PCS Structural Solutions

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STRUCTURAL CALCULATIONS

FOR

STARBUCKS PUYALLUP TI
1115 E MAIN ST
PUYALLUP, WA 98372

City of Puyallup
Building
REVIEWED
FOR
COMPLIANCE
SKinnear
12/13/2024
4:49:01 PM

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

PRCTI20241352

PREPARED BY
PCS STRUCTURAL *SOLUTIONS*

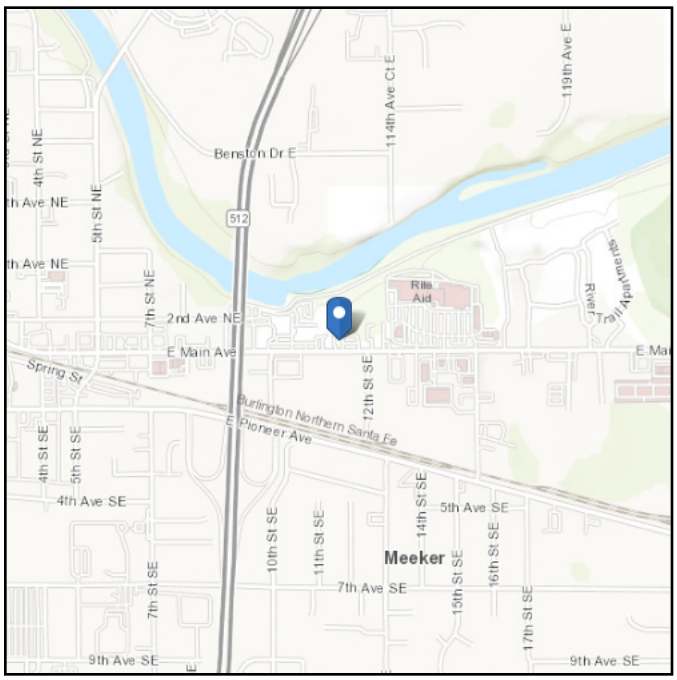
Calculations required to be provided by the Permittee on site for all Inspections

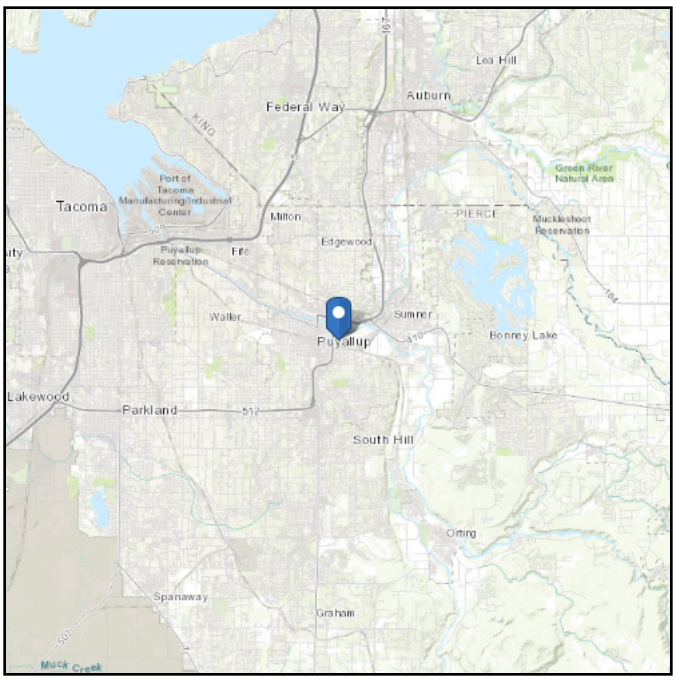
AUGUST 22, 2024
24-356

ASCE Hazards Report

Address:
1115 E Main
Puyallup, Washington
98372

Standard:	ASCE/SEI 7-16	**Latitude:**	47.192103
Risk Category:	II	**Longitude:**	-122.27905
Soil Class:	D - Default (see Section 11.4.3)	**Elevation:**	54.273300457218 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:	Fri Jul 26 2024

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.

Seismic

Site Soil Class: D - Default (see Section 11.4.3)

Results:

S_S :	1.266	S_{D1} :	N/A
S_1 :	0.436	T_L :	6
F_a :	1.2	PGA :	0.5
F_v :	N/A	PGA_M :	0.6
S_{MS} :	1.519	F_{PGA} :	1.2
S_{M1} :	N/A	I_e :	1
S_{DS} :	1.013	C_v :	1.353

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Fri Jul 26 2024

Date Source: USGS Seismic Design Maps

Snow

Results:

Ground Snow Load, p_g:	18 lb/ft^2
Mapped Elevation:	54.3 ft
Data Source:	
Date Accessed:	Fri Jul 26 2024

Statutory requirements of the Authority Having Jurisdiction are not included.

Snow load values are mapped to a 0.5 mile resolution. This resolution can create a mismatch between the mapped elevation and the site-specific elevation in topographically complex areas. Engineers should consult the local authority having jurisdiction in locations where the reported ‘elevation’ and ‘mapped elevation’ differ significantly from each other.

Project: Starbucks Puyallup TI | Job Number: 24-356

Sheet: of | Name: BRT

Originating Office: Tacoma | Date: 8/9/2024

DESIGN CRITERIA CHECKLIST

CODE: IBC 2021, ASCE 7-16 | LOCATION: PUYALLUP, WA

RISK CATEGORY: II (Per ASCE 7-16 Table 1.5-1 & IBC Table 1604.5)

VERTICAL DESIGN CRITERIA

	DEAD	LIVE	PARTITION	CONCENTRATED
ROOF:	20 PSF	25 PSF		

WIND DESIGN CRITERIA

BASIC WIND SPEED (V) =	98 MPH	(Per ASCE 7-16 Sec. 26.5.1, Fig. 26.5-1A; 1B; 1C & 1D, or as required by Bld'g Dept.)
EXPOSURE CATEGORY:	B	(Per ACSE 7-16 Section 26.7.3)
DIRECTIONALITY FACTOR (K_d):	0.85	(Per ASCE 7-16 Table 26.6-1)
GUST EFFECT FACTOR (G):	0.85	(Per ASCE 7-16 Section 26.11)
TOPOGRAPHIC FEATURE:	None	(See ASCE 7-16 Figure 26.8-1)
HILL HEIGHT (H):	0 FT	(See ASCE 7-16 Figure 26.8-1)
UPWIND DISTANCE TO HALF HILL (Lh):	0 FT	(See ASCE 7-16 Figure 26.8-1)
DISTANCE FROM CREST TO SITE (x):	0 FT UPWIND	(See ASCE 7-16 Figure 26.8-1)
MEAN ROOF HEIGHT:	0-15 FT	(See ASCE 7-16 Section 26.2 - Definitions)
ELEVATION:	0 FT	(See ASCE 7-16 Section 26.9)
ENCLOSURE CLASSIFICATION:	Enclosed	(See ASCE 7-16 Secion 26.2 & Table 26.13-1)
ROOF TYPE:	Monoslope	(See ASCE 7-16 Figure 27.3-1)
ROOF SLOPE (__:12):	0.25:12	(Enter vertical rise in 12 horizontal units) θ (degrees): 1.19

SEISMIC DESIGN CRITERIA

SITE CLASS:	D	(Per IBC Section 1613.2.2, Assumed as "D" or per Geotech.)
IMPORTANCE FACTOR (I_E):	1	(Per ASCE 7-16 Table 1.5-2)
STRUCTURAL SYSTEM (R):	6.5	(Per ASCE 7-16 Table 12.2-1)
OVERSTRENGTH FACTOR (Ω_o):	2.5	(Per ASCE 7-16 Table 12.2-1)

INFORMATION BELOW FROM APPLIED TECHNOLOGY COUNCIL (ATC) "HAZARDS BY LOCATION"

LATITUDE:	47.192	S_S =	1.266	F_a =	1.200
LONGITUDE:	-122.279	S_1 =	0.436	F_v =	N/A

DEFLECTION CRITERIA

FLOOR (LIVE):	L/ 480	ROOF (LIVE):	L/ 360
FLOOR (TOTAL):	L/ 360	ROOF (TOTAL):	L/ 240
WALLS:	L/ 360	SPECIAL:	L/

SOIL DESIGN CRITERIA

REPORT: NO

NO SOILS REPORT PROVIDED. ALL ENGINEERING SOIL PARAMETERS ARE ASSUMED.

BEARING:	1500 PSF
ACTIVE:	35 PCF
PASSIVE:	250 PCF
COEFFICIENT OF FRICTION:	0.35

MINIMUM FOOTING DIMENSIONS:

CONTINUOUS:	1'-4"
SPREAD:	1'-6"
FROST DEPTH:	1'-6"

PILE TYPE:	NONE
VERTICAL CAPACITY :	N/A
UPLIFT CAPACITY:	N/A
LATERAL CAPACITY:	N/A
SIZE:	N/A

PCS Structural Solutions

Project: Starbucks Puyallup TI | Job Number: 24-356

Sheet: of | Name: BRT

Originating Office: Tacoma | Date: 08/09/24

MATERIALS

CONCRETE

Footings/Piles:	3000 PSI	Columns:	4000 PSI
Slabs/Walls:	4000 PSI	Beams:	4000 PSI
-	-	-	-

REINFORCING

Steel Grade = 60 | f_y = 60 KSI

STRUCTURAL STEEL

W-Flange Beams	ASTM A992	f_y = 50 KSI
Shapes & Plates	ASTM A36	f_y = 36 KSI
Pipes	ASTM A53, Grade B	f_y = 35 KSI
HSS Rect.	ASTM A500, Grade C	f_y = 50 KSI
HSS Round	ASTM A500, Grade C	f_y = 46 KSI

MASONRY

ASTM C90 | f'_m = 2000 PSI | SOLID GROUTED

GLULAM BEAMS

	Simple Spans		Cantilevers
	24F-V4	Grade =	24F-V8
	1.80E+06 PSI	E =	1.80E+06 PSI
	2400 PSI	$F_{b\ (BOTTOM)}$ =	2400 PSI
	1850 PSI	$F_{b\ (TOP)}$ =	2400 PSI
	240 PSI	F_v =	240 PSI

SCL PRODUCTS

	2x SCL	1¾" SCL	3½, 5¼ SCL
E =	1.30E+06 PSI	1.80E+06 PSI	2.00E+06 PSI
F_b =	1700 PSI	2600 PSI	2900 PSI
F_v =	285 PSI	285 PSI	285 PSI
F_c =	1400 PSI	2400 PSI	2600 PSI

FRAMING LUMBER

Joists & Studs	2x DF #2	2x HF #1	-
E =	1.60E+06 PSI	1.50E+06 PSI	-
F_b =	900 PSI	975 PSI	-
F_v =	180 PSI	150 PSI	-
F_c =	1350 PSI	1350 PSI	-
Beams & Headers	4x DF #2	4x HF #1	6x DF #1
E =	1.60E+06 PSI	1.50E+06 PSI	1.60E+06 PSI
F_b =	900 PSI	975 PSI	1350 PSI
F_v =	180 PSI	150 PSI	170 PSI
Posts & Timbers	6x DF #1	-	-
E =	1.60E+06 PSI	-	-
F_c =	1000 PSI	-	-

