PCS Structural Solutions

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PRCA20220091

THE APPROVED CONSTRUCTION PLANS, DOCUMENTS AND ALL ENGINEERING MUST BE POSTED ON THE JOB AT ALL INSPECTIONS IN A VISIBLE AND READILY ACCESSIBLE LOCATION.

FULL SIZED LEDGIBLE COLOR PLANS ARE REQUIRED TO BE PROVIDED BY THE PERMITEE ON SITE FOR INSPECTION

City of Puyallup
Building
ACCEPTED
JMontgomery
04/13/2022
2:05:09 PM

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

STRUCTURAL CALCULATIONS

FOR

LARSON JEEP
300 RIVER ROAD
PUYALLUP, WASHINGTON

PREPARED BY
PCS STRUCTURAL *SOLUTIONS*

JACK J. PINKARD
STATE OF WASHINGTON
26161
STRUCTURAL ENGINEER
PROFESSIONAL ENGINEER

SEPTEMBER 24, 2021
21-067

PRCA20220091

DESIGN CRITERIA

PRCA20220091

Project: Larson Jeep | Job Number: 21-067

Sheet: of | Name: HYH

Originating Office: Tacoma | Date: 9/20/2021

DESIGN CRITERIA CHECKLIST

CODE: IBC 2018, ASCE 7-16 | LOCATION: PUYALLUP, WA

VERTICAL DESIGN CRITERIA

	DEAD	LIVE	PARTITION	CONCENTRATED
ROOF:	15 PSF	25 PSF		
OPEN-WEB TRUSS:	20 PSF	25 PSF		

WIND DESIGN CRITERIA

BASIC WIND SPEED (V) =	97 MPH	(Per ASCE 7-16 Sec. 26.5.1, Fig. 26.5-1A; 1B; 1C & 1D, or as required by Bld'g Dept.)
RISK CATEGORY:	II	(Per ASCE 7-16 Table 1.5-1 & IBC Table 1604.5)
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 FACTOR (K_{zt}):	1.00	(Per ASCE 7-16 Section 26.8.2)
MEAN ROOF HEIGHT:	20 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:	Gable	(See ASCE 7-16 Figure 27.3-1)
ROOF SLOPE (__:12):	1.00:12	(Enter vertical rise in 12 horizontal units)
θ (degrees):	4.76	

SEISMIC DESIGN CRITERIA

RISK CATEGORY:	I & II	(Per ASCE 7-16 Table 1.5-1 & IBC Table 1604.5)
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, Flexible Diaphragm to reduce by 0.5 when $\Omega_o \geq 2.5$)

INFORMATION BELOW FROM "EARTHQUAKE SPECTRAL RESPONSE ACCELERATION MAPS" PER USGS

LATITUDE:	47.199	S_S =	1.276	F_a =	1.200
LONGITUDE:	-122.297	S_1 =	0.439	F_v =	1.861

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:	YES
BEARING:	1000 PSF
ACTIVE:	35 PCF
PASSIVE:	200 PCF
COEFFICIENT OF FRICTION:	0.35
PILE TYPE:	NONE
VERTICAL CAPACITY :	N/A
UPLIFT CAPACITY:	N/A

SOIL DESIGN CRITERIA ASSUMED

MINIMUM FOOTING DIMENSIONS:

CONTINUOUS:	1'-4"
SPREAD:	1'-6"
FROST DEPTH:	1'-6"
LATERAL CAPACITY:	N/A
SIZE:	N/A

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Project: Larson Jeep | Job Number: 21-067

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Originating Office: Tacoma | Date: 09/20/21

MATERIALS

CONCRETE

Footings/Piles:	3000 PSI	-	-
Slabs/Walls:	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

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
E =	1.30E+06 PSI
F_b =	1700 PSI
F_v =	285 PSI
F_c =	1400 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	-	-

PRCA20220091

Hazards by Location

Search Information

Address: 300 River Rd, Puyallup, WA 98371, USA

Coordinates: 47.1992097, -122.2973828

Elevation: 43 ft

Timestamp: 2020-12-07T19:54:26.704Z

Hazard Type: Wind

ASCE 7-16

MRI 10-Year	67 mph
MRI 25-Year	73 mph
MRI 50-Year	78 mph
MRI 100-Year	82 mph
Risk Category I	92 mph
Risk Category II	97 mph
Risk Category III	104 mph
Risk Category IV	108 mph

ASCE 7-10

MRI 10-Year	72 mph
MRI 25-Year	79 mph
MRI 50-Year	85 mph
MRI 100-Year	91 mph
Risk Category I	100 mph
Risk Category II	110 mph
Risk Category III-IV	115 mph

ASCE 7-05

ASCE 7-05 Wind Speed	85 mph

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer. Per ASCE 7, islands and coastal areas outside the last contour should use the last wind speed contour of the coastal area – in some cases, this website will extrapolate past the last wind speed contour and therefore, provide a wind speed that is slightly higher. NOTE: For queries near wind-borne debris region boundaries, the resulting determination is sensitive to rounding which may affect whether or not it is considered to be within a wind-borne debris region.

Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

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Project: Larson Jeep | Job Number: 21-067

PCS Structural Solutions

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Originating Office: Tacoma | Date: 09/20/21

DESIGN CRITERIA - WIND

BASIC WIND SPEED (V):	97 MPH	MEAN ROOF HEIGHT:	20 FT
RISK CATEGORY:	II	GROUND ELEVATION FACTOR (Ke):	1.00
EXPOSURE CATEGORY:	B	ENCLOSURE CLASSIFICATION:	Enclosed
DIRECTIONALITY FACTOR (K_d):	0.85	ROOF TYPE:	Gable
GUST EFFECT FACTOR (G):	0.85	ROOF SLOPE (__:12):	1.0:12
TOPOGRAPHIC FACTOR (K_{zt}):	1.00	θ (degrees):	4.76

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

NOTE: q_z and q_i have conservatively been taken equal to q_h.

HORIZONTAL WALL PRESSURES (Figure 27.3-1)

	External Pressures ($q*(GC_p)$):			Internal Pressures ($\pm q_i*(GC_{pi})$)
L/B:	Windward wall	Leeward wall	Sidewall	All walls
0-1	8.6	-5.4	-7.6	2.3
2		-3.2		
≥4		-2.2		

ROOF PRESSURES (Figure 27.3-1)

		External Pressures ($q*(GC_p)$):			Internal Pressures ($\pm q_i*(GC_{pi})$)
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	2.3
	0.50	N/A	N/A	N/A	
	≥1.0	N/A	N/A	N/A	

	h/L:	Horizontal Distance from Windward Edge	External Pressures ($q*(GC_p)$): Positive Pressure	External Pressures ($q*(GC_p)$): Negative Pressure	Internal Pressures ($\pm q_i*(GC_{pi})$) All Roofs
Normal to Ridge for θ < 10° and Parallel to Ridge for All θ	≤0.5	0 to h	-1.9	-9.7	2.3
		h to 2h		-5.4	
		>2h		-3.2	
	≥1.0	0 to h/2	-1.9	-14.0	
		>h/2		-7.6	

ASCE 7-16 27.1.5: Minimum Design Wind Loads: 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.

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	-23.9	-31.5	-42.9	N/A	N/A
20 SF	16.0	-16.0	-22.3	-29.5	-38.9	N/A	N/A
50 SF	16.0	-16.0	-20.2	-26.8	-33.5	N/A	N/A
100 SF	16.0	-16.0	-18.6	-24.8	-29.5	N/A	N/A

WALL SURFACES & ROOF OVERHANGS

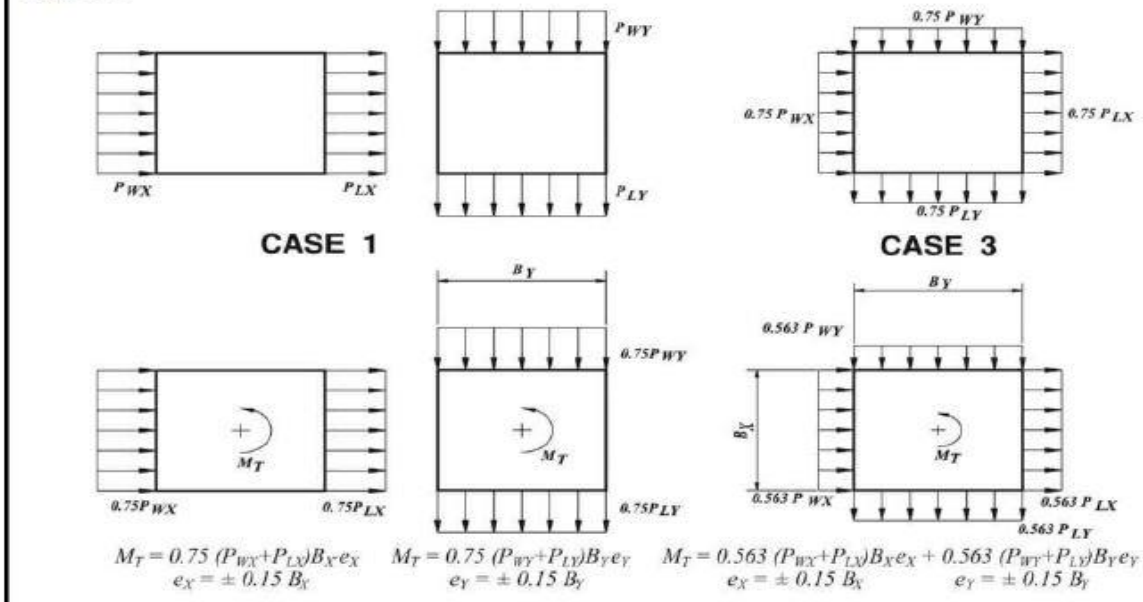
Effective Wind Area	WALL ZONES				ROOF OVERHANG ZONES					
	POSITIVE PRESSURES		NEGATIVE PRESSURES		NEGATIVE PRESSURES					
	4	5	4	5	1'	1	2n	2r	3e	3r
10 SF	16.0	16.0	-16.2	-20.1	-23.9	-23.9	-31.5	-42.9	N/A	N/A
20 SF	16.0	16.0	-16.0	-18.7	-23.5	-23.5	-28.8	-38.2	N/A	N/A
50 SF	16.0	16.0	-16.0	-16.9	-23.0	-23.0	-25.2	-31.9	N/A	N/A
100 SF	16.0	16.0	-16.0	-16.0	-22.6	-22.6	-22.5	-27.2	N/A	N/A
500 SF	16.0	16.0	-16.0	-16.0	-21.7	-21.7	-16.2	-16.2	N/A	N/A

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.

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

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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

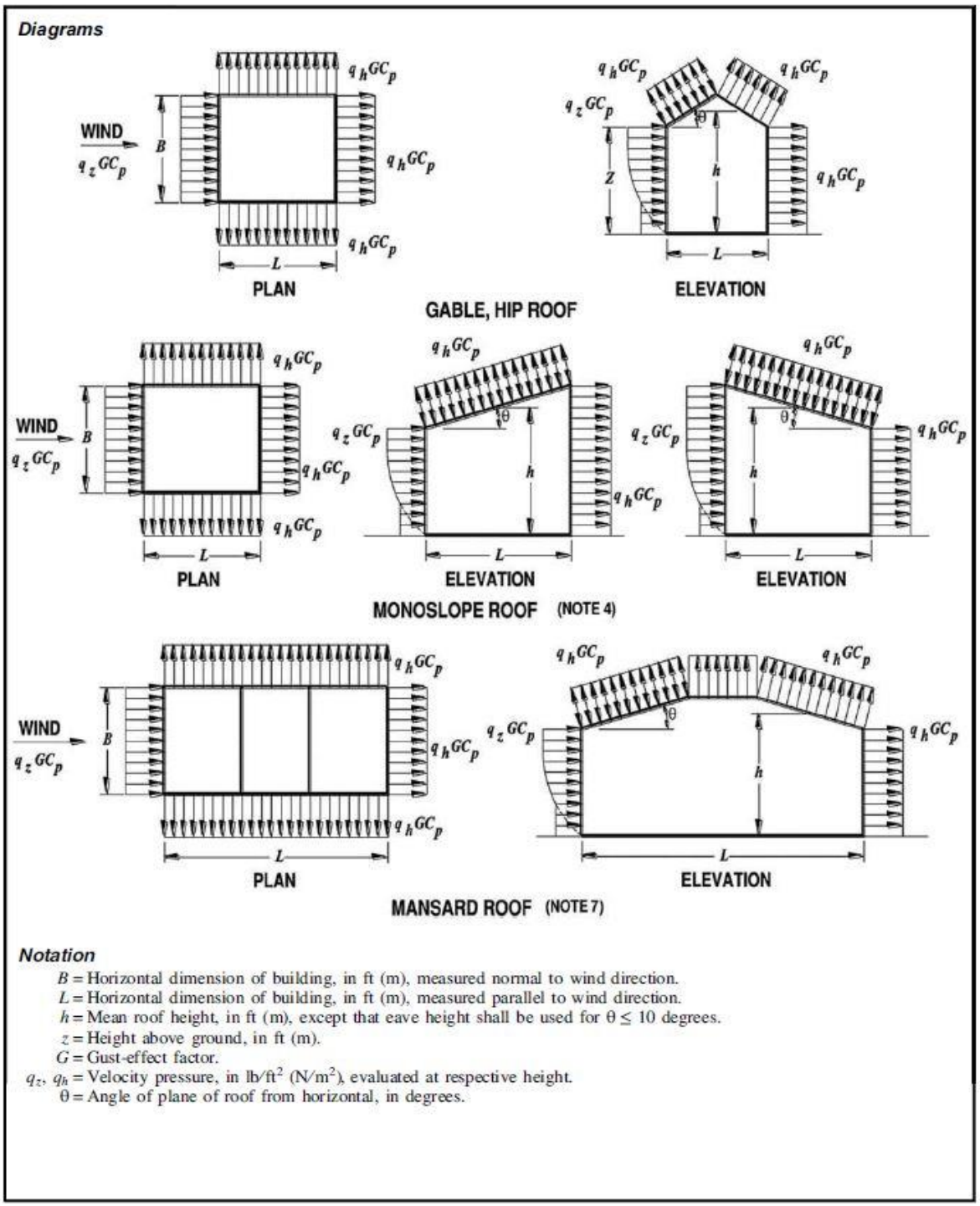

FIGURE 27.3-1 Main Wind Force Resisting System, Part 1 (All Heights): External Pressure Coefficients, C_p, for Enclosed and Partially Enclosed Buildings—Walls and Roofs

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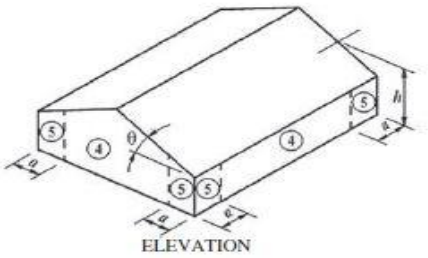
Originating Office: Tacoma | Date: 09/20/21

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

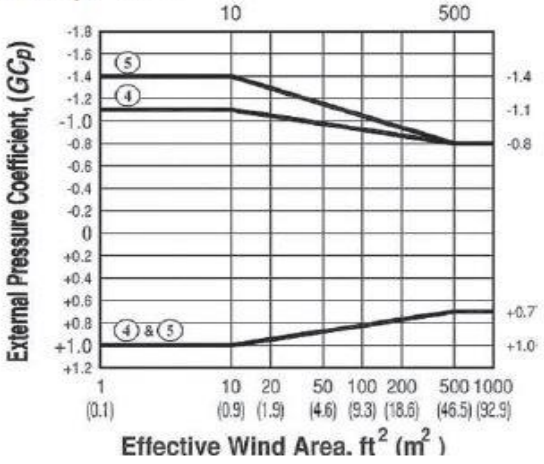
a = 10% of least horizontal dimension or $0.4h$, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9 m).

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

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

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 $\theta \leq 10°$.

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

Hazards by Location

PRCA20220091

Search Information

Address: 300 River Rd, Puyallup, WA 98371, USA

Coordinates: 47.1992097, -122.2973828

Elevation: 43 ft

Timestamp: 2021-06-09T17:25:04.493Z

Hazard Type: Seismic

Reference Document: ASCE7-16

Risk Category: II

Site Class: D-default

Basic Parameters

Name	Value	Description
S_S	1.276	MCE_R ground motion (period=0.2s)
S_1	0.439	MCE_R ground motion (period=1.0s)
S_{MS}	1.531	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.02	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.914	Coefficient of risk (0.2s)
CR_1	0.899	Coefficient of risk (1.0s)
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration

T_L	6	Long-period tr PRCA20220091
SsRT	1.276	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.395	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.439	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.488	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.6	Factored deterministic acceleration value (1.0s)
PGAd	0.5	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

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Project: Larson Jeep | Job Number: 21-067

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Originating Office: Tacoma | Date: 09/20/21

DESIGN CRITERIA - SEISMIC

ASCE 7-16 SECTION 12.8 - EQUIVALENT LATERAL FORCE PROCEDURE

OCCUPANCY CATEGORY:	I & II	LATITUDE:	47.199
SITE CLASS:	D	LONGITUDE:	-122.297
IMPORTANCE FACTOR (I_E):	1	S_S =	1.276
STRUCTURAL SYSTEM (R):	6.5	S_1 =	0.439
OVERSTRENGTH FACTOR (Ω_o):	2.5	F_a =	1.200
		F_v =	1.861

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

$S_{MS} = F_a*S_S$ = 1.531 $S_{M1} = F_v*S_1$ = 0.817

Section 11.4.5 - Design Spectral Response Acceleration Parameters

$S_{DS} = 2/3*S_{MS}$ = 1.021 $S_{D1} = 2/3*S_{M1}$ = 0.545

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
	D		

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 =	20 FT
x =	0.75
$T_a = C_t*h_n^x$ =	0.189

ASCE 7-16 SECTION 12.8.1.1 - SEISMIC RESPONSE COEFFICIENT

GENERAL EQUATION:	$C_S = S_{DS}/(R/I)$ =	0.157	<--CONTROLS	EQ. 12.8-2
MAXIMUM:	CS = 1.5*SD1/(T*(R/I)) =	0.665		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 7-10 SECTION 12.8.1 - SEISMIC BASE SHEAR

$V = C_S*W$ = **0.157*W**

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

PRCA20220091

Hazards by Location

Search Information

Address: 300 River Rd, Puyallup, WA 98371, USA

Coordinates: 47.1992097, -122.2973828

Elevation: 43 ft

Timestamp: 2020-12-07T19:54:45.306Z

Hazard Type: Snow

ASCE 7-16

Ground Snow Load ..... ⚠ 18 lb/sqft

The reported ground snow load applies at the query location of 43 feet up to a maximum elevation of 40 feet with a tolerance of 100 feet.

ASCE 7-10

Ground Snow Load ..... ⚠ 15 lb/sqft

The reported ground snow load applies at the query location of 43 feet up to a maximum elevation of 400 feet.

ASCE 7-05

Ground Snow Load ..... ⚠ 15 lb/sqft

The reported ground snow load applies at the query location of 43 feet up to a maximum elevation of 400 feet.

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer.

PRCA20220091

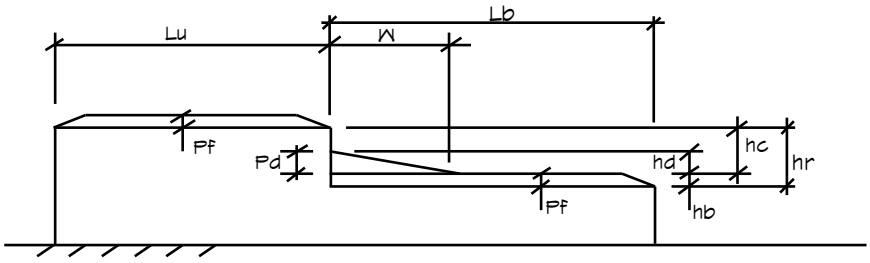
Project: Larson Jeep | Job Number: 21-067

Sheet: ____ of ____ | Name: HYH

Originating Office: Tacoma | Date: 09/20/21

SNOW DRIFT

IBC2018/ASCE7-16



CRITERIA

GROUND SNOW LOAD (P_g) =	18	PSF	Per ASCE 7-16 Figure 7.2.1 & Table 7.2
EXPOSURE FACTOR (C_e) =	1.0		Per ASCE 7-16 Table 7.3-1
THERMAL FACTOR (C_t) =	1.0		Per ASCE 7-16 Table 7.3-2
IMPORTANCE FACTOR (I_s) =	1.0		Per ASCE 7-16 Table 1.5-2
ROOF SLOPE FACTOR (C_s) =	1.0		Per ASCE 7-16 Figure 7.4-1

BALANCED SNOW LOAD

ROOF SNOW LOAD (P_s) =	12.60	PSF	$P_s = 0.7(C_e)(C_t)(C_s)(I)(P_g)$
SNOW DENSITY (γ) =	16.34	PCF	$\gamma = ((0.13)(P_g) + 14) <= 30$ PCF
BALANCED SNOW LOAD (h_b) =	0.771	FT	$h_b = (P_s)/(\gamma)$

NOTE: SEE FOLLOWING PAGE FOR UNBALANCED SNOW LOAD

DRIFTING & SLIDING SNOW LOAD (in addition to balanced snow load)

	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6
L_u =	100 FT	37 FT				
L_b =	45 FT	38 FT				
h_r =	6.0 FT	4.0 FT				
h_c =	5.23 FT	3.23 FT				
Leeward (h_d) =	3.09 FT	1.80 FT				
Windward (h_d) =	1.51 FT	1.37 FT				
Maximum?	3.09 FT	1.80 FT				
$h_c < h_d$?	NO	NO				
Maximum (h_d)=	3.09 FT	1.80 FT				
Drift W =	**12.36 FT**	**7.18 FT**				
$W > L_b$?	NO	NO				
$P_{d(MAX)}$ =	**50.5 PSF**	**29.3 PSF**				
IF $W > L_b$, $P_{d(TRUNCATED)}$ =	N/A	N/A				
Check Sliding?	NO	NO				
$P_{SLIDING}$ (on 1st 15ft) =	N/A	N/A				

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SHOWROOM
LATERAL & GRAVITY DESIGN

SHOWROOM - Lateral

Seismic Weight

High Roof						
	Dead Load (psf)	Length (ft)	Parapet Ht. (ft)	Ht. Below (ft)	Area (ft^2)	Weight (kips)
Roof	24				3395	81.5
Wall @ GL A	15	28.67	3.33	19.00	368	5.5
Wall @ GL A	15	71.67	3.33	4.92	415	6.2
Wall @ GL 1	15	14.50	3.33	19.00	186	2.8
Wall @ GL 1	15	20.33	3.33	4.92	118	1.8
Wall @ GL 8	15	16.00	3.33	19.00	205	3.1
						100.9

Low Roof						
	Dead Load (psf)	Length (ft)	Parapet Ht. (ft)	Ht. Below (ft)	Area (ft^2)	Weight (kips)
Roof	20				6305	126.1
Wall @ GL B	15	10.50	1.33	15.00	93	1.4
Wall @ GL D	15	45.50	3.33	15.00	493	7.4
Wall @ GL D	15	56.00	1.33	15.00	495	7.4
Wall @ GL 1	15	40.75	3.33	15.00	441	6.6
Wall @ GL 11	15	37.25	1.33	15.00	329	4.9
						153.9

Seismic Base Shear

$V_E = C_S * W = 0.157*(100.9+153.9) = 40.0$ kips ⟶ Seismic Controls

Wind Base Shear

$V_W = (8.6psf+7.6psf)*(100ft*12.83ft+44.83ft*8.83ft) = 27.2$ kips

Vertical Distribution of Seismic Forces

Period, T = 0.189 sec

k = 1

Base Shear, V = 39.99 kips

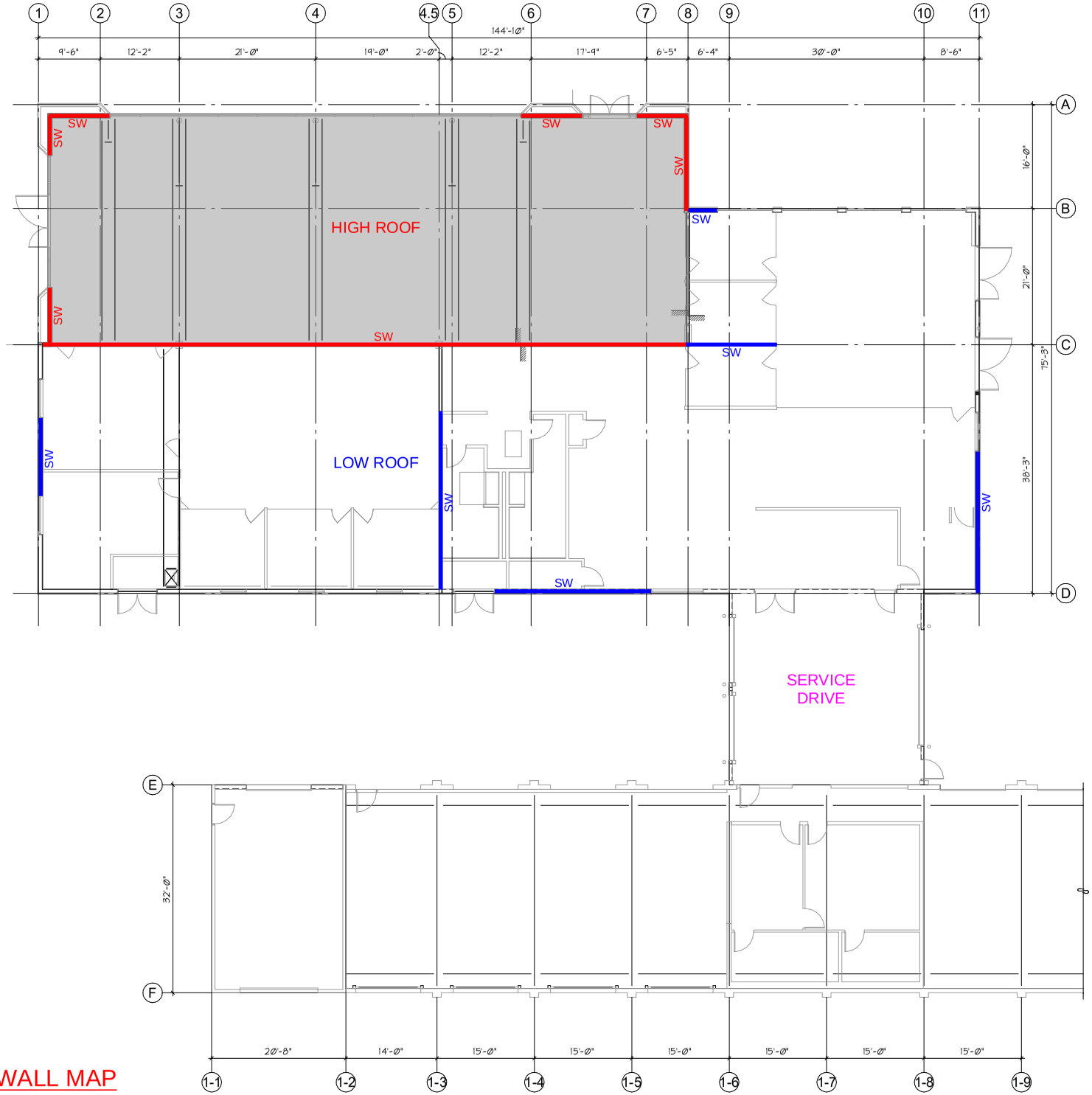
	h_x (ft)	w_x (kips)	$w_x h_x^k$ (k-ft)	C_{vx}	F_x (kips)	ΣF_x (kips)
High Roof	19	100.9	1916	0.480	19.2	19.2
Low Roof	13.5	153.9	2077	0.520	20.8	40.0
Σ		254.7	3994			

Diaphragm Design Forces

S_{DS} = 1.021

I_e = 1.0

	ΣF_x (kips)	w_x (kips)	Σw_i (kips)	F_{px} (kips)	$F_{px,min}$ (kips)	$F_{px,max}$ (kips)	$F_{px,control}$ (kips)
High Roof	19.19	100.9	100.9	19.19	20.60	41.19	20.6
Low Roof	39.99	153.9	254.7	24.16	31.42	62.84	31.4



SHEAR WALL MAP

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SHOWROOM - SHEAR WALL DESIGN

High Roof : $F_x = 19.2^k$, $\rho = 1.0$

1). SW @ Grid ①

$h = 19'$, $L_w = 6'\text{-}4''$, $6'\text{-}8''$ ⇝ Max $h/L_w = 3 > 2$

$V = 0.7 \times (\frac{1}{2} \times 19.2^k) = 6.72^k$

$V_s = \frac{6.72^k}{(6'\text{-}4'') + (6'\text{-}8'')} = 517\ plf < V_a$

$T = \frac{OTM - 0.5RM}{L_w} = \frac{62.2\ k\text{-}ft - 3.4\ k\text{-}ft}{6'\text{-}4''} = 9.28^k < T_a$ (0.6 − 0.12S_{DS})

$OTM = 517\ plf \times 6.33' \times 19' = 62.2\ k\text{-}ft$

$0.5RM = 0.5(15\ psf \times 19' \times 6.33'^2/2) = 3.4\ k\text{-}ft$

SHT'G : 15/32" STR I , 10d @ 3" o.c. ⇝ $V_a = 0.5(1330\ plf)\underbrace{(1.25 - 0.125\frac{h}{L_w})}_{0.875} = 582\ plf$

HOLDOWN : HDU11 ⇝ $T_a = 9335\ \#$

2). SW @ Grid ⑧

$h = 19'$, $L_w = 15'$ ⇝ Max $h/L_w = 1.27 < 2$

$V = 0.7 \times (\frac{1}{2} \times 19.2^k) = 6.72^k$

$V_s = \frac{6.72^k}{15'} = 448\ plf < V_a$

$T = \frac{OTM - 0.5RM}{L_w} = \frac{127.7\ k\text{-}ft - 16.0\ k\text{-}ft}{15'} = 7.45^k < T_a$ (0.6 − 0.12S_{DS})

$OTM = 448\ plf \times 15' \times 19' = 127.7\ k\text{-}ft$

$0.5RM = 0.5(15\ psf \times 19' \times 15'^2/2) = 16.0\ k\text{-}ft$

SHT'G : 15/32" STR I , 10d @ 4" o.c. ⇝ $V_a = 0.5(1020\ plf) = 510\ plf$

HOLDOWN : HDU8 ⇝ $T_a = 7870\ \#$

3). SW @ Grid Ⓐ

$h = 19'$, $L_w = 9'\text{-}6"$, $9'\text{-}5"$, $7'\text{-}11"$ ⇝ Max $h/L_w = 2.4 > 2$

$V = 0.7 \times (\frac{1}{2} \times 19.2^k) = 6.72^k$

$V_s = \frac{6.72^k}{26'\text{-}10"} = 250\ plf < V_a$

$T = \frac{OTM - 0.5RM}{L_w} = \frac{37.7\ k\text{-}ft - 5.4\ k\text{-}ft}{7'\text{-}11"} = 4.08^k < T_a$ (0.5 → 0.6 − 0.12S_{DS})

$OTM = 250\ plf \times 7.92' \times 19' = 37.7\ k\text{-}ft$

$0.5RM = 0.5(15\ psf \times 19' \times 7.92'^2/2) = 5.4\ k\text{-}ft$

SHT'G: 15/32" STR I, 10d @ 6" o.c. ⇝ $V_a = 0.5(680\ plf)\underbrace{(1.25 - 0.125\frac{h}{L_w})}_{0.95} = 323\ plf$

HOLDOWN: HDU4 ⇝ $T_a = 4565\ \#$

4). SW @ Grid Ⓒ

$h = 19'$, $L_w = 100'$

$V = 0.7 \times (\frac{1}{2} \times 19.2^k) = 6.72^k$

$V_s = \frac{6.72^k}{100'} = 67\ plf < V_a$

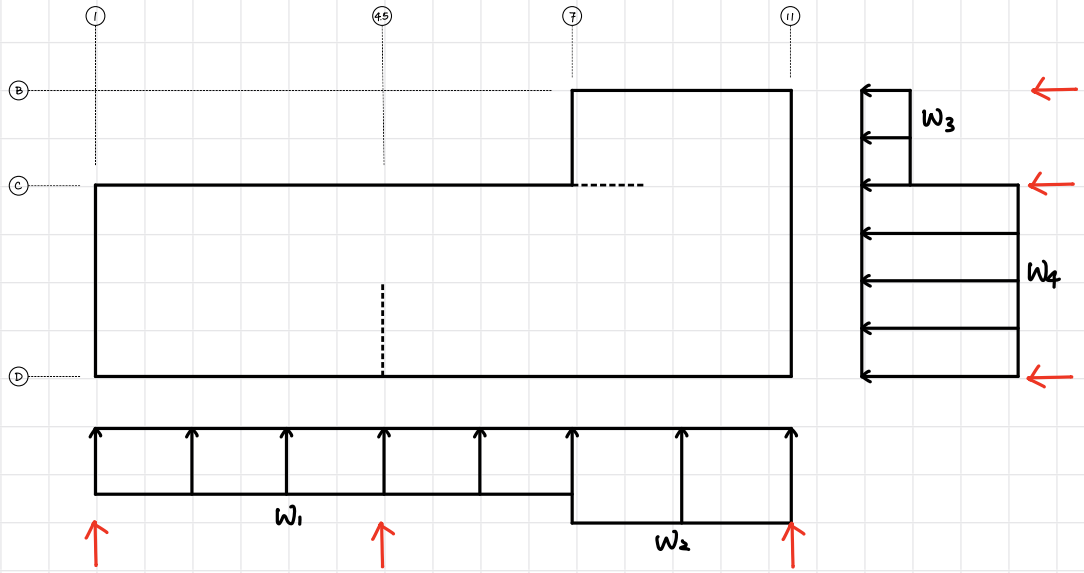
$T = V_s \times h = 1.28^k < T_a$

SHT'G: 15/32" STR I, 10d @ 6" o.c. ⇝ $V_a = 0.5(680\ plf) = 340\ plf$

HOLDOWN: LSTA30 ⇝ $T_a = 1640\ \#$

SHOWROOM - SHEAR WALL DESIGN

Low Roof: $F_x = 40.3^k$, $\rho = 1.0$



$$W_1 = \frac{40.3^k}{6305sf} \times (38'\text{-}3'') = 244\ plf$$

$$W_2 = \frac{40.3^k}{6305sf} \times (59'\text{-}3'') = 378\ plf$$

$$W_3 = \frac{40.3^k}{6305sf} \times (44'\text{-}10'') = 286\ plf$$

$$W_4 = \frac{40.3^k}{6305sf} \times (144'\text{-}10'') = 925\ plf$$

1). SW @ Grid ①

$h = 15'$, $L_w = 12'$ ⇝ Max $h/L_w = 1.25 < 2$

$V = 0.7 \times (244\,plf \times \frac{61.67'}{2}) = 5.27^k$

$V_s = \frac{5.27^k}{12'} = 489\,plf < V_a$

$T = \frac{OTM - 0.5RM}{L_w} = \frac{79\,k\text{-}ft - 9.7\,k\text{-}ft}{12'} = 5.77^k < T_a$ (0.5 ← 0.6 − 0.12S_{DS})

$OTM = 5.27^k \times 15' = 79.0\,k\text{-}ft$

$0.5RM = 0.5(15psf \times 15' \times 12^2/2) = 9.7\,k\text{-}ft$

SHT'G: 15/32" STR I, 10d@4" o.c. ⇝ $V_a = 0.5(1020plf) = 510\,plf$

HOLDOWN: HDU 8 ⇝ $T_a = 7870\,\#$

2). SW @ Grid (4.5)

$h = 15'$, $L_w = 27'\text{-}4"$

$V = 0.7 \times (244plf \times \frac{144.83'}{2} + (378-244)plf \times \frac{44.83^2}{2 \times 83.17'}) = 13.5^k$

$V_s = \frac{13.5^k}{27'\text{-}4"} = 494\,plf < V_a$

$T = \frac{OTM - 0.5RM}{L_w} = \frac{202.5^{k\text{-}ft} - 50.4^{k\text{-}ft}}{27.33'} = 5.56^k < T_a$ (0.5 ← 0.6 − 0.12S_{DS})

$OTM = 13.5^k \times 15' = 202.5^{k\text{-}ft}$

$0.5RM = 0.5(15psf \times 15' \times 27.33^2/2) = 50.4^{k\text{-}ft}$

SHT'G: 15/32" STR I, 10d@4" o.c. ⇝ $V_a = 0.5(1020plf) = 510\,plf$

HOLDOWN: HDU 5 ⇝ $T_a = 5645\,\#$

3). SW @ Grid ⑪

$h = 15'$, $L_w = 21'-10"$

$$V = 0.7 \times \left(244\,psf \times \frac{83.17'}{2} + (378-244)psf \times \frac{44.83'(2\times 83.17' - 44.83')}{2\times 83.17'}\right) = 10.17^k$$

$$V_s = \frac{10.17^k}{21'-10"} = 466\,plf \quad < \quad V_a$$

$$T = \frac{OTM - 0.5^{0.6-0.12S_{DS}}RM}{L_w} = \frac{152.6^{k\text{-}ft} - 64.4^{k\text{-}ft}}{21'-10"} = 4.04^k \quad < \quad T_a$$

$OTM = 10.17^k \times 15' = 152.6^{k\text{-}ft}$

$0.5RM = 0.5(15psf \times 15' \times 21.83^2/2) = 64.4^{k\text{-}ft}$

SHT'G: 15/32" STR I, 10d @ 4" o.c. ⇝ $V_a = 0.5(1020plf) = 510\,plf$

HOLDOWN: HDU4 ⇝ $T_a = 4565\#$

4). SW @ Grid Ⓑ

$h = 15'$, $L_w = 4'-6"$ ⇝ Max $h/L_w = 3.3 > 2$

$$V = 0.7 \times \left(286plf \times \frac{21'}{2}\right) = 2.10^k$$

$$V_s = \frac{2.10^k}{4'-6"} = 467\,plf \quad < \quad V_a$$

$$T = \frac{OTM - 0.5^{0.6-0.12S_{DS}}RM}{L_w} = \frac{31.5^{k\text{-}ft} - 2.6^{k\text{-}ft}}{4'-6"} = 6.42^k \quad < \quad T_a$$

$OTM = 2.10^k \times 15' = 31.5^{k\text{-}ft}$

$0.5RM = 0.5(15psf \times 15' + 20psf \times \frac{21'}{2}) \times 4.5^2/2 = 2.6^{k\text{-}ft}$

SHT'G: 15/32" STR I, 10d @ 4" o.c. ⇝ $V_a = 0.5(1330plf)\underbrace{(1.25-0.125\frac{h}{L_w})}_{0.833} = 554\,plf$

HOLDOWN: HDU8 ⇝ $T_a = 7870\#$

5). SW @ Grid ©

$h = 15'$, $L_w = 14'\text{-}2"$ ⇝ Max $h/L_w = 0.95 < 2$

$V = 0.7 \times (28psf \times \frac{21'}{2} + 925plf \times \frac{38.25'}{2}) = 14.48^k$

$V_s = \frac{14.48^k}{14'\text{-}2"} = 1022 plf \quad < \quad V_a$

$T = \frac{OTM - 0.5RM}{L_w} = \frac{217.2^{k\text{-}ft} - 49.2^{k\text{-}ft}}{14'\text{-}2"} = 11.8^k \quad < T_a$ (0.6 − 0.12S_{DS})

$OTM = 14.48^k \times 15' = 217.2^{k\text{-}ft}$

$0.5RM = 0.5(15psf \times 15' + 20psf \times \frac{59.25'}{2}) \times 14.17'^2/2 = 49.2^{k\text{-}ft}$

SHT'G: 15/32" (2) sides, 10d @ 3" o.c. ⇝ $V_a = 0.5(1330plf) \times 2 = 1330 plf$

HOLDOWN: HDU 14 ⇝ $T_a = 14445\#$

6). SW @ Grid Ⓓ

$h = 15'$, $L_w = 24'$

$V = 0.7 \times (925plf \times \frac{38.25'}{2}) = 12.4^k$

$V_s = \frac{12.4^k}{24'} = 516 plf \quad < \quad V_a$

$T = \frac{OTM - 0.5RM}{L_w} = \frac{185.7^{k\text{-}ft} - 105^{k\text{-}ft}}{24'} = 3.36^k \quad < T_a$ (0.6 − 0.12S_{DS})

$OTM = 12.4^k \times 15' = 185.7^{k\text{-}ft}$

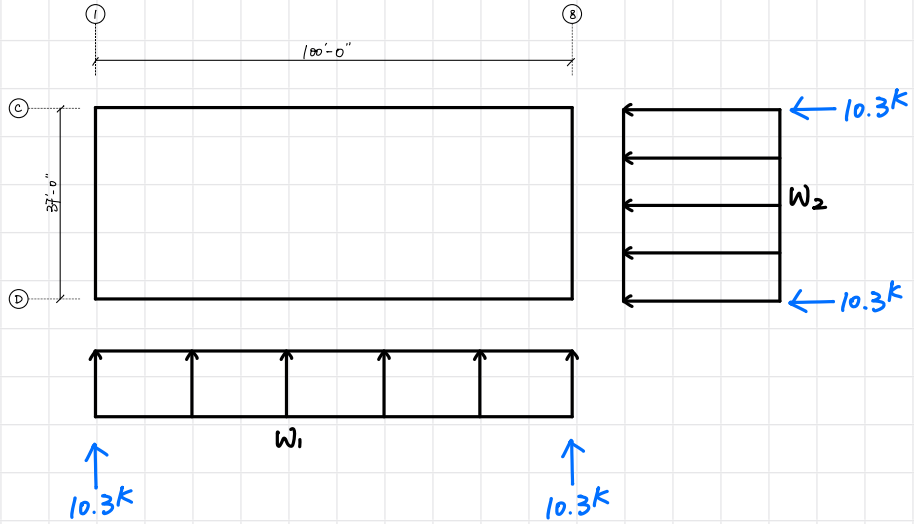
$0.5RM = 0.5(15psf \times 15' + 20psf \times \frac{38.25'}{2}) \times 24'^2/2 = 105.0^k$

SHT'G: 15/32" STR I, 10d @ 3" o.c. ⇝ $V_a = 0.5(1330plf) = 665 plf$

HOLDOWN: HDU 4 ⇝ $T_a = 4565\#$

DIAPHRAGM FORCES

High Roof: $F_{px} = 20.6^k$, $L/B = \frac{100'}{37'} = 2.7 < 3$



$W_1 = \frac{20.6^k}{100'} = 206\ plf$

$W_2 = \frac{20.6^k}{37'} = 557\ plf$

Roof Diaphragm: 19/32" sheathing (unblocked), 10d @ 6" o.c.

$\rightsquigarrow$ $V_s = 0.5(640plf) = 320\ plf$ (case 1 – N/S)
$V_s = 0.5(480\ plf) = 240\ plf$ (case 3 – E/W)

N-S: $V_{d,1} = 0.7 \times 10.3^k/37' = 278\ plf < 320\ plf$

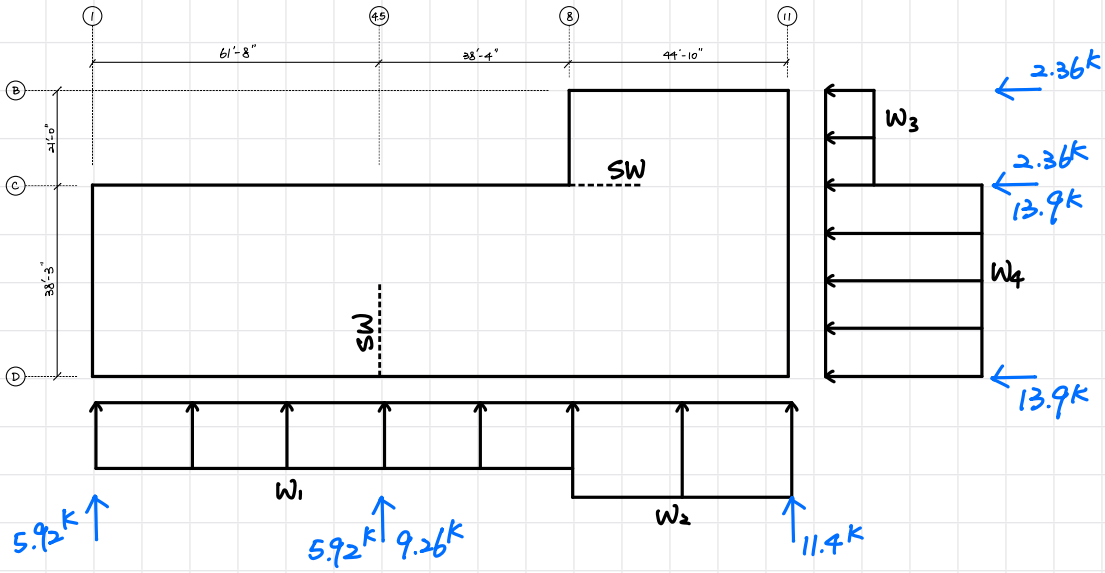
Max Chord Force $= \frac{M_{max}}{d_{min}} = \frac{206plf(100')^2/8}{37'} \times 0.7 = 4872\#$ ← Resolved w/ Double Top Plate

E-W: $V_{d,c} = 0.7 \times 10.3^k/100' = 72\ plf < 240\ plf$

Max Chord Force $= \frac{M_{max}}{d_{min}} = \frac{557plf(37')^2/8}{100'} \times 0.7 = 667\#$ ← Resolved w/ Double Top Plate

DIAPHRAGM FORCES

Low Roof: $F_{px} = 31.7^k$, Area = 6305 sf, $L/B = \frac{83'-2"}{38'-3"} = 2.17 < 3$



$$w_1 = \frac{31.7^k}{6305sf} \times (38'-3") = 192\ plf$$

$$w_2 = \frac{31.7^k}{6305sf} \times (59'-3") = 298\ plf$$

$$w_3 = \frac{31.7^k}{6305sf} \times (44'-10") = 225\ plf$$

$$w_4 = \frac{31.7^k}{6305sf} \times (144'-10") = 728\ plf$$

Roof Diaphragm: 19/32" sheathing (unblocked), 10d @ 6" o.c.

$\rightsquigarrow$ $V_s = 0.5(640plf) = 320\ plf$ (case 1 – N/S)

$V_s = 0.5(480\ plf) = 240\ plf$ (case 3 – E/W)

N-S: $V_{d,4.5} = 0.7(5.92^k + 9.26^k)/38'\text{-}3" = 278\,plf < 320\,plf$

$\text{Max Chord Force} = \frac{M_{max}}{d_{min}} = \frac{155\,k\text{-}ft}{38'\text{-}3"} = 4052\,\#$

↝ Use CMST14 ($T_a = 6475\,\#$)

E-W: $V_{d,C_R} = 0.7(2.36^k)/44'\text{-}10" = 37\,plf$

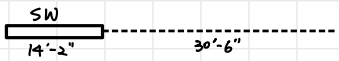
$V_{d,C_L} = 0.7(13.9^k)/144'\text{-}10" = 67\,plf < 240\,plf$

$\text{Max Chord Force} = \frac{M_{max}}{d_{min}} = \frac{728plf(38.25')^2/8}{61'\text{-}8"} \times 0.7 = 1511\,\#$

↝ Use CS14 ($T_a = 2490\,\#$)

Collector

- Grid ©



$\text{Drag Force} = (37plf + 67plf)(30.5') = 3170\,\#$

↝ Provide MSTC40 ($T_a = 4735\,\#$)

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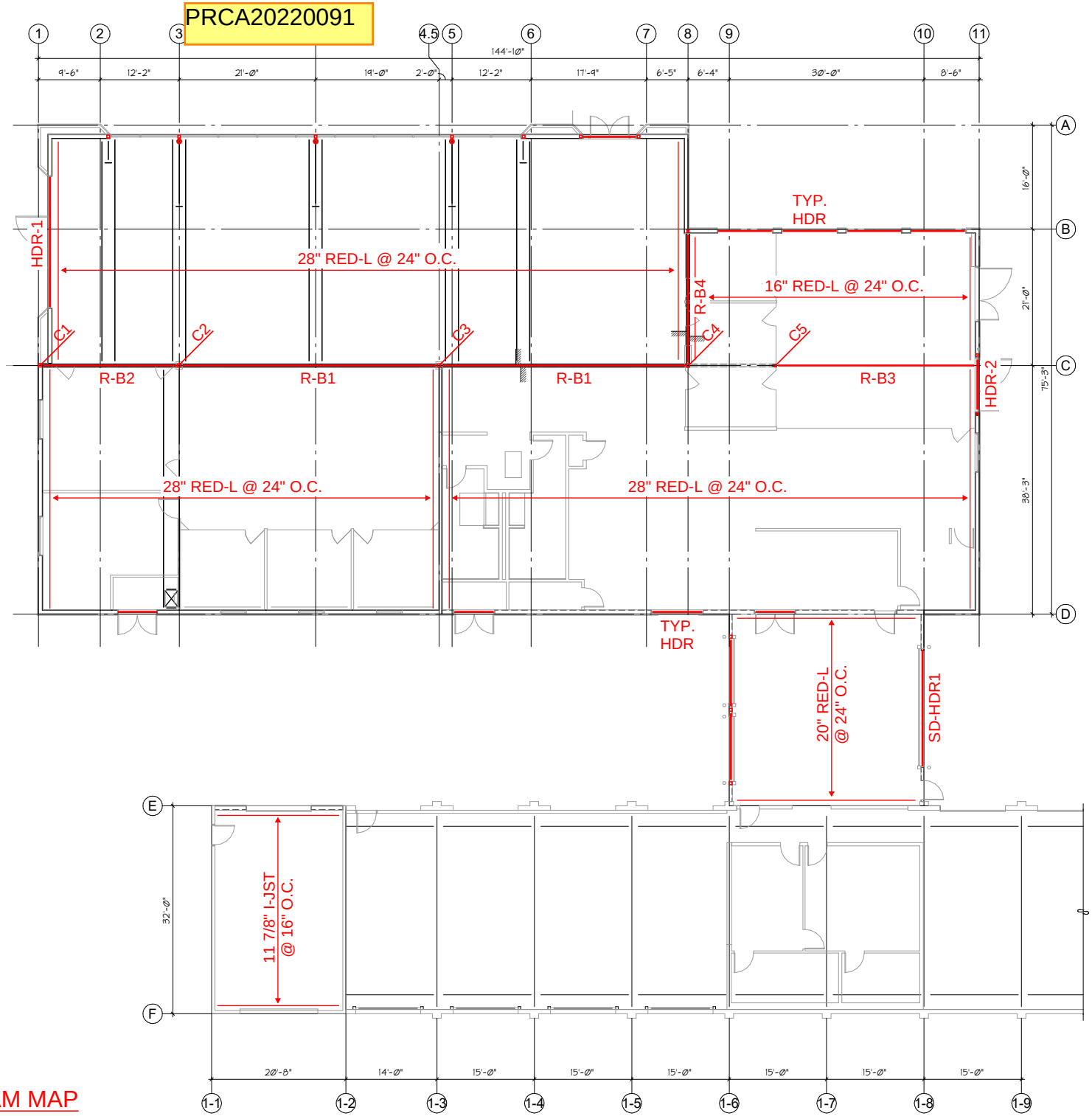


BEAM MAP

SHOWROOM FRAMING

High Roof : DL = 24 psf , SL = 25 psf
Low Roof : DL = 20 psf , SL = 25 psf

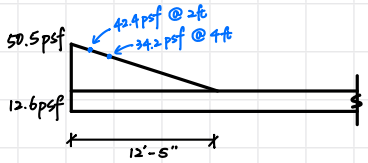
Roof Truss

Span = 37'-0" , Spacing = 24" o.c.
DL = (20 psf + 4psf solar) x 24"/12 = 48 plf
SL = 25psf x 24"/12 = 50 plf

Try 28" Red-L Truss (38' span):
Allowable for 115% TL = 116 plf > 98 plf
for 100% LL = 57 plf > 50 plf
O.K.

