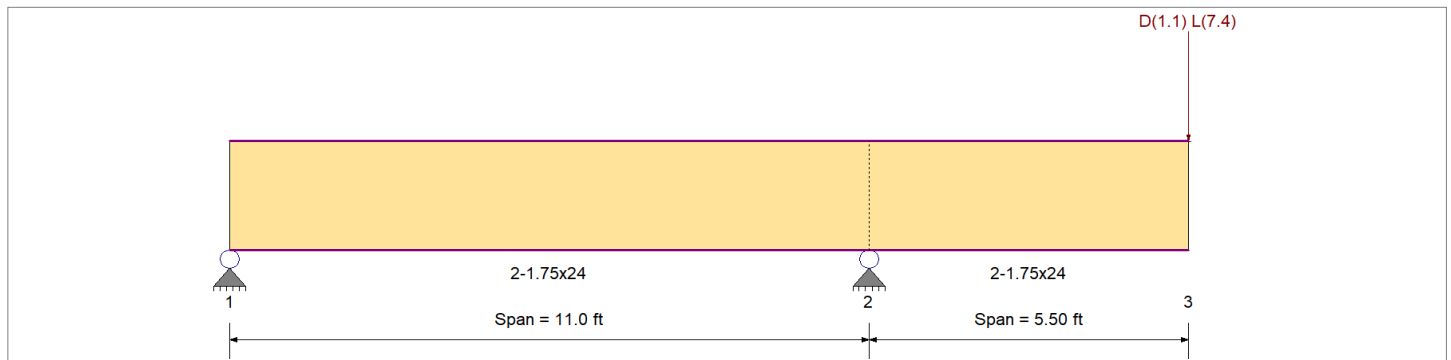
Ft 1555 psi

E : Modulus of Elasticity

Ebend- xx 2000 ksi

Eminbend - xx 1016.535 ksi

Density 42.01 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added

Load for Span Number 2

Point Load : D = 1.10, L = 7.40 k @ 5.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.706 1	Maximum Shear Stress Ratio	=	0.533 1
Section used for this span		2-1.75x24	Section used for this span		2-1.75x24
fb: Actual	=	1,669.64psi	fv: Actual	=	151.79 psi
F'b	=	2,366.10psi	F'v	=	285.00 psi
Load Combination			Load Combination		
		+D+L			+D+L
Location of maximum on span	=	11.000ft	Location of maximum on span	=	11.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.263 in	Ratio = 500 >=360	Span: 2 : L Only		
Max Upward Transient Deflection	-0.068 in	Ratio = 1935 >=360	Span: 1 : L Only		
Max Downward Total Deflection	0.303 in	Ratio = 436 >=180	Span: 2 : +D+L		
Max Upward Total Deflection	-0.078 in	Ratio = 1685 >=180	Span: 1 : +D+L		

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only														0.0			
Length = 11.0 ft	1	0.101	0.077	0.90	1.00	1.00	1.00	0.910	1.00	1.00	1.00	6.05	216.1	2,129.5	1.10	19.6	256.5
Length = 5.50 ft	2	0.101	0.077	0.90	1.00	1.00	1.00	0.910	1.00	1.00	1.00	6.05	216.1	2,129.5	1.10	19.6	256.5
+D+L														0.0			
Length = 11.0 ft	1	0.706	0.533	1.00	1.00	1.00	1.00	0.910	1.00	1.00	1.00	46.75	1,669.6	2,366.1	8.50	151.8	285.0
Length = 5.50 ft	2	0.706	0.533	1.00	1.00	1.00	1.00	0.910	1.00	1.00	1.00	46.75	1,669.6	2,366.1	8.50	151.8	285.0
+D+0.750L														0.0			
Length = 11.0 ft	1	0.442	0.333	1.25	1.00	1.00	1.00	0.910	1.00	1.00	1.00	36.58	1,306.3	2,957.6	6.65	118.8	356.3



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DESCRIPTION: SW Deck Cantilever Rim

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	Moment Values			Shear Values		
			M	V									M	fb	F ^b	V	fv	F ^v
Length = 5.50 ft		2	0.442	0.333	1.25	1.00	1.00	1.00	0.910	1.00	1.00	1.00	36.57	1,306.3	2,957.6	6.65	118.8	356.3
+0.60D						1.00	1.00	1.00	0.910	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft		1	0.034	0.026	1.60	1.00	1.00	1.00	0.910	1.00	1.00	1.00	3.63	129.6	3,785.8	0.66	11.8	456.0
Length = 5.50 ft		2	0.034	0.026	1.60	1.00	1.00	1.00	0.910	1.00	1.00	1.00	3.63	129.6	3,785.8	0.66	11.8	456.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1		0.0000	0.000	+D+L	-0.0783	6.391
2	+D+L	0.3026	5.500		0.0000	6.391

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions		12.750	
Max Upward from Load Combinations		12.750	
Max Upward from Load Cases		11.100	
Max Downward from all Load Conditions (Resisting Uplift)	-4.250		
Max Downward from Load Combinations (Resisting Uplift)	-4.250		
Max Downward from Load Cases (Resisting Uplift)	-3.700		
D Only	-0.550	1.650	
+D+L	-4.250	12.750	
+D+0.750L	-3.325	9.975	
+0.60D	-0.330	0.990	
L Only	-3.700	11.100	



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: North Deck Joists

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combination Set : IBC 2021

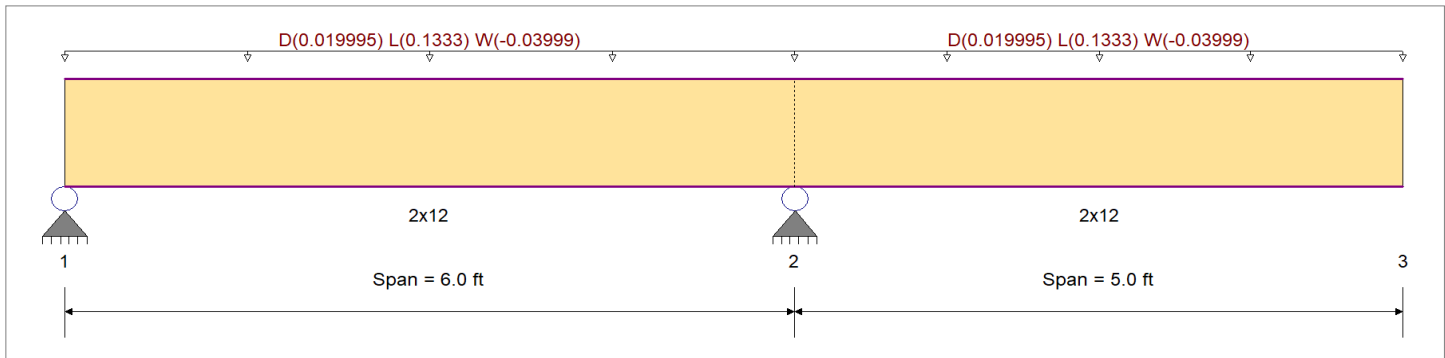
Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

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

Fb +	900.0 psi	E : Modulus of Elasticity	
Fb -	900.0 psi	Ebend- xx	1,600.0ksi
Fc - Prll	1,350.0 psi	Eminbend - xx	580.0ksi
Fc - Perp	625.0 psi		
Fv	180.0 psi		
Ft	575.0 psi	Density	31.210pcf
		Repetitive Member Stress Increase	



Applied Loads

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

Beam self weight NOT internally calculated and added

Load for Span Number 1

Uniform Load : D = 0.0150, L = 0.10, W = -0.030 ksf, Tributary Width = 1.333 ft

Load for Span Number 2

Uniform Load : D = 0.0150, L = 0.10, W = -0.030 ksf, Tributary Width = 1.333 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.878	1	Maximum Shear Stress Ratio	=	0.395	1
Section used for this span		2x12		Section used for this span		2x12	
fb: Actual	=	726.73psi		fv: Actual	=	56.93 psi	
F'b	=	828.00psi		F'v	=	144.00 psi	
Load Combination		+D+L+H, LL Comb Run (LL)		Load Combination		+D+L+H, LL Comb Run (LL)	
Location of maximum on span	=	6.000ft		Location of maximum on span	=	5.095 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection	0.173 in	Ratio =	694 >=360	Span: 2 : L Only, LL Comb Run (*L)			
Max Upward Transient Deflection	-0.025 in	Ratio =	2908 >=360	Span: 1 : L Only, LL Comb Run (*L)			
Max Downward Total Deflection	0.193 in	Ratio =	622 >=180	Span: 2 : +D+L+H, LL Comb Run (*L)			
Max Upward Total Deflection	-0.026 in	Ratio =	2730 >=180	Span: 1 : +D+L+H, LL Comb Run (*L)			

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
+D+H														0.0			
Length = 6.0 ft	1	0.127	0.057	0.90	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.25	94.8	745.2	0.08	7.4	129.6
Length = 5.0 ft	2	0.127	0.057	0.90	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.25	94.8	745.2	0.08	7.4	129.6
+D+L+H, LL Comb Run (*L)														0.0			
Length = 6.0 ft	1	0.878	0.386	1.00	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.92	726.7	828.0	0.63	55.6	144.0
Length = 5.0 ft	2	0.878	0.386	1.00	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.92	726.7	828.0	0.63	55.6	144.0



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LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: North Deck Joists

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F ^b	V	fv	F ^v
+D+L+H, LL Comb Run (L*)						1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1		0.261	0.224	1.00	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.57	216.4	828.0	0.36	32.2	144.0
Length = 5.0 ft	2		0.114	0.224	1.00	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.25	94.8	828.0	0.08	32.2	144.0
+D+L+H, LL Comb Run (LL)						1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1		0.878	0.395	1.00	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.92	726.7	828.0	0.64	56.9	144.0
Length = 5.0 ft	2		0.878	0.395	1.00	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.92	726.7	828.0	0.63	56.9	144.0
+D+Lr+H, LL Comb Run (*L)						1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1		0.092	0.041	1.25	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.25	94.8	1,035.0	0.08	7.4	180.0
Length = 5.0 ft	2		0.092	0.041	1.25	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.25	94.8	1,035.0	0.08	7.4	180.0
+D+Lr+H, LL Comb Run (L*)						1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1		0.092	0.041	1.25	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.25	94.8	1,035.0	0.08	7.4	180.0
Length = 5.0 ft	2		0.092	0.041	1.25	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.25	94.8	1,035.0	0.08	7.4	180.0
+D+Lr+H, LL Comb Run (LL)						1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1		0.092	0.041	1.25	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.25	94.8	1,035.0	0.08	7.4	180.0
Length = 5.0 ft	2		0.092	0.041	1.25	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.25	94.8	1,035.0	0.08	7.4	180.0
+D+S+H						1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1		0.100	0.045	1.15	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.25	94.8	952.2	0.08	7.4	165.6
Length = 5.0 ft	2		0.100	0.045	1.15	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.25	94.8	952.2	0.08	7.4	165.6
+D+0.750Lr+0.750L+H, LL Comb Run (*L)						1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1		0.550	0.242	1.25	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.50	568.7	1,035.0	0.49	43.5	180.0
Length = 5.0 ft	2		0.550	0.242	1.25	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.50	568.7	1,035.0	0.49	43.5	180.0
+D+0.750Lr+0.750L+H, LL Comb Run (L*)						1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1		0.155	0.145	1.25	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.42	160.1	1,035.0	0.29	26.0	180.0
Length = 5.0 ft	2		0.092	0.145	1.25	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.25	94.8	1,035.0	0.08	26.0	180.0
+D+0.750Lr+0.750L+H, LL Comb Run (LL)						1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1		0.550	0.248	1.25	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.50	568.7	1,035.0	0.50	44.6	180.0
Length = 5.0 ft	2		0.550	0.248	1.25	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.50	568.7	1,035.0	0.49	44.6	180.0
+D+0.750L+0.750S+H, LL Comb Run (*L)						1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1		0.597	0.263	1.15	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.50	568.7	952.2	0.49	43.5	165.6
Length = 5.0 ft	2		0.597	0.263	1.15	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.50	568.7	952.2	0.49	43.5	165.6
+D+0.750L+0.750S+H, LL Comb Run (L*)						1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1		0.168	0.157	1.15	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.42	160.1	952.2	0.29	26.0	165.6
Length = 5.0 ft	2		0.100	0.157	1.15	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.25	94.8	952.2	0.08	26.0	165.6
+D+0.750L+0.750S+H, LL Comb Run (LL)						1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1		0.597	0.269	1.15	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.50	568.7	952.2	0.50	44.6	165.6
Length = 5.0 ft	2		0.597	0.269	1.15	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.50	568.7	952.2	0.49	44.6	165.6
+D+0.60W+H						1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1		0.014	0.006	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.05	19.0	1,324.8	0.02	1.5	230.4
Length = 5.0 ft	2		0.014	0.006	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.05	19.0	1,324.8	0.02	1.5	230.4
+D+0.70E+H						1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1		0.072	0.032	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.25	94.8	1,324.8	0.08	7.4	230.4
Length = 5.0 ft	2		0.072	0.032	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.25	94.8	1,324.8	0.08	7.4	230.4
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L)						1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1		0.365	0.160	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.27	483.4	1,324.8	0.42	37.0	230.4
Length = 5.0 ft	2		0.365	0.160	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.27	483.4	1,324.8	0.42	37.0	230.4
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*)						1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1		0.128	0.084	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.45	169.3	1,324.8	0.22	19.4	230.4



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LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: North Deck Joists

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F ^b	V	fv	F ^v
Length = 5.0 ft	2	0.007	0.084	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.02	9.5	1,324.8	0.01	19.4	230.4
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL)					1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.365	0.164	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.27	483.4	1,324.8	0.43	37.9	230.4
Length = 5.0 ft	2	0.365	0.164	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.27	483.4	1,324.8	0.42	37.9	230.4
+D+0.750L+0.750S+0.450W+H, LL Comb Run (*L)					1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.365	0.160	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.27	483.4	1,324.8	0.42	37.0	230.4
Length = 5.0 ft	2	0.365	0.160	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.27	483.4	1,324.8	0.42	37.0	230.4
+D+0.750L+0.750S+0.450W+H, LL Comb Run (L*)					1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.128	0.084	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.45	169.3	1,324.8	0.22	19.4	230.4
Length = 5.0 ft	2	0.007	0.084	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.02	9.5	1,324.8	0.01	19.4	230.4
+D+0.750L+0.750S+0.450W+H, LL Comb Run (LL)					1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.365	0.164	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.27	483.4	1,324.8	0.43	37.9	230.4
Length = 5.0 ft	2	0.365	0.164	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.27	483.4	1,324.8	0.42	37.9	230.4
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L)					1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.429	0.189	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.50	568.7	1,324.8	0.49	43.5	230.4
Length = 5.0 ft	2	0.429	0.189	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.50	568.7	1,324.8	0.49	43.5	230.4
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)					1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.121	0.113	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.42	160.1	1,324.8	0.29	26.0	230.4
Length = 5.0 ft	2	0.072	0.113	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.25	94.8	1,324.8	0.08	26.0	230.4
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)					1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.429	0.193	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.50	568.7	1,324.8	0.50	44.6	230.4
Length = 5.0 ft	2	0.429	0.193	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	1.50	568.7	1,324.8	0.49	44.6	230.4
+0.60D+0.60W+0.60H					1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.043	0.019	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.15	56.9	1,324.8	0.05	4.5	230.4
Length = 5.0 ft	2	0.043	0.019	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.15	56.9	1,324.8	0.05	4.5	230.4
+0.60D+0.70E+0.60H					1.00	1.00	1.00	1.000	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.043	0.019	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.15	56.9	1,324.8	0.05	4.5	230.4
Length = 5.0 ft	2	0.043	0.019	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.15	0.15	56.9	1,324.8	0.05	4.5	230.4

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1		0.0000	0.000	+D+L+H, LL Comb Run (*L)	-0.0264	3.520
2	+D+L+H, LL Comb Run (*L)	0.1929	5.000		0.0000	3.520

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.418	1.546	
Max Upward from Load Combinations	0.418	1.546	
Max Upward from Load Cases	0.400	1.344	
Max Downward from all Load Conditions (Resisting Uplift)	-0.278	-0.403	
Max Downward from Load Combinations (Resisting Uplift)	-0.259	-0.121	
Max Downward from Load Cases (Resisting Uplift)	-0.278	-0.403	
+D+H	0.018	0.202	
+D+L+H, LL Comb Run (*L)	-0.259	1.146	
+D+L+H, LL Comb Run (L*)	0.418	0.602	
+D+L+H, LL Comb Run (LL)	0.141	1.546	
+D+Lr+H, LL Comb Run (*L)	0.018	0.202	
+D+Lr+H, LL Comb Run (L*)	0.018	0.202	
+D+Lr+H, LL Comb Run (LL)	0.018	0.202	
+D+S+H	0.018	0.202	
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	-0.190	0.910	



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: North Deck Joists

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	0.318	0.502	
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	0.110	1.210	
+D+0.750L+0.750S+H, LL Comb Run (L*)	-0.190	0.910	
+D+0.750L+0.750S+H, LL Comb Run (L*)	0.318	0.502	
+D+0.750L+0.750S+H, LL Comb Run (LL)	0.110	1.210	
+D+0.60W+H	-0.004	-0.040	
+D+0.70E+H	0.018	0.202	
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*)	-0.206	0.728	
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*)	0.302	0.320	
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL)	0.093	1.028	
+D+0.750L+0.750S+0.450W+H, LL Comb Run (L*)	-0.206	0.728	
+D+0.750L+0.750S+0.450W+H, LL Comb Run (L*)	0.302	0.320	
+D+0.750L+0.750S+0.450W+H, LL Comb Run (LL)	0.093	1.028	
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	-0.190	0.910	
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	0.318	0.502	
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)	0.110	1.210	
+0.60D+0.60W+0.60H	-0.011	-0.121	
+0.60D+0.70E+0.60H	0.011	0.121	
D Only	0.018	0.202	
L Only, LL Comb Run (L*)	-0.278	0.944	
L Only, LL Comb Run (L*)	0.400	0.400	
L Only, LL Comb Run (LL)	0.122	1.344	
W Only	-0.037	-0.403	
H Only			



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Project Title:
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Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: North High Roof Beam

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : DF/DF

Wood Grade : 24F-V4

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

Fb + 2400 psi

Fb - 1850 psi

Fc - Prll 1650 psi

Fc - Perp 650 psi

Fv 265 psi

Ft 1100 psi

E : Modulus of Elasticity

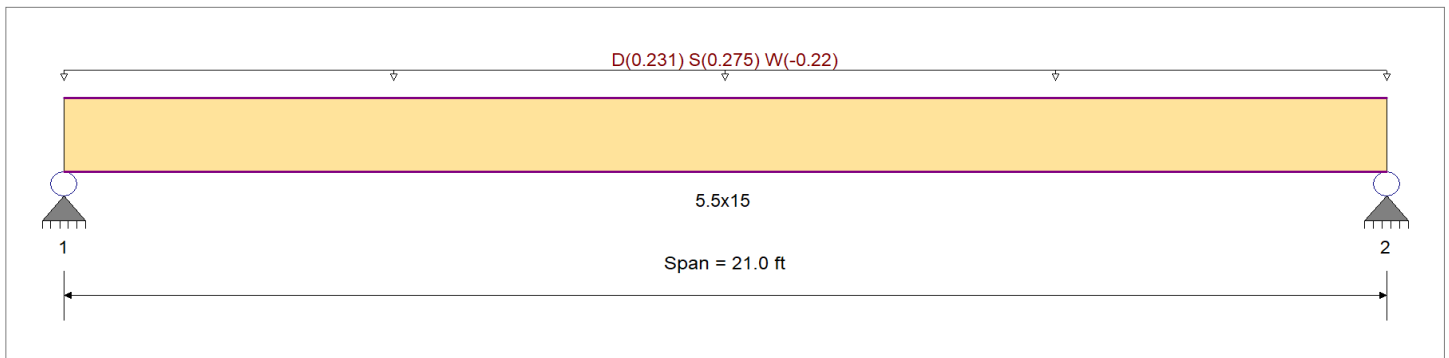
Ebend- xx 1800ksi

Eminbend - xx 950ksi

Ebend- yy 1600ksi

Eminbend - yy 850ksi

Density 31.21pcf



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.0210, S = 0.0250, W = -0.020 ksf, Tributary Width = 11.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.606 : 1	Maximum Shear Stress Ratio	=	0.280 : 1
Section used for this span		5.5x15	Section used for this span		5.5x15
fb: Actual	=	1,622.88psi	fv: Actual	=	85.32 psi
F'b	=	2,680.10psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	10.500ft	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	0.435 in	Ratio = 579 >= 360	Span: 1 : S Only		
Max Upward Transient Deflection	-0.348 in	Ratio = 724 >= 360	Span: 1 : W Only		
Max Downward Total Deflection	0.800 in	Ratio = 315 >= 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	CD	CM	C _t	CLx	C _v	Cfu	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.353	0.163	0.90	1.00	1.00	1.00	0.971	1.00	1.00	1.00	12.73	740.9	2,097.5	2.14	38.9	238.5
+D+S														0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.606	0.280	1.15	1.00	1.00	1.00	0.971	1.00	1.00	1.00	27.89	1,622.9	2,680.1	4.69	85.3	304.8
+D+0.750S														0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.523	0.242	1.15	1.00	1.00	1.00	0.971	1.00	1.00	1.00	24.10	1,402.4	2,680.1	4.05	73.7	304.8
+D+0.60W														0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.085	0.039	1.60	1.00	1.00	1.00	0.971	1.00	1.00	1.00	5.46	317.5	3,728.8	0.92	16.7	424.0
+D+0.450W														0.0	0.00	0.0	0.0



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: North High Roof Beam

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _V	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
Length = 21.0 ft		1	0.114	0.052	1.60	1.00	1.00	1.00	0.971	1.00	1.00	1.00	7.28	423.4	3,728.8	1.22	22.3	424.0
+D+0.750S+0.450W						1.00	1.00	1.00	0.971	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft		1	0.291	0.135	1.60	1.00	1.00	1.00	0.971	1.00	1.00	1.00	18.65	1,084.9	3,728.8	3.14	57.0	424.0
+0.60D+0.60W						1.00	1.00	1.00	0.971	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft		1	0.006	0.003	1.60	1.00	1.00	1.00	0.971	1.00	1.00	1.00	0.36	21.2	3,728.8	0.06	1.1	424.0
+0.60D						1.00	1.00	1.00	0.971	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft		1	0.119	0.055	1.60	1.00	1.00	1.00	0.971	1.00	1.00	1.00	7.64	444.5	3,728.8	1.29	23.4	424.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+S	0.7999	10.577		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	5.313	5.313
Max Upward from Load Combinations	5.313	5.313
Max Upward from Load Cases	2.888	2.888
Max Downward from all Load Conditions (Resisting Uplift)	-2.310	-2.310
Max Downward from Load Cases (Resisting Uplift)	-2.310	-2.310
D Only	2.426	2.426
+D+S	5.313	5.313
+D+0.750S	4.591	4.591
+D+0.60W	1.040	1.040
+D+0.450W	1.386	1.386
+D+0.750S+0.450W	3.552	3.552
+0.60D+0.60W	0.069	0.069
+0.60D	1.455	1.455
S Only	2.888	2.888
W Only	-2.310	-2.310



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: North Floor Beam

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combination Set : IBC 2021

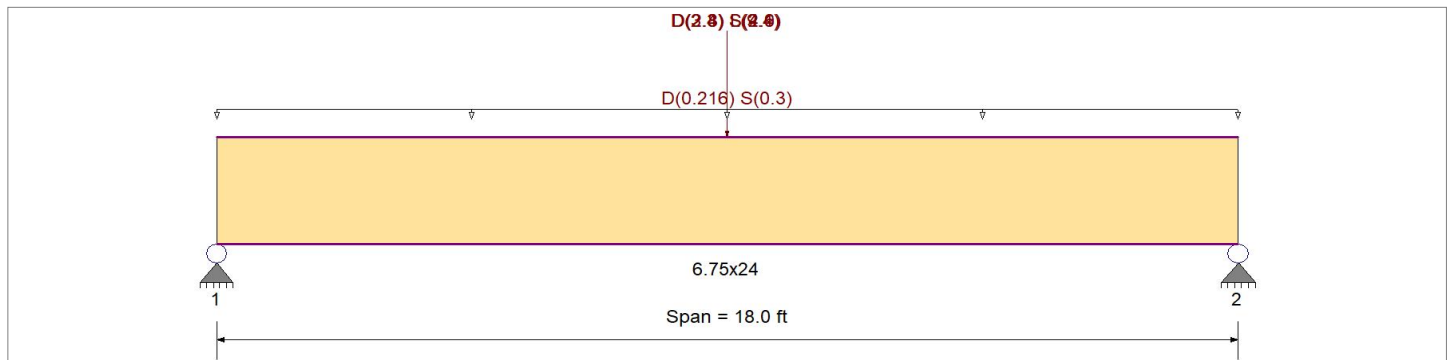
Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

Wood Species : DF/DF
Wood Grade : 24F-V4

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

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Fv	265.0 psi	Eminbend - yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Point Load : D = 2.80, L = 9.40 k @ 9.0 ft, (Floor Beam)
Point Load : D = 2.40, S = 2.90 k @ 9.0 ft, (High Roof Beam)
Point Load : D = 3.30, S = 4.60 k @ 9.0 ft, (Low Roof Beam)
Uniform Load : D = 0.0180, S = 0.0250 ksf, Tributary Width = 12.0 ft, (Low Roof)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.824 : 1	Maximum Shear Stress Ratio	=	0.416 : 1
Section used for this span		6.75x24	Section used for this span		6.75x24
fb: Actual	=	2,095.33psi	fv: Actual	=	126.73 psi
F'b	=	2,544.13psi	F'v	=	304.75 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	9.000ft	Location of maximum on span	=	16.029 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.164 in	Ratio = 1316 >=360	Span: 1 : S Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.394 in	Ratio = 547 >=180	Span: 1 : +D+0.750L+0.750S		
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	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only														0.0			
Length = 18.0 ft	1	0.437	0.224	0.90	1.00	1.00	1.00	0.922	1.00	1.00	1.00	47.00	870.3	1,991.1	5.77	53.4	238.5
+D+L														0.0			
Length = 18.0 ft	1	0.747	0.366	1.00	1.00	1.00	1.00	0.922	1.00	1.00	1.00	89.30	1,653.7	2,212.3	10.47	96.9	265.0
+D+S														0.0			
Length = 18.0 ft	1	0.676	0.353	1.15	1.00	1.00	1.00	0.922	1.00	1.00	1.00	92.90	1,720.3	2,544.1	11.63	107.7	304.8



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: North Floor Beam

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios			C _D	C _M	C _t	C _{Lx}	C _V	C _{fu}	C _i	C _r	Moment Values			Shear Values		
			M	V	CD									M	fb	F'b	V	fv	F'v
+D+0.750L						1.00	1.00	1.00	0.922	1.00	1.00	1.00				0.0	0.00	0.0	0.0
Length = 18.0 ft		1	0.527	0.260	1.25	1.00	1.00	1.00	0.922	1.00	1.00	1.00		78.72	1,457.8	2,765.4	9.29	86.0	331.3
+D+0.750L+0.750S						1.00	1.00	1.00	0.922	1.00	1.00	1.00				0.0	0.00	0.0	0.0
Length = 18.0 ft		1	0.824	0.416	1.15	1.00	1.00	1.00	0.922	1.00	1.00	1.00		113.15	2,095.3	2,544.1	13.69	126.7	304.8
+0.60D+0.10S						1.00	1.00	1.00	0.922	1.00	1.00	1.00				0.0	0.00	0.0	0.0
Length = 18.0 ft		1	0.172	0.088	1.60	1.00	1.00	1.00	0.922	1.00	1.00	1.00		32.79	607.2	3,539.7	4.05	37.5	424.0
+0.60D						1.00	1.00	1.00	0.922	1.00	1.00	1.00				0.0	0.00	0.0	0.0
Length = 18.0 ft		1	0.148	0.076	1.60	1.00	1.00	1.00	0.922	1.00	1.00	1.00		28.20	522.2	3,539.7	3.46	32.0	424.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+0.750L+0.750S	0.3942	9.066		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	14.557	14.557
Max Upward from Load Combinations	14.557	14.557
Max Upward from Load Cases	6.450	6.450
D Only	6.194	6.194
+D+L	10.894	10.894
+D+S	12.644	12.644
+D+0.750L	9.719	9.719
+D+0.750L+0.750S	14.557	14.557
+0.60D	3.716	3.716
L Only	4.700	4.700
S Only	6.450	6.450

4.0 - WALL AND COLUMN DESIGN



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typical Ext Stud: 2x6 at 16" oc (Zone 4)

Code References

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combinations Used : IBC 2021

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name		2x6	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.		Graded Lumber	
Overall Column Height		10 ft		Wood Member Type		Sawn	
(Used for non-slender calculations)							
Wood Species		Douglas Fir-Larch		Exact Width		1.50 in	
Wood Grade		No.2		Exact Depth		5.50 in	
Fb +		900.0 psi	Fv	180.0 psi	Area	8.250 in^2	Allow Stress Modification Factors
Fb -		900.0 psi	Ft	575.0 psi	Ix	20.797 in^4	Cf or Cv for Bending 1.30
Fc - Prll		1,350.0 psi	Density	31.210 pcf	Iy	1.547 in^4	Cf or Cv for Compression 1.10
Fc - Perp		625.0 psi					Cf or Cv for Tension 1.30
E : Modulus of Elasticity . . .		x-x Bending	y-y Bending	Axial			Cm : Wet Use Factor 1.0
		Basic	1,600.0	1,600.0	1,600.0 ksi		Ct : Temperature Factc 1.0
		Minimum	580.0	580.0			Cfu : Flat Use Factor 1.0
							Kf : Built-up columns 1.0
							Use Cr : Repetitive ? No
Column Buckling Condition:							
ABOUT X-X Axis: Lux = 10 ft, Kx = 1.0							
Fully braced against buckling ABOUT Y-Y Axis							

Applied Loads

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

Column self weight included : 17.881 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 10.0 ft, D = 5.40 k

BENDING LOADS . . .