Project: Starbucks Puyallup TI | Job Number: 24-356

Sheet: of | Name: BRT

Originating Office: Tacoma | Date: 08/09/24

DESIGN CRITERIA - WIND

BASIC WIND SPEED (V):	98 MPH	MEAN ROOF HEIGHT:	15 FT
RISK CATEGORY:	II	GROUND ELEVATION FACTOR (Ke):	1.00
EXPOSURE CATEGORY:	B	ENCLOSURE CLASSIFICATION:	Enclosed
DIRECTIONALITY FACTOR (K_d):	0.85	ROOF TYPE:	Monoslope
GUST EFFECT FACTOR (G):	0.85	ROOF SLOPE (__:12):	0.3:12
		θ (degrees):	1.19

ROOF PRESSURES (Figure 27.3-1)

		External Pressures (q_h*(GC_p)):			Internal Pressures (±q_i*(GC_{pi}))
Wind Direction:	h/L:	Windward (Positive)	Windward (Negative)	Leeward	All Roofs
Normal to Ridge for θ ≥ 10°	≤0.25	N/A	N/A	N/A	2.1
	0.50	N/A	N/A	N/A	
	≥1.0	N/A	N/A	N/A	

			External Pressures (q_h*(GC_p)):		Internal Pressures (±q_i*(GC_{pi}))
	h/L:	Horizontal Distance from Windward Edge	Positive Pressure	Negative Pressure	All Roofs
Normal to Ridge for θ < 10° and Parallel to Ridge for All θ	≤0.5	0 to h	-1.8	-9.1	2.1
		h to 2h		-5.1	
		>2h		-3.0	
			-1.8	-13.2	
		>h/2		-7.1	

ASCE 7-16 CHAPTER 27: WIND LOADS ON BUILDINGS: MWFRS (DIRECTIONAL PROCEDURE)
PART 1: ENCLOSED AND PARTIALLY ENCLOSED BUILDINGS OF ALL HEIGHTS

HORIZONTAL WALL PRESSURES (Figure 27.3-1)

Windward External Pressures (q_z*(GC_p)):			Leeward & Sidewall External Pressures (q_h*(GC_p)):			Internal Pressures (±q_i*(GC_{pi}))
Height Above Ground Level, z	K_{zt}	Windward wall	L/B:	Leeward wall	Sidewall	All walls
15	1.00	8.1	0-1	-5.1	-7.1	2.1
20	1.00	8.8	2	-3.0		
25	1.00	9.4	≥4	-2.0		
30	1.00	9.9				
40	1.00	10.8				
50	1.00	11.5				
60	1.00	12.1				
70	1.00	12.6				
80	1.00	13.2				
90	1.00	13.6				
100	1.00	14.1				
120	1.00	14.8				
140	1.00	15.5				
160	1.00	16.1				
180	1.00	16.6				
200	1.00	17.1				
250	1.00	18.2				
300	1.00	19.2				
350	1.00	20.0				
400	1.00	20.9				
450	1.00	21.6				
500	1.00	22.2				

NOTES:

1) Minimum Design Wind Loads (Per ASCE 7-16 27.1.5): The wind load used for design of the MWFRS shall not be less than 16 PSF multiplied by the wall area of the building, and 8 PSF multiplied by the roof area of the building projected on a vertical plane normal to the assumed wind direction. Wall and roof loads shall be applied simultaneously.

2) q_i has conservatively been taken equal to q_h

K_{ht} = 1.00

q_h = 11.9 PSF

Project: Starbucks Puyallup TI | Job Number: 24-356

Sheet: of | Name: BRT

Originating Office: Tacoma | Date: 08/09/24

DESIGN CRITERIA - WIND

BASIC WIND SPEED (V):	98 MPH	MEAN ROOF HEIGHT:	15 FT
RISK CATEGORY:	II	GROUND ELEVATION FACTOR (Ke):	1.00
EXPOSURE CATEGORY:	B	ENCLOSURE CLASSIFICATION:	Enclosed
DIRECTIONALITY FACTOR (K_d):	0.85	ROOF TYPE:	Monoslope
GUST EFFECT FACTOR (G):	0.85	ROOF SLOPE (__:12):	0.3:12
		θ (degrees):	1.19

ASCE 7-16 CHAPTER 30: WIND LOADS: COMPONENTS AND CLADDING
PART 1: LOW-RISE BUILDINGS (h≤60 ft)

ROOF SURFACES

Effective Wind Area	POSITIVE PRESSURES	NEGATIVE PRESSURES					
		ZONE					
	ALL ZONES	1'	1	2	3	N/A	N/A
10 SF	16.0	-16.0	-22.4	-29.5	-40.3	N/A	N/A
20 SF	16.0	-16.0	-20.9	-27.6	-36.5	N/A	N/A
50 SF	16.0	-16.0	-19.0	-25.1	-31.4	N/A	N/A
100 SF	16.0	-16.0	-17.5	-23.2	-27.6	N/A	N/A

WALL SURFACES & ROOF OVERHANGS

Effective Wind Area	WALL ZONES				ROOF OVERHANG ZONES					
	POSITIVE PRESSURES		NEGATIVE PRESSURES		NEGATIVE PRESSURES					
	4	5	4	5	1'	1	2	3	N/A	N/A
10 SF	16.0	16.0	-16.0	-18.8	-20.3	-20.3	-27.4	-38.1	N/A	N/A
20 SF	16.0	16.0	-16.0	-17.6	-19.9	-19.9	-24.9	-33.7	N/A	N/A
50 SF	16.0	16.0	-16.0	-16.0	-19.4	-19.4	-21.5	-27.8	N/A	N/A
100 SF	16.0	16.0	-16.0	-16.0	-19.1	-19.1	-19.0	-23.4	N/A	N/A
500 SF	16.0	16.0	-16.0	-16.0	-18.2	-18.2	-16.0	-16.0	N/A	N/A

NOTES:

1) ASCE 7-16 30.2.2: Minimum Design Wind Loads: The design wind pressure for C&C of buildings shall not be less than a net pressure of 16 PSF acting in either direction normal to the surface.

2) q_i has conservatively been taken equal to q_h

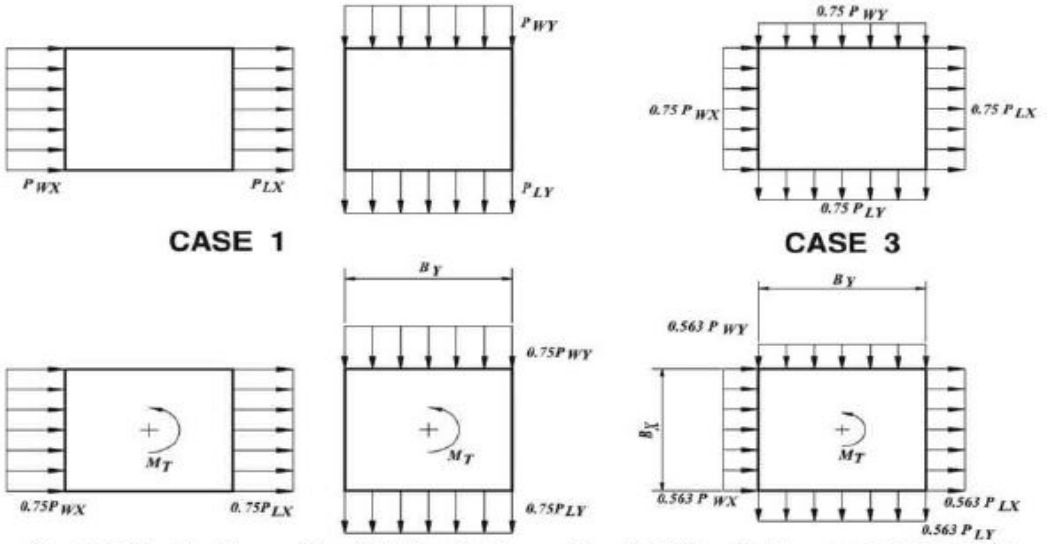
K_{ht} = 1.00

q_h = 11.9 PSF

DESIGN CRITERIA - WIND

FIGURE 27.3-8: Main Wind Force Resisting System, Part 1 (All Heights): Design Wind Load Cases per ASCE 7-16

Diagrams



Notation

P_{WX}, P_{WY} = Windward face design pressure acting in the x, y principal axis, respectively.
P_{LX}, P_{LY} = Leeward face design pressure acting in the x, y principal axis, respectively.
$e(e_X, e_Y)$ = Eccentricity for the x, y principal axis of the structure, respectively.
M_T = Torsional moment per unit height acting about a vertical axis of the building.

Case 1. Full design wind pressure acting on the projected area perpendicular to each principal axis of the structure, considered separately along each principal axis.
Case 2. Three-quarters of the design wind pressure acting on the projected area perpendicular to each principal axis of the structure in conjunction with a torsional moment as shown, considered separately for each principal axis.
Case 3. Wind loading as defined in Case 1, but considered to act simultaneously at 75% of the specified value.
Case 4. Wind loading as defined in Case 2, but considered to act simultaneously at 75% of the specified value.

Notes

1. Design wind pressures for windward and leeward faces shall be determined in accordance with the provisions of Sections 27.3.1 and 27.3.2 as applicable for buildings of all heights.
2. Diagrams show plan views of buildings.

FIGURE 27.3-8 Main Wind Force Resisting System, Part 1 (All Heights): Design Wind Load Cases

DESIGN CRITERIA - WIND

FIGURE 27.3-1 Main Wind Force Resisting System, Part 1 (All Heights): External Pressure Coefficients, Cp, for Enclosed and Partially Enclosed Buildings - Walls and Roofs per ASCE 7-16

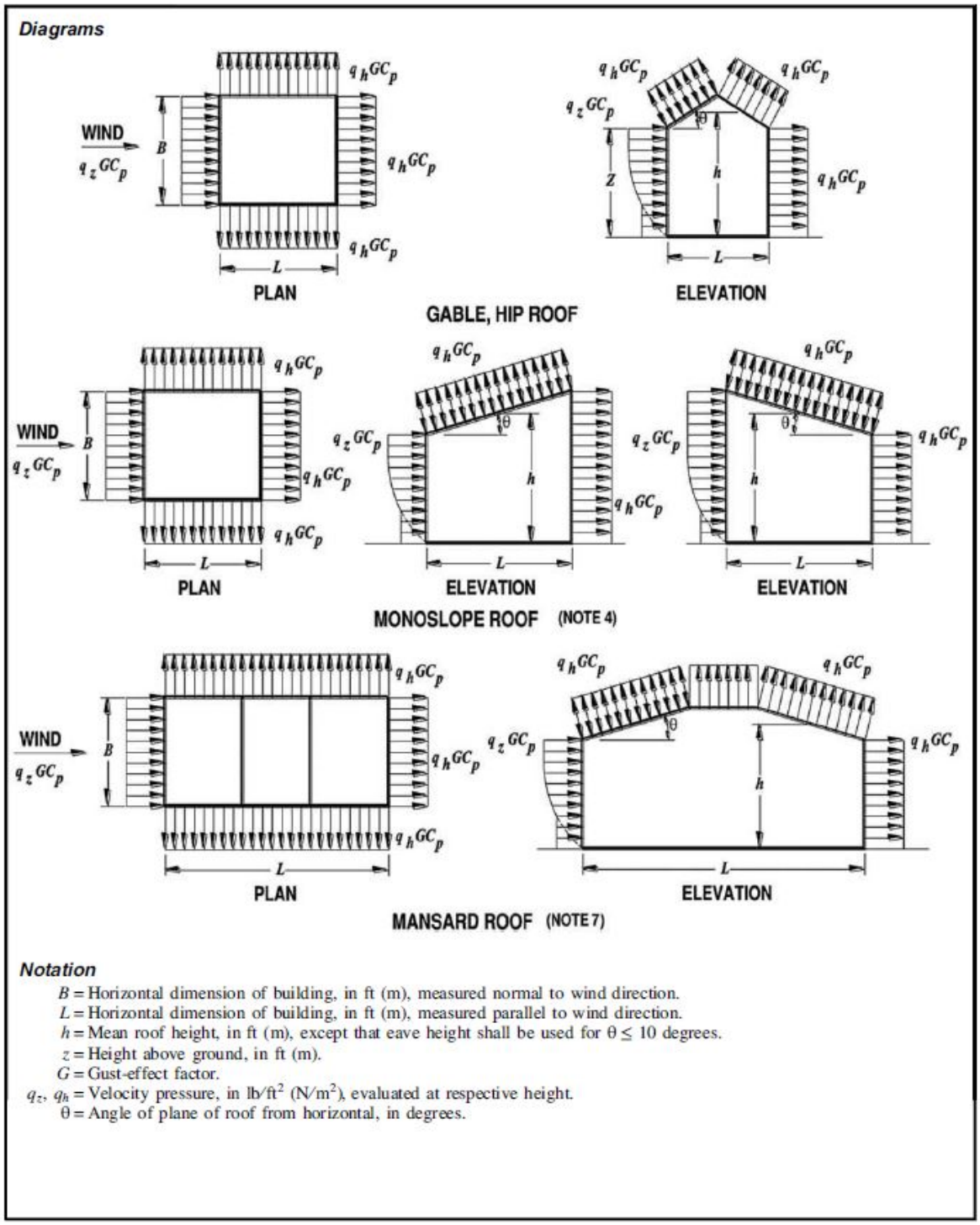
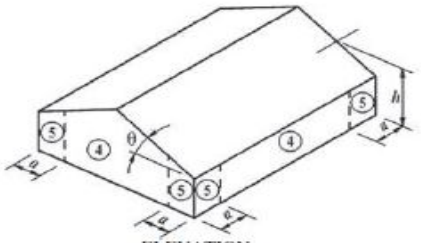