Check Roof Truss w/ Snow Drift:

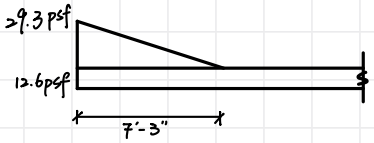
- Roof Truss at North-East of Building (L = 21'-0")



DL = 20psf x 24"/12 = 40plf
SL = (12.6psf+42.4psf) x 24"/12 = 109.6 plf
SLmax = (12.6psf+50.5psf) x 12"/12 = 63.1 plf

16" Red-L Truss, Span = 22' ⇝ Allowable = 204 plf > 150 plf ✓
Provide Truss @ 12" o.c. at Snow Drift Area ⇝ Allowable 100% LL = 84 plf ✓

- Roof Truss at South of Building (L = 38'-0")

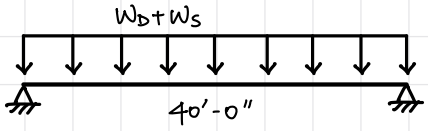


DL = 20psf x 24"/12 = 40plf
SL = (12.6psf + 29.3psf/2) x 24"/12 = 54.5 plf

28" Red-L Truss ⇝ Allowable for 115% TL = 116 plf > 94.5 plf
Allowable for 100% LL = 57 plf > 54.5 plf ✓

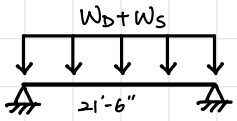
Roof Beam (See Enercalc)

R-B1



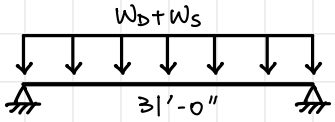
High Roof : Trib Width = 37'/2 = 18.5'
D = 15psf + 4psf solar = 19 psf, S = 25psf
Low Roof : Trib Width = 38.25'/2 = 19.125'
D = 15psf, S = 25psf
Wall : D = 15psf x (22.33'-15') = 110 plf

R-B2



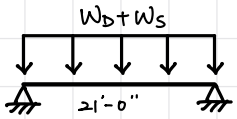
High Roof : Trib Width = 37'/2 = 18.5'
D = 15psf + 4psf solar = 19 psf, S = 25psf
Low Roof : Trib Width = 38.25'/2 = 19.125'
D = 15psf, S = 25psf
Wall : D = 15psf x (22.33'-15') = 110 plf

R-B3



Low Roof : Trib Width = 59.25'/2 = 29.625'
D = 15psf, S = 25psf

R-B4



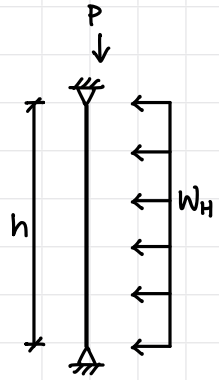
Roof : D = 20 psf x 2' = 40 psf

S = 25 psf x 2' = 50 psf

Wall : D = 15 psf x (22.33'-15') = 110 plf

Column (See Enercalc)

C1 h = 15'

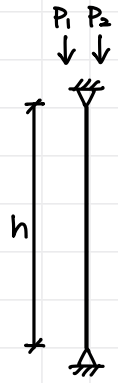


P from R-B2:

D = 8.681 k, S = 10.112 k

W_H = 16 psf x 2' = 32 plf

C2 h = 15'



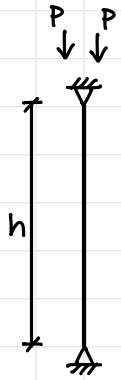
P_1 from R-B1:

D = 16.152 k, S = 18.813 k

P_2 from R-B2:

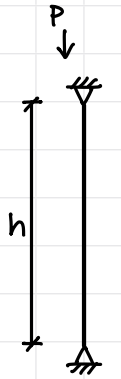
D = 8.681 k, S = 10.112 k

C3 $h = 15'$



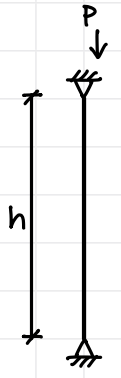
P from R-B1:
D = 16.152 k, S = 18.813 k

C4 $h = 15'$



P from R-B1:
D = 16.152 k, S = 18.813 k

C5 $h = 15' - 30"/12 = 12.5'$



P from R-B3:
D = 7.568 k, S = 11.48 k

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

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File: 21067 Larson Jeep_hyh.ec6

Lic. # : KW-06002327
PCS STRUCTURAL SOLUTIONS

Wood Beam

DESCRIPTION: R-B1

CODE REFERENCES

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

Material Properties

Analysis Method : Load Resistance Factor D
Load Combination : IBC 2018

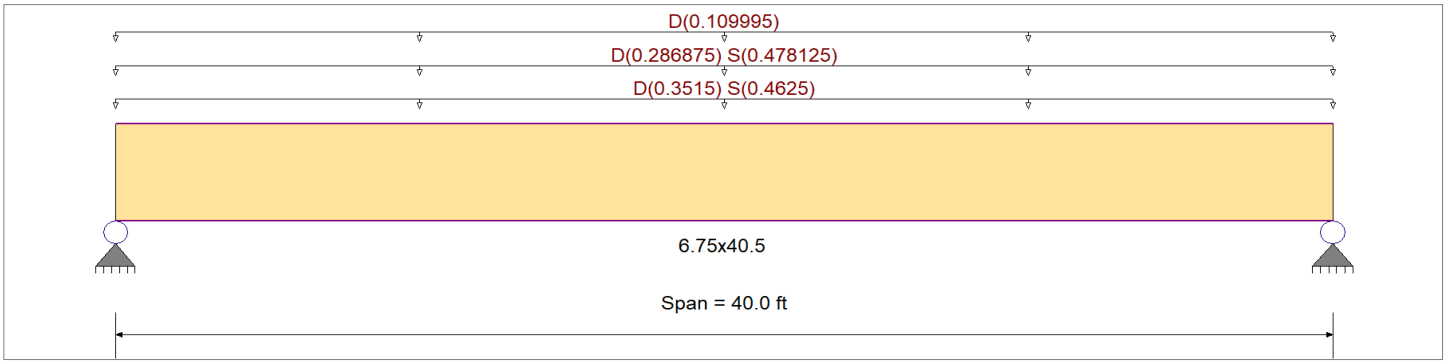
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0190, S = 0.0250 ksf, Tributary Width = 18.50 ft, (High Roof)
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 19.125 ft, (Low Roof)
Uniform Load : D = 0.0150 ksf, Tributary Width = 7.333 ft, (Wall Above)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.961 : 1	Maximum Shear Stress Ratio	=	0.493 : 1
Section used for this span		6.75x40.5	Section used for this span		6.75x40.5
fb: Actual	=	3,217.91 psi	fv: Actual	=	225.93 psi
Fb: Allowable	=	3,349.52 psi	Fv: Allowable	=	457.92 psi
Load Combination		+1.20D+1.60S	Load Combination		+1.20D+1.60S
Location of maximum on span	=	20.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.810 in	Ratio =	592 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	1.506 in	Ratio =	318 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	λ	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values Mu	Moment Values fb	Moment Values Fb	Shear Values Vu	Shear Values fv	Shear Values Fv
+1.40D					0.808	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 40.0 ft	1	0.585	0.301	0.60	0.808	1.00	1.00	1.00	1.00	1.00	226.13	1,470.56	2512.14	18.82	103.25	343.44
+1.20D					0.808	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 40.0 ft	1	0.376	0.193	0.80	0.808	1.00	1.00	1.00	1.00	1.00	193.83	1,260.48	3349.52	16.13	88.50	457.92
+1.20D+0.50S					0.808	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 40.0 ft	1	0.559	0.287	0.80	0.808	1.00	1.00	1.00	1.00	1.00	287.89	1,872.18	3349.52	23.96	131.45	457.92
+1.20D+1.60S					0.808	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 40.0 ft	1	0.961	0.493	0.80	0.808	1.00	1.00	1.00	1.00	1.00	494.83	3,217.91	3349.52	41.18	225.93	457.92
+1.20D+0.70S					0.808	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 40.0 ft	1	0.506	0.260	1.00	0.808	1.00	1.00	1.00	1.00	1.00	325.52	2,116.86	4186.90	27.09	148.62	572.40
+0.90D					0.808	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 24 SEP 2021, 7:08AM

Wood Beam

File: 21067 Larson Jeep_hyh.ec6

Lic. # : KW-06002327

PCS STRUCTURAL SOLUTIONS

DESCRIPTION: R-B1

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	λ	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Mu	fb	Fb	Vu	fv	Fv
Length = 40.0 ft	1	0.226	0.116	1.00	0.808	1.00	1.00	1.00	1.00	1.00	145.37	945.36	4186.90	12.10	66.37	572.40

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	1.5059	20.146		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	34.965	34.965
Overall MINimum	18.813	18.813
D Only	16.152	16.152
+D+S	34.965	34.965
+D+0.750S	30.262	30.262
+0.60D	9.691	9.691
S Only	18.813	18.813

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 23 SEP 2021, 2:39PM
File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327
PCS STRUCTURAL SOLUTIONS

Wood Beam

DESCRIPTION: R-B2

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2018

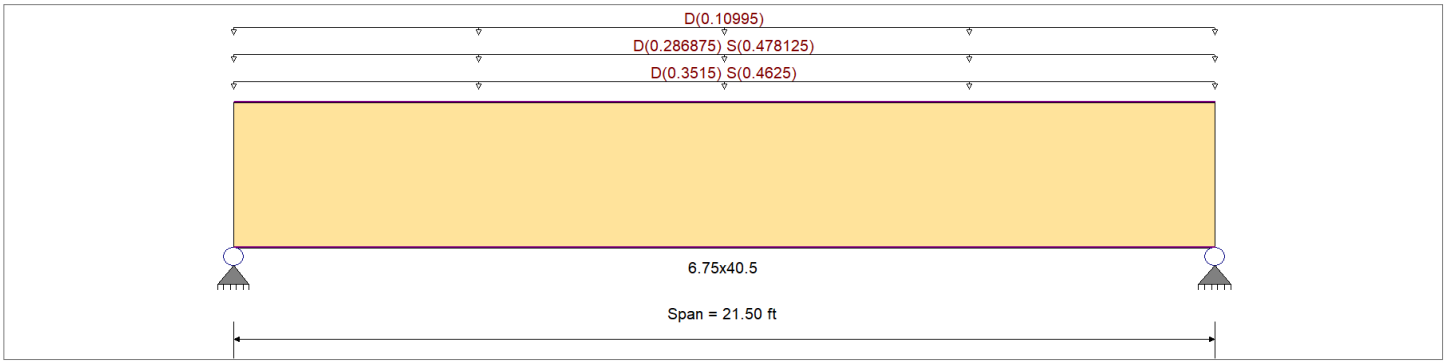
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0190, S = 0.0250 ksf, Tributary Width = 18.50 ft, (High Roof)
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 19.125 ft, (Low Roof)
Uniform Load : D = 0.0150 ksf, Tributary Width = 7.330 ft, (Wall Above)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.277 : 1	Maximum Shear Stress Ratio	=	0.232 : 1
Section used for this span		6.75x40.5	Section used for this span		6.75x40.5
fb: Actual	=	656.90 psi	fv: Actual	=	70.75 psi
Fb: Allowable	=	2,371.91 psi	Fv: Allowable	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	10.750 ft	Location of maximum on span	=	18.126 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.068 in	Ratio =	3815 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.126 in	Ratio =	2052 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.163	0.137	0.90	0.859	1.00	1.00	1.00	1.00	1.00	46.66	303.45	1856.28	5.96	32.68	238.50
+D+S					0.859	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.277	0.232	1.15	0.859	1.00	1.00	1.00	1.00	1.00	101.01	656.90	2371.91	12.89	70.75	304.75
+D+0.750S					0.859	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.240	0.201	1.15	0.859	1.00	1.00	1.00	1.00	1.00	87.43	568.53	2371.91	11.16	61.24	304.75
+0.60D					0.859	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.055	0.046	1.60	0.859	1.00	1.00	1.00	1.00	1.00	28.00	182.07	3300.05	3.57	19.61	424.00

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 23 SEP 2021, 2:39PM

Wood Beam

File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327

PCS STRUCTURAL SOLUTIONS

DESCRIPTION: R-B2

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.1257	10.828		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	18.793	18.793
Overall MINimum	10.112	10.112
D Only	8.681	8.681
+D+S	18.793	18.793
+D+0.750S	16.265	16.265
+0.60D	5.209	5.209
S Only	10.112	10.112

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 24 SEP 2021, 7:17AM
File: 21067 Larson Jeep_hyh.ec6

Lic. # : KW-06002327
PCS STRUCTURAL SOLUTIONS

Wood Beam

DESCRIPTION: R-B3

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2018

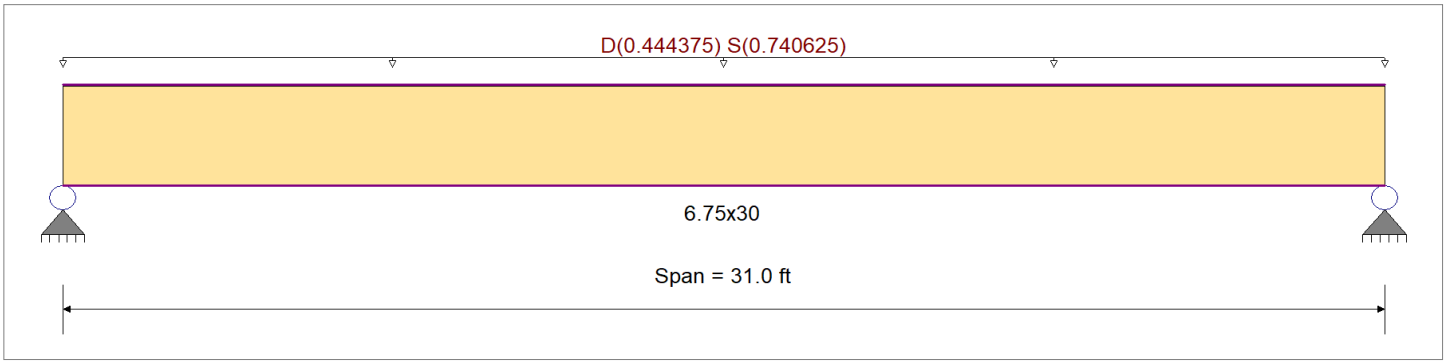
Wood Species : DF/DF
Wood Grade : 24F-V4

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 loads
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 29.625 ft, (Low Roof)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.742 : 1	Maximum Shear Stress Ratio	=	0.389 : 1
Section used for this span		6.75x30	Section used for this span		6.75x30
fb: Actual	=	1,749.57 psi	fv: Actual	=	118.44 psi
Fb: Allowable	=	2,356.35 psi	Fv: Allowable	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	15.500 ft	Location of maximum on span	=	28.511 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.566 in	Ratio =	656 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.940 in	Ratio =	395 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 31.0 ft	1	0.377	0.197	0.90	0.854	1.00	1.00	1.00	1.00	1.00	58.65	695.14	1844.10	6.35	47.06	238.50
+D+S					0.854	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 31.0 ft	1	0.742	0.389	1.15	0.854	1.00	1.00	1.00	1.00	1.00	147.62	1,749.57	2356.35	15.99	118.44	304.75
+D+0.750S					0.854	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 31.0 ft	1	0.631	0.330	1.15	0.854	1.00	1.00	1.00	1.00	1.00	125.38	1,485.97	2356.35	13.58	100.59	304.75
+0.60D					0.854	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 31.0 ft	1	0.127	0.067	1.60	0.854	1.00	1.00	1.00	1.00	1.00	35.19	417.09	3278.40	3.81	28.23	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.9395	15.613		0.0000	0.000

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 24 SEP 2021, 7:17AM

Wood Beam

File: 21067 Larson Jeep_hyh.ec6

Lic. # : KW-06002327

PCS STRUCTURAL SOLUTIONS

DESCRIPTION: R-B3

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	19.048	19.048
Overall MINimum	11.480	11.480
D Only	7.568	7.568
+D+S	19.048	19.048
+D+0.750S	16.178	16.178
+0.60D	4.541	4.541
S Only	11.480	11.480

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 19 SEP 2021, 7:53PM

Wood Beam

File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327

PCS STRUCTURAL SOLUTIONS

DESCRIPTION: R-B4

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2018

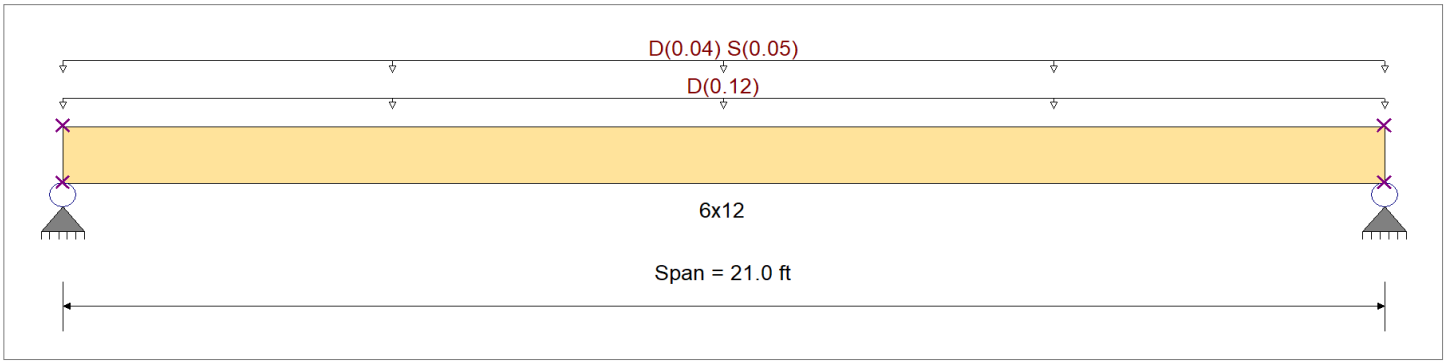
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

Beam Bracing : Completely Unbraced

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0150 ksf, Tributary Width = 8.0 ft, (Wall Above)
Uniform Load : D = 0.020, S = 0.0250 ksf, Tributary Width = 2.0 ft, (Roof)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.811 : 1	Maximum Shear Stress Ratio	=	0.260 : 1
Section used for this span		6x12	Section used for this span		6x12
fb: Actual	=	1,220.69 psi	fv: Actual	=	50.83 psi
Fb: Allowable	=	1,506.06 psi	Fv: Allowable	=	195.50 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	0.197 in	Ratio =	1277 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.883 in	Ratio =	285 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 21.0 ft	1	0.797	0.258	0.90	1.000	1.00	1.00	1.00	1.00	0.98	9.58	947.86	1189.36	1.66	39.47	153.00
+D+S					1.000	1.00	1.00	1.00	1.00	0.98			0.00	0.00	0.00	0.00
Length = 21.0 ft	1	0.811	0.260	1.15	1.000	1.00	1.00	1.00	1.00	0.97	12.33	1,220.69	1506.06	2.14	50.83	195.50
+D+0.750S					1.000	1.00	1.00	1.00	1.00	0.97			0.00	0.00	0.00	0.00
Length = 21.0 ft	1	0.765	0.245	1.15	1.000	1.00	1.00	1.00	1.00	0.97	11.64	1,152.48	1506.06	2.02	47.99	195.50
+0.60D					1.000	1.00	1.00	1.00	1.00	0.97			0.00	0.00	0.00	0.00
Length = 21.0 ft	1	0.278	0.087	1.60	1.000	1.00	1.00	1.00	1.00	0.95	5.75	568.72	2049.41	1.00	23.68	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.8828	10.577		0.0000	0.000

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 19 SEP 2021, 7:53PM

Wood Beam

File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327

PCS STRUCTURAL SOLUTIONS

DESCRIPTION: R-B4

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.349	2.349
Overall MINimum	0.525	0.525
D Only	1.824	1.824
+D+S	2.349	2.349
+D+0.750S	2.218	2.218
+0.60D	1.094	1.094
S Only	0.525	0.525

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 23 SEP 2021, 5:17PM

Steel Column

File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327

PCS STRUCTURAL SOLUTIONS

DESCRIPTION: C1

Code References

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

General Information

Steel Section Name :	**HSS6x6x1/4**	Overall Column Height	15 ft
Analysis Method :	Load Resistance Factor	Top & Bottom Fixity	Top & Bottom Pinned
Steel Stress Grade	, A500, Grade C, Fy = 50 ksi, Carbon	Brace condition for deflection (buckling) along columns :	
Fy : Steel Yield	50.0 ksi	X-X (width) axis :	
E : Elastic Bending Modulus	29,000.0 ksi	Unbraced Length for buckling ABOUT Y-Y Axis = 15 ft, K = 1.0	
		Y-Y (depth) axis :	
		Unbraced Length for buckling ABOUT X-X Axis = 15 ft, K = 1.0	

Applied Loads

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

Column self weight included : 285.30 lbs * Dead Load Factor
AXIAL LOADS . . .
R-B2: Axial Load at 15.0 ft, Xecc = 3.0 in, D = 8.681, S = 10.112 k
BENDING LOADS . . .
Lat. Uniform Load creating My-y, W = 0.0320 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2464** : 1

Load Combination	+1.20D+1.60S
Location of max.above base	15.0 ft
At maximum location values are . . .	
Pu	26.939 k
0.9 * Pn	152.985 k
Mu-x	0.0 k-ft
0.9 * Mn-x :	42.0 k-ft
Mu-y	-6.649 k-ft
0.9 * Mn-y :	42.0 k-ft

Maximum Load Reactions . .

Top along X-X	0.3791 k
Bottom along X-X	0.3132 k
Top along Y-Y	0.0 k
Bottom along Y-Y	0.0 k

Maximum Load Deflections . . .

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

Along X-X -0.1425 in at 8.758 ft above base
for load combination : +D+S

PASS Maximum Shear Stress Ratio = **0.01013** : 1

Load Combination	+1.20D+1.60S+0.50W
Location of max.above base	15.0 ft
At maximum location values are . . .	
Vu : Applied	0.5633 k
Vn * Phi : Allowable	55.581 k

Load Combination Results

	Maximum Axial + Bending Stress Ratios							Maximum Shear Ratios		
Load Combination	Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Stress Ratio	Status	Location
+1.40D	0.113	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.004	PASS	0.00 ft
+1.20D	0.097	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.003	PASS	0.00 ft
+1.20D+0.50S	0.144	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.005	PASS	0.00 ft
+1.20D+0.50W	0.097	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.005	PASS	15.00 ft
+1.20D+1.60S	0.246	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.008	PASS	0.00 ft
+1.20D+1.60S+0.50W	0.246	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.010	PASS	15.00 ft
+1.20D+W	0.097	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.007	PASS	15.00 ft
+1.20D+0.50S+W	0.144	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.009	PASS	15.00 ft
+1.20D+0.70S	0.162	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.005	PASS	0.00 ft
+0.90D+W	0.073	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.007	PASS	15.00 ft
+0.90D	0.073	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.002	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

	Axial Reaction	X-X Axis Reaction k		Y-Y Axis Reaction		Mx - End Moments k-ft		My - End Moments	
Load Combination	@ Base	@ Base	@ Top	@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
D Only	8.966	0.145	0.145						
+D+S	19.078	0.313	0.313						

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 23 SEP 2021, 5:17PM

Steel Column

File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327

PCS STRUCTURAL SOLUTIONS

DESCRIPTION: C1

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
+D+0.750S	16.550	0.271	0.271								
+D+0.60W	8.966	0.001	0.289								
+D+0.450W	8.966	0.037	0.253								
+D+0.750S+0.450W	16.550	0.163	0.379								
+0.60D+0.60W	5.380	-0.057	0.231								
+0.60D	5.380	0.087	0.087								
S Only	10.112	0.169	0.169								
W Only		-0.240	0.240								

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
Axial @ Base	Maximum	19.078	0.313	0.313								-4.698
"	Minimum		-0.240	0.240								
Reaction, X-X Axis Base	Maximum	19.078	0.313	0.313								-4.698
"	Minimum		-0.240	0.240								
Reaction, Y-Y Axis Base	Maximum	8.966	0.145	0.145								-2.170
"	Minimum	8.966	0.145	0.145								-2.170
Reaction, X-X Axis Top	Maximum	16.550	0.163	0.379								-4.066
"	Minimum	5.380	0.087	0.087								-1.302
Reaction, Y-Y Axis Top	Maximum	10.112	0.169	0.169								-2.528
"	Minimum		-0.240	0.240								
Moment, X-X Axis Base	Maximum	8.966		0.145								-2.170
"	Minimum	8.966		0.145								-2.170
Moment, Y-Y Axis Base	Maximum	8.966	0.145	0.145					-2.170			
"	Minimum	8.966	0.145	0.145					-2.170			
Moment, X-X Axis Top	Maximum	8.966	0.145	0.145								-2.170
"	Minimum	8.966	0.145	0.145								-2.170
Moment, Y-Y Axis Top	Maximum		-0.240	0.240								
"	Minimum	19.078	0.313	0.313								-4.698

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	-0.0658	in	8.758	ft	0.000	in	0.000	ft
+D+S	-0.1425	in	8.758	ft	0.000	in	0.000	ft
+D+0.750S	-0.1233	in	8.758	ft	0.000	in	0.000	ft
+D+0.60W	-0.0405	in	9.463	ft	0.000	in	0.000	ft
+D+0.450W	-0.0467	in	9.262	ft	0.000	in	0.000	ft
+D+0.750S+0.450W	-0.1040	in	8.960	ft	0.000	in	0.000	ft
+0.60D+0.60W	-0.0149	in	10.570	ft	0.000	in	0.000	ft
+0.60D	-0.0395	in	8.758	ft	0.000	in	0.000	ft
S Only	-0.0767	in	8.758	ft	0.000	in	0.000	ft
W Only	0.0444	in	7.550	ft	0.000	in	0.000	ft

Steel Section Properties : HSS6x6x1/4

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

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Steel Column

File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327

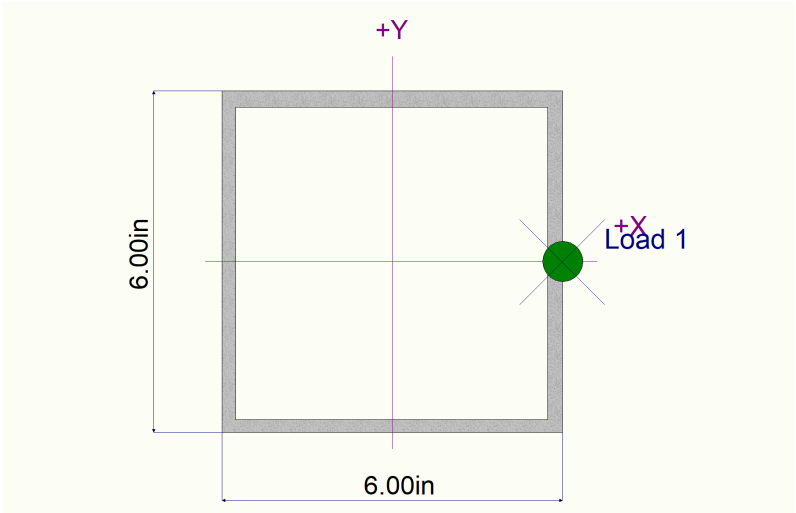
PCS STRUCTURAL SOLUTIONS

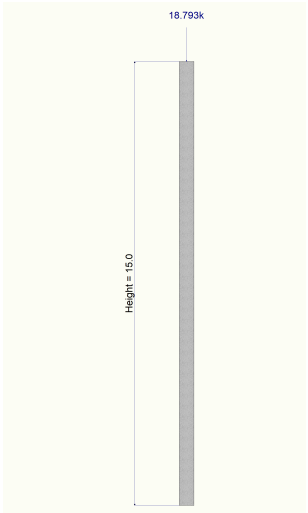
DESCRIPTION: C1

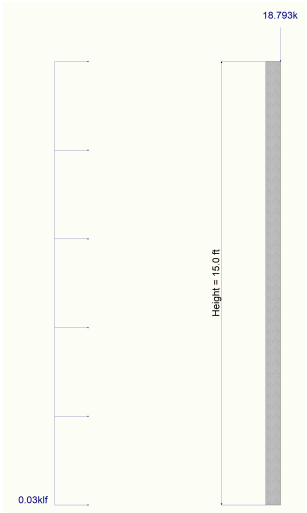
Steel Section Properties : HSS6x6x1/4

Depth	=	6.000	in	I xx	=	28.60	in^4	J	=	45.600 in^4
Design Thick	=	0.233	in	S xx	=	9.54	in^3			
Width	=	6.000	in	R xx	=	2.340	in			
Wall Thick	=	0.250	in	Zx	=	11.200	in^3			
Area	=	5.240	in^2	I yy	=	28.600	in^4	C	=	15.400 in^3
Weight	=	19.020	plf	S yy	=	9.540	in^3			
				R yy	=	2.340	in			
Ycg	=	0.000	in							

Sketches







PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

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File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327
PCS STRUCTURAL SOLUTIONS

Steel Column

DESCRIPTION: C2

Code References

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

General Information

Steel Section Name :	**HSS6x6x1/4**	Overall Column Height	15 ft
Analysis Method :	Load Resistance Factor	Top & Bottom Fixity	Top & Bottom Pinned
Steel Stress Grade	, A500, Grade C, Fy = 50 ksi, Carbon	Brace condition for deflection (buckling) along columns :	
Fy : Steel Yield	50.0 ksi	X-X (width) axis :	
E : Elastic Bending Modulus	29,000.0 ksi	Unbraced Length for buckling ABOUT Y-Y Axis = 15 ft, K = 1.0	
		Y-Y (depth) axis :	
		Unbraced Length for buckling ABOUT X-X Axis = 15 ft, K = 1.0	

Applied Loads

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

Column self weight included : 285.30 lbs * Dead Load Factor
AXIAL LOADS . . .
R-B1: Axial Load at 15.0 ft, Xecc = 6.0 in, D = 16.152, S = 18.813 k
R-B2: Axial Load at 15.0 ft, Xecc = -6.0 in, D = 8.681, S = 10.112 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.7417** : 1

Load Combination	+1.20D+1.60S
Location of max.above base	15.0 ft
At maximum location values are . . .	
Pu	76.422 k
0.9 * Pn	152.985 k
Mu-x	0.0 k-ft
0.9 * Mn-x :	42.0 k-ft
Mu-y	-11.443 k-ft
0.9 * Mn-y :	42.0 k-ft

Maximum Load Reactions . .

Top along X-X	0.5391 k
Bottom along X-X	0.5391 k
Top along Y-Y	0.0 k
Bottom along Y-Y	0.0 k

Maximum Load Deflections . . .

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

Along X-X -0.2453 in at 8.758 ft above base
for load combination : +D+S

PASS Maximum Shear Stress Ratio = **0.01373** : 1

Load Combination	+1.20D+1.60S
Location of max.above base	0.0 ft
At maximum location values are . . .	
Vu : Applied	0.7629 k
Vn * Phi : Allowable	55.581 k

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios		
	Stress Ratio	Status	Location					Stress Ratio	Status	Location
+1.40D	0.341	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.006	PASS	0.00 ft
+1.20D	0.205	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.005	PASS	0.00 ft
+1.20D+0.50S	0.432	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.008	PASS	0.00 ft
+1.20D+1.60S	0.742	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.014	PASS	0.00 ft
+0.90D	0.154	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.004	PASS	0.00 ft
+1.20D+0.20S	0.348	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.006	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments k-ft @ Base	@ Top	My - End Moments @ Base	@ Top
D Only	25.118	0.249	0.249						
+D+S	54.043	0.539	0.539						
+D+0.750S	46.812	0.467	0.467						
+0.60D	15.071	0.149	0.149						
S Only	28.925	0.290	0.290						

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

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Steel Column

File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327

PCS STRUCTURAL SOLUTIONS

DESCRIPTION: C2

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
Axial @ Base	Maximum	54.043	0.539	0.539								-8.086
"	Minimum	15.071	0.149	0.149								-2.241
Reaction, X-X Axis Base	Maximum	54.043	0.539	0.539								-8.086
"	Minimum	15.071	0.149	0.149								-2.241
Reaction, Y-Y Axis Base	Maximum	25.118	0.249	0.249								-3.735
"	Minimum	25.118	0.249	0.249								-3.735
Reaction, X-X Axis Top	Maximum	54.043	0.539	0.539								-8.086
"	Minimum	15.071	0.149	0.149								-2.241
Reaction, Y-Y Axis Top	Maximum	28.925	0.290	0.290								-4.350
"	Minimum	25.118	0.249	0.249								-3.735
Moment, X-X Axis Base	Maximum	25.118		0.249								-3.735
"	Minimum	25.118		0.249								-3.735
Moment, Y-Y Axis Base	Maximum	25.118	0.249	0.249					-3.735			
"	Minimum	25.118	0.249	0.249					-3.735			
Moment, X-X Axis Top	Maximum	25.118	0.249	0.249								-3.735
"	Minimum	25.118	0.249	0.249								-3.735
Moment, Y-Y Axis Top	Maximum	15.071	0.149	0.149								-2.241
"	Minimum	54.043	0.539	0.539								-8.086

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	-0.1133	in	8.758	ft	0.000	in	0.000	ft
+D+S	-0.2453	in	8.758	ft	0.000	in	0.000	ft
+D+0.750S	-0.2123	in	8.758	ft	0.000	in	0.000	ft
+0.60D	-0.0680	in	8.758	ft	0.000	in	0.000	ft
S Only	-0.1320	in	8.758	ft	0.000	in	0.000	ft

Steel Section Properties : HSS6x6x1/4

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

Ycg = 0.000 in

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

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Steel Column

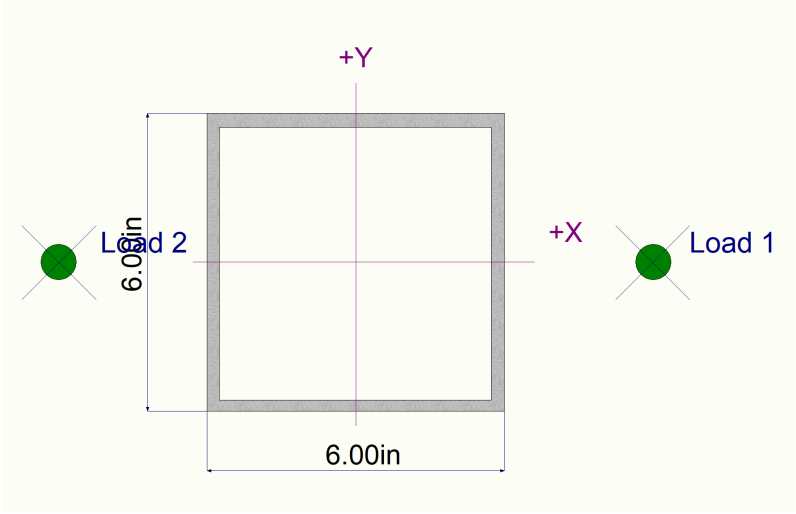
File: 21067 Larson Jeep.ec6

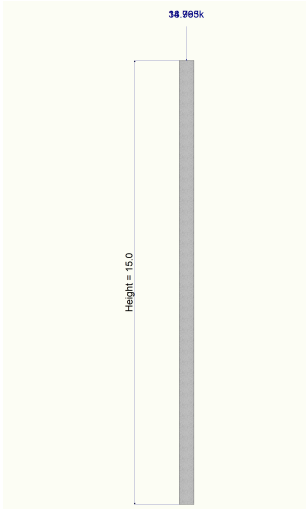
Lic. # : KW-06002327

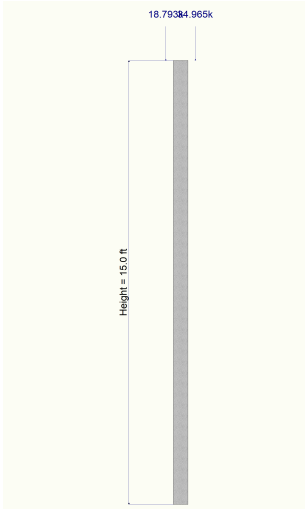
PCS STRUCTURAL SOLUTIONS

DESCRIPTION: C2

Sketches







PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 23 SEP 2021, 5:20PM
File: 21067 Larson Jeep.ec6

Steel Column

Lic. # : KW-06002327 — PCS STRUCTURAL SOLUTIONS

DESCRIPTION: C3

Code References

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

General Information

Steel Section Name :	**HSS6x6x1/4**	Overall Column Height	15 ft
Analysis Method :	Load Resistance Factor	Top & Bottom Fixity	Top & Bottom Pinned
Steel Stress Grade	, A500, Grade C, Fy = 50 ksi, Carbon	Brace condition for deflection (buckling) along columns :	
Fy : Steel Yield	50.0 ksi	X-X (width) axis :	
E : Elastic Bending Modulus	29,000.0 ksi	Unbraced Length for buckling ABOUT Y-Y Axis = 15 ft, K = 1.0	
		Y-Y (depth) axis :	
		Unbraced Length for buckling ABOUT X-X Axis = 15 ft, K = 1.0	

Applied Loads

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

Column self weight included : 285.30 lbs * Dead Load Factor
AXIAL LOADS . . .
R-B1: Axial Load at 15.0 ft, Xecc = 6.0 in, D = 16.152, S = 18.813 k
R-B1: Axial Load at 15.0 ft, Xecc = -6.0 in, D = 16.152, S = 18.813 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.6491** : 1

Load Combination	+1.20D+1.60S
Location of max.above base	0.0 ft
At maximum location values are . . .	
Pu	99.309 k
0.9 * Pn	152.985 k
Mu-x	0.0 k-ft
0.9 * Mn-x :	42.0 k-ft
Mu-y	0.0 k-ft
0.9 * Mn-y :	42.0 k-ft

PASS Maximum Shear Stress Ratio = **0.0** : 1

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

Maximum Load Reactions . .

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

Maximum Load Deflections . . .

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

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

Load Combination Results

	Maximum Axial + Bending Stress Ratios							Maximum Shear Ratios		
Load Combination	Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Stress Ratio	Status	Location
+1.40D	0.298	PASS	0.00 ft	1.00	1.00	76.92	76.92	0.000	PASS	0.00 ft
+1.20D	0.256	PASS	0.00 ft	1.00	1.00	76.92	76.92	0.000	PASS	0.00 ft
+1.20D+0.50S	0.379	PASS	0.00 ft	1.00	1.00	76.92	76.92	0.000	PASS	0.00 ft
+1.20D+1.60S	0.649	PASS	0.00 ft	1.00	1.00	76.92	76.92	0.000	PASS	0.00 ft
+0.90D	0.192	PASS	0.00 ft	1.00	1.00	76.92	76.92	0.000	PASS	0.00 ft
+1.20D+0.20S	0.305	PASS	0.00 ft	1.00	1.00	76.92	76.92	0.000	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

	Axial Reaction	X-X Axis Reaction k		Y-Y Axis Reaction		Mx - End Moments k-ft		My - End Moments	
Load Combination	@ Base	@ Base	@ Top	@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
D Only	32.589								
+D+S	70.215								
+D+0.750S	60.809								
+0.60D	19.554								
S Only	37.626								

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

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Steel Column

File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327

PCS STRUCTURAL SOLUTIONS

DESCRIPTION: C3

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments @ Base	Mx - End Moments @ Top	My - End Moments @ Base	My - End Moments @ Top
		k					k-ft			
Axial @ Base	Maximum	70.215								
"	Minimum	19.554								
Reaction, X-X Axis Base	Maximum	32.589								
"	Minimum	32.589								
Reaction, Y-Y Axis Base	Maximum	32.589								
"	Minimum	32.589								
Reaction, X-X Axis Top	Maximum	32.589								
"	Minimum	32.589								
Reaction, Y-Y Axis Top	Maximum	32.589								
"	Minimum	32.589								
Moment, X-X Axis Base	Maximum	32.589								
"	Minimum	32.589								
Moment, Y-Y Axis Base	Maximum	32.589								
"	Minimum	32.589								
Moment, X-X Axis Top	Maximum	32.589								
"	Minimum	32.589								
Moment, Y-Y Axis Top	Maximum	32.589								
"	Minimum	32.589								

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+S	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750S	0.0000	in	0.000	ft	0.000	in	0.000	ft
+0.60D	0.0000	in	0.000	ft	0.000	in	0.000	ft
S Only	0.0000	in	0.000	ft	0.000	in	0.000	ft

Steel Section Properties : HSS6x6x1/4

Depth	=	6.000	in	I xx	=	28.60	in^4	J	=	45.600 in^4
Design Thick	=	0.233	in	S xx	=	9.54	in^3			
Width	=	6.000	in	R xx	=	2.340	in			
Wall Thick	=	0.250	in	Zx	=	11.200	in^3			
Area	=	5.240	in^2	I yy	=	28.600	in^4	C	=	15.400 in^3
Weight	=	19.020	plf	S yy	=	9.540	in^3			
				R yy	=	2.340	in			
Ycg	=	0.000	in							

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 23 SEP 2021, 5:20PM

Steel Column

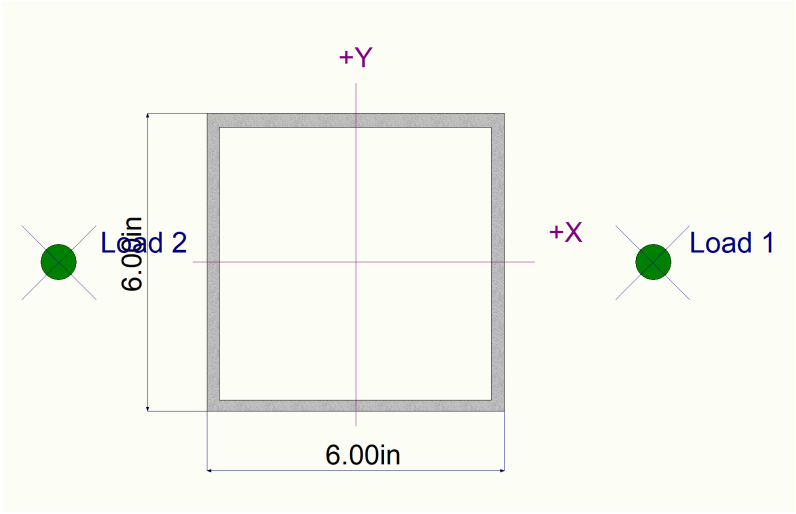
File: 21067 Larson Jeep.ec6

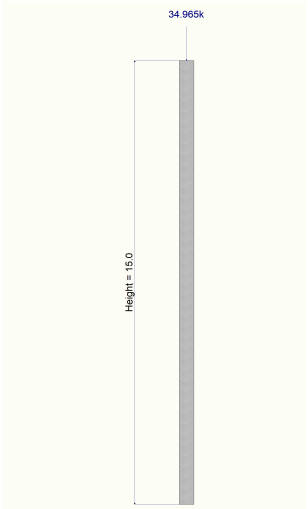
Lic. # : KW-06002327

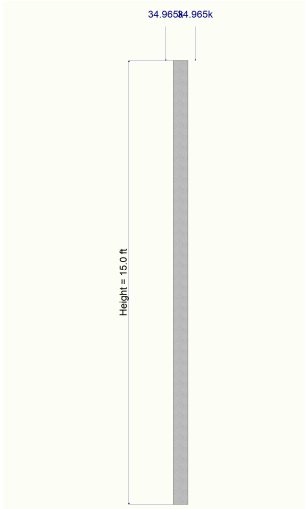
PCS STRUCTURAL SOLUTIONS

DESCRIPTION: C3

Sketches







PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 23 SEP 2021, 5:23PM
File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327
PCS STRUCTURAL SOLUTIONS

Steel Column

DESCRIPTION: C4

Code References

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

General Information

Steel Section Name : **HSS6x6x1/4**
Analysis Method : Load Resistance Factor
Steel Stress Grade , A500, Grade C, Fy = 50 ksi, Carbon
Fy : Steel Yield 50.0 ksi
E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height 15 ft
Top & Bottom Fixity Top & Bottom Pinned
Brace condition for deflection (buckling) along columns :
X-X (width) axis :
Unbraced Length for buckling ABOUT Y-Y Axis = 15 ft, K = 1.0
Y-Y (depth) axis :
Unbraced Length for buckling ABOUT X-X Axis = 15 ft, K = 1.0

Applied Loads

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

Column self weight included : 285.30 lbs * Dead Load Factor
AXIAL LOADS . . .
R-B1: Axial Load at 15.0 ft, Xecc = -3.0 in, D = 16.152, S = 18.813 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.5875** : 1
Load Combination +1.20D+1.60S
Location of max.above base 15.0 ft
At maximum location values are . . .
Pu 49.826 k
0.9 * Pn 152.985 k
Mu-x 0.0 k-ft
0.9 * Mn-x : 42.0 k-ft
Mu-y 12.371 k-ft
0.9 * Mn-y : 42.0 k-ft

PASS Maximum Shear Stress Ratio = **0.01484** : 1
Load Combination +1.20D+1.60S
Location of max.above base 0.0 ft
At maximum location values are . . .
Vu : Applied 0.8247 k
Vn * Phi : Allowable 55.581 k

Maximum Load Reactions . .
Top along X-X 0.5828 k
Bottom along X-X 0.5828 k
Top along Y-Y 0.0 k
Bottom along Y-Y 0.0 k

Maximum Load Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination :
Along X-X 0.2651 in at 8.758 ft above base
for load combination : +D+S

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
+1.40D	0.210	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.007	PASS	0.00 ft
+1.20D	0.180	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.006	PASS	0.00 ft
+1.20D+0.50S	0.267	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.009	PASS	0.00 ft
+1.20D+1.60S	0.588	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.015	PASS	0.00 ft
+0.90D	0.135	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.004	PASS	0.00 ft
+1.20D+0.20S	0.215	PASS	15.00 ft	1.00	1.66	76.92	76.92	0.007	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments k-ft @ Base	@ Top	My - End Moments @ Base	@ Top
D Only	16.437	-0.269	-0.269						
+D+S	35.250	-0.583	-0.583						
+D+0.750S	30.547	-0.504	-0.504						
+0.60D	9.862	-0.162	-0.162						
S Only	18.813	-0.314	-0.314						

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 23 SEP 2021, 5:23PM

Steel Column

File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327

PCS STRUCTURAL SOLUTIONS

DESCRIPTION: C4

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
Axial @ Base	Maximum	35.250	-0.583	-0.583								8.741
"	Minimum	9.862	-0.162	-0.162								2.423
Reaction, X-X Axis Base	Maximum	9.862	-0.162	-0.162								2.423
"	Minimum	35.250	-0.583	-0.583								8.741
Reaction, Y-Y Axis Base	Maximum	16.437	-0.269	-0.269								4.038
"	Minimum	16.437	-0.269	-0.269								4.038
Reaction, X-X Axis Top	Maximum	9.862	-0.162	-0.162								2.423
"	Minimum	35.250	-0.583	-0.583								8.741
Reaction, Y-Y Axis Top	Maximum	16.437	-0.269	-0.269								4.038
"	Minimum	18.813	-0.314	-0.314								4.703
Moment, X-X Axis Base	Maximum	16.437		-0.269								4.038
"	Minimum	16.437		-0.269								4.038
Moment, Y-Y Axis Base	Maximum	16.437	-0.269	-0.269					4.038			
"	Minimum	16.437	-0.269	-0.269					4.038			
Moment, X-X Axis Top	Maximum	16.437	-0.269	-0.269								4.038
"	Minimum	16.437	-0.269	-0.269								4.038
Moment, Y-Y Axis Top	Maximum	35.250	-0.583	-0.583								8.741
"	Minimum	9.862	-0.162	-0.162								2.423

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	0.1225	in	8.758	ft	0.000	in	0.000	ft
+D+S	0.2651	in	8.758	ft	0.000	in	0.000	ft
+D+0.750S	0.2295	in	8.758	ft	0.000	in	0.000	ft
+0.60D	0.0735	in	8.758	ft	0.000	in	0.000	ft
S Only	0.1427	in	8.758	ft	0.000	in	0.000	ft

Steel Section Properties : HSS6x6x1/4

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

Ycg = 0.000 in

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 23 SEP 2021, 5:23PM

Steel Column

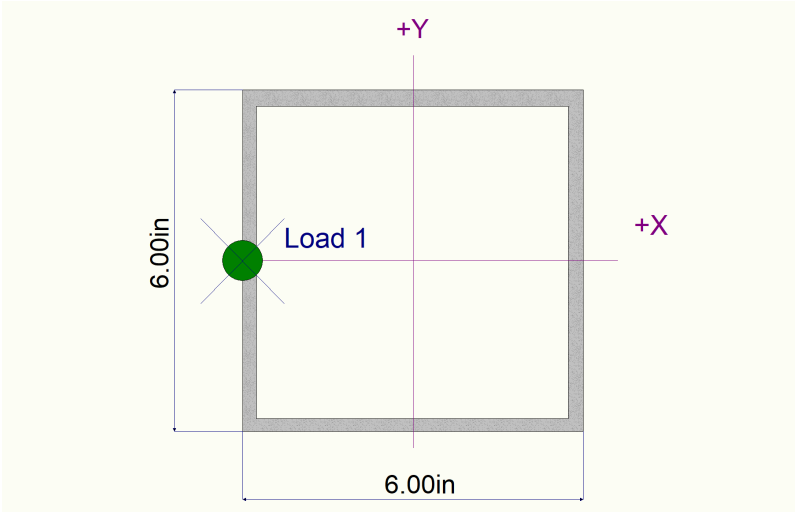
File: 21067 Larson Jeep.ec6

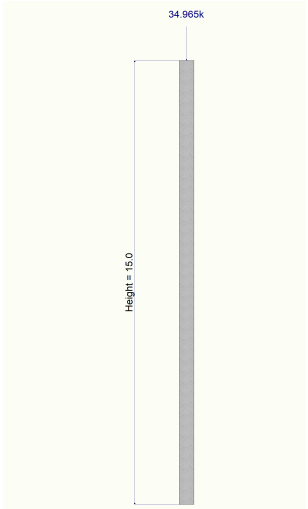
Lic. # : KW-06002327

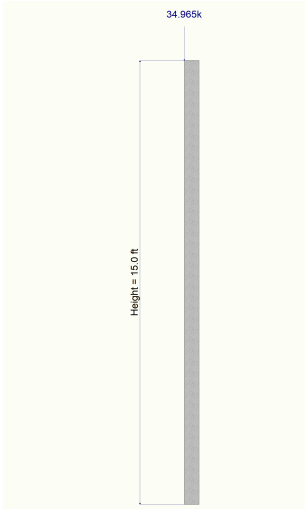
PCS STRUCTURAL SOLUTIONS

DESCRIPTION: C4

Sketches







PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 23 SEP 2021, 5:24PM
File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327
PCS STRUCTURAL SOLUTIONS

Wood Column

DESCRIPTION: C5 (B.U. Col.)