Zone 4: Lat. Uniform Load creating Mx-x, W = 0.02280 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9649 : 1**
Load Combination +D+0.60W
Governing NDS Forumla Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base 4.966 ft
At maximum location values are . . .
Applied Axial 5.418 k
Applied Mx 0.1710 k-ft
Applied My 0.0 k-ft
Fc : Allowable 893.75 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.1140 k	Bottom along Y-Y	0.1140 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.1558 in	at	5.034 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 . . .

<u>Bending</u>	<u>Compression</u>	<u>Tension</u>
----------------	--------------------	----------------

PASS Maximum Shear Stress Ratio = **0.04318 : 1**
Load Combination +D+0.60W
Location of max.above base 0.0 ft
Applied Design Shear 18.655 psi
Allowable Shear 288.0 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	0.585	0.8404	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W	1.600	0.376	0.9649	PASS	4.966 ft	0.04318	PASS	0.0 ft
+D+0.450W	1.600	0.376	0.8587	PASS	4.966 ft	0.03239	PASS	10.0 ft
+0.60D+0.60W	1.600	0.376	0.4414	PASS	4.966 ft	0.04318	PASS	0.0 ft
+0.60D	1.600	0.376	0.4409	PASS	0.0 ft	0.0	PASS	10.0 ft



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Typical Ext Stud: 2x6 at 16" oc (Zone 4)

Maximum Reactions

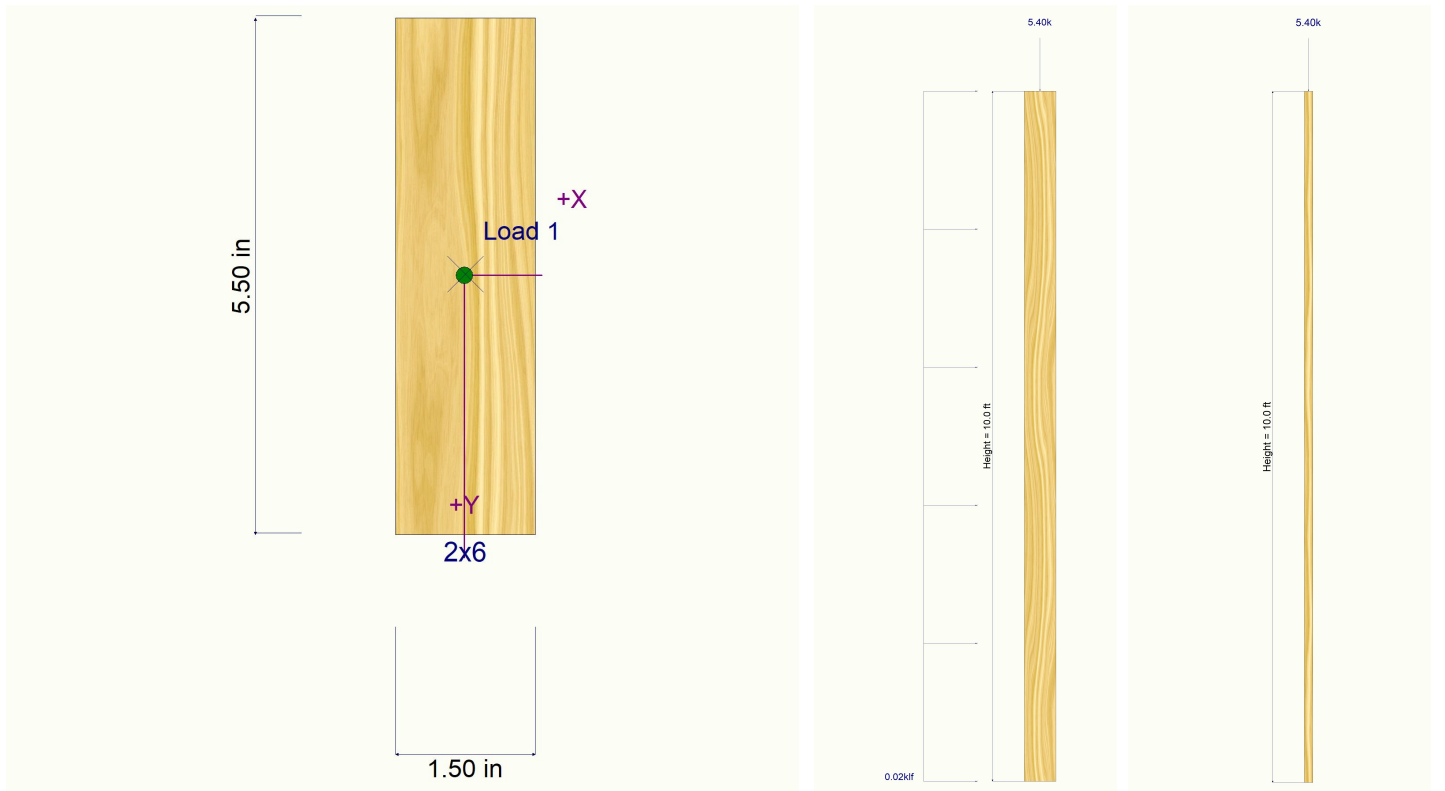
Note: Only non-zero reactions are listed.

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						5.418					
+D+0.60W				0.068	0.068	5.418					
+D+0.450W				0.051	0.051	5.418					
+0.60D+0.60W				0.068	0.068	3.251					
+0.60D						3.251					
W Only				0.114	0.114						

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+0.60W	0.0000 in	0.000 ft	0.093 in	5.034 ft
+D+0.450W	0.0000 in	0.000 ft	0.070 in	5.034 ft
+0.60D+0.60W	0.0000 in	0.000 ft	0.093 in	5.034 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.156 in	5.034 ft

Sketches





AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Typical Ext Stud: 2x6 at 16" oc (Zone 5)

Code References

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combinations Used : IBC 2021

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name		2x6	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.		Graded Lumber	
Overall Column Height		10 ft		Wood Member Type		Sawn	
(Used for non-slender calculations)							
Wood Species		Douglas Fir-Larch		Exact Width		1.50 in	
Wood Grade		No.2		Exact Depth		5.50 in	
Fb +		900.0 psi	Fv	180.0 psi	Area	8.250 in^2	Allow Stress Modification Factors
Fb -		900.0 psi	Ft	575.0 psi	Ix	20.797 in^4	Cf or Cv for Bending 1.30
Fc - Prll		1,350.0 psi	Density	31.210 pcf	Iy	1.547 in^4	Cf or Cv for Compression 1.10
Fc - Perp		625.0 psi					Cf or Cv for Tension 1.30
E : Modulus of Elasticity . . .		x-x Bending	y-y Bending	Axial			Cm : Wet Use Factor 1.0
		Basic	1,600.0	1,600.0	1,600.0 ksi		Ct : Temperature Factc 1.0
		Minimum	580.0	580.0			Cfu : Flat Use Factor 1.0
							Kf : Built-up columns 1.0
							Use Cr : Repetitive ? No
Column Buckling Condition:							
ABOUT X-X Axis: Lux = 10 ft, Kx = 1.0							
Fully braced against buckling ABOUT Y-Y Axis							

Applied Loads

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

Column self weight included : 17.881 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 10.0 ft, D = 5.20 k

BENDING LOADS . . .

Zone 5: Lat. Uniform Load creating Mx-x, W = 0.02810 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9902 : 1**
Load Combination +D+0.60W
Governing NDS Forumla Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base 4.966 ft
At maximum location values are . . .
Applied Axial 5.218 k
Applied Mx 0.2107 k-ft
Applied My 0.0 k-ft
Fc : Allowable 893.75 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.1405 k	Bottom along Y-Y	0.1405 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.1921 in	at	5.034 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 . . .

<u>Bending</u>	<u>Compression</u>	<u>Tension</u>
----------------	--------------------	----------------

PASS Maximum Shear Stress Ratio = **0.05322 : 1**
Load Combination +D+0.60W
Location of max.above base 10.0 ft
Applied Design Shear 22.991 psi
Allowable Shear 288.0 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	0.585	0.8093	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W	1.600	0.376	0.9902	PASS	4.966 ft	0.05322	PASS	10.0 ft
+D+0.450W	1.600	0.376	0.8678	PASS	4.966 ft	0.03992	PASS	10.0 ft
+0.60D+0.60W	1.600	0.376	0.4706	PASS	5.034 ft	0.05322	PASS	10.0 ft
+0.60D	1.600	0.376	0.4246	PASS	0.0 ft	0.0	PASS	10.0 ft



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Typical Ext Stud: 2x6 at 16" oc (Zone 5)

Maximum Reactions

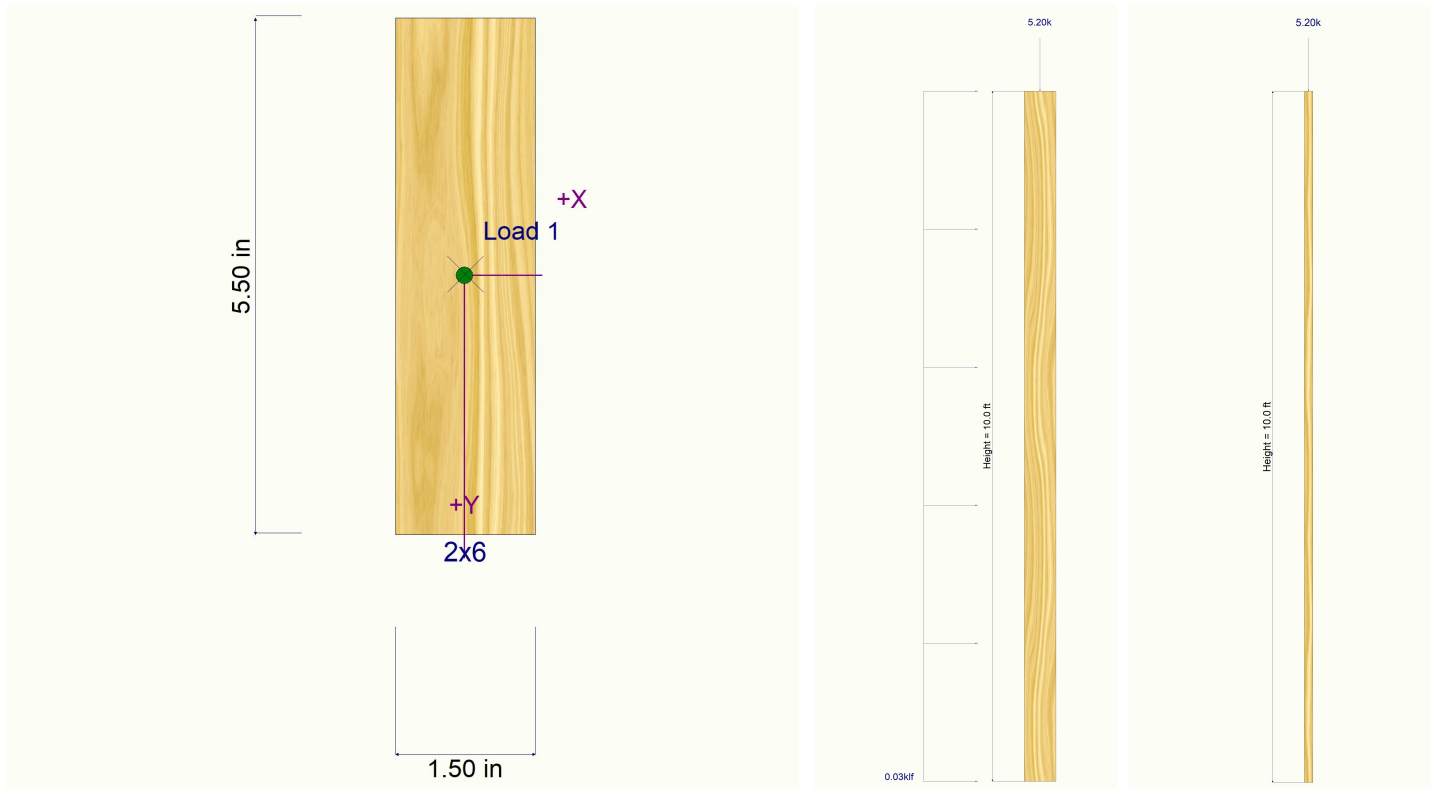
Note: Only non-zero reactions are listed.

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						5.218					
+D+0.60W				0.084	0.084	5.218					
+D+0.450W				0.063	0.063	5.218					
+0.60D+0.60W				0.084	0.084	3.131					
+0.60D						3.131					
W Only				0.141	0.141						

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+0.60W	0.0000 in	0.000 ft	0.115 in	5.034 ft
+D+0.450W	0.0000 in	0.000 ft	0.086 in	5.034 ft
+0.60D+0.60W	0.0000 in	0.000 ft	0.115 in	5.034 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.192 in	5.034 ft

Sketches





AHBL, INC.
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Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Typical Int Stud: 2x6 at 16" oc

Code References

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combinations Used : IBC 2021

General Information

Analysis Method :	Allowable Stress Design			Wood Section Name	2x6	
End Fixities	Top & Bottom Pinned			Wood Grading/Manuf.	Graded Lumber	
Overall Column Height	10 ft			Wood Member Type	Sawn	
(Used for non-slender calculations)						
Wood Species	Douglas Fir-Larch			Exact Width	1.50 in	Allow Stress Modification Factors
Wood Grade	No.2			Exact Depth	5.50 in	
Fb +	900.0 psi	Fv	180.0 psi	Area	8.250 in^2	Cf or Cv for Bending 1.30
Fb -	900.0 psi	Ft	575.0 psi	Ix	20.797 in^4	Cf or Cv for Compression 1.10
Fc - Prll	1,350.0 psi	Density	31.210 pcf	Iy	1.547 in^4	Cf or Cv for Tension 1.30
Fc - Perp	625.0 psi					Cm : Wet Use Factor 1.0
						Ct : Temperature Factc 1.0
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial			Cfu : Flat Use Factor 1.0
	Basic	1,600.0	1,600.0	1,600.0 ksi		Kf : Built-up columns 1.0
	Minimum	580.0	580.0			Use Cr : Repetitive ? No
Column Buckling Condition:						
ABOUT X-X Axis: Lux = 10 ft, Kx = 1.0						
Fully braced against buckling ABOUT Y-Y Axis						

Applied Loads

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

Column self weight included : 17.881 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 10.0 ft, D = 5.40 k

BENDING LOADS . . .

Lat. Uniform Load creating Mx-x, L = 0.00670 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9917 : 1**
Load Combination +D+L
Governing NDS Forumla Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base 5.034 ft
At maximum location values are . . .
Applied Axial 5.418 k
Applied Mx 0.08375 k-ft
Applied My 0.0 k-ft
Fc : Allowable 808.37 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.03350 k	Bottom along Y-Y	0.03350 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.04579 in	at	5.034 ft	above base
for load combination : +D+L				
Along X-X	0.0 in	at	0.0 ft	above base
for load combination : n/a				

Other Factors used to calculate allowable stresses . . .

<u>Bending</u>	<u>Compression</u>	<u>Tension</u>
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PASS Maximum Shear Stress Ratio = **0.03384 : 1**
Load Combination +D+L
Location of max.above base 10.0 ft
Applied Design Shear 9.136 psi
Allowable Shear 180.0 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	0.585	0.8404	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+L	1.000	0.544	0.9917	PASS	5.034 ft	0.03384	PASS	10.0 ft
+D+0.750L	1.250	0.461	0.7889	PASS	4.966 ft	0.02030	PASS	10.0 ft
+0.60D	1.600	0.376	0.4409	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					5.418				



AHBL, INC.
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Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Typical Int Stud: 2x6 at 16" oc

Maximum Reactions

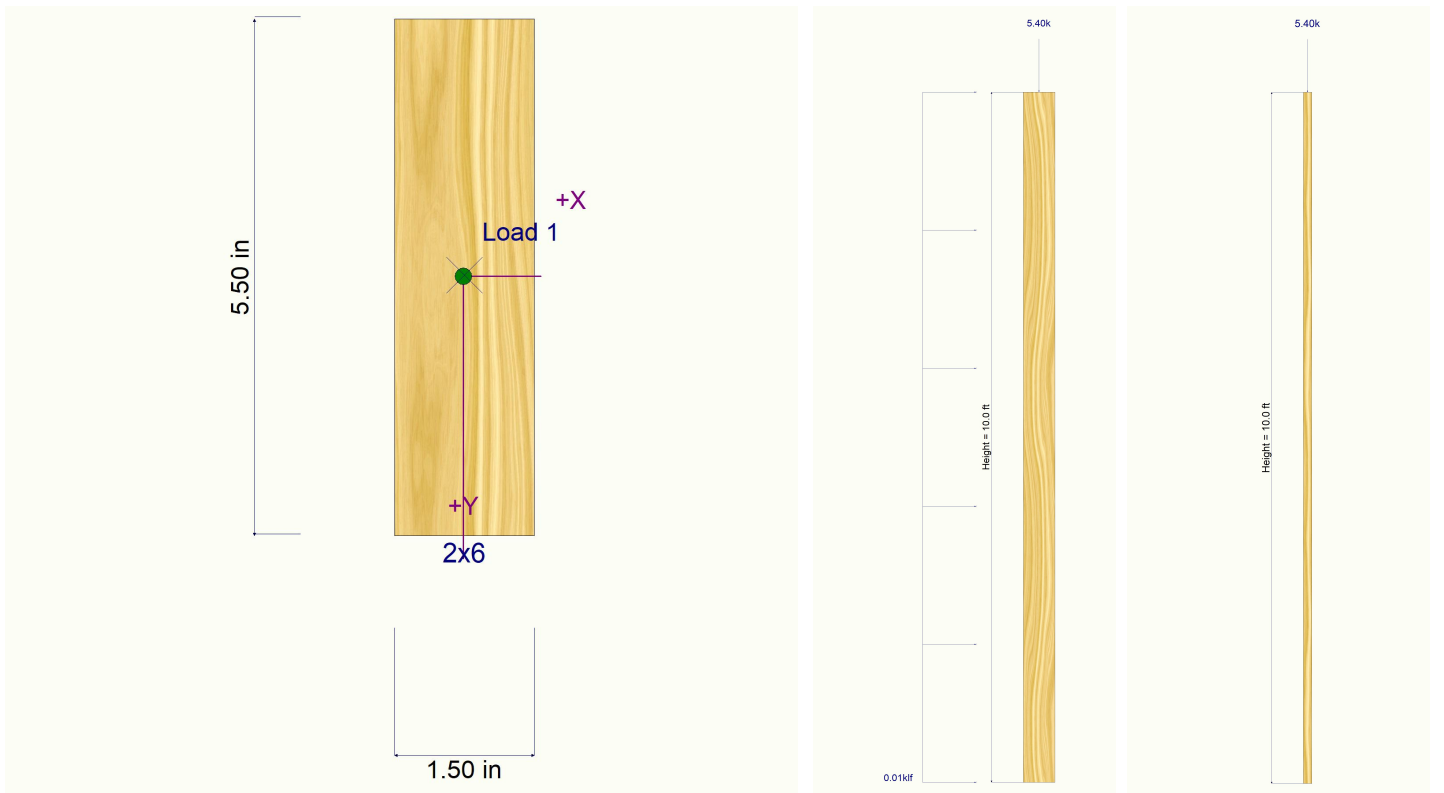
Note: Only non-zero reactions are listed.

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+L				0.034	0.034	5.418					
+D+0.750L				0.025	0.025	5.418					
+0.60D						3.251					
L Only				0.034	0.034						

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+L	0.0000 in	0.000 ft	0.046 in	5.034 ft
+D+0.750L	0.0000 in	0.000 ft	0.034 in	5.034 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.046 in	5.034 ft

Sketches





AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Typical Int Stud: 2x4 at 16" oc

Code References

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combinations Used : IBC 2021

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name		2x4	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.		Graded Lumber	
Overall Column Height		10 ft		Wood Member Type		Sawn	
(Used for non-slender calculations)							
Wood Species		Douglas Fir-Larch		Exact Width		1.50 in	
Wood Grade		No.2		Exact Depth		3.50 in	
Fb +		900.0 psi	Fv	180.0 psi	Area	5.250 in^2	Allow Stress Modification Factors
Fb -		900.0 psi	Ft	575.0 psi	Ix	5.359 in^4	Cf or Cv for Bending 1.50
Fc - Prll		1,350.0 psi	Density	31.210 pcf	Iy	0.9844 in^4	Cf or Cv for Compression 1.150
Fc - Perp		625.0 psi					Cf or Cv for Tension 1.50
E : Modulus of Elasticity . . .		x-x Bending	y-y Bending	Axial			Cm : Wet Use Factor 1.0
		Basic	1,600.0	1,600.0	1,600.0 ksi		Ct : Temperature Factc 1.0
		Minimum	580.0	580.0			Cfu : Flat Use Factor 1.0
							Kf : Built-up columns 1.0
							Use Cr : Repetitive ? No
Column Buckling Condition:							
ABOUT X-X Axis: Lux = 10 ft, Kx = 1.0							
Fully braced against buckling ABOUT Y-Y Axis							

Applied Loads

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

Column self weight included : 11.379 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 10.0 ft, D = 1.20 k

BENDING LOADS . . .

Lat. Uniform Load creating Mx-x, L = 0.00670 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9332 : 1**
Load Combination +D+L
Governing NDS Forumla Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base 4.966 ft
At maximum location values are . . .
Applied Axial 1.211 k
Applied Mx 0.08375 k-ft
Applied My 0.0 k-ft
Fc : Allowable 380.822 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.03350 k	Bottom along Y-Y	0.03350 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.1777 in	at	5.034 ft	above base
for load combination : +D+L				
Along X-X	0.0 in	at	0.0 ft	above base
for load combination : n/a				

Other Factors used to calculate allowable stresses . . .

<u>Bending</u>	<u>Compression</u>	<u>Tension</u>
----------------	--------------------	----------------

PASS Maximum Shear Stress Ratio = **0.05318 : 1**
Load Combination +D+L
Location of max.above base 10.0 ft
Applied Design Shear 14.357 psi
Allowable Shear 180.0 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	0.270	0.6111	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+L	1.000	0.245	0.9332	PASS	4.966 ft	0.05318	PASS	10.0 ft
+D+0.750L	1.250	0.199	0.6967	PASS	4.966 ft	0.03191	PASS	10.0 ft
+0.60D	1.600	0.157	0.3541	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					1.211				



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Typical Int Stud: 2x4 at 16" oc

Maximum Reactions

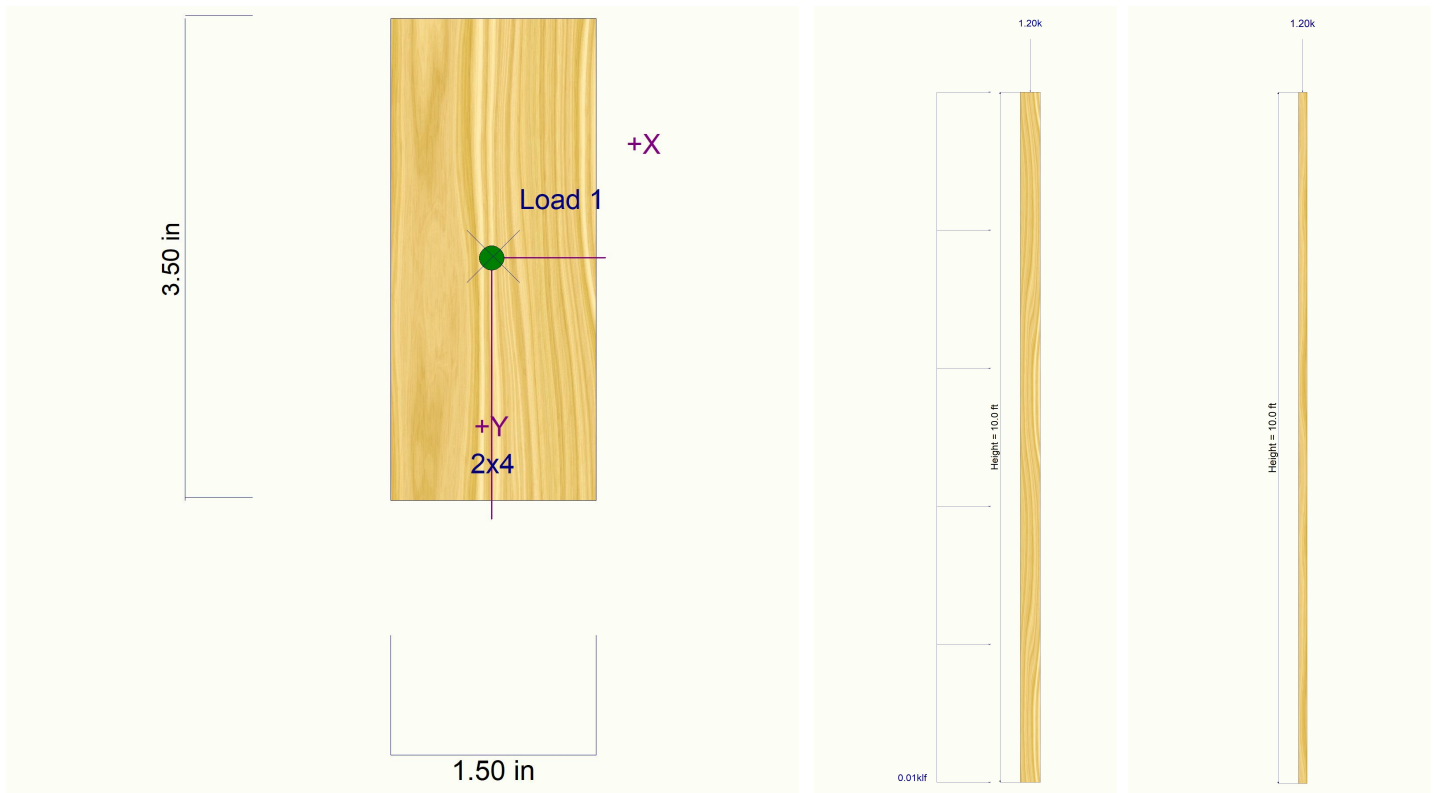
Note: Only non-zero reactions are listed.

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+L				0.034	0.034	1.211					
+D+0.750L				0.025	0.025	1.211					
+0.60D						0.727					
L Only				0.034	0.034						

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+L	0.0000 in	0.000 ft	0.178 in	5.034 ft
+D+0.750L	0.0000 in	0.000 ft	0.133 in	5.034 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.178 in	5.034 ft

Sketches





AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: (2) 2x4 BU Stud Column

Code References

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combinations Used : IBC 2021

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name		2-2x4	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.		Graded Lumber	
Overall Column Height		10 ft		Wood Member Type		Sawn	
(Used for non-slender calculations)							
Wood Species		Douglas Fir-Larch		Exact Width		3.0 in	
Wood Grade		No.2		Exact Depth		3.50 in	
Fb +		900.0 psi	Fv	180.0 psi	Area	10.50 in^2	Allow Stress Modification Factors
Fb -		900.0 psi	Ft	575.0 psi	Ix	10.719 in^4	Cf or Cv for Bending 1.50
Fc - Prll		1,350.0 psi	Density	31.210 pcf	Iy	7.875 in^4	Cf or Cv for Compression 1.150
Fc - Perp		625.0 psi					Cf or Cv for Tension 1.50
E : Modulus of Elasticity . . .		x-x Bending	y-y Bending	Axial			Cm : Wet Use Factor 1.0
		Basic	1,600.0	1,600.0	1,600.0 ksi		Ct : Temperature Factc 1.0
		Minimum	580.0	580.0			Cfu : Flat Use Factor 1.0
					Column Buckling Condition:		Kf : Built-up columns 1.0
					ABOUT X-X Axis: Lux = 10 ft, Kx = 1.0		Use Cr : Repetitive ? No
					Fully braced against buckling ABOUT Y-Y Axis		

Applied Loads

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

Column self weight included : 22.757 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 10.0 ft, D = 3.0 k

BENDING LOADS . . .