FIGURE 27.3-1 Main Wind Force Resisting System, Part 1 (All Heights): External Pressure Coefficients, C_p, for Enclosed and Partially Enclosed Buildings—Walls and Roofs

DESIGN CRITERIA - WIND

FIGURE 30.3-1: Components and Cladding [h ≤ 60 ft]: External Pressure Coefficients, (GCp), for Enclosed and Partially Enclosed Buildings - Walls

Diagram



Notation

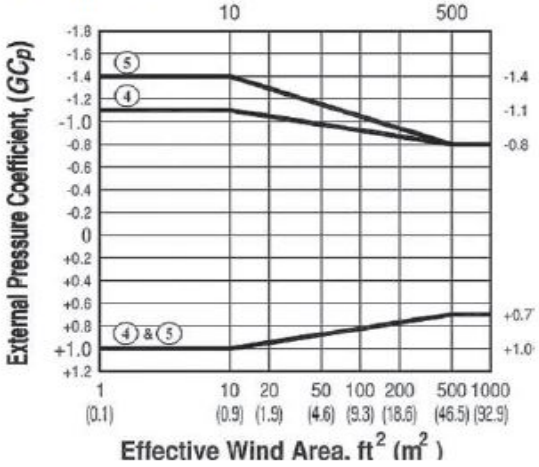
a = 10% of least horizontal dimension or $0.4h$, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9 m).

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

h = Mean roof height, in ft (m), except that eave height shall be used for θ ≤ 10°.

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

External Pressure Coefficient, (GC_p) - Walls



Notes

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

FIGURE 30.3-1 Components and Cladding [$h \leq 60$ ft ($h \leq 18.3$ m)]: External Pressure Coefficients, (GC_p), for Enclosed and Partially Enclosed Buildings—Walls

Project: Starbucks Puyallup TI | Job Number: 24-356

Sheet: of | Name: BRT

Originating Office: Tacoma | Date: 08/09/24

DESIGN CRITERIA - SEISMIC

ASCE 7-16 SECTION 12.8 - EQUIVALENT LATERAL FORCE PROCEDURE

RISK CATEGORY:	II	LATITUDE:	47.192
SITE CLASS:	D	LONGITUDE:	-122.279
IMPORTANCE FACTOR (I_E):	1	S_S =	1.266
STRUCTURAL SYSTEM (R):	6.5	S_1 =	0.436
OVERSTRENGTH FACTOR (Ω_o):	2.5	F_a =	1.200
		F_v =	N/A

ASCE 7-16 SECTION 11.4 SEISMIC GROUND MOTION VALUES

Section 11.4.4 - Coefficients and Risk-Targeted Maximum Considered Earthquake (MCER) Spectral Response Acceleration Parameters

$S_{MS} = F_a*S_S$ = 1.519 $S_{M1} = F_v*S_1$ = #VALUE!

Section 11.4.5 - Design Spectral Response Acceleration Parameters

$S_{DS} = 2/3*S_{MS}$ = 1.013 $S_{D1} = 2/3*S_{M1}$ = #VALUE!

ASCE 7-16 SECTION 11.6 - SEISMIC DESIGN CATEGORY - SECTION 12.8.2 - PERIOD DETERMINATION

ASCE 7-16 TABLE 11.6-1			
SEISMIC DESIGN CATEGORY BASED ON S_{DS}			
	RISK CATEGORY:		
	I & II	III	IV
< 0.167g	A	A	A
< 0.33g	B	B	C
< 0.50g	C	C	D
>= 0.50g	D	D	D
	D		

ASCE 7-16 TABLE 11.6-2			
SEISMIC DESIGN CATEGORY BASED ON S_{D1}			
	RISK CATEGORY:		
	I & II	III	IV
< 0.067g	A	A	A
< 0.133g	B	B	C
< 0.20g	C	C	D
>= 0.20g	D	D	D
	#VALUE!		

Each building and structure shall be assigned to the most severe Seismic Design Category in accordance with Table 11.6-1 or Table 11.6-2, irrespective of the fundamental period of vibration of the structure.

PERIOD DETERMINATION:	
C_t =	0.02
h_n =	15 FT
x =	0.75
$T_a = C_t*h_n^x$ =	0.152

ASCE 7-16 SECTION 12.8.1.1 - SEISMIC RESPONSE COEFFICIENT

GENERAL EQUATION:	$C_S = S_{DS}/(R/I)$ =	0.156	CONTROLS	EQ. 12.8-2
MAXIMUM:	CS = 1.5*SD1/(T*(R/I)) =	#VALUE!		EQ. 12.8-3
MINIMUM:	$C_S = 0.044*S_{DS}*I > 0.01$ =	0.045		EQ. 12.8-5
For structures located where S1 > 0.6g				
	$C_S = 0.5*S_1/(R/I)$ =	0.000		EQ. 12.8-6

ASCE 7-16 SECTION 12.8.1 - SEISMIC BASE SHEAR

$V = C_S*W$ = **0.156*W**

W = the total dead load and applicable portion of other loads as indicated in Section 12.7.2

LATERAL

SEISMIC:

Wroof = 2590SF(20PSF) = 51.8k

Wcanopy = (630SF)(10PSF) = 6.3k

Wwall = 235ft(17ft/2)(10PSF) = 20k

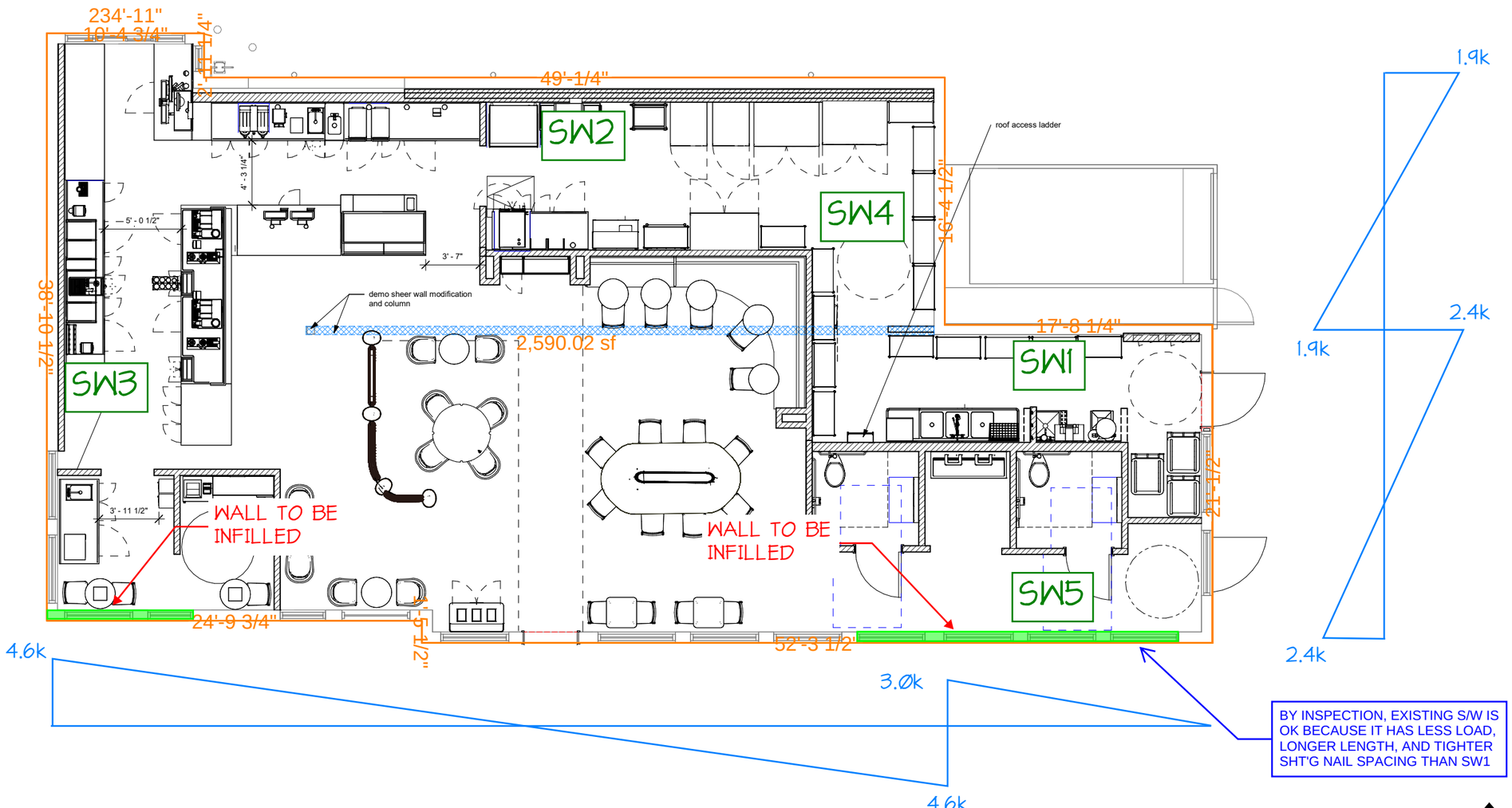
Vtotal = (51.8k+6.3k+20k)(0.156) = 12.2k EQ CONTROLS BOTH DIRECTIONS

KEYED NOTES

1. EDIT AS NEEDED

GENERAL NOTES

A. EDIT AS NEEDED



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PROJECT #:	<XXXXX-XXX>
ISSUE DATE:	<XX-XX-XXXX>
DESIGN MANAGER:	<DESIGN MANAGER>
PRODUCTION DESIGNER:	<DESIGNER>
CHECKED BY:	<CHECKED BY>