Code References

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

General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 12.5 ft
(Used for non-slender calculations)
Wood Species : Douglas Fir-Larch
Wood Grade : No.2

Fb +	900.0 psi	Fv	180.0 psi
Fb -	900.0 psi	Ft	575.0 psi
Fc - Prll	1,350.0 psi	Density	31.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Wood Section Name : **5-2x6**
Wood Grading/Manuf. : Graded Lumber
Wood Member Type : Sawn

Exact Width	**7.50**	in
Exact Depth	**5.50**	in
Area	41.250	in^2
Ix	103.984	in^4
Iy	193.359	in^4

Allow Stress Modification Factors

Cf or Cv for Bending	1.30
Cf or Cv for Compression	1.10
Cf or Cv for Tension	1.30
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 NDS 15.3.2
Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis : Fully braced against buckling ABOUT X-X Axis

Applied Loads

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

Column self weight included : 111.755 lbs * Dead Load Factor
AXIAL LOADS . . .
R-B3: Axial Load at 12.50 ft, Xecc = 1.0 in, Yecc = 1.0 in, D = 7.568, S = 11.480 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.7186** : 1
Load Combination : +D+S
Governing NDS Forumla : np + Mxx + Myy, NDS Eq. 3.9-
Location of max.above base : 12.416 ft
At maximum location values are . . .
Applied Axial : 19.160 k
Applied Mx : -1.577 k-ft
Applied My : -1.577 k-ft
Fc : Allowable : 1,707.75 psi

PASS Maximum Shear Stress Ratio = **0.02231** : 1
Load Combination : +D+S
Location of max.above base : 12.50 ft
Applied Design Shear : 4.618 psi
Allowable Shear : 207.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.1270 k	Bottom along Y-Y	0.1270 k
Top along X-X	0.1270 k	Bottom along X-X	0.1270 k

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y -0.1667 in at 7.299 ft above base
for load combination : +D+S
Along X-X -0.08964 in at 7.299 ft above base
for load combination : +D+S

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	1.000	0.3467	PASS	12.416 ft	0.01133	PASS	12.50 ft
+D+S	1.150	1.000	0.7186	PASS	12.416 ft	0.02231	PASS	12.50 ft
+D+0.750S	1.150	1.000	0.6009	PASS	12.416 ft	0.01895	PASS	12.50 ft
+0.60D	1.600	1.000	0.1127	PASS	12.416 ft	0.003822	PASS	12.50 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only	-0.050	0.050	-0.050	0.050	7.680				
+D+S	-0.127	0.127	-0.127	0.127	19.160				
+D+0.750S	-0.108	0.108	-0.108	0.108	16.290				

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

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Wood Column

File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327

PCS STRUCTURAL SOLUTIONS

DESCRIPTION: C5 (B.U. Col.)

Maximum Reactions

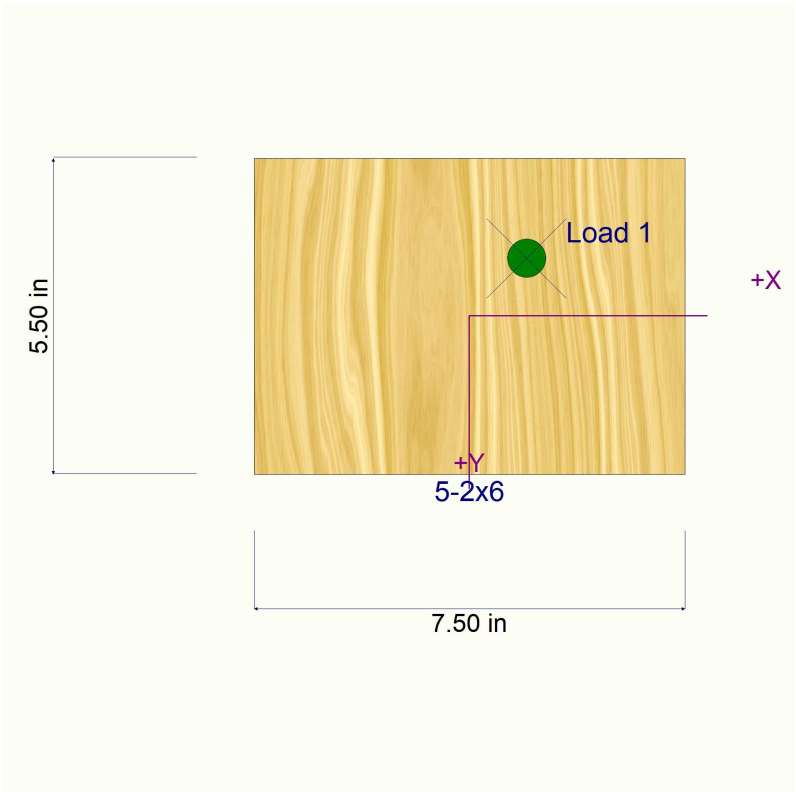
Note: Only non-zero reactions are listed.

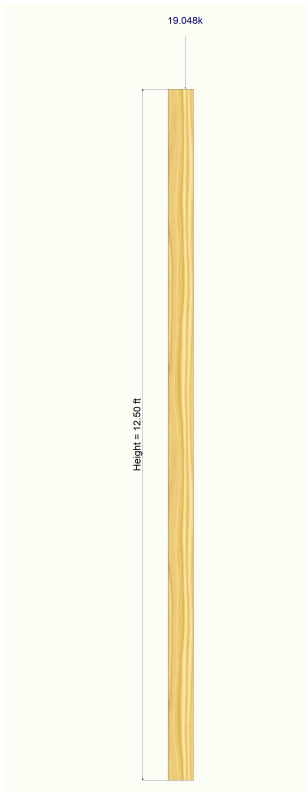
Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+0.60D	-0.030	0.030		-0.030	0.030	4.608					
S Only	-0.077	0.077		-0.077	0.077	11.480					

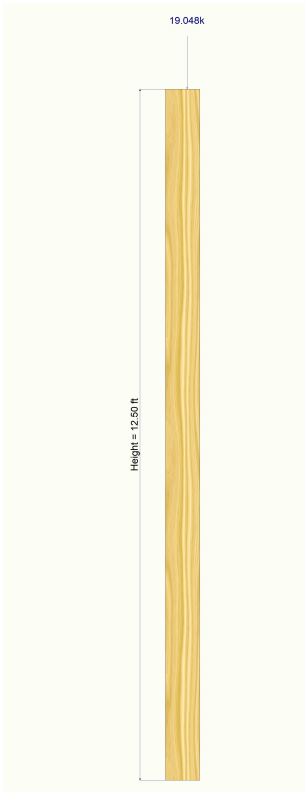
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	-0.0356	in	7.299	ft	-0.0662	in	7.299	ft
+D+S	-0.0896	in	7.299	ft	-0.1667	in	7.299	ft
+D+0.750S	-0.0761	in	7.299	ft	-0.1416	in	7.299	ft
+0.60D	-0.0214	in	7.299	ft	-0.0397	in	7.299	ft
S Only	-0.0540	in	7.299	ft	-0.1005	in	7.299	ft

Sketches







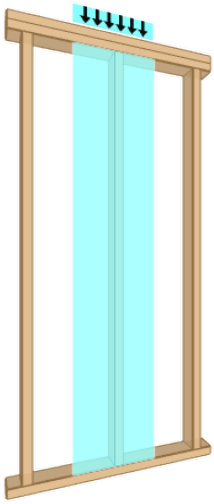
PRCA20220091 R REPORT

PASSED

Showroom, Typ. Wall Studs

1 piece(s) 2 x 8 DF No.2 @ 24" OC

Wall Height: 19' Member Height: 18' 7 1/2" O. C. Spacing: 24.00"



Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	31	50	Passed (62%)	--	--
Compression (lbs)	2483	5053	Passed (49%)	1.15	1.0 D + 1.0 S
Plate Bearing (lbs)	2483	8496	Passed (29%)	--	1.0 D + 1.0 S
Lateral Reaction (lbs)	179	--	--	1.60	1.0 D + 0.6 W
Lateral Shear (lbs)	167	2088	Passed (8%)	1.60	1.0 D + 0.6 W
Lateral Moment (ft-lbs)	833 @ mid-span	2145	Passed (39%)	1.60	1.0 D + 0.6 W
Total Deflection (in)	0.56 @ mid-span	1.24	Passed (L/402)	--	1.0 D + 0.6 W
Bending/Compression	0.88	1	Passed (88%)	1.60	1.0 D + 0.45 W + 0.75 L + 0.75 S

- Lateral deflection criteria: Wind (L/180)
- Input axial load eccentricity for this design is 16.67% of applicable member side dimension.
- Applicable calculations are based on NDS.
- A bearing area factor of 1.25 has been applied to base plate bearing capacity.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.

Supports	Type	Material
Top	Dbl 2X	Douglas Fir-Larch
Base	2X	Douglas Fir-Larch

System : Wall
Member Type : Stud
Building Code : IBC 2018
Design Methodology : ASD

Max Unbraced Length	Comments
1'	Wall Sheathing Nailing

Lateral Connections

Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	8d x 2.5" Box (Toe)	2	N/A
Base	Nails	8d x 2.5" Box (Toe)	2	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Loads	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Point (PLF)	24.00"	444.0	462.5	Roof
2 - Point (PLF)	24.00"	335.0	-	Ext. Wall

Lateral Load	Location	Spacing	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	24.00"	16.0	

- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

Member Notes

Typ. Wall Stud

Weyerhaeuser Notes

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Huiyao "Yoyo" Huang PCS Structural Solutions (253) 383-2797 hhuang@pcs-structural.com	

Weyerhaeuser

Exterior Wall Studs - Supporting ACM Wall System

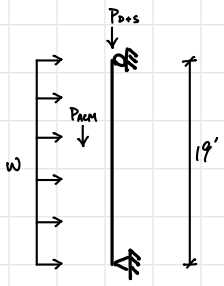
Wind Pressure :

	Eff. Area	Pressure
Wall (24" o.c.)	120 sf	16 psf

Roof : $D = 20\,psf + 4\,psf = 24\,psf$ (↑ Solar Readiness), $S = 25\,psf$

Wall : $D = 15\,psf$

ACM wall System : $+5\,psf$



$P_D = (24\,psf \times \frac{37'}{2} + 15\,psf \times 22.33') \times \frac{24"}{12} = 1558\,\#$

$P_S = 25\,psf \times \frac{37'}{2} \times \frac{24"}{12} = 925\,\#$

$P_{ACM} = 5\,psf \times 22.33' \times \frac{24"}{12} = 225\,\#$

$e = 18"/2 = 9"$ from face of studs

$w = 16\,psf \times \frac{24"}{12} = 32\,plf$

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 20 SEP 2021, 2:26PM

Wood Column

File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327

PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Exterior Studs Supporting ACM Wall System

Code References

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

General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 19 ft
(Used for non-slender calculations)

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

Fb +	900.0 psi	Fv	180.0 psi
Fb -	900.0 psi	Ft	575.0 psi
Fc - Prll	1,350.0 psi	Density	31.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Wood Section Name : **2x8**
Wood Grading/Manuf. : Graded Lumber
Wood Member Type : Sawn

Exact Width	**1.50**	in
Exact Depth	**7.250**	in
Area	10.875	in^2
Ix	47.635	in^4
Iy	2.039	in^4

Allow Stress Modification Factors

Cf or Cv for Bending	1.20
Cf or Cv for Compression	1.050
Cf or Cv for Tension	1.20
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	Yes

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 1 ft, K = 1.0

Applied Loads

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

Column self weight included : 44.783 lbs * Dead Load Factor
AXIAL LOADS . . .
ACM panel: Axial Load at 9.50 ft, Yecc = 12.625 in, D = 0.2250 k
Axial Load at 19.0 ft, D = 1.558, S = 0.9250 k
BENDING LOADS . . .
Wind at Walls: Lat. Uniform Load creating Mx-x, W = 0.0320 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.4568** : 1
Load Combination +D+0.60W
Governing NDS Forumla 1Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base 9.564 ft
At maximum location values are . . .
Applied Axial 1.603 k
Applied Mx 0.9839 k-ft
Applied My 0.0 k-ft
Fc : Allowable 2,262.04 psi

PASS Maximum Shear Stress Ratio = **0.09332** : 1
Load Combination +D+0.60W
Location of max.above base 19.0 ft
Applied Design Shear 26.877 psi
Allowable Shear 288.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.3040 k	Bottom along Y-Y	0.3040 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y 1.244 in at 9.564 ft above base
for load combination : W Only
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.999	0.1319	PASS	0.0 ft	0.01061	PASS	19.0 ft
+D+S	1.150	0.998	0.1556	PASS	0.0 ft	0.008302	PASS	19.0 ft
+D+0.750S	1.150	0.998	0.1425	PASS	0.0 ft	0.008302	PASS	19.0 ft
+D+0.60W	1.600	0.997	0.4568	PASS	9.564 ft	0.09332	PASS	19.0 ft
+D+0.450W	1.600	0.997	0.3572	PASS	9.564 ft	0.07148	PASS	19.0 ft
+D+0.750S+0.450W	1.600	0.997	0.3618	PASS	9.564 ft	0.07148	PASS	19.0 ft
+0.60D+0.60W	1.600	0.997	0.4323	PASS	9.564 ft	0.09094	PASS	19.0 ft
+0.60D	1.600	0.997	0.04458	PASS	0.0 ft	0.003580	PASS	19.0 ft

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 20 SEP 2021, 2:26PM

Wood Column

File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327

PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Exterior Studs Supporting ACM Wall System

Maximum Reactions

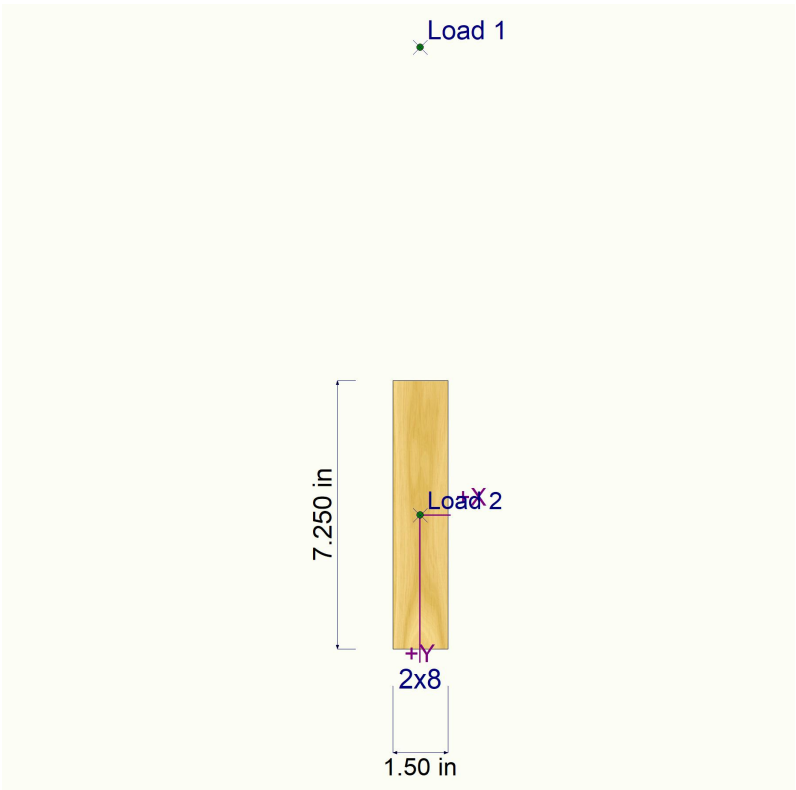
Note: Only non-zero reactions are listed.

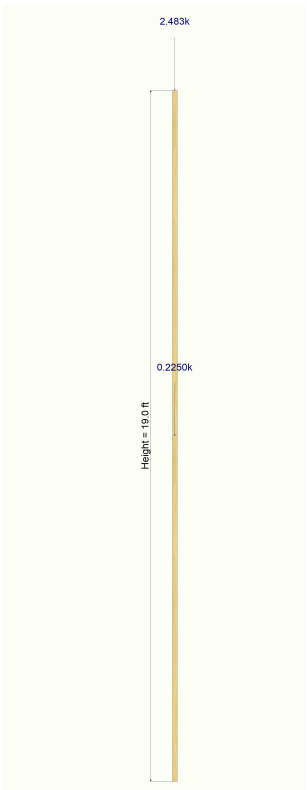
Load Combination	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	k	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Axial Reaction @ Base	My - End Moments @ Base	My - End Moments @ Top	k-ft	Mx - End Moments @ Base	Mx - End Moments @ Top
D Only				-0.012	0.012	1.828					
+D+S				-0.012	0.012	2.753					
+D+0.750S				-0.012	0.012	2.522					
+D+0.60W				0.170	0.195	1.828					
+D+0.450W				0.124	0.149	1.828					
+D+0.750S+0.450W				0.124	0.149	2.522					
+0.60D+0.60W				0.175	0.190	1.097					
+0.60D				-0.007	0.007	1.097					
S Only						0.925					
W Only				0.304	0.304						

Maximum Deflections for Load Combinations

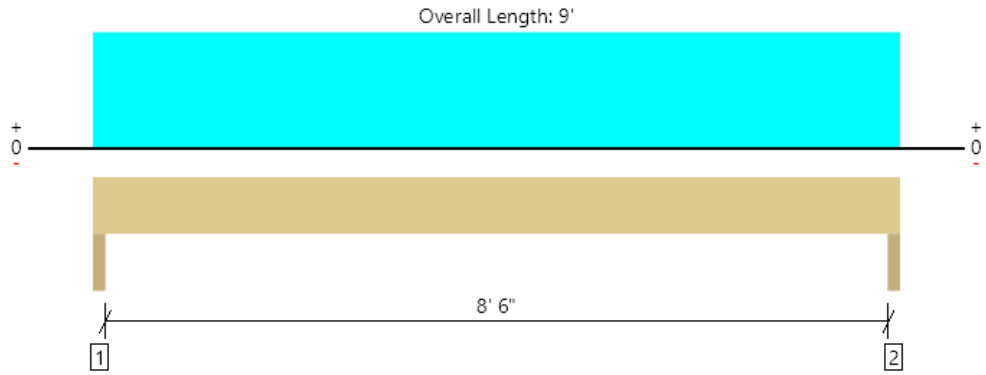
Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	0.0000	in	0.000	ft	-0.0158	in	5.611	ft
+D+S	0.0000	in	0.000	ft	-0.0158	in	5.611	ft
+D+0.750S	0.0000	in	0.000	ft	-0.0158	in	5.611	ft
+D+0.60W	0.0000	in	0.000	ft	0.7480	in	9.946	ft
+D+0.450W	0.0000	in	0.000	ft	0.5618	in	10.074	ft
+D+0.750S+0.450W	0.0000	in	0.000	ft	0.5618	in	10.074	ft
+0.60D+0.60W	0.0000	in	0.000	ft	0.7471	in	9.819	ft
+0.60D	0.0000	in	0.000	ft	-0.0095	in	5.611	ft
S Only	0.0000	in	0.000	ft	0.0000	in	0.000	ft
W Only	0.0000	in	0.000	ft	1.2444	in	9.564	ft

Sketches





Showroom, Typ. HDR
1 piece(s) 6 x 12 DF No.1



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4502 @ 1 1/2"	10313 (3.00")	Passed (44%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3293 @ 1' 2 1/2"	8244	Passed (40%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	9574 @ 4' 6"	15684	Passed (61%)	1.15	1.0 D + 1.0 S (All Spans)
Vert Live Load Defl. (in)	0.057 @ 4' 6"	0.292	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Vert Total Load Defl. (in)	0.118 @ 4' 6"	0.438	Passed (L/888)	--	1.0 D + 1.0 S (All Spans)
Lat Member Reaction (lbs)	252 @ 8' 10 1/2"	N/A	Passed (N/A)	1.60	1.0 D + 0.6 W
Lat Shear (lbs)	218 @ 8 1/2"	11469	Passed (2%)	1.60	1.0 D + 0.6 W
Lat Moment (Ft-lbs)	551 @ mid-span	7723	Passed (7%)	1.60	1.0 D + 0.6 W
Lat Deflection (in)	0.021 @ mid-span	0.438	Passed (L/999+)	--	1.0 D + 0.6 W
Bi-Axial Bending	0.45	1.00	Passed (45%)	1.60	1.0 D + 0.45 W + 0.75 L + 0.75 S

System : Wall
Member Type : Header
Building Use : Commercial
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Lateral deflection criteria: Wind (L/240)
- Lumber grading provisions must be extended over the length of the member per NDS 4.2.5.5.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - DF	3.00"	3.00"	1.50"	2350	2152	4502	None
2 - Trimmer - DF	3.00"	3.00"	1.50"	2350	2152	4502	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' o/c	
Bottom Edge (Lu)	9' o/c	

•Maximum allowable bracing intervals based on applied load.

Lateral Connections						
Supports	Plate Size	Plate Material	Connector	Type/Model	Quantity	Nailing
Left	2X	Douglas Fir-Larch	Nails	8d x 2.5" Box (Toe)	3	
Right	2X	Douglas Fir-Larch	Nails	8d x 2.5" Box (Toe)	3	

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 9'	N/A	16.0	--	
1 - Uniform (PSF)	0 to 9'	19' 1 1/2"	20.0	25.0	Roof
2 - Uniform (PSF)	0 to 9'	8' 3"	15.0	-	Ext. Wall

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	6'	16.0	

• IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

ForteWEB Software Operator	Job Notes
Huiyao "Yoyo" Huang PCS Structural Solutions (253) 383-2797 hhuang@pcs-structural.com	

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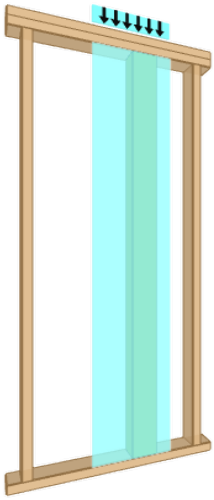
PRCA20220091 R REPORT

PASSED

Showroom, Jamb Studs for Typ. HDR

1 piece(s) 2 x 8 DF No.2

Wall Height: 15' | Member Height: 14' 7 1/2" | Tributary Width: 5' 6"



Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	24	50	Passed (48%)	--	--
Compression (lbs)	275	7257	Passed (4%)	0.90	1.0 D
Plate Bearing (lbs)	275	6797	Passed (4%)	--	1.0 D
Lateral Reaction (lbs)	386	--	--	1.60	1.0 D + 0.6 W
Lateral Shear (lbs)	354	2088	Passed (17%)	1.60	1.0 D + 0.6 W
Lateral Moment (ft-lbs)	1412 @ mid-span	1870	Passed (76%)	1.60	1.0 D + 0.6 W
Total Deflection (in)	0.51 @ mid-span	0.73	Passed (L/346)	--	1.0 D + 0.6 W
Bending/Compression	0.80	1	Passed (80%)	1.60	1.0 D + 0.6 W

- Lateral deflection criteria: Wind (L/240)
- Input axial load eccentricity for this design is 16.67% of applicable member side dimension.
- Applicable calculations are based on NDS.

Supports	Type	Material
Top	Dbl 2X	Douglas Fir-Larch
Base	2X	Douglas Fir-Larch

System : Wall
Member Type : Column
Building Code : IBC 2018
Design Methodology : ASD

Max Unbraced Length	Comments
1'	Wall Sheathing Nailing

Lateral Connections

Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	8d x 2.5" Box (Toe)	5	N/A
Base	Nails	8d x 2.5" Box (Toe)	5	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Load	Tributary Width	Dead (0.90)	Comments
1 - Point (PLF)	5' 6.00"	50.0	15psf*(3'-4" parapet)

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	5' 6"	16.0	

- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Huiyao "Yoyo" Huang PCS Structural Solutions (253) 383-2797 hhuang@pcs-structural.com	

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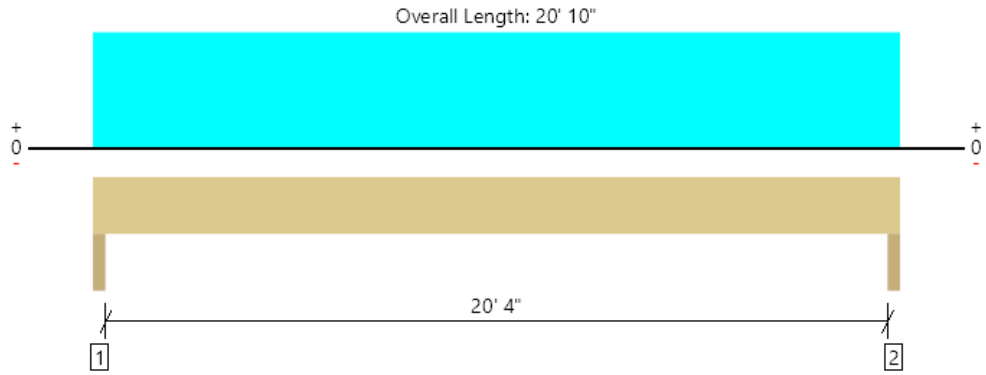
Showroom, HDR-1

1 piece(s) 6 x 14 DF No.1



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2423 @ 1 1/2"	10313 (3.00")	Passed (23%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1651 @ 1' 4 1/2"	7574	Passed (22%)	0.90	1.0 D (All Spans)
Moment (Ft-lbs)	9668 @ 10' 5"	16695	Passed (58%)	0.90	1.0 D (All Spans)
Vert Live Load Defl. (in)	0.112 @ 10' 5"	0.686	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Vert Total Load Defl. (in)	0.521 @ 10' 5"	1.029	Passed (L/474)	--	1.0 D + 1.0 S (All Spans)
Lat Member Reaction (lbs)	1103 @ 20' 8 1/2"	N/A	Passed (N/A)	1.60	1.0 D + 0.6 W
Lat Shear (lbs)	1041 @ 8 1/2"	13464	Passed (8%)	1.60	1.0 D + 0.6 W
Lat Moment (Ft-lbs)	5677 @ mid-span	8948	Passed (63%)	1.60	1.0 D + 0.6 W
Lat Deflection (in)	1.012 @ mid-span	1.029	Passed (L/244)	--	1.0 D + 0.6 W
Bi-Axial Bending	1.01	1.00	Passed (101%)	1.60	1.0 D + 0.6 W

System : Wall
Member Type : Header
Building Use : Commercial
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Lateral deflection criteria: Wind (L/240)
- Lumber grading provisions must be extended over the length of the member per NDS 4.2.5.5.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - DF	3.00"	3.00"	1.50"	1902	521	2423	None
2 - Trimmer - DF	3.00"	3.00"	1.50"	1902	521	2423	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	20' 10" o/c	
Bottom Edge (Lu)	20' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Lateral Connections: Simpson Strong-Tie						
Supports	Plate Size	Plate Material	Connector	Type/Model	Quantity	Nailing
Left	2X	Douglas Fir-Larch	Angle Connectors	A21	8	(4) - 10d x 1 1/2"
Right	2X	Douglas Fir-Larch	Angle Connectors	A21	8	(4) - 10d x 1 1/2"

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 20' 10"	N/A	18.8	--	
1 - Uniform (PSF)	0 to 20' 10"	2'	20.0	25.0	Roof
2 - Uniform (PSF)	0 to 20' 10"	8' 3"	15.0	-	Ext. Wall

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	11' 2"	16.0	

• IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

ForteWEB Software Operator	Job Notes
Huiyao "Yoyo" Huang PCS Structural Solutions (253) 383-2797 hhuang@pcs-structural.com	

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PRCA20220091 R REPORT

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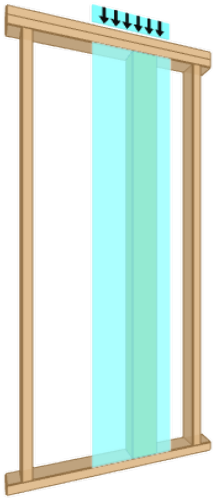
Showroom, Jamb Studs for HDR-1

3 piece(s) 2 x 8 DF No.2

Wall Height: 19' Member Height: 18' 7 1/2" Tributary Width: 11' 5"



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Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	31	50	Passed (62%)	--	--
Compression (lbs)	571	14748	Passed (4%)	0.90	1.0 D
Plate Bearing (lbs)	571	20391	Passed (3%)	--	1.0 D
Lateral Reaction (lbs)	1021	--	--	1.60	1.0 D + 0.6 W
Lateral Shear (lbs)	954	6264	Passed (15%)	1.60	1.0 D + 0.6 W
Lateral Moment (ft-lbs)	4752 @ mid-span	5670	Passed (84%)	1.60	1.0 D + 0.6 W
Total Deflection (in)	0.92 @ mid-span	0.93	Passed (L/243)	--	1.0 D + 0.6 W
Bending/Compression	0.88	1	Passed (88%)	1.60	1.0 D + 0.6 W

- Lateral deflection criteria: Wind (L/240)
- Input axial load eccentricity for this design is 16.67% of applicable member side dimension.
- Applicable calculations are based on NDS.
- The column stability factor (Kf = 0.6) applied to this design assumes nailed built-up columns per NDS section 15.3.3. For Weyerhaeuser ELP products refer to the U.S. Wall Guide for multiple-member connection requirements.

Supports	Type	Material
Top	Dbl 2X	Douglas Fir-Larch
Base	2X	Douglas Fir-Larch

System : Wall
Member Type : Column
Building Code : IBC 2018
Design Methodology : ASD

Max Unbraced Length	Comments
1'	Wall Sheathing Nailing

Lateral Connections: Simpson Strong-Tie				
Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Angle Connectors	A21	7	(4) - 10d x 1 1/2"
Base	Angle Connectors	A21	7	(4) - 10d x 1 1/2"

Vertical Load	Tributary Width	Dead (0.90)	Comments
1 - Point (PLF)	11' 5.00"	50.0	15psf*(3'-4" parapet)

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	11' 5"	16.0	

• IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

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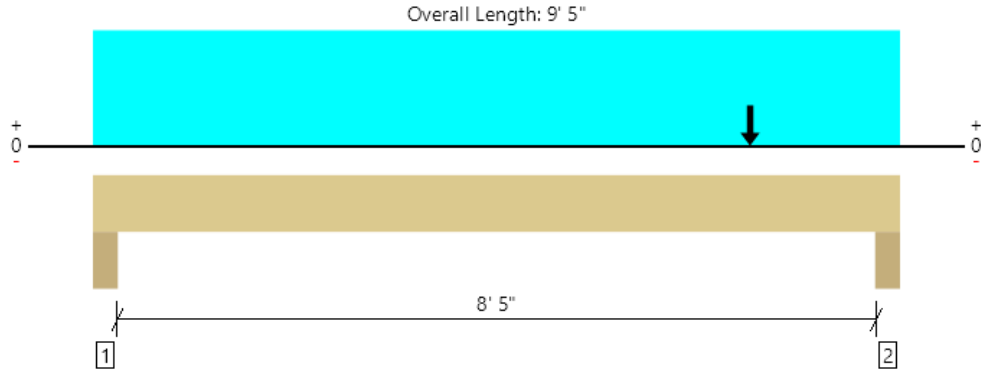
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Huiyao "Yoyo" Huang PCS Structural Solutions (253) 383-2797 hhuang@pcs-structural.com	

Weyerhaeuser

Showroom, HDR-2

1 piece(s) 6 x 20 DF No.1



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	18674 @ 9' 1/2"	20625 (6.00")	Passed (91%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	13425 @ 7' 3 1/2"	13978	Passed (96%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	25455 @ 7' 8"	42728	Passed (60%)	1.15	1.0 D + 1.0 S (All Spans)
Vert Live Load Defl. (in)	0.024 @ 5' 3 1/16"	0.289	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Vert Total Load Defl. (in)	0.047 @ 5' 2 11/16"	0.433	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Lat Member Reaction (lbs)	340 @ 9' 1/2"	N/A	Passed (N/A)	1.60	1.0 D + 0.6 W
Lat Shear (lbs)	294 @ 11 1/2"	19448	Passed (2%)	1.60	1.0 D + 0.6 W
Lat Moment (Ft-lbs)	736 @ mid-span	12408	Passed (6%)	1.60	1.0 D + 0.6 W
Lat Deflection (in)	0.016 @ mid-span	0.578	Passed (L/999+)	--	1.0 D + 0.6 W
Bi-Axial Bending	0.43	1.00	Passed (43%)	1.60	1.0 D + 0.45 W + 0.75 L + 0.75 S

System : Wall
Member Type : Header
Building Use : Commercial
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Lateral deflection criteria: Wind (L/180)
- Lumber grading provisions must be extended over the length of the member per NDS 4.2.5.5.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - DF	6.00"	6.00"	1.50"	2164	1939	4103	None
2 - Trimmer - DF	6.00"	6.00"	5.43"	8898	9776	18674	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 5" o/c	
Bottom Edge (Lu)	9' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Lateral Connections						
Supports	Plate Size	Plate Material	Connector	Type/Model	Quantity	Nailing
Left	2X	Douglas Fir-Larch	Nails	8d x 2.5" Box (Toe)	4	
Right	2X	Douglas Fir-Larch	Nails	8d x 2.5" Box (Toe)	4	

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 9' 5"	N/A	27.2	--	
1 - Uniform (PSF)	0 to 9' 5"	1'	20.0	25.0	Roof
2 - Uniform (PSF)	0 to 9' 5"	5' 4"	15.0	-	Ext. Wall
3 - Point (lb)	7' 8"	N/A	9864	11480	R-B3

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	8' 2"	16.0	

• IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

ForteWEB Software Operator	Job Notes
Huiyao "Yoyo" Huang PCS Structural Solutions (253) 383-2797 hhuang@pcs-structural.com	

Weyerhaeuser

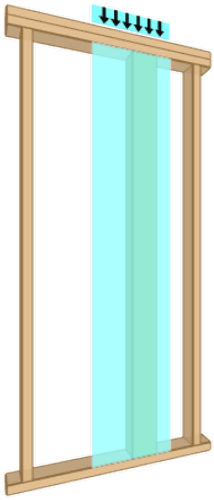
PRCA20220091 R REPORT

PASSED

Showroom, Jamb Studs for HDR-2

2 piece(s) 2 x 8 DF No.2

Wall Height: 15' Member Height: 14' 7 1/2" Tributary Width: 5' 9"



Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	24	50	Passed (48%)	--	--
Compression (lbs)	288	14513	Passed (2%)	0.90	1.0 D
Plate Bearing (lbs)	288	13594	Passed (2%)	--	1.0 D
Lateral Reaction (lbs)	404	--	--	1.60	1.0 D + 0.6 W
Lateral Shear (lbs)	370	4176	Passed (9%)	1.60	1.0 D + 0.6 W
Lateral Moment (ft-lbs)	1476 @ mid-span	3775	Passed (39%)	1.60	1.0 D + 0.6 W
Total Deflection (in)	0.27 @ mid-span	0.73	Passed (L/661)	--	1.0 D + 0.6 W
Bending/Compression	0.41	1	Passed (41%)	1.60	1.0 D + 0.6 W

- Lateral deflection criteria: Wind (L/240)
- Input axial load eccentricity for this design is 16.67% of applicable member side dimension.
- Applicable calculations are based on NDS.
- The column stability factor (Kf = 0.6) applied to this design assumes nailed built-up columns per NDS section 15.3.3. For Weyerhaeuser ELP products refer to the U.S. Wall Guide for multiple-member connection requirements.

Supports	Type	Material
Top	Dbl 2X	Douglas Fir-Larch
Base	2X	Douglas Fir-Larch

System : Wall
Member Type : Column
Building Code : IBC 2018
Design Methodology : ASD

Max Unbraced Length	Comments
1'	Wall Sheathing Nailing

Lateral Connections

Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	8d x 2.5" Box (Toe)	5	N/A
Base	Nails	8d x 2.5" Box (Toe)	5	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Load	Tributary Width	Dead (0.90)	Comments
1 - Point (PLF)	5' 9.00"	50.0	15psf*(3'-4" parapet)

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	5' 9"	16.0	

- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

Weyerhaeuser Notes

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Huiyao "Yoyo" Huang PCS Structural Solutions (253) 383-2797 hhuang@pcs-structural.com	

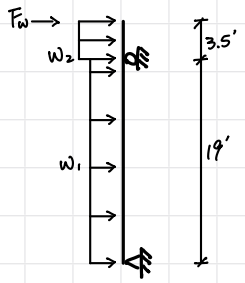
Weyerhaeuser

Exterior Wall Studs - Parapet (Detail 1/S5.4)

Wind Pressure :

	Eff. Area	Pressure
Wall (24" o.c.)	120 sf	16 psf
parapet (8' o.c.)	32 sf	16psf + 38.9psf = 55 psf

- (3) 2x8 Full Height Studs



$W_1 = 16\,psf \times 24"/12 = 32\,plf$

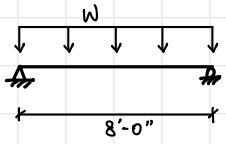
$W_2 = 55\,psf \times 24"/12 = 110\,plf$

$F_w = 55\,psf \times 8' \times 4'/2 = 880\,\#$

$DCR_{max} = 0.318 < 1.0$ ✓

$\Delta_{max} = L/376 < L/360$ ✓ (see Enercalc)

- Double Top Plate at Top of Parapet



$W = (16\,psf + 42.9\,psf) \times 4'/2 = 118\,plf$

$DCR_{max} = 0.134 < 1.0$ ✓ (see Enercalc)

Force at Support = 472 # ⇝ Provide (2) A35

Allowable Load = 2 x 650 # = 1300 # > 472 # ✓

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 19 SEP 2021, 9:10PM
File: 21067 Larson Jeep.ec6

Wood Beam

Lic. # : KW-06002327 — PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Parapet Multi-Stud Columns

CODE REFERENCES

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

Material Properties

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

Wood Species : Hem-Fir
Wood Grade : No.1

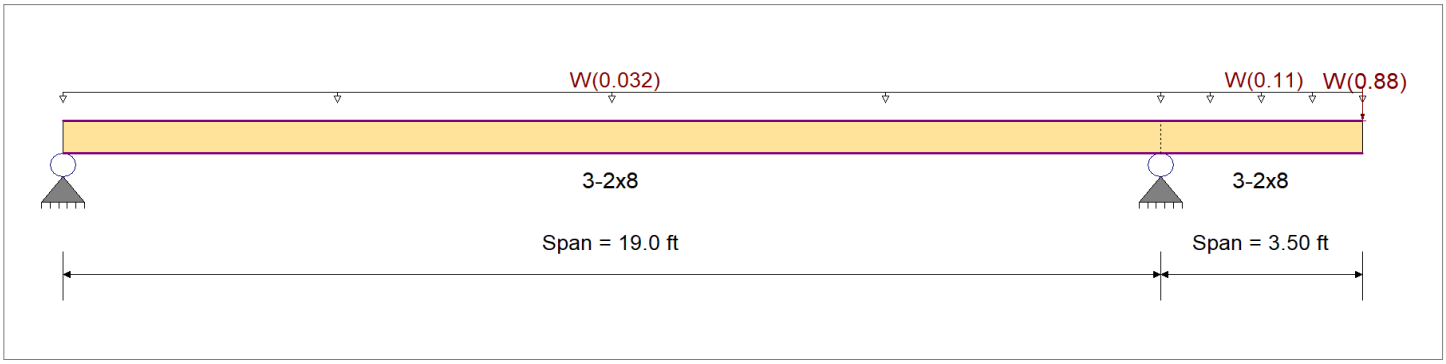
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	975 psi
Fb -	975 psi
Fc - Prll	1350 psi
Fc - Perp	405 psi
Fv	150 psi
Ft	625 psi

E : Modulus of Elasticity

Ebend- xx	1500 ksi
Eminbend - xx	550 ksi
Density	26.84 pcf

Repetitive Member Stress Increase



Applied Loads

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

Load for Span Number 1
Uniform Load : W = 0.0320 , Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : W = 0.110 , Tributary Width = 1.0 ft
Point Load : W = 0.880 k @ 3.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.318 : 1	Maximum Shear Stress Ratio	=	0.138 : 1
Section used for this span		3-2x8	Section used for this span		3-2x8
fb: Actual	=	685.58 psi	fv: Actual	=	33.12 psi
Fb: Allowable	=	2,152.80 psi	Fv: Allowable	=	240.00 psi
Load Combination		+0.60W	Load Combination		+0.60W
Location of maximum on span	=	19.000 ft	Location of maximum on span	=	19.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.000 in	Ratio =	0 <360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.223 in	Ratio =	376 >=360
Max Upward Total Deflection	-0.124 in	Ratio =	1836 >=360

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
													0.00	0.00	0.00	0.00
Length = 19.0 ft	1			0.90	1.200	1.00	1.15	1.00	1.00	1.00			1210.95	0.00	0.00	135.00
Length = 3.50 ft	2			0.90	1.200	1.00	1.15	1.00	1.00	1.00			1210.95	0.00	0.00	135.00
+0.60W					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.0 ft	1	0.318	0.138	1.60	1.200	1.00	1.15	1.00	1.00	1.00	2.25	685.58	2152.80	0.72	33.12	240.00
Length = 3.50 ft	2	0.318	0.138	1.60	1.200	1.00	1.15	1.00	1.00	1.00	2.25	685.58	2152.80	0.72	33.12	240.00
+0.450W					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.0 ft	1	0.239	0.103	1.60	1.200	1.00	1.15	1.00	1.00	1.00	1.69	514.19	2152.80	0.54	24.84	240.00
Length = 3.50 ft	2	0.239	0.103	1.60	1.200	1.00	1.15	1.00	1.00	1.00	1.69	514.19	2152.80	0.54	24.84	240.00

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 19 SEP 2021, 9:10PM

Wood Beam

File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327

PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Parapet Multi-Stud Columns

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+0.420W	-0.1242	13.056
+0.420W	2	0.2227	3.500		0.0000	13.056

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.106	1.767	
Overall MINimum	0.106	1.767	
+0.60W	0.064	1.060	
+0.450W	0.048	0.795	
W Only	0.106	1.767	

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 19 SEP 2021, 9:15PM
File: 21067 Larson Jeep.ec6

Wood Beam

Lic. # : KW-06002327 — PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Double Top Plate at Top of Parapet

CODE REFERENCES

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

Material Properties

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

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

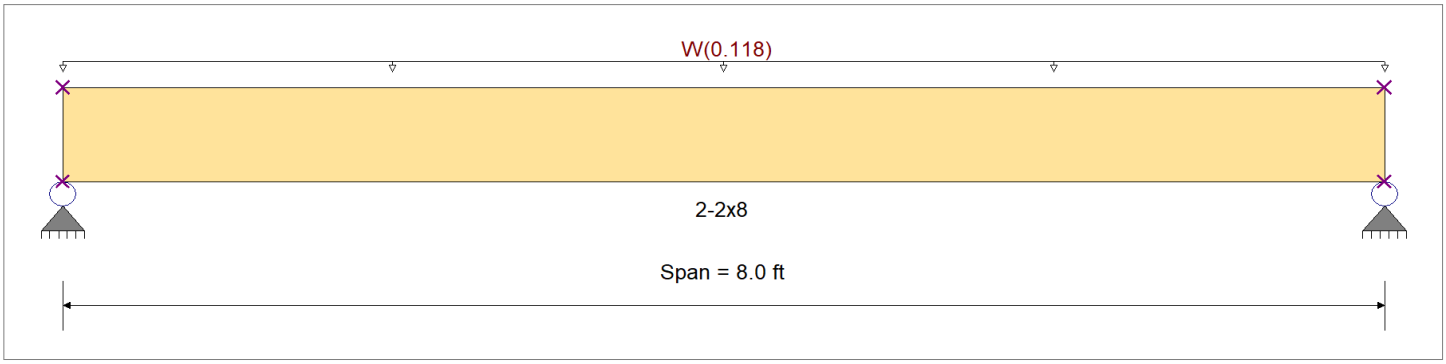
Beam Bracing : Completely Unbraced

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.

Uniform Load : W = 0.1180 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.134 : 1	Maximum Shear Stress Ratio	=	0.058 : 1
Section used for this span		2-2x8	Section used for this span		2-2x8
fb: Actual	=	258.62 psi	fv: Actual	=	16.68 psi
Fb: Allowable	=	1,923.90 psi	Fv: Allowable	=	288.00 psi
Load Combination		+0.60W	Load Combination		+0.60W
Location of maximum on span	=	4.000 ft	Location of maximum on span	=	7.416 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.000 in	Ratio =	0 <360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.030 in	Ratio =	3185 >=360
Max Upward Total Deflection	0.000 in	Ratio =	0 <360

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
													0.00	0.00	0.00	0.00
Length = 8.0 ft	1			0.90	1.200	1.00	1.15	1.00	1.00	0.99			1101.60	0.00	0.00	162.00
+0.60W					1.200	1.00	1.15	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.134	0.058	1.60	1.200	1.00	1.15	1.00	1.00	0.97	0.57	258.62	1923.90	0.24	16.68	288.00
+0.450W					1.200	1.00	1.15	1.00	1.00	0.97			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.101	0.043	1.60	1.200	1.00	1.15	1.00	1.00	0.97	0.42	193.96	1923.90	0.18	12.51	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+0.420W	1	0.0301	4.029		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.472	0.472

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

Printed: 19 SEP 2021, 9:15PM

Wood Beam

File: 21067 Larson Jeep.ec6

Lic. # : KW-06002327

PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Double Top Plate at Top of Parapet

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MINimum	0.472	0.472
+0.60W	0.283	0.283
+0.450W	0.212	0.212
W Only	0.472	0.472

PRCA20220091

SPREAD FOOTING DESIGN

Allowable Soil Bearing Pressure =	1000	psf		f'_c =	3000	psi
Ultimate Bearing Pressure =	1600	psf		f_y =	60	ksi
Clear Cover =	3	in		ρ min =	0.0018	
Column Dimensions =	6	in	min			

								One-Way Shear		Punching Shear						
Mark	W ft	t in	d in	Reinforcing (each way)	A_s in²	ρ	ΦV_n k	V_u k	ΦV_n k	V_u k	a in	ΦM_n k-ft	M_u k-ft	Design Checks	Max Allowable Load k
F3.0	3.0	11	7.3	(4) #4	0.80	0.0020	21.4	3.1	63.1	14.4	0.523	25.2	1.9	**OK**	7.7
F3.5	3.5	11	7.3	(5) #4	1.00	0.0022	25.0	5.0	63.1	19.6	0.560	31.4	3.7	**OK**	10.4
F4.0	4.0	11	7.3	(5) #4	1.00	0.0019	28.6	7.3	63.1	25.6	0.490	31.5	6.2	**OK**	13.6
F4.5	4.5	11	7.1	(4) #5	1.24	0.0021	31.3	10.2	60.6	32.4	0.540	37.9	9.9	**OK**	17.2
F5.0	5.0	12	8.1	(5) #5	1.55	0.0022	39.7	12.6	74.5	40.0	0.608	54.1	13.4	**OK**	21.3
F5.5	5.5	14	9.9	(5) #6	2.20	0.0024	53.5	14.8	103.0	48.4	0.784	93.9	16.3	**OK**	25.7
F6.0	6.0	14	9.9	(6) #6	2.64	0.0026	58.4	18.5	103.0	57.6	0.863	112.2	22.8	**OK**	30.6
F6.5	6.5	14	9.9	(6) #6	2.64	0.0024	63.3	22.6	103.0	67.6	0.796	112.6	30.6	**OK**	35.9
F7.0	7.0	16	11.9	(7) #6	3.08	0.0023	82.0	25.3	139.5	78.4	0.863	158.6	35.3	**OK**	41.7
F7.5	7.5	16	11.9	(7) #6	3.08	0.0021	87.8	30.1	139.5	90.0	0.805	159.0	45.7	**OK**	47.8
F8.0	8.0	18	13.7	(8) #7	4.80	0.0028	108.0	33.4	177.1	102.4	1.176	282.9	52.3	**OK**	54.4
F9.0	9.0	18	13.7	(9) #7	5.40	0.0028	121.5	44.8	177.1	129.6	1.176	318.3	81.3	**OK**	70.2

	P_T from Column	Ftg. Type	P_A from Ftg. Type	
F1	19.1 k	F5.0	21.3 k	**OK**
F2	54.0 k	F8.0	54.4 k	**OK**
F3	70.2 k	F9.0	70.2 k	**OK**
F4	35.3 k	F6.5	35.9 k	**OK**
F5	19.2 k	F5.0	21.3 k	**OK**

CONTINUOUS FOOTING DESIGN

Allowable Soil Bearing q_a = 1000 psf (Assumed)

At Bearing Walls,

$W_D = 24psf(38'/2) + 15psf(22'-4") = 791\ plf$
$W_S = 25psf(38'/2) = 475\ plf$

Try 2'-0" Wide x 11" Thk. Cont. Ftg.:

$q = (791+475)\ plf / 2' = 633\ psf < q_a$ O.K.

Check Flexural

$M_u = 1.6(633psf)(\frac{11"-2"}{12})^2/2 = 285\ \#\text{-ft/ft}$

$\phi M_n = \phi 5 \lambda \sqrt{f'_c} S_m$, $\phi = 0.6$, $\lambda = 1.0$, $f'_c = 3000psi$
$S_m = (11"-2")^2(12")/6 = 162\ in^3/ft$

$\rightsquigarrow \phi M_n = 0.6 \times 5 \times 1 \times \sqrt{3000psi} \times 162\ in^3/ft = 2218\ \#\text{-ft/ft} > M_u$ O.K.

Check Shear

$V_u = 1.6(633psf)(2'-0.5')/2 = 760\ \#/ft$

$\phi V_u = \phi 2 \lambda \sqrt{f'_c} A$, $\phi = 0.75$, $A = (11"-2")(12") = 108\ in^2/ft$

$\rightsquigarrow \phi V_u = 0.75 \times 2 \times 1 \times \sqrt{3000psi} \times 108\ in^2/ft = 8873\ \#/ft > V_u$ O.K.