Lat. Uniform Load creating Mx-x, L = 0.00670 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9907 : 1**
Load Combination +D+L
Governing NDS Forumla Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base 5.034 ft
At maximum location values are . . .
Applied Axial 3.023 k
Applied Mx 0.08375 k-ft
Applied My 0.0 k-ft
Fc : Allowable 380.822 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.03350 k	Bottom along Y-Y	0.03350 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.08885 in	at	5.034 ft	above base
for load combination : +D+L				
Along X-X	0.0 in	at	0.0 ft	above base
for load combination : n/a				

Other Factors used to calculate allowable stresses . . .

<u>Bending</u>	<u>Compression</u>	<u>Tension</u>
----------------	--------------------	----------------

PASS Maximum Shear Stress Ratio = **0.02659 : 1**
Load Combination +D+L
Location of max.above base 10.0 ft
Applied Design Shear 7.179 psi
Allowable Shear 180.0 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	0.270	0.7624	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+L	1.000	0.245	0.9907	PASS	5.034 ft	0.02659	PASS	10.0 ft
+D+0.750L	1.250	0.199	0.8068	PASS	4.966 ft	0.01595	PASS	10.0 ft
+0.60D	1.600	0.157	0.4418	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					3.023				



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: (2) 2x4 BU Stud Column

Maximum Reactions

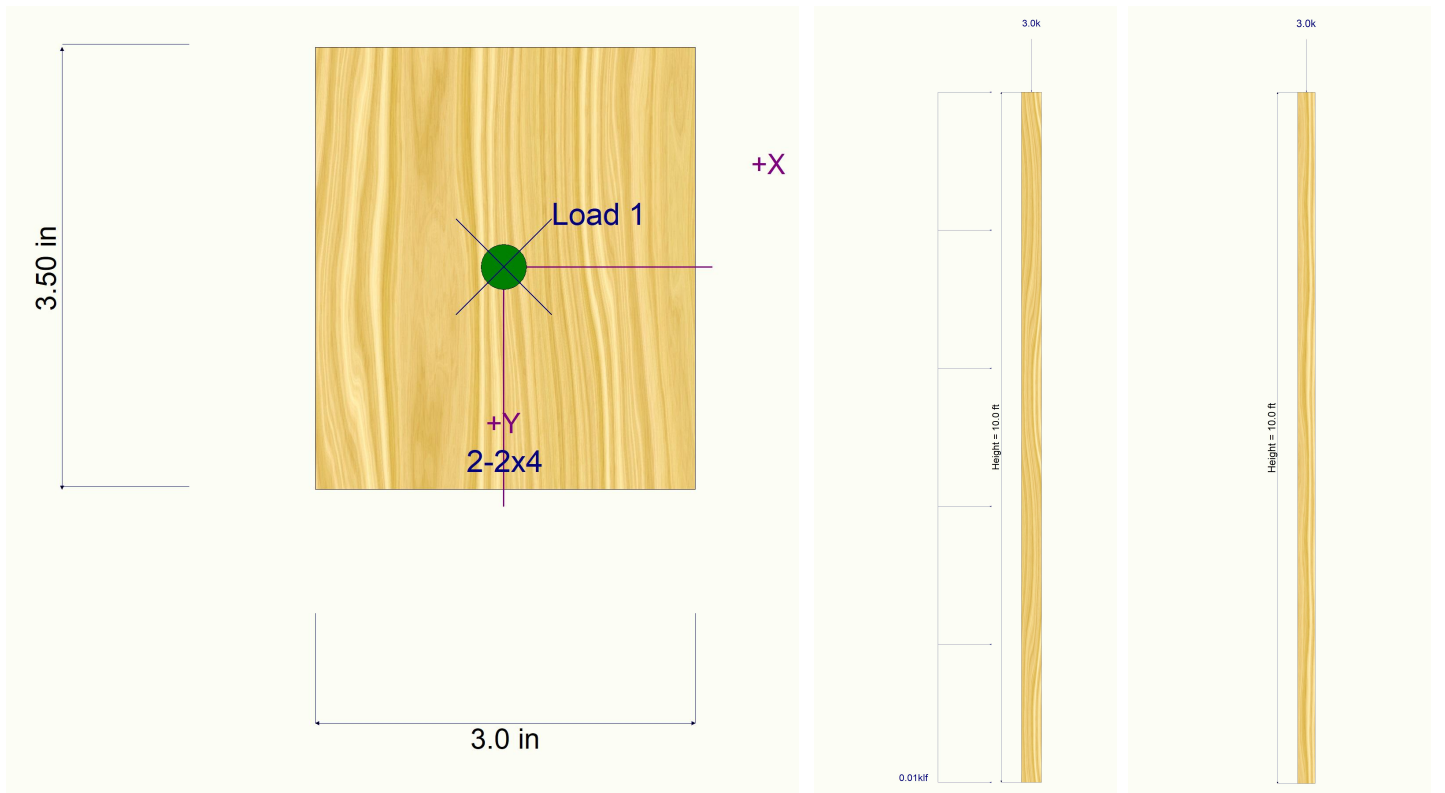
Note: Only non-zero reactions are listed.

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+L				0.034	0.034	3.023					
+D+0.750L				0.025	0.025	3.023					
+0.60D						1.814					
L Only				0.034	0.034						

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+L	0.0000 in	0.000 ft	0.089 in	5.034 ft
+D+0.750L	0.0000 in	0.000 ft	0.067 in	5.034 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.089 in	5.034 ft

Sketches





AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: (3) 2x4 BU Stud Column

Code References

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combinations Used : IBC 2021

General Information

Analysis Method :	Allowable Stress Design	Wood Section Name	3-2x4
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Graded Lumber
Overall Column Height	10 ft	Wood Member Type	Sawn
(Used for non-slender calculations)			
Wood Species	Douglas Fir-Larch	Exact Width	4.50 in
Wood Grade	No.2	Exact Depth	3.50 in
Fb +	900.0 psi	Area	15.750 in^2
Fb -	900.0 psi	Ix	16.078 in^4
Fc - Prll	1,350.0 psi	Iy	26.578 in^4
Fc - Perp	625.0 psi		
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
	Basic	1,600.0	1,600.0
	Minimum	580.0	580.0
			1,600.0 ksi
			Column Buckling Condition:
			ABOUT X-X Axis: Lux = 10 ft, Kx = 1.0
			Fully braced against buckling ABOUT Y-Y Axis

Applied Loads

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

Column self weight included : 34.136 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 10.0 ft, D = 4.80 k

BENDING LOADS . . .

Lat. Uniform Load creating Mx-x, L = 0.00670 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9827 : 1**
Load Combination +D+L
Governing NDS Formula Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base 5.034 ft
At maximum location values are . . .
Applied Axial 4.834 k
Applied Mx 0.08375 k-ft
Applied My 0.0 k-ft
Fc : Allowable 380.822 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.03350 k	Bottom along Y-Y	0.03350 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.05923 in	at	5.034 ft	above base
for load combination : +D+L				
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 = **0.01773 : 1**
Load Combination +D+L
Location of max.above base 10.0 ft
Applied Design Shear 4.786 psi
Allowable Shear 180.0 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	0.270	0.8128	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+L	1.000	0.245	0.9827	PASS	5.034 ft	0.01773	PASS	10.0 ft
+D+0.750L	1.250	0.199	0.8309	PASS	4.966 ft	0.01064	PASS	10.0 ft
+0.60D	1.600	0.157	0.4710	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					4.834				



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2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: (3) 2x4 BU Stud Column

Maximum Reactions

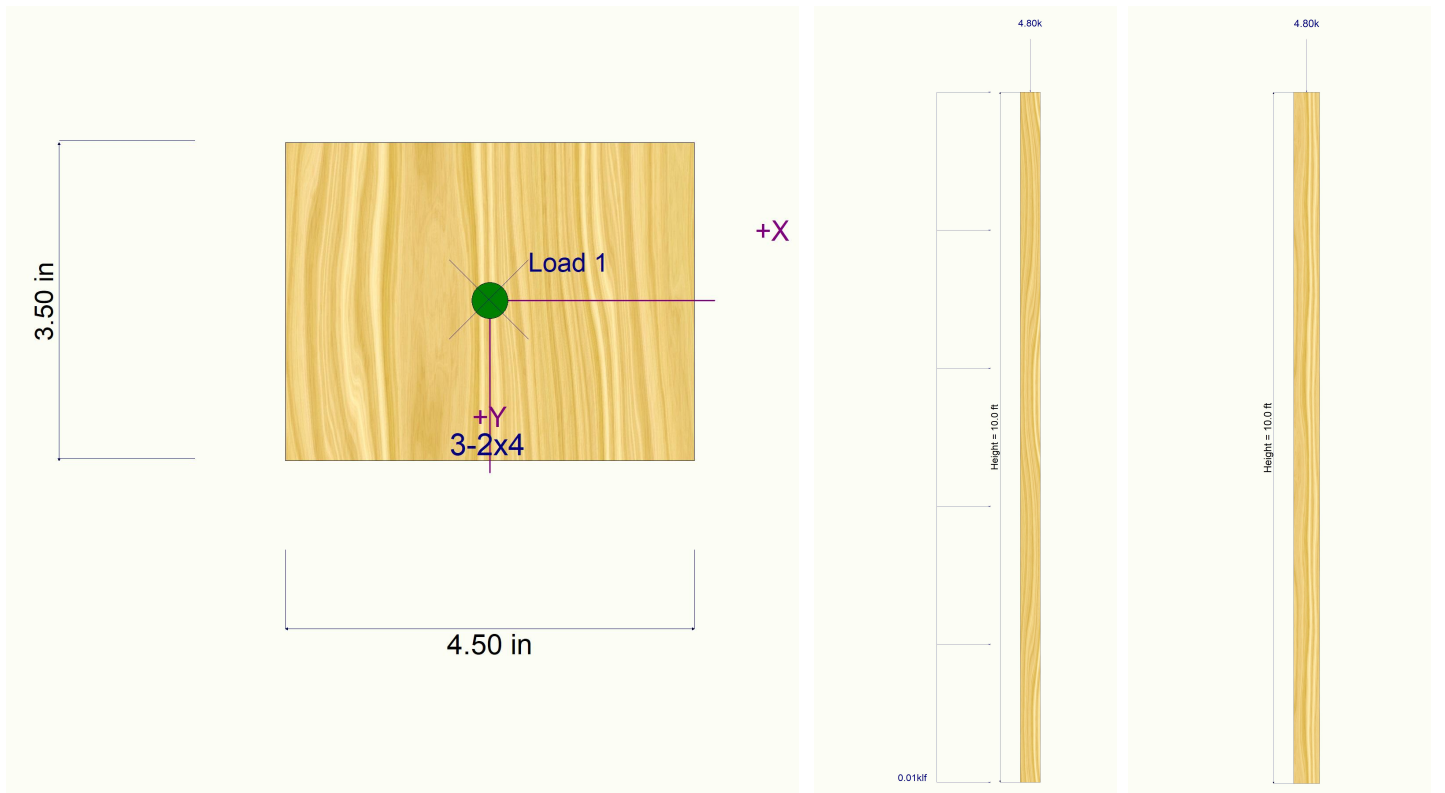
Note: Only non-zero reactions are listed.

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+L				0.034	0.034	4.834					
+D+0.750L				0.025	0.025	4.834					
+0.60D						2.900					
L Only				0.034	0.034						

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+L	0.0000 in	0.000 ft	0.059 in	5.034 ft
+D+0.750L	0.0000 in	0.000 ft	0.044 in	5.034 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.059 in	5.034 ft

Sketches





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Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: (4) 2x4 BU Stud Column

Code References

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combinations Used : IBC 2021

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name		4-2x4	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.		Graded Lumber	
Overall Column Height		10 ft		Wood Member Type		Sawn	
(Used for non-slender calculations)				Exact Width		6.0 in	
Wood Species		Douglas Fir-Larch		Exact Depth		3.50 in	
Wood Grade		No.2		Area		21.0 in^2	
Fb +		900.0 psi	Fv	180.0 psi	Ix	21.438 in^4	Allow Stress Modification Factors
Fb -		900.0 psi	Ft	575.0 psi	Iy	63.0 in^4	Cf or Cv for Bending
Fc - Prll		1,350.0 psi	Density	31.210 pcf			Cf or Cv for Compression
Fc - Perp		625.0 psi					Cf or Cv for Tension
E : Modulus of Elasticity . . .		x-x Bending	y-y Bending	Axial			Cm : Wet Use Factor
		Basic	1,600.0	1,600.0	1,600.0 ksi		Ct : Temperature Factc
		Minimum	580.0	580.0			Cfu : Flat Use Factor
					Column Buckling Condition:		Kf : Built-up columns
					ABOUT X-X Axis: Lux = 10 ft, Kx = 1.0		Use Cr : Repetitive ?
					Fully braced against buckling ABOUT Y-Y Axis		No

Applied Loads

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

Column self weight included : 45.515 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 10.0 ft, D = 6.60 k

BENDING LOADS . . .

Lat. Uniform Load creating Mx-x, L = 0.00670 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9671 : 1**
Load Combination +D+L
Governing NDS Forumla Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base 4.966 ft
At maximum location values are . . .
Applied Axial 6.646 k
Applied Mx 0.08375 k-ft
Applied My 0.0 k-ft
Fc : Allowable 380.822 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.03350 k	Bottom along Y-Y	0.03350 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.04442 in	at	5.034 ft	above base
for load combination : +D+L				
Along X-X	0.0 in	at	0.0 ft	above base
for load combination : n/a				

Other Factors used to calculate allowable stresses . . .

<u>Bending</u>	<u>Compression</u>	<u>Tension</u>
----------------	--------------------	----------------

PASS Maximum Shear Stress Ratio = **0.01329 : 1**
Load Combination +D+L
Location of max.above base 10.0 ft
Applied Design Shear 3.589 psi
Allowable Shear 180.0 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	0.270	0.8380	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+L	1.000	0.245	0.9671	PASS	4.966 ft	0.01329	PASS	10.0 ft
+D+0.750L	1.250	0.199	0.8368	PASS	4.966 ft	0.007976	PASS	10.0 ft
+0.60D	1.600	0.157	0.4856	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					6.646				



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Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: (4) 2x4 BU Stud Column

Maximum Reactions

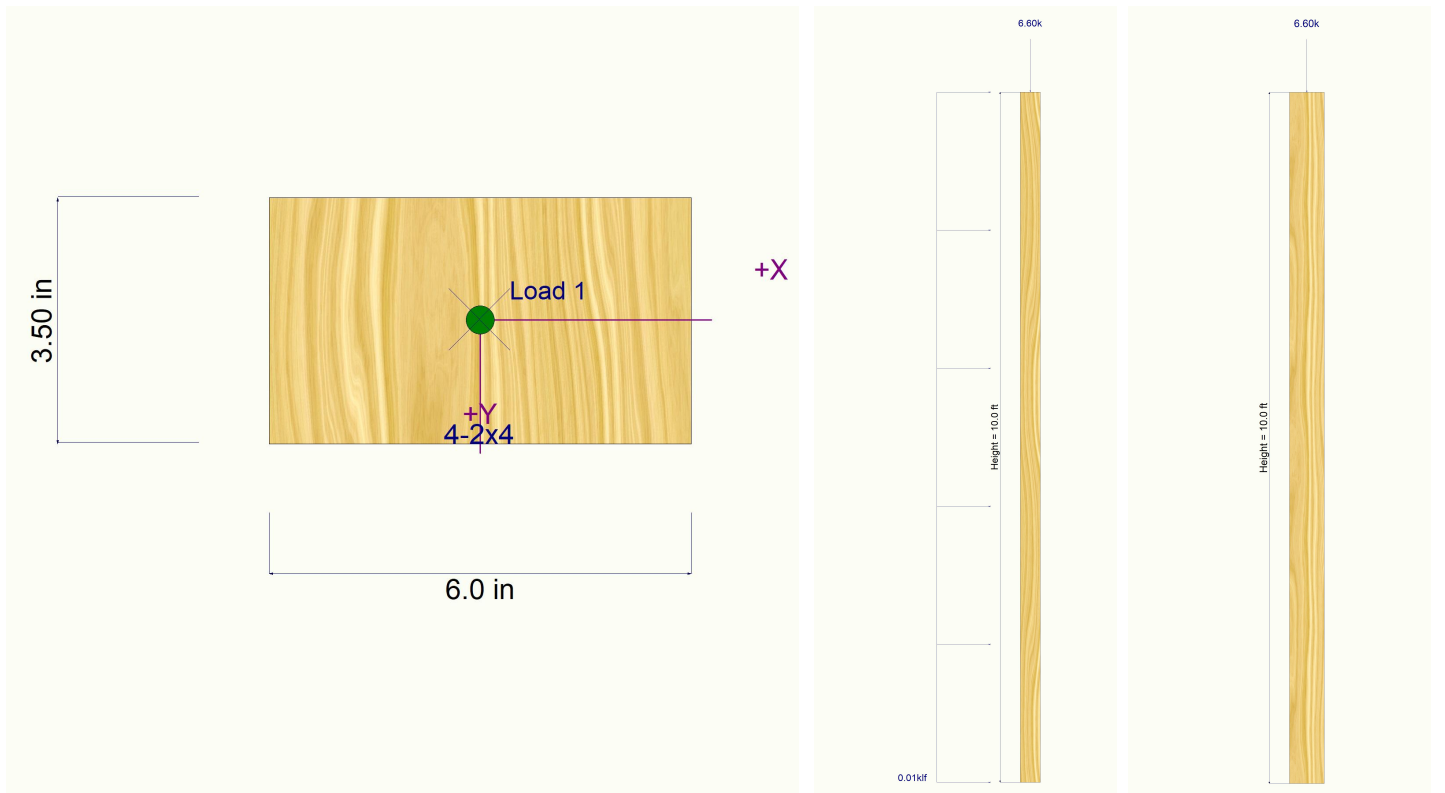
Note: Only non-zero reactions are listed.

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+L				0.034	0.034	6.646					
+D+0.750L				0.025	0.025	6.646					
+0.60D						3.987					
L Only				0.034	0.034						

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+L	0.0000 in	0.000 ft	0.044 in	5.034 ft
+D+0.750L	0.0000 in	0.000 ft	0.033 in	5.034 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.044 in	5.034 ft

Sketches





AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: (2) 2x6 BU Stud Column (Zone 4)

Code References

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combinations Used : IBC 2021

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name		2-2x6	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.		Graded Lumber	
Overall Column Height		10 ft		Wood Member Type		Sawn	
(Used for non-slender calculations)				Exact Width		3.0 in	
Wood Species		Douglas Fir-Larch		Exact Depth		5.50 in	
Wood Grade		No.2		Area		16.50 in^2	
Fb +		900.0 psi	Fv	180.0 psi	Ix	41.594 in^4	Allow Stress Modification Factors
Fb -		900.0 psi	Ft	575.0 psi	Iy	12.375 in^4	Cf or Cv for Bending
Fc - Prll		1,350.0 psi	Density	31.210 pcf			Cf or Cv for Compression
Fc - Perp		625.0 psi					Cf or Cv for Tension
E : Modulus of Elasticity . . .		x-x Bending	y-y Bending	Axial			Cm : Wet Use Factor
		Basic	1,600.0	1,600.0	1,600.0 ksi		Ct : Temperature Factc
		Minimum	580.0	580.0			Cfu : Flat Use Factor
				Column Buckling Condition:			
				ABOUT X-X Axis: Lux = 10 ft, Kx = 1.0			
				Fully braced against buckling ABOUT Y-Y Axis			
				Kf : Built-up columns			
				Use Cr : Repetitive ?			
				No			

Applied Loads

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

Column self weight included : 35.761 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 10.0 ft, D = 12.30 k

BENDING LOADS . . .

Zone 4: Lat. Uniform Load creating Mx-x, W = 0.02280 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9862 : 1**
Load Combination +D+0.60W
Governing NDS Forumla Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base 5.034 ft
At maximum location values are . . .
Applied Axial 12.336 k
Applied Mx 0.1710 k-ft
Applied My 0.0 k-ft
Fc : Allowable 893.75 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.1140 k	Bottom along Y-Y	0.1140 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.07792 in	at	5.034 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 . . .

<u>Bending</u>	<u>Compression</u>	<u>Tension</u>
----------------	--------------------	----------------

PASS Maximum Shear Stress Ratio = **0.02159 : 1**
Load Combination +D+0.60W
Location of max.above base 10.0 ft
Applied Design Shear 9.327 psi
Allowable Shear 288.0 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	0.585	0.9567	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W	1.600	0.376	0.9862	PASS	5.034 ft	0.02159	PASS	10.0 ft
+D+0.450W	1.600	0.376	0.9146	PASS	4.966 ft	0.01619	PASS	10.0 ft
+0.60D+0.60W	1.600	0.376	0.5019	PASS	4.966 ft	0.02159	PASS	10.0 ft
+0.60D	1.600	0.376	0.5019	PASS	0.0 ft	0.0	PASS	10.0 ft



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: (2) 2x6 BU Stud Column (Zone 4)

Maximum Reactions

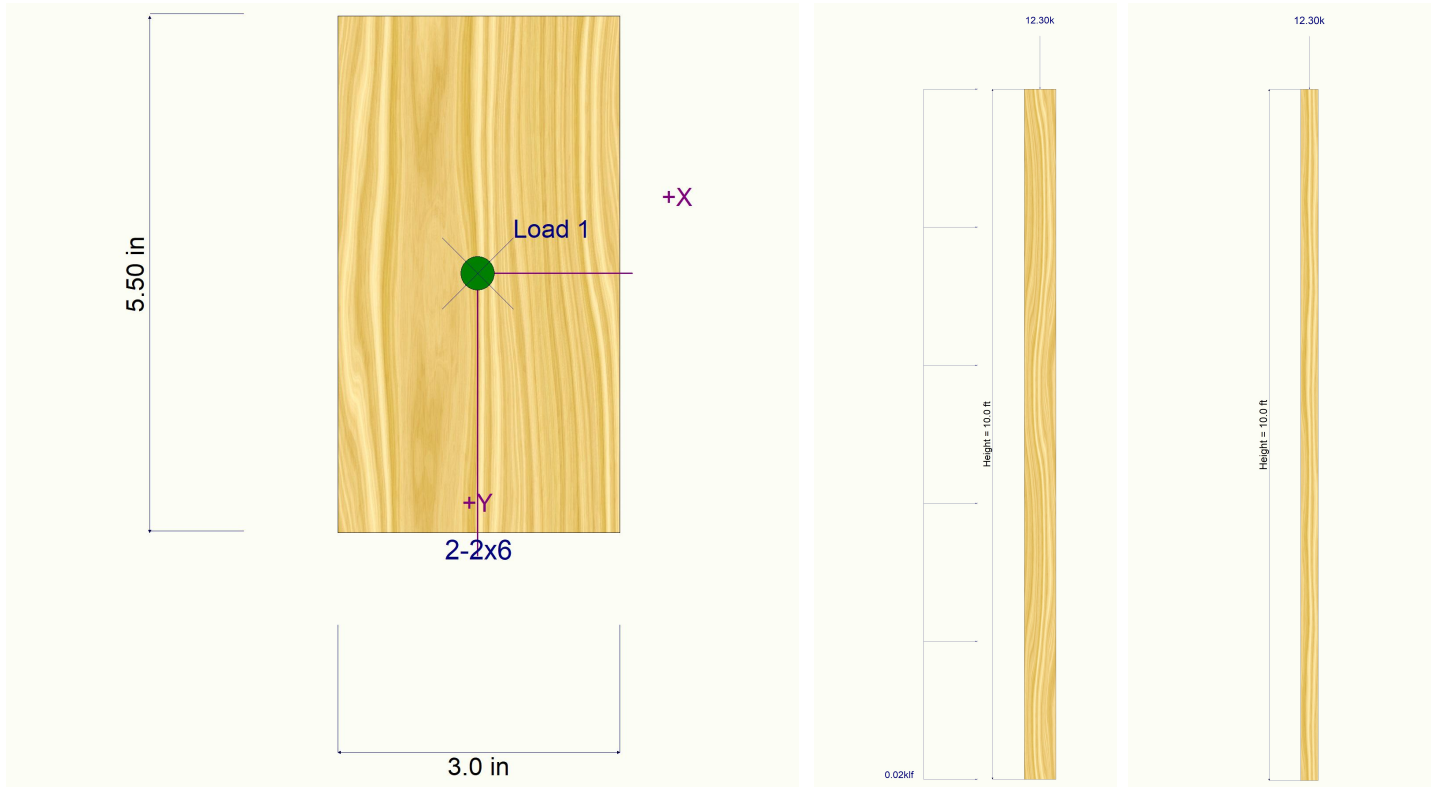
Note: Only non-zero reactions are listed.

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						12.336					
+D+0.60W				0.068	0.068	12.336					
+D+0.450W				0.051	0.051	12.336					
+0.60D+0.60W				0.068	0.068	7.401					
+0.60D						7.401					
W Only				0.114	0.114						

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+0.60W	0.0000 in	0.000 ft	0.047 in	5.034 ft
+D+0.450W	0.0000 in	0.000 ft	0.035 in	5.034 ft
+0.60D+0.60W	0.0000 in	0.000 ft	0.047 in	5.034 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.078 in	5.034 ft

Sketches





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2215 N. 30th Street, Suite 300
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Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: (3) 2x6 BU Stud Column (Zone 4)

Code References

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combinations Used : IBC 2021

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name		3-2x6	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.		Graded Lumber	
Overall Column Height		10 ft		Wood Member Type		Sawn	
(Used for non-slender calculations)							
Wood Species		Douglas Fir-Larch		Exact Width		4.50 in	
Wood Grade		No.2		Exact Depth		5.50 in	
Fb +		900.0 psi	Fv	180.0 psi	Area	24.750 in^2	Allow Stress Modification Factors
Fb -		900.0 psi	Ft	575.0 psi	Ix	62.391 in^4	Cf or Cv for Bending 1.30
Fc - Prll		1,350.0 psi	Density	31.210 pcf	Iy	41.766 in^4	Cf or Cv for Compression 1.10
Fc - Perp		625.0 psi					Cf or Cv for Tension 1.30
E : Modulus of Elasticity . . .		x-x Bending	y-y Bending	Axial			Cm : Wet Use Factor 1.0
		Basic	1,600.0	1,600.0	1,600.0 ksi		Ct : Temperature Factc 1.0
		Minimum	580.0	580.0			Cfu : Flat Use Factor 1.0
							Kf : Built-up columns 1.0
							Use Cr : Repetitive ? No
Column Buckling Condition:							
ABOUT X-X Axis: Lux = 10 ft, Kx = 1.0							
Fully braced against buckling ABOUT Y-Y Axis							

Applied Loads

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

Column self weight included : 53.642 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 10.0 ft, D = 19.20 k

BENDING LOADS . . .