Revision Schedule

Rev	Date	By	Description

SHEET TITLE:
SCHEMATIC SITE PLAN

SCALE: AS SHOWN

SHEET NUMBER:
SD0

PCS Structural Solutions

Project: STARBUCKS PUYALLUP TI Job No: 24-356

Subject: _____ Sheet _____ Name: BRT

Originating Office: ☐ Seattle ☒ Tacoma ☐ Portland Date: 7-29-24

WIND

PARAPETS ON MWFRS

$$P_p = q_p (GC_{pn})$$

q_p = 11.9 psf

GC_{pn} = +1.5 FOR WINDWARD PARAPET

−1.0 FOR LEEWARD PARAPET

= 11.9 (+1.5) = 17.9 psf WINDWARD PARAPET

= 11.9 (−1.0) = 11.9 psf LEEWARD PARAPET

WINDWARD ON WALLS

p = +8.1 ± 2.1 = +10.2 psf, +6.0 psf

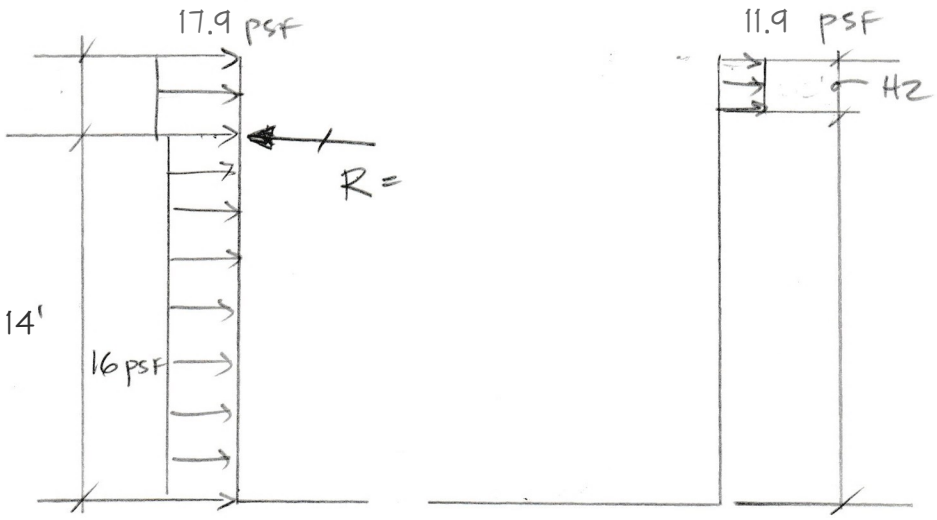
LEEWARD ON WALLS

p = −5.1 ± 2.1 = −3.0 psf, −7.2 psf

NET 13.2 psf USE 16 psf MIN

WIND

FRONT - TO - BACK



H1 = 4'

$$R = \frac{(17.9PSF + 11.9PSF)(4')(17.5') + 16\ psf\ (13.5^2/2)}{13.5'} = 263\ PLF$$

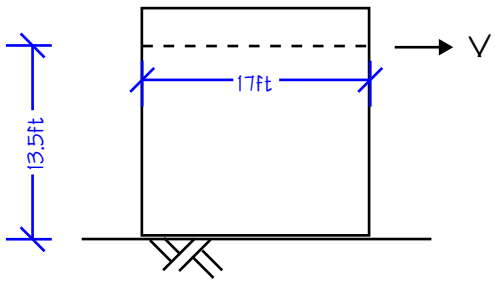
$W_{N/S}$ = 263 PLF (77') = 20.3k

20.3k (0.6) = 12.2k [ASD]

W_{E-W} = 263 PLF (39') = 10.3k

10.3k (0.6) = 6.2k [ASD]

S/W 1



SHEAR:

v = [Ø.7(1.9k+2.4k)] / 17ft = Ø.177klf < 354plf

(E) S/W OK

SEE S/W TABLE FOR EXISTING S/W CAPACITIES...

OVERTURNING:

OVERTURNING = (Ø.7)(1.9k+2.4k)(13.5ft) - [(Ø.6-.14(1.Ø13))(Ø.17klf+Ø.157klf)](17ft)(17ft/2)] = 2.36k

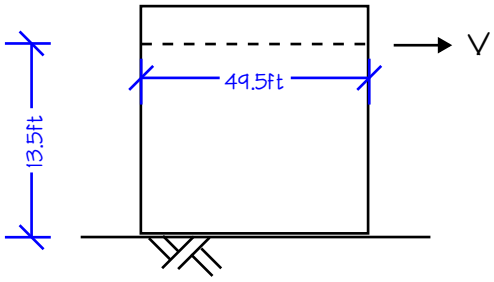
T/C = 2.36k/17ft = Ø.14k --> NO HDU NEEDED, BY INSPECTION CALCS ARE CONSERVATIVE

DIAPHRAGM: (1/2 PW W/ 10d NAILS @ 6" O.C. EDGE AND 12" O.C. FIELD)

v = [Ø.7(1.9k+4.7k)] / 17ft = Ø.272klf < Ø.358klf

(E) DIAPHRAGM OK

S/W 2



SHEAR:

v = [0.7(1.9)] / 49ft = 0.027klf < 266plf

EXISTING SHEAR WALL OK

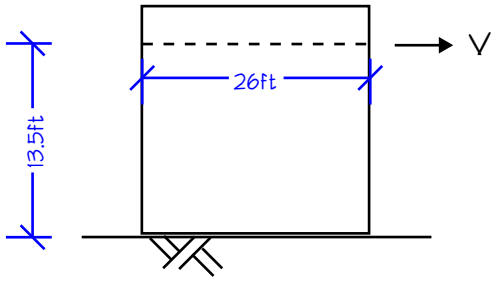
OVERTURNING:

OK BY INSPECTION...

DIAPHRAGM:

OK BY INSPECTION...

S/W 3



SHEAR:

v = [Ø.7(4.6k)] / 26ft = Ø.19ØkIf < 266plf EXISTING SHEAR WALL OK

OVERTURNING:

OVERTURNING = (Ø.7)(4.6k)(13.5ft) - [(Ø.6-.14(1.Ø13))(Ø.17kIf)](26ft)(26ft/2)] = 17.2k

T/C = 17.2k/26ft = Ø.66k --> HDU2

DIAPHRAGM:

OK BY INSPECTION...

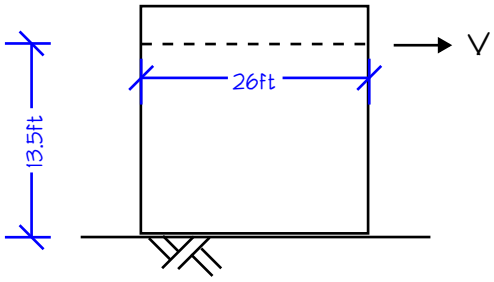
PCS Structural Solutions

Project: STARBUCKS PUYALLUP TI Job No: 24-356

Subject: _____ Sheet _____ Name: BRT

Originating Office: ☐ Seattle ☒ Tacoma ☐ Portland Date: 7-29-24

S/W 4



SHEAR:

v = [Ø.7(3.Ø+4.6k)] / 26ft = Ø.2Ø5klf < 266plf EXISTING SHEAR WALL OK

OVERTURNING:

OVERTURNING = (Ø.7)(3.Øk+4.6k)(13.5ft) - [(Ø.6-.14(1.Ø13))(Ø.17klf)](26ft)(26ft/2)] = 45.5k

T/C = 45.5k/26ft = 1.75k --> HDU2

DIAPHRAGM: (1/2 PW W/ 1Ød NAILS @ 6" O.C. EDGE AND 12" O.C. FIELD)

v = [Ø.7(3.Øk+4.6k)] / 38ft = Ø.14Øklf < Ø.265klf

(E) DIAPHRAGM OK

PCS Structural Solutions

Project: Project Name | Job Number: xx-xxx

Sheet: of | Name: xxx

Originating Office: Portland | Date: 8/9/2024

WOOD SHEATHED SHEAR WALLS - 2021 SDPWS TABLE 4.3A

SEISMIC OR WIND:	SEISMIC	SHEATHING NAILS:	8d
DESIGN METHODOLOGY:	ASD	SILL PLATE ANCHOR DIAMETER:	5/8"
SHEAR CAPACITY FACTOR:	2.8	RIM MATERIAL:	HEM FIR
FRAMING SPECIES:	HEM FIR	TREATED MATERIAL FACTOR:	1.00
FRAMING SPACING ≤ 16" O.C.:	YES		
SHEATHING MATERIAL:	SHEATHING		
PANEL THICKNESS:	7/16"		
S.G. ADJUSTMENT FACTOR:	0.93		

SHEAR WALL CAPACITIES

WALL MARK	WALL SHEATHING	SIDES	SHEATHING NAILS	EDGE NAILING	EDGE FRAMING	BOTTOM PLATE	NOMINAL CAPACITY (PLF)	**ADJUSTED CAPACITY (PLF)**
A	7/16"	(1)	8d	6" o.c.	2x	2x	730	**242**
B	7/16"	(1)	8d	4" o.c.	3x	2x	1065	**354**
C	7/16"	(1)	8d	3" o.c.	3x	2x	1370	**455**
D	7/16"	(1)	8d	2" o.c.	3x	2x	1790	**595**
E	7/16"	(2)	8d	6" o.c.	3x	2x	1460	**485**
F	7/16"	(2)	8d	4" o.c.	3x	2x	2130	**707**
G	7/16"	(2)	8d	3" o.c.	3x	2x	2740	**910**
H	7/16"	(2)	8d	2" o.c.	3x	2x	3580	**1189**

used to determine existing s/w capacities

CONNECTION CALCULATOR

	SOLE PLATE					SILL PLATE			RIM CONNECTOR		
MARK	FASTENER	ROWS	SPACING	RIM	CHECK	ANCHOR	SPACING	CHECK	CLIP	SPACING	CHECK
A	16d	(1)	4" o.c.	1-1/2"	OK	5/8"	48" o.c.	OK	A35	16" o.c.	OK
B	16d	(2)	6" o.c.	1-1/2"	OK	5/8"	32" o.c.	OK	A35	12" o.c.	OK
C	16d	(2)	4" o.c.	1-1/2"	OK	5/8"	16" o.c.	OK	A35	12" o.c.	OK
D	16d	(3)	5" o.c.	3-1/2"	OK	5/8"	24" o.c.	OK	A35	9" o.c.	OK
E	16d	(2)	4" o.c.	1-1/2"	OK	5/8"	32" o.c.	OK	A35	9" o.c.	OK
F	SDWS	(1)	6" o.c.	1-1/2"	OK	5/8"	20" o.c.	OK	A35	6" o.c.	OK
G	SDWS	(2)	9" o.c.	3-1/2"	OK	5/8"	16" o.c.	OK	A35	6" o.c.	OK
H	SDWS	(2)	6" o.c.	3-1/2"	OK	5/8"	12" o.c.	OK	N/A		

CONNECTION CALCULATOR - REFERENCE VALUES

CONNECTION CAPACITIES				
SOLE PLATE:	**16d**	**110 lbs**	**SDWS**	**472 lbs**
5/8" ANCHOR:	**2x**	**1376 lbs**	**3x**	**1712 lbs**
RIM:	**A35**	**560 lbs**	**A35/LTP**	**420 lbs**

NDS Table 11.3.1 Adjustment Factors			
ASD	**LRFD Adjustment Factors**		
C_D	K_F	Φ	λ
1.6	**N/A**	**N/A**	**N/A**