PCS Structural Solutions

Project: PRCA20220091 JEEP — Job No:

Subject: — Sheet — Name: DCT

Originating Office: ☐ Seattle ☐ Tacoma ☐ Portland — Date: 9/14/21

STOREFRONT FRAMING

LOADS

$w_D = 19psf(35.5ft/2) + 15psf(8ft) = 457\#/ft$

$w_S = 25psf(\ \ "\ \ ) = 444\#/ft$

$w_W = \begin{cases} 16psf(14.5ft/2) + 86\#/ft = 202\#/ft \\ 148\#/ft \end{cases}$ ← PER ENERCALC; ↑ PER ENERCALC

NOTE: $p_W = \begin{cases} 16psf \text{ AT WALLS} \\ 16 + 31.9psf = 47.9psf \text{ AT PARAPETS FOR } A \geq 50ft^2 \end{cases}$

TRY 10" ϕ XS PIPE COLS
HSS 6x6x1/4 COLS AT ENDS
HSS 6x6x1/4 HIGH HDR
HSS 12x6x5/16 LOW HDR
HSS 6x6x1/4 STUBS & VERT SUPPORTS

PER RISA

$DCR_{MAX} = 0.69 < 1.0$ OK

∴ FRAMING OK

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Beam Analysis

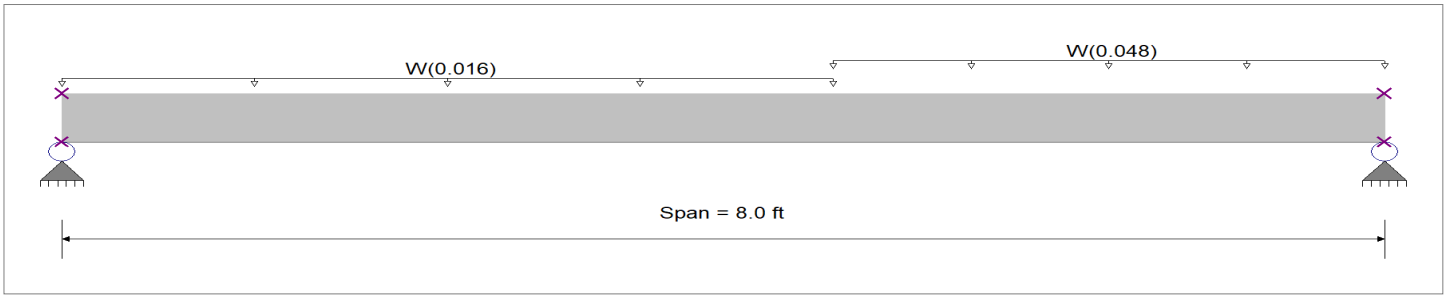
Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Storefront Wind Loading

General Beam Properties

Elastic Modulus 29,000.0 ksi

Span #1 Span Length = 8.0 ft Area = 10.0 in^2 Moment of Inertia = 100.0 in^4



Applied Loads

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

Load for Span Number 1

Uniform Load : W = 0.0160 k/ft, Extent = 0.0 -->> 4.670 ft, Tributary Width = 1.0 ft

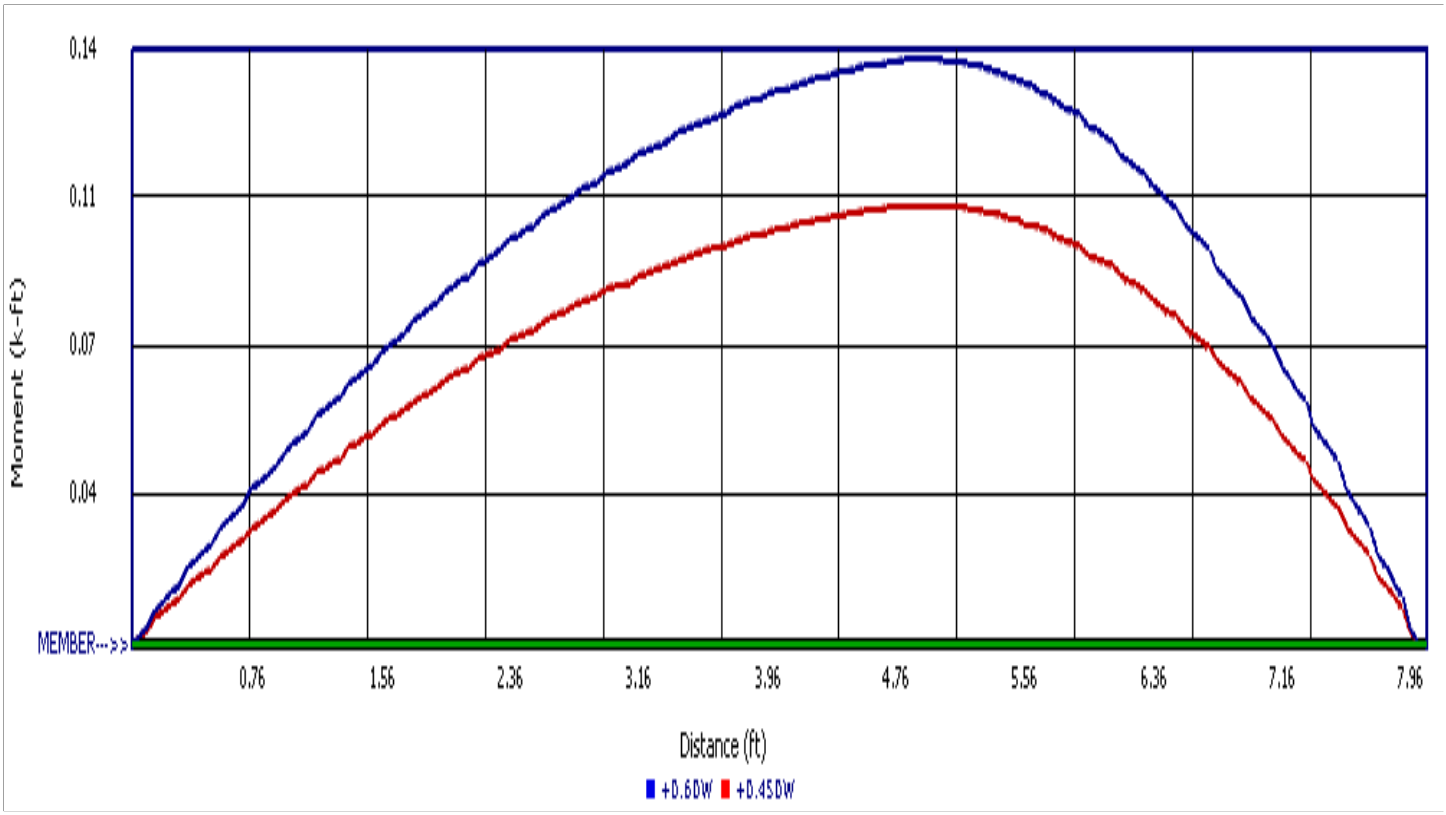
Uniform Load : W = 0.0480 k/ft, Extent = 4.670 -->> 8.0 ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Maximum Bending =	0.138 k-ft	Maximum Shear =	0.08903 k
Load Combination	+0.60W	Load Combination	+0.60W
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Location of maximum on span	4.920 ft	Location of maximum on span	8.000 ft

Maximum Deflection

Max Downward Transient Deflection	0.000 in	0
Max Upward Transient Deflection	0.000 in	0
Max Downward Total Deflection	0.001 in	179532
Max Upward Total Deflection	0.000 in	8029357



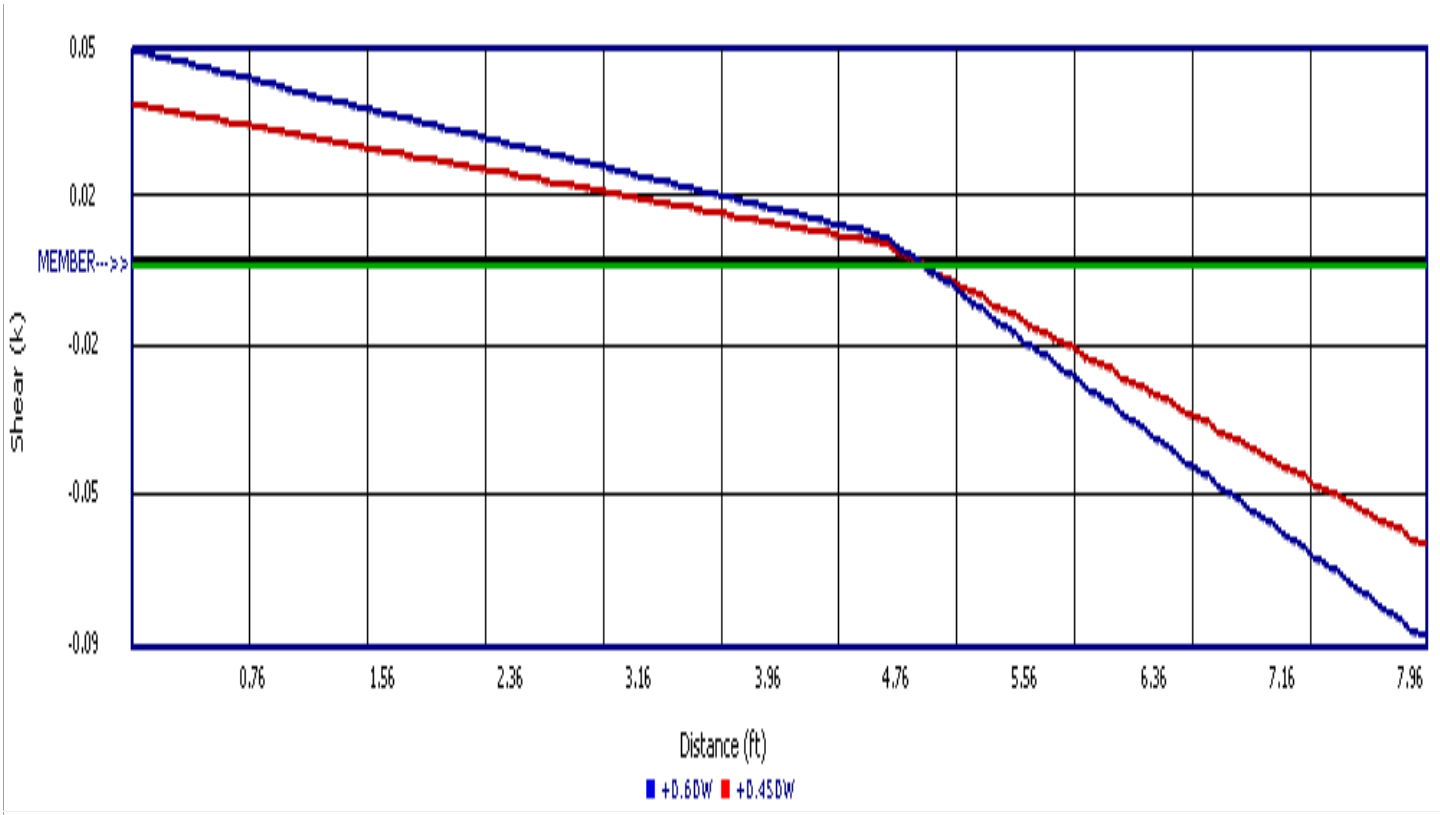
PRCA20220091

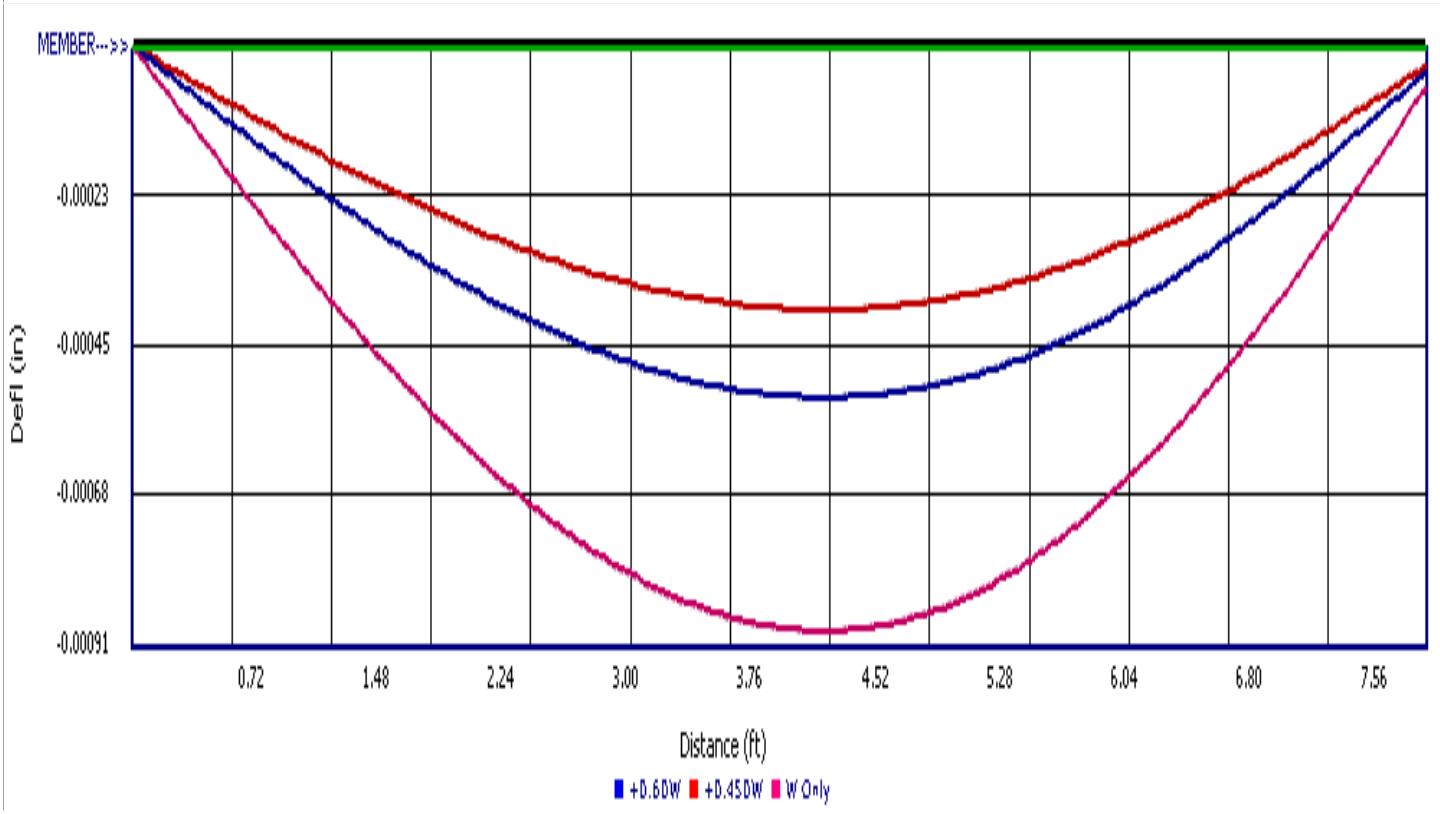
Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Beam Analysis

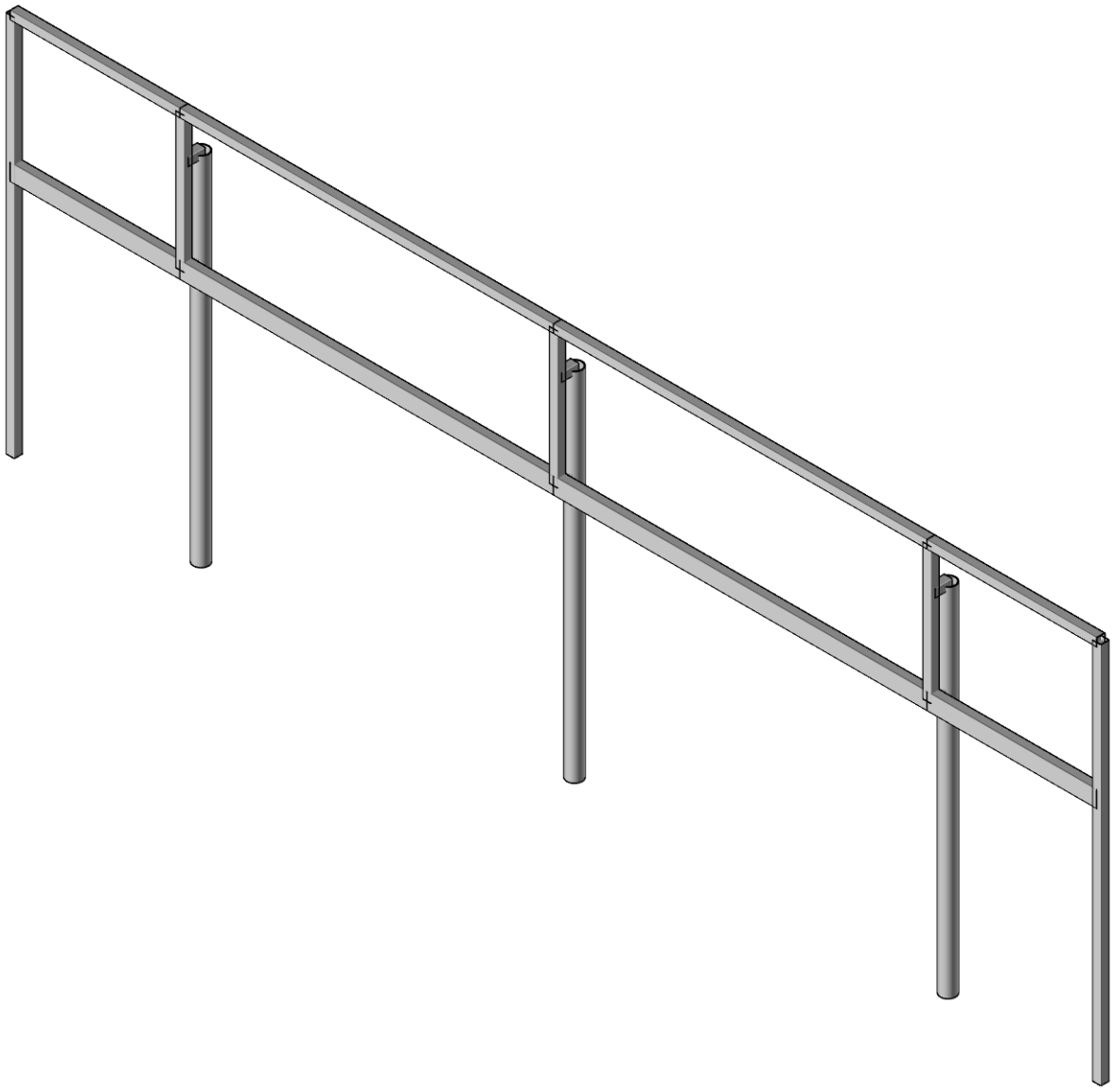
Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Storefront Wind Loading





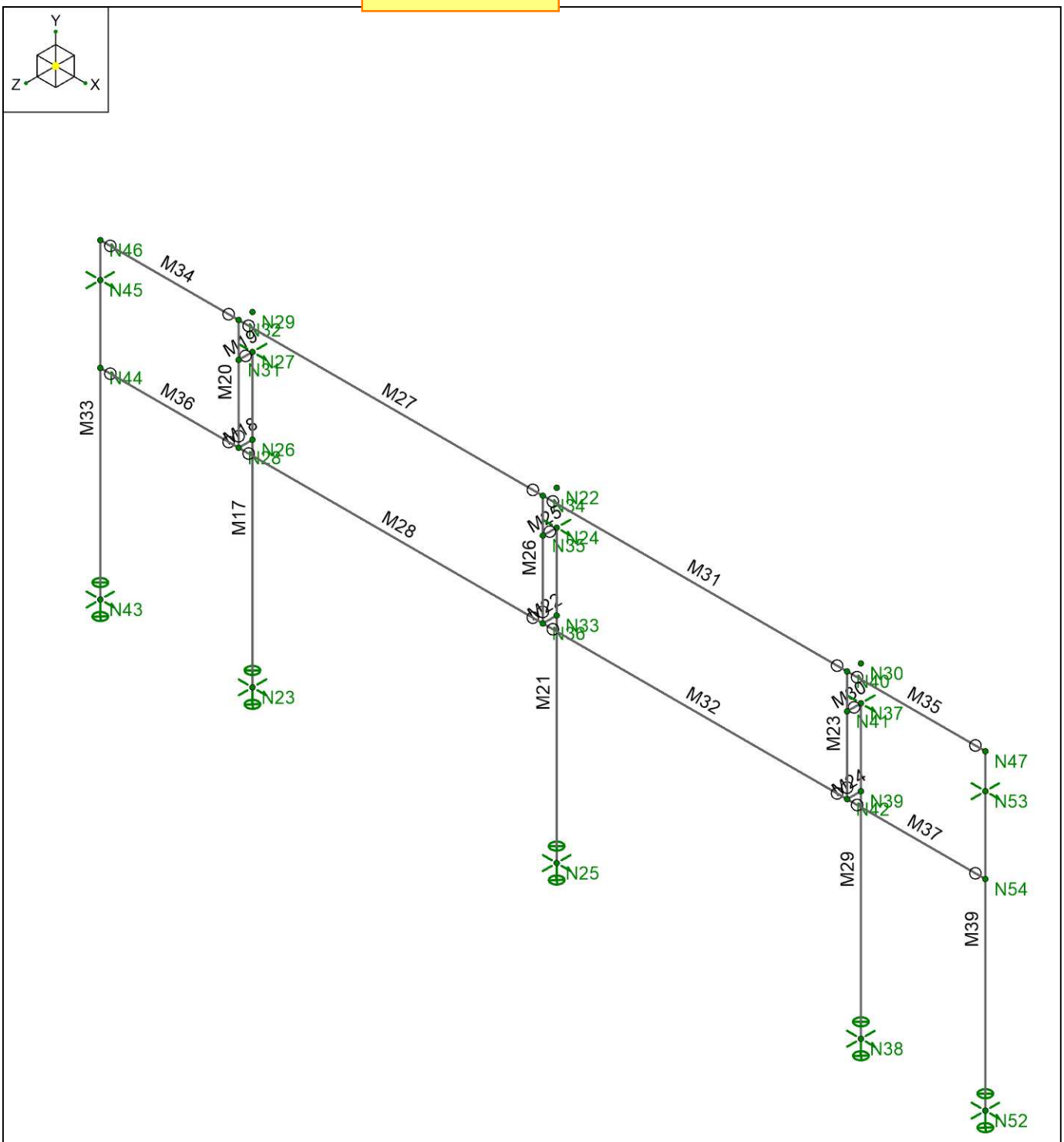
PRCA20220091



Envelope Only Solution

<Licensed Company>		SK-1
dtappel		Sep 15, 2021
		Storefront Framing 09-14-21.r3d

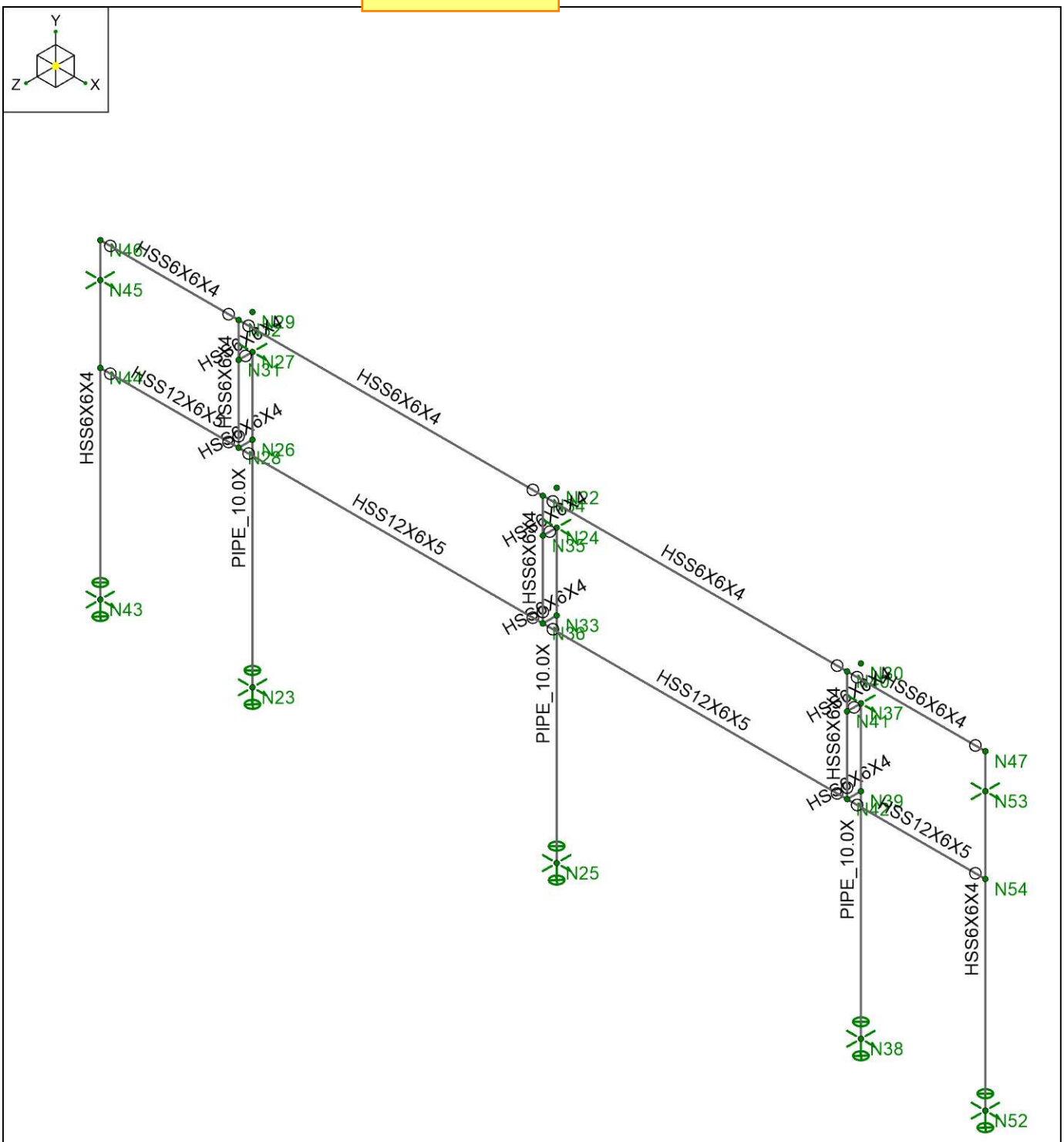
PRCA20220091



Envelope Only Solution

<Licensed Company>		SK-2
dtappel		Sep 15, 2021
		Storefront Framing 09-14-21.r3d

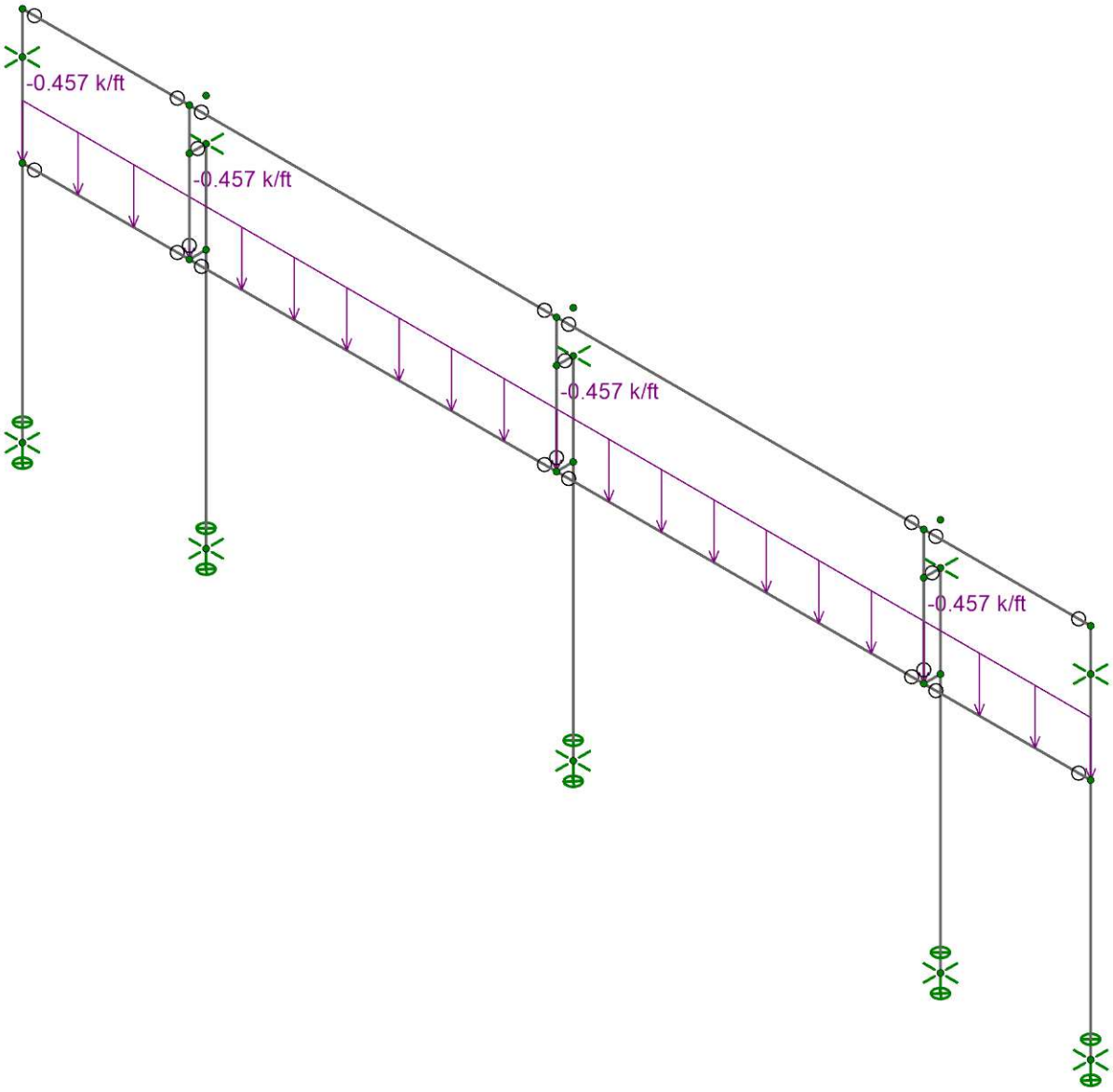
PRCA20220091



Envelope Only Solution

<Licensed Company>		SK-3
dtappel		Sep 15, 2021
		Storefront Framing 09-14-21.r3d

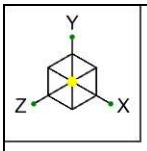
PRCA20220091

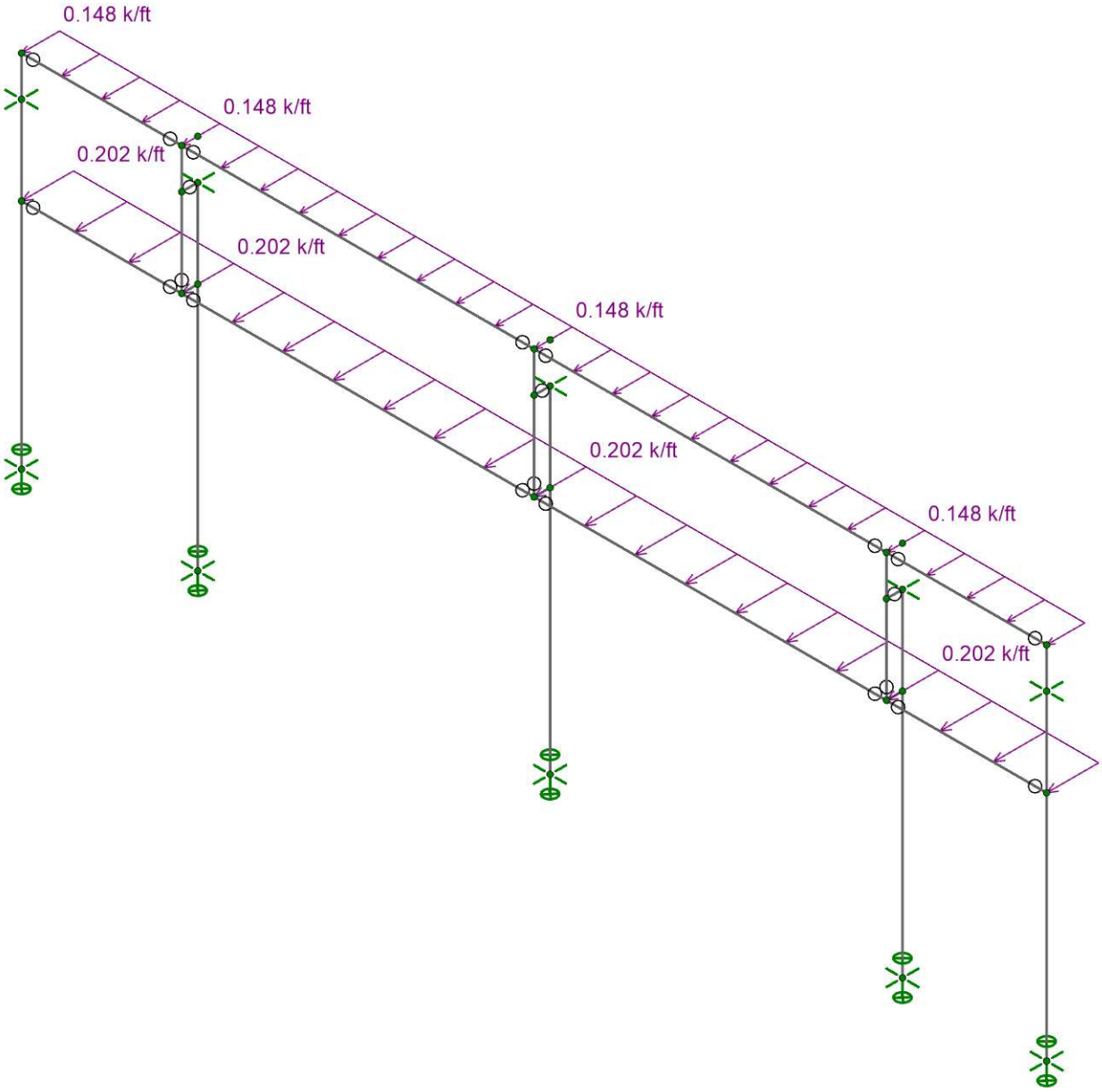


Loads: BLC 1, Dead Load
Envelope Only Solution

<Licensed Company>		SK-4
dtappel		Sep 15, 2021
		Storefront Framing 09-14-21.r3d

PRCA20220091

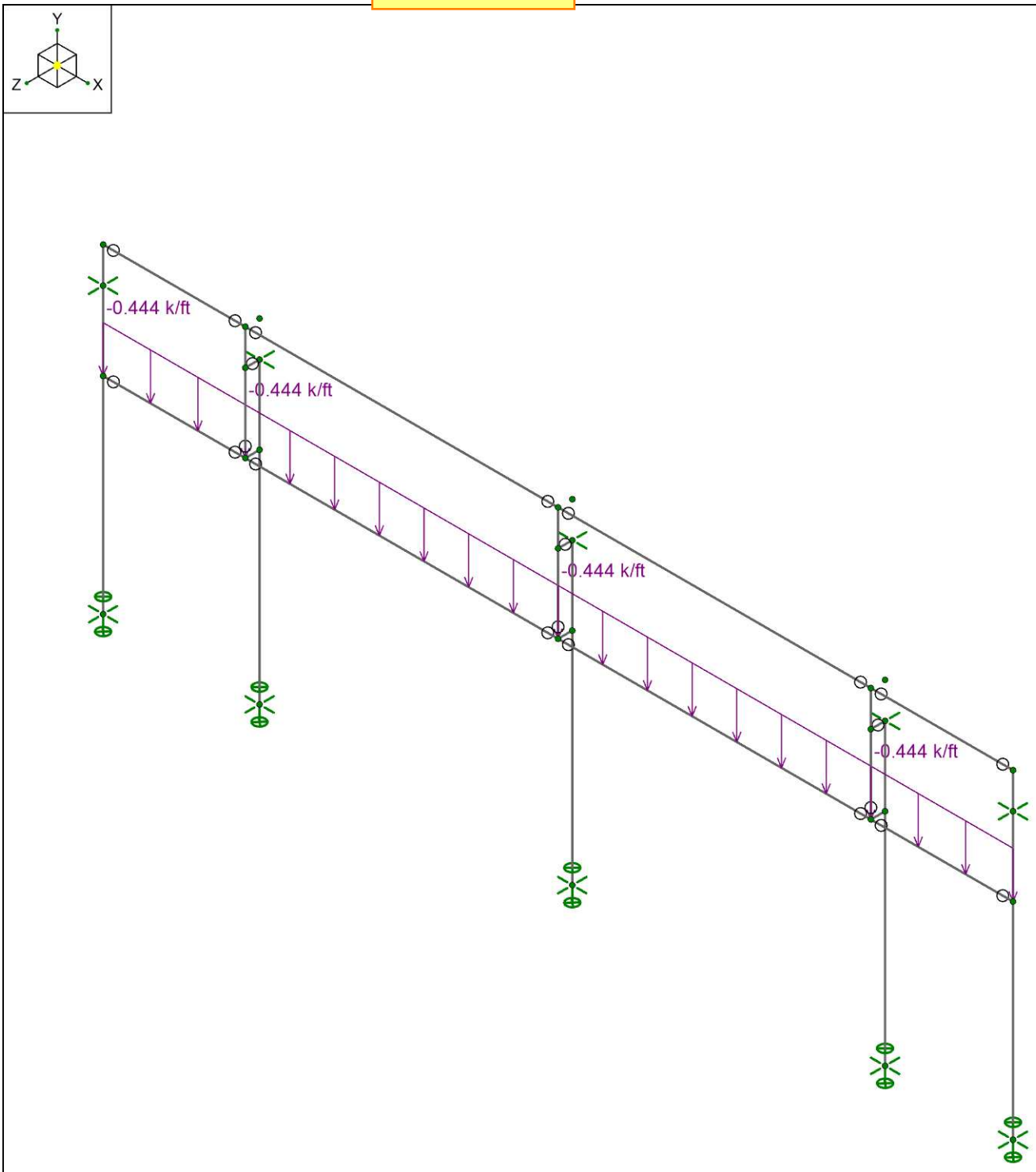




Loads: BLC 2, Wind Load Envelope Only Solution

<Licensed Company>		SK-5
dtappel		Sep 15, 2021
		Storefront Framing 09-14-21.r3d

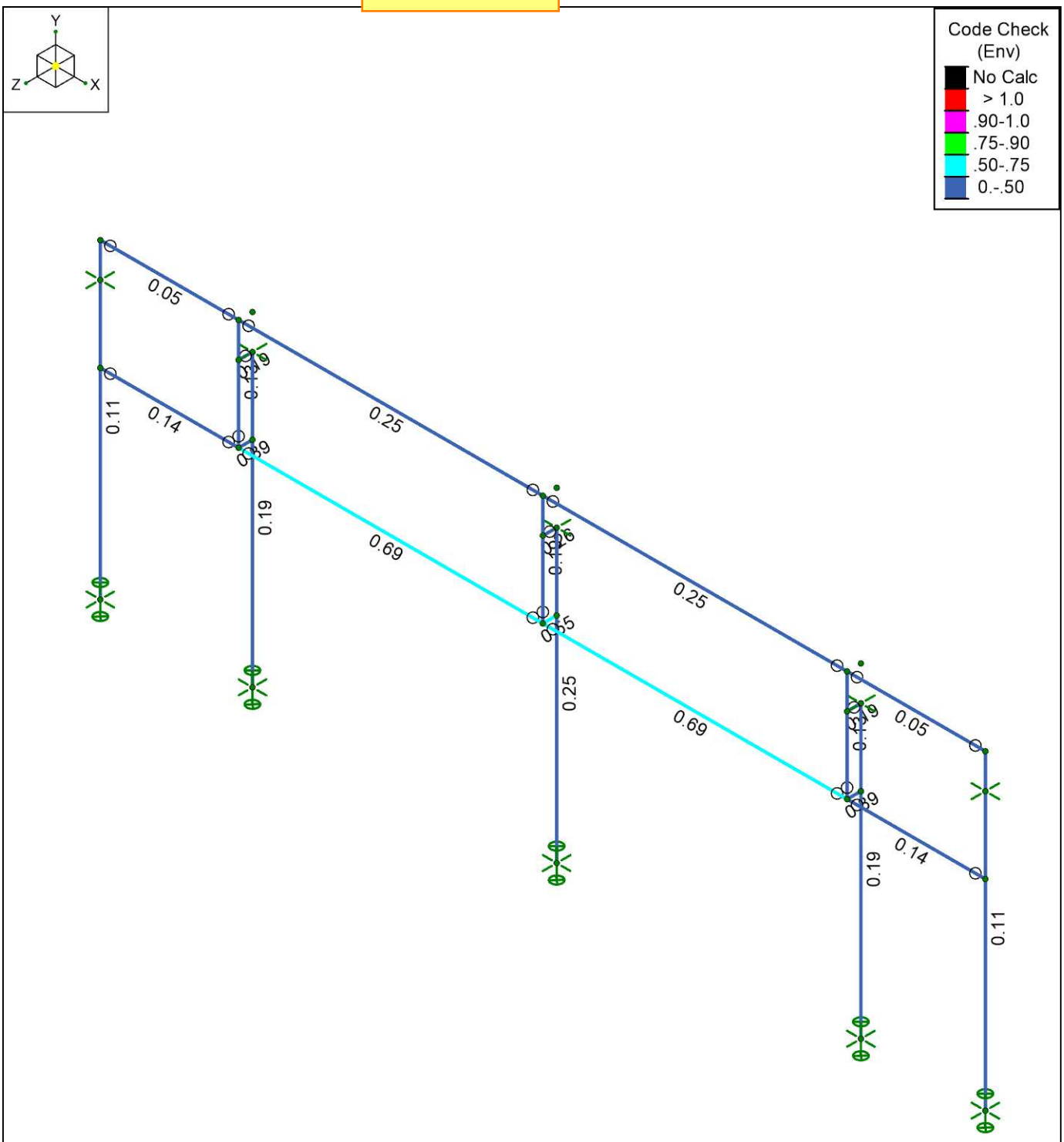
PRCA20220091



Loads: BLC 3, Snow Load
Envelope Only Solution

<Licensed Company>		SK-6
dtappel		Sep 15, 2021
		Storefront Framing 09-14-21.r3d

PRCA20220091



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

<Licensed Company>		SK-7
dtappel		Sep 15, 2021
		Storefront Framing 09-14-21.r3d

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	0.3	0.65	0.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	0.3	0.65	0.49	35	1.6	60	1.2
7	A1085	29000	11154	0.3	0.65	0.49	50	1.25	65	1.15
8	A913 Gr.65	29000	11154	0.3	0.65	0.49	65	1.1	80	1.1

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	Col	PIPE_10.0X	Column	Pipe	A53 Gr.B	Typical	15.1	199	199	398
2	Low Hdr	HSS12X6X5	Beam	Tube	A500 Gr.B Rect	Typical	9.92	62.8	184	152
3	High Hdr	HSS6X6X4	Beam	Tube	A500 Gr.B Rect	Typical	5.24	28.6	28.6	45.6
4	Stub	HSS6X6X4	Beam	Tube	A500 Gr.B Rect	Typical	5.24	28.6	28.6	45.6
5	Vert	HSS6X6X4	Column	Tube	A500 Gr.B Rect	Typical	5.24	28.6	28.6	45.6
6	End Col	HSS6X6X4	Column	Tube	A500 Gr.B Rect	Typical	5.24	28.6	28.6	45.6

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	N22	22	22.5	0	
2	N23	0	-1	0	
3	N24	22	20	0	
4	N25	22	-1	0	
5	N26	0	14.5	0	
6	N27	0	20	0	
7	N28	0	14.5	1	
8	N29	0	22.5	0	
9	N30	44	22.5	0	
10	N31	0	20	1	
11	N32	0	22.5	1	
12	N33	22	14.5	0	
13	N34	22	22.5	1	
14	N35	22	20	1	
15	N36	22	14.5	1	
16	N37	44	20	0	
17	N38	44	-1	0	
18	N39	44	14.5	0	
19	N40	44	22.5	1	
20	N41	44	20	1	
21	N42	44	14.5	1	
22	N43	-10	0	1	
23	N44	-10	14.5	1	
24	N45	-10	20	1	
25	N52	54	0	1	
26	N53	54	20	1	
27	N54	54	14.5	1	
28	N46	-10	22.5	1	
29	N47	54	22.5	1	

Member Primary Data

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
1	M17	N23	N27	Col	Column	Pipe	A53 Gr.B	Typical
2	M18	N26	N28	Stub	Beam	Tube	A500 Gr.B Rect	Typical
3	M19	N27	N31	Stub	Beam	Tube	A500 Gr.B Rect	Typical
4	M20	N28	N32	Vert	Column	Tube	A500 Gr.B Rect	Typical
5	M21	N25	N24	Col	Column	Pipe	A53 Gr.B	Typical
6	M22	N33	N36	Stub	Beam	Tube	A500 Gr.B Rect	Typical
7	M23	N42	N40	Vert	Column	Tube	A500 Gr.B Rect	Typical
8	M24	N39	N42	Stub	Beam	Tube	A500 Gr.B Rect	Typical
9	M25	N24	N35	Stub	Beam	Tube	A500 Gr.B Rect	Typical
10	M26	N36	N34	Vert	Column	Tube	A500 Gr.B Rect	Typical
11	M27	N32	N34	High Hdr	Beam	Tube	A500 Gr.B Rect	Typical
12	M28	N28	N36	Low Hdr	Beam	Tube	A500 Gr.B Rect	Typical
13	M29	N38	N37	Col	Column	Pipe	A53 Gr.B	Typical
14	M30	N37	N41	Stub	Beam	Tube	A500 Gr.B Rect	Typical
15	M31	N34	N40	High Hdr	Beam	Tube	A500 Gr.B Rect	Typical
16	M32	N36	N42	Low Hdr	Beam	Tube	A500 Gr.B Rect	Typical
17	M33	N43	N46	End Col	Column	Tube	A500 Gr.B Rect	Typical
18	M39	N52	N47	End Col	Column	Tube	A500 Gr.B Rect	Typical
19	M34	N46	N32	High Hdr	Beam	Tube	A500 Gr.B Rect	Typical
20	M35	N40	N47	High Hdr	Beam	Tube	A500 Gr.B Rect	Typical
21	M36	N44	N28	Low Hdr	Beam	Tube	A500 Gr.B Rect	Typical
22	M37	N42	N54	Low Hdr	Beam	Tube	A500 Gr.B Rect	Typical

Hot Rolled Steel Design Parameters

	Label	Shape	Length [ft]	Lcomp top [ft]	Function
1	M17	Col	21	Lbyy	Lateral
2	M18	Stub	1	Lbyy	Lateral
3	M19	Stub	1	Lbyy	Lateral
4	M20	Vert	8	Lbyy	Lateral
5	M21	Col	21	Lbyy	Lateral
6	M22	Stub	1	Lbyy	Lateral
7	M23	Vert	8	Lbyy	Lateral
8	M24	Stub	1	Lbyy	Lateral
9	M25	Stub	1	Lbyy	Lateral
10	M26	Vert	8	Lbyy	Lateral
11	M27	High Hdr	22	Lbyy	Lateral
12	M28	Low Hdr	22	Lbyy	Lateral
13	M29	Col	21	Lbyy	Lateral
14	M30	Stub	1	Lbyy	Lateral
15	M31	High Hdr	22	Lbyy	Lateral
16	M32	Low Hdr	22	Lbyy	Lateral
17	M33	End Col	22.5	Lbyy	Lateral
18	M39	End Col	22.5	Lbyy	Lateral
19	M34	High Hdr	10	Lbyy	Lateral
20	M35	High Hdr	10	Lbyy	Lateral
21	M36	Low Hdr	10	Lbyy	Lateral
22	M37	Low Hdr	10	Lbyy	Lateral

Member Advanced Data

	Label	I Release	J Release	Physical	Deflection Ratio Options	Seismic DR
1	M17			Yes	** NA **	None
2	M18			Yes	Default	None

Member Advanced Data (Continued)

	Label	I Release	J Release	Physical	Deflection Ratio Options	Seismic DR
3	M19		BenPIN	Yes	Default	None
4	M20	BenPIN		Yes	** NA **	None
5	M21			Yes	** NA **	None
6	M22			Yes	Default	None
7	M23	BenPIN		Yes	** NA **	None
8	M24			Yes	Default	None
9	M25		BenPIN	Yes	Default	None
10	M26	BenPIN		Yes	** NA **	None
11	M27	BenPIN	BenPIN	Yes	Default	None
12	M28	BenPIN	BenPIN	Yes	Default	None
13	M29			Yes	** NA **	None
14	M30		BenPIN	Yes	Default	None
15	M31	BenPIN	BenPIN	Yes	Default	None
16	M32	BenPIN	BenPIN	Yes	Default	None
17	M33			Yes	** NA **	None
18	M39			Yes	** NA **	None
19	M34	BenPIN	BenPIN	Yes	Default	None
20	M35	BenPIN	BenPIN	Yes	Default	None
21	M36	BenPIN	BenPIN	Yes	Default	None
22	M37	BenPIN	BenPIN	Yes	Default	None

Node Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]	Y Rot [k-ft/rad]
1	N23	Reaction	Reaction	Reaction	Reaction
2	N24	Reaction		Reaction	
3	N25	Reaction	Reaction	Reaction	Reaction
4	N27	Reaction		Reaction	
5	N37	Reaction		Reaction	
6	N38	Reaction	Reaction	Reaction	Reaction
7	N43	Reaction	Reaction	Reaction	Reaction
8	N45	Reaction		Reaction	
9	N52	Reaction	Reaction	Reaction	Reaction
10	N53	Reaction		Reaction	

Basic Load Cases

	BLC Description	Category	Y Gravity	Distributed
1	Dead Load	DL	-1	4
2	Wind Load	WL		8
3	Snow Load	SL		4

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	IBC 16-8	Yes	Y	DL	1										
2	IBC 16-9	Yes	Y	DL	1	LL	1	LLS	1						
3	IBC 16-10 (b)	Yes	Y	DL	1	SL	1	SLN	1						
4	IBC 16-11 (b)	Yes	Y	DL	1	LL	0.75	LLS	0.75	SL	0.75	SLN	0.75		
5	IBC 16-12 (a) (a)	Yes	Y	DL	1	WL	0.6								
6	IBC 16-12 (a) (b)	Yes	Y	DL	1	WL	-0.6								
7	IBC 16-13 (a) (a)	Yes	Y	DL	1	WL	0.45	LL	0.75	LLS	0.75				
8	IBC 16-13 (a) (b)	Yes	Y	DL	1	WL	-0.45	LL	0.75	LLS	0.75				
9	IBC 16-13 (b) (a)	Yes	Y	DL	1	WL	0.45	LL	0.75	LLS	0.75	SL	0.75	SLN	0.75
10	IBC 16-13 (b) (b)	Yes	Y	DL	1	WL	-0.45	LL	0.75	LLS	0.75	SL	0.75	SLN	0.75

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
11	IBC 16-15 (a)	Yes	Y	DL	0.6	WL	0.6										
12	IBC 16-15 (b)	Yes	Y	DL	0.6	WL	-0.6										
13	Dead Load		Y	DL	1												
14	Snow Load		Y	SL	1												
15	Wind Load		Y	WL	1												

Envelope Node Reactions

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N23	max	0	12	16.5745	3	0.8743	10	0	12	0	12	0	12
2		min	0	1	5.6823	12	-0.1379	11	0	1	0	1	0	1
3	N24	max	0	12	0	12	3.8422	12	0	12	0	12	0	12
4		min	0	1	0	1	-4.6724	5	0	1	0	1	0	1
5	N25	max	0	12	22.3134	3	1.1903	10	0	12	0	12	0	12
6		min	0	1	7.5272	11	-0.155	11	0	1	0	1	0	1
7	N27	max	0	12	0	12	2.7756	12	0	12	0	12	0	12
8		min	0	1	0	1	-3.3709	5	0	1	0	1	0	1
9	N37	max	0	12	0	12	2.7756	12	0	12	0	12	0	12
10		min	0	1	0	1	-3.3709	5	0	1	0	1	0	1
11	N38	max	0	12	16.5745	3	0.8743	10	0	12	0	12	0	12
12		min	0	1	5.6823	11	-0.1379	11	0	1	0	1	0	1
13	N43	max	0	12	5.2139	3	0.1259	10	0	12	0	12	0	12
14		min	0	1	1.7963	11	-0.0605	11	0	1	0	1	0	1
15	N45	max	0	12	0	12	0.9424	12	0	12	0	12	0	12
16		min	0	1	0	1	-1.0056	5	0	1	0	1	0	1
17	N52	max	0	12	5.2139	3	0.1259	10	0	12	0	12	0	12
18		min	0	1	1.7963	11	-0.0605	11	0	1	0	1	0	1
19	N53	max	0	12	0	12	0.9424	12	0	12	0	12	0	12
20		min	0	1	0	1	-1.0056	5	0	1	0	1	0	1
21	Totals:	max	0	12	65.8901	3	13.44	6						
22		min	0	1	22.4845	11	-13.44	11						