Zone 4: Lat. Uniform Load creating Mx-x, W = 0.02280 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.9955 : 1	Maximum SERVICE Lateral Load Reactions . .			
Load Combination	D Only	Top along Y-Y	0.1140 k	Bottom along Y-Y	0.1140 k
Governing NDS Forumla	Comp Only, fc/Fc'	Top along X-X	0.0 k	Bottom along X-X	0.0 k
Location of max.above base	0.0 ft	Maximum SERVICE Load Lateral Deflections . . .			
At maximum location values are . . .		Along Y-Y	0.05194 in at	5.034 ft	above base
Applied Axial	19.254 k	for load combination : W Only			
Applied Mx	0.0 k-ft	Along X-X	0.0 in at	0.0 ft	above base
Applied My	0.0 k-ft	for load combination : n/a			
Fc : Allowable	781.47 psi	Other Factors used to calculate allowable stresses . . .			
PASS Maximum Shear Stress Ratio =	0.01439 : 1				
Load Combination	+D+0.60W				
Location of max.above base	10.0 ft				
Applied Design Shear	6.218 psi				
Allowable Shear	288.0 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	0.585	0.9955	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W	1.600	0.376	0.9742	PASS	4.966 ft	0.01439	PASS	10.0 ft
+D+0.450W	1.600	0.376	0.9201	PASS	4.966 ft	0.01080	PASS	10.0 ft
+0.60D+0.60W	1.600	0.376	0.5222	PASS	4.966 ft	0.01439	PASS	10.0 ft
+0.60D	1.600	0.376	0.5222	PASS	0.0 ft	0.0	PASS	10.0 ft



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Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: (3) 2x6 BU Stud Column (Zone 4)

Maximum Reactions

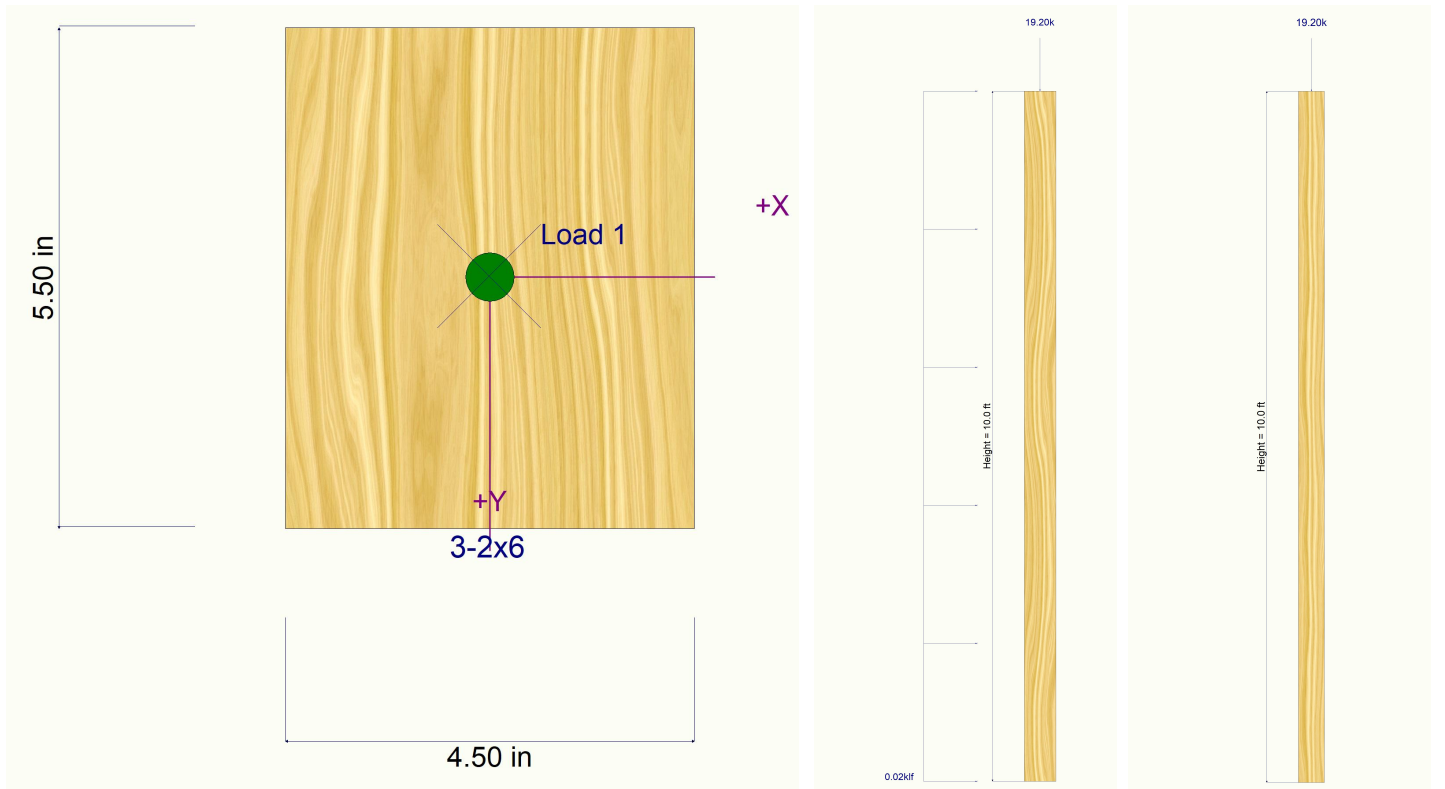
Note: Only non-zero reactions are listed.

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						19.254					
+D+0.60W				0.068	0.068	19.254					
+D+0.450W				0.051	0.051	19.254					
+0.60D+0.60W				0.068	0.068	11.552					
+0.60D						11.552					
W Only				0.114	0.114						

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+0.60W	0.0000 in	0.000 ft	0.031 in	5.034 ft
+D+0.450W	0.0000 in	0.000 ft	0.023 in	5.034 ft
+0.60D+0.60W	0.0000 in	0.000 ft	0.031 in	5.034 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.052 in	5.034 ft

Sketches





AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: (2) 2x6 BU Stud Column (Zone 5)

Code References

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combinations Used : IBC 2021

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name		2-2x6	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.		Graded Lumber	
Overall Column Height		10 ft		Wood Member Type		Sawn	
(Used for non-slender calculations)							
Wood Species		Douglas Fir-Larch		Exact Width		3.0 in	
Wood Grade		No.2		Exact Depth		5.50 in	
Fb +		900.0 psi	Fv	180.0 psi	Area	16.50 in^2	Allow Stress Modification Factors
Fb -		900.0 psi	Ft	575.0 psi	Ix	41.594 in^4	Cf or Cv for Bending 1.30
Fc - Prll		1,350.0 psi	Density	31.210 pcf	Iy	12.375 in^4	Cf or Cv for Compression 1.10
Fc - Perp		625.0 psi					Cf or Cv for Tension 1.30
E : Modulus of Elasticity . . .		x-x Bending	y-y Bending	Axial			Cm : Wet Use Factor 1.0
		Basic	1,600.0	1,600.0	1,600.0 ksi		Ct : Temperature Factc 1.0
		Minimum	580.0	580.0			Cfu : Flat Use Factor 1.0
							Kf : Built-up columns 1.0
							Use Cr : Repetitive ? No
Column Buckling Condition:							
ABOUT X-X Axis: Lux = 10 ft, Kx = 1.0							
Fully braced against buckling ABOUT Y-Y Axis							

Applied Loads

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

Column self weight included : 35.761 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 10.0 ft, D = 12.0 k

BENDING LOADS . . .

Zone 5: Lat. Uniform Load creating Mx-x, W = 0.02810 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9956 : 1**
Load Combination +D+0.60W
Governing NDS Forumla Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base 4.966 ft
At maximum location values are . . .
Applied Axial 12.036 k
Applied Mx 0.2107 k-ft
Applied My 0.0 k-ft
Fc : Allowable 893.75 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.1405 k	Bottom along Y-Y	0.1405 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.09603 in	at	5.034 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 . . .

<u>Bending</u>	<u>Compression</u>	<u>Tension</u>
----------------	--------------------	----------------

PASS Maximum Shear Stress Ratio = **0.02661 : 1**
Load Combination +D+0.60W
Location of max.above base 10.0 ft
Applied Design Shear 11.495 psi
Allowable Shear 288.0 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	0.585	0.9334	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W	1.600	0.376	0.9956	PASS	4.966 ft	0.02661	PASS	10.0 ft
+D+0.450W	1.600	0.376	0.9132	PASS	4.966 ft	0.01996	PASS	0.0 ft
+0.60D+0.60W	1.600	0.376	0.4897	PASS	4.966 ft	0.02661	PASS	10.0 ft
+0.60D	1.600	0.376	0.4897	PASS	0.0 ft	0.0	PASS	10.0 ft



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: (2) 2x6 BU Stud Column (Zone 5)

Maximum Reactions

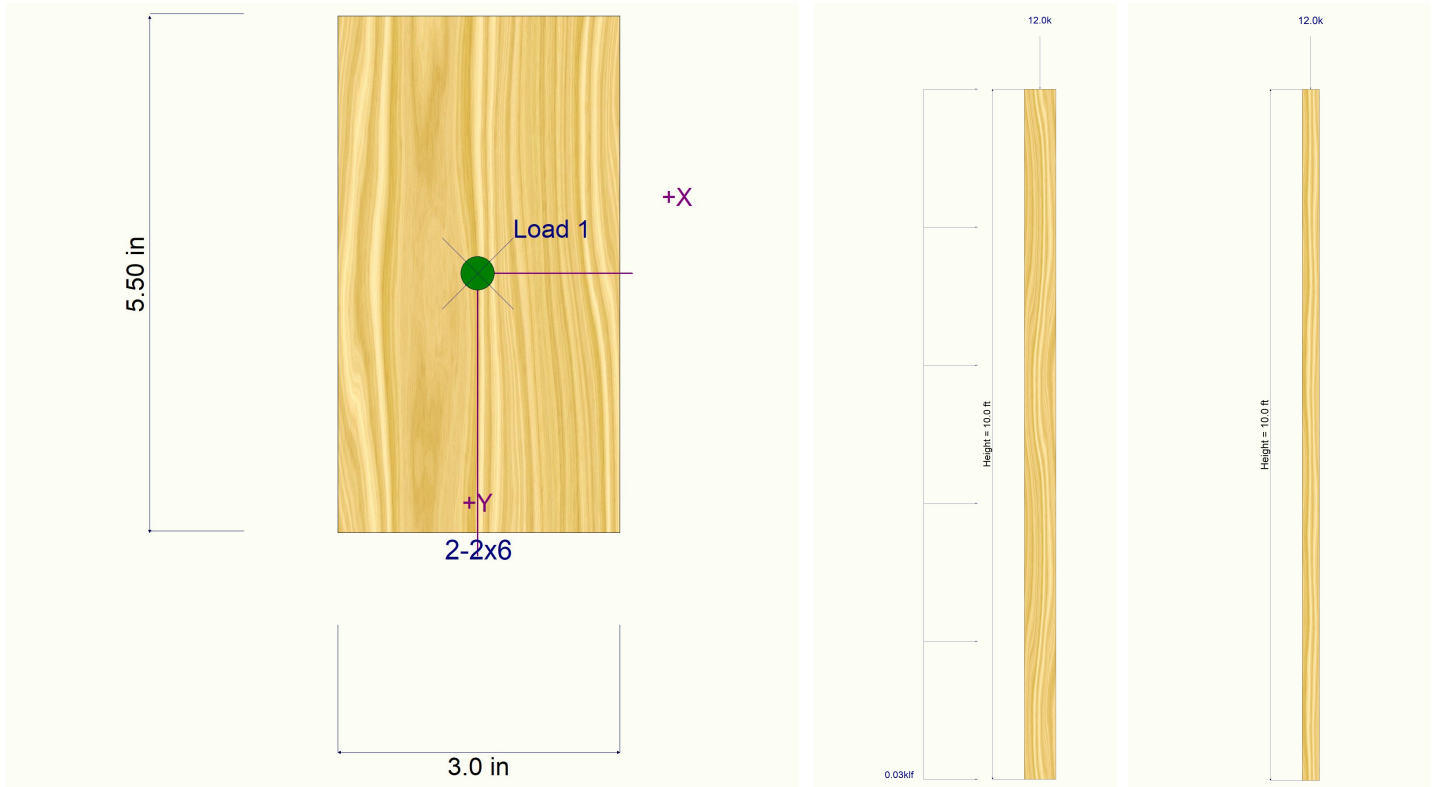
Note: Only non-zero reactions are listed.

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						12.036					
+D+0.60W				0.084	0.084	12.036					
+D+0.450W				0.063	0.063	12.036					
+0.60D+0.60W				0.084	0.084	7.221					
+0.60D						7.221					
W Only				0.141	0.141						

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+0.60W	0.0000 in	0.000 ft	0.058 in	5.034 ft
+D+0.450W	0.0000 in	0.000 ft	0.043 in	5.034 ft
+0.60D+0.60W	0.0000 in	0.000 ft	0.058 in	5.034 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.096 in	5.034 ft

Sketches





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Project Title:
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Wood Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: (3) 2x6 BU Stud Column (Zone 5)

Code References

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combinations Used : IBC 2021

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name		3-2x6	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.		Graded Lumber	
Overall Column Height		10 ft		Wood Member Type		Sawn	
(Used for non-slender calculations)				Exact Width		4.50 in	
Wood Species		Douglas Fir-Larch		Exact Depth		5.50 in	
Wood Grade		No.2		Area		24.750 in^2	
Fb +		900.0 psi	Fv	180.0 psi	Ix	62.391 in^4	Allow Stress Modification Factors
Fb -		900.0 psi	Ft	575.0 psi	Iy	41.766 in^4	Cf or Cv for Bending
Fc - Prll		1,350.0 psi	Density	31.210 pcf			Cf or Cv for Compression
Fc - Perp		625.0 psi					Cf or Cv for Tension
E : Modulus of Elasticity . . .		x-x Bending	y-y Bending	Axial			Cm : Wet Use Factor
		Basic	1,600.0	1,600.0	1,600.0 ksi		Ct : Temperature Factc
		Minimum	580.0	580.0			Cfu : Flat Use Factor
							Kf : Built-up columns
							Use Cr : Repetitive ?
							No
Column Buckling Condition:							
ABOUT X-X Axis: Lux = 10 ft, Kx = 1.0							
Fully braced against buckling ABOUT Y-Y Axis							

Applied Loads

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

Column self weight included : 53.642 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 10.0 ft, D = 18.80 k

BENDING LOADS . . .

Zone 5: Lat. Uniform Load creating Mx-x, W = 0.03030 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9949 : 1**
Load Combination +D+0.60W
Governing NDS Forumla Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base 4.966 ft
At maximum location values are . . .
Applied Axial 18.854 k
Applied Mx 0.2272 k-ft
Applied My 0.0 k-ft
Fc : Allowable 893.75 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.1515 k	Bottom along Y-Y	0.1515 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.06903 in	at	5.034 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 . . .

<u>Bending</u>	<u>Compression</u>	<u>Tension</u>
----------------	--------------------	----------------

PASS Maximum Shear Stress Ratio = **0.01913 : 1**
Load Combination +D+0.60W
Location of max.above base 10.0 ft
Applied Design Shear 8.264 psi
Allowable Shear 288.0 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	0.585	0.9748	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W	1.600	0.376	0.9949	PASS	4.966 ft	0.01913	PASS	10.0 ft
+D+0.450W	1.600	0.376	0.9278	PASS	4.966 ft	0.01435	PASS	10.0 ft
+0.60D+0.60W	1.600	0.376	0.5114	PASS	4.966 ft	0.01913	PASS	10.0 ft
+0.60D	1.600	0.376	0.5114	PASS	0.0 ft	0.0	PASS	10.0 ft



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Project Title:
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Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: (3) 2x6 BU Stud Column (Zone 5)

Maximum Reactions

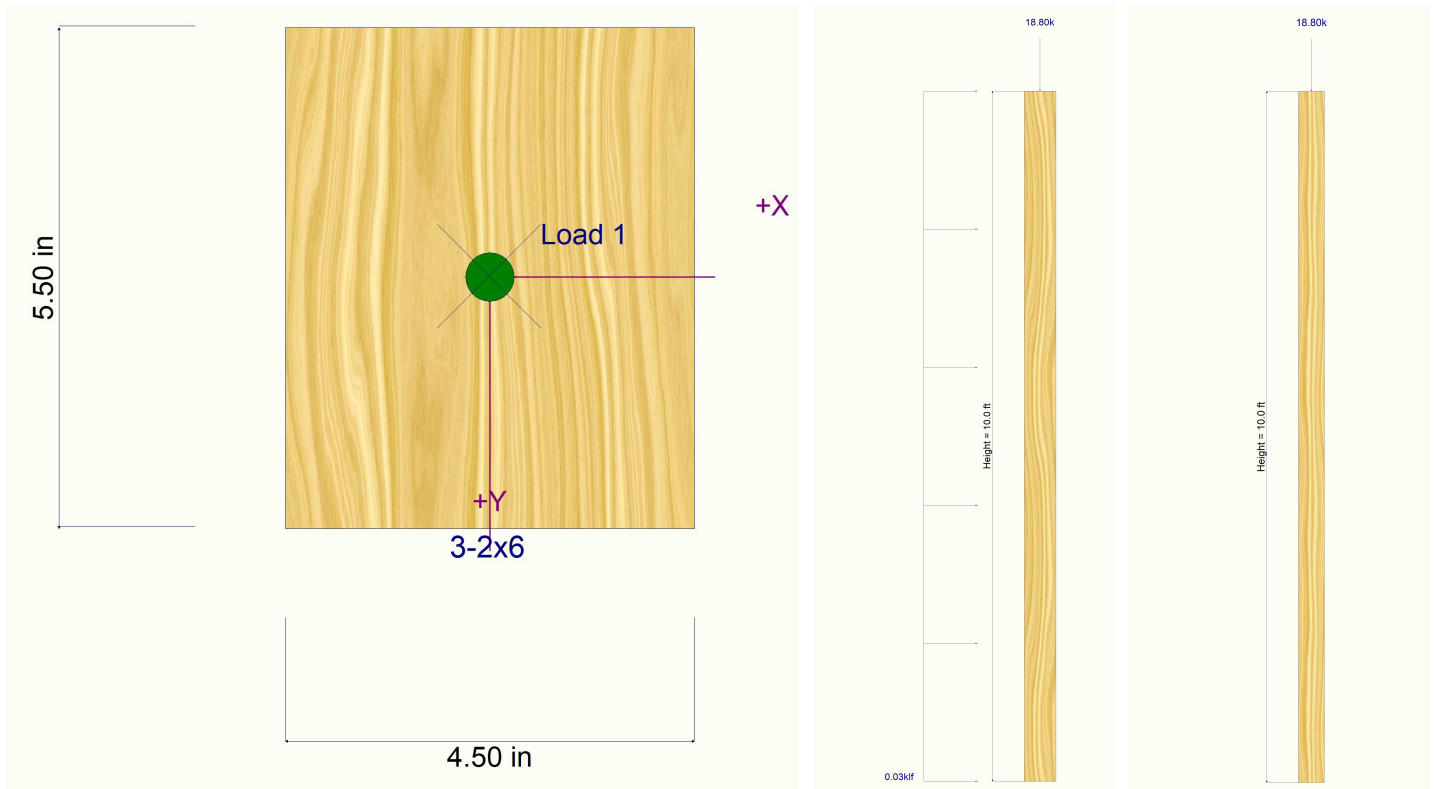
Note: Only non-zero reactions are listed.

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						18.854					
+D+0.60W				0.091	0.091	18.854					
+D+0.450W				0.068	0.068	18.854					
+0.60D+0.60W				0.091	0.091	11.312					
+0.60D						11.312					
W Only				0.152	0.152						

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+0.60W	0.0000 in	0.000 ft	0.041 in	5.034 ft
+D+0.450W	0.0000 in	0.000 ft	0.031 in	5.034 ft
+0.60D+0.60W	0.0000 in	0.000 ft	0.041 in	5.034 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.069 in	5.034 ft

Sketches





AHBL, INC.
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Tacoma, WA 98403

Project Title:
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Project Descr:

Wood Column

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Typ Crawl Space Post

Code References

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combinations Used : IBC 2021

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name	6x6	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.	Graded Lumber	
Overall Column Height		10 ft		Wood Member Type	Sawn	
(Used for non-slender calculations)						
Wood Species	Douglas Fir-Larch			Exact Width	5.50 in	Allow Stress Modification Factors
Wood Grade	No.1			Exact Depth	5.50 in	
Fb +	1,200.0 psi	Fv	170.0 psi	Area	30.250 in^2	Cf or Cv for Bending 1.0
Fb -	1,200.0 psi	Ft	825.0 psi	Ix	76.255 in^4	Cf or Cv for Compression 1.0
Fc - Prll	1,000.0 psi	Density	31.210 pcf	Iy	76.255 in^4	Cf or Cv for Tension 1.0
Fc - Perp	625.0 psi					Cm : Wet Use Factor
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial			Ct : Temperature Factc
	Basic	1,600.0	1,600.0	1,600.0 ksi		Cfu : Flat Use Factor
	Minimum	580.0	580.0			Kf : Built-up columns
				Column Buckling Condition:		Use Cr : Repetitive ?
				ABOUT X-X Axis:	Lux = 10 ft, Kx = 1.0	
				ABOUT Y-Y Axis:	Luy = 10 ft, Ky = 1.0	

Applied Loads

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

AXIAL LOADS . . .

Axial Load at 10.0 ft, D = 3.70, L = 6.60 k

Axial Load at 10.0 ft, D = 3.70, L = 6.60 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9848 : 1**
Load Combination +D+L
Governing NDS Forumla Comp Only, f_c/F_c'
Location of max.above base 0.0 ft
At maximum location values are . . .
Applied Axial 20.60 k
Applied Mx 0.0 k-ft
Applied My 0.0 k-ft
Fc : Allowable 691.51 psi

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

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

PASS Maximum Shear Stress Ratio = **0.0 : 1**
Load Combination +0.60D
Location of max.above base 10.0 ft
Applied Design Shear 0.0 psi
Allowable Shear 272.0 psi

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

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	0.727	0.3741	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+L	1.000	0.692	0.9848	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L	1.250	0.610	0.7498	PASS	0.0 ft	0.0	PASS	10.0 ft
+0.60D	1.600	0.516	0.1778	PASS	10.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top	@ Base	@ Top	@ Base	@ Base	@ Top	@ Base	@ Top
D Only					7.400				
+D+L					20.600				
+D+0.750L					17.300				



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Wood Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Typ Crawl Space Post

Maximum Reactions

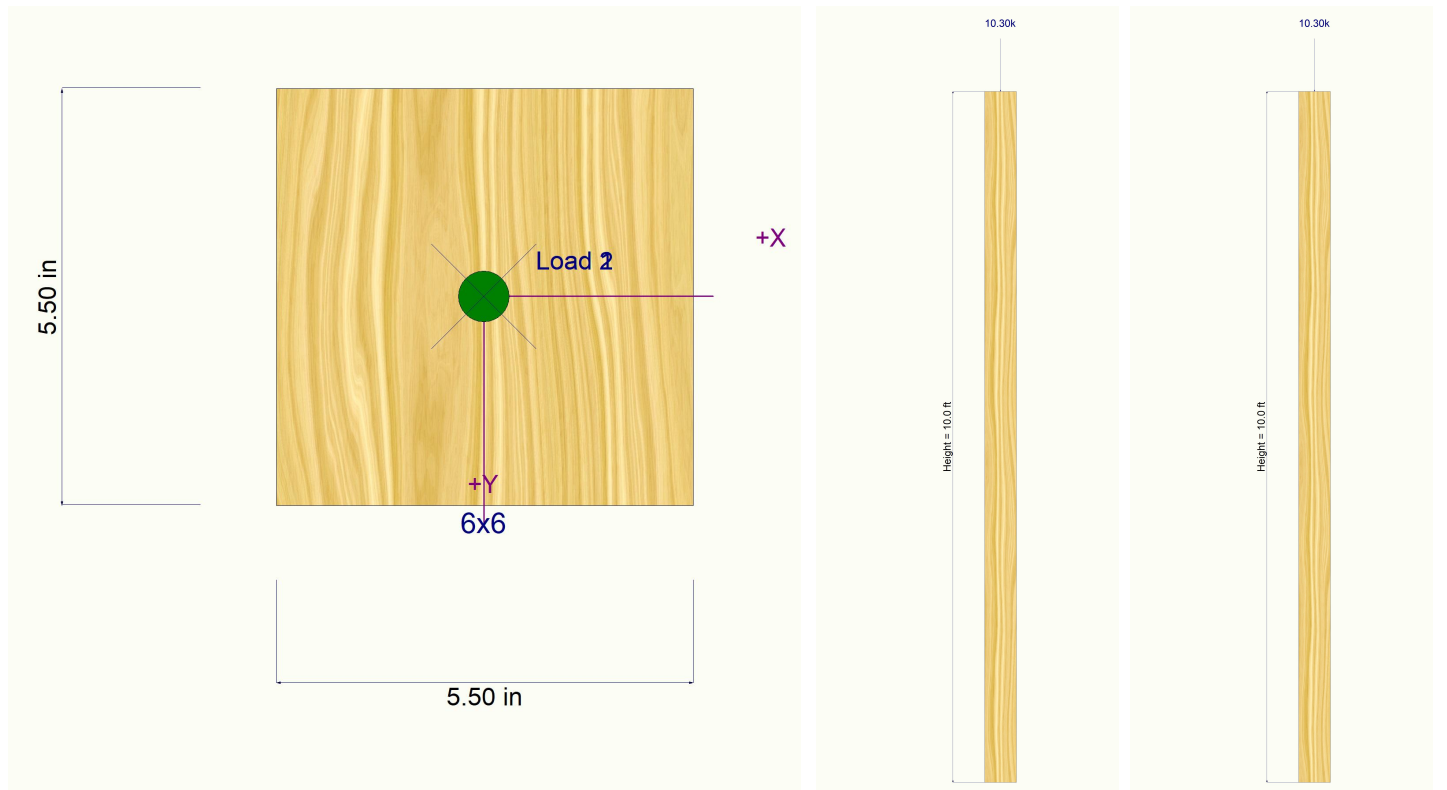
Note: Only non-zero reactions are listed.

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
+0.60D						4.440					
L Only						13.200					

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+L	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L	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
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Sketches



5.0 - LATERAL DESIGN

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021 ref. ASCE 7 (2016)



Seismic Base Shear per the Equivalent Lateral Force Procedure (ASCE 7-16 § 12.8)

Project 707 39th Avenue Southeast
Location Puyallup, WA 98374

Latitude 47.155637 °N
 Longitude 122.282849 °W

Mapped Spectral Accelerations (%g)	
Site Class	C
S_S	1.257
S_1	0.434

Site Coefficients (%g)	
F_a Table 11.4-1	F_v Table 11.4-2
1.2	1.5

Adjusted MCE Spectral Response Acceleration Parameters (ASCE 7-16 § 11.4.4)

S_{MS}	$F_a \cdot S_s$	1.508	(EQN 11.4-1)
S_{M1}	$F_v \cdot S_1$	0.651	(EQN 11.4-1)

Design Spectral Acceleration Parameters (ASCE 7-16 § 11.4.5)

S_{DS}	$2/3 \cdot S_{MS}$	1.006	(EQN 11.4-3)
S_{D1}	$2/3 \cdot S_{M1}$	0.434	(EQN 11.4-4)

Building Site Classification and Importance Factor (ASCE 7-16 § 1.5.2)

Occupancy Category:	II	
Seismic Importance Factor [I_e]:	1.00	(TBL 1.5-2)
Design Category Based On:		
S_1	N/A	
S_{DS}	D	
S_{D1}	D	
Seismic Design Category	D	

Design Coefficients and Factors for SFRS (ASCE 7-16 § 12.2)

Seismic Force Resisting System per ASCE 7 (T. 12.2-1):	LFWSW		
Is the Diaphragm Flexible? (T 12.2-1: Footnote b)	YES	(TBL 12.2-1)	Footnote b
Response Modification Coefficient [R]:	6.5	(TBL 12.2-1)	
System Overstrength Factor [Ω_0]:	2.5	(TBL 12.2-1)	
Deflection Amplification Factor [C_d]:	4	(TBL 12.2-1)	
System Limitations: (For Seismic Design Category D)	65'	(TBL 12.2-1)	

Determine the Structural Period (ASCE 7-16 § 12.8.2)

C_t		0.02		(TBL 12.8-2)
x		0.75		(TBL 12.8-2)
h_n		24.0	feet	
C_u	Take As:	1.0		(TBL 12.8-1)
T_a	$C_u \cdot C_t \cdot h_n^x$	0.217	seconds	(EQN 12.8-7)
T_L		6		(FIG 22-14)
T_s	S_{D1} / S_{DS}	0.432		

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
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Seismic Response Coefficient (ASCE 7-16 § 12.8.1)

ρ	Redundancy		1.0	(§ 12.3.4)
C_s	$S_{DS}/(R/I)$		0.155	(EQN 12.8-2)
$C_{s\ MAX}$	$S_{D1}/(T \cdot R/I)$	$T \leq T_L$	0.308	(EQN 12.8-3)
	$S_{D1} \cdot T_L / (T^2 \cdot R/I)$	$T > T_L$		(EQN 12.8-4)
$C_{s\ MIN}$	$0.044 \cdot S_{DS} \cdot I$	$S_1 < 0.6g$	0.044	(EQN 12.8-5)
	$0.5 \cdot S_1 / (R/I)$	$S_1 \geq 0.6g$		(EQN 12.8-6)
V_u	$C_s \cdot W$		$0.155 \cdot W$	STRENGTH
$V_{u\ (incl.\ \rho)}$	$\rho \cdot C_s \cdot W$		$0.155 \cdot W$	STRENGTH
V_{ASD}	$0.7 \cdot V$		$0.108 \cdot W$	ASD
$V_{ASD\ (incl.\ \rho)}$	$0.7 \cdot \rho \cdot V$		$0.108 \cdot W$	ASD

Vertical Distribution of Forces. ASCE 7-16 § 12.8.3

STRENGTH

k		1.000				
UPPER						
LEVEL	W _x (kips)	h _x (feet)	W _x ·h _x ^k	C _{vx} = W _x ·h _x ^k /ΣW _x ·h _x ^k	F _x = C _{vx} ·V	F _x = C _{vx} ·V/ΣW _x
ROOF	901.7	24.0	21640	0.679	0.105*W	192.4
1	929.9	11.0	10229	0.321	0.050*W	91.0
TOTAL	1831.6		31870	1.000	0.155*W	283 kips

6.1
3.9

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
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 By: KBG
 Code: IBC 2021 ref. ASCE 7 (2016)



Effective Seismic Weight (Upper 5 Floors of LFW)

Roof	Unit Weight (psf)	Area (ft ²)	Weight (k)	Story Weight
Typical Roof	21.0	31600	663.6	
Perimeter Walls	13.0	6160	80.1	
Interior Walls	10.0	15800	158.0	
				+ 901.7 kips
Level 1	Unit Weight (psf)	Area (ft ²)	Weight (k)	
Typical Floor	28.0	23500	658.0	
Perimeter Walls	13.0	11880	154.4	
Interior Walls	10.0	11750	117.5	
				+ 929.9 kips
Total Seismic Weight - Upper				1832 kips

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
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 Code: IBC 2021, ref. ASCE 7 (2016)



Minimum Seismic Diaphragm Forces (ASCE 7-16 § 12.10.1.1)

LEVEL	W_{px} (kips)	ΣW_i (kips)	ΣF_i (kips)	$F_{px} = \Sigma F_i / \Sigma W_i * W_{px}$	$F_{p\ MAX}$	$F_{p\ MIN}$	F_p
ROOF 1	821.6	821.6	114.9	$0.140 * W$	$0.402 * W$	$0.201 * W$	165 kips
	271.9	1093.5	54.3	$0.050 * W$	$0.402 * W$	$0.201 * W$	55 kips
	0.0	0.0	0.0	$0.000 * W$	$0.402 * W$	$0.201 * W$	0 kips
	0.0	0.0	0.0	$0.000 * W$	$0.402 * W$	$0.201 * W$	0 kips
	0.0	0.0	0.0	$0.000 * W$	$0.402 * W$	$0.201 * W$	0 kips
	0.0	0.0	0.0	$0.000 * W$	$0.402 * W$	$0.201 * W$	0 kips
	0.0	0.0	0.0	$0.000 * W$	$0.402 * W$	$0.201 * W$	0 kips
	0.0	0.0	0.0	$0.000 * W$	$0.402 * W$	$0.201 * W$	0 kips
Total	1093.5		169.2				

$$F_{p\ MAX} = 0.4 * S_{DS} * I_e * W_{px} \quad (EQN\ 12.10-2)$$

$$F_{p\ MIN} = 0.2 * S_{DS} * I_e * W_{px} \quad (EQN\ 12.10-3)$$

Notes:

The redundancy factor (ρ) has been removed from the calculated story force, it does not apply for diaphragm design.