PCS Structural Solutions

Project: Project Name | Job Number: xx-xxx

Sheet: of | Name: xxx

Originating Office: Portland | Date: 8/9/2024

WOOD SHEATHED SHEAR WALLS - 2021 SDPWS TABLE 4.3A

SEISMIC OR WIND:	SEISMIC	SHEATHING NAILS:	10d
DESIGN METHODOLOGY:	ASD	HOLDOWN SYSTEM:	INSIDE POST
SHEAR CAPACITY FACTOR:	2.8	10d NAIL CAPACITY REDUCTION:	0.92
FRAMING SPECIES:	HEM FIR	SILL PLATE ANCHOR DIAMETER:	5/8"
SHEATHING MATERIAL:	SHEATHING	RIM MATERIAL:	HEM FIR
PANEL THICKNESS:	15/32"	TREATED MATERIAL FACTOR:	1.00
S.G. ADJUSTMENT FACTOR:	0.93		

SHEAR WALL CAPACITIES

If using LRFD, verify	WALL SHEATHING	SIDES	SHEATHING NAILS	EDGE NAILING	EDGE FRAMING	BOTTOM PLATE	NOMINAL CAPACITY (PLF)	**ADJUSTED CAPACITY (PLF)**
A	15/32"	(1)	10d	6" o.c.	2x	2x	870	**266**
B	15/32"	(1)	10d	4" o.c.	3x	2x	1290	**394**
C	15/32"	(1)	10d	3" o.c.	3x	2x	1680	**513**
D	15/32"	(1)	10d	2" o.c.	3x	2x	2155	**659**
E	15/32"	(2)	10d	6" o.c.	3x	2x	1740	**532**
F	15/32"	(2)	10d	4" o.c.	3x	2x	2580	**788**
G	15/32"	(2)	10d	3" o.c.	3x	2x	3360	**1027**
H	15/32"	(2)	10d	2" o.c.	3x	2x	4310	**1317**

used to determine existing s/w capacities

CONNECTION CALCULATOR

SOLE PLATE						SILL PLATE			RIM CONNECTOR		
MARK	FASTENER	ROWS	SPACING	RIM	CHECK	ANCHOR	SPACING	CHECK	CLIP	SPACING	CHECK
A	16d	(1)	4" o.c.	1-1/2"	OK	5/8"	48" o.c.	OK	A35	16" o.c.	OK
B	16d	(2)	4" o.c.	1-1/2"	OK	5/8"	32" o.c.	OK	A35	12" o.c.	OK
C	16d	(2)	4" o.c.	1-1/2"	OK	5/8"	24" o.c.	OK	A35	9" o.c.	OK
D	16d	(3)	5" o.c.	3-1/2"	OK	5/8"	16" o.c.	OK	A35	8" o.c.	OK
E	16d	(2)	4" o.c.	1-1/2"	OK	5/8"	24" o.c.	OK	A35	9" o.c.	OK
F	SDWS	(2)	5" o.c.	3-1/2"	OK	5/8"	16" o.c.	OK	A35	6" o.c.	OK
G	SDWS	(2)	8" o.c.	3-1/2"	OK	5/8"	12" o.c.	OK	A35	5" o.c.	OK
H	SDWS	(2)	6" o.c.	3-1/2"	OK	5/8"	10" o.c.	OK	N/A		

CONNECTION CALCULATOR - REFERENCE VALUES

CONNECTION CAPACITIES				
SOLE PLATE:	**16d**	**110 lbs**	**SDWS**	**472 lbs**
5/8" ANCHOR:	**2x**	**1376 lbs**	**3x**	**1712 lbs**
RIM:	**A35**	**560 lbs**	**A35/LTP**	**420 lbs**

NDS Table 11.3.1 Adjustment Factors			
ASD	**LRFD Adjustment Factors**		
C_D	K_F	Φ	λ
1.6	**N/A**	**N/A**	**N/A**

PCS Structural Solutions

Project: STARBUCKS PUYALLUP TI | Job Number: 23-659

Sheet: _____ of _____ | Name: BRT

Originating Office: Tacoma | Date: 08/09/24

STUD WALL DESIGN

2018 NDS/2018 IBC

WALL DATA

LUMBER TYPE:	DF#2/HF#1	APPLIED LOADS:			
F_b =	900 PSI	W_{WIND} =	16.0 PSF	P_{DEAD} =	400 LBS
F_c =	1350 PSI	$W_{SEISMIC}$ =	0.0 PSF	P_{LIVE} =	0 LBS
$F_{c\perp}$ =	405 PSI			P_{SNOW} =	500 LBS
E =	1.50E+06 PSI			P_{WIND} =	0 LBS
				$P_{SEISMIC}$ =	0 LBS

STUD SIZE:	(1) 2x6	MISCELLANEOUS:			
A_X =	8.25 IN^2		HEIGHT =	13.5 FT	
S_X =	7.56 IN^3		SPACING =	16 IN	
I_X =	20.80 IN^4		ECCENTRICITY =	0.1 IN	
$C_{F(BENDING)}$ =	1.3 (NDS 4.3.6)		$C_{F(COMPRESSION)}$ =	1.10 (NDS 4.3.6)	
				APPLY?	
F_{cE} =	518.7 PSI		$C_{SYS(BENDING)}$ =	1.35 YES	(SDPWS T3.1.1.1)
C_b =	1.25 (NDS 3.10.4)		$C_{r(BENDING)}$ =	1.15 YES	(NDS 4.3.9)

LOAD CASES - IBC 1605.3.1

CASE 1	DEAD + LIVE + 5 PSF LAT.	CASE 4	DEAD + 0.45WIND + 0.75LIVE + 0.75SNOW
CASE 2	DEAD + SNOW + 5 PSF LAT.	CASE 5	DEAD + 0.60WIND
CASE 3	DEAD + 0.75LIVE + 0.75SNOW + 5 PSF LAT.	CASE 6	DEAD + 0.75EISMIC
		CASE 7	DEAD + 0.53SEISMIC + 0.75LIVE + 0.75SNOW

ALLOWABLE STRESSES - Cd PER NDS T2.3.2, Cp PER NDS 3.7.1, ASSUME Cm, Ct, Ci, CL = 1.0

CASE	C_D	F_c*	F_{cE}/F_c*	C_P	F_c'	F_b'	$F_{c\perp}$
1	1.00	1485	0.35	0.319	474	1346	506
2 & 3	1.15	1708	0.30	0.282	481	1547	506
4 & 5	1.60	2376	0.22	0.207	493	2527	506
6 & 7	1.60	2376	0.22	0.207	493	2153	506

APPLIED STRESSES - NDS CHAPTER 3 DESIGN EQUATIONS

CASE	$P_{APPLIED}$	f_c	$M_{LAT. LOAD}$	$M_{ECC.}$	M_{TOTAL}	f_b
1	400	48	152	3	154	244
2	900	109	152	8	157	248
3	775	94	152	6	156	247
4	775	94	219	6	223	353
5	400	48	292	3	294	466
6	400	48	0	3	2	3
7	775	94	0	6	4	6

DESIGN CHECKS - COMBINED STRESS CHECK PER NDS EQN 3.9-3

CASE	f_c/F_c'	f_b/F_b'	$f_c/F_{c\perp}$	Combined	f_c/F_{cE}	Deflection	L/?
1	0.10	0.18	0.10	0.21	0.09	0.16	L/1001
2	0.23	0.16	0.22	0.25	0.21	0.16	L/984
3	0.20	0.16	0.19	0.23	0.18	0.16	L/988
4*	0.19	0.14	0.19	0.21	0.18	0.12	L/1334
5*	0.10	0.18	0.10	0.21	0.09	0.16	L/1012
6	0.10	0.00	0.10	0.01	0.09	0.00	L/73944
7	0.19	0.00	0.19	0.04	0.18	0.00	L/38165
MAX. --->	0.23	0.18	0.22	0.25	0.21	0.16	L/984
	O.K.	O.K.	O.K.	O.K.	O.K.		

* Deflections reduced by 0.42 per IBC Table 1604.3 footnote f. Increase deflection by 1.4 for jambs supporting glass.

PLATE BENDING - *ALIGN STUDS WITH JOISTS WHERE POSSIBLE*

MISCELLANEOUS:		ALLOWABLE STRESSES:	
C_{fu} =	1.15 (NDS 4.3.7)	F_v' =	173 PSI
F_v =	150 PSI	F_b' =	1547 PSI

STUD REACTIONS (OUT - OF - PLANE)
144 LB

DBL TOP PLATE PROPERTIES:		APPLIED STRESSES:		
A_X =	16.50 IN^2	f_v =	55 PSI	<--- O.K.
S_X =	4.13 IN^3	f_b =	873 PSI	<--- O.K.
I_X =	3.09 IN^4	Δ_{MAX} =	0.017 IN	

STARBUCKS PUYALLUP TI
BRT
24356

Steel Beam

Project File: 24356 Enercalc BRT.ec6

LIC# : KW-06014122, Build:20.24.07.08 PCS STRUCTURAL SOLUTIONS (c) ENERCALC INC 1983-2023

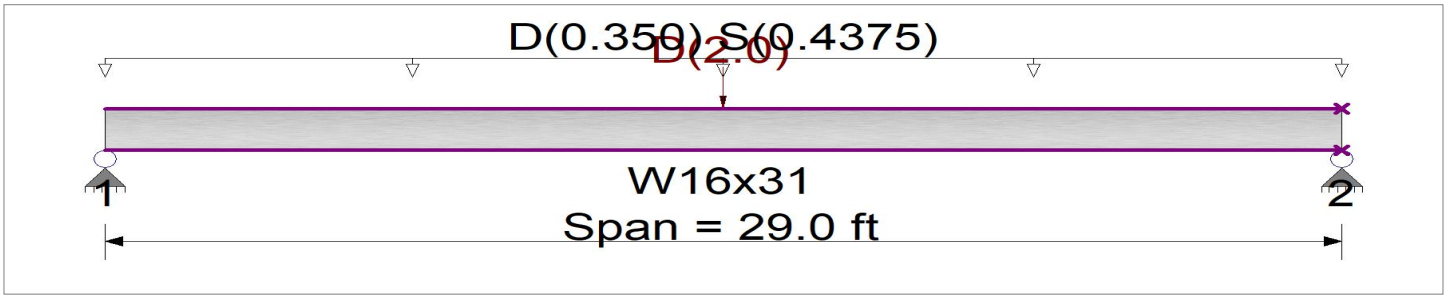
DESCRIPTION: New Steel Beam

CODE REFERENCES

Calculations per AISC 360-16, IBC 2021, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Load Resistance Factor 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 calculated and added to loading
Uniform Load : D = 0.020, S = 0.0250 ksf, Tributary Width = 17.50 ft, (Roof Trib)
Point Load : D = 2.0 k @ 14.50 ft, (RTU)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.687 : 1	Maximum Shear Stress Ratio =	0.137 : 1
Section used for this span	W16x31	Section used for this span	W16x31
Mu : Applied	139.051 k-ft	Vu : Applied	17.979 k
Mn * Phi : Allowable	202.500 k-ft	Vn * Phi : Allowable	131.175 k
Load Combination	+1.20D+1.60S	Load Combination	+1.20D+1.60S
		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	0.642 in	Ratio =	541	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	1.365 in	Ratio =	255	>=240.	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240.0	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values max Mu +	max Mu -	Mu Max	Mnx	Phi*Mnx	Cb	Rm	Summary of Shear Values VuMax	Vnx	Phi*Vnx
+1.40D													
Dsgn. L = 29.00 ft	1	0.377	0.070	76.37		76.37	225.00	202.50	1.00	1.00	9.13	131.18	131.18
+1.20D													
Dsgn. L = 29.00 ft	1	0.323	0.060	65.46		65.46	225.00	202.50	1.00	1.00	7.83	131.18	131.18
+1.20D+0.50S													
Dsgn. L = 29.00 ft	1	0.437	0.084	88.46		88.46	225.00	202.50	1.00	1.00	11.00	131.18	131.18
+1.20D+1.60S													
Dsgn. L = 29.00 ft	1	0.687	0.137	139.05		139.05	225.00	202.50	1.00	1.00	17.98	131.18	131.18
+1.20D+0.70S													
Dsgn. L = 29.00 ft	1	0.482	0.094	97.66		97.66	225.00	202.50	1.00	1.00	12.27	131.18	131.18
+0.90D													
Dsgn. L = 29.00 ft	1	0.242	0.045	49.10		49.10	225.00	202.50	1.00	1.00	5.87	131.18	131.18