Envelope AISC 15TH (360-16): ASD Member Steel Code Checks

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-ft]	Mnzz/om [k-ft]	Cb	Eqn
1	M17	PIPE_10.0X	0.1863	15.3125	10	0.0144	21		5	247.2972	316.4671	85.9281	85.9281	1	H1-1b
2	M18	HSS6X6X4	0.394	0	3	0.2707	0	y	3	144.0794	144.3353	25.7086	25.7086	1.7743	H1-1b
3	M19	HSS6X6X4	0.1858	0	9	0.114	0	y	9	144.0794	144.3353	25.7086	25.7086	1.6676	H1-1b
4	M20	HSS6X6X4	0.1346	5.5	5	0.0348	8	z	5	128.838	144.3353	25.7086	25.7086	1	H1-1b
5	M21	PIPE_10.0X	0.2547	15.3125	10	0.0198	21		5	247.2972	316.4671	85.9281	85.9281	1	H1-1b
6	M22	HSS6X6X4	0.5525	0	3	0.3681	0	y	3	144.0794	144.3353	25.7086	25.7086	1.7334	H1-1b
7	M23	HSS6X6X4	0.1346	5.5	5	0.0348	8	z	5	128.838	144.3353	25.7086	25.7086	1	H1-1b
8	M24	HSS6X6X4	0.394	0	3	0.2707	0	y	3	144.0794	144.3353	25.7086	25.7086	1.7743	H1-1b
9	M25	HSS6X6X4	0.2612	0	9	0.1602	0	y	9	144.0794	144.3353	25.7086	25.7086	1.6674	H1-1b
10	M26	HSS6X6X4	0.1946	5.5	5	0.0479	8	z	5	128.838	144.3353	25.7086	25.7086	1	H1-1b
11	M27	HSS6X6X4	0.2541	11	6	0.0302	22	z	5	61.1398	144.3353	25.7086	25.7086	1.1364	H1-1b
12	M28	HSS12X6X5	0.6907	11	10	0.1039	22	y	3	130.2946	273.2455	46.1773	87.4551	1.1364	H1-1b
13	M29	PIPE_10.0X	0.1863	15.3125	10	0.0144	21		5	247.2972	316.4671	85.9281	85.9281	1	H1-1b
14	M30	HSS6X6X4	0.1858	0	9	0.114	0	y	9	144.0794	144.3353	25.7086	25.7086	1.6676	H1-1b
15	M31	HSS6X6X4	0.2541	11	6	0.0302	22	z	5	61.1398	144.3353	25.7086	25.7086	1.1364	H1-1b
16	M32	HSS12X6X5	0.6907	11	10	0.1039	22	y	3	130.2946	273.2455	46.1773	87.4551	1.1364	H1-1b
17	M33	HSS6X6X4	0.1092	14.2969	10	0.0138	19.9219	z	5	58.7726	144.3353	25.7086	25.7086	1	H1-1b
18	M39	HSS6X6X4	0.1092	14.2969	10	0.0138	19.9219	z	5	58.7726	144.3353	25.7086	25.7086	1	H1-1b
19	M34	HSS6X6X4	0.0525	5	6	0.034	10	z	5	120.8639	144.3353	25.7086	25.7086	1.1364	H1-1b
20	M35	HSS6X6X4	0.0525	5	6	0.034	10	z	5	120.8639	144.3353	25.7086	25.7086	1.1364	H1-1b

Envelope AISC 15TH (360-16): ASD Member Steel Code Checks (Continued)

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-ft]	Mnzz/om [k-ft]	Cb	Eqn
21	M36	HSS12X6X5	0.1427	5	10	0.0685	10	y	3	233.7557	273.2455	46.1773	87.4551	1.1364	H1-1b
22	M37	HSS12X6X5	0.1427	5	10	0.0685	10	y	3	233.7557	273.2455	46.1773	87.4551	1.1364	H1-1b

PCS Structural Solutions

Project: PRCA20220091 JEEP Job No:

Subject: Sheet Name: DCT

Originating Office: ☐ Seattle ☐ Tacoma ☐ Portland Date: 9/14/21

CHECK WELDS

FROM HDR TO VERT SUPPORTS

$V_{RY} = 10.31k$

$V_{RX} = 1.33k$

} MAX ALL HDRS & LOAD COMB'S, CONSERVATIVE

$V_{R\ RESULTANT} = \sqrt{(10.31^2 + 1.33k^2)} = 10.40k$

TRY 1/4" FILLET WELD

$L_R = \frac{10.40k}{0.928(4)\ k/in} = 2.8\ in$ ∴ OK BY INSPECTION

∴ USE 1/4" FILLET WELD

FROM HORIZ SUPPORT TO COL

$P_R = 2.82k$

$V_{R_y} = 14.97k$

$M_R = 14.19^{1-k} = 170^{11-k}$

} MAX ALL SUPPORTS & LOAD COMB'S, CONSERVATIVE

TRY 1/4" FILLET WELD ALL AROUND

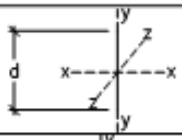
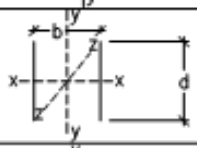
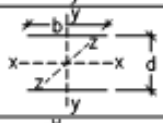
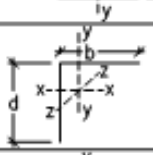
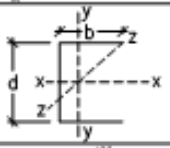
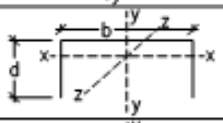
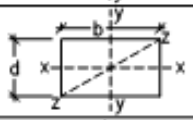
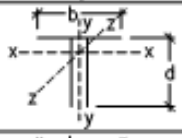
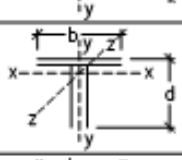
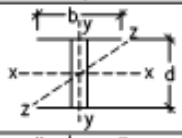
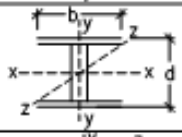
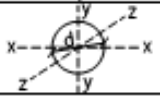
PER ATTACHED MATHCAD

$DCR_{MAX} = 1.0$ ∴ OK FOR CONSERVATIVE LOADING

∴ USE 1/4" FILLET WELD ALL AROUND

PRCA20220091

Blodgett Welded Connection Strengths

WELD SHAPE	OUTLINE OF WELDED JOINT b=WIDTH, d=DEPTH	BENDING (ABOUT HORIZ. AXIS X – X)	BENDING (ABOUT VERT. AXIS Y – Y)	TWISTING
1		$S_x = \frac{d^2}{6}$ in^2	$S_Y = 0$ in^2	$J_x = \frac{d^3}{12}$ in^3
2		$S_x = \frac{d^2}{3}$	$S_Y = db$	$J_x = \frac{d(3b^2 + d^2)}{6}$
3		$S_x = bd$	$S_Y = \frac{b^2}{3}$	$J_x = \frac{(b^3 + 3bd^2)}{6}$
4		$S_{x(T)} = \frac{4bd + d^2}{6}$ $S_{x(B)} = \frac{d^2(4b+d)}{6(2b+d)}$	$S_{Y(L)} = \frac{4db + b^2}{6}$ $S_{Y(R)} = \frac{b^2(4d+b)}{6(2d+b)}$	$J_x = \frac{(b+d)^4 - 6b^2d^2}{12(b+d)}$
5		$S_x = bd + \frac{d^2}{6}$	$S_{Y(L)} = \frac{2db + b^2}{3}$ $S_{Y(X)} = \frac{b^2(2d+b)}{3(d+b)}$	$J_x = \frac{(2b+d)^3}{12} - \frac{b^2(b+d)^2}{2b+d}$
6		$S_{x(T)} = \frac{2bd + d^2}{3}$ $S_{x(B)} = \frac{d^2(2b+d)}{3(b+d)}$	$S_Y = db + \frac{b^2}{6}$	$J_x = \frac{(b+2d)^3}{12} - \frac{d^2(b+d)^2}{(b+2d)}$
7		$S_x = bd + \frac{d^2}{3}$	$S_Y = db + \frac{b^2}{3}$	$J_x = \frac{(b+d)^3}{6}$
8		$S_{x(T)} = \frac{2bd + d^2}{3}$ $S_{x(B)} = \frac{d^2(2b+d)}{3(b+d)}$	$S_Y = \frac{b^2}{6}$	$J_x = \frac{(b+2d)^3}{12} - \frac{d^2(b+d)^2}{(b+2d)}$
9		$S_{x(T)} = \frac{4bd + d^2}{3}$ $S_{x(B)} = \frac{4bd^2 + d^3}{6b+3d}$	$S_Y = \frac{b^2}{3}$	$J_x = \frac{d^3(4b+d)}{6(b+d)} + \frac{b^3}{6}$
10		$S_x = bd + \frac{d^2}{3}$	$S_Y = \frac{b^2}{3}$	$J_x = \frac{b^3 + 3bd^2 + d^3}{6}$
11		$S_x = 2bd + \frac{d^2}{3}$	$S_Y = \frac{2b^2}{3}$	$J_x = \frac{2b^3 + 6bd^2 + d^3}{6}$
12		$S_x = \frac{\pi d^2}{4}$	$S_Y = \frac{\pi d^2}{4}$	$J_x = \frac{\pi d^3}{4}$

PRCA20220091

Design Variables:

Electrode classification number: $F_{EXX} := 70 \cdot ksi$

Specified minimum rupture strength of base metal: $F_u := 58 \cdot ksi$

A36.....Fu = 58ksi
A500 Gr. B.....Fu = 58ksi
A992.....Fu = 65ksi

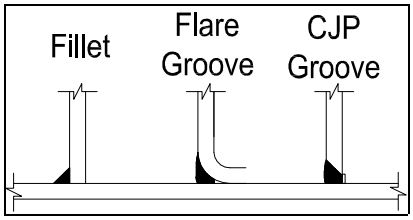
Width of weld group: $b := 6in$

Depth of weld group: $d := 6in$

ASD factor of safety: $\Omega := 2.0$ *(SEE AISC 360-05 SECT J2.4)*

Effective_Throat_Factor := Fillet / Flare Groove / CJP Groove

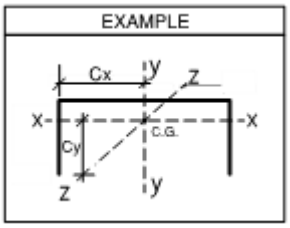
Effective_Throat_Factor = 0.707



Weld_Shape := 7 / 8 / 9

C_x= distance along x-axis from C.G. of weld to extreme fiber of weld $C_x := 3in$

C_y= distance along x-axis from C.G. of weld to extreme fiber of weld $C_y := 3in$



Weld Properties

Weld Properties:

Minimum elastic section modulus of weld group about x-axis: $S_{wx} = 48 \cdot \frac{in^3}{in}$

Minimum elastic section modulus of weld group about y-axis: $S_{wy} = 48 \cdot \frac{in^3}{in}$

Polar moment of inertia of weld group: $J_w = 288 \cdot \frac{in^4}{in}$

Total length of weld in weld group: $L_w = 24 \cdot in$

PRCA20220091

Working Stress Force:

Axial Force (Z): $Axial := 2.82kip$

$f_a := \frac{Axial}{L_w}$ $f_a = 0.12 \cdot \frac{kip}{in}$

Shear Force (X): $Shear_x := 0kip$

$f_{vx} := \frac{Shear_x}{L_w}$ $f_{vx} = 0.00 \cdot \frac{kip}{in}$

Shear Force (Y): $Shear_y := 14.97kip$

$f_{vy} := \frac{Shear_y}{L_w}$ $f_{vy} = 0.62 \cdot \frac{kip}{in}$

Moment about X: $M_x := 170 \cdot in \cdot kip$

$f_{mx} := \frac{M_x}{S_{wx}}$ $f_{mx} = 3.54 \cdot \frac{kip}{in}$

Moment about Y: $M_y := 0 \cdot in \cdot kip$

$f_{my} := \frac{M_y}{S_{wy}}$ $f_{my} = 0.00 \cdot \frac{kip}{in}$

Twisting about Z: $T_z := 0 \cdot in \cdot kip$

$f_{tx} := \frac{T_z \cdot C_x}{J_w}$ $f_{tx} = 0.00 \cdot \frac{kip}{in}$

$f_{ty} := \frac{T_z \cdot C_y}{J_w}$ $f_{ty} = 0.00 \cdot \frac{kip}{in}$

Resultant Force:

$f_r := \sqrt{(f_a + f_{mx} + f_{my})^2 + (f_{vx} + f_{tx})^2 + (f_{vy} + f_{ty})^2}$ $f_r = 3.71 \cdot \frac{kip}{in}$

Required Weld Throat Thickness:

$throat_{req} := \frac{\Omega \cdot f_r}{0.6 F_{EXX} \cdot Effective\_Throat\_Factor}$ $throat_{req} = 0.25 \cdot in$

Specify Weld Size:

Weld := 1/4

Demand Capacity Ratio:

$DCR := \frac{throat_{req}}{Weld}$ $DCR = 1.0001$ **DEMAND CAPACITY RATIO OK**

Minimum Base Metal Thickness: (Rupture)

To match rupture strength of weld

$t_{req} := \frac{0.6 \cdot F_{EXX} \cdot Effective\_Throat\_Factor \cdot Weld}{0.6 \cdot F_u}$ $t_{req} = 0.213 \cdot in$

PCS Structural Solutions

Project: PRCA20220091 JEEP Job No:

Subject: Sheet Name: DCT

Originating Office: ☐ Seattle ☐ Tacoma ☐ Portland Date: 9/15/21

ROOF DRAGS

AT TYP 10" ϕ COL

$V_R = 4.67^k$

CHECK WELD FROM PL TO COL – TRY 1/4" FILLET WELD

$L_e = \frac{4.67^k}{0.928(4)^k/_{in}} = 1.3_{in}$ ∴ OK BY INSPECTION

∴ USE 1/4" FILLET WELD

DETERMINE NUMBER OF 1/4" ϕ x 3 1/2" SDS SCREWS

PER SIMPSON

$V_a = 420^{\#}(1.6) = 672^{\#}$

$\text{No. REQD} = \frac{4670^{\#}}{672^{\#}/\text{SCREW}} = 6.9 \Rightarrow (7)\ \text{MIN}$

∴ USE (7) 1/4" ϕ x 3 1/2" SDS SCREWS MIN

Strong-Drive® SDS HEAVY-DUTY CONNECTOR Screw

Structural Fastener

The Simpson Strong-Tie Strong-Drive SDS Heavy-Duty Connector screw is a ¼"-diameter structural wood screw ideal for various connector installations as well as wood-to-wood applications. It installs with no predrilling and has been extensively tested in various applications. The SDS Heavy-Duty Connector screw is improved with an easy-driving Type-17 point and a corrosion resistant double-barrier coating.

For more information about package quantities, visit **strongtie.com.**

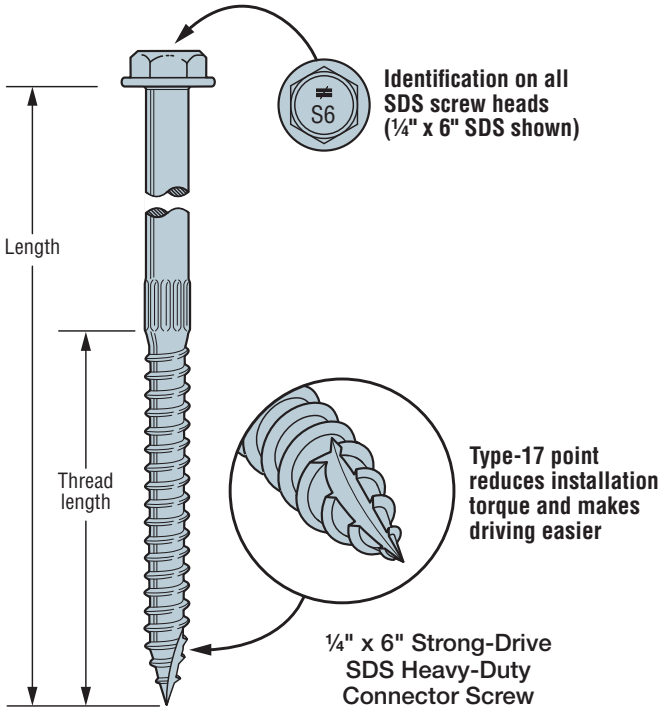
Features:

- The Type-17 point reduces installation torque and makes driving easier with no predrilling and minimal wood splitting.
- Available with a double-barrier coating or in Type 316 stainless steel. Carbon steel loads apply to corresponding stainless-steel models.
- ⅜" hex washer head is stamped with the No-Equal sign and fastener length for easy identification after installation.
- For the ⅜" hex-head driver bit, order model no. BITHEXR38-134.

Material: Heat-treated carbon steel, Type 316 stainless steel

Finish: Double barrier (all lengths); Type 316 stainless steel (1½" thru 3½" lengths)

Codes: See p. 12 for Code Reference Key Chart



These products are available with additional corrosion protection. For more information, see p. 15.

SS For stainless-steel fasteners, see p. 21.

Strong-Drive ® SDS Heavy-Duty Connector Screw

	Model No.	Size (in.)	Thread Length (in.)	Fasteners per Carton[6]	DF/SP Allowable Loads (lb.)[4]						SPF/HF Allowable Loads (lb.)[4]						Code Ref.
					Shear (100)					Withdrawal[5] (100)	Shear (100)					Withdrawal[5] (100)	
					Wood Side Plate[3]		Steel Side Plate				Wood Side Plate[3]		Steel Side Plate				
					1½"	1¾" SCL	16 ga.	14 ga. and 12 ga.	10 ga. or Greater	Wood or Steel Side Plate	1½"	1¾" SPF LVL	16 ga.	14 ga. and 12 ga.	10 ga. or Greater	Wood or Steel Side Plate	
SS	SDS25112	¼ x 1½	1	1,500	—	—	250	250	250	170	—	—	180	180	180	120	IBC, FL, LA
SS	SDS25200	¼ x 2	1¼	1,300	—	—	250	290	290	215	—	—	180	210	210	150	
SS	SDS25212	¼ x 2½	1½	1,100	190	—	250	390	420	255	135	—	180	280	300	180	
SS	SDS25300	¼ x 3	2	950	280	—	250	420	420	345	200	—	180	300	300	240	
SS	SDS25312	¼ x 3½	2¼	900	340	340	250	420	420	385	245	245	180	300	300	270	
	SDS25412	¼ x 4½	2¾	800	350	340	250	420	420	475	250	245	180	300	300	330	
	SDS25500	¼ x 5	2¾	500	350	340	250	420	420	475	250	245	180	300	300	330	
	SDS25600	¼ x 6	3¼	600	350	340	250	420	420	560	250	245	180	300	300	395	
	SDS25800	¼ x 8	3¼	400	350	340	250	420	420	560	250	245	180	300	300	395	

1. Screws may be provided with the 4CUT™ or Type-17 point.
2. Strong-Drive® SDS Heavy-Duty Connector screws install best using a low-speed ½" drill with a ⅜" hex-head driver.
3. Shear values are valid for connections between two members with full thread penetration into the main member. For other wood side plate values, see *Fastening Systems* catalog (C-F-2017) at **strongtie.com**.
4. Allowable loads are shown at a wood load duration factor of C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values must be multiplied by all applicable NDS adjustment factors.
5. Withdrawal loads shown are in pounds (lb.) and are based on penetration of the screw's entire threaded section into the main member. If thread penetration into the main member is less than the Thread Length as shown in the table for DF/SP, reduce allowable load by 172 lb./in. of thread not in main member. Use 121 lb./in. for SPF/HF.
6. Fasteners per Carton represents the quantity of screws that are available in bulk packaging. Screws are also available in mini-bulk and retail packs. Refer to Simpson Strong-Tie® *Fastening Systems* catalog (C-F-2017) at **strongtie.com**.
7. LSL wood-to-wood applications that require 4½", 5", 6" or 8" SDS Heavy-Duty Connector screws are limited to interior-dry use only.
8. Where predrilling is required for Strong-Drive® SDS Heavy-Duty Connector screws, predrill diameter is 5⁄32".
9. Minimum spacing, edge, and end distance requirements are listed in ICC-ES ESR-2236. For smaller spacing, please contact Simpson Strong-Tie Engineering.

PCS Structural Solutions

Project: PRCA20220091 JEGP Job No:

Subject: Sheet Name: DCT

Originating Office: ☐ Seattle ☐ Tacoma ☐ Portland Date: 9/15/21

DETERMINE LENGTH OF DIAPHRAGM REQD TO RESIST LATERAL FORCE

$$V_a = \frac{570^{\#}/_{FT}}{2}\,(2\ \text{SIDES}) = 570^{\#}/_{FT}$$

$$L_R = \frac{4670^{\#}}{570^{\#}/_{FT}} = 8.2\,FT$$

∴ USE (2) ROWS OF 10d @ 6" OC FOR 8.2FT MIN

PCS Structural Solutions

Project: PRCA20220091 JEEP Job No:

Subject: Sheet Name: DCT

Originating Office: ☐ Seattle ☐ Tacoma ☐ Portland Date: 9/15/21

AT TYP HSS 6x6

$V_R = 1.01k$

DETERMINE NUMBER OF 1/4" Ø x 3 1/2" SDS SCREWS

$$\text{No. REQD} = \frac{1010\#}{672\#/\text{SCREW}} = 1.5 \Rightarrow (2) \text{ MIN}$$

∴ USE (2) 1/4" Ø x 3 1/2" SDS SCREWS MIN

DETERMINE LENGTH OF DIAPHRAGM REQD TO RESIST LATERAL FORCES

$$L_R = \frac{1010\#}{570\#/\text{FT}} = 1.8 \text{ FT}$$

∴ USE (2) ROWS OF 10d @ 6" oc FOR 1.8 FT MIN

PCS Structural Solutions

Project: PRCA20220091 Job No:

Subject: Sheet Name: DCT

Originating Office: ☐ Seattle ☐ Tacoma ☐ Portland Date: 9/15/21

FOUNDATIONS

AT TYP 10" ϕ COL

P_D = 12.55k

V_D = 0.52k

P_S = 9.77k

V_S = 0.44k

V_W = 0.78k

TRY 6'-0" SQ x 16" DP FTG

PER ENERCALC

q_{MAX} = 900psf < q_a ∴ OK

SF_{OT} = 42.6 > 1.5 OK

$SF_{SLIDING}$ = 11.0 > 1.5 OK

DCR_{STR} = 0.17 < 1.0 OK

∴ USE 6'-0" SQ x 14" DP FTG

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Storefront Fdn - 10" Col

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

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	=	1.009	ksf
Soil Density	=	110.0	pcf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	300.0	pcf
Soil/Concrete Friction Coeff.	=	0.450	

Increases based on footing Depth

Footing base depth below soil surface	=	1.917	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

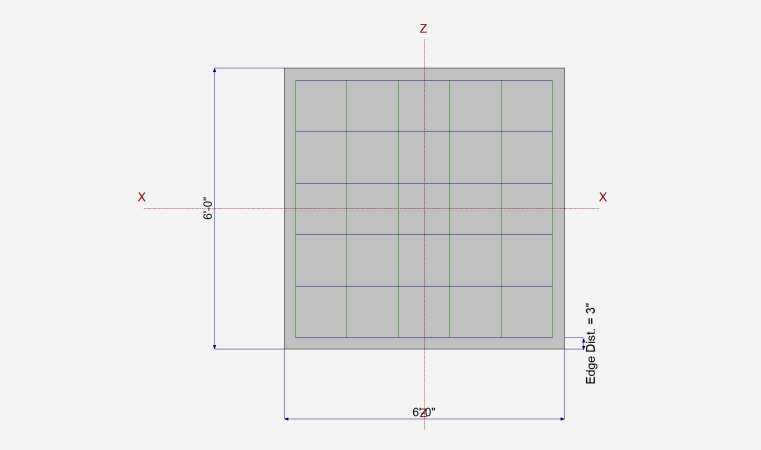
Width parallel to X-X Axis	=	6.0 ft
Length parallel to Z-Z Axis	=	6.0 ft
Footing Thickness	=	14.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	12.0 in
pz : parallel to Z-Z Axis	=	12.0 in
Height	=	in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in



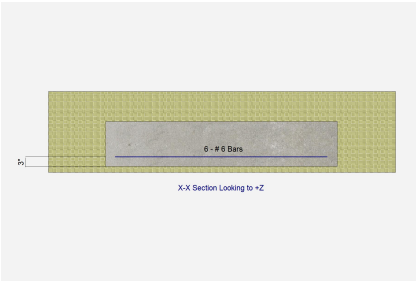
Reinforcing

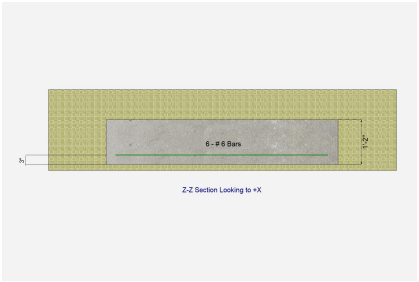
Bars parallel to X-X Axis			
Number of Bars	=		6
Reinforcing Bar Size	=	#	6
Bars parallel to Z-Z Axis			
Number of Bars	=		6
Reinforcing Bar Size	=	#	6

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation n/a

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





Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	12.550			9.770				k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=	0.520			0.440	0.780			k
V-z	=								k

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Storefront Fdn - 10" Col

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8922	Soil Bearing	0.9002 ksf	1.009 ksf	+D+S about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	42.584	Overturning - Z-Z	0.910 k-ft	38.752 k-ft	+0.60D+0.60W
PASS	11.043	Sliding - X-X	0.780 k	8.613 k	+0.60D+0.60W
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	0.1329	Z Flexure (+X)	2.781 k-ft/ft	20.926 k-ft/ft	+1.20D+1.60S+0.50W
PASS	0.1223	Z Flexure (-X)	2.558 k-ft/ft	20.926 k-ft/ft	+1.20D+1.60S
PASS	0.1269	X Flexure (+Z)	2.655 k-ft/ft	20.926 k-ft/ft	+1.20D+1.60S
PASS	0.1269	X Flexure (-Z)	2.655 k-ft/ft	20.926 k-ft/ft	+1.20D+1.60S
PASS	0.1282	1-way Shear (+X)	10.530 psi	82.158 psi	+1.20D+1.60S+0.50W
PASS	0.1177	1-way Shear (-X)	9.667 psi	82.158 psi	+1.20D+1.60S
PASS	0.1222	1-way Shear (+Z)	10.043 psi	82.158 psi	+1.20D+1.60S
PASS	0.1222	1-way Shear (-Z)	10.043 psi	82.158 psi	+1.20D+1.60S
PASS	0.1651	2-way Punching	27.135 psi	164.317 psi	+1.20D+1.60S

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	1.009	n/a	0.0	0.5980	0.5980	n/a	n/a	0.593
X-X, +D+S	1.009	n/a	0.0	0.8694	0.8694	n/a	n/a	0.862
X-X, +D+0.750S	1.009	n/a	0.0	0.8016	0.8016	n/a	n/a	0.795
X-X, +D+0.60W	1.009	n/a	0.0	0.5980	0.5980	n/a	n/a	0.593
X-X, +D+0.450W	1.009	n/a	0.0	0.5980	0.5980	n/a	n/a	0.593
X-X, +D+0.750S+0.450W	1.009	n/a	0.0	0.8016	0.8016	n/a	n/a	0.795
X-X, +0.60D+0.60W	1.009	n/a	0.0	0.3588	0.3588	n/a	n/a	0.356
X-X, +0.60D	1.009	n/a	0.0	0.3588	0.3588	n/a	n/a	0.356
Z-Z, D Only	1.009	0.3382	n/a	n/a	n/a	0.5813	0.6147	0.609
Z-Z, +D+S	1.009	0.4294	n/a	n/a	n/a	0.8386	0.9002	0.892
Z-Z, +D+0.750S	1.009	0.4124	n/a	n/a	n/a	0.7743	0.8288	0.821
Z-Z, +D+0.60W	1.009	0.6425	n/a	n/a	n/a	0.5663	0.6297	0.624
Z-Z, +D+0.450W	1.009	0.5664	n/a	n/a	n/a	0.5701	0.6260	0.620
Z-Z, +D+0.750S+0.450W	1.009	0.5827	n/a	n/a	n/a	0.7630	0.8401	0.833
Z-Z, +0.60D+0.60W	1.009	0.8454	n/a	n/a	n/a	0.3338	0.3838	0.380
Z-Z, +0.60D	1.009	0.3382	n/a	n/a	n/a	0.3488	0.3688	0.366

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	0.6067 k-ft	64.586 k-ft	106.461	OK
Z-Z, +D+S	1.120 k-ft	93.896 k-ft	83.836	OK
Z-Z, +D+0.750S	0.9917 k-ft	86.569 k-ft	87.296	OK
Z-Z, +D+0.60W	1.153 k-ft	64.586 k-ft	56.032	OK
Z-Z, +D+0.450W	1.016 k-ft	64.586 k-ft	63.559	OK
Z-Z, +D+0.750S+0.450W	1.401 k-ft	86.569 k-ft	61.783	OK
Z-Z, +0.60D+0.60W	0.910 k-ft	38.752 k-ft	42.584	OK
Z-Z, +0.60D	0.3640 k-ft	38.752 k-ft	106.461	OK

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Storefront Fdn - 10" Col

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, D Only	0.520 k	12.489 k	24.017	OK
X-X, +D+S	0.960 k	16.885 k	17.589	OK
X-X, +D+0.750S	0.850 k	15.786 k	18.572	OK
X-X, +D+0.60W	0.9880 k	12.489 k	12.640	OK
X-X, +D+0.450W	0.8710 k	12.489 k	14.338	OK
X-X, +D+0.750S+0.450W	1.201 k	15.786 k	13.144	OK
X-X, +0.60D+0.60W	0.780 k	8.613 k	11.043	OK
X-X, +0.60D	0.3120 k	8.613 k	27.607	OK
Z-Z, D Only	0.0 k	12.489 k	No Sliding	OK
Z-Z, +D+S	0.0 k	16.885 k	No Sliding	OK
Z-Z, +D+0.750S	0.0 k	15.786 k	No Sliding	OK
Z-Z, +D+0.60W	0.0 k	12.489 k	No Sliding	OK
Z-Z, +D+0.450W	0.0 k	12.489 k	No Sliding	OK
Z-Z, +D+0.750S+0.450W	0.0 k	15.786 k	No Sliding	OK
Z-Z, +0.60D+0.60W	0.0 k	8.613 k	No Sliding	OK
Z-Z, +0.60D	0.0 k	8.613 k	No Sliding	OK

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	1.515	+Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +1.40D	1.515	-Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +1.20D	1.299	+Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +1.20D	1.299	-Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +1.20D+0.50S	1.723	+Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +1.20D+0.50S	1.723	-Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +1.20D+0.50W	1.299	+Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +1.20D+0.50W	1.299	-Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +1.20D+1.60S	2.655	+Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +1.20D+1.60S	2.655	-Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +1.20D+1.60S+0.50W	2.655	+Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +1.20D+1.60S+0.50W	2.655	-Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +1.20D+W	1.299	+Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +1.20D+W	1.299	-Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +1.20D+0.50S+W	1.723	+Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +1.20D+0.50S+W	1.723	-Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +0.90D+W	0.9740	+Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +0.90D+W	0.9740	-Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +1.20D+0.20S	1.468	+Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +1.20D+0.20S	1.468	-Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +0.90D	0.9740	+Z	Bottom	0.3024	AsMin	0.440	20.926	OK
X-X, +0.90D	0.9740	-Z	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.40D	1.462	-X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.40D	1.568	+X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.20D	1.253	-X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.20D	1.344	+X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.20D+0.50S	1.661	-X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.20D+0.50S	1.784	+X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.20D+0.50W	1.224	-X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.20D+0.50W	1.373	+X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.20D+1.60S	2.558	-X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.20D+1.60S	2.753	+X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.20D+1.60S+0.50W	2.530	-X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.20D+1.60S+0.50W	2.781	+X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.20D+W	1.196	-X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.20D+W	1.401	+X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.20D+0.50S+W	1.604	-X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.20D+0.50S+W	1.841	+X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +0.90D+W	0.8827	-X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +0.90D+W	1.065	+X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.20D+0.20S	1.416	-X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +1.20D+0.20S	1.520	+X	Bottom	0.3024	AsMin	0.440	20.926	OK
Z-Z, +0.90D	0.9397	-X	Bottom	0.3024	AsMin	0.440	20.926	OK

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Storefront Fdn - 10" Col

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
Z-Z, +0.90D	1.008	+X	Bottom	0.3024	AsMin	0.440	20.926	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	5.52 psi	5.94 psi	5.73 psi	5.73 psi	5.94 psi	82.16 psi	0.07	OK
+1.20D	4.74 psi	5.09 psi	4.91 psi	4.91 psi	5.09 psi	82.16 psi	0.06	OK
+1.20D+0.50S	6.28 psi	6.75 psi	6.52 psi	6.52 psi	6.75 psi	82.16 psi	0.08	OK
+1.20D+0.50W	4.62 psi	5.20 psi	4.91 psi	4.91 psi	5.20 psi	82.16 psi	0.06	OK
+1.20D+1.60S	9.67 psi	10.42 psi	10.04 psi	10.04 psi	10.42 psi	82.16 psi	0.13	OK
+1.20D+1.60S+0.50W	9.56 psi	10.53 psi	10.04 psi	10.04 psi	10.53 psi	82.16 psi	0.13	OK
+1.20D+W	4.51 psi	5.31 psi	4.91 psi	4.91 psi	5.31 psi	82.16 psi	0.06	OK
+1.20D+0.50S+W	6.06 psi	6.98 psi	6.52 psi	6.52 psi	6.98 psi	82.16 psi	0.08	OK
+0.90D+W	3.33 psi	4.04 psi	3.68 psi	3.68 psi	4.04 psi	82.16 psi	0.05	OK
+1.20D+0.20S	5.35 psi	5.76 psi	5.55 psi	5.55 psi	5.76 psi	82.16 psi	0.07	OK
+0.90D	3.55 psi	3.82 psi	3.68 psi	3.68 psi	3.82 psi	82.16 psi	0.05	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	15.48 psi	164.32 psi	0.09422	OK
+1.20D	13.27 psi	164.32 psi	0.08076	OK
+1.20D+0.50S	17.60 psi	164.32 psi	0.1071	OK
+1.20D+0.50W	13.27 psi	164.32 psi	0.08076	OK
+1.20D+1.60S	27.14 psi	164.32 psi	0.1651	OK
+1.20D+1.60S+0.50W	27.14 psi	164.32 psi	0.1651	OK
+1.20D+W	13.27 psi	164.32 psi	0.08076	OK
+1.20D+0.50S+W	17.60 psi	164.32 psi	0.1071	OK
+0.90D+W	9.95 psi	164.32 psi	0.06057	OK
+1.20D+0.20S	15.00 psi	164.32 psi	0.0913	OK
+0.90D	9.95 psi	164.32 psi	0.06057	OK

AT TYP HSS 6x6 COL

$P_D = 2.99k$

$V_D = 0.04k$

$P_S = 2.22k$

$V_S = 0.03k$

$V_W = 0.14k$

TRY 3'-0" SQ x 11" DP FTG

PER ENERCALC

$q_{MAX} = 839 psf < q_a \therefore OK$

$SF_{OT} = 22.0 > 1.5 \therefore OK$

$SF_{SLIDING} = 23.8 > 1.5 \therefore OK$

$DCR_{MAX} = 0.05 < 1.0 \therefore OK$

$\therefore$ USE 3'-0" SQ x 11" DP FTG

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Storefront Fdn - HSS 6x6 Col

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

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	=	1.50	ksf
Soil Density	=	110.0	pcf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	300.0	pcf
Soil/Concrete Friction Coeff.	=	0.450	

Increases based on footing Depth

Footing base depth below soil surface	=	1.917	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

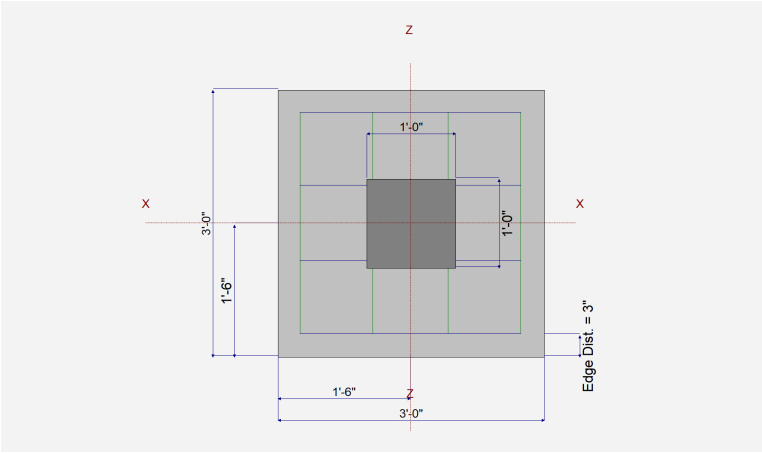
Width parallel to X-X Axis	=	3.0 ft
Length parallel to Z-Z Axis	=	3.0 ft
Footing Thickness	=	11.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	12.0 in
pz : parallel to Z-Z Axis	=	12.0 in
Height	=	12.0 in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in



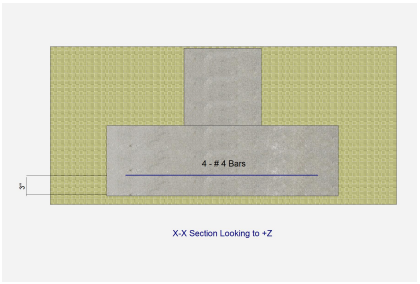
Reinforcing

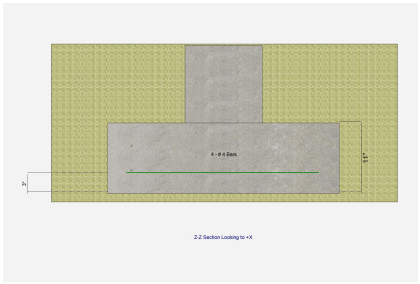
Bars parallel to X-X Axis			
Number of Bars	=		4.0
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis			
Number of Bars	=		4.0
Reinforcing Bar Size	=	#	4

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	=	2.990			2.220				k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=	0.040			0.030	0.140			k
V-z	=								k

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Storefront Fdn - HSS 6x6 Col

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.5594	Soil Bearing	0.8391 ksf	1.50 ksf	+D+S about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	22.028	Overturning - Z-Z	0.2070 k-ft	4.560 k-ft	+0.60D+0.60W
PASS	23.809	Sliding - X-X	0.1080 k	2.571 k	+0.60D+0.60W
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	0.04488	Z Flexure (+X)	0.4168 k-ft/ft	9.286 k-ft/ft	+1.20D+1.60S+0.50W
PASS	0.04021	Z Flexure (-X)	0.3734 k-ft/ft	9.286 k-ft/ft	+1.20D+1.60S
PASS	0.04192	X Flexure (+Z)	0.3893 k-ft/ft	9.286 k-ft/ft	+1.20D+1.60S
PASS	0.04192	X Flexure (-Z)	0.3893 k-ft/ft	9.286 k-ft/ft	+1.20D+1.60S
PASS	0.03521	1-way Shear (+X)	2.893 psi	82.158 psi	+1.20D+1.60S+0.50W
PASS	0.03106	1-way Shear (-X)	2.552 psi	82.158 psi	+1.20D+1.60S
PASS	0.03258	1-way Shear (+Z)	2.677 psi	82.158 psi	+1.20D+1.60S
PASS	0.03258	1-way Shear (-Z)	2.677 psi	82.158 psi	+1.20D+1.60S
PASS	0.04574	2-way Punching	7.516 psi	164.317 psi	+1.20D+1.60S+0.50W

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	1.50	n/a	0.0	0.5629	0.5629	n/a	n/a	0.375
X-X, +D+S	1.50	n/a	0.0	0.8096	0.8096	n/a	n/a	0.540
X-X, +D+0.750S	1.50	n/a	0.0	0.7479	0.7479	n/a	n/a	0.499
X-X, +D+0.60W	1.50	n/a	0.0	0.5629	0.5629	n/a	n/a	0.375
X-X, +D+0.450W	1.50	n/a	0.0	0.5629	0.5629	n/a	n/a	0.375
X-X, +D+0.750S+0.450W	1.50	n/a	0.0	0.7479	0.7479	n/a	n/a	0.499
X-X, +0.60D+0.60W	1.50	n/a	0.0	0.3378	0.3378	n/a	n/a	0.225
X-X, +0.60D	1.50	n/a	0.0	0.3378	0.3378	n/a	n/a	0.225
Z-Z, D Only	1.50	0.1816	n/a	n/a	n/a	0.5461	0.5798	0.387
Z-Z, +D+S	1.50	0.2210	n/a	n/a	n/a	0.7801	0.8391	0.559
Z-Z, +D+0.750S	1.50	0.2135	n/a	n/a	n/a	0.7216	0.7743	0.516
Z-Z, +D+0.60W	1.50	0.5629	n/a	n/a	n/a	0.5107	0.6152	0.410
Z-Z, +D+0.450W	1.50	0.4676	n/a	n/a	n/a	0.5195	0.6064	0.404
Z-Z, +D+0.750S+0.450W	1.50	0.4288	n/a	n/a	n/a	0.6950	0.8009	0.534
Z-Z, +0.60D+0.60W	1.50	0.8171	n/a	n/a	n/a	0.2922	0.3833	0.256
Z-Z, +0.60D	1.50	0.1816	n/a	n/a	n/a	0.3277	0.3479	0.232

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	0.07667 k-ft	7.60 k-ft	99.128	OK
Z-Z, +D+S	0.1342 k-ft	10.930 k-ft	81.464	OK
Z-Z, +D+0.750S	0.1198 k-ft	10.097 k-ft	84.291	OK
Z-Z, +D+0.60W	0.2377 k-ft	7.60 k-ft	31.977	OK
Z-Z, +D+0.450W	0.1974 k-ft	7.60 k-ft	38.496	OK
Z-Z, +D+0.750S+0.450W	0.2405 k-ft	10.097 k-ft	41.977	OK
Z-Z, +0.60D+0.60W	0.2070 k-ft	4.560 k-ft	22.028	OK
Z-Z, +0.60D	0.0460 k-ft	4.560 k-ft	99.128	OK

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Storefront Fdn - HSS 6x6 Col

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, D Only	0.040 k	3.483 k	87.084	OK
X-X, +D+S	0.070 k	4.482 k	64.033	OK
X-X, +D+0.750S	0.06250 k	4.233 k	67.722	OK
X-X, +D+0.60W	0.1240 k	3.483 k	28.091	OK
X-X, +D+0.450W	0.1030 k	3.483 k	33.819	OK
X-X, +D+0.750S+0.450W	0.1255 k	4.233 k	33.726	OK
X-X, +0.60D+0.60W	0.1080 k	2.571 k	23.809	OK
X-X, +0.60D	0.0240 k	2.571 k	107.140	OK
Z-Z, D Only	0.0 k	3.483 k	No Sliding	OK
Z-Z, +D+S	0.0 k	4.482 k	No Sliding	OK
Z-Z, +D+0.750S	0.0 k	4.233 k	No Sliding	OK
Z-Z, +D+0.60W	0.0 k	3.483 k	No Sliding	OK
Z-Z, +D+0.450W	0.0 k	3.483 k	No Sliding	OK
Z-Z, +D+0.750S+0.450W	0.0 k	4.233 k	No Sliding	OK
Z-Z, +0.60D+0.60W	0.0 k	2.571 k	No Sliding	OK
Z-Z, +0.60D	0.0 k	2.571 k	No Sliding	OK

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	0.2240	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.40D	0.2240	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D	0.1920	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D	0.1920	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+0.50S	0.2536	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+0.50S	0.2536	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+0.50W	0.1920	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+0.50W	0.1920	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+1.60S	0.3893	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+1.60S	0.3893	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+1.60S+0.50W	0.3893	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+1.60S+0.50W	0.3893	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+W	0.1920	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+W	0.1920	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+0.50S+W	0.2536	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+0.50S+W	0.2536	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +0.90D+W	0.1440	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +0.90D+W	0.1440	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+0.20S	0.2166	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+0.20S	0.2166	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +0.90D	0.1440	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +0.90D	0.1440	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.40D	0.2147	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.40D	0.2332	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D	0.1840	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D	0.1999	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+0.50S	0.2432	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+0.50S	0.2641	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+0.50W	0.1724	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+0.50W	0.2115	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+1.60S	0.3734	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+1.60S	0.4052	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+1.60S+0.50W	0.3618	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+1.60S+0.50W	0.4168	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+W	0.1608	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+W	0.2231	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+0.50S+W	0.220	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+0.50S+W	0.2873	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +0.90D+W	0.1148	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +0.90D+W	0.1731	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+0.20S	0.2077	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+0.20S	0.2256	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +0.90D	0.1380	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Storefront Fdn - HSS 6x6 Col

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
Z-Z, +0.90D	0.1499	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	1.47 psi	1.61 psi	1.54 psi	1.54 psi	1.61 psi	82.16 psi	0.02	OK
+1.20D	1.26 psi	1.38 psi	1.32 psi	1.32 psi	1.38 psi	82.16 psi	0.02	OK
+1.20D+0.50S	1.66 psi	1.83 psi	1.74 psi	1.74 psi	1.83 psi	82.16 psi	0.02	OK
+1.20D+0.50W	1.17 psi	1.47 psi	1.32 psi	1.32 psi	1.47 psi	82.16 psi	0.02	OK
+1.20D+1.60S	2.55 psi	2.80 psi	2.68 psi	2.68 psi	2.80 psi	82.16 psi	0.03	OK
+1.20D+1.60S+0.50W	2.46 psi	2.89 psi	2.68 psi	2.68 psi	2.89 psi	82.16 psi	0.04	OK
+1.20D+W	1.08 psi	1.57 psi	1.32 psi	1.32 psi	1.57 psi	82.16 psi	0.02	OK
+1.20D+0.50S+W	1.48 psi	2.01 psi	1.74 psi	1.74 psi	2.01 psi	82.16 psi	0.02	OK
+0.90D+W	0.76 psi	1.22 psi	0.99 psi	0.99 psi	1.22 psi	82.16 psi	0.01	OK
+1.20D+0.20S	1.42 psi	1.56 psi	1.49 psi	1.49 psi	1.56 psi	82.16 psi	0.02	OK
+0.90D	0.94 psi	1.04 psi	0.99 psi	0.99 psi	1.04 psi	82.16 psi	0.01	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	4.32 psi	164.32 psi	0.02632	OK
+1.20D	3.71 psi	164.32 psi	0.02256	OK
+1.20D+0.50S	4.90 psi	164.32 psi	0.0298	OK
+1.20D+0.50W	3.71 psi	164.32 psi	0.02256	OK
+1.20D+1.60S	7.52 psi	164.32 psi	0.04574	OK
+1.20D+1.60S+0.50W	7.52 psi	164.32 psi	0.04574	OK
+1.20D+W	3.71 psi	164.32 psi	0.02256	OK
+1.20D+0.50S+W	4.90 psi	164.32 psi	0.0298	OK
+0.90D+W	2.78 psi	164.32 psi	0.01692	OK
+1.20D+0.20S	4.18 psi	164.32 psi	0.02546	OK
+0.90D	2.78 psi	164.32 psi	0.01692	OK

PCS Structural Solutions

Project: PRCA20220091 JEEP Job No:

Subject: Sheet Name: DCT

Originating Office: ☐ Seattle ☐ Tacoma ☐ Portland Date: 9/15/21

SHOWROOM CANOPY

LOADS

$P_D = \begin{cases} 19\text{psf} & \text{ROOF} \\ 15\text{psf} & \text{ASSUMED FOR WALL \& CANOPY} \end{cases}$

$P_S = \begin{cases} 25\text{psf} & \text{UNIFORM} \\ 12.6\text{psf} & \text{UNIFORM} + 29.3\text{ psf DRIFT} \quad \underset{7.2\text{ft}}{\triangle} = 41.9\text{psf} \end{cases}$

$P_W = \begin{cases} 16\text{psf} & \text{WALL PRESSURE} \\ \pm 0.9(12.6\text{psf}) = \pm 11.4\text{ psf} & \text{CANOPY} \end{cases}$

WHERE $q_z = 12.6\text{psf}$ FROM DES CRIT

$GC_p = \pm 0.90$ FOR $h_c/h_e < 0.9$, CONSERVATIVE

DETERMINE LOADS ON HDR DUE TO WALL DL, SNOW, & WIND

$w_D = 15\text{psf}(10\text{ft}) + 19\text{psf}(35.5\text{ft}/2) = 487\#/\text{ft}$