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Wind Loads - MWFRS all h (ASCE 7-16 § 27.3.1)

Building Geometry

B = 430
 L = 85
 Parapet Ht. = 3.5

See Code Search For Wind Load Criteria

Vertical Distribution of Forces. ASCE 7-16 § 27.3.1

STRENGTH

Wind Dir. N-S

ASD

LEVEL	h_x (feet)	Tributary Width (ft)	Tributary Height (ft)	Tributary Area (ft ²)	p (psf)	F_p
ROOF 1	24.0	85	10.0	850	17.1	14.54
	11.0	85	12.0	1020	15.8	16.12
						0.00
						0.00
						0.00
						0.00
						0.00
Total						31 kips

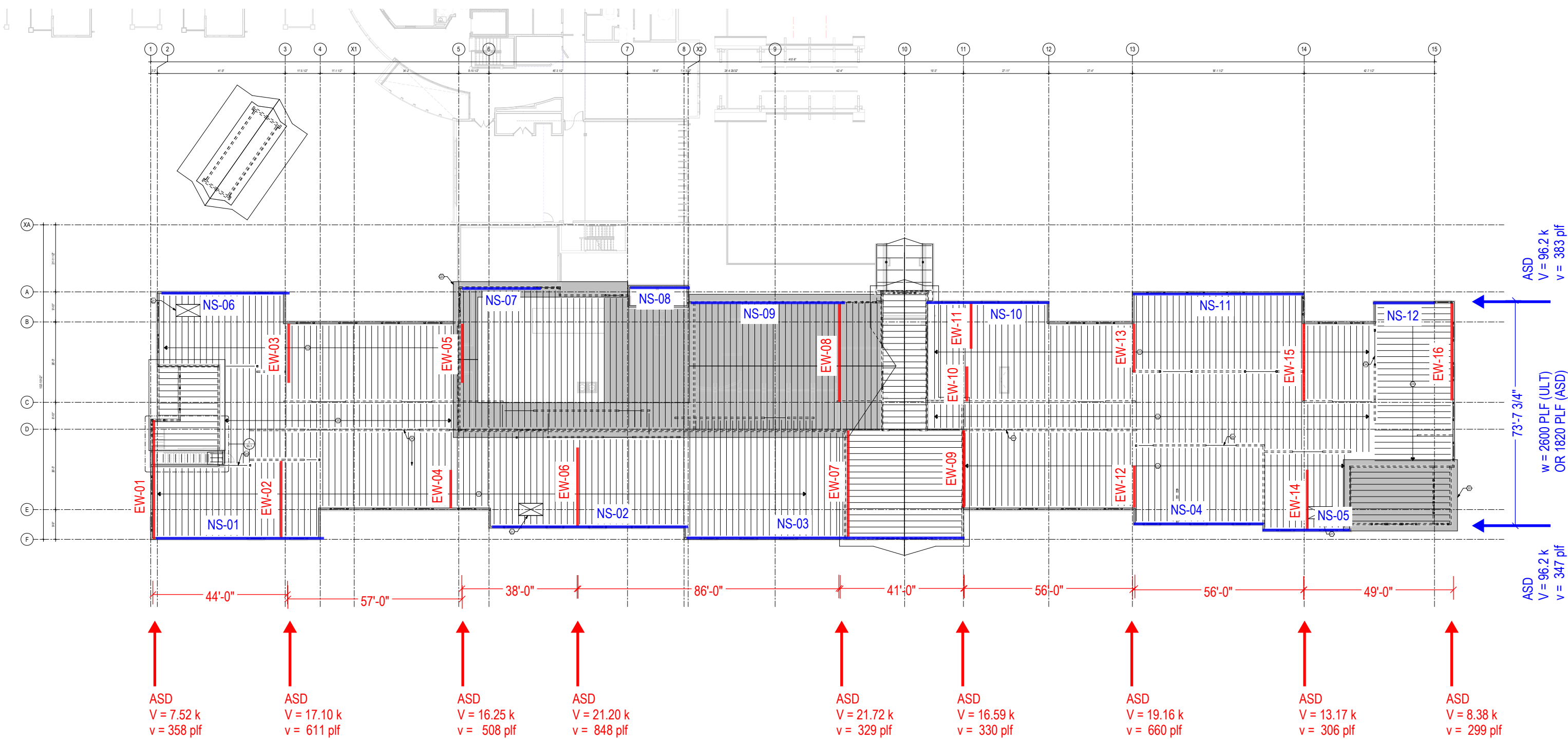
18 kips

Wind Dir. E-W

LEVEL	h_x (feet)	Tributary Width (ft)	Tributary Height (ft)	Tributary Area (ft ²)	p (psf)	F_p
ROOF 1	24.0	430	10.0	4300	17.1	73.53
	11.0	430	12.0	5160	15.8	81.53
						0.00
						0.00
						0.00
						0.00
						0.00
Total						155 kips

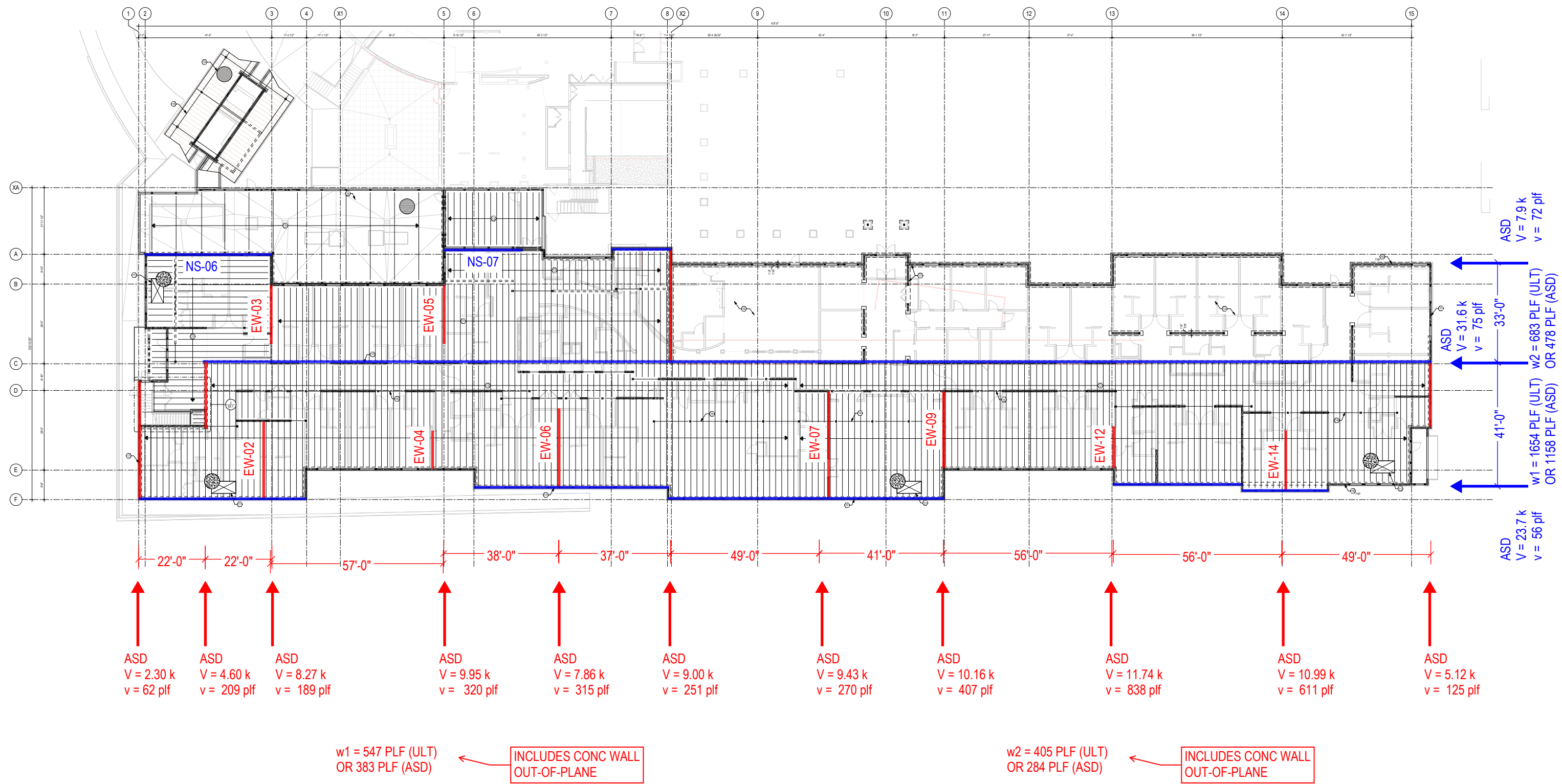
93 kips

LATERAL LOAD PLAN
ROOF PLAN
STORY SHEAR, $F_x = 192.4 \text{ k}$



$w = 488 \text{ PLF (ULT)}$
OR 342 PLF (ASD)

LATERAL LOAD PLAN
LEVEL 1 PLAN
STORY SHEAR, $F_x = 91.0 \text{ k}$



Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Wood Shear Wall Properties

Nominal Shear Capacities	WSP - Sheathing 15/32" w/ 10d Fasteners		
	Wall Tag	Seismic Capacity	Wind Capacity
	W / 6	620 plf	870 plf
	W / 4	920 plf	1290 plf
	W / 3	1200 plf	1680 plf
	W / 2	1540 plf	2155 plf
	2 W / 6	1240 plf	1740 plf
	2 W / 4	1840 plf	2580 plf
	2 W / 3	2400 plf	3360 plf
	2 W / 2	3080 plf	4310 plf

Lateral Loads

STRENGTH

Level	Seismic Demand		Wind Demand		Floor Area
	N-S	E-W	N-S	E-W	
Roof	192.4 kips	192.4 kips	14.5 kips	73.5 kips	31600 sf
1	91.0 kips	91.0 kips	16.1 kips	81.5 kips	23500 sf
			0.0 kips	0.0 kips	
			0.0 kips	0.0 kips	
			0.0 kips	0.0 kips	

Floor Wood Stud Capacity	Stud Height 10.00 ft		
	Wall Framing	Stud Axial Capacity	Governing Capacity
	2x4 at 16" O.C.	1088 plf	1088 plf
	(2) 2x4 at 16" O.C.	2175 plf	2175 plf
	(3) 2x4 at 16" O.C.	3263 plf	3263 plf
	2x4 at 12" O.C.	1450 plf	1450 plf
	(2) 2x4 at 12" O.C.	2900 plf	2900 plf
	(3) 2x4 at 12" O.C.	4350 plf	4350 plf
	2x6 at 16" O.C.	3975 plf	3867 plf
	(2) 2x6 at 16" O.C.	7950 plf	7734 plf
	(3) 2x6 at 16" O.C.	11925 plf	11601 plf
	2x6 at 12" O.C.	5300 plf	5156 plf
	(2) 2x6 at 12" O.C.	10600 plf	10312 plf
	(3) 2x6 at 12" O.C.	15900 plf	15468 plf
	2x8 at 16" O.C.	6975 plf	5097 plf
	(2) 2x8 at 16" O.C.	13950 plf	10195 plf
	(3) 2x8 at 16" O.C.	20925 plf	15292 plf
	2x8 at 12" O.C.	9300 plf	6796 plf
	(2) 2x8 at 12" O.C.	18600 plf	13593 plf
	(3) 2x8 at 12" O.C.	27900 plf	20390 plf

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.2
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Lateral Loads

Interior Axial Members		Axial Capacity	Assumptions :	$C_D = 1.0$
DF No. 2	2 x 4	1450 lbs	$W = 5 \text{ psf}$ $\ell_b = 10'-0"$ (conservative) $d/c = 0.80$ (upper limit)	
	2 x 6	5300 lbs		
	2 x 8	9300 lbs		
1.8E PSL	3½ x 3½	4250 lbs		
	5¼ x 5¼	28300 lbs		
	5¼ x 7	38000 lbs		
	7 x 7	75000 lbs		

Built-up Column Capacities		2 Studs	3 Studs	4 Studs	5 Studs	6 Studs	7 Studs
DF No. 2	2 x 4	2900 lbs	4350 lbs	5800 lbs	7250 lbs	8700 lbs	10150 lbs
$\ell_b = 10'-0"$	2 x 6	10600 lbs	15900 lbs	21200 lbs	26500 lbs	31800 lbs	37100 lbs
Typical	2 x 8	18600 lbs	27900 lbs	37200 lbs	46500 lbs	55800 lbs	65100 lbs

Exterior Axial Members		Axial Capacity	Assumptions :	$C_D = 1.0$
DF No. 2	2 x 6	3300 lbs	$W = 42 \text{ psf}$ (c/c loads) $\ell_b = 10'-0"$ (conservative) $d/c = 0.80$ (upper limit)	
	2 x 8	8950 lbs		

Built-up Column Capacities		2 Studs	3 Studs	4 Studs	5 Studs	6 Studs	7 Studs
DF No. 2	2 x 6	6600 lbs	9900 lbs	13200 lbs	16500 lbs	19800 lbs	23100 lbs
$\ell_b = 10'-0"$	2 x 8	17900 lbs	26850 lbs	35800 lbs	44750 lbs	53700 lbs	62650 lbs

See Enercalc Output for Member Calcs

3



h (ft) 13.00

[illegible]

5



h (ft)	11.00
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6

Project: Wesley Bradley Park 2 Care Center
Project No.: 2220236.20
Date: 11/18/2024
By: KBG
Code: IBC 2021, ref. ASCE 7 (2016)



Notes to Engineer

- NDS SPDWS 4.2.5.2 Diaphragm idealized as rigid for open front structures, cantilever not to exceed 35'
- NDS SPDWS 4.3.3 Strength design (LRFD) modified nominal unit shear capacity by $\phi_D = 0.8$
- NDS SPDWS 4.3.3.4.2 Wall capacities modified by $2b_s/h$ per Exception 1 (i.e. effective length of wall)

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Shear Wall: NS_01
 Length: 45.00 ft

Bearing Wall ID:

Note:
 NS_02, NS_04,
 and NS_05 similar

Shear Wall - Overturning

Chord Force

Level	hx (ft)	v_u (plf)	E (k)	0.7E	0.525E	0.7E
Roof	13.00	496	6.44	4.5	3.4	4.5

Bearing Wall - Resisting

Wall	DL (plf)	LL (plf)	SL (plf)	(1.0+0.14S _{ds})D	(1.0+0.105S _{ds})D +0.75L+0.75S	(0.6-0.14S _{ds})D
Roof	216	0	300	0.5	0.9	2.2

ATS Run Loading

ASD Load Combinations

Level	LC 1	LC 2	LC 3
Roof	5.0	4.3	-2.3

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Shear Wall: NS_03 Bearing Wall ID:
 Length: 60.00 ft

Shear Wall - Overturning

			Chord Force			
Level	hx (ft)	v_u (plf)	E (k)	0.7E	0.525E	0.7E
Roof	13.00	520	6.76	4.7	3.5	4.7

Bearing Wall - Resisting

		(1.0+0.105S _{ds})D				
Wall	DL (plf)	LL (plf)	SL (plf)	(1.0+0.14S _{ds})D	+0.75L+0.75S	(0.6-0.14S _{ds})D
Roof	36	0	50	0.1	0.2	0.4

ATS Run Loading

ASD Load Combinations

Level	LC 1	LC 2	LC 3
Roof	4.8	3.7	-4.4

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Shear Wall: NS_06 Bearing Wall ID:
 Length: 36.50 ft

Shear Wall - Overturning			Chord Force			
Level	hx (ft)	v_u (plf)	E (k)	0.7E	0.525E	0.7E
Roof	13.00	516	6.71	4.7	3.5	4.7
1	11.00	635	13.70	9.6	7.2	9.6

Bearing Wall - Resisting				(1.0+0.105S _{ds})D		
Wall	DL (plf)	LL (plf)	SL (plf)	(1.0+0.14S _{ds})D	+0.75L+0.75S	(0.6-0.14S _{ds})D
Roof	216	0	300	0.5	0.9	2.2
1.000	60	80	0	0.1	0.3	0.6

ATS Run Loading		ASD Load Combinations		
Level		LC 1	LC 2	LC 3
Roof		5.2	4.5	-2.5
1		9.7	7.4	-9.0

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Shear Wall: NS_07 Bearing Wall ID:
 Length: 25.50 ft

Shear Wall - Overturning			Chord Force			
Level	hx (ft)	v_u (plf)	E (k)	0.7E	0.525E	0.7E
Roof	13.00	516	6.71	4.7	3.5	4.7
1	11.00	635	13.70	9.6	7.2	9.6

Bearing Wall - Resisting				(1.0+0.105S _{ds})D		
Wall	DL (plf)	LL (plf)	SL (plf)	(1.0+0.14S _{ds})D	+0.75L+0.75S	(0.6-0.14S _{ds})D
Roof	36	0	50	0.1	0.2	0.4
1.000	150	500	0	0.3	1.1	1.5

ATS Run Loading		ASD Load Combinations		
Level		LC 1	LC 2	LC 3
Roof		4.8	3.7	-4.3
1		9.9	8.3	-8.0

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Shear Wall: NS_08
 Length: 19.50 ft

Bearing Wall ID:

Note:
 NS_09, NS_10,
 and NS_11 similar

Shear Wall - Overturning

Chord Force

Level	hx (ft)	v_u (plf)	E (k)	0.7E	0.525E	0.7E
Roof	13.00	516	6.71	4.7	3.5	4.7

Bearing Wall - Resisting

Wall	DL (plf)	LL (plf)	SL (plf)	$(1.0+0.14S_{ds})D$	$(1.0+0.105S_{ds})D$ $+0.75L+0.75S$	$(0.6-0.14S_{ds})D$
Roof	216	0	300	0.5	0.9	2.2

ATS Run Loading

ASD Load Combinations

Level	LC 1	LC 2	LC 3
Roof	5.2	4.5	-2.5

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Shear Wall: NS_12 Bearing Wall ID:
 Length: 20.00 ft

Shear Wall - Overturning

			Chord Force			
Level	hx (ft)	v_u (plf)	E (k)	0.7E	0.525E	0.7E
Roof	13.00	516	6.71	4.7	3.5	4.7

Bearing Wall - Resisting

		(1.0+0.105S _{ds})D				
Wall	DL (plf)	LL (plf)	SL (plf)	(1.0+0.14S _{ds})D	+0.75L+0.75S	(0.6-0.14S _{ds})D
Roof	36	0	50	0.1	0.2	0.4

ATS Run Loading

ASD Load Combinations

Level	LC 1	LC 2	LC 3
Roof	4.8	3.7	-4.3

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Shear Wall: EW_01 Bearing Wall ID:
 Length: 14.25 ft

Shear Wall - Overturning			Chord Force			
Level	hx (ft)	v_u (plf)	E (k)	0.7E	0.525E	0.7E
Roof	13.00	526	6.83	4.8	3.6	4.8

Bearing Wall - Resisting				(1.0+0.105S _{ds})D		
Wall	DL (plf)	LL (plf)	SL (plf)	(1.0+0.14S _{ds})D	+0.75L+0.75S	(0.6-0.14S _{ds})D
Roof	36	0	50	0.1	0.2	0.1

ATS Run Loading		ASD Load Combinations		
Level	LC 1	LC 2	LC 3	
Roof	4.9	3.7	-4.7	

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Shear Wall: EW_02
 Length: 25.50 ft

Bearing Wall ID:

Note:
 EW_03 similar

Shear Wall - Overturning

Level	hx (ft)	v_u (plf)	Chord Force			
			E (k)	0.7E	0.525E	0.7E
Roof	13.00	420	5.46	3.8	2.9	3.8
1	11.00	624	12.32	8.6	6.5	8.6

Bearing Wall - Resisting

Wall	DL (plf)	LL (plf)	SL (plf)	(1.0+0.105S _{ds})D		
				(1.0+0.14S _{ds})D	+0.75L+0.75S	(0.6-0.14S _{ds})D
Roof	36	0	50	0.1	0.2	0.1
1.000	60	80	0	0.1	0.3	0.2

ATS Run Loading

ASD Load Combinations

Level	LC 1	LC 2	LC 3
Roof	3.9	3.0	-3.7
1	8.8	6.7	-8.4

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Shear Wall: EW_04
 Length: 12.50 ft

Bearing Wall ID:

Note:
 EW_05 similar

Shear Wall - Overturning

Level	hx (ft)	v_u (plf)	Chord Force			
			E (k)	0.7E	0.525E	0.7E
Roof	13.00	517	6.72	4.7	3.5	4.7
1	11.00	834	15.90	11.1	8.3	11.1

Bearing Wall - Resisting

Wall	DL (plf)	LL (plf)	SL (plf)	(1.0+0.105S _{ds})D		
				(1.0+0.14S _{ds})D	+0.75L+0.75S	(0.6-0.14S _{ds})D
Roof	36	0	50	0.1	0.2	0.1
1.000	60	80	0	0.1	0.3	0.2

ATS Run Loading

ASD Load Combinations

Level	LC 1	LC 2	LC 3
Roof	4.8	3.7	-4.6
1	11.3	8.6	-10.9

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Shear Wall: EW_06 Bearing Wall ID:
 Length: 25.50 ft

Shear Wall - Overturning			Chord Force			
Level	hx (ft)	v_u (plf)	E (k)	0.7E	0.525E	0.7E
Roof	13.00	831	10.80	7.6	5.7	7.6
1	11.00	1139	23.33	16.3	12.2	16.3

Bearing Wall - Resisting				(1.0+0.105S _{ds})D		
Wall	DL (plf)	LL (plf)	SL (plf)	(1.0+0.14S _{ds})D	+0.75L+0.75S	(0.6-0.14S _{ds})D
Roof	36	0	50	0.1	0.2	0.1
1.000	60	80	0	0.1	0.3	0.2

ATS Run Loading		ASD Load Combinations		
Level		LC 1	LC 2	LC 3
Roof		7.6	5.8	-7.4
1		16.5	12.5	-16.1

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Shear Wall: EW_07 Bearing Wall ID:
 Length: 29.50 ft

Shear Wall - Overturning			Chord Force			
Level	hx (ft)	v_u (plf)	E (k)	0.7E	0.525E	0.7E
Roof	13.00	335	4.36	3.1	2.3	3.1
1	11.00	657	11.58	8.1	6.1	8.1

Bearing Wall - Resisting				(1.0+0.105S _{ds})D		
Wall	DL (plf)	LL (plf)	SL (plf)	(1.0+0.14S _{ds})D	+0.75L+0.75S	(0.6-0.14S _{ds})D
Roof	342	0	475	0.8	1.5	1.1
1.000	60	80	0	0.1	0.3	0.2

ATS Run Loading		ASD Load Combinations		
Level		LC 1	LC 2	LC 3
Roof		3.8	3.8	-1.9
1		8.2	6.3	-7.9

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Shear Wall: EW_08 Bearing Wall ID:
 Length: 32.50 ft

Shear Wall - Overturning

			Chord Force			
Level	hx (ft)	v_u (plf)	E (k)	0.7E	0.525E	0.7E
Roof	13.00	364	4.73	3.3	2.5	3.3

Bearing Wall - Resisting

		(1.0+0.105S _{ds})D				
Wall	DL (plf)	LL (plf)	SL (plf)	(1.0+0.14S _{ds})D	+0.75L+0.75S	(0.6-0.14S _{ds})D
Roof	36	0	50	0.1	0.2	0.1

ATS Run Loading

ASD Load Combinations

Level	LC 1	LC 2	LC 3
Roof	3.4	2.6	-3.2

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Shear Wall: EW_09 Bearing Wall ID:
 Length: 25.50 ft

Shear Wall - Overturning			Chord Force			
Level	hx (ft)	v_u (plf)	E (k)	0.7E	0.525E	0.7E
Roof	13.00	318	4.14	2.9	2.2	2.9
1	11.00	717	12.03	8.4	6.3	8.4

Bearing Wall - Resisting				(1.0+0.105S _{ds})D		
Wall	DL (plf)	LL (plf)	SL (plf)	(1.0+0.14S _{ds})D	+0.75L+0.75S	(0.6-0.14S _{ds})D
Roof	342	0	475	0.8	1.5	1.1
1.000	60	80	0	0.1	0.3	0.2

ATS Run Loading		ASD Load Combinations		
Level		LC 1	LC 2	LC 3
Roof		3.7	3.6	-1.8
1		8.6	6.6	-8.2

Project: Wesley Bradley Park 2 Care Center
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 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Shear Wall: EW_10
 Length: 11.75 ft

Bearing Wall ID:

Note:
 EW_11 similar

Shear Wall - Overturning

Chord Force

Level	hx (ft)	v_u (plf)	E (k)	0.7E	0.525E	0.7E
Roof	13.00	318	4.14	2.9	2.2	2.9

Bearing Wall - Resisting

Wall	DL (plf)	LL (plf)	SL (plf)	$(1.0+0.14S_{ds})D$	$(1.0+0.105S_{ds})D$ $+0.75L+0.75S$	$(0.6-0.14S_{ds})D$
Roof	36	0	50	0.1	0.2	0.1

ATS Run Loading

ASD Load Combinations

Level	LC 1	LC 2	LC 3
Roof	3.0	2.3	-2.8

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Shear Wall: EW_12
 Length: 14.00 ft

Bearing Wall ID:

Note:
 EW_13 similar

Shear Wall - Overturning

Level	hx (ft)	v_u (plf)	Chord Force			
			E (k)	0.7E	0.525E	0.7E
Roof	13.00	645	8.38	5.9	4.4	5.9
1	11.00	1488	24.75	17.3	13.0	17.3

Bearing Wall - Resisting

Wall	DL (plf)	LL (plf)	SL (plf)	(1.0+0.105S _{ds})D		
				(1.0+0.14S _{ds})D	+0.75L+0.75S	(0.6-0.14S _{ds})D
Roof	36	0	50	0.1	0.2	0.1
1.000	60	80	0	0.1	0.3	0.2

ATS Run Loading

ASD Load Combinations

Level	LC 1	LC 2	LC 3
Roof	5.9	4.6	-5.7
1	17.5	13.2	-17.1

Project: Wesley Bradley Park 2 Care Center
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 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Shear Wall: EW_14
 Length: 17.50 ft

Bearing Wall ID:

Note:
 EW_15 similar

Shear Wall - Overturning

Level	hx (ft)	v_u (plf)	Chord Force			
			E (k)	0.7E	0.525E	0.7E
Roof	13.00	307	3.99	2.8	2.1	2.8
1	11.00	938	14.31	10.0	7.5	10.0

Bearing Wall - Resisting

Wall	DL (plf)	LL (plf)	SL (plf)	(1.0+0.105S _{ds})D		
				(1.0+0.14S _{ds})D	+0.75L+0.75S	(0.6-0.14S _{ds})D
Roof	36	0	50	0.1	0.2	0.1
1.000	60	80	0	0.1	0.3	0.2