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	1.3654	14.583		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	12.868	12.868
Max Upward from Load Combinations	12.868	12.868
Max Upward from Load Cases	6.525	6.525
D Only	6.525	6.525

STARBUCKS PUYALLUP TI
BRT
24356

Steel Beam

Project File: 24356 Enercalc BRT.ec6

DESCRIPTION: New Steel Beam

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
+D+S	12.868	12.868
+D+0.750S	11.282	11.282
+0.60D	3.915	3.915
S Only	6.344	6.344

STARBUCKS PUYALLUP TI
BRT
24356

Wood Beam

Project File: 24356 Enercalc BRT.ec6

DESCRIPTION: New Wood Beam (long span)

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16
Load Combination Set : IBC 2021

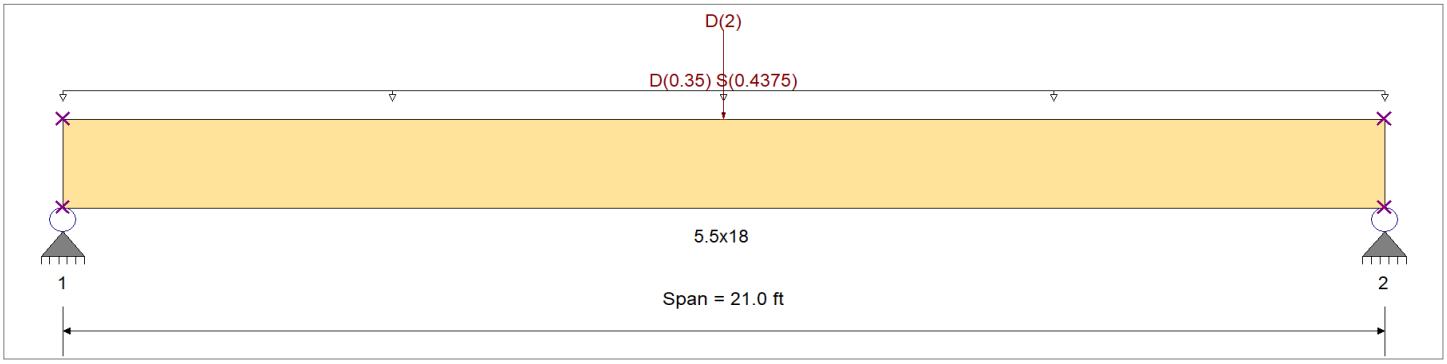
Material Properties

Analysis Method :	Allowable Stress Design
Load Combination :	IBC 2021
Wood Species :	DF/DF
Wood Grade :	24F-V4
Beam Bracing :	Completely Unbraced

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 = 0.020, S = 0.0250 ksf, Tributary Width = 17.50 ft, (Roof Trib)
Point Load : D = 2.0 k @ 10.50 ft, (RTU)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.846 : 1	Maximum Shear Stress Ratio	=	0.413 : 1
Section used for this span		5.5x18	Section used for this span		5.5x18
fb: Actual	=	2,226.01 psi	fv: Actual	=	126.00 psi
F'b	=	2,631.68 psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	10.500 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.400 in	Ratio =	629 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.879 in	Ratio =	286 >=240	Span: 1 : +D+S
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_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	0.608	0.277	0.90	1.00	1.00	0.97	0.954	1.00	1.00	1.00	30.98	1,251.6	2,059.6	4.36	66.1	238.5
+D+S					1.00	1.00	0.97	0.954	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.846	0.413	1.15	1.00	1.00	0.95	0.954	1.00	1.00	1.00	55.09	2,226.0	2,631.7	8.32	126.0	304.8
+D+0.750S					1.00	1.00	0.95	0.954	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.753	0.364	1.15	1.00	1.00	0.95	0.954	1.00	1.00	1.00	49.06	1,982.4	2,631.7	7.33	111.0	304.8
+0.60D					1.00	1.00	0.95	0.954	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.214	0.093	1.60	1.00	1.00	0.91	0.954	1.00	1.00	1.00	18.59	750.9	3,506.2	2.62	39.6	424.0

STARBUCKS PUYALLUP TI
BRT
24356

Wood Beam

Project File: 24356 Enercalc BRT.ec6

LIC# : KW-06014122, Build:20.24.07.08 PCS STRUCTURAL SOLUTIONS (c) ENERCALC INC 1983-2023

DESCRIPTION: New Wood Beam (long span)

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.8794	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	9.494	9.494
Max Upward from Load Combinations	9.494	9.494
Max Upward from Load Cases	4.900	4.900
D Only	4.900	4.900
+D+S	9.494	9.494
+D+0.750S	8.346	8.346
+0.60D	2.940	2.940
S Only	4.594	4.594

FOOTING CALCS

F4.0 --> (4FT)(4FT)(1.5KSF) = 24k

F3.0 --> (3FT)(3FT)(1.5KSF) = 13.5k

F1 = 9.5k+12.9k = 22.4k < 24k USE F4.0

F2 = 9.5k+3.3k = 12.8k < 13.5k USE F3.0

STARBUCKS PUYALLUP TI
BRT
24356

Wood Beam

Project File: 24356 Enercalc BRT.ec6

DESCRIPTION: New Wood Beam (Short Span)

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16
Load Combination Set : IBC 2021

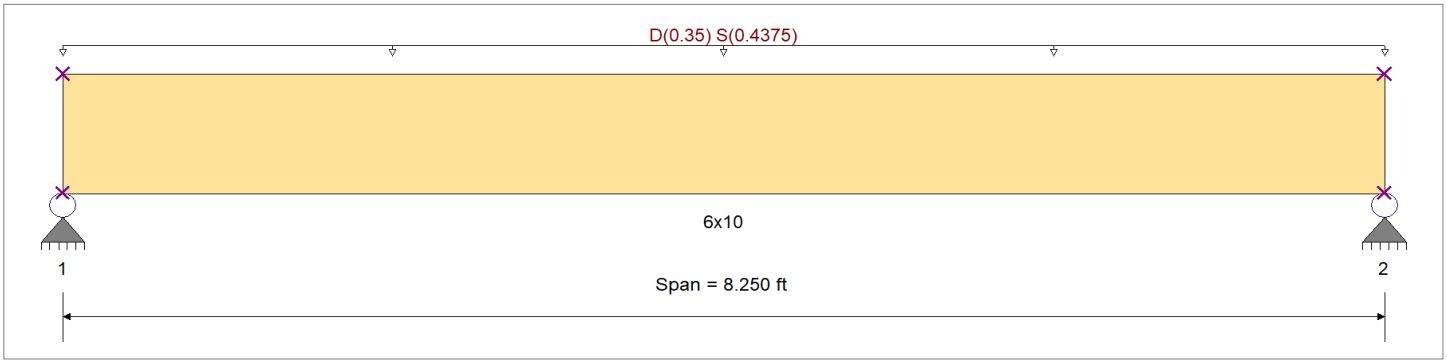
Material Properties

Analysis Method :	Allowable Stress Design
Load Combination :	IBC 2021
Wood Species :	Douglas Fir-Larch
Wood Grade :	No.1
Beam Bracing :	Completely Unbraced

Fb +	1,000.0 psi
Fb -	1,000.0 psi
Fc - Prll	1,500.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,700.0 ksi
Eminbend - xx	620.0 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 = 0.020, S = 0.0250 ksf, Tributary Width = 17.50 ft, (Roof Trib)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.862 : 1	Maximum Shear Stress Ratio	=	0.370 : 1
Section used for this span		6x10	Section used for this span		6x10
fb: Actual	=	985.81 psi	fv: Actual	=	76.64 psi
F'b	=	1,144.22 psi	F'v	=	207.00 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.125 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	0.069 in	Ratio =	1441 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.125 in	Ratio =	789 >=240	Span: 1 : +D+S
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	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 8.250 ft	1	0.497	0.214	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.07	445.9	896.5	1.21	34.7	162.0
+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 = 8.250 ft	1	0.862	0.370	1.15	1.00	1.00	0.99	1.000	1.00	1.00	1.00	6.80	985.8	1,144.2	2.67	76.6	207.0
+D+0.750S					1.00	1.00	0.99	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.250 ft	1	0.744	0.320	1.15	1.00	1.00	0.99	1.000	1.00	1.00	1.00	5.87	850.8	1,144.2	2.30	66.2	207.0
+0.60D					1.00	1.00	0.99	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.250 ft	1	0.168	0.072	1.60	1.00	1.00	0.99	1.000	1.00	1.00	1.00	1.84	267.5	1,588.4	0.72	20.8	288.0

STARBUCKS PUYALLUP TI
BRT
24356

Wood Beam

Project File: 24356 Enercalc BRT.ec6

DESCRIPTION: New Wood Beam (Short Span)

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.1254	4.155		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	3.295	3.295
Max Upward from Load Combinations	3.295	3.295
Max Upward from Load Cases	1.805	1.805
D Only	1.490	1.490
+D+S	3.295	3.295
+D+0.750S	2.844	2.844
+0.60D	0.894	0.894
S Only	1.805	1.805

STARBUCKS PUYALLUP TI
BRT
24-356

Wood Beam

Project File: 24356 Enercalc BRT.ec6

LIC# : KW-06014122, Build:20.24.07.08 PCS STRUCTURAL SOLUTIONS (c) ENERCALC INC 1983-2023

DESCRIPTION: Beams @ Roof Hatch

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

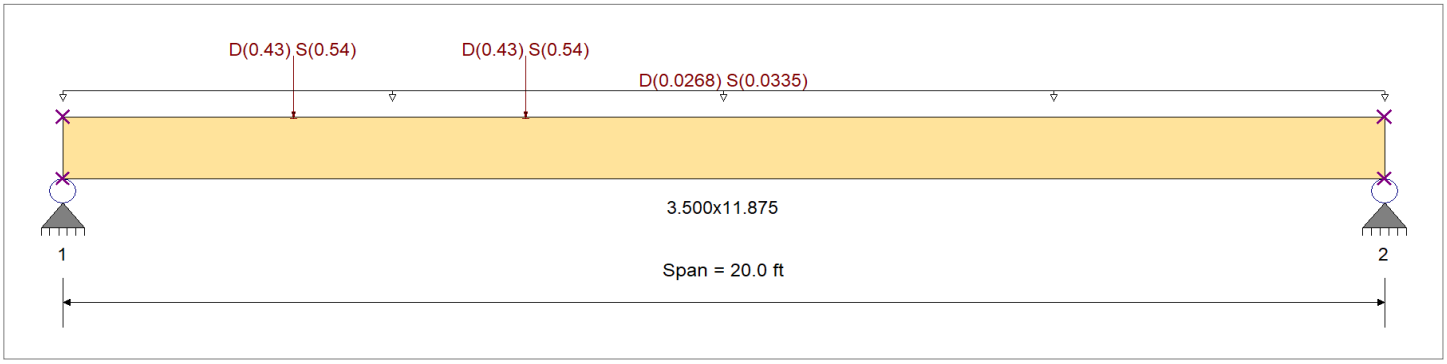
Wood Species : Louisiana Pacific
Wood Grade : SolidStart LVL 2900Fb-2.0E