$w_W = 16\text{psf}(20\text{ft}/2) = 160\#/\text{ft}$

$w_S = 25\text{psf}(35.5\text{ft}/2) = 444\#/\text{ft}$

TRY HSS 6x6x¼ COL & HSS 8x6x¼ HDR

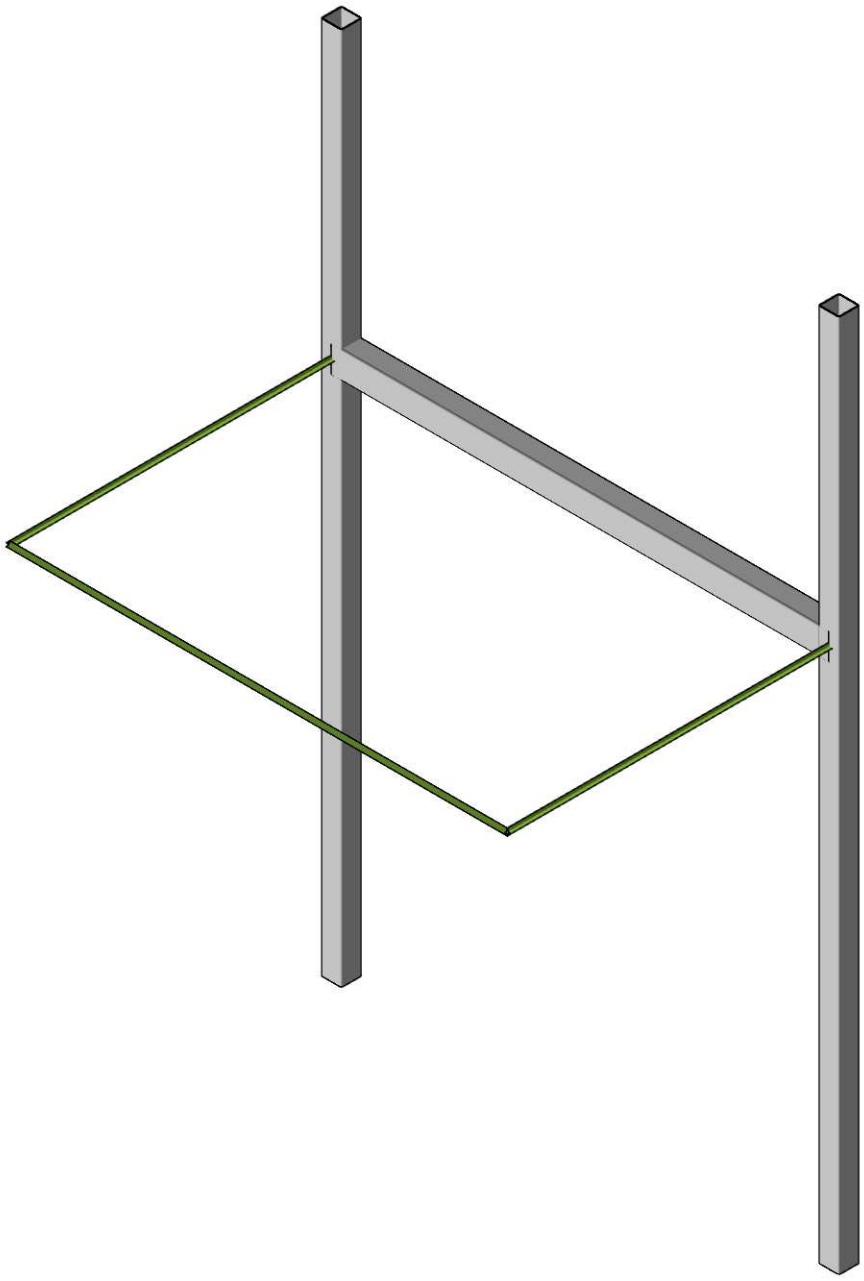
PER RISA

$DCR_{MAX} = 0.55 < 1 \therefore \text{OK}$

$\therefore$ MEMBERS OK

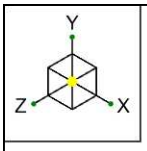
NOTE: USE ¼" FILLET WELDS BY INSPECTION

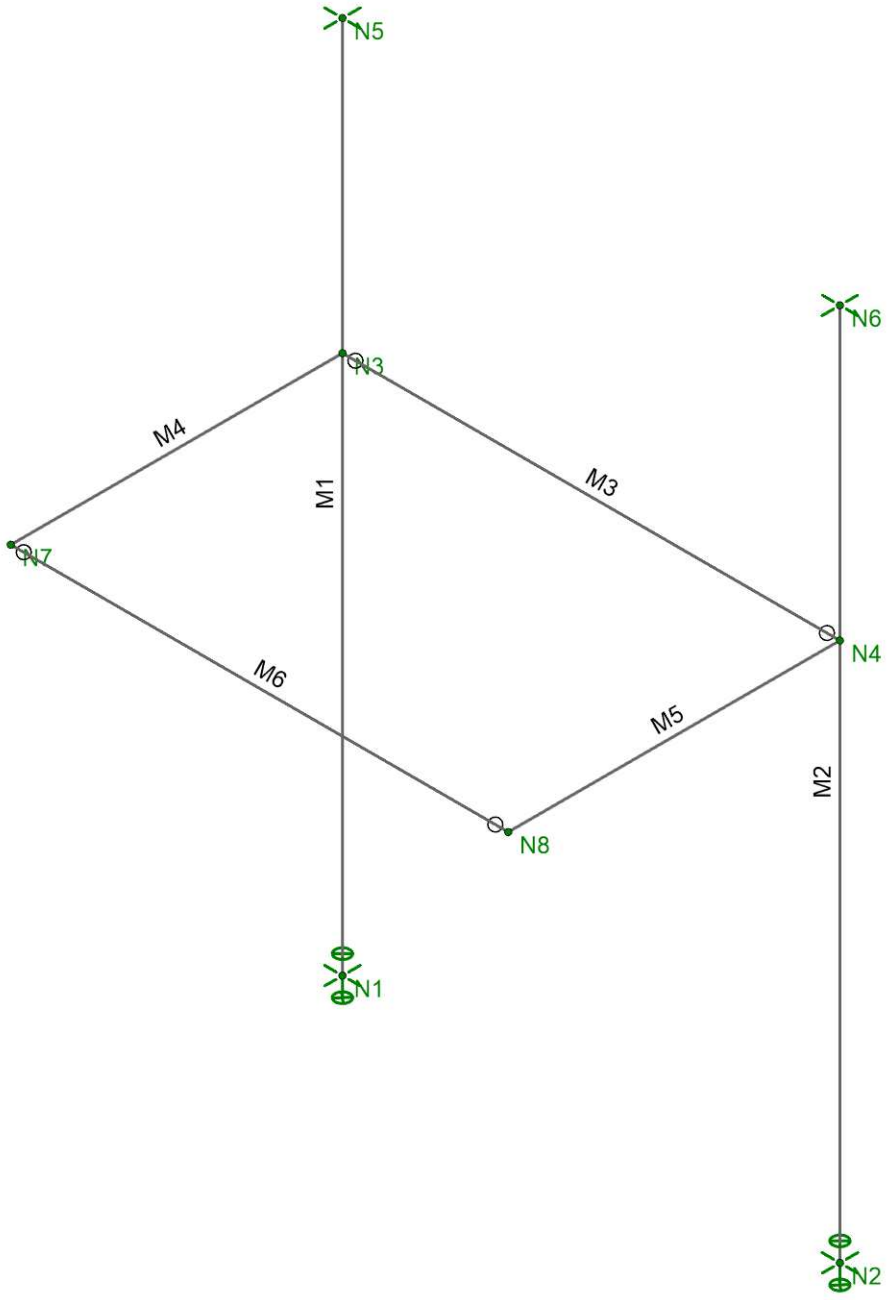
PRCA20220091



<Licensed Company>		SK-7
dtappel		Sep 15, 2021
		Showroom Canopy Framing 09-…

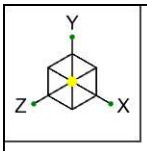
PRCA20220091

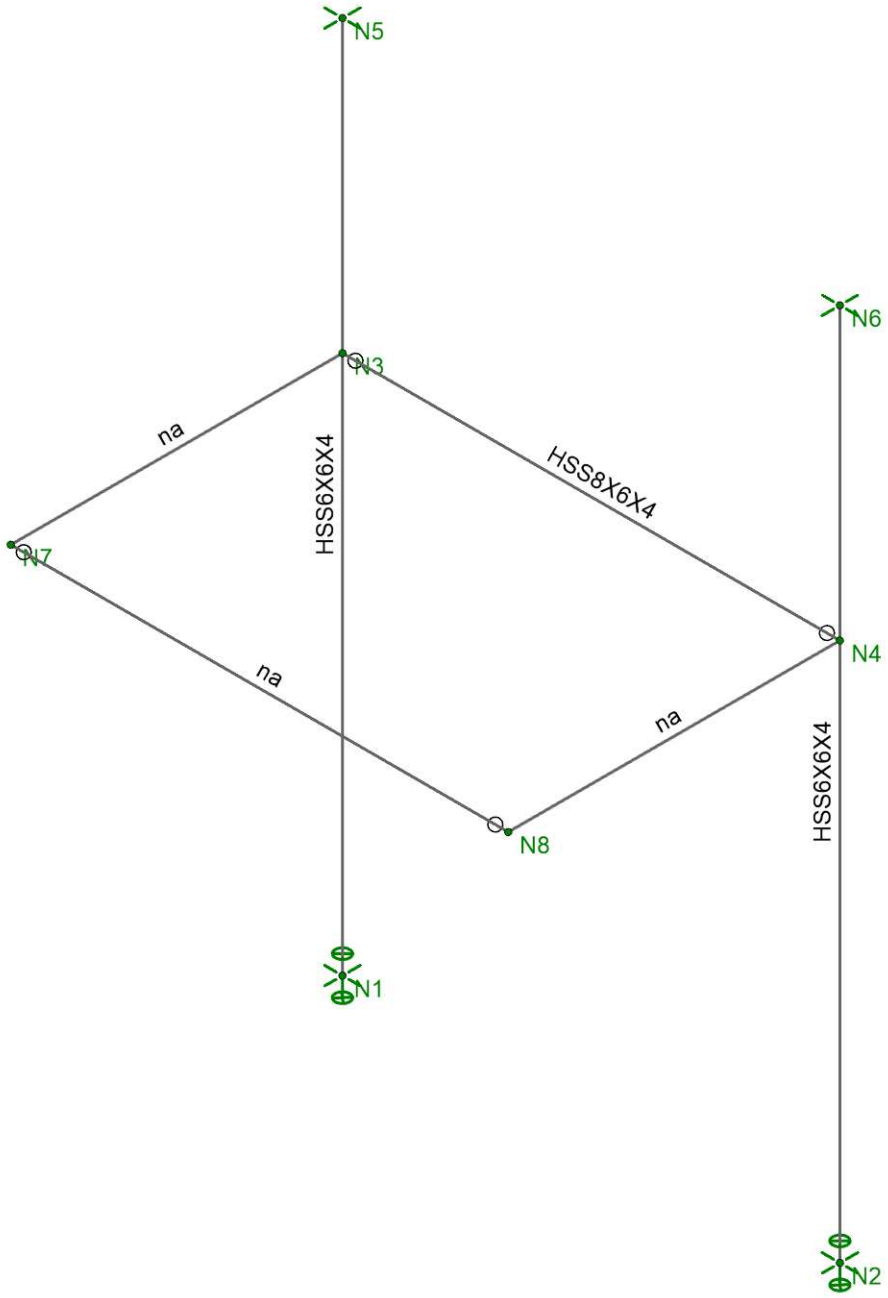




<Licensed Company>		SK-8
dtappel		Sep 15, 2021
		Showroom Canopy Framing 09-…

PRCA20220091





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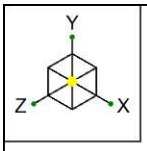
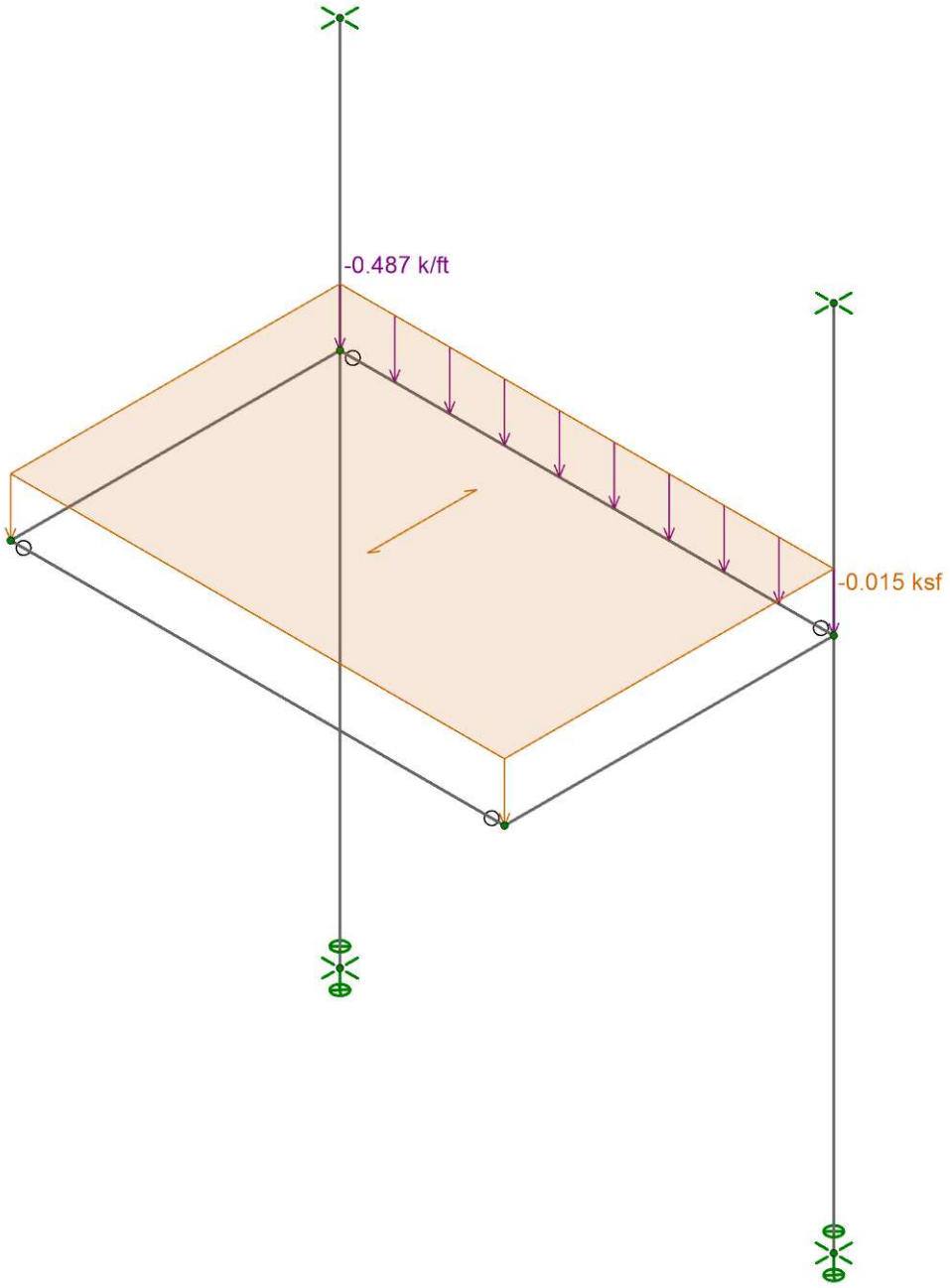
dtappel		Sep 15, 2021
		Showroom Canopy Framing 09-…

PRCA20220091

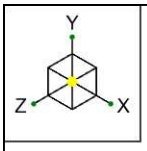


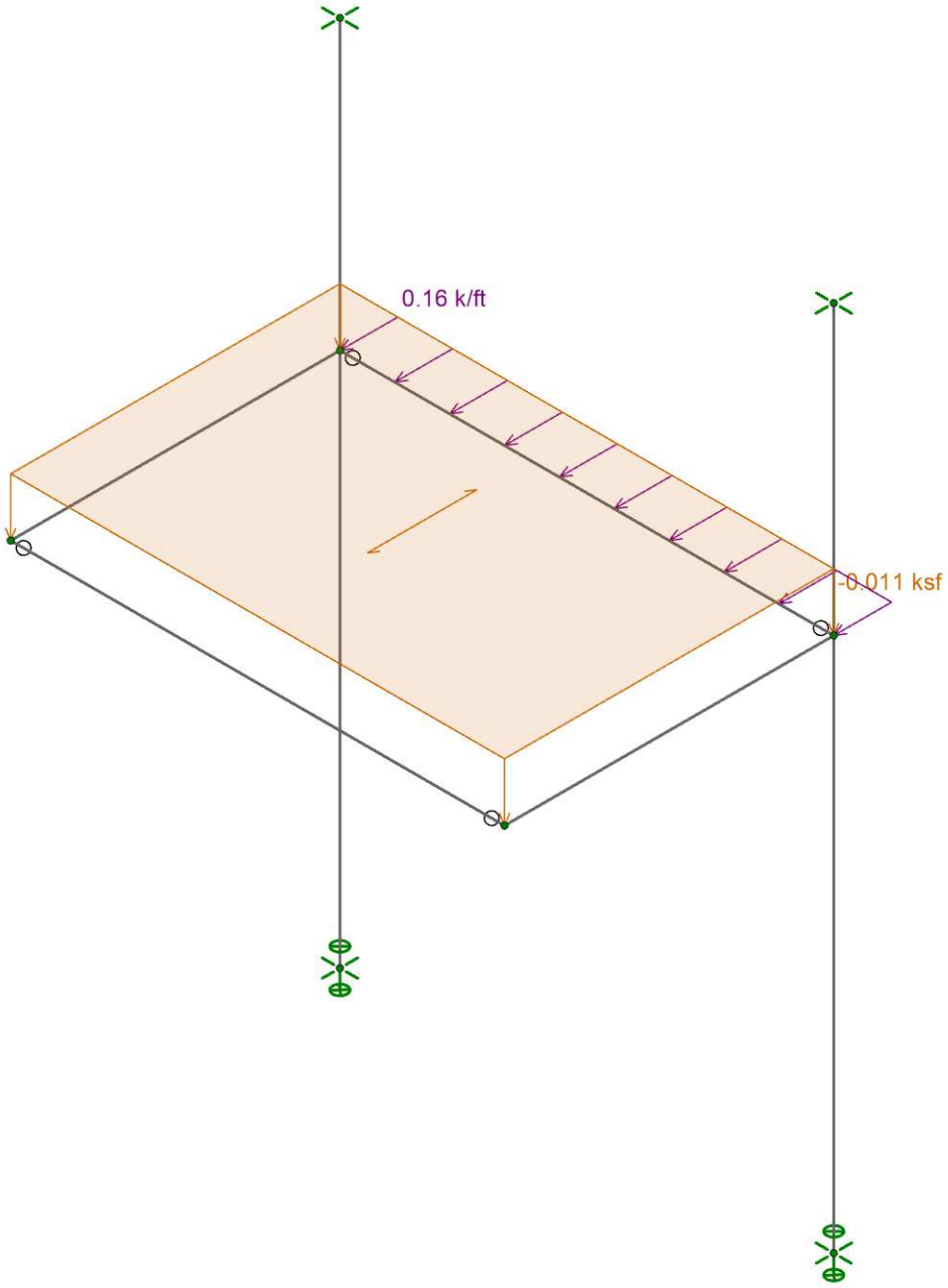


Loads: BLC 1, Dead Load

<Licensed Company>		SK-10
dtappel		Sep 15, 2021
		Showroom Canopy Framing 09-…

PRCA20220091

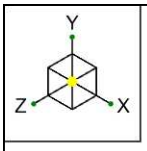


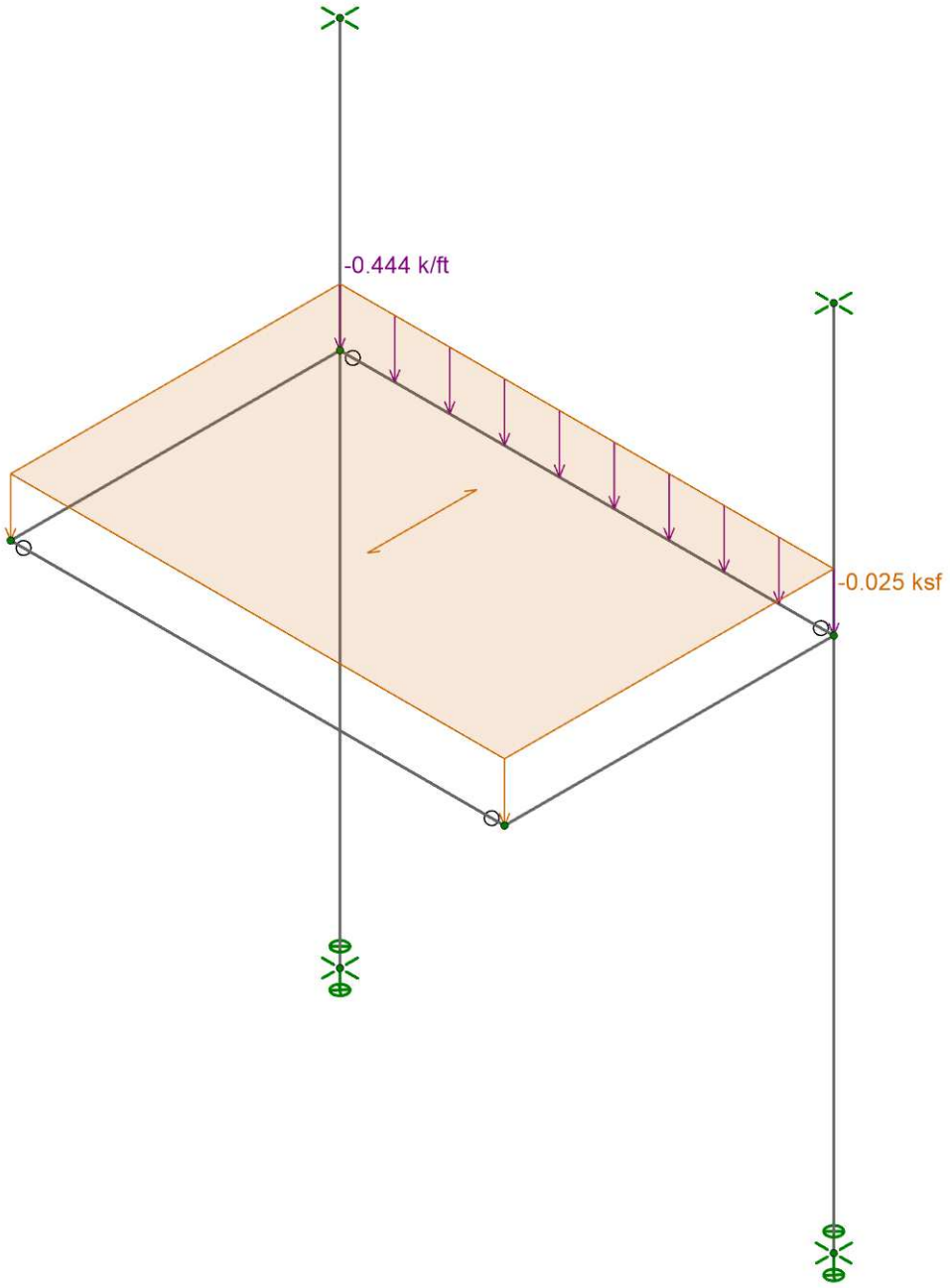


Loads: BLC 2, Wind Load

<Licensed Company>		SK-11
dtappel		Sep 15, 2021
		Showroom Canopy Framing 09-…

PRCA20220091

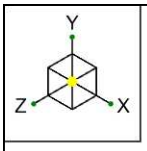


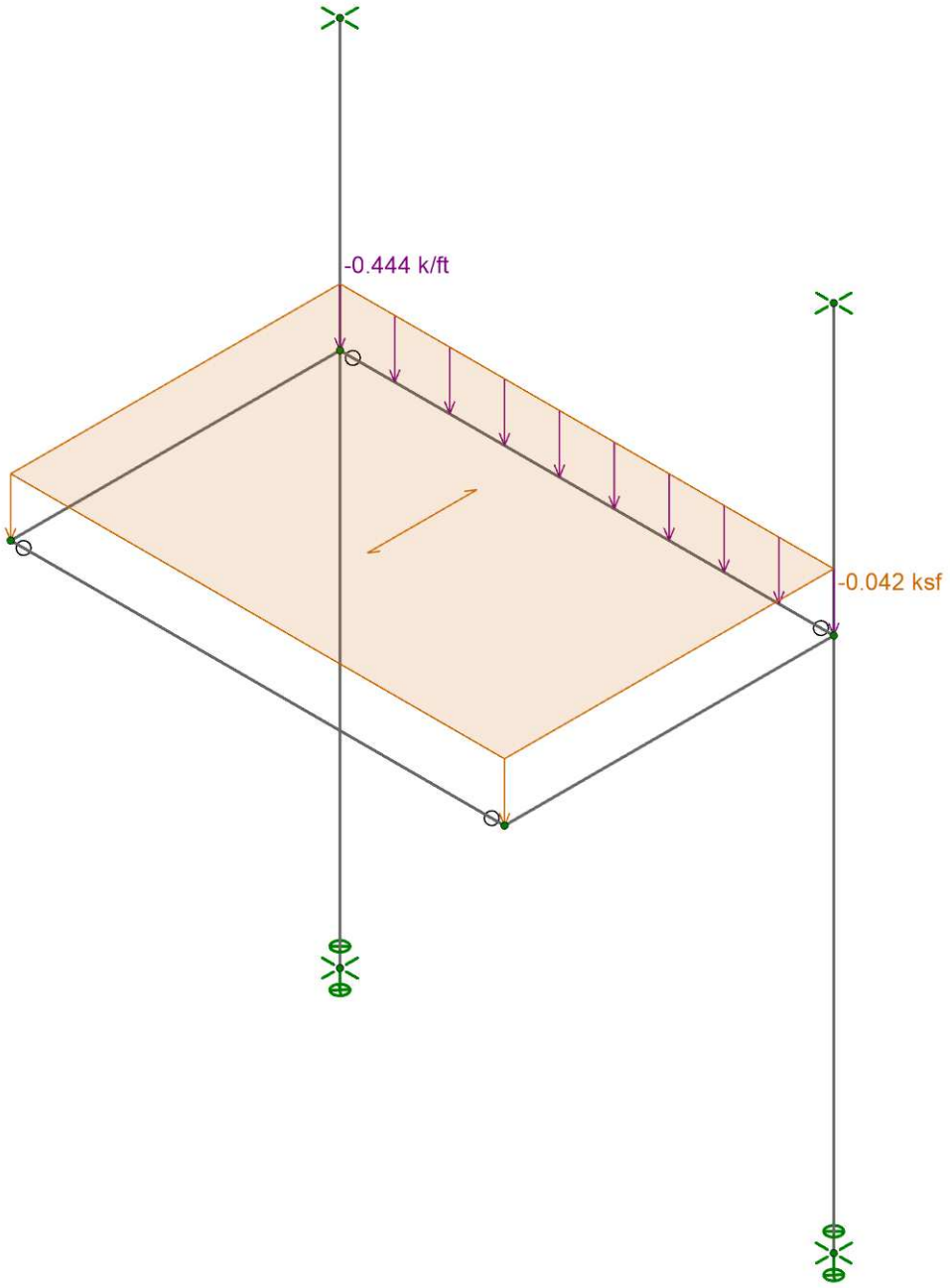


Loads: BLC 3, Snow Load

<Licensed Company>		SK-12
dtappel		Sep 15, 2021
		Showroom Canopy Framing 09-…

PRCA20220091

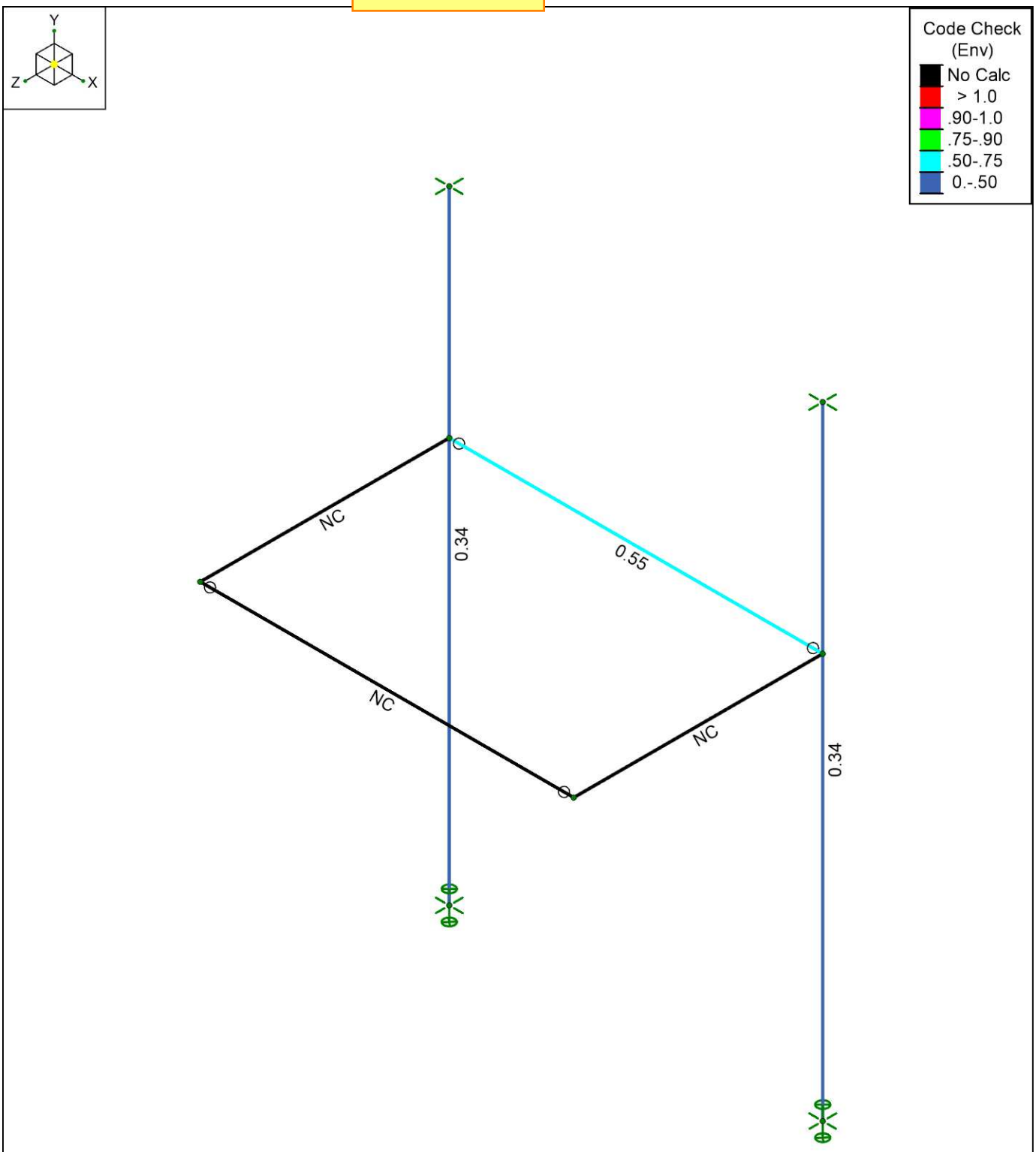




Loads: BLC 4, Snow Drift

<Licensed Company>		SK-13
dtappel		Sep 15, 2021
		Showroom Canopy Framing 09-…

PRCA20220091



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

<Licensed Company>		SK-14
dtappel		Sep 15, 2021
		Showroom Canopy Framing 09-…

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	0.3	0.65	0.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	0.3	0.65	0.49	35	1.6	60	1.2
7	A1085	29000	11154	0.3	0.65	0.49	50	1.25	65	1.15
8	A913 Gr.65	29000	11154	0.3	0.65	0.49	65	1.1	80	1.1

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	Col	HSS6X6X4	Column	Tube	A500 Gr.B Rect	Typical	5.24	28.6	28.6	45.6
2	Hdr	HSS8X6X4	Beam	Tube	A500 Gr.B Rect	Typical	6.17	36.4	56.6	70.3

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	N1	0	0	0	
2	N2	12	0	0	
3	N3	0	13	0	
4	N4	12	13	0	
5	N5	0	20	0	
6	N6	12	20	0	
7	N7	0	13	8	
8	N8	12	13	8	

Member Primary Data

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
1	M1	N1	N5	Col	Column	Tube	A500 Gr.B Rect	Typical
2	M2	N2	N6	Col	Column	Tube	A500 Gr.B Rect	Typical
3	M3	N3	N4	Hdr	Beam	Tube	A500 Gr.B Rect	Typical
4	M4	N3	N7	RIGID	None	None	RIGID	Typical
5	M5	N4	N8	RIGID	None	None	RIGID	Typical
6	M6	N7	N8	RIGID	None	None	RIGID	Typical

Hot Rolled Steel Design Parameters

	Label	Shape	Length [ft]	Lcomp top [ft]	Function
1	M1	Col	20	Lbyy	Lateral
2	M2	Col	20	Lbyy	Lateral
3	M3	Hdr	12	Lbyy	Lateral

Member Advanced Data

	Label	I Release	J Release	Physical	Deflection Ratio Options	Seismic DR
1	M1			Yes	** NA **	None
2	M2			Yes	** NA **	None
3	M3	BenPIN	BenPIN	Yes	Default	None
4	M4			Yes	** NA **	None
5	M5			Yes	** NA **	None
6	M6	BenPIN	BenPIN	Yes	** NA **	None

Node Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]	Y Rot [k-ft/rad]
1	N6	Reaction		Reaction	
2	N5	Reaction		Reaction	
3	N2	Reaction	Reaction	Reaction	Reaction
4	N1	Reaction	Reaction	Reaction	Reaction

Basic Load Cases

	BLC Description	Category	Y Gravity	Distributed	Area(Member)
1	Dead Load	DL	-1	1	1
2	Wind Load	WL		1	1
3	Snow Load	SL		1	1
4	Snow Drift	OL1		1	1
5	BLC 1 Transient Area Loads	None		2	
6	BLC 2 Transient Area Loads	None		2	
7	BLC 3 Transient Area Loads	None		2	
8	BLC 4 Transient Area Loads	None		2	

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	IBC 16-8	Yes	Y	DL	1										
2	IBC 16-9	Yes	Y	DL	1	LL	1	LLS	1						
3	IBC 16-10 (b)	Yes	Y	DL	1	SL	1	SLN	1						
4	IBC 16-10 (b)	Yes	Y	DL	1	OL1	1								
5	IBC 16-11 (b)	Yes	Y	DL	1	LL	0.75	LLS	0.75	SL	0.75	SLN	0.75		
6	IBC 16-12 (a) (a)	Yes	Y	DL	1	WL	0.6								
7	IBC 16-12 (a) (b)	Yes	Y	DL	1	WL	-0.6								
8	IBC 16-13 (a) (a)	Yes	Y	DL	1	WL	0.45	LL	0.75	LLS	0.75				
9	IBC 16-13 (a) (b)	Yes	Y	DL	1	WL	-0.45	LL	0.75	LLS	0.75				
10	IBC 16-13 (b) (a)	Yes	Y	DL	1	WL	0.45	LL	0.75	LLS	0.75	SL	0.75	SLN	0.75
11	IBC 16-13 (b) (b)	Yes	Y	DL	1	WL	-0.45	LL	0.75	LLS	0.75	SL	0.75	SLN	0.75
12	IBC 16-13 (b) (a)	Yes	Y	DL	1	WL	0.45	LL	0.75	LLS	0.75	OL1	0.75		
13	IBC 16-13 (b) (b)	Yes	Y	DL	1	WL	-0.45	LL	0.75	LLS	0.75	OL1	0.75		
14	IBC 16-15 (a)	Yes	Y	DL	0.6	WL	0.6								
15	IBC 16-15 (b)	Yes	Y	DL	0.6	WL	-0.6								
16	Dead Load		Y	DL	1										
17	Snow Load		Y	SL	1										
18	Snow Drift		Y	OL1	1										
19	Wind Load		Y	WL	1										

Envelope Node Reactions

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N6	max	0	15	0	15	0.3538	15	0	15	0	15	0	15
2		min	0	4	0	1	-0.7714	12	0	1	0	1	0	1
3	N5	max	0	4	0	15	0.3538	15	0	15	0	15	0	15
4		min	0	15	0	1	-0.7714	12	0	1	0	1	0	1
5	N2	max	0	15	8.841	4	0.5364	13	0	15	0	15	0	15
6		min	0	4	2.1798	15	-0.0498	14	0	1	0	4	0	1
7	N1	max	0	15	8.841	4	0.5364	13	0	15	0	4	0	15
8		min	0	4	2.1798	15	-0.0498	14	0	1	0	15	0	1
9	Totals:	max	0	15	17.682	4	1.152	7						
10		min	0	4	4.3596	15	-1.152	14						

Envelope AISC 15TH (360-16): ASD Member Steel Code Checks

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-ft]	Mnzz/om [k-ft]	Cb	Eqn
1	M1	HSS6X6X4	0.3389	12.9167	4	0.0189	20	z	12	70.9689	144.3353	25.7086	25.7086	1	H1-1b
2	M2	HSS6X6X4	0.3389	12.9167	4	0.0189	20	z	12	70.9689	144.3353	25.7086	25.7086	1	H1-1b
3	M3	HSS8X6X4	0.5483	6	4	0.1261	12	y	4	134.1662	169.9521	30.0599	38.7924	1.1364	H1-1b

FOUNDATION

$P_D = 4.16k$

$V_D = 0.14k$

$P_S = 4.68k$

$V_S = 0.40k$

$P_W = 0.53k$

$V_W = 0.23k$

TRY 4-6" SQ x 11" DP FTG

PER ENERCALC

$q_{MAX} = 885 psf < q_a \therefore OK$

$SF_{OT} = 22.4 > 1 \therefore OK$

$SF_{SLIDING} = 12.6 > 1 \therefore OK$

$DCR_{MAX} = 0.10 < 1 \therefore OK$

$\therefore$ USE 4-6" SQ x 11" DP FTG

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Showroom Canopy Fdn

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

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	=	1.0	ksf
Soil Density	=	110.0	pcf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	300.0	pcf
Soil/Concrete Friction Coeff.	=	0.450	

Increases based on footing Depth

Footing base depth below soil surface	=	1.917	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

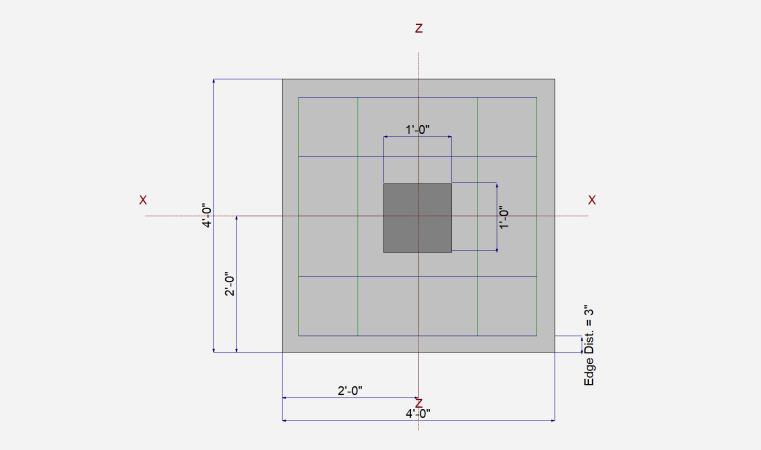
Width parallel to X-X Axis	=	4.0 ft
Length parallel to Z-Z Axis	=	4.0 ft
Footing Thickness	=	11.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	12.0 in
pz : parallel to Z-Z Axis	=	12.0 in
Height	=	12.0 in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in



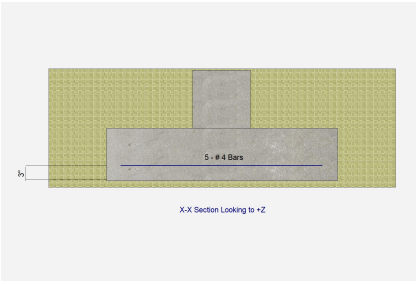
Reinforcing

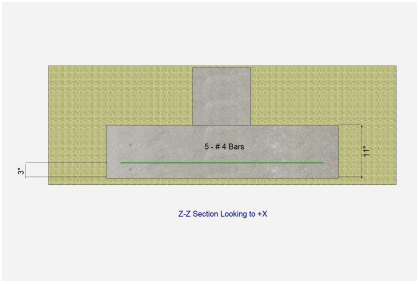
Bars parallel to X-X Axis			
Number of Bars	=		5
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis			
Number of Bars	=		5
Reinforcing Bar Size	=	#	4

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	=	4.160			4.680	0.530			k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=	0.140			0.40	0.230			k
V-z	=								k

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Showroom Canopy Fdn

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8846	Soil Bearing	0.8846 ksf	1.0 ksf	+D+S about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	22.436	Overturning - Z-Z	1.042 k-ft	23.371 k-ft	+D+0.750S+0.450W
PASS	12.628	Sliding - X-X	0.5435 k	6.863 k	+D+0.750S+0.450W
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	0.1177	Z Flexure (+X)	1.027 k-ft/ft	8.724 k-ft/ft	+1.20D+1.60S+0.50W
PASS	0.08560	Z Flexure (-X)	0.7468 k-ft/ft	8.724 k-ft/ft	+1.20D+1.60S+0.50W
PASS	0.1016	X Flexure (+Z)	0.8867 k-ft/ft	8.724 k-ft/ft	+1.20D+1.60S+0.50W
PASS	0.1016	X Flexure (-Z)	0.8867 k-ft/ft	8.724 k-ft/ft	+1.20D+1.60S+0.50W
PASS	0.09791	1-way Shear (+X)	8.044 psi	82.158 psi	+1.20D+1.60S+0.50W
PASS	0.070	1-way Shear (-X)	5.751 psi	82.158 psi	+1.20D+1.60S+0.50W
PASS	0.08396	1-way Shear (+Z)	6.898 psi	82.158 psi	+1.20D+1.60S+0.50W
PASS	0.08396	1-way Shear (-Z)	6.898 psi	82.158 psi	+1.20D+1.60S+0.50W
PASS	0.09878	2-way Punching	16.231 psi	164.317 psi	+1.20D+1.60S+0.50W

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	1.0	n/a	0.0	0.4961	0.4961	n/a	n/a	0.496
X-X, +D+S	1.0	n/a	0.0	0.7886	0.7886	n/a	n/a	0.789
X-X, +D+0.750S	1.0	n/a	0.0	0.7155	0.7155	n/a	n/a	0.716
X-X, +D+0.60W	1.0	n/a	0.0	0.5160	0.5160	n/a	n/a	0.516
X-X, +D+0.450W	1.0	n/a	0.0	0.5110	0.5110	n/a	n/a	0.511
X-X, +D+0.750S+0.450W	1.0	n/a	0.0	0.7304	0.7304	n/a	n/a	0.730
X-X, +0.60D+0.60W	1.0	n/a	0.0	0.3175	0.3175	n/a	n/a	0.318
X-X, +0.60D	1.0	n/a	0.0	0.2976	0.2976	n/a	n/a	0.298
Z-Z, D Only	1.0	0.4057	n/a	n/a	n/a	0.4712	0.5210	0.521
Z-Z, +D+S	1.0	0.9844	n/a	n/a	n/a	0.6925	0.8846	0.885
Z-Z, +D+0.750S	1.0	0.8841	n/a	n/a	n/a	0.6372	0.7937	0.794
Z-Z, +D+0.60W	1.0	0.7745	n/a	n/a	n/a	0.4665	0.5654	0.565
Z-Z, +D+0.450W	1.0	0.6850	n/a	n/a	n/a	0.4677	0.5543	0.554
Z-Z, +D+0.750S+0.450W	1.0	1.070	n/a	n/a	n/a	0.6337	0.8270	0.827
Z-Z, +0.60D+0.60W	1.0	1.005	n/a	n/a	n/a	0.2780	0.3570	0.357
Z-Z, +0.60D	1.0	0.4057	n/a	n/a	n/a	0.2827	0.3126	0.313

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	0.2683 k-ft	15.874 k-ft	59.159	OK
Z-Z, +D+S	1.035 k-ft	25.234 k-ft	24.381	OK
Z-Z, +D+0.750S	0.8433 k-ft	22.894 k-ft	27.148	OK
Z-Z, +D+0.60W	0.5328 k-ft	16.510 k-ft	30.986	OK
Z-Z, +D+0.450W	0.4667 k-ft	16.351 k-ft	35.036	OK
Z-Z, +D+0.750S+0.450W	1.042 k-ft	23.371 k-ft	22.436	OK
Z-Z, +0.60D+0.60W	0.4255 k-ft	10.161 k-ft	23.879	OK
Z-Z, +0.60D	0.1610 k-ft	9.525 k-ft	59.159	OK

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Showroom Canopy Fdn

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, D Only	0.140 k	5.176 k	36.973	OK
X-X, +D+S	0.540 k	7.282 k	13.486	OK
X-X, +D+0.750S	0.440 k	6.756 k	15.354	OK
X-X, +D+0.60W	0.2780 k	5.319 k	19.134	OK
X-X, +D+0.450W	0.2435 k	5.284 k	21.699	OK
X-X, +D+0.750S+0.450W	0.5435 k	6.863 k	12.628	OK
X-X, +0.60D+0.60W	0.2220 k	3.891 k	17.526	OK
X-X, +0.60D	0.0840 k	3.748 k	44.614	OK
Z-Z, D Only	0.0 k	5.176 k	No Sliding	OK
Z-Z, +D+S	0.0 k	7.282 k	No Sliding	OK
Z-Z, +D+0.750S	0.0 k	6.756 k	No Sliding	OK
Z-Z, +D+0.60W	0.0 k	5.319 k	No Sliding	OK
Z-Z, +D+0.450W	0.0 k	5.284 k	No Sliding	OK
Z-Z, +D+0.750S+0.450W	0.0 k	6.863 k	No Sliding	OK
Z-Z, +0.60D+0.60W	0.0 k	3.891 k	No Sliding	OK
Z-Z, +0.60D	0.0 k	3.748 k	No Sliding	OK

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	0.3986	+Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +1.40D	0.3986	-Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +1.20D	0.3417	+Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +1.20D	0.3417	-Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +1.20D+0.50S	0.5062	+Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +1.20D+0.50S	0.5062	-Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +1.20D+0.50W	0.3603	+Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +1.20D+0.50W	0.3603	-Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +1.20D+1.60S	0.8681	+Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +1.20D+1.60S	0.8681	-Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +1.20D+1.60S+0.50W	0.8867	+Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +1.20D+1.60S+0.50W	0.8867	-Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +1.20D+W	0.3789	+Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +1.20D+W	0.3789	-Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +1.20D+0.50S+W	0.5434	+Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +1.20D+0.50S+W	0.5434	-Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +0.90D+W	0.2935	+Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +0.90D+W	0.2935	-Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +1.20D+0.20S	0.4075	+Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +1.20D+0.20S	0.4075	-Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +0.90D	0.2562	+Z	Bottom	0.2376	AsMin	0.250	8.724	OK
X-X, +0.90D	0.2562	-Z	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.40D	0.3689	-X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.40D	0.4283	+X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.20D	0.3162	-X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.20D	0.3671	+X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.20D+0.50S	0.4504	-X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.20D+0.50S	0.5619	+X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.20D+0.50W	0.3174	-X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.20D+0.50W	0.4032	+X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.20D+1.60S	0.7456	-X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.20D+1.60S	0.9905	+X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.20D+1.60S+0.50W	0.7468	-X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.20D+1.60S+0.50W	1.027	+X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.20D+W	0.3186	-X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.20D+W	0.4392	+X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.20D+0.50S+W	0.4528	-X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.20D+0.50S+W	0.6341	+X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +0.90D+W	0.2395	-X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +0.90D+W	0.3475	+X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.20D+0.20S	0.3699	-X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +1.20D+0.20S	0.4450	+X	Bottom	0.2376	AsMin	0.250	8.724	OK
Z-Z, +0.90D	0.2371	-X	Bottom	0.2376	AsMin	0.250	8.724	OK

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
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Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Showroom Canopy Fdn

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
Z-Z, +0.90D	0.2753	+X	Bottom	0.2376	AsMin	0.250	8.724	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	2.86 psi	3.34 psi	3.10 psi	3.10 psi	3.34 psi	82.16 psi	0.04	OK
+1.20D	2.45 psi	2.87 psi	2.66 psi	2.66 psi	2.87 psi	82.16 psi	0.03	OK
+1.20D+0.50S	3.48 psi	4.40 psi	3.94 psi	3.94 psi	4.40 psi	82.16 psi	0.05	OK
+1.20D+0.50W	2.45 psi	3.15 psi	2.80 psi	2.80 psi	3.15 psi	82.16 psi	0.04	OK
+1.20D+1.60S	5.75 psi	7.76 psi	6.75 psi	6.75 psi	7.76 psi	82.16 psi	0.09	OK
+1.20D+1.60S+0.50W	5.75 psi	8.04 psi	6.90 psi	6.90 psi	8.04 psi	82.16 psi	0.10	OK
+1.20D+W	2.45 psi	3.44 psi	2.95 psi	2.95 psi	3.44 psi	82.16 psi	0.04	OK
+1.20D+0.50S+W	3.49 psi	4.97 psi	4.23 psi	4.23 psi	4.97 psi	82.16 psi	0.06	OK
+0.90D+W	1.84 psi	2.73 psi	2.28 psi	2.28 psi	2.73 psi	82.16 psi	0.03	OK
+1.20D+0.20S	2.86 psi	3.48 psi	3.17 psi	3.17 psi	3.48 psi	82.16 psi	0.04	OK
+0.90D	1.84 psi	2.15 psi	1.99 psi	1.99 psi	2.15 psi	82.16 psi	0.03	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	7.30 psi	164.32 psi	0.04441	OK
+1.20D	6.25 psi	164.32 psi	0.03806	OK
+1.20D+0.50S	9.27 psi	164.32 psi	0.05639	OK
+1.20D+0.50W	6.60 psi	164.32 psi	0.04014	OK
+1.20D+1.60S	15.89 psi	164.32 psi	0.09671	OK
+1.20D+1.60S+0.50W	16.23 psi	164.32 psi	0.09878	OK
+1.20D+W	6.94 psi	164.32 psi	0.04221	OK
+1.20D+0.50S+W	9.95 psi	164.32 psi	0.06054	OK
+0.90D+W	5.37 psi	164.32 psi	0.0327	OK
+1.20D+0.20S	7.46 psi	164.32 psi	0.04539	OK
+0.90D	4.69 psi	164.32 psi	0.02855	OK

PRCA20220091

SERVICE DRIVE
LATERAL & GRAVITY DESIGN

SERVICE DRIVE - Lateral

Seismic : Base Shear $= C_s \times W$
$= 0.157 \times (20psf)(30')^2$
$= 2826\#$

Wind : Wind Force $= (16psf)(30')(16.33'/2)$
$= 3920\#$

$0.7(2826\#) = 1978\# < 0.6(3920\#) = 2352\#$

∴ Wind Controls.

Shear Wall Design

a). N-S Direction

$L_w = 4'$, $h = 13.5' \rightsquigarrow h/L_w = 3.375 < 3.5$

$V_s = (\frac{1}{2} \times 2352\#)/4' = 294 plf$
$T = V_s \times h = (294plf)(13.5') = 3969\#$

SHT'G: 15/32" STR I, 10d @ 6" o.c. $\rightsquigarrow V_a = 0.5(950plf)\underbrace{(1.25-0.125\frac{h}{L_w})}_{0.83} = 393 plf$
HOLDOWN: HDU4 $\rightsquigarrow T_a = 4565\#$

b). E-W Direction

$V = 2352\#$
By inspection, resisted by SW @ Grid D is OK.

SERVICE DRIVE FRAMING

Roof Loads : DL = 20 psf , SL = 25 psf

Roof Truss

Span = 30'-0" , Spacing = 24" o.c.

DL = 20 psf x 24"/12 = 40 plf
SL = 25 psf x 24"/12 = 50 plf

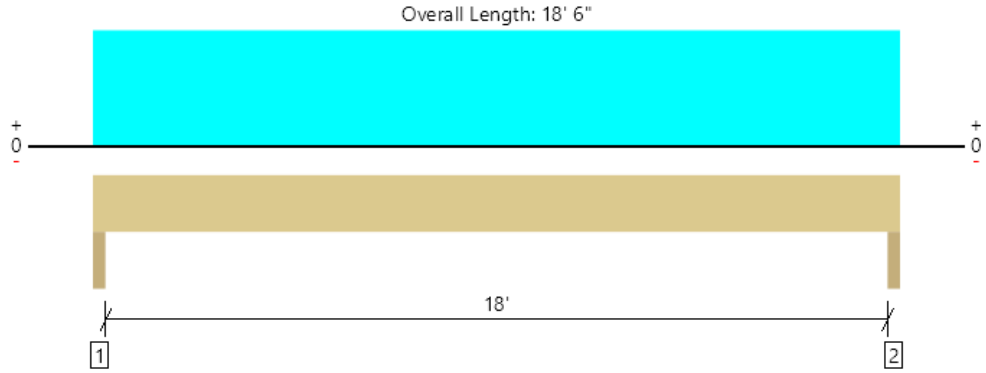
Try 20" Red-L Truss :

Allowable for 115% TL = 114 plf > 90 plf
Allowable for 100% LL = 56 plf > 50 plf

O.K.