ATS Run Loading

ASD Load Combinations

Level	LC 1	LC 2	LC 3
Roof	2.9	2.3	-2.7
1	10.2	7.8	-9.8

Project: Wesley Bradley Park 2 Care Center
 Project No.: 2220236.20
 Date: 11/18/2024
 By: KBG
 Code: IBC 2021, ref. ASCE 7 (2016)



Shear Wall: EW_16 Bearing Wall ID:
 Length: 31.50 ft

Shear Wall - Overturning

		Chord Force				
Level	hx (ft)	v_u (plf)	E (k)	0.7E	0.525E	0.7E
Roof	13.00	267	3.47	2.4	1.8	2.4

Bearing Wall - Resisting

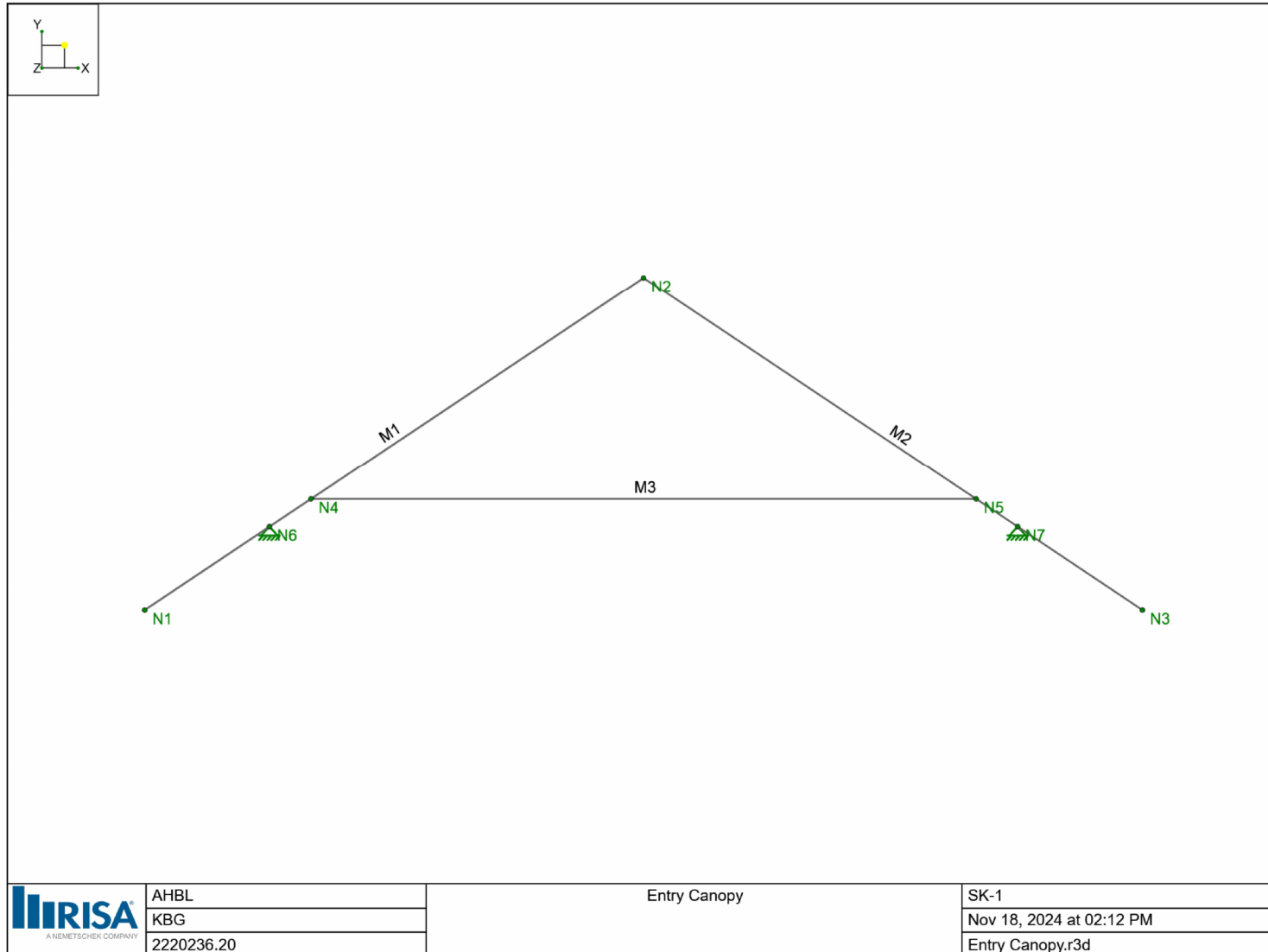
		(1.0+0.105S _{ds})D				
Wall	DL (plf)	LL (plf)	SL (plf)	(1.0+0.14S _{ds})D	+0.75L+0.75S	(0.6-0.14S _{ds})D
Roof	216	0	300	0.5	0.9	0.7

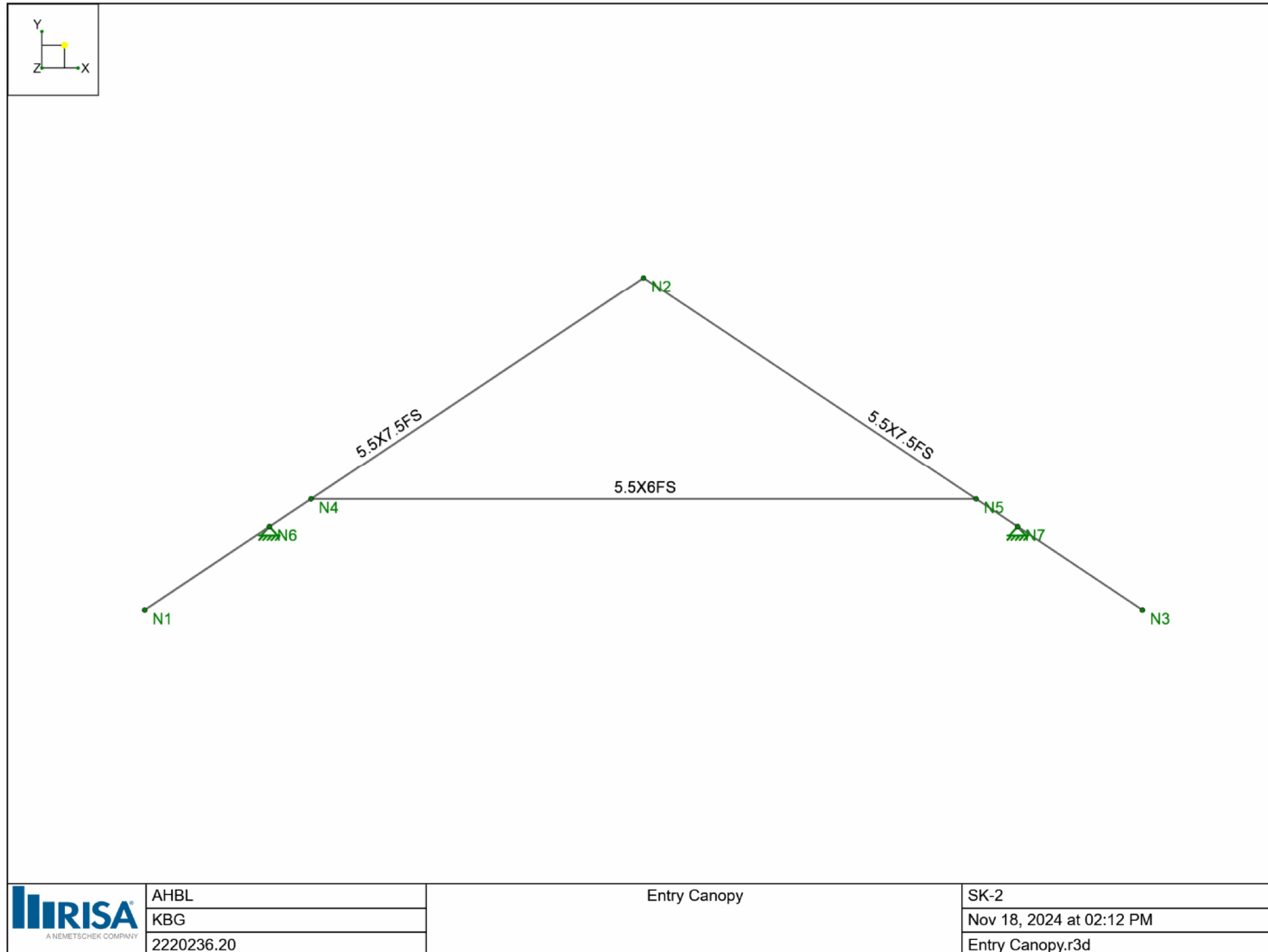
ATS Run Loading

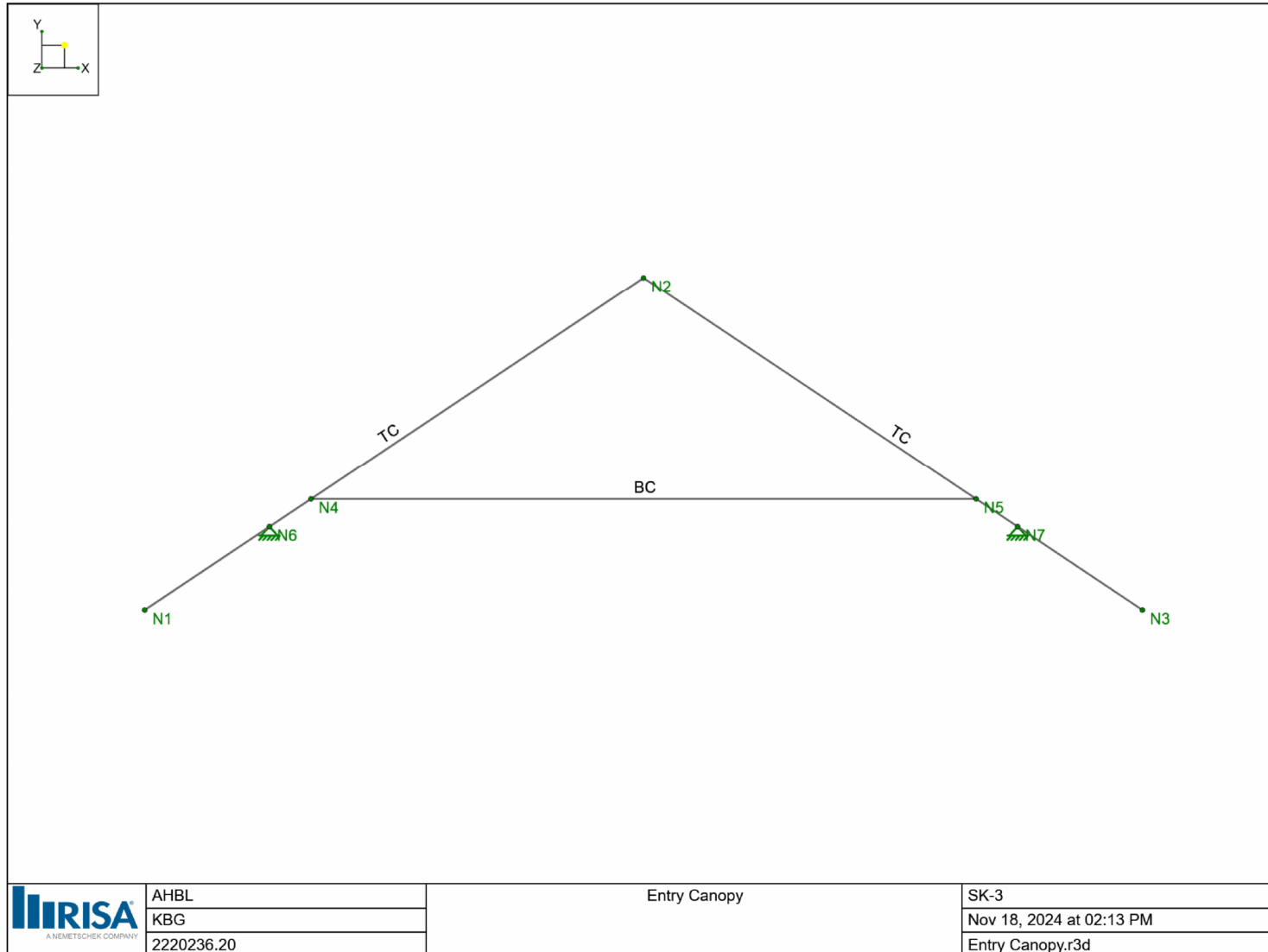
ASD Load Combinations

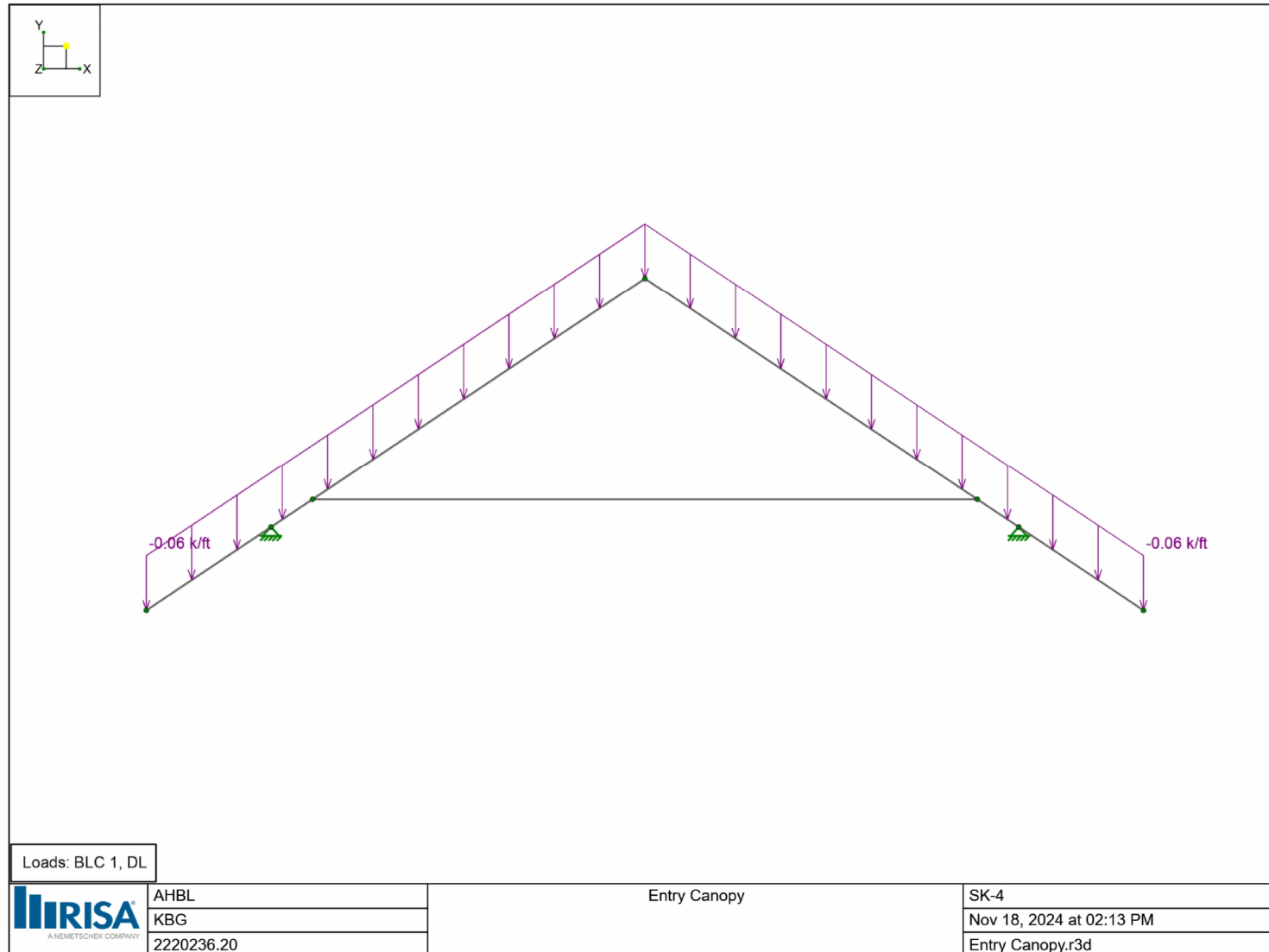
Level	LC 1	LC 2	LC 3
Roof	2.9	2.7	-1.7

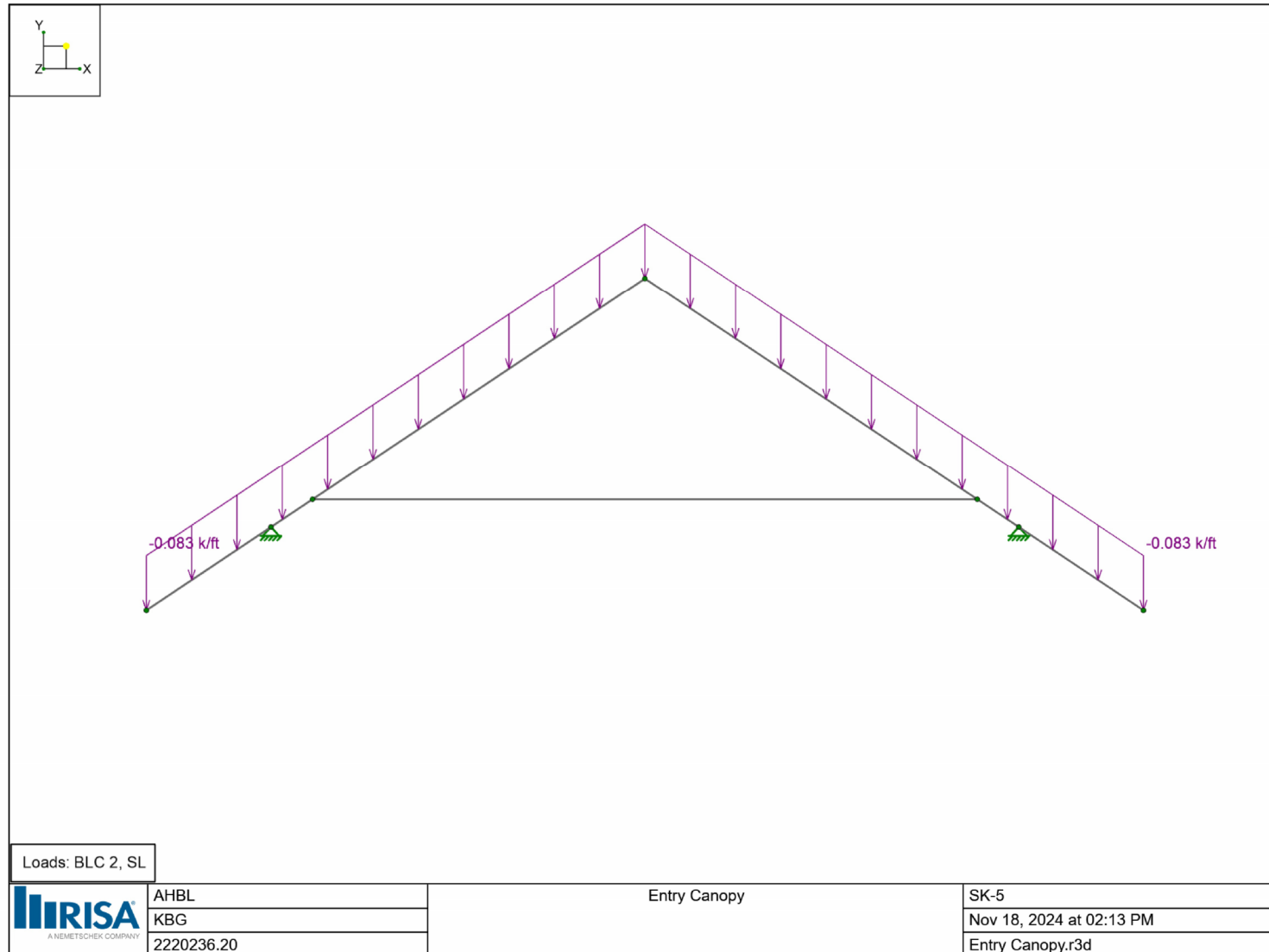
6.0 - CANOPY DESIGN

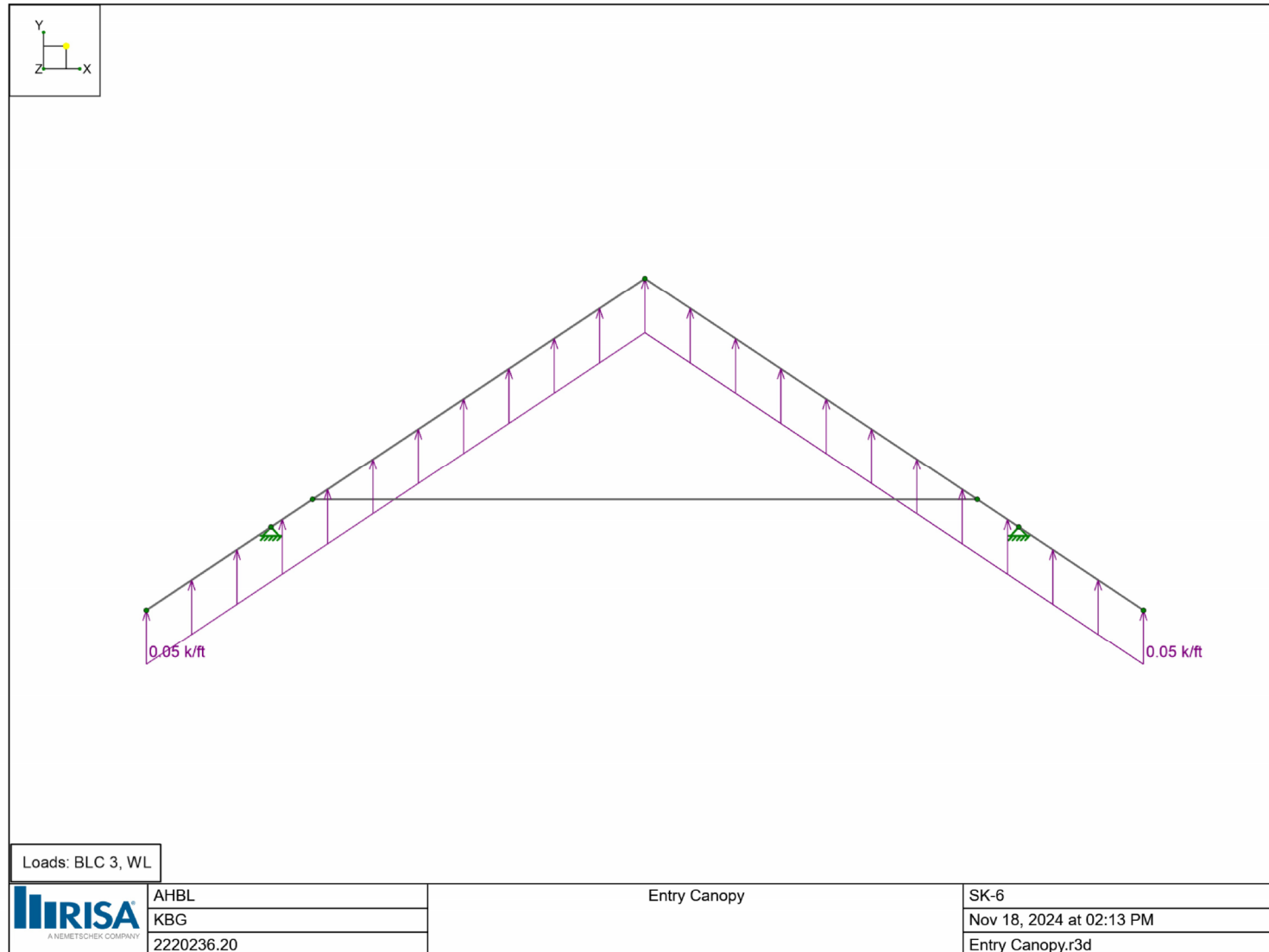


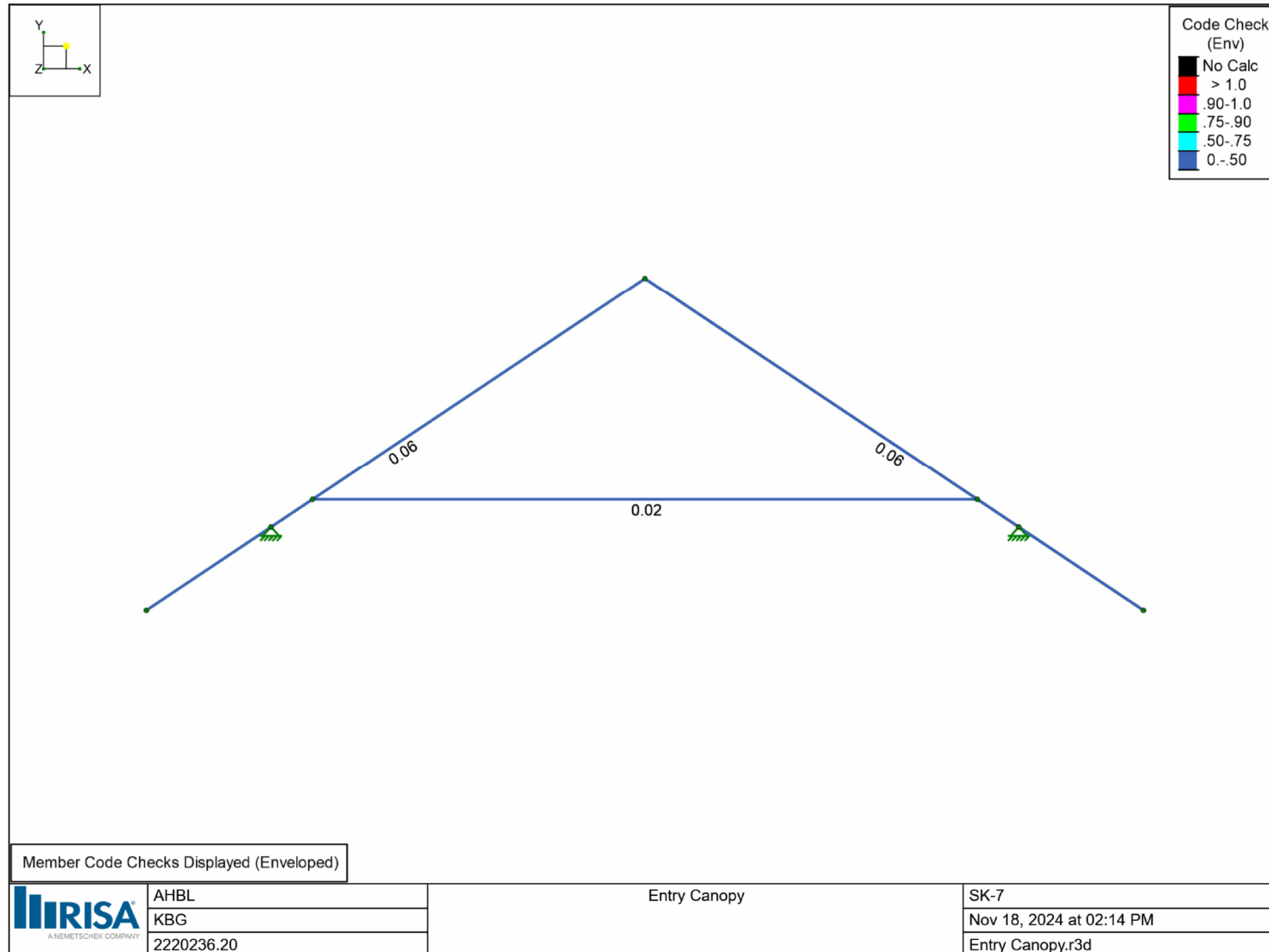












Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	N1	0	0	0	
2	N2	9	6	0	
3	N3	18	0	0	
4	N4	3	2	0	
5	N5	15	2	0	
6	N6	2.25	1.5	0	
7	N7	15.75	1.5	0	

Node Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]
1	N2			Reaction
2	N1			Reaction
3	N3			Reaction
4	N6	Reaction	Reaction	Reaction
5	N7	Reaction	Reaction	Reaction