Beam Bracing : Completely Unbraced

Fb +	2900 psi
Fb -	2900 psi
Fc - Prll	3200 psi
Fc - Perp	750 psi
Fv	285 psi
Ft	1800 psi

E : Modulus of Elasticity

Ebend- xx	2000 ksi
Eminbend - xx	1000 ksi
Density	28.72 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.020, S = 0.0250 ksf, Tributary Width = 1.340 ft, (Roof Trib)
Point Load : D = 0.430, S = 0.540 k @ 7.0 ft, (Header Load)
Point Load : D = 0.430, S = 0.540 k @ 3.50 ft, (Header Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.555 : 1	Maximum Shear Stress Ratio	=	0.218 : 1
Section used for this span		3.500x11.875	Section used for this span		3.500x11.875
fb: Actual	=	1,365.66 psi	fv: Actual	=	71.33 psi
F'b	=	2,459.36 psi	F'v	=	327.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	7.007 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	0.347 in	Ratio =	690 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.625 in	Ratio =	384 >=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.275	0.123	0.90	1.00	1.00	0.84	1.001	1.00	1.00	1.00	4.15	605.9	2,205.8	0.88	31.6	256.5
+D+S					1.00	1.00	0.84	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.555	0.218	1.15	1.00	1.00	0.74	1.001	1.00	1.00	1.00	9.36	1,365.7	2,459.4	1.98	71.3	327.8
+D+0.750S					1.00	1.00	0.74	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.478	0.187	1.15	1.00	1.00	0.74	1.001	1.00	1.00	1.00	8.06	1,175.7	2,459.4	1.70	61.4	327.8
+0.60D					1.00	1.00	0.74	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.138	0.042	1.60	1.00	1.00	0.57	1.001	1.00	1.00	1.00	2.49	363.5	2,631.3	0.53	19.0	456.0

Wood Beam

Project File: 24356 Enercalc BRT.ec6

DESCRIPTION: Beams @ Roof Hatch

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.6246	9.416		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	2.034	1.112
Max Upward from Load Combinations	2.034	1.112
Max Upward from Load Cases	1.132	0.619
D Only	0.902	0.494
+D+S	2.034	1.112
+D+0.750S	1.751	0.958
+0.60D	0.541	0.296
S Only	1.132	0.619

STARBUCKS PUYALLUP TI
BRT
24356

Steel Column

Project File: 24356 Enercalc BRT.ec6

DESCRIPTION: STL Column

Code References

Calculations per AISC 360-16, IBC 2021, ASCE 7-16
Load Combinations Used : IBC 2021

General Information

Steel Section Name : **HSS4x4x1/4**

Analysis Method :	Load Resistance Factor
Steel Stress Grade	
Fy : Steel Yield	50.0 ksi
E : Elastic Bending Modulus	29,000.0 ksi

Overall Column Height	14.0 ft
Top & Bottom Fixity	Top & Bottom Pinned
Brace condition :	

Unbraced Length for buckling ABOUT X-X Axis = 14.0 ft, K = 1.0
Unbraced Length for buckling ABOUT Y-Y Axis = 14.0 ft, K = 1.0

Applied Loads

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

Column self weight included : 170.940 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 14.0 ft, D = 9.50, S = 11.0 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.4705** : 1

Load Combination	+1.20D+1.60S	
Location of max.above base	0.0	ft
At maximum location values are . . .		
Pu	29.205	k
0.9 * Pn	62.077	k
Mu-x	0.0	k-ft
0.9 * Mn-x :	17.588	k-ft
Mu-y	0.0	k-ft
0.9 * Mn-y :	17.588	k-ft

PASS Maximum Shear Stress Rati **0.0** : 1

Load Combination	0.0	
Location of max.above base	0.0	ft
At maximum location values are . . .		
Vu : Applied	0.0	k
Vn * Phi : Allowable	0.0	k

Maximum Load Reactions . .

Top along X-X	k
Bottom along X-X	k
Top along Y-Y	k
Bottom along Y-Y	k

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 :

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios: Stress Ratio	Status	Location

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	k	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments @ Base	Mx - End Moments @ Top	k-ft	My - End Moments @ Base	My - End Moments @ Top

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	k	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments @ Base	Mx - End Moments @ Top	k-ft	My - End Moments @ Base	My - End Moments @ Top

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance

Steel Section Properties : HSS4x4x1/4

Steel Section Properties : HSS4x4x1/4

STARBUCKS PUYALLUP TI
BRT
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Steel Column

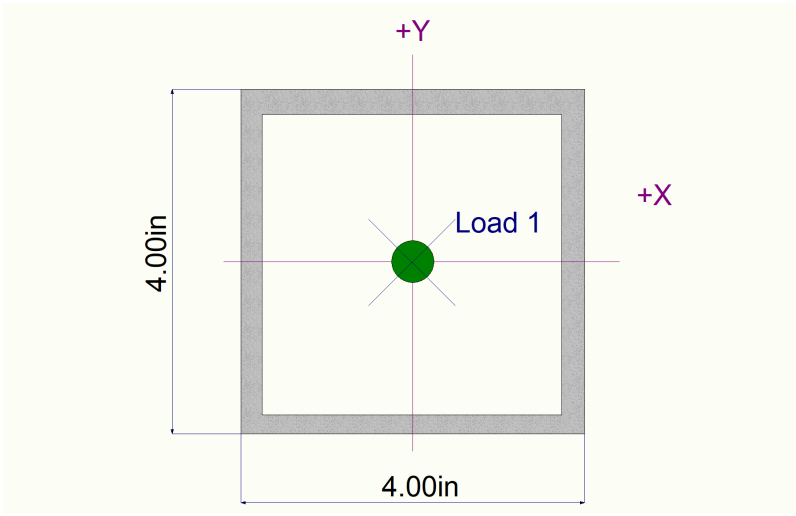
Project File: 24356 Enercalc BRT.ec6

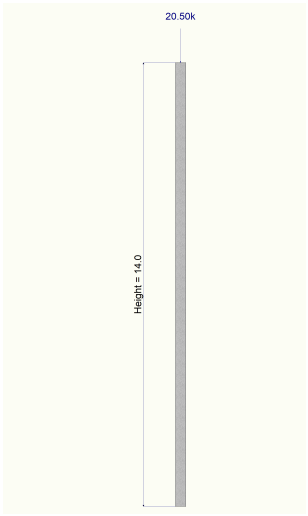
LIC# : KW-06014122, Build:20.24.07.08 PCS STRUCTURAL SOLUTIONS (c) ENERCALC INC 1983-2023

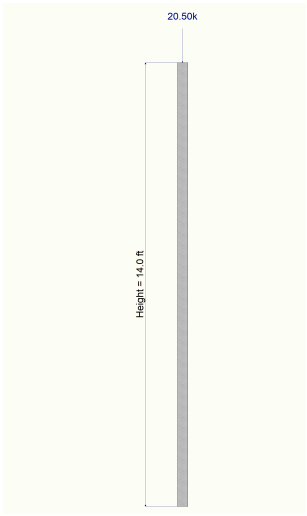
DESCRIPTION: STL Column

Depth	=	4.000	in	I xx	=	7.80	in^4	J	=	12.800	in^4
Design Thick	=	0.233	in	S xx	=	3.90	in^3				
Width	=	4.000	in	R xx	=	1.520	in				
Wall Thick	=	0.250	in	Zx	=	4.690	in^3				
Area	=	3.370	in^2	I yy	=	7.800	in^4	C	=	6.560	in^3
Weight	=	12.210	plf	S yy	=	3.900	in^3				
				R yy	=	1.520	in				
Ycg	=	0.000	in								

Sketches







STARBUCKS PUYALLUP TI
BRT
24356

Steel Beam

Project File: 24356 Enercalc BRT.ec6

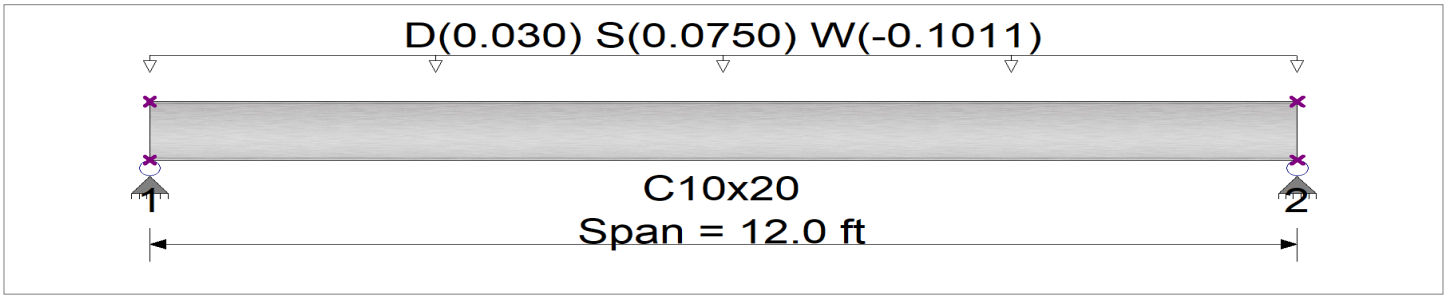
DESCRIPTION: Canopy Edge Beam

CODE REFERENCES

Calculations per AISC 360-16, IBC 2021, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Load Resistance Factor Design	Fy : Steel Yield :	36.0 ksi
Beam Bracing :	Completely Unbraced	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 calculated and added to loading
Uniform Load : D = 0.010, S = 0.0250, W = -0.03370 ksf, Tributary Width = 3.0 ft, (Roof Trib)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.091 : 1	Maximum Shear Stress Ratio =	0.015 : 1
Section used for this span	C10x20	Section used for this span	C10x20
Mu : Applied	3.240 k-ft	Vu : Applied	1.080 k
Mn * Phi : Allowable	35.702 k-ft	Vn * Phi : Allowable	73.678 k
Load Combination	+1.20D+1.60S	Load Combination	+1.20D+1.60S
		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	0.015 in	Ratio =	9,373	>=360	Span: 1 : S Only
Max Upward Transient Deflection	-0.014 in	Ratio =	9,933	>=360	Span: 1 : +0.70W
Max Downward Total Deflection	0.026 in	Ratio =	5624	>=240.	Span: 1 : +D+S
Max Upward Total Deflection	-0.006 in	Ratio =	22929	>=240.	Span: 1 : +0.60D+0.60W