Service Drive, SD-HDR1

1 piece(s) 5 1/2" x 13 1/2" 24F-V4 DF Glulam



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6931 @ 1 1/2"	10725 (3.00")	Passed (65%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	5901 @ 1' 4 1/2"	15085	Passed (39%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	31195 @ 9' 3"	38240	Passed (82%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.461 @ 9' 3"	0.608	Passed (L/475)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.921 @ 9' 3"	0.913	Passed (L/238)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Commercial
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 18' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - DF	3.00"	3.00"	1.94"	3462	3469	6931	None
2 - Trimmer - DF	3.00"	3.00"	1.94"	3462	3469	6931	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	18' 6" o/c	
Bottom Edge (Lu)	18' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 18' 6"	N/A	18.0	--	
1 - Uniform (PSF)	0 to 18' 6"	15'	20.0	25.0	Roof
2 - Uniform (PSF)	0 to 18' 6"	3' 9"	15.0	-	Ext. Wall

Member Notes

HDR BM at Service Drive

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Huiyao "Yoyo" Huang PCS Structural Solutions (253) 383-2797 hhuang@pcs-structural.com	

Weyerhaeuser

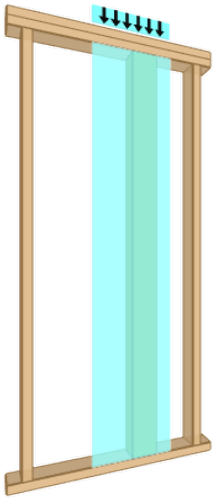
PRCA20220091 R REPORT

PASSED

Service Drive, Jamb Studs for SD-HDR1

2 piece(s) 2 x 8 DF No.2

Wall Height: 13' 6" Member Height: 13' 1 1/2" Tributary Width: 10' 3"



Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	22	50	Passed (43%)	--	--
Compression (lbs)	6150	18159	Passed (34%)	1.15	1.0 D + 1.0 S
Plate Bearing (lbs)	6150	13594	Passed (45%)	--	1.0 D + 1.0 S
Lateral Reaction (lbs)	646	--	--	1.60	1.0 D + 0.6 W
Lateral Shear (lbs)	586	4176	Passed (14%)	1.60	1.0 D + 0.6 W
Lateral Moment (ft-lbs)	2119 @ mid-span	3775	Passed (56%)	1.60	1.0 D + 0.6 W
Total Deflection (in)	0.33 @ mid-span	0.66	Passed (L/476)	--	1.0 D + 0.6 W
Bending/Compression	0.81	1	Passed (81%)	1.60	1.0 D + 0.45 W + 0.75 L + 0.75 S

- Lateral deflection criteria: Wind (L/240)
- Input axial load eccentricity for this design is 16.67% of applicable member side dimension.
- Applicable calculations are based on NDS.
- The column stability factor (Kf = 0.6) applied to this design assumes nailed built-up columns per NDS section 15.3.3. For Weyerhaeuser ELP products refer to the U.S. Wall Guide for multiple-member connection requirements.

Supports	Type	Material
Top	Dbl 2X	Douglas Fir-Larch
Base	2X	Douglas Fir-Larch

System : Wall
Member Type : Column
Building Code : IBC 2018
Design Methodology : ASD

Max Unbraced Length	Comments
1'	Wall Sheathing Nailing

Lateral Connections

Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	10d x 3" Box (End)	7	N/A
Base	Nails	10d x 3" Box (End)	7	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Load	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
1 - Point (PLF)	10' 3.00"	225.0	375.0	Roof

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	10' 3"	16.0	

- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Huiyao "Yoyo" Huang PCS Structural Solutions (253) 383-2797 hhuang@pcs-structural.com	

Weyerhaeuser

PCS Structural Solutions

Project: PRCA20220091 JEEP Job No:

Subject: Sheet Name: DCT

Originating Office: ☐ Seattle ☐ Tacoma ☐ Portland Date: 9/15/21

SERVICE DRIVE CANOPY

LOADS

SAME AS SHOWROOM CANOPY

DETERMINE LOADS ON HDR DUE TO WALL WT & WIND

$w_D = 15psf(10H) + 15psf(30H/2) = 375\#/H$

$w_W = 16psf(20H/2) = 160\#/H$

$w_S = 25psf(30H/2) = 375\#/H$

TRY HSS 6x6x1/4 COL & HSS 8x6x1/4 HDR

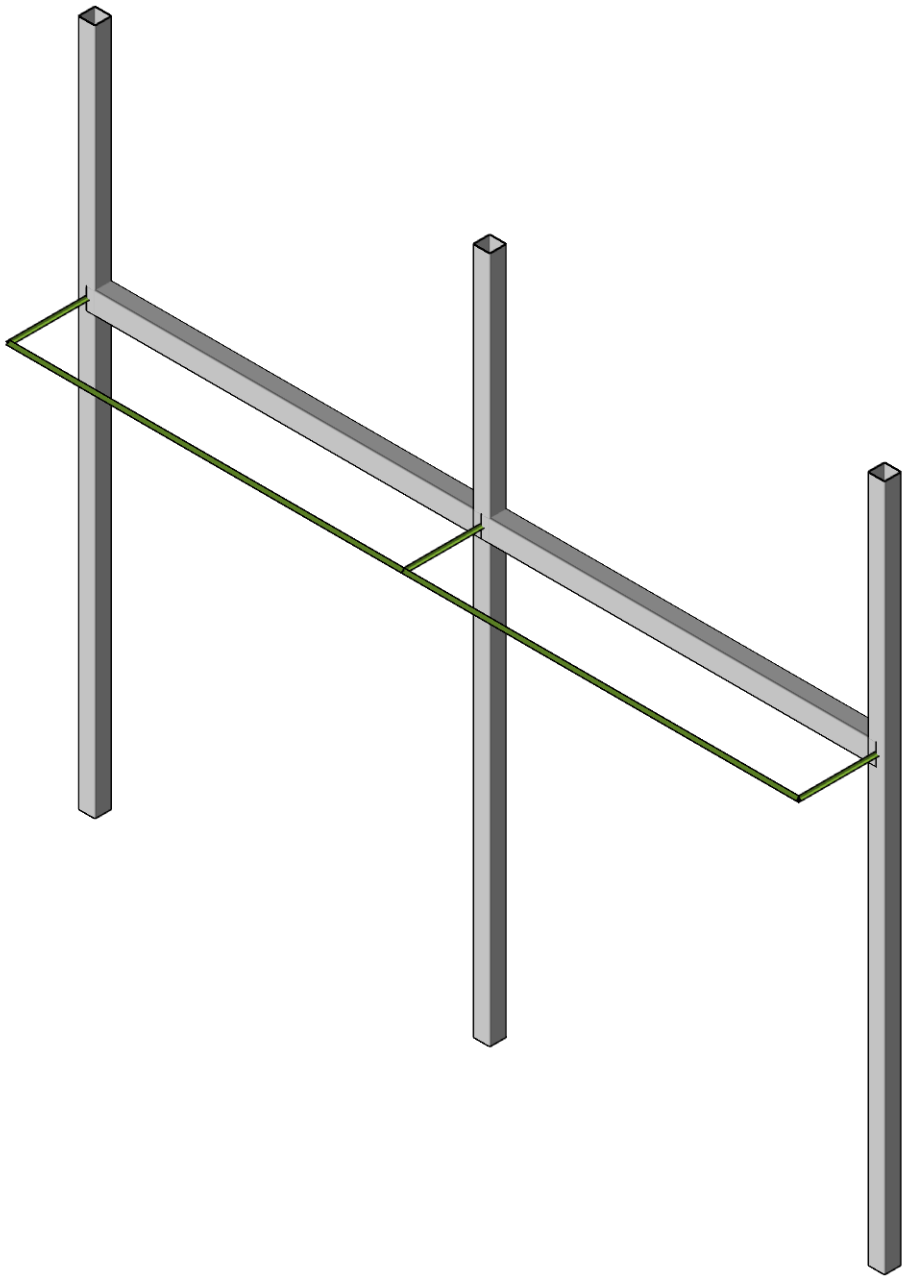
PER RISA

$DCR_{MAX} = 0.44 < 1 \therefore ok$

$\therefore$ MEMBERS OK

NOTE: USE 1/4" FILLET WELDS BY INSPECTION

PRCA20220091



Envelope Only Solution

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dtappel		Sep 15, 2021
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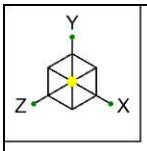
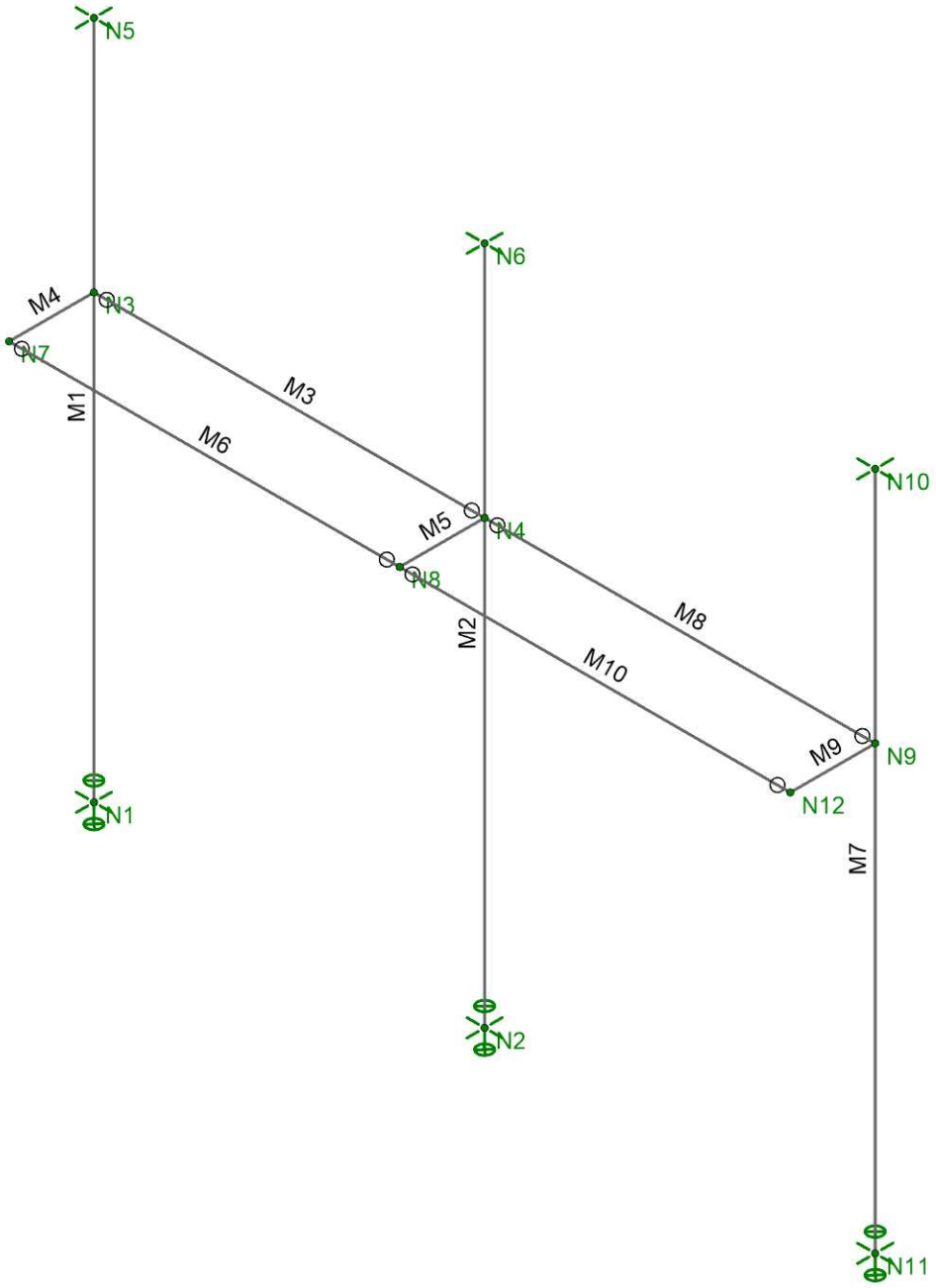
PRCA20220091





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dtappel		Sep 15, 2021
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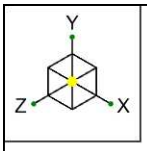
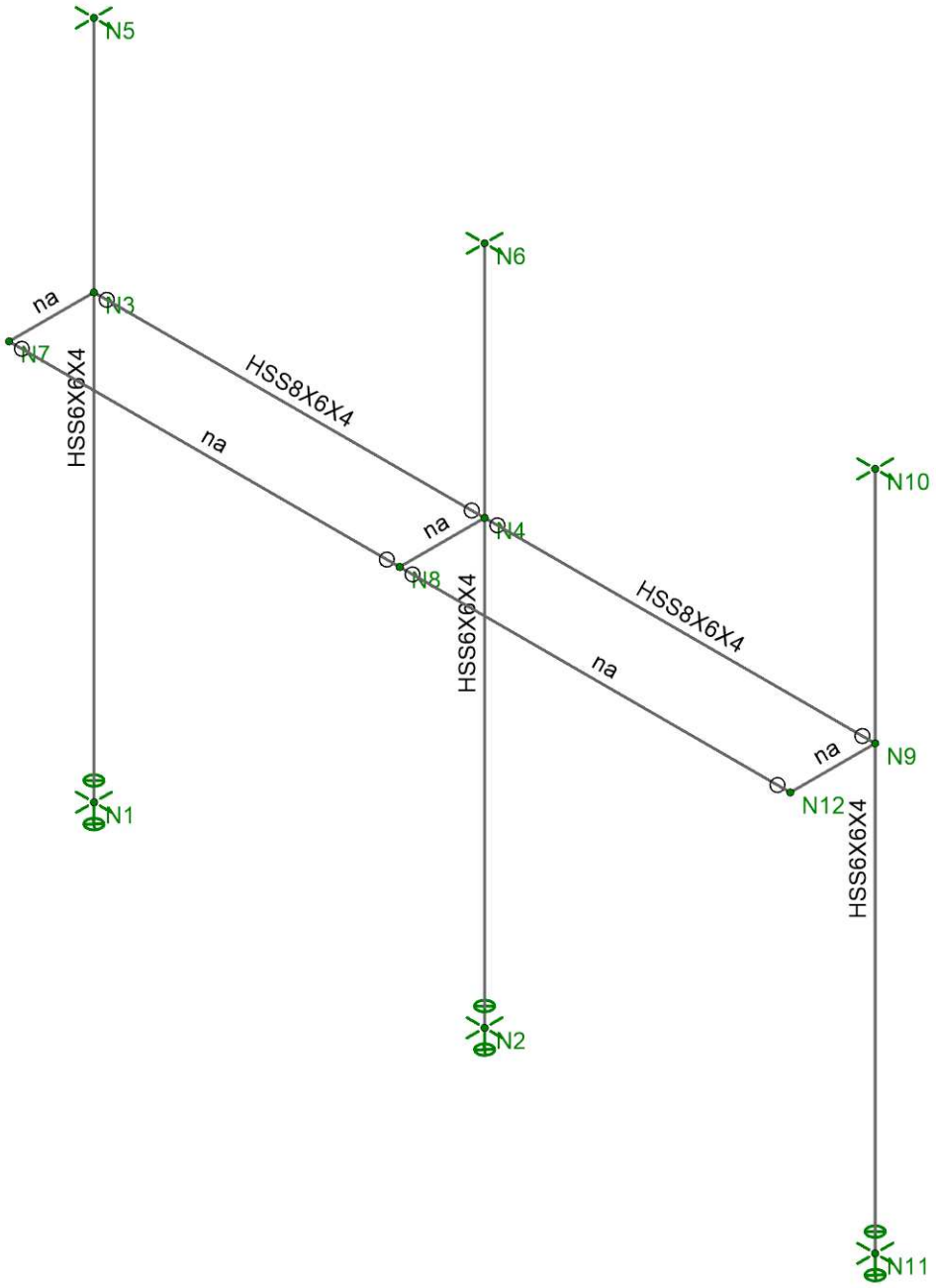
PRCA20220091





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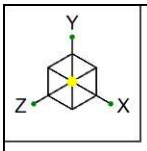

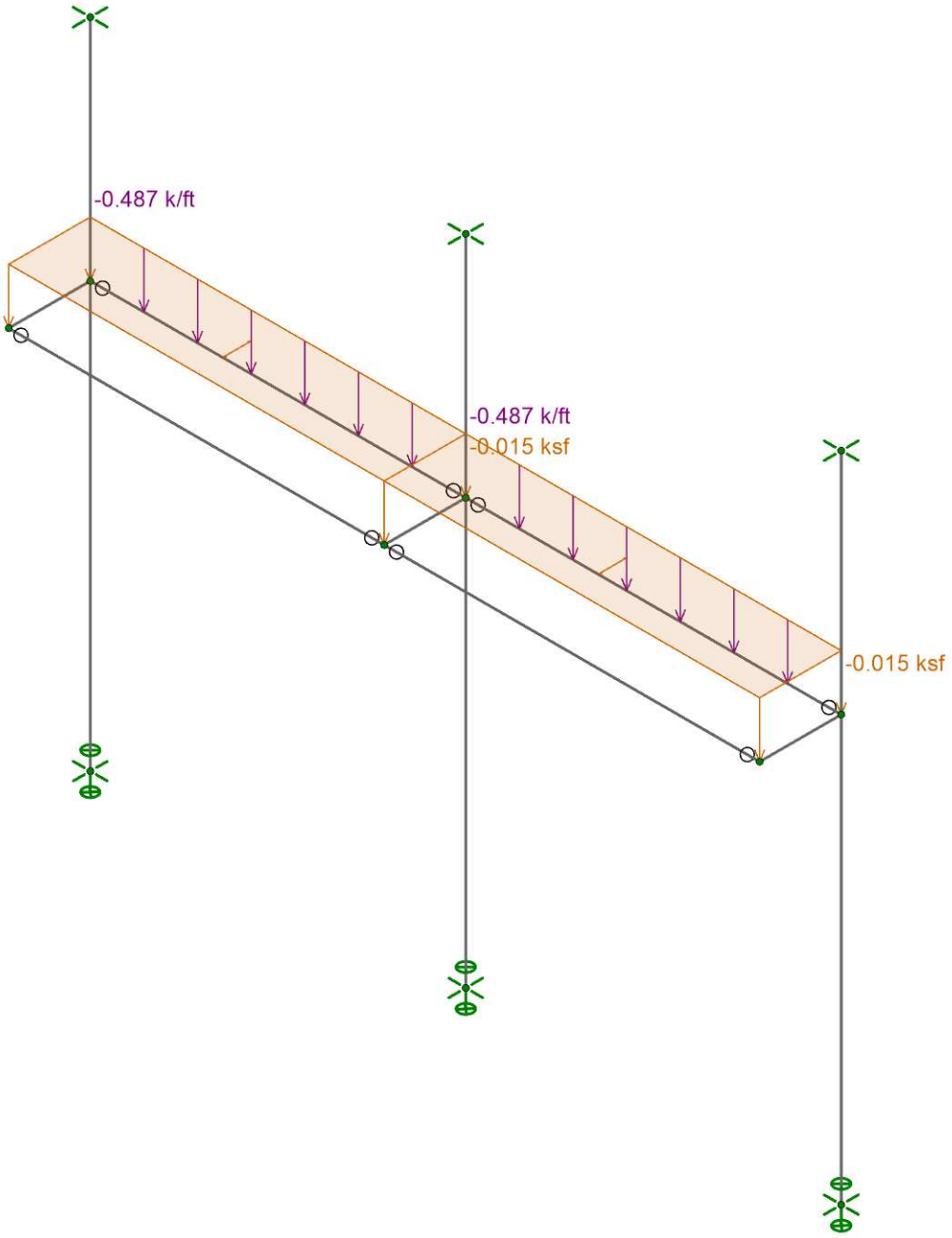

Loads: BLC 1, Dead Load
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dtappel		Sep 15, 2021
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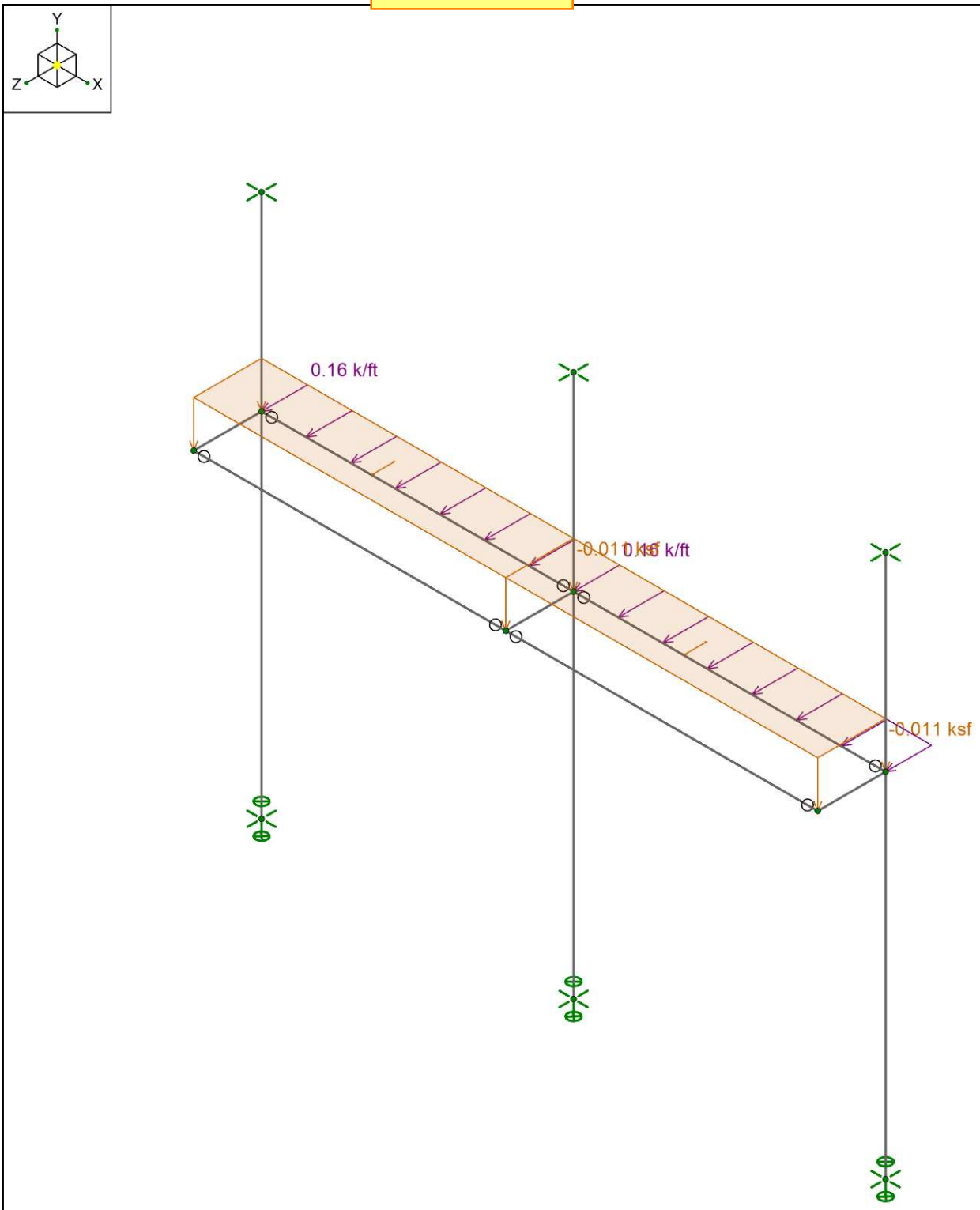
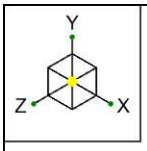
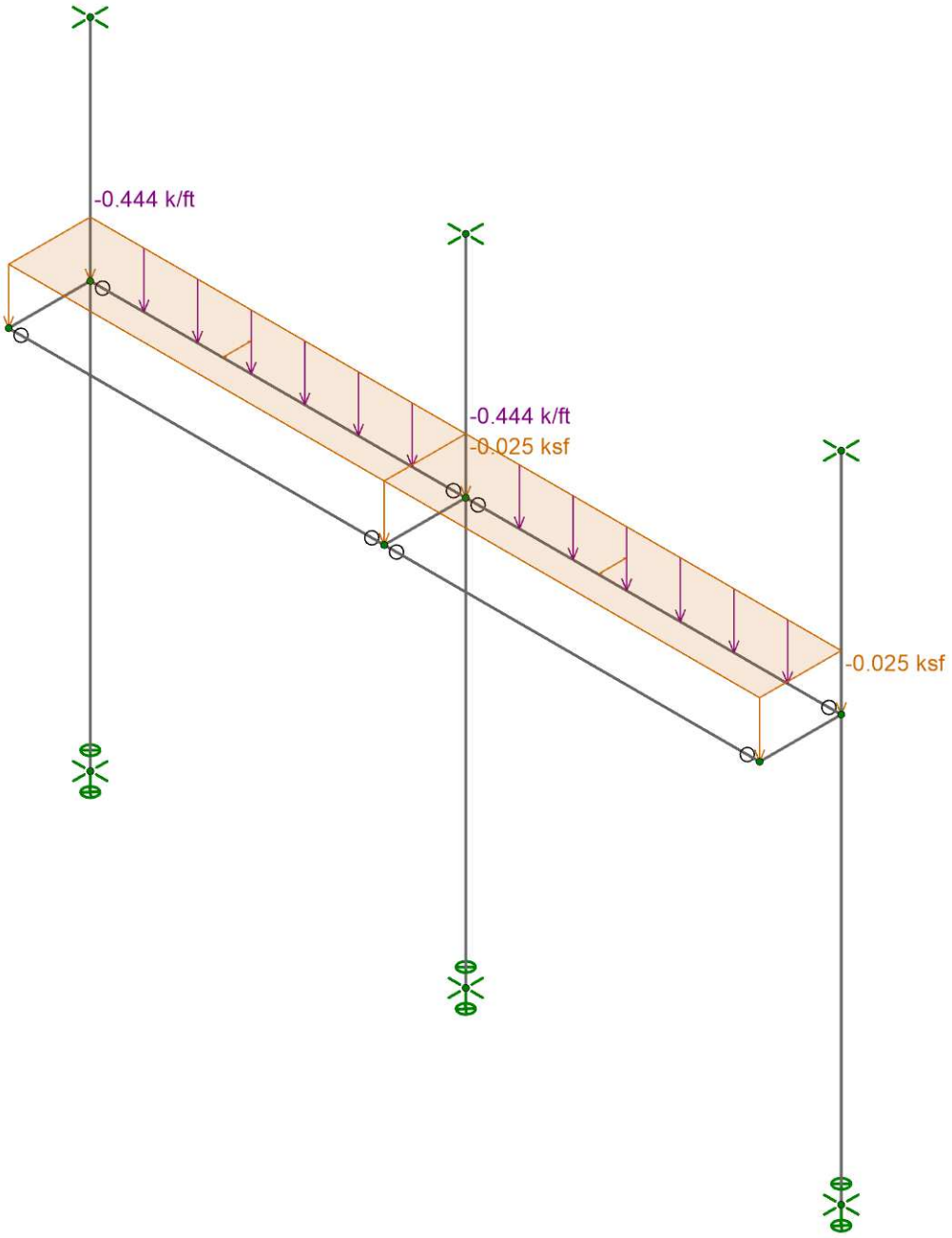


Loads: BLC 2, Wind Load
Envelope Only Solution

<Licensed Company>		SK-5
dtappel		Sep 15, 2021
		Service Drive Canopy Framing 0…

PRCA20220091





Loads: BLC 3, Snow Load
Envelope Only Solution

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dtappel		Sep 15, 2021
		Service Drive Canopy Framing 0…

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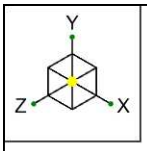

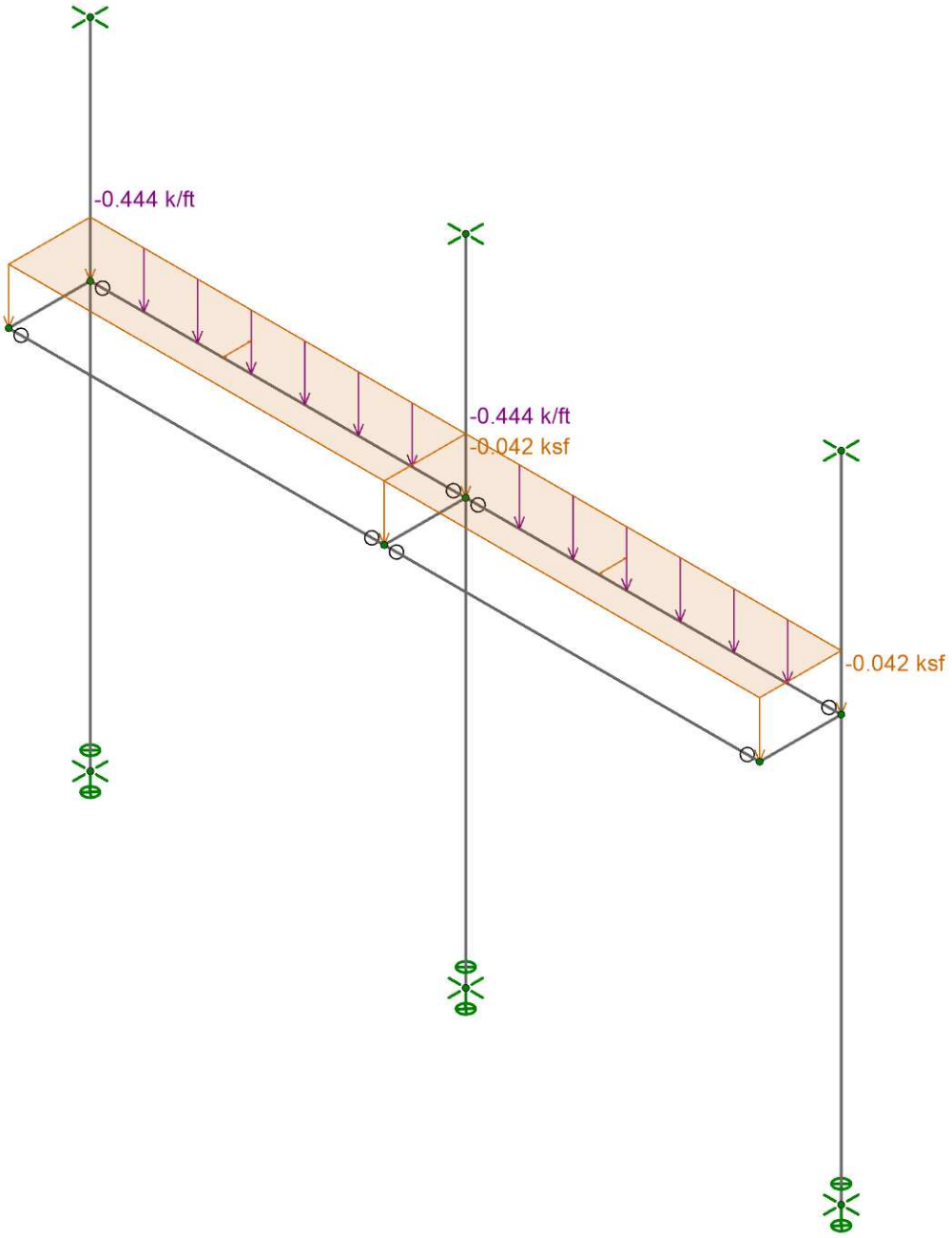

Loads: BLC 4, Snow Drift
Envelope Only Solution

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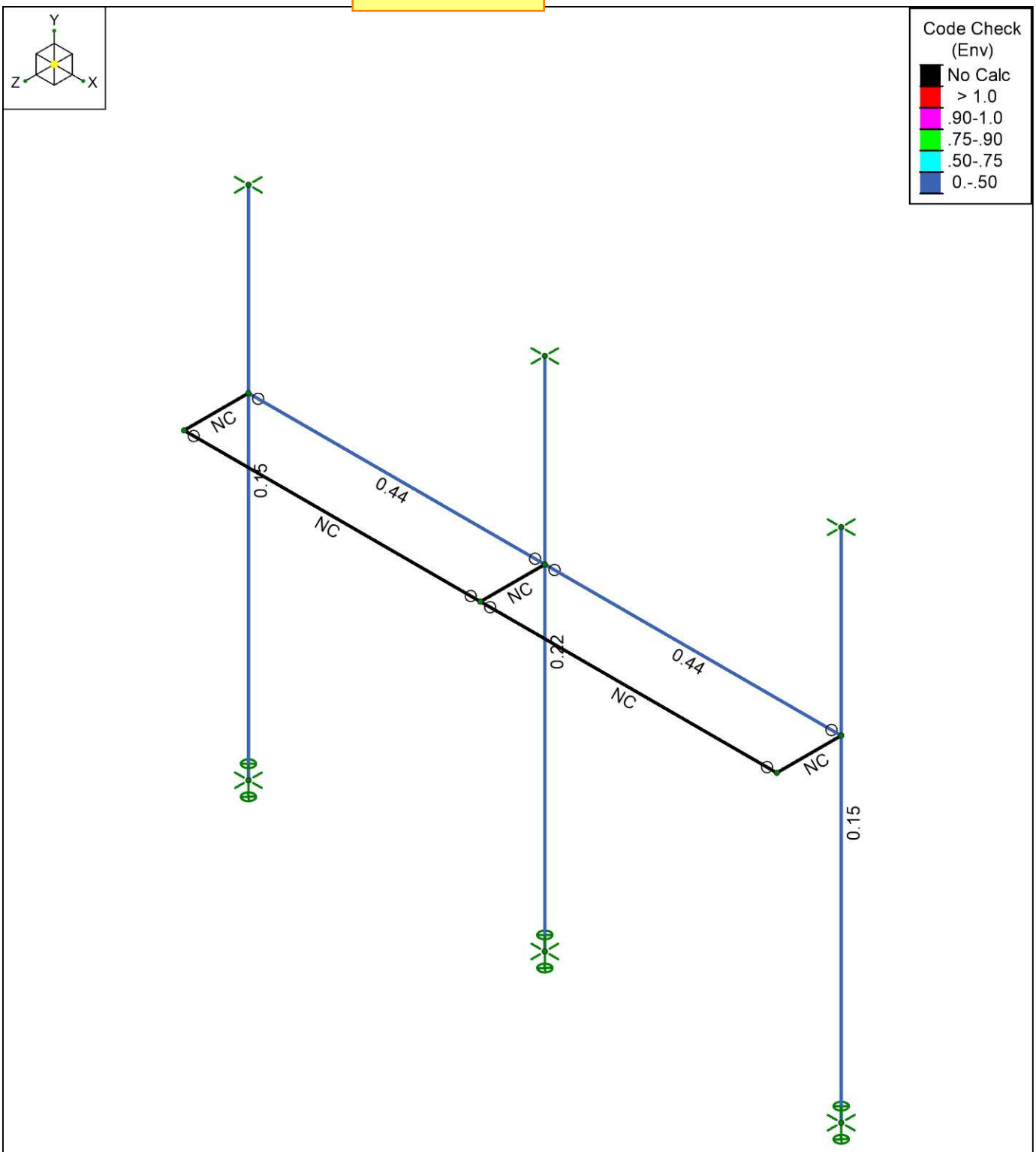
PRCA20220091



Member Code Checks Displayed (Enveloped)
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<Licensed Company>		SK-8
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		Service Drive Canopy Framing 0…

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	0.3	0.65	0.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	0.3	0.65	0.49	35	1.6	60	1.2
7	A1085	29000	11154	0.3	0.65	0.49	50	1.25	65	1.15
8	A913 Gr.65	29000	11154	0.3	0.65	0.49	65	1.1	80	1.1

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	Col	HSS6X6X4	Column	Tube	A500 Gr.B Rect	Typical	5.24	28.6	28.6	45.6
2	Hdr	HSS8X6X4	Beam	Tube	A500 Gr.B Rect	Typical	6.17	36.4	56.6	70.3

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	N1	0	0	0	
2	N2	11.5	0	0	
3	N3	0	13	0	
4	N4	11.5	13	0	
5	N5	0	20	0	
6	N6	11.5	20	0	
7	N7	0	13	2.5	
8	N8	11.5	13	2.5	
9	N9	23	13	0	
10	N10	23	20	0	
11	N11	23	0	0	
12	N12	23	13	2.5	

Member Primary Data

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
1	M1	N1	N5	Col	Column	Tube	A500 Gr.B Rect	Typical
2	M2	N2	N6	Col	Column	Tube	A500 Gr.B Rect	Typical
3	M3	N3	N4	Hdr	Beam	Tube	A500 Gr.B Rect	Typical
4	M4	N3	N7	RIGID	None	None	RIGID	Typical
5	M5	N4	N8	RIGID	None	None	RIGID	Typical
6	M6	N7	N8	RIGID	None	None	RIGID	Typical
7	M7	N11	N10	Col	Column	Tube	A500 Gr.B Rect	Typical
8	M8	N4	N9	Hdr	Beam	Tube	A500 Gr.B Rect	Typical
9	M9	N9	N12	RIGID	None	None	RIGID	Typical
10	M10	N8	N12	RIGID	None	None	RIGID	Typical

Hot Rolled Steel Design Parameters

	Label	Shape	Length [ft]	Lcomp top [ft]	Function
1	M1	Col	20	Lbyy	Lateral
2	M2	Col	20	Lbyy	Lateral
3	M3	Hdr	11.5	Lbyy	Lateral
4	M7	Col	20	Lbyy	Lateral
5	M8	Hdr	11.5	Lbyy	Lateral

Member Advanced Data

	Label	I Release	J Release	Physical	Deflection Ratio Options	Seismic DR
1	M1			Yes	** NA **	None
2	M2			Yes	** NA **	None
3	M3	BenPIN	BenPIN	Yes	Default	None
4	M4			Yes	** NA **	None
5	M5			Yes	** NA **	None
6	M6	BenPIN	BenPIN	Yes	** NA **	None
7	M7			Yes	** NA **	None
8	M8	BenPIN	BenPIN	Yes	Default	None
9	M9			Yes	** NA **	None
10	M10	BenPIN	BenPIN	Yes	** NA **	None

Node Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]	Y Rot [k-ft/rad]
1	N6	Reaction		Reaction	
2	N5	Reaction		Reaction	
3	N2	Reaction	Reaction	Reaction	Reaction
4	N1	Reaction	Reaction	Reaction	Reaction
5	N10	Reaction		Reaction	
6	N11	Reaction	Reaction	Reaction	Reaction

Basic Load Cases

	BLC Description	Category	Y Gravity	Distributed	Area(Member)
1	Dead Load	DL	-1	2	2
2	Wind Load	WL		2	2
3	Snow Load	SL		2	2
4	Snow Drift	OL1		2	2
5	BLC 1 Transient Area Loads	None		4	
6	BLC 2 Transient Area Loads	None		4	
7	BLC 3 Transient Area Loads	None		4	
8	BLC 4 Transient Area Loads	None		4	

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	IBC 16-8	Yes	Y	DL	1										
2	IBC 16-9	Yes	Y	DL	1	LL	1	LLS	1						
3	IBC 16-10 (b)	Yes	Y	DL	1	SL	1	SLN	1						
4	IBC 16-10 (b)	Yes	Y	DL	1	OL1	1								
5	IBC 16-11 (b)	Yes	Y	DL	1	LL	0.75	LLS	0.75	SL	0.75	SLN	0.75		
6	IBC 16-12 (a) (a)	Yes	Y	DL	1	WL	0.6								
7	IBC 16-12 (a) (b)	Yes	Y	DL	1	WL	-0.6								
8	IBC 16-13 (a) (a)	Yes	Y	DL	1	WL	0.45	LL	0.75	LLS	0.75				
9	IBC 16-13 (a) (b)	Yes	Y	DL	1	WL	-0.45	LL	0.75	LLS	0.75				
10	IBC 16-13 (b) (a)	Yes	Y	DL	1	WL	0.45	LL	0.75	LLS	0.75	SL	0.75	SLN	0.75
11	IBC 16-13 (b) (b)	Yes	Y	DL	1	WL	-0.45	LL	0.75	LLS	0.75	SL	0.75	SLN	0.75
12	IBC 16-13 (b) (a)	Yes	Y	DL	1	WL	0.45	LL	0.75	LLS	0.75	OL1	0.75		
13	IBC 16-13 (b) (b)	Yes	Y	DL	1	WL	-0.45	LL	0.75	LLS	0.75	OL1	0.75		
14	IBC 16-15 (a)	Yes	Y	DL	0.6	WL	0.6								
15	IBC 16-15 (b)	Yes	Y	DL	0.6	WL	-0.6								
16	Dead Load		Y	DL	1										
17	Snow Load		Y	SL	1										
18	Snow Drift		Y	OL1	1										

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
19	Wind Load		Y	WL	1												

Envelope Node Reactions

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N6	max	0	4	0	15	0.8018	15	0	15	0	15	0	15
2		min	0	15	0	1	-0.8368	6	0	1	0	1	0	1
3	N5	max	0	4	0	15	0.3183	15	0	15	0	15	0	15
4		min	0	15	0	1	-0.3482	6	0	1	0	1	0	1
5	N2	max	0	15	12.9885	4	0.3033	7	0	15	0	4	0	15
6		min	0	4	3.8152	15	-0.28	14	0	1	0	15	0	1
7	N1	max	0	15	6.686	4	0.2397	7	0	15	0	4	0	15
8		min	0	4	2.0227	15	-0.2121	14	0	1	0	15	0	1
9	N10	max	0	15	0	15	0.3183	15	0	15	0	15	0	15
10		min	0	4	0	1	-0.3482	6	0	1	0	1	0	1
11	N11	max	0	15	6.686	4	0.2397	7	0	15	0	15	0	15
12		min	0	4	2.0227	15	-0.2121	14	0	1	0	4	0	1
13	Totals:	max	0	15	26.3605	4	2.208	15						
14		min	0	4	7.8606	15	-2.208	6						

Envelope AISC 15TH (360-16): ASD Member Steel Code Checks

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-ft]	Mnzz/om [k-ft]	Cb	Eqn
1	M1	HSS6X6X4	0.1542	12.9167	13	0.0085	20	z	6	70.9689	144.3353	25.7086	25.7086	1	H1-1b
2	M2	HSS6X6X4	0.2248	13.125	6	0.0205	20	z	6	70.9689	144.3353	25.7086	25.7086	1	H1-1b
3	M3	HSS8X6X4	0.4367	5.75	4	0.1048	11.5	y	4	136.7797	169.9521	30.0599	38.7924	1.1364	H1-1b
4	M7	HSS6X6X4	0.1542	12.9167	13	0.0085	20	z	6	70.9689	144.3353	25.7086	25.7086	1	H1-1b
5	M8	HSS8X6X4	0.4367	5.75	4	0.1048	11.5	y	4	136.7797	169.9521	30.0599	38.7924	1.1364	H1-1b

PCS Structural Solutions

Project: PRCA20220091 JEEP Job No:

Subject: Sheet Name: DCT

Originating Office: ☐ Seattle ☐ Tacoma ☐ Portland Date: 9/15/21

FOUNDATION – CHECK MIDDLE COL AS WORST CASE

$P_D = 6.68k$

$V_D = 0.02k$

$P_S = 6.31k$

$V_S = 0.05k$

$P_W = 0.32k$

$V_W = 0.50k$

TRY 4'-6" SQ x 11" DP FTG

PER ENERCALC

$q_{MAX} = 888 psf < q_a$ ∴ OK

$SF_{OT} = 26.7 > 1$ ∴ OK

$SF_{SLIDING} = 16.0 > 1$ ∴ OK

$DCR_{MAX} = 0.15 < 1$ ∴ OK

∴ USE FTG 4'-6" SQ x 11" DP

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Service Drive Canopy Fdn

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

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	=	1.0	ksf
Soil Density	=	110.0	pcf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	300.0	pcf
Soil/Concrete Friction Coeff.	=	0.450	

Increases based on footing Depth

Footing base depth below soil surface	=	1.917	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

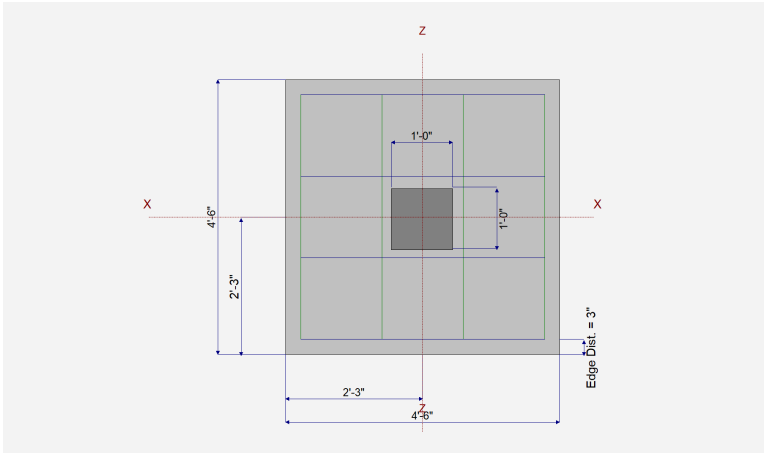
Width parallel to X-X Axis	=	4.50 ft
Length parallel to Z-Z Axis	=	4.50 ft
Footing Thickness	=	11.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	12.0 in
pz : parallel to Z-Z Axis	=	12.0 in
Height	=	12.0 in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in



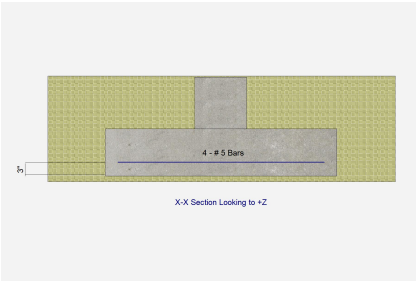
Reinforcing

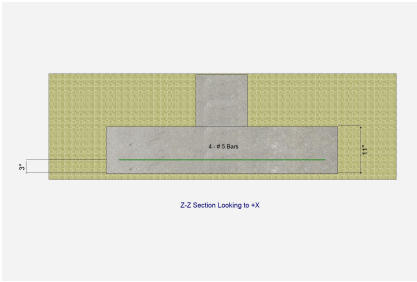
Bars parallel to X-X Axis			
Number of Bars	=		4
Reinforcing Bar Size	=	#	5
Bars parallel to Z-Z Axis			
Number of Bars	=		4
Reinforcing Bar Size	=	#	5

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation 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	=	6.680			6.310	0.320			k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=	0.020			0.050	0.50			k
V-z	=								k

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Service Drive Canopy Fdn

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8877	Soil Bearing	0.8877 ksf	1.0 ksf	+D+S about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	26.661	Overturning - Z-Z	0.5980 k-ft	15.943 k-ft	+0.60D+0.60W
PASS	16.006	Sliding - X-X	0.3120 k	4.994 k	+0.60D+0.60W
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	0.1484	Z Flexure (+X)	1.422 k-ft/ft	9.585 k-ft/ft	+1.20D+1.60S+0.50W
PASS	0.1403	Z Flexure (-X)	1.345 k-ft/ft	9.585 k-ft/ft	+1.20D+1.60S
PASS	0.1431	X Flexure (+Z)	1.372 k-ft/ft	9.585 k-ft/ft	+1.20D+1.60S+0.50W
PASS	0.1431	X Flexure (-Z)	1.372 k-ft/ft	9.585 k-ft/ft	+1.20D+1.60S+0.50W
PASS	0.1273	1-way Shear (+X)	10.460 psi	82.158 psi	+1.20D+1.60S+0.50W
PASS	0.1202	1-way Shear (-X)	9.877 psi	82.158 psi	+1.20D+1.60S
PASS	0.1227	1-way Shear (+Z)	10.078 psi	82.158 psi	+1.20D+1.60S+0.50W
PASS	0.1227	1-way Shear (-Z)	10.078 psi	82.158 psi	+1.20D+1.60S+0.50W
PASS	0.1476	2-way Punching	24.251 psi	164.317 psi	+1.20D+1.60S+0.50W

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	1.0	n/a	0.0	0.5674	0.5674	n/a	n/a	0.567
X-X, +D+S	1.0	n/a	0.0	0.8790	0.8790	n/a	n/a	0.879
X-X, +D+0.750S	1.0	n/a	0.0	0.8011	0.8011	n/a	n/a	0.801
X-X, +D+0.60W	1.0	n/a	0.0	0.5769	0.5769	n/a	n/a	0.577
X-X, +D+0.450W	1.0	n/a	0.0	0.5745	0.5745	n/a	n/a	0.575
X-X, +D+0.750S+0.450W	1.0	n/a	0.0	0.8082	0.8082	n/a	n/a	0.808
X-X, +0.60D+0.60W	1.0	n/a	0.0	0.3499	0.3499	n/a	n/a	0.350
X-X, +0.60D	1.0	n/a	0.0	0.3404	0.3404	n/a	n/a	0.340
Z-Z, D Only	1.0	0.04004	n/a	n/a	n/a	0.5649	0.5699	0.570
Z-Z, +D+S	1.0	0.09045	n/a	n/a	n/a	0.8703	0.8877	0.888
Z-Z, +D+0.750S	1.0	0.08152	n/a	n/a	n/a	0.7939	0.8083	0.808
Z-Z, +D+0.60W	1.0	0.630	n/a	n/a	n/a	0.5369	0.6169	0.617
Z-Z, +D+0.450W	1.0	0.4844	n/a	n/a	n/a	0.5439	0.6051	0.605
Z-Z, +D+0.750S+0.450W	1.0	0.3970	n/a	n/a	n/a	0.7729	0.8435	0.844
Z-Z, +0.60D+0.60W	1.0	1.013	n/a	n/a	n/a	0.3109	0.3889	0.389
Z-Z, +0.60D	1.0	0.04004	n/a	n/a	n/a	0.3389	0.3419	0.342

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	0.03833 k-ft	25.852 k-ft	674.40	OK
Z-Z, +D+S	0.1342 k-ft	40.049 k-ft	298.505	OK
Z-Z, +D+0.750S	0.1102 k-ft	36.50 k-ft	331.192	OK
Z-Z, +D+0.60W	0.6133 k-ft	26.284 k-ft	42.854	OK
Z-Z, +D+0.450W	0.4696 k-ft	26.176 k-ft	55.743	OK
Z-Z, +D+0.750S+0.450W	0.5415 k-ft	36.824 k-ft	68.009	OK
Z-Z, +0.60D+0.60W	0.5980 k-ft	15.943 k-ft	26.661	OK
Z-Z, +0.60D	0.0230 k-ft	15.511 k-ft	674.40	OK

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Service Drive Canopy Fdn

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, D Only	0.020 k	6.976 k	348.775	OK
X-X, +D+S	0.070 k	9.815 k	140.214	OK
X-X, +D+0.750S	0.05750 k	9.105 k	158.350	OK
X-X, +D+0.60W	0.320 k	7.062 k	22.068	OK
X-X, +D+0.450W	0.2450 k	7.040 k	28.736	OK
X-X, +D+0.750S+0.450W	0.2825 k	9.170 k	32.460	OK
X-X, +0.60D+0.60W	0.3120 k	4.994 k	16.006	OK
X-X, +0.60D	0.0120 k	4.907 k	408.945	OK
Z-Z, D Only	0.0 k	6.976 k	No Sliding	OK
Z-Z, +D+S	0.0 k	9.815 k	No Sliding	OK
Z-Z, +D+0.750S	0.0 k	9.105 k	No Sliding	OK
Z-Z, +D+0.60W	0.0 k	7.062 k	No Sliding	OK
Z-Z, +D+0.450W	0.0 k	7.040 k	No Sliding	OK
Z-Z, +D+0.750S+0.450W	0.0 k	9.170 k	No Sliding	OK
Z-Z, +0.60D+0.60W	0.0 k	4.994 k	No Sliding	OK
Z-Z, +0.60D	0.0 k	4.907 k	No Sliding	OK

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	0.6955	+Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +1.40D	0.6955	-Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +1.20D	0.5962	+Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +1.20D	0.5962	-Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +1.20D+0.50S	0.8347	+Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +1.20D+0.50S	0.8347	-Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +1.20D+0.50W	0.6083	+Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +1.20D+0.50W	0.6083	-Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +1.20D+1.60S	1.360	+Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +1.20D+1.60S	1.360	-Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +1.20D+1.60S+0.50W	1.372	+Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +1.20D+1.60S+0.50W	1.372	-Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +1.20D+W	0.6204	+Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +1.20D+W	0.6204	-Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +1.20D+0.50S+W	0.8589	+Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +1.20D+0.50S+W	0.8589	-Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +0.90D+W	0.4713	+Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +0.90D+W	0.4713	-Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +1.20D+0.20S	0.6916	+Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +1.20D+0.20S	0.6916	-Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +0.90D	0.4471	+Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
X-X, +0.90D	0.4471	-Z	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.40D	0.6915	-X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.40D	0.6995	+X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.20D	0.5927	-X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.20D	0.5996	+X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.20D+0.50S	0.8277	-X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.20D+0.50S	0.8417	+X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.20D+0.50W	0.5690	-X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.20D+0.50W	0.6475	+X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.20D+1.60S	1.345	-X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.20D+1.60S	1.374	+X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.20D+1.60S+0.50W	1.321	-X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.20D+1.60S+0.50W	1.422	+X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.20D+W	0.5454	-X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.20D+W	0.6954	+X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.20D+0.50S+W	0.7804	-X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.20D+0.50S+W	0.9375	+X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +0.90D+W	0.3972	-X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +0.90D+W	0.5455	+X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.20D+0.20S	0.6867	-X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +1.20D+0.20S	0.6965	+X	Bottom	0.2376	AsMin	0.2756	9.585	OK
Z-Z, +0.90D	0.4445	-X	Bottom	0.2376	AsMin	0.2756	9.585	OK