Wood Properties

	Label	Type	Database	Species	Grade	Cm	Ci	Emod	Nu	Therm. Coeff. [1e ⁵ °F ⁻¹]	Density [k/ft ³]
1	DF	Solid Sawn	Visually Graded	Douglas Fir-Larch	No.1			1	0.3	0.3	0.035
2	SP	Solid Sawn	Visually Graded	Southern Pine	No.1			1	0.3	0.3	0.035
3	HF	Solid Sawn	Visually Graded	Hem-Fir	No.1			1	0.3	0.3	0.035
4	SPF	Solid Sawn	Visually Graded	Spruce-Pine-fir	No.1			1	0.3	0.3	0.035
5	24F-1.8E DF Balanced	Glulam	NDS Table 5A	24F-1.8E DF BAL	na			1	0.3	0.3	0.035
6	24F-1.8E DF Unbalanced	Glulam	NDS Table 5A	24F-1.8E DF UNBAL	na			1	0.3	0.3	0.035
7	24F-1.8E SP Balanced	Glulam	NDS Table 5A	24F-1.8E SP BAL	na			1	0.3	0.3	0.035
8	24F-1.8E SP Unbalanced	Glulam	NDS Table 5A	24F-1.8E SP UNBAL	na			1	0.3	0.3	0.035
9	1.3E-1600F VERSALAM	SCL	Boise Cascade	1.3E-1600F VERSALAM	na			1	0.3	0.3	0.035
10	1.35E LSL SolidStart	SCL	Louisiana Pacific	1.35E LSL SolidStart	na			1	0.3	0.3	0.035
11	1.4E RIGIDLAM LVL	SCL	Roseburg Forest Products 2023	1.4E RIGIDLAM LVL	na			1	0.3	0.3	0.035
12	2.0E DF Parallam PSL	SCL	TrusJoist	2.0E DF Parallam PSL	na			1	0.3	0.3	0.035
13	LVL PRL 1.5E 2250F	Custom	N/A	LVL PRL 1.5E 2250F	na			1	0.3	0.3	0.035
14	LVL Microlam 1.9E 2600F	Custom	N/A	LVL Microlam 1.9E 2600F	na			1	0.3	0.3	0.035
15	PSL Parallam 2.0E 2900F	Custom	N/A	PSL Parallam 2.0E 2900F	na			1	0.3	0.3	0.035
16	LSL TimberStrand 1.55E 2325F	Custom	N/A	LSL TimberStrand 1.55E 2325F	na			1	0.3	0.3	0.035

Wood Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in ²]	Iyy [in ⁴]	Izz [in ⁴]	J [in ⁴]
1	TC	5.5X7.5FS	Beam	Glulam Western	24F-1.8E DF Balanced	Typical	41.25	103.984	193.359	228.406
2	BC	5.5X6FS	Beam	Glulam Western	24F-1.8E DF Balanced	Typical	33	83.188	99	151.894

Member Primary Data

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
1	M1	N1	N2	TC	Beam	Glulam Western	24F-1.8E DF Balanced	Typical
2	M2	N3	N2	TC	Beam	Glulam Western	24F-1.8E DF Balanced	Typical
3	M3	N4	N5	BC	Beam	Glulam Western	24F-1.8E DF Balanced	Typical

Member Advanced Data

	Label	Col-Wall Vert Release	Physical	Deflection Ratio Options	Seismic DR
1	M1		Yes	Default	None
2	M2		Yes	Default	None
3	M3		Yes	Default	None

Wood Design Parameters

	Label	Shape	Length [ft]	le-bend top [ft]	Cr	y sway	z sway
1	M1	TC	10.817	Lbyy			
2	M2	TC	10.817	Lbyy			
3	M3	BC	12	Lbyy			

Member Distributed Loads (BLC 1 : DL)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M1	Y	-0.06	-0.06	0	%100
2	M2	Y	-0.06	-0.06	0	%100

Member Distributed Loads (BLC 2 : SL)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M1	PY	-0.1	-0.1	0	%100
2	M2	PY	-0.1	-0.1	0	%100

Member Distributed Loads (BLC 3 : WL)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M1	PY	0.06	0.06	0	%100
2	M2	PY	0.06	0.06	0	%100

Basic Load Cases

	BLC Description	Category	Y Gravity	Distributed
1	DL	DL	-1	2
2	SL	SL		2
3	WL	WL		2

Load Combinations

	Description	Solve	BLC	Factor	BLC	Factor	BLC	Factor
1	IBC 21/ASCE ASD 1	Yes	DL	1				
2	IBC 21/ASCE ASD 3 (b)	Yes	DL	1	SL	1	SLN	1
3	IBC 21/ASCE ASD 5 (a) (a)	Yes	DL	1	WL	0.6		
4	IBC 21/ASCE ASD 5 (a) (b)	Yes	DL	1	WL	-0.6		
5	IBC 21/ASCE ASD 6 (b) (a)	Yes	DL	1	WL	0.45	SL	0.75
6	IBC 21/ASCE ASD 6 (b) (b)	Yes	DL	1	WL	-0.45	SL	0.75
7	IBC 21/ASCE ASD 7 (a)	Yes	DL	0.6	WL	0.6		
8	IBC 21/ASCE ASD 7 (b)	Yes	DL	0.6	WL	-0.6		

Node Reactions

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	N2	0	0	0	0	0	0
2	1	N1	0	0	0	0	0	0
3	1	N3	0	0	0	0	0	0
4	1	N6	0.776	0.806	0	0	0	0
5	1	N7	-0.776	0.806	0	0	0	0
6	1	Totals:	0	1.611	0			
7	1	COG (ft):	X: 9	Y: 2.94	Z: 0			
8	2	N2	0	0	0	0	0	0
9	2	N1	0	0	0	0	0	0
10	2	N3	0	0	0	0	0	0
11	2	N6	1.527	1.706	0	0	0	0
12	2	N7	-1.527	1.706	0	0	0	0

Node Reactions (Continued)

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
13	2	Totals:	0	3.411	0			
14	2	COG (ft):	X: 9	Y: 2.972	Z: 0			
15	3	N2	0	0	0	0	0	0
16	3	N1	0	0	0	0	0	0
17	3	N3	0	0	0	0	0	0
18	3	N6	0.505	0.482	0	0	0	0
19	3	N7	-0.505	0.482	0	0	0	0
20	3	Totals:	0	0.963	0			
21	3	COG (ft):	X: 9	Y: 2.9	Z: 0			
22	4	N2	0	0	0	0	0	0
23	4	N1	0	0	0	0	0	0
24	4	N3	0	0	0	0	0	0
25	4	N6	1.046	1.13	0	0	0	0
26	4	N7	-1.046	1.13	0	0	0	0
27	4	Totals:	0	2.259	0			
28	4	COG (ft):	X: 9	Y: 2.957	Z: 0			
29	5	N2	0	0	0	0	0	0
30	5	N1	0	0	0	0	0	0
31	5	N3	0	0	0	0	0	0
32	5	N6	1.136	1.238	0	0	0	0
33	5	N7	-1.136	1.238	0	0	0	0
34	5	Totals:	0	2.475	0			
35	5	COG (ft):	X: 9	Y: 2.961	Z: 0			
36	6	N2	0	0	0	0	0	0
37	6	N1	0	0	0	0	0	0
38	6	N3	0	0	0	0	0	0
39	6	N6	1.542	1.724	0	0	0	0
40	6	N7	-1.542	1.724	0	0	0	0
41	6	Totals:	0	3.447	0			
42	6	COG (ft):	X: 9	Y: 2.972	Z: 0			
43	7	N2	0	0	0	0	0	0
44	7	N1	0	0	0	0	0	0
45	7	N3	0	0	0	0	0	0
46	7	N6	0.195	0.159	0	0	0	0
47	7	N7	-0.195	0.159	0	0	0	0
48	7	Totals:	0	0.319	0			
49	7	COG (ft):	X: 9	Y: 2.819	Z: 0			
50	8	N2	0	0	0	0	0	0
51	8	N1	0	0	0	0	0	0

Node Reactions (Continued)

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
52	8	N3	0	0	0	0	0	0
53	8	N6	0.736	0.807	0	0	0	0
54	8	N7	-0.736	0.807	0	0	0	0
55	8	Totals:	0	1.615	0			
56	8	COG (ft):	X: 9	Y: 2.964	Z: 0			

Node Displacements

	LC	Node Label	X [in]	Y [in]	Z [in]	X Rotation [rad]	Y Rotation [rad]	Z Rotation [rad]
1	1	N1	0	0	0	0	0	2.351e-5
2	1	N2	0	-0.001	0	0	0	0
3	1	N3	0	0	0	0	0	-2.351e-5
4	1	N4	0	-0.001	0	0	0	-1.245e-4
5	1	N5	0	-0.001	0	0	0	1.245e-4
6	1	N6	0	0	0	0	0	-5.594e-5
7	1	N7	0	0	0	0	0	5.594e-5
8	2	N1	0.001	-0.001	0	0	0	8.617e-5
9	2	N2	0	-0.003	0	0	0	0
10	2	N3	-0.001	-0.001	0	0	0	-8.617e-5
11	2	N4	0.001	-0.002	0	0	0	-2.298e-4
12	2	N5	-0.001	-0.002	0	0	0	2.298e-4
13	2	N6	0	0	0	0	0	-8.768e-5
14	2	N7	0	0	0	0	0	8.768e-5
15	3	N1	0	0	0	0	0	9.545e-7
16	3	N2	0	-0.001	0	0	0	0
17	3	N3	0	0	0	0	0	-9.545e-7
18	3	N4	0	-0.001	0	0	0	-8.659e-5
19	3	N5	0	-0.001	0	0	0	8.659e-5
20	3	N6	0	0	0	0	0	-4.451e-5
21	3	N7	0	0	0	0	0	4.451e-5
22	4	N1	0	-0.001	0	0	0	4.607e-5
23	4	N2	0	-0.002	0	0	0	0
24	4	N3	0	-0.001	0	0	0	-4.607e-5
25	4	N4	0.001	-0.001	0	0	0	-1.624e-4
26	4	N5	-0.001	-0.001	0	0	0	1.624e-4
27	4	N6	0	0	0	0	0	-6.736e-5
28	4	N7	0	0	0	0	0	6.736e-5
29	5	N1	0	-0.001	0	0	0	5.359e-5
30	5	N2	0	-0.002	0	0	0	0

Node Displacements (Continued)

	LC	Node Label	X [in]	Y [in]	Z [in]	X Rotation [rad]	Y Rotation [rad]	Z Rotation [rad]
31	5	N3	0	-0.001	0	0	0	-5.359e-5
32	5	N4	0.001	-0.001	0	0	0	-1.75e-4
33	5	N5	-0.001	-0.001	0	0	0	1.75e-4
34	5	N6	0	0	0	0	0	-7.117e-5
35	5	N7	0	0	0	0	0	7.117e-5
36	6	N1	0.001	-0.001	0	0	0	8.742e-5
37	6	N2	0	-0.003	0	0	0	0
38	6	N3	-0.001	-0.001	0	0	0	-8.742e-5
39	6	N4	0.001	-0.002	0	0	0	-2.319e-4
40	6	N5	-0.001	-0.002	0	0	0	2.319e-4
41	6	N6	0	0	0	0	0	-8.831e-5
42	6	N7	0	0	0	0	0	8.831e-5
43	7	N1	0	0	0	0	0	-8.45e-6
44	7	N2	0	0	0	0	0	0
45	7	N3	0	0	0	0	0	8.45e-6
46	7	N4	0	0	0	0	0	-3.679e-5
47	7	N5	0	0	0	0	0	3.679e-5
48	7	N6	0	0	0	0	0	-2.214e-5
49	7	N7	0	0	0	0	0	2.214e-5
50	8	N1	0	-0.001	0	0	0	3.666e-5
51	8	N2	0	-0.001	0	0	0	0
52	8	N3	0	-0.001	0	0	0	-3.666e-5
53	8	N4	0	-0.001	0	0	0	-1.126e-4
54	8	N5	0	-0.001	0	0	0	1.126e-4
55	8	N6	0	0	0	0	0	-4.499e-5
56	8	N7	0	0	0	0	0	4.499e-5

Maximum Member Section Forces

	LC	Member Label		Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-ft]	Loc[ft]	y-y Moment[k-ft]	Loc[ft]	z-z Moment[k-ft]	Loc[ft]
1	1	M1	max	0.987	2.704	0.177	3.606	0	10.817	0	10.817	0	10.817	0.33	10.817
2			min	-0.101	2.591	-0.243	10.817	0	0	0	0	0	0	-0.177	6.648
3	1	M2	max	0.987	2.704	0.177	3.606	0	10.817	0	10.817	0	10.817	0.33	10.817
4			min	-0.101	2.591	-0.243	10.817	0	0	0	0	0	0	-0.177	6.648
5	1	M3	max	0.338	12	0.048	0	0	12	0	12	0	12	0.071	0
6			min	0.338	0	-0.048	12	0	0	0	0	0	0	-0.074	6
7	2	M1	max	1.987	2.704	0.401	3.606	0	10.817	0	10.817	0	10.817	0.687	10.817
8			min	-0.22	2.591	-0.518	10.817	0	0	0	0	0	0	-0.367	6.76
9	2	M2	max	1.987	2.704	0.401	3.606	0	10.817	0	10.817	0	10.817	0.687	10.817

Maximum Member Section Forces (Continued)

	LC	Member Label		Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-ft]	Loc[ft]	y-y Moment[k-ft]	Loc[ft]	z-z Moment[k-ft]	Loc[ft]
10			min	-0.22	2.591	-0.518	10.817	0	0	0	0	0	0	-0.367	6.76
11	2	M3	max	0.593	12	0.048	0	0	12	0	12	0	12	0.049	0
12			min	0.593	0	-0.048	12	0	0	0	0	0	0	-0.096	6
13	3	M1	max	0.628	2.704	0.096	3.606	0	10.817	0	10.817	0	10.817	0.201	10.817
14			min	-0.058	2.591	-0.144	10.817	0	0	0	0	0	0	-0.11	6.535
15	3	M2	max	0.628	2.704	0.096	3.606	0	10.817	0	10.817	0	10.817	0.201	10.817
16			min	-0.058	2.591	-0.144	10.817	0	0	0	0	0	0	-0.11	6.535
17	3	M3	max	0.246	12	0.048	0	0	12	0	12	0	12	0.078	0
18			min	0.246	0	-0.048	12	0	0	0	0	0	0	-0.066	6
19	4	M1	max	1.347	2.704	0.258	3.606	0	10.817	0	10.817	0	10.817	0.458	10.817
20			min	-0.144	2.591	-0.342	10.817	0	0	0	0	0	0	-0.245	6.76
21	4	M2	max	1.347	2.704	0.258	3.606	0	10.817	0	10.817	0	10.817	0.458	10.817
22			min	-0.144	2.591	-0.342	10.817	0	0	0	0	0	0	-0.245	6.76
23	4	M3	max	0.43	12	0.048	0	0	12	0	12	0	12	0.063	0
24			min	0.43	0	-0.048	12	0	0	0	0	0	0	-0.082	6
25	5	M1	max	1.467	2.704	0.285	3.606	0	10.817	0	10.817	0	10.817	0.501	10.817
26			min	-0.158	2.591	-0.375	10.817	0	0	0	0	0	0	-0.268	6.76
27	5	M2	max	1.467	2.704	0.285	3.606	0	10.817	0	10.817	0	10.817	0.501	10.817
28			min	-0.158	2.591	-0.375	10.817	0	0	0	0	0	0	-0.268	6.76
29	5	M3	max	0.46	12	0.048	0	0	12	0	12	0	12	0.06	0
30			min	0.46	0	-0.048	12	0	0	0	0	0	0	-0.084	6
31	6	M1	max	2.007	2.704	0.406	3.606	0	10.817	0	10.817	0	10.817	0.694	10.817
32			min	-0.223	2.591	-0.524	10.817	0	0	0	0	0	0	-0.371	6.76
33	6	M2	max	2.007	2.704	0.406	3.606	0	10.817	0	10.817	0	10.817	0.694	10.817
34			min	-0.223	2.591	-0.524	10.817	0	0	0	0	0	0	-0.371	6.76
35	6	M3	max	0.598	12	0.048	0	0	12	0	12	0	12	0.048	0
36			min	0.598	0	-0.048	12	0	0	0	0	0	0	-0.096	6
37	7	M1	max	0.233	2.704	0.026	3.606	0	10.817	0	10.817	0	10.817	0.069	10.817
38			min	-0.017	2.591	-0.047	10.817	0	0	0	0	0	0	-0.04	6.197
39	7	M2	max	0.233	2.704	0.026	3.606	0	10.817	0	10.817	0	10.817	0.069	10.817
40			min	-0.017	2.591	-0.047	10.817	0	0	0	0	0	0	-0.04	6.197
41	7	M3	max	0.111	12	0.029	0	0	12	0	12	0	12	0.05	0
42			min	0.111	0	-0.029	12	0	0	0	0	0	0	-0.036	6
43	8	M1	max	0.952	2.704	0.187	3.606	0	10.817	0	10.817	0	10.817	0.326	10.817
44			min	-0.103	2.591	-0.245	10.817	0	0	0	0	0	0	-0.174	6.76
45	8	M2	max	0.952	2.704	0.187	3.606	0	10.817	0	10.817	0	10.817	0.326	10.817
46			min	-0.103	2.591	-0.245	10.817	0	0	0	0	0	0	-0.174	6.76
47	8	M3	max	0.294	12	0.029	0	0	12	0	12	0	12	0.035	0
48			min	0.294	0	-0.029	12	0	0	0	0	0	0	-0.052	6



Company : AHBL
Designer : KBG
Job Number : 2220236.20
Model Name : Entry Canopy

11/18/2024
2:15:48 PM
Checked By : _____

Maximum Member Section Forces (Continued)

LC	Member Label	Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-ft]	Loc[ft]	y-y Moment[k-ft]	Loc[ft]	z-z Moment[k-ft]	Loc[ft]
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Member End Reactions

	LC	Member Label	Member End	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1	1	M1	I	0	0	0	0	0	0
2			J	0.365	-0.243	0	0	0	0.33
3	1	M2	I	0	0	0	0	0	0
4			J	0.365	-0.243	0	0	0	0.33
5	1	M3	I	0.338	0.048	0	0	0	0.071
6			J	0.338	-0.048	0	0	0	0.071
7	2	M1	I	0	0	0	0	0	0
8			J	0.777	-0.518	0	0	0	0.687
9	2	M2	I	0	0	0	0	0	0
10			J	0.777	-0.518	0	0	0	0.687
11	2	M3	I	0.593	0.048	0	0	0	0.049
12			J	0.593	-0.048	0	0	0	0.049
13	3	M1	I	0	0	0	0	0	0
14			J	0.216	-0.144	0	0	0	0.201
15	3	M2	I	0	0	0	0	0	0
16			J	0.216	-0.144	0	0	0	0.201
17	3	M3	I	0.246	0.048	0	0	0	0.078
18			J	0.246	-0.048	0	0	0	0.078
19	4	M1	I	0	0	0	0	0	0
20			J	0.513	-0.342	0	0	0	0.458
21	4	M2	I	0	0	0	0	0	0
22			J	0.513	-0.342	0	0	0	0.458
23	4	M3	I	0.43	0.048	0	0	0	0.063
24			J	0.43	-0.048	0	0	0	0.063
25	5	M1	I	0	0	0	0	0	0
26			J	0.563	-0.375	0	0	0	0.501
27	5	M2	I	0	0	0	0	0	0
28			J	0.563	-0.375	0	0	0	0.501
29	5	M3	I	0.46	0.048	0	0	0	0.06
30			J	0.46	-0.048	0	0	0	0.06
31	6	M1	I	0	0	0	0	0	0
32			J	0.786	-0.524	0	0	0	0.694
33	6	M2	I	0	0	0	0	0	0
34			J	0.786	-0.524	0	0	0	0.694
35	6	M3	I	0.598	0.048	0	0	0	0.048
36			J	0.598	-0.048	0	0	0	0.048
37	7	M1	I	0	0	0	0	0	0
38			J	0.07	-0.047	0	0	0	0.069
39	7	M2	I	0	0	0	0	0	0

Member End Reactions (Continued)

LC	Member Label	Member End	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
40		J	0.07	-0.047	0	0	0	0.069
41	7	M3	I	0.111	0.029	0	0	0.05
42		J	0.111	-0.029	0	0	0	0.05
43	8	M1	I	0	0	0	0	0
44		J	0.367	-0.245	0	0	0	0.326
45	8	M2	I	0	0	0	0	0
46		J	0.367	-0.245	0	0	0	0.326
47	8	M3	I	0.294	0.029	0	0	0.035
48		J	0.294	-0.029	0	0	0	0.035

AWC NDS-18 / SDPWS-21 ASD Member Wood Code Checks

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Fc' [ksi]	Ft' [ksi]	Fb1' [ksi]	Fb2' [ksi]	Fv' [ksi]	RB	CL	CP	Eqn
1	1	M1	5.5X7.5FS	0.036	10.817	0.037	10.817	y	1.01	0.99	2.152	1.305	0.239	5.673	0.996	0.702	3.9-3
2	1	M2	5.5X7.5FS	0.036	10.817	0.037	10.817	y	1.01	0.99	2.152	1.305	0.239	5.673	0.996	0.702	3.9-3
3	1	M3	5.5X6FS	0.013	6	0.009	12	y	0.877	0.99	2.153	1.305	0.239	5.344	0.997	0.609	3.9-3
4	2	M1	5.5X7.5FS	0.059	10.817	0.062	10.817	y	1.09	1.265	2.747	1.667	0.305	5.673	0.995	0.592	3.9-3
5	2	M2	5.5X7.5FS	0.059	10.817	0.062	10.817	y	1.09	1.265	2.747	1.667	0.305	5.673	0.995	0.592	3.9-3
6	2	M3	5.5X6FS	0.019	12	0.007	12	y	0.922	1.265	2.748	1.667	0.305	5.344	0.996	0.501	3.6.3
7	3	M1	5.5X7.5FS	0.013	2.704	0.012	10.817	y	1.153	1.76	3.814	2.32	0.424	5.673	0.993	0.451	3.6.3
8	3	M2	5.5X7.5FS	0.013	2.704	0.012	10.817	y	1.153	1.76	3.814	2.32	0.424	5.673	0.993	0.451	3.6.3
9	3	M3	5.5X6FS	0.008	12	0.005	12	y	0.957	1.76	3.817	2.32	0.424	5.344	0.994	0.374	3.6.3
10	4	M1	5.5X7.5FS	0.028	2.704	0.029	10.817	y	1.153	1.76	3.814	2.32	0.424	5.673	0.993	0.451	3.6.3
11	4	M2	5.5X7.5FS	0.028	2.704	0.029	10.817	y	1.153	1.76	3.814	2.32	0.424	5.673	0.993	0.451	3.6.3
12	4	M3	5.5X6FS	0.014	12	0.005	12	y	0.957	1.76	3.817	2.32	0.424	5.344	0.994	0.374	3.6.3
13	5	M1	5.5X7.5FS	0.031	10.817	0.032	10.817	y	1.153	1.76	3.814	2.32	0.424	5.673	0.993	0.451	3.9-3
14	5	M2	5.5X7.5FS	0.031	10.817	0.032	10.817	y	1.153	1.76	3.814	2.32	0.424	5.673	0.993	0.451	3.9-3
15	5	M3	5.5X6FS	0.015	12	0.005	12	y	0.957	1.76	3.817	2.32	0.424	5.344	0.994	0.374	3.6.3
16	6	M1	5.5X7.5FS	0.043	10.817	0.045	10.817	y	1.153	1.76	3.814	2.32	0.424	5.673	0.993	0.451	3.9-3
17	6	M2	5.5X7.5FS	0.043	10.817	0.045	10.817	y	1.153	1.76	3.814	2.32	0.424	5.673	0.993	0.451	3.9-3
18	6	M3	5.5X6FS	0.019	12	0.005	12	y	0.957	1.76	3.817	2.32	0.424	5.344	0.994	0.374	3.6.3
19	7	M1	5.5X7.5FS	0.005	2.704	0.004	10.817	y	1.153	1.76	3.814	2.32	0.424	5.673	0.993	0.451	3.6.3
20	7	M2	5.5X7.5FS	0.005	2.704	0.004	10.817	y	1.153	1.76	3.814	2.32	0.424	5.673	0.993	0.451	3.6.3
21	7	M3	5.5X6FS	0.005	12	0.003	12	y	0.957	1.76	3.817	2.32	0.424	5.344	0.994	0.374	3.9-3
22	8	M1	5.5X7.5FS	0.02	10.817	0.021	10.817	y	1.153	1.76	3.814	2.32	0.424	5.673	0.993	0.451	3.9-3
23	8	M2	5.5X7.5FS	0.02	10.817	0.021	10.817	y	1.153	1.76	3.814	2.32	0.424	5.673	0.993	0.451	3.9-3
24	8	M3	5.5X6FS	0.009	12	0.003	12	y	0.957	1.76	3.817	2.32	0.424	5.344	0.994	0.374	3.6.3



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Entry Canopy Beam - End Cantilevered

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

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

Fb + 875.0 psi

Fb - 875.0 psi

Fc - Prll 600.0 psi

Fc - Perp 625.0 psi

Fv 170.0 psi

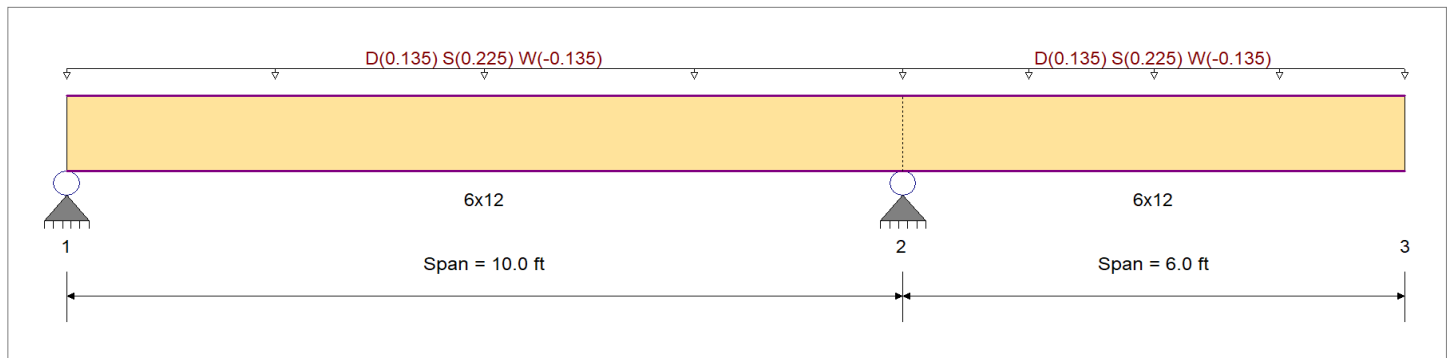
Ft 425.0 psi

E : Modulus of Elasticity

Ebend- xx 1,300.0ksi

Eminbend - xx 470.0ksi

Density 31.210pcf



Applied Loads

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

Beam self weight calculated and added to loading

Load for Span Number 1

Uniform Load : D = 0.0150, S = 0.0250, W = -0.0150 ksf, Tributary Width = 9.0 ft

Load for Span Number 2

Uniform Load : D = 0.0150, S = 0.0250, W = -0.0150 ksf, Tributary Width = 9.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.662	1	Maximum Shear Stress Ratio	=	0.265	1
Section used for this span		6x12		Section used for this span		6x12	
fb: Actual	=	665.86psi		fv: Actual	=	51.85 psi	
F'b	=	1,006.25psi		F'v	=	195.50 psi	
Load Combination				Load Combination			
			+D+S				+D+S
Location of maximum on span	=	10.000ft		Location of maximum on span	=	9.050 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection	0.116 in	Ratio =	1236 >=360	Span: 2 : S Only			
Max Upward Transient Deflection	-0.070 in	Ratio =	2060 >=360	Span: 2 : W Only			
Max Downward Total Deflection	0.193 in	Ratio =	744 >=180	Span: 2 : +D+S			
Max Upward Total Deflection	-0.008 in	Ratio =	15792 >=180	Span: 1 : +D+S			

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.336	0.135	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.68	265.0	787.5	0.87	20.6	153.0
Length = 6.0 ft	2	0.336	0.135	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.68	265.0	787.5	0.75	20.6	153.0
+D+S														0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.662	0.265	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.73	665.9	1,006.3	2.19	51.8	195.5
Length = 6.0 ft	2	0.662	0.265	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.73	665.9	1,006.3	1.89	51.8	195.5



AHBL, INC.
2215 N. 30th Street, Suite 300
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Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Entry Canopy Beam - End Cantilevered

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
+D+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.562	0.225	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.71	565.6	1,006.3	1.86	44.0	195.5
Length = 6.0 ft	2	0.562	0.225	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.71	565.6	1,006.3	1.61	44.0	195.5
+D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.086	0.035	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.22	120.6	1,400.0	0.40	9.4	272.0
Length = 6.0 ft	2	0.086	0.035	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.22	120.6	1,400.0	0.34	9.4	272.0
+D+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.112	0.045	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.58	156.7	1,400.0	0.51	12.2	272.0
Length = 6.0 ft	2	0.112	0.045	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.58	156.7	1,400.0	0.45	12.2	272.0
+D+0.750S+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.327	0.131	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.62	457.4	1,400.0	1.50	35.6	272.0
Length = 6.0 ft	2	0.327	0.131	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.62	457.4	1,400.0	1.30	35.6	272.0
+0.60D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.010	0.004	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.15	14.7	1,400.0	0.05	1.1	272.0
Length = 6.0 ft	2	0.010	0.004	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.15	14.7	1,400.0	0.04	1.1	272.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.114	0.046	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.61	159.0	1,400.0	0.52	12.4	272.0
Length = 6.0 ft	2	0.114	0.046	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.61	159.0	1,400.0	0.45	12.4	272.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+S	0.0175	3.352	+D+S	-0.0076	8.715
2	+D+S	0.1934	6.000		0.0000	8.715