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values max Mu +	max Mu -	Mu Max	Mnx	Phi*Mnx	Cb	Rm	Summary of Shear Values VuMax	Vnx	Phi*Vnx
+1.40D													
Dsgn. L = 12.00 ft	1	0.035	0.006	1.26		1.26	39.67	35.70	1.14	1.00	0.42	81.86	73.68
+1.20D													
Dsgn. L = 12.00 ft	1	0.030	0.005	1.08		1.08	39.67	35.70	1.14	1.00	0.36	81.86	73.68
+1.20D+0.50S													
Dsgn. L = 12.00 ft	1	0.049	0.008	1.76		1.76	39.67	35.70	1.14	1.00	0.59	81.86	73.68
+1.20D+0.50W													
Dsgn. L = 12.00 ft	1	0.005	0.001	0.17		0.17	39.67	35.70	1.14	1.00	0.06	81.86	73.68
+1.20D+1.60S													
Dsgn. L = 12.00 ft	1	0.091	0.015	3.24		3.24	39.67	35.70	1.14	1.00	1.08	81.86	73.68
+1.20D+1.60S+0.50W													
Dsgn. L = 12.00 ft	1	0.065	0.011	2.33		2.33	39.67	35.70	1.14	1.00	0.78	81.86	73.68
+1.20D+W													
Dsgn. L = 12.00 ft	1	0.021	0.003		-0.74	0.74	39.67	35.70	1.14	1.00	0.25	81.86	73.68
+1.20D+0.50S+W													
Dsgn. L = 12.00 ft	1	0.002	0.000		-0.06	0.06	39.67	35.70	1.14	1.00	0.02	81.86	73.68
+1.20D+0.70S													
Dsgn. L = 12.00 ft	1	0.057	0.009	2.03		2.03	39.67	35.70	1.14	1.00	0.68	81.86	73.68
+0.90D+W													
Dsgn. L = 12.00 ft	1	0.028	0.005		-1.01	1.01	39.67	35.70	1.14	1.00	0.34	81.86	73.68
+0.90D													
Dsgn. L = 12.00 ft	1	0.023	0.004	0.81		0.81	39.67	35.70	1.14	1.00	0.27	81.86	73.68

Steel Beam

DESCRIPTION: Canopy Edge Beam

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0256	6.034		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	0.750	0.750
Max Upward from Load Combinations	0.750	0.750
Max Upward from Load Cases	0.450	0.450
Max Downward from all Load Conditions (Resis	-0.607	-0.607
Max Downward from Load Combinations (Resi	-0.184	-0.184
Max Downward from Load Cases (Resisting Up	-0.607	-0.607
D Only	0.300	0.300
+D+S	0.750	0.750
+D+0.750S	0.638	0.638
+D+0.60W	-0.064	-0.064
+D+0.450W	0.027	0.027
+D+0.750S+0.450W	0.365	0.365
+0.60D+0.60W	-0.184	-0.184
+0.60D	0.180	0.180
S Only	0.450	0.450
W Only	-0.607	-0.607

STARBUCKS PUYALLUP TI
BRT
24356

Steel Beam

Project File: 24356 Enercalc BRT.ec6

LIC# : KW-06014122, Build:20.24.07.08 PCS STRUCTURAL SOLUTIONS

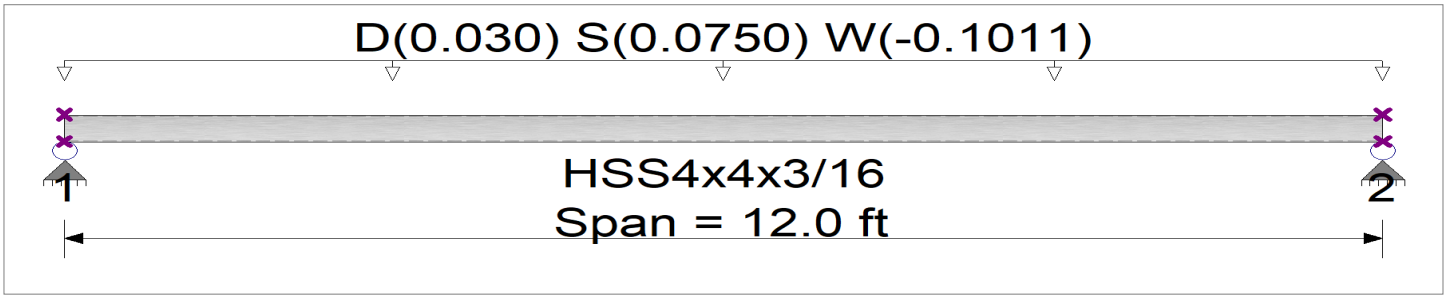
DESCRIPTION: Canopy Interior Beam

CODE REFERENCES

Calculations per AISC 360-16, IBC 2021, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Load Resistance Factor Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Completely Unbraced	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 calculated and added to loading
Uniform Load : D = 0.010, S = 0.0250, W = -0.03370 ksf, Tributary Width = 3.0 ft, (Roof Trib)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.219 : 1	Maximum Shear Stress Ratio =	0.031 : 1
Section used for this span	HSS4x4x3/16	Section used for this span	HSS4x4x3/16
Mu : Applied	3.011 k-ft	Vu : Applied	1.004 k
Mn * Phi : Allowable	13.763 k-ft	Vn * Phi : Allowable	32.679 k
Load Combination	+1.20D+1.60S	Load Combination	+1.20D+1.60S
		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	0.195 in	Ratio =	737	>=360	Span: 1 : S Only
Max Upward Transient Deflection	-0.184 in	Ratio =	781	>=360	Span: 1 : +0.70W
Max Downward Total Deflection	0.298 in	Ratio =	484	>=240.	Span: 1 : +D+S
Max Upward Total Deflection	-0.096 in	Ratio =	1495	>=240.	Span: 1 : +0.60D+0.60W

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values max Mu +	max Mu -	Mu Max	Mnx	Phi*Mnx	Cb	Rm	Summary of Shear Values VuMax	Vnx	Phi*Vnx
+1.40D													
Dsgn. L = 12.00 ft	1	0.072	0.010	0.99		0.99	15.29	13.76	1.14	1.00	0.33	36.31	32.68
+1.20D													
Dsgn. L = 12.00 ft	1	0.062	0.009	0.85		0.85	15.29	13.76	1.14	1.00	0.28	36.31	32.68
+1.20D+0.50S													
Dsgn. L = 12.00 ft	1	0.111	0.016	1.53		1.53	15.29	13.76	1.14	1.00	0.51	36.31	32.68
+1.20D+0.50W													
Dsgn. L = 12.00 ft	1	0.004	0.001		-0.06	0.06	15.29	13.76	1.14	1.00	0.02	36.31	32.68
+1.20D+1.60S													
Dsgn. L = 12.00 ft	1	0.219	0.031	3.01		3.01	15.29	13.76	1.14	1.00	1.00	36.31	32.68
+1.20D+1.60S+0.50W													
Dsgn. L = 12.00 ft	1	0.153	0.021	2.10		2.10	15.29	13.76	1.14	1.00	0.70	36.31	32.68
+1.20D+W													
Dsgn. L = 12.00 ft	1	0.070	0.010		-0.97	0.97	15.29	13.76	1.14	1.00	0.32	36.31	32.68
+1.20D+0.50S+W													
Dsgn. L = 12.00 ft	1	0.021	0.003		-0.29	0.29	15.29	13.76	1.14	1.00	0.10	36.31	32.68
+1.20D+0.70S													
Dsgn. L = 12.00 ft	1	0.131	0.018	1.80		1.80	15.29	13.76	1.14	1.00	0.60	36.31	32.68
+0.90D+W													
Dsgn. L = 12.00 ft	1	0.086	0.012		-1.18	1.18	15.29	13.76	1.14	1.00	0.39	36.31	32.68
+0.90D													
Dsgn. L = 12.00 ft	1	0.046	0.007	0.64		0.64	15.29	13.76	1.14	1.00	0.21	36.31	32.68

STARBUCKS PUYALLUP TI
BRT
24356

Steel Beam

Project File: 24356 Enercalc BRT.ec6

DESCRIPTION: Canopy Interior Beam

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2978	6.034		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	0.687	0.687
Max Upward from Load Combinations	0.687	0.687
Max Upward from Load Cases	0.450	0.450
Max Downward from all Load Conditions (Resis	-0.607	-0.607
Max Downward from Load Combinations (Resi	-0.222	-0.222
Max Downward from Load Cases (Resisting Up	-0.607	-0.607
D Only	0.237	0.237
+D+S	0.687	0.687
+D+0.750S	0.574	0.574
+D+0.60W	-0.127	-0.127
+D+0.450W	-0.036	-0.036
+D+0.750S+0.450W	0.301	0.301
+0.60D+0.60W	-0.222	-0.222
+0.60D	0.142	0.142
S Only	0.450	0.450
W Only	-0.607	-0.607

CHECK CONNECTION @ PERP. HSS

V = 687#(2 SIDES) = 1374#

(4) 1/4" DIA. x 4-1/2" SDS --> 420#(4 SCREWS) = 1680# > 1374# OK

WIND UPLIFT ON ROD

ROD OK IN COMPRESSION BY INSPECTION

$[.6(34psf) - .6(10\ psf)](2')(12) = 346\#$

$l = 6'-0"$

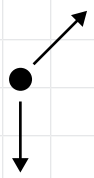
$\frac{kl}{r} \leq 200$

$\frac{1.0(6'-0")(12"/')}{r} \leq 200$

$r_{req'd} = 0.36\ in = \frac{d}{4}$

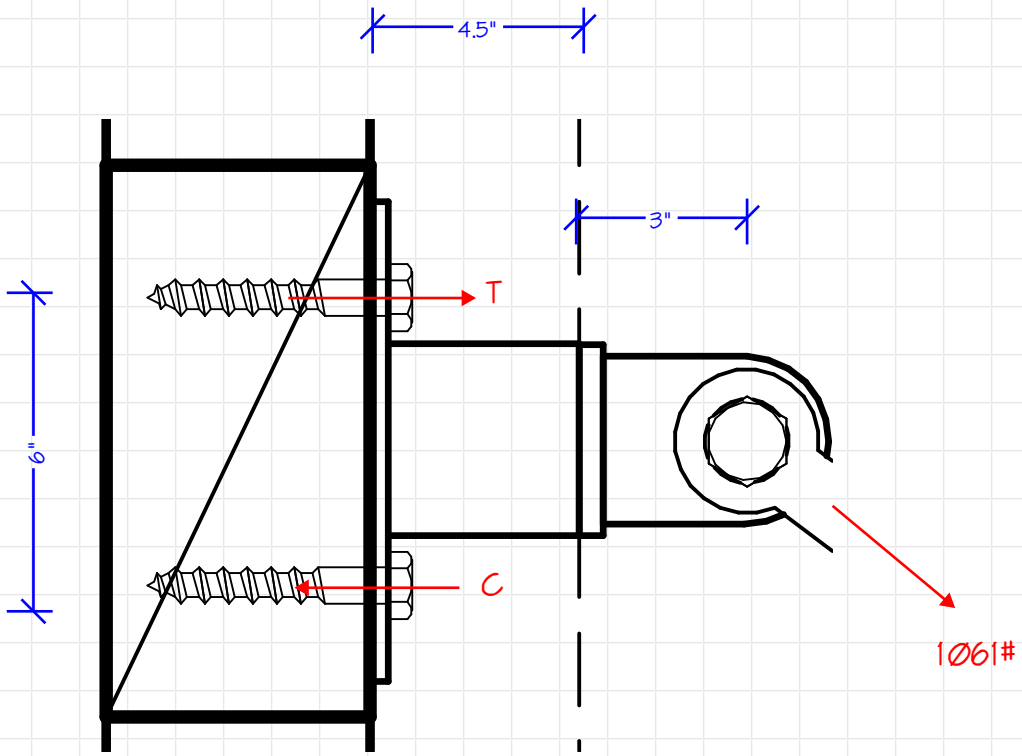
$d_{req'd} = 1.44"$ USE 1.5"ϕ ROD

GRAVITY LOAD ON ROD



ROD OK IN TENSION BY INSPECTION

750# (FROM ENERCALC)



CHECK MOMENT ON SCREW CONNECTION

Masd = 1061# (7.5/12) = 664#*FT

664#*FT/(6/12)/(2 SCREWS) = 664#/SCREW (WITHDRAWAL)

1/4" x 5" SDS SCREW WITHDRAWAL CAPACITY --> (172#/IN)(5IN) = 860# > 664# OK