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	1.196	4.783	
Max Upward from Load Combinations	1.196	4.783	
Max Upward from Load Cases	0.720	2.880	
Max Downward from all Load Conditions (Resisting Uplift)	-0.432	-1.728	
Max Downward from Load Cases (Resisting Uplift)	-0.432	-1.728	
D Only	0.476	1.903	
+D+S	1.196	4.783	
+D+0.750S	1.016	4.063	
+D+0.60W	0.217	0.867	
+D+0.450W	0.281	1.126	
+D+0.750S+0.450W	0.821	3.286	
+0.60D+0.60W	0.026	0.105	
+0.60D	0.286	1.142	
S Only	0.720	2.880	
W Only	-0.432	-1.728	

7.0 - MISCELLANEOUS



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Steel Beam - Option 1

CODE REFERENCES

Calculations per AISC 360-16, IBC 2021

Load Combination Set : IBC 2021

Material Properties

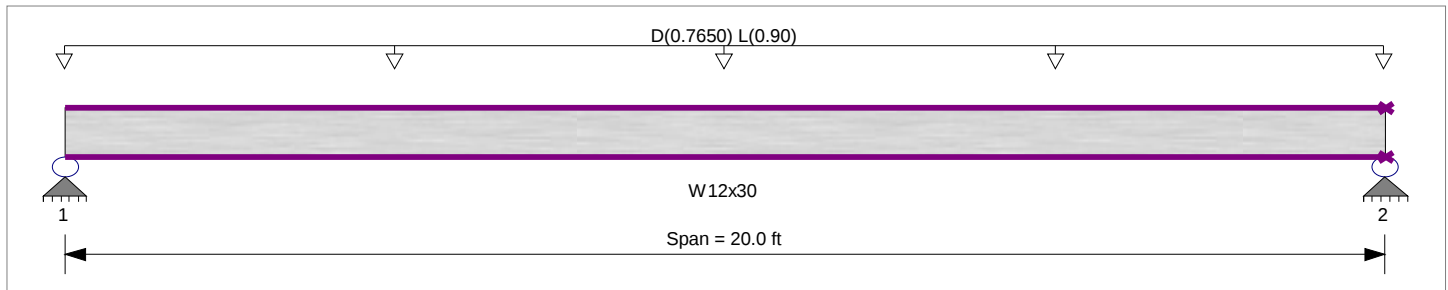
Analysis Method : Allowable Strength Design

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 = 0.0850, L = 0.10 ksf, Tributary Width = 9.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =		0.774 : 1	Maximum Shear Stress Ratio =		0.260 : 1
Section used for this span		W12x30	Section used for this span		W12x30
Ma : Applied		83.250 k-ft	Va : Applied		16.650 k
Mn / Omega : Allowable		107.535 k-ft	Vn/Omega : Allowable		63.960 k
Load Combination		+D+L	Load Combination		+D+L
Span # where maximum occurs		Span # 1	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		0.472 in	Ratio =	508	>=360
Max Upward Transient Deflection		0 in	Ratio =	0	<360
Max Downward Total Deflection		0.872 in	Ratio =	275	>=240.
Max Upward Total Deflection		0 in	Ratio =	0	<240.0
					n/a

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 = 20.00 ft	1	0.356	0.120	38.25		38.25	179.58	107.53	1.00	1.00	7.65	95.94	63.96
+D+L													
Dsgn. L = 20.00 ft	1	0.774	0.260	83.25		83.25	179.58	107.53	1.00	1.00	16.65	95.94	63.96
+D+0.750L													
Dsgn. L = 20.00 ft	1	0.670	0.225	72.00		72.00	179.58	107.53	1.00	1.00	14.40	95.94	63.96
+0.60D													
Dsgn. L = 20.00 ft	1	0.213	0.072	22.95		22.95	179.58	107.53	1.00	1.00	4.59	95.94	63.96

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.8724	10.057		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	16.650	16.650
Max Upward from Load Combinations	16.650	16.650
Max Upward from Load Cases	9.000	9.000
D Only	7.650	7.650
+D+L	16.650	16.650
+D+0.750L	14.400	14.400
+0.60D	4.590	4.590
L Only	9.000	9.000



AHBL, INC.
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Project Title:
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Project Descr:

Steel Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Steel Beam - Option 2

CODE REFERENCES

Calculations per AISC 360-16, IBC 2021

Load Combination Set : IBC 2021

Material Properties

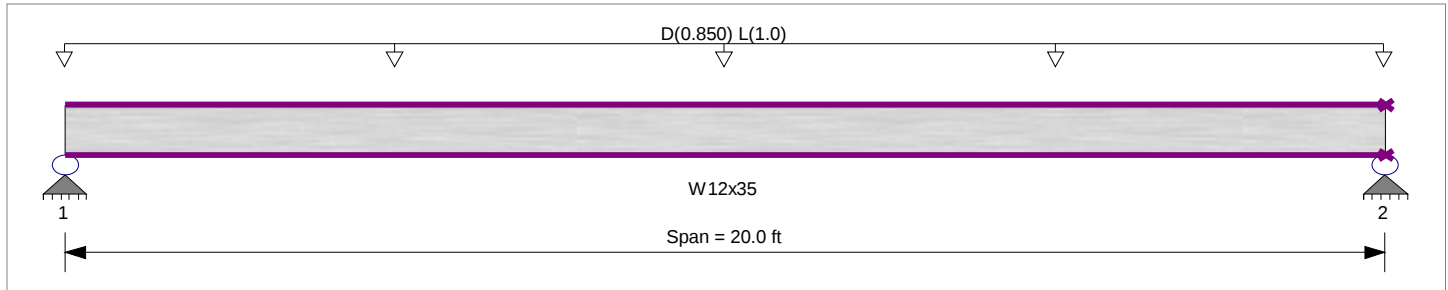
Analysis Method : Allowable Strength Design

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 = 0.0850, L = 0.10 ksf, Tributary Width = 10.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =		0.724 : 1	Maximum Shear Stress Ratio =		0.247 : 1
Section used for this span		W12x35	Section used for this span		W12x35
Ma : Applied		92.500 k-ft	Va : Applied		18.50 k
Mn / Omega : Allowable		127.745 k-ft	Vn/Omega : Allowable		75.0 k
Load Combination		+D+L	Load Combination		+D+L
Span # where maximum occurs		Span # 1	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		0.437 in	Ratio =	548	>=360
Max Upward Transient Deflection		0 in	Ratio =	0	<360
Max Downward Total Deflection		0.809 in	Ratio =	296	>=240.
Max Upward Total Deflection		0 in	Ratio =	0	<240.0
				Span: 1 : L Only	
				n/a	
				Span: 1 : +D+L	
				n/a	

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 = 20.00 ft	1	0.333	0.113	42.50		42.50	213.33	127.74	1.00	1.00	8.50	112.50	75.00
+D+L													
Dsgn. L = 20.00 ft	1	0.724	0.247	92.50		92.50	213.33	127.74	1.00	1.00	18.50	112.50	75.00
+D+0.750L													
Dsgn. L = 20.00 ft	1	0.626	0.213	80.00		80.00	213.33	127.74	1.00	1.00	16.00	112.50	75.00
+0.60D													
Dsgn. L = 20.00 ft	1	0.200	0.068	25.50		25.50	213.33	127.74	1.00	1.00	5.10	112.50	75.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.8095	10.057		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	18.500	18.500
Max Upward from Load Combinations	18.500	18.500
Max Upward from Load Cases	10.000	10.000
D Only	8.500	8.500
+D+L	18.500	18.500
+D+0.750L	16.000	16.000
+0.60D	5.100	5.100
L Only	10.000	10.000



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: HSS Column

Code References

Calculations per AISC 360-16, IBC 2021
Load Combinations Used : IBC 2021

General Information

Steel Section Name : **HSS3x3x1/4**

Analysis Method : Allowable Strength
Steel Stress Grade : A500, Grade C, Fy = 50 ksi, Carbon Steel
Fy : Steel Yield 50.0 ksi
E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height 11 ft
Top & Bottom Fixity Top & Bottom Pinned

Brace condition :
Unbraced Length for buckling ABOUT X-X Axis = 11 ft, K = 1.0
Unbraced Length for buckling ABOUT Y-Y Axis = 11 ft, K = 1.0

Applied Loads

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

Column self weight included : 96.558 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 11.0 ft, D = 8.50, L = 10.0 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =
Load Combination
Location of max.above base
At maximum location values are . . .

0.7171 : 1
+D+L
0.0 ft

Maximum Load Reactions . .

Top along X-X k
Bottom along X-X k
Top along Y-Y k
Bottom along Y-Y k

Pa : Axial 18.597 k
Pn / Omega : Allowable 25.934 k
Ma-x : Applied 0.0 k-ft
Mn-x / Omega : Allowable 6.188 k-ft
Ma-y : Applied 0.0 k-ft
Mn-y / Omega : Allowable 6.188 k-ft

Maximum Load Deflections . . .

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

PASS Maximum Shear Stress Ratio

0.0 : 1
0.0
0.0 ft
0.0 k
0.0 k

Load Combination
Location of max.above base
At maximum location values are . . .
Va : Applied
Vn / Omega : Allowable

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Cbz	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios			
	Stress Ratio	Status	Location						Stress Ratio	Status	Location	

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

Extreme Reactions

Item	Axial Reaction		X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		k-ft	My - End Moments	
	Extreme Value	@ Base	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top		@ Base	@ Top

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
------------------	--------------------------	----------	--------------------------	----------

Steel Section Properties : HSS3x3x1/4

Steel Section Properties : HSS3x3x1/4



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Column

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

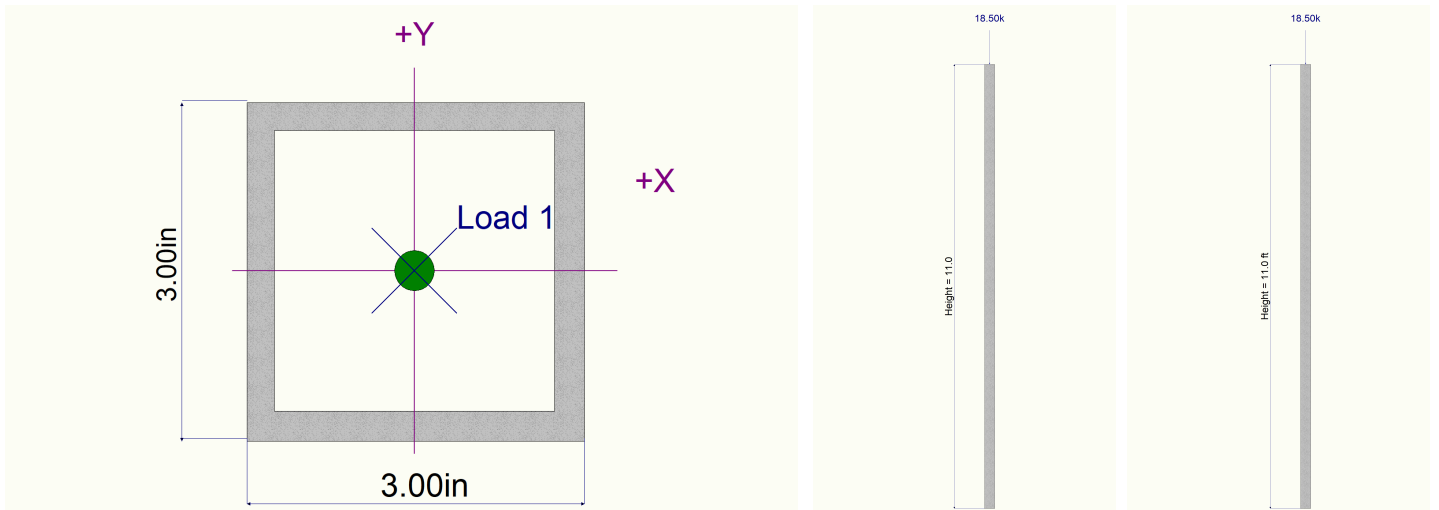
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DESCRIPTION: HSS Column

Depth	=	3.000 in	I xx	=	3.02 in^4	J	=	5.080 in^4
Design Thick	=	0.233 in	S xx	=	2.01 in^3			
Width	=	3.000 in	R xx	=	1.110 in			
Wall Thick	=	0.250 in	Zx	=	2.480 in^3			
Area	=	2.440 in^2	I yy	=	3.020 in^4	C	=	3.520 in^3
Weight	=	8.778 plf	S yy	=	2.010 in^3			
			R yy	=	1.110 in			

Ycg = 0.000 in

Sketches





AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Stair Stringer - Long Span

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : iLevel Truss Joist

Wood Grade : TimberStrand LSL 1.55E

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

Fb + 2,325.0 psi

Fb - 2,325.0 psi

Fc - Prll 2,050.0 psi

Fc - Perp 800.0 psi

Fv 310.0 psi

Ft 1,070.0 psi

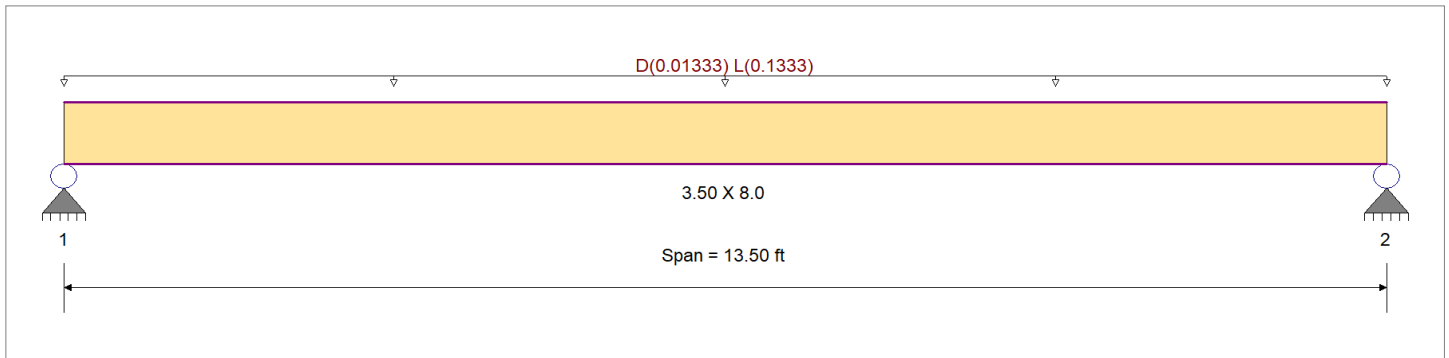
E : Modulus of Elasticity

Ebend- xx 1,550.0 ksi

Eminbend - xx 787.82 ksi

Density 45.010 pcf

Repetitive Member Stress Increase



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.010, L = 0.10 ksf, Tributary Width = 1.333 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio = 0.413 1				Maximum Shear Stress Ratio = 0.155 : 1			
Section used for this span 3.50 X 8.0				Section used for this span 3.50 X 8.0			
fb: Actual = 1,073.70psi				fv: Actual = 47.99 psi			
F'b = 2,597.93psi				F'v = 310.00 psi			
Load Combination				Load Combination			
Location of maximum on span = 6.750ft				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 0.433 in Ratio = 374 >=360				Span: 1 : L Only			
Max Upward Transient Deflection 0 in Ratio = 0 <360				n/a			
Max Downward Total Deflection 0.476 in Ratio = 340 >=240				Span: 1 : +D+L			
Max Upward Total Deflection 0 in Ratio = 0 <240				n/a			

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only																	
Length = 13.451 ft	1	0.042	0.016	0.90	1.00	1.00	1.00	1.074	1.00	1.00	1.04	0.30	97.6	2,338.1	0.08	4.4	279.0
Length = 0.04927 ft	1	0.001	0.016	0.90	1.00	1.00	1.00	1.074	1.00	1.00	1.04	0.00	1.4	2,338.1	0.08	4.4	279.0
+D+L																	
Length = 13.451 ft	1	0.413	0.155	1.00	1.00	1.00	1.00	1.074	1.00	1.00	1.04	3.34	1,073.7	2,597.9	0.90	48.0	310.0
Length = 0.04927 ft	1	0.006	0.155	1.00	1.00	1.00	1.00	1.074	1.00	1.00	1.04	0.05	15.6	2,597.9	0.90	48.0	310.0
+D+0.750L																	
Length = 13.451 ft	1	0.255	0.096	1.25	1.00	1.00	1.00	1.074	1.00	1.00	1.04	2.58	829.7	3,247.4	0.69	37.1	387.5
Length = 0.04927 ft	1	0.004	0.096	1.25	1.00	1.00	1.00	1.074	1.00	1.00	1.04	0.04	12.1	3,247.4	0.69	37.1	387.5



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2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Stair Stringer - Long Span

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
+0.60D						1.00	1.00	1.00	1.074	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 13.451 ft		1	0.014	0.005	1.60	1.00	1.00	1.00	1.074	1.00	1.00	1.04	0.18	58.6	4,156.7	0.05	2.6	496.0
Length = 0.04927 ft		1	0.000	0.005	1.60	1.00	1.00	1.00	1.074	1.00	1.00	1.04	0.00	0.9	4,156.7	0.05	2.6	496.0

Overall Maximum Deflections

Span	Load Combination	Max. "." Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.4762	6.799		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.990	0.990
Max Upward from Load Combinations	0.990	0.990
Max Upward from Load Cases	0.900	0.900
D Only	0.090	0.090
+D+L	0.990	0.990
+D+0.750L	0.765	0.765
+0.60D	0.054	0.054
L Only	0.900	0.900



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Project Title:
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Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Stair Stringer - Typ

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

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

Fb + 900 psi

Fb - 900 psi

Fc - Prll 1350 psi

Fc - Perp 625 psi

Fv 180 psi

Ft 575 psi

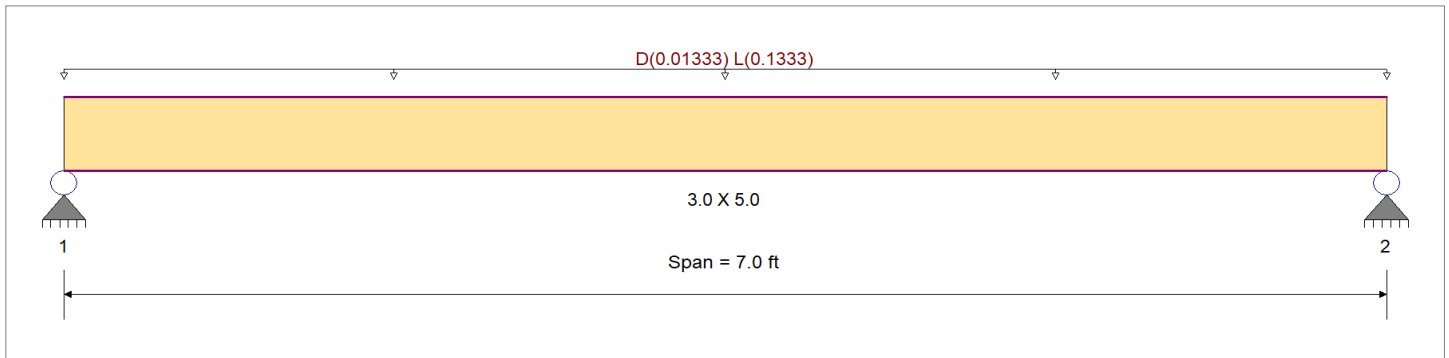
E : Modulus of Elasticity

Ebend- xx 1600ksi

Eminbend - xx 580ksi

Density 31.21pcf

Repetitive Member Stress Increase



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.010, L = 0.10 ksf, Tributary Width = 1.333 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.595 1	Maximum Shear Stress Ratio	=	0.252 : 1
Section used for this span		3.0 X 5.0	Section used for this span		3.0 X 5.0
fb: Actual	=	862.18psi	fv: Actual	=	45.33 psi
F'b	=	1,449.00psi	Fv	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.500ft	Location of maximum on span	=	6.591 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.145 in	Ratio = 579 >=360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.159 in	Ratio = 527 >=240	Span: 1 : +D+L		
Max Upward Total Deflection	0 in	Ratio = 0 <240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 7.0 ft	1	0.060	0.025	0.90	1.00	1.00	1.00	1.400	1.00	1.00	1.15	0.08	78.4	1,304.1	0.04	4.1	162.0
+D+L														0.0	0.00	0.0	0.0
Length = 7.0 ft	1	0.595	0.252	1.00	1.00	1.00	1.00	1.400	1.00	1.00	1.15	0.90	862.2	1,449.0	0.45	45.3	180.0
+D+0.750L														0.0	0.00	0.0	0.0
Length = 7.0 ft	1	0.368	0.156	1.25	1.00	1.00	1.00	1.400	1.00	1.00	1.15	0.69	666.2	1,811.3	0.35	35.0	225.0
+0.60D														0.0	0.00	0.0	0.0
Length = 7.0 ft	1	0.020	0.009	1.60	1.00	1.00	1.00	1.400	1.00	1.00	1.15	0.05	47.0	2,318.4	0.02	2.5	288.0



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
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Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Stair Stringer - Typ

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.1594	3.526		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.513	0.513
Max Upward from Load Combinations	0.513	0.513
Max Upward from Load Cases	0.467	0.467
D Only	0.047	0.047
+D+L	0.513	0.513
+D+0.750L	0.397	0.397
+0.60D	0.028	0.028
L Only	0.467	0.467



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Tacoma, WA 98403

Project Title:
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Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC#: KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Landing Joist

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

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

Fb + 900.0 psi

Fb - 900.0 psi

Fc - Prll 1,350.0 psi

Fc - Perp 625.0 psi

Fv 180.0 psi

Ft 575.0 psi

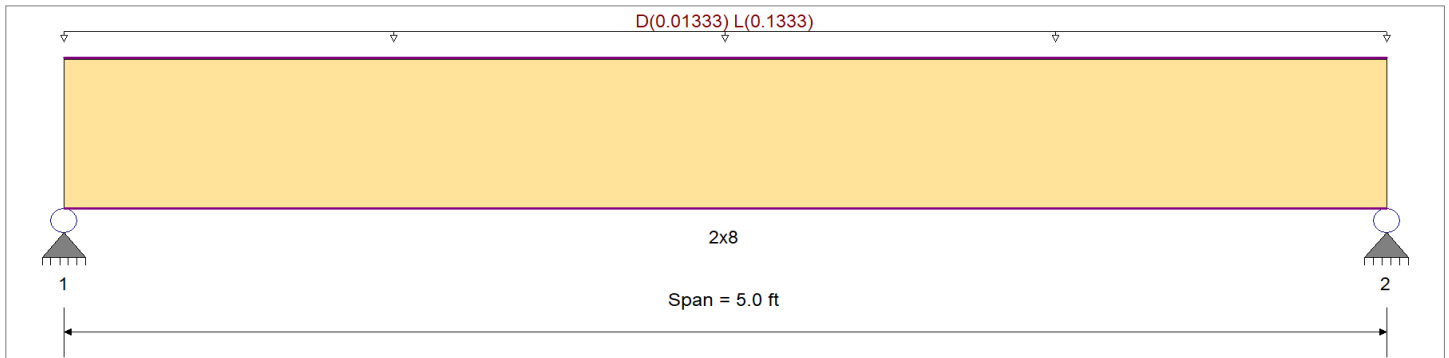
E : Modulus of Elasticity

Ebend- xx 1,600.0ksi

Eminbend - xx 580.0ksi

Density 31.210pcf

Repetitive Member Stress Increase



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.010, L = 0.10 ksf, Tributary Width = 1.333 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.337 : 1	Maximum Shear Stress Ratio	=	0.213 : 1
Section used for this span		2x8	Section used for this span		2x8
fb: Actual	=	418.44psi	fv: Actual	=	38.38 psi
F'b	=	1,242.00psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.500ft	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	0.025 in	Ratio = 2425 >=360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.027 in	Ratio = 2204 >=240	Span: 1 : +D+L		
Max Upward Total Deflection	0 in	Ratio = 0 <240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.034	0.022	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.04	38.0	1,117.8	0.03	3.5	162.0
+D+L					1.00	1.00	1.00	1.200	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.337	0.213	1.00	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.46	418.4	1,242.0	0.28	38.4	180.0
+D+0.750L					1.00	1.00	1.00	1.200	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.208	0.132	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.35	323.3	1,552.5	0.22	29.7	225.0
+0.60D					1.00	1.00	1.00	1.200	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.011	0.007	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.02	22.8	1,987.2	0.02	2.1	288.0



AHBL, INC.
2215 N. 30th Street, Suite 300
Tacoma, WA 98403

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Landing Joist

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.0272	2.518		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.367	0.367
Max Upward from Load Combinations	0.367	0.367
Max Upward from Load Cases	0.333	0.333
D Only	0.033	0.033
+D+L	0.367	0.367
+D+0.750L	0.283	0.283
+0.60D	0.020	0.020
L Only	0.333	0.333



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Wood Beam

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LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

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DESCRIPTION: Landing Beam

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

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

Fb + 900 psi

Fb - 900 psi

Fc - Prll 1350 psi

Fc - Perp 625 psi

Fv 180 psi

Ft 575 psi

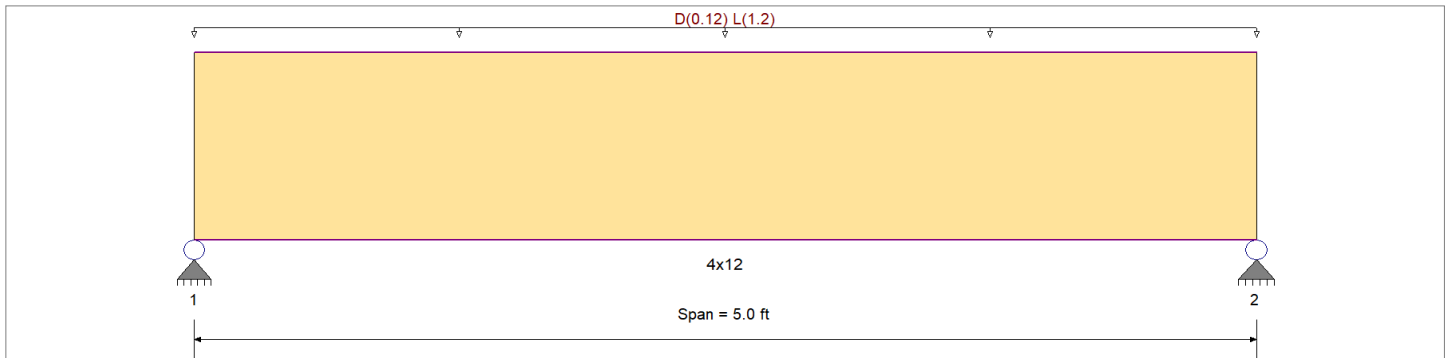
E : Modulus of Elasticity

Ebend- xx 1600 ksi

Eminbend - xx 580 ksi

Density 31.21 pcf

Repetitive Member Stress Increase



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.010, L = 0.10 ksf, Tributary Width = 12.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.589 1	Maximum Shear Stress Ratio	=	0.438 : 1
Section used for this span		4x12	Section used for this span		4x12
fb: Actual	=	670.48psi	fv: Actual	=	78.92 psi
F'b	=	1,138.50psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.500ft	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	0.026 in	Ratio = 2348 >=360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.028 in	Ratio = 2135 >=240	Span: 1 : +D+L		
Max Upward Total Deflection	0 in	Ratio = 0 <240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.059	0.044	0.90	1.00	1.00	1.00	1.100	1.00	1.00	1.15	0.38	61.0	1,024.7	0.19	7.2	162.0
+D+L														0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.589	0.438	1.00	1.00	1.00	1.00	1.100	1.00	1.00	1.15	4.13	670.5	1,138.5	2.07	78.9	180.0
+D+0.750L														0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.364	0.271	1.25	1.00	1.00	1.00	1.100	1.00	1.00	1.15	3.19	518.1	1,423.1	1.60	61.0	225.0
+0.60D														0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.020	0.015	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.15	0.23	36.6	1,821.6	0.11	4.3	288.0



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Wood Beam

Project File: 2220236_care center redesign.ec6

LIC# : KW-06014847, Build:20.24.10.30

AHBL, INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Landing Beam

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.0281	2.518		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	3.300	3.300
Max Upward from Load Combinations	3.300	3.300
Max Upward from Load Cases	3.000	3.000
D Only	0.300	0.300
+D+L	3.300	3.300
+D+0.750L	2.550	2.550
+0.60D	0.180	0.180
L Only	3.000	3.000