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Service Drive Canopy Fdn

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
Z-Z, +0.90D	0.4497	+X	Bottom	0.2376	AsMin	0.2756	9.585	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	5.08 psi	5.14 psi	5.11 psi	5.11 psi	5.14 psi	82.16 psi	0.06	OK
+1.20D	4.35 psi	4.41 psi	4.38 psi	4.38 psi	4.41 psi	82.16 psi	0.05	OK
+1.20D+0.50S	6.08 psi	6.19 psi	6.13 psi	6.13 psi	6.19 psi	82.16 psi	0.08	OK
+1.20D+0.50W	4.17 psi	4.77 psi	4.47 psi	4.47 psi	4.77 psi	82.16 psi	0.06	OK
+1.20D+1.60S	9.88 psi	10.10 psi	9.99 psi	9.99 psi	10.10 psi	82.16 psi	0.12	OK
+1.20D+1.60S+0.50W	9.70 psi	10.46 psi	10.08 psi	10.08 psi	10.46 psi	82.16 psi	0.13	OK
+1.20D+W	3.99 psi	5.12 psi	4.56 psi	4.56 psi	5.12 psi	82.16 psi	0.06	OK
+1.20D+0.50S+W	5.72 psi	6.90 psi	6.31 psi	6.31 psi	6.90 psi	82.16 psi	0.08	OK
+0.90D+W	2.90 psi	4.02 psi	3.46 psi	3.46 psi	4.02 psi	82.16 psi	0.05	OK
+1.20D+0.20S	5.04 psi	5.12 psi	5.08 psi	5.08 psi	5.12 psi	82.16 psi	0.06	OK
+0.90D	3.27 psi	3.30 psi	3.29 psi	3.29 psi	3.30 psi	82.16 psi	0.04	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	12.30 psi	164.32 psi	0.07483	OK
+1.20D	10.54 psi	164.32 psi	0.06414	OK
+1.20D+0.50S	14.76 psi	164.32 psi	0.08981	OK
+1.20D+0.50W	10.75 psi	164.32 psi	0.06545	OK
+1.20D+1.60S	24.04 psi	164.32 psi	0.1463	OK
+1.20D+1.60S+0.50W	24.25 psi	164.32 psi	0.1476	OK
+1.20D+W	10.97 psi	164.32 psi	0.06675	OK
+1.20D+0.50S+W	15.19 psi	164.32 psi	0.09242	OK
+0.90D+W	8.33 psi	164.32 psi	0.05071	OK
+1.20D+0.20S	12.23 psi	164.32 psi	0.07441	OK
+0.90D	7.91 psi	164.32 psi	0.04811	OK

CHECK OUTER COLS

$P_D = 3.53k$

$V_D = 0.02k$

$P_S = 3.16k$

$V_S = 0.05k$

$P_W = 0.16k$

$V_W = 0.37k$

TRY 3'-0" SQ x 11" DP FTG

PER ENERCALC

$q_{MAX} = 1004 psf \approx q_a \therefore OK$

$SF_{OT} = 11.6 > 1 \therefore OK$

$SF_{SLIDING} = 11.8 > 1 \therefore OK$

$DCR_{MAX} = 0.06 < 1 \therefore OK$

$\therefore$ USE FTG 3'-0" SQ x 11" DP

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Service Drive Canopy Fdn - Outer Cols

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

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	=	1.004	ksf
Soil Density	=	110.0	pcf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	300.0	pcf
Soil/Concrete Friction Coeff.	=	0.450	

Increases based on footing Depth

Footing base depth below soil surface	=	1.917	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

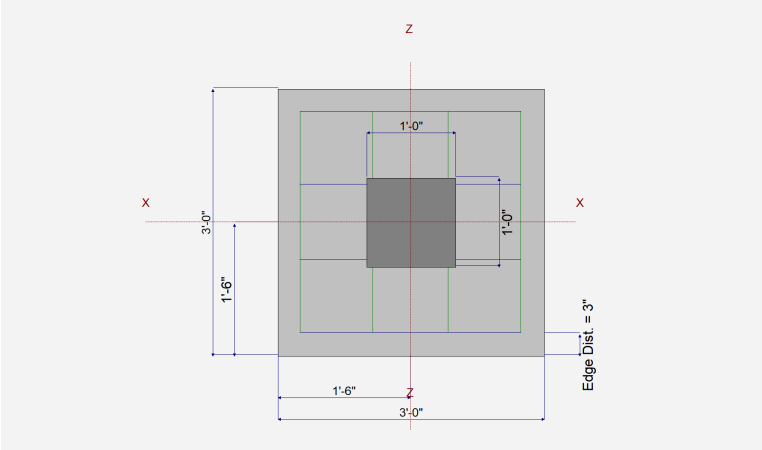
Width parallel to X-X Axis	=	3.0 ft
Length parallel to Z-Z Axis	=	3.0 ft
Footing Thickness	=	11.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	12.0 in
pz : parallel to Z-Z Axis	=	12.0 in
Height	=	12.0 in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in



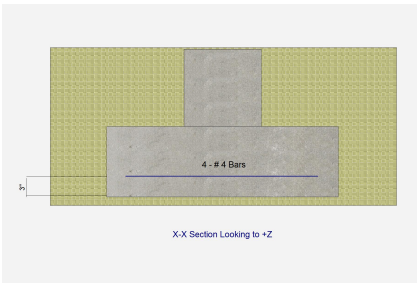
Reinforcing

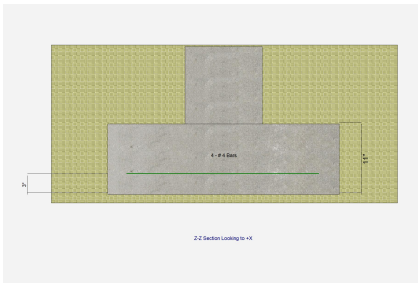
Bars parallel to X-X Axis			
Number of Bars	=		4.0
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis			
Number of Bars	=		4.0
Reinforcing Bar Size	=	#	4

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	=	3.530			3.160	0.160	0.0		k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=	0.020			0.050	0.370			k
V-z	=								k

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Service Drive Canopy Fdn - Outer Cols

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	1.0	Soil Bearing	1.004 ksf	1.004 ksf	+D+S about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	11.572	Overturning - Z-Z	0.4485 k-ft	5.190 k-ft	+0.60D+0.60W
PASS	11.796	Sliding - X-X	0.2340 k	2.760 k	+0.60D+0.60W
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	0.06043	Z Flexure (+X)	0.5611 k-ft/ft	9.286 k-ft/ft	+1.20D+1.60S+0.50W
PASS	0.05294	Z Flexure (-X)	0.4916 k-ft/ft	9.286 k-ft/ft	+1.20D+1.60S
PASS	0.05527	X Flexure (+Z)	0.5133 k-ft/ft	9.286 k-ft/ft	+1.20D+1.60S+0.50W
PASS	0.05527	X Flexure (-Z)	0.5133 k-ft/ft	9.286 k-ft/ft	+1.20D+1.60S+0.50W
PASS	0.04754	1-way Shear (+X)	3.906 psi	82.158 psi	+1.20D+1.60S+0.50W
PASS	0.04093	1-way Shear (-X)	3.363 psi	82.158 psi	+1.20D+1.60S
PASS	0.04296	1-way Shear (+Z)	3.529 psi	82.158 psi	+1.20D+1.60S+0.50W
PASS	0.04296	1-way Shear (-Z)	3.529 psi	82.158 psi	+1.20D+1.60S+0.50W
PASS	0.06031	2-way Punching	9.910 psi	164.317 psi	+1.20D+1.60S+0.50W

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	1.004	n/a	0.0	0.6229	0.6229	n/a	n/a	0.620
X-X, +D+S	1.004	n/a	0.0	0.9741	0.9741	n/a	n/a	0.970
X-X, +D+0.750S	1.004	n/a	0.0	0.8863	0.8863	n/a	n/a	0.883
X-X, +D+0.60W	1.004	n/a	0.0	0.6336	0.6336	n/a	n/a	0.631
X-X, +D+0.450W	1.004	n/a	0.0	0.6309	0.6309	n/a	n/a	0.628
X-X, +D+0.750S+0.450W	1.004	n/a	0.0	0.8943	0.8943	n/a	n/a	0.891
X-X, +0.60D+0.60W	1.004	n/a	0.0	0.3844	0.3844	n/a	n/a	0.383
X-X, +0.60D	1.004	n/a	0.0	0.3738	0.3738	n/a	n/a	0.372
Z-Z, D Only	1.004	0.08205	n/a	n/a	n/a	0.6145	0.6314	0.629
Z-Z, +D+S	1.004	0.1837	n/a	n/a	n/a	0.9445	1.004	1.000
Z-Z, +D+0.750S	1.004	0.1658	n/a	n/a	n/a	0.8620	0.9105	0.907
Z-Z, +D+0.60W	1.004	0.9761	n/a	n/a	n/a	0.5316	0.7357	0.733
Z-Z, +D+0.450W	1.004	0.7554	n/a	n/a	n/a	0.5523	0.7096	0.707
Z-Z, +D+0.750S+0.450W	1.004	0.6401	n/a	n/a	n/a	0.7998	0.9887	0.985
Z-Z, +0.60D+0.60W	1.004	1.556	n/a	n/a	n/a	0.2858	0.4831	0.481
Z-Z, +0.60D	1.004	0.08205	n/a	n/a	n/a	0.3687	0.3788	0.377

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	0.03833 k-ft	8.410 k-ft	219.386	OK
Z-Z, +D+S	0.1342 k-ft	13.150 k-ft	98.011	OK
Z-Z, +D+0.750S	0.1102 k-ft	11.965 k-ft	108.565	OK
Z-Z, +D+0.60W	0.4638 k-ft	8.554 k-ft	18.442	OK
Z-Z, +D+0.450W	0.3575 k-ft	8.518 k-ft	23.829	OK
Z-Z, +D+0.750S+0.450W	0.4293 k-ft	12.073 k-ft	28.120	OK
Z-Z, +0.60D+0.60W	0.4485 k-ft	5.190 k-ft	11.572	OK
Z-Z, +0.60D	0.0230 k-ft	5.046 k-ft	219.386	OK

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Service Drive Canopy Fdn - Outer Cols

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, D Only	0.020 k	3.726 k	186.317	OK
X-X, +D+S	0.070 k	5.148 k	73.548	OK
X-X, +D+0.750S	0.05750 k	4.793 k	83.354	OK
X-X, +D+0.60W	0.2420 k	3.770 k	15.577	OK
X-X, +D+0.450W	0.1865 k	3.759 k	20.154	OK
X-X, +D+0.750S+0.450W	0.2240 k	4.825 k	21.541	OK
X-X, +0.60D+0.60W	0.2340 k	2.760 k	11.796	OK
X-X, +0.60D	0.0120 k	2.717 k	226.431	OK
Z-Z, D Only	0.0 k	3.726 k	No Sliding	OK
Z-Z, +D+S	0.0 k	5.148 k	No Sliding	OK
Z-Z, +D+0.750S	0.0 k	4.793 k	No Sliding	OK
Z-Z, +D+0.60W	0.0 k	3.770 k	No Sliding	OK
Z-Z, +D+0.450W	0.0 k	3.759 k	No Sliding	OK
Z-Z, +D+0.750S+0.450W	0.0 k	4.825 k	No Sliding	OK
Z-Z, +0.60D+0.60W	0.0 k	2.760 k	No Sliding	OK
Z-Z, +0.60D	0.0 k	2.717 k	No Sliding	OK

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	0.2660	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.40D	0.2660	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D	0.2280	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D	0.2280	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+0.50S	0.3157	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+0.50S	0.3157	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+0.50W	0.2324	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+0.50W	0.2324	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+1.60S	0.5088	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+1.60S	0.5088	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+1.60S+0.50W	0.5133	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+1.60S+0.50W	0.5133	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+W	0.2369	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+W	0.2369	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+0.50S+W	0.3246	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+0.50S+W	0.3246	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +0.90D+W	0.1799	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +0.90D+W	0.1799	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+0.20S	0.2631	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +1.20D+0.20S	0.2631	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +0.90D	0.1710	+Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
X-X, +0.90D	0.1710	-Z	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.40D	0.2613	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.40D	0.2706	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D	0.2240	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D	0.2319	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+0.50S	0.3076	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+0.50S	0.3239	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+0.50W	0.1978	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+0.50W	0.2670	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+1.60S	0.4916	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+1.60S	0.5261	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+1.60S+0.50W	0.4654	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+1.60S+0.50W	0.5611	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+W	0.1716	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+W	0.3021	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+0.50S+W	0.2552	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+0.50S+W	0.3940	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +0.90D+W	0.1156	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +0.90D+W	0.2441	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+0.20S	0.2575	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +1.20D+0.20S	0.2687	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK
Z-Z, +0.90D	0.1680	-X	Bottom	0.2376	AsMin	0.2667	9.286	OK

PRCA20220091

Project Title: Larson Jeep
Engineer: HYH
Project ID: 21-067
Project Descr:

General Footing

Project File: 21067 Larson Jeep.ec6

DESCRIPTION: Service Drive Canopy Fdn - Outer Cols

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
Z-Z, +0.90D	0.1740	+X	Bottom	0.2376	AsMin	0.2667	9.286	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	1.79 psi	1.87 psi	1.83 psi	1.83 psi	1.87 psi	82.16 psi	0.02	OK
+1.20D	1.54 psi	1.60 psi	1.57 psi	1.57 psi	1.60 psi	82.16 psi	0.02	OK
+1.20D+0.50S	2.11 psi	2.24 psi	2.17 psi	2.17 psi	2.24 psi	82.16 psi	0.03	OK
+1.20D+0.50W	1.33 psi	1.87 psi	1.60 psi	1.60 psi	1.87 psi	82.16 psi	0.02	OK
+1.20D+1.60S	3.36 psi	3.63 psi	3.50 psi	3.50 psi	3.63 psi	82.16 psi	0.04	OK
+1.20D+1.60S+0.50W	3.15 psi	3.91 psi	3.53 psi	3.53 psi	3.91 psi	82.16 psi	0.05	OK
+1.20D+W	1.12 psi	2.14 psi	1.63 psi	1.63 psi	2.14 psi	82.16 psi	0.03	OK
+1.20D+0.50S+W	1.69 psi	2.78 psi	2.23 psi	2.23 psi	2.78 psi	82.16 psi	0.03	OK
+0.90D+W	0.73 psi	1.74 psi	1.24 psi	1.24 psi	1.74 psi	82.16 psi	0.02	OK
+1.20D+0.20S	1.77 psi	1.85 psi	1.81 psi	1.81 psi	1.85 psi	82.16 psi	0.02	OK
+0.90D	1.15 psi	1.20 psi	1.18 psi	1.18 psi	1.20 psi	82.16 psi	0.01	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	5.14 psi	164.32 psi	0.03125	OK
+1.20D	4.40 psi	164.32 psi	0.02679	OK
+1.20D+0.50S	6.10 psi	164.32 psi	0.0371	OK
+1.20D+0.50W	4.49 psi	164.32 psi	0.02731	OK
+1.20D+1.60S	9.82 psi	164.32 psi	0.05979	OK
+1.20D+1.60S+0.50W	9.91 psi	164.32 psi	0.06031	OK
+1.20D+W	4.57 psi	164.32 psi	0.02783	OK
+1.20D+0.50S+W	6.27 psi	164.32 psi	0.03814	OK
+0.90D+W	3.47 psi	164.32 psi	0.02113	OK
+1.20D+0.20S	5.08 psi	164.32 psi	0.03091	OK
+0.90D	3.30 psi	164.32 psi	0.02009	OK

PCS Structural Solutions

Project: PRCA20220091 JEEP | Job No:

Subject: | Sheet | Name: DCT

Originating Office: ☐ Seattle ☐ Tacoma ☐ Portland | Date: 9/23/21

DETERMINE COL CONN TO DBL TOP PL

$V_R = 808^{\#}$

DETERMINE NUMBER OF 1/4"ϕ x 3 1/2" SDS SCREWS PER SIMPSON (FROM PREV. CALCS)

$V_a = 672^{\#}$

$$\text{No. REQD} = \frac{808^{\#}}{672^{\#}/\text{SCREW}} = 1.2 \Rightarrow (2) \text{ MIN}$$

∴ USE (2) 1/4"ϕ x 3 1/2" SDS SCREWS MIN

PRCA20220091

CARWASH FRAMING DESIGN

RedSpec™ by RedBuilt™
v7.1.12

PRCA20220091

Project: Project
Location: Puyallup, WA
Folder: Folder
Date: 9/23/21 5:56 PM
Designer: HYH
Comment: ROOF JOIST AT CAR WASH

Type: Car Wash: Roof J

11.875" Red-I45™ @ 16" o.c.

This product meets or exceeds the set design controls for the application and loads listed

DESIGN CONTROLS	%	Design	Allow.	DOL	Combination	Pattern	Pass/Fail
Shear (lb)	30%	620	2053	Snow(115%)	1.0D+1.0S	All Spans	PASS
Positive Moment (ft-lb)	59%	3203	5388	Snow(115%)	1.0D+1.0S	All Spans	PASS

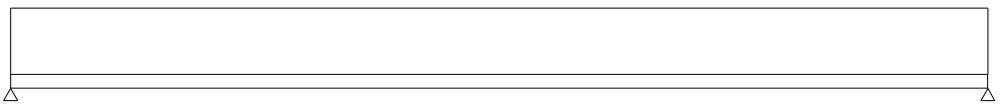
DEFLECTIONS (in)	%	Design	Allow.	Design	Allow.	Combination	Pattern	Pass/Fail
Span Live	67%	0.461	0.689	L / 538	L / 360	1.0D+1.0S	All Spans	PASS
Span Total	80%	0.829	1.033	L / 299	L / 240	1.0D+1.0S	All Spans	PASS

SUPPORTS	Support 1	Support 2
Live Reaction, Critical (lb) (DOL%)	344 (115)	344 (115)
Dead Reaction (lb)	276	276
Total Reaction (lb) (DOL%)	620 (115)	620 (115)
Bearing	Bottom	Bottom
Support	Wall	Wall
Req'd Bearing, No Stiffeners (in)	1.75	1.75
Req'd Bearing, Stiffeners (in)	-	-

SPANS AND LOADS

Dimensions represent horizontal design spans.

Member Slope: 0/12



20'- 8.0"

APPLICATION LOADS

Type	Units	DOL	Live	Dead	Partition	Tributary	Member Type
Uniform	psf	Snow(115%)	25	20	0	16"	Snow Roof Joist

NOTES

- Building code and design methodology: 2018 IBC ASD (US).
- Product Acceptance: ICC-ES ESR-2994 and LABC/LARC Supplement.
- Continuous lateral support required at top edge. Lateral support at bottom edge shall be per RedBuilt recommendations.

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PRCA20220091

SERVICE BAYS ANALYSIS & DESIGN

SERVICE BAYS ANALYSIS

Design Criteria

Dead Load:

Roof = 15 psf

Wall = 41 psf (8" CMU w/ Grout @ 48" O.C.)

Snow Load:

P_s = 25psf

Seismic:

S_s = 1.276, S_{DS} = 1.021

S_1 = 0.439, S_{D1} = 0.545

R = 2 (Detailed Plain Masonry Shear Wall)

I_e = 1.0

$C_s = \frac{S_{DS}}{R/I_e} = 0.51$

Wind:

V = 97 mph,

Exposure B

$q_{z=15'} = 0.00256 K_z K_{zt} K_d K_e V^2 = 0.00256(0.57)(1)(0.85)(1)(97)^2 = 11.67$ psf

where $K_z = 0.57$

$K_{zt} = 1.0$

$K_d = 0.85$

$K_e = 1.0$

Determine Seismic / Wind Force in E/W:

Building Dimensions : 32' in N/S
200' in E/W

Seismic :

$V = C_s W$

where $W = W_{Roof} + W_{wall} = 210^k$

$W_{Roof} = 15psf\,(32' \times 200') = 96^k$

$W_{wall} = 41psf\,(14.5'/2)(232' \times 2 - 80') = 114^k$

$\rightsquigarrow V = 0.51 \times 210^k = 107.1^k$

$75\%\,V = 0.75(0.51 \times 210^k) = 80.3^k$ (Reduced Seismic Forces)

Wind :

Does not control by inspection.

Determine Min. Wall Length Based on Allowable Shear Stress:

Shear Force, $V_u = 80.3^k/2 = 40.2^k$ (use Reduced Force)

$V_{ASD} = 0.7 \times 40.2^k = 28.1^k$

Shear Stress, $F_{vm} = \frac{1}{2}\{(4 - 1.75\frac{M}{Vd}^{1.0})\sqrt{f'_m}\} + 0.25\frac{P}{A_n}^{0}$, where $f'_m = 1500psi$

$= \frac{1}{2}(4 - 1.75 \times 1.0)\sqrt{1500psi}$

$= 43.6psi$

$F_{vm,max} = 2\sqrt{f'_m} = 2\sqrt{1500psi} = 77.5psi$

$A_{nv} = 40.7 in^2/ft$ for Grout @ 48" o.c.

$\rightsquigarrow L_R = \frac{28.1^k \times 1000}{(43.6psi)(40.7in^2/ft)} = 15.8\ ft$

Length of Remained Wall @ Grid F = 93'-2" >> L_R ✓

Determine Wall Ability to Resist Overturning Moment:

Wall Length = 93'-2"
Wall Height = 14'-6"

$M_{OT} = 28.1^k \times 14.5' = 408\ k\text{-}ft$

$M_{Res} = (0.6 - 0.14\overset{=1.021}{S_{DS}})(41psf \times 14.5')(93'-2")^2/2 = 1179\ k\text{-}ft$

$M_{Res} > M_{OT}$ ✓

∴ Remaining wall is sufficient.

Determine If North Walls of Service Bay Needs Retrofit :

Base Shear of Service Drive = 2826 # (R = 6.5)

for R = 2 : $V = 2826^{\#} \times \frac{6.5}{2} = 9185^{\#}$

Additional Shear from (N) Service Drive = $\frac{1}{2}(9185^{\#}) = 4592^{\#}$ (ult.)

$\frac{4592^{\#}/1000}{\frac{1}{2}(107.1^{K})} \times 100\% = 8.6\%$ increased $< 10\%$

∴ No Retrofit Needed.

(N) Opening @ (E) Masonry Wall

Dimension of (N) Opening :

Width = 10'

Height = 10'

Vert. Load :

Self-Weight = 41psf (4.5' above) = 184.5 plf

Horiz. Load :

- Wind pressure on Wall.

$p = q_h \{(GC_p) - (GC_{pi})\}$, where $GC_{pi} = \pm 0.18$

	GCp		Wall Pressure (psf)	
	Zone 4	Zone 5	Zone 4	Zone 5
10sf	+1.0/-1.1	+1.0/-1.4	+13.8/-14.9	+13.8/-18.4
500sf	+0.7/-0.8	+0.7/-0.8	+10.3/-11.4	+10.3/-11.4

Min. Wind Pressure = ±16 psf

- Seismic

$F_p = 0.4 S_{DS} I_e W = 0.4(1.021)(1.0) \times W = 0.408 W > 10\% W$

$= 0.408 \times 41 psf$

$= 16.7$ psf

1). Steel Channel Header.

Effective Wind Area = max { $10^2/3 = 33$ sf ; $10'(4.5' + \frac{10'}{2}) = 95$ sf }

D = 185 plf

W = (16.0 psf)(4.5' + 10'/2) = 152 plf > out-of-plane

E = (16.7 psf)(4.5') = 75 plf

Section = C15 x 33.9 (see RISA)

Check Out-of-Plane Deflection (Wind Controls):

$$\Delta_{max} = \frac{5(152\text{plf} \times 0.42)(10')^4(12)^3/1000}{384(29000\text{ksi})(8.07\text{in}^4)} = 0.061" < 0.007h = 0.07" \checkmark$$

(I_y)

2). HSS Strongback

W = (-18.4psf)(2.5' + 10'/2) = 138 plf

E = (16.7psf)(2.5' + 10'/2) = 126 plf

OR (16.7psf)(2.5') = 42 plf

Section = HSS5 x 5 x 1/4 (see RISA)

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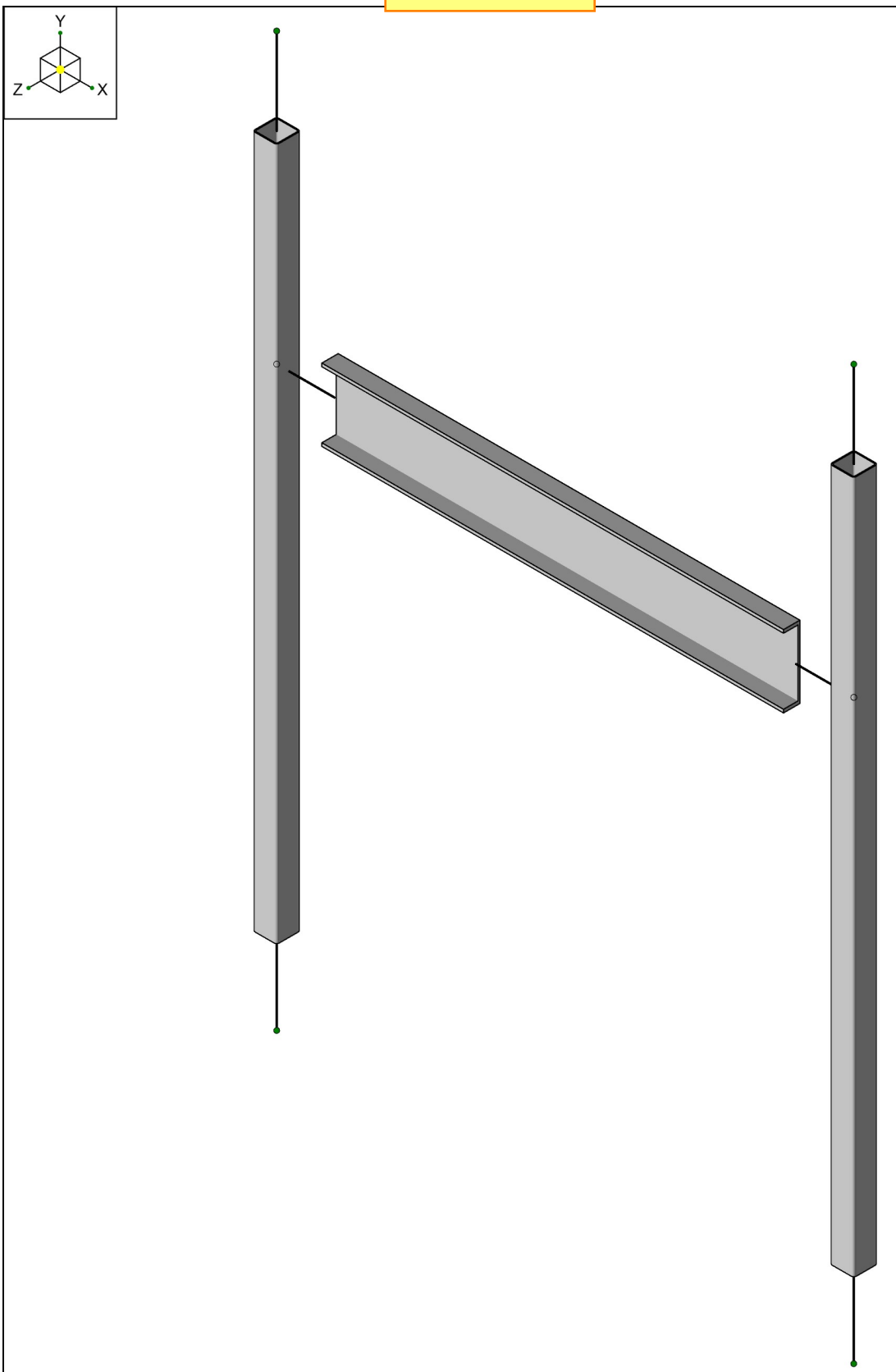

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HYH		Sep 19, 2021
21-067		Service Bay Opening.r3d

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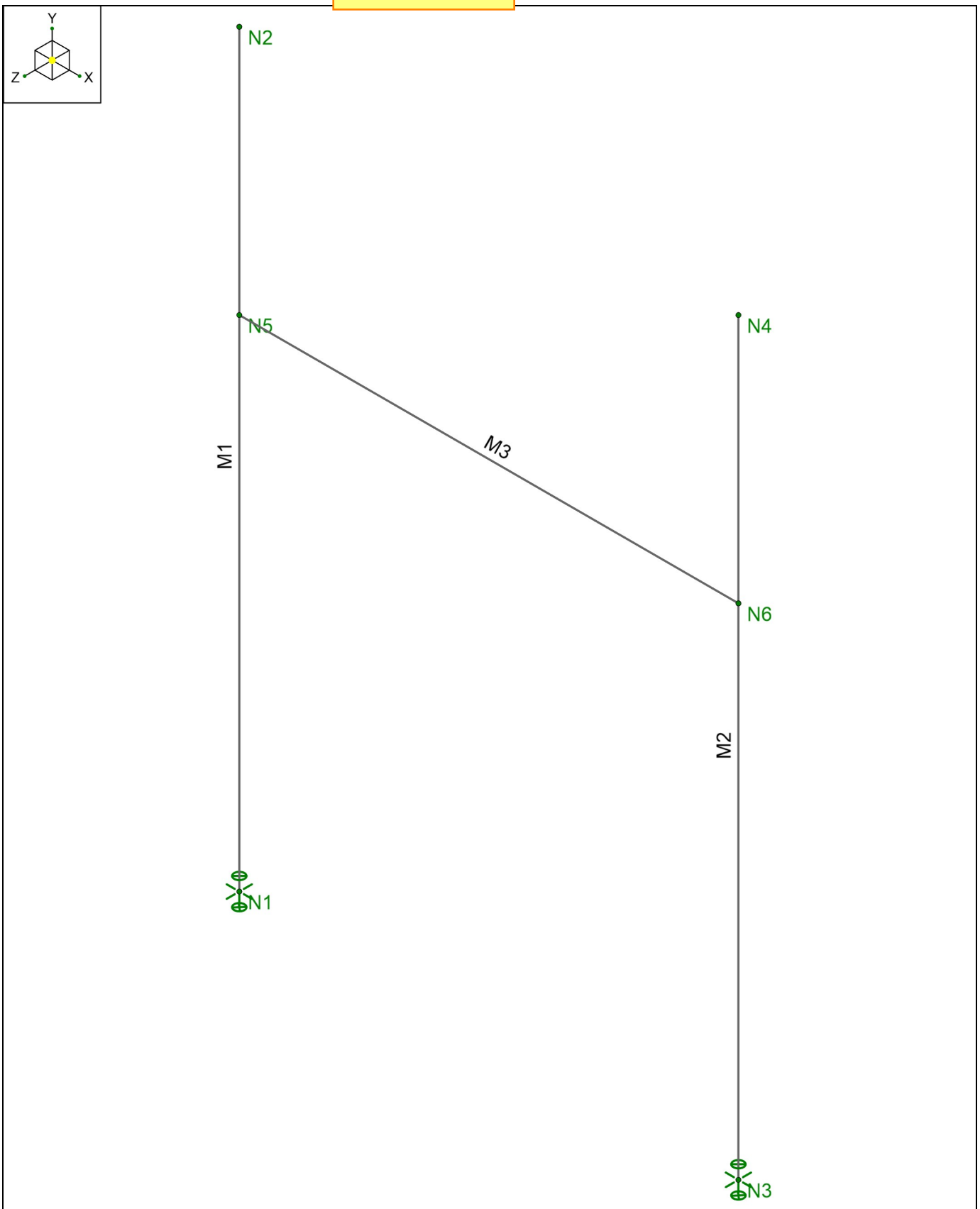

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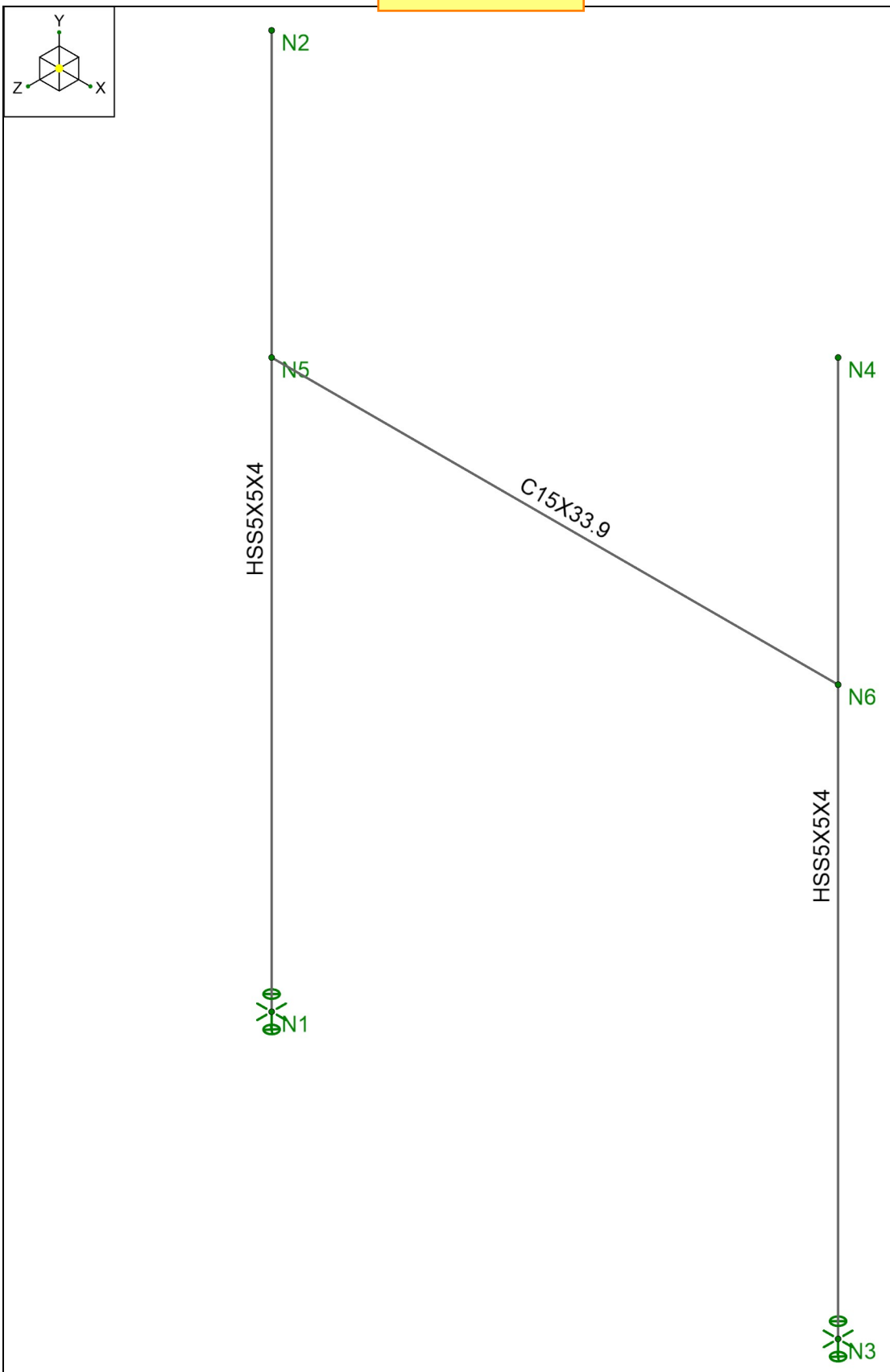

PCS Structural Solutions	Opening Support at Service Bays	SK-3
HYH		Sep 19, 2021
21-067		Service Bay Opening.r3d

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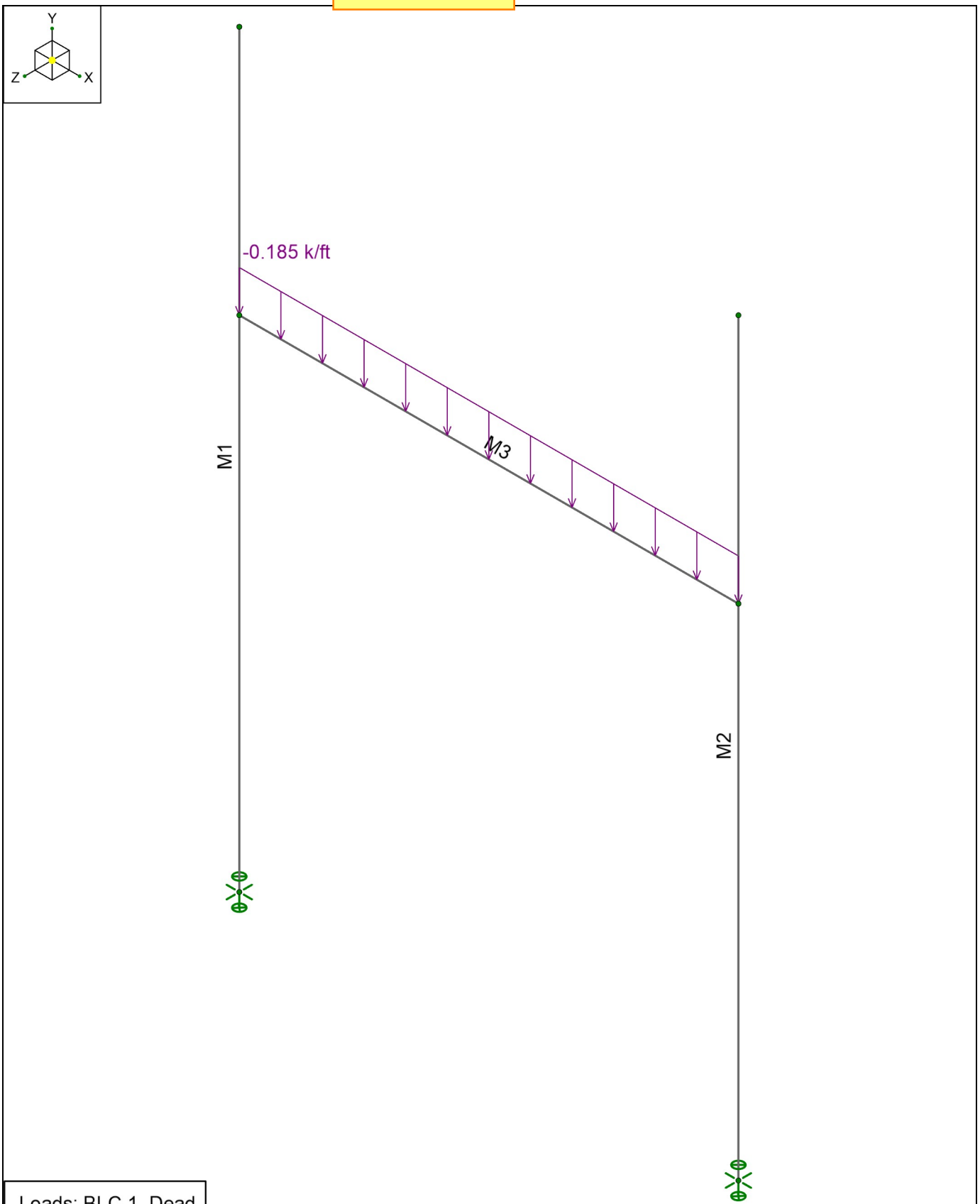

Loads: BLC 1, Dead

PCS Structural Solutions	Opening Support at Service Bays	SK-4
HYH		Sep 19, 2021
21-067		Service Bay Opening.r3d

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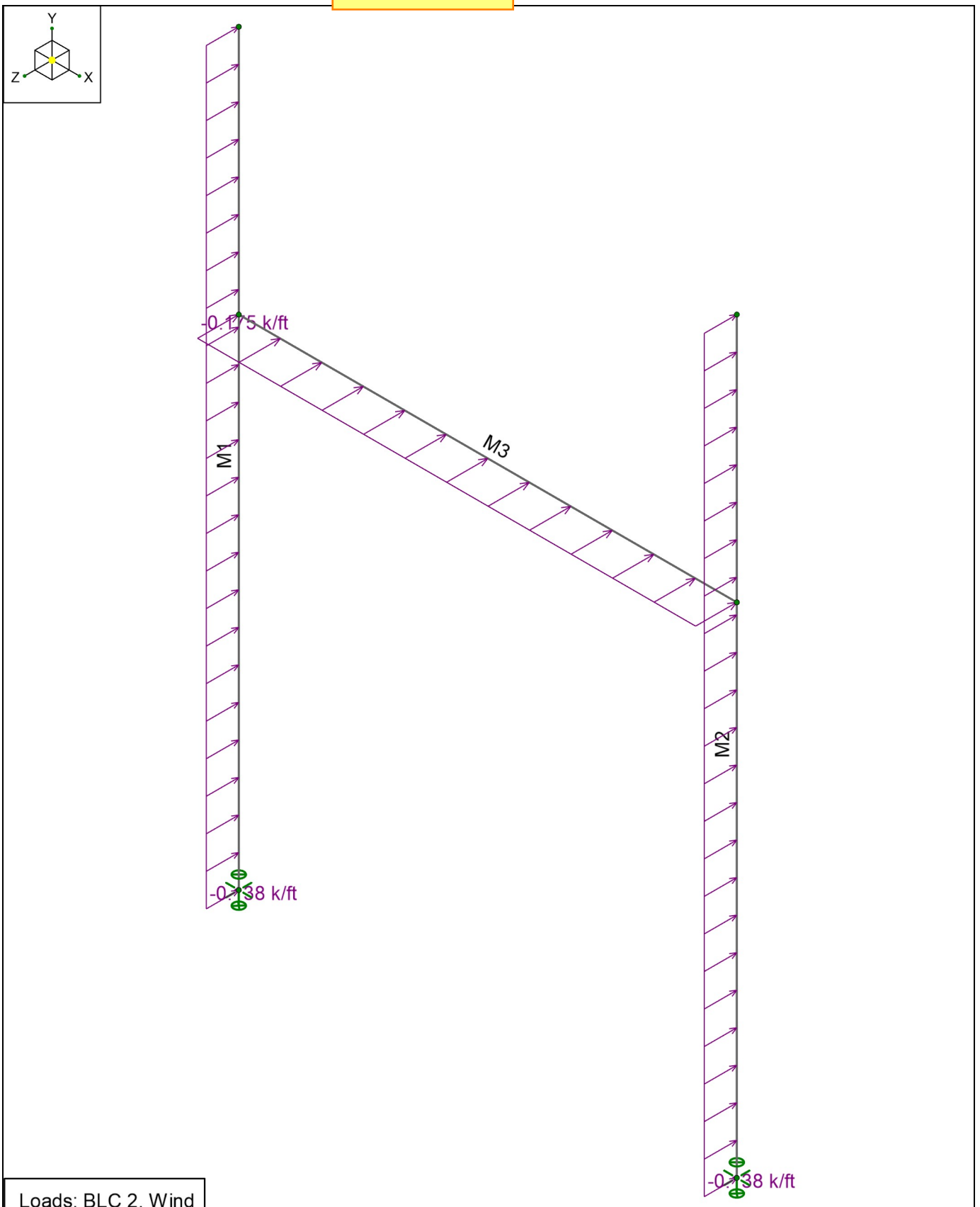

Loads: BLC 2, Wind

PCS Structural Solutions	Opening Support at Service Bays	SK-5
HYH		Sep 19, 2021
21-067		Service Bay Opening.r3d

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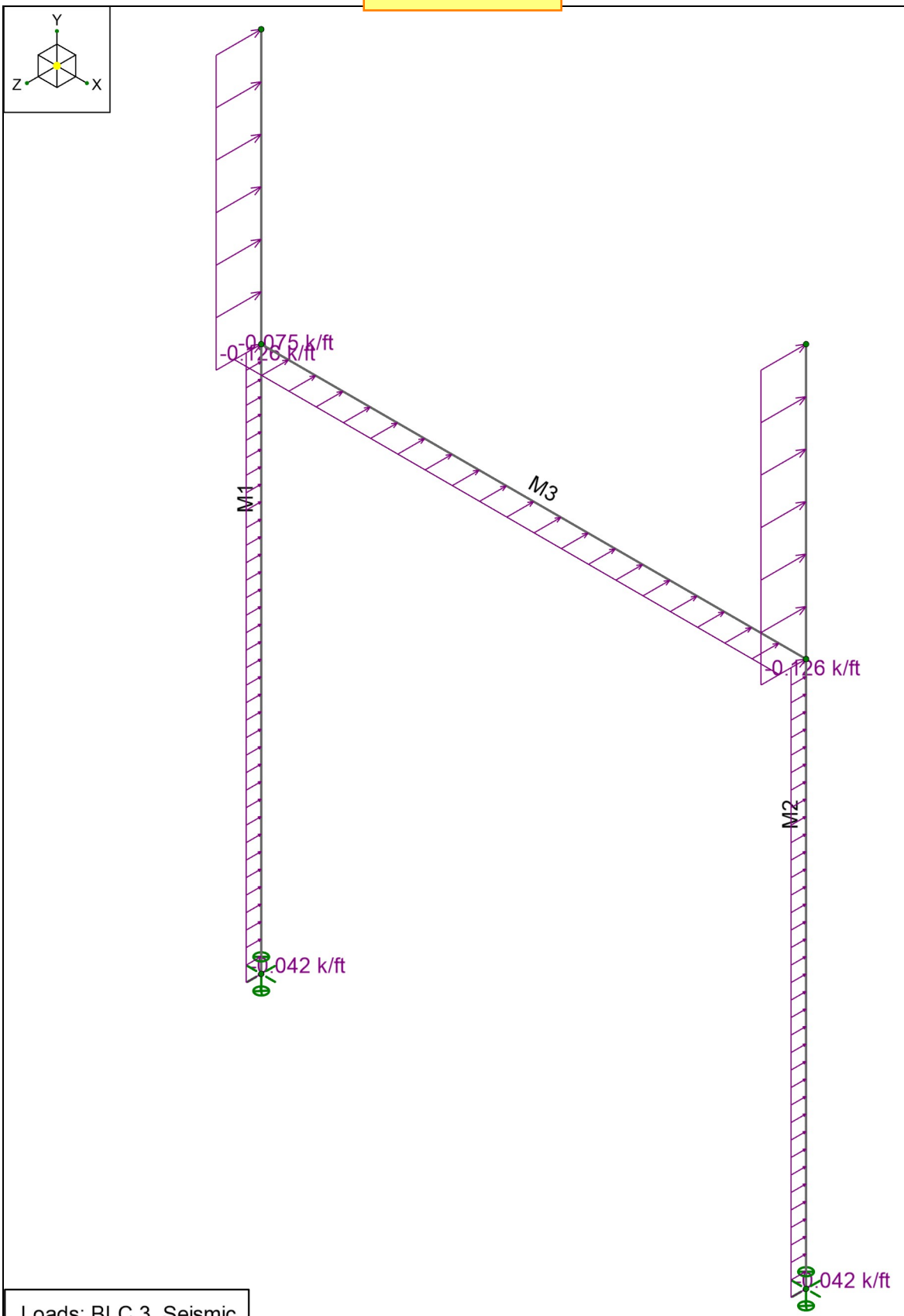


Loads: BLC 3, Seismic

PCS Structural Solutions	Opening Support at Service Bays	SK-6
HYH		Sep 19, 2021
21-067		Service Bay Opening.r3d

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	N1	0	0	0	
2	N2	0	15	0	
3	N3	10	0	0	
4	N4	10	15	0	
5	N5	0	10	0	
6	N6	10	10	0	

Node Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]	Y Rot [k-ft/rad]
1	N1	Reaction	Reaction	Reaction	Reaction
2	N3	Reaction	Reaction	Reaction	Reaction
3	ALL			Reaction	

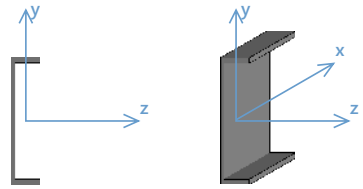
Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	IBC 16-8	Yes	Y	DL	1						
2	IBC 16-9	Yes	Y	DL	1	LL	1	LLS	1		
3	IBC 16-12 (a) (a)	Yes	Y	DL	1	WL	0.6				
4	IBC 16-12 (a) (b)	Yes	Y	DL	1	WL	-0.6				
5	IBC 16-13 (a) (a)	Yes	Y	DL	1	WL	0.45	LL	0.75	LLS	0.75
6	IBC 16-13 (a) (b)	Yes	Y	DL	1	WL	-0.45	LL	0.75	LLS	0.75
7	IBC 16-15 (a)	Yes	Y	DL	0.6	WL	0.6				
8	IBC 16-15 (b)	Yes	Y	DL	0.6	WL	-0.6				
9	IBC 16-12 (b) (a)	Yes	Y	DL	1	EL	0.7				
10	IBC 16-12 (b) (b)	Yes	Y	DL	1	EL	-0.7				
11	IBC 16-14 (a)	Yes	Y	DL	1	EL	0.525	LL	0.75	LLS	0.75
12	IBC 16-14 (b)	Yes	Y	DL	1	EL	-0.525	LL	0.75	LLS	0.75
13	IBC 16-16 (a)	Yes	Y	DL	0.6	EL	0.7				
14	IBC 16-16 (b)	Yes	Y	DL	0.6	EL	-0.7				

Envelope Node Reactions

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N1	max	0.013	12	1.331	12	0.337	7	0	14	0.38	8	0	14
2		min	0.008	7	0.799	7	-0.337	4	0	1	-0.38	3	0	1
3	N2	max	0	14	0	14	0.154	13	0	14	0	14	0	14
4		min	0	1	0	1	-0.154	10	0	1	0	1	0	1
5	N3	max	-0.008	14	1.331	12	0.337	7	0	14	0.38	7	0	14
6		min	-0.013	1	0.799	7	-0.337	4	0	1	-0.38	4	0	1
7	N4	max	0	14	0	14	0.154	13	0	14	0	14	0	14
8		min	0	1	0	1	-0.154	10	0	1	0	1	0	1
9	N5	max	0	14	0	14	1.377	7	0	14	0	14	0	14
10		min	0	1	0	1	-1.377	4	0	1	0	1	0	1
11	N6	max	0	14	0	14	1.377	7	0	14	0	14	0	14
12		min	0	1	0	1	-1.377	4	0	1	0	1	0	1
13	Totals:	max	0	14	2.662	12	3.533	7						
14		min	0	1	1.597	7	-3.533	4						

Detail Report: M3 **Unity Check:** 0.092 (LC 4) **Load Combination:** Envelope



Input Data:

Shape:	C15X33.9	I Node:	N5
Member Type:	Beam	J Node:	N6
Length (ft):	10	I Release:	Fixed
Material Type:	Hot Rolled Steel	J Release:	Fixed
Design Rule:	Typical	I Offset (in):	N/A
Number of Internal Sections:	97	J Offset (in):	N/A

Material Properties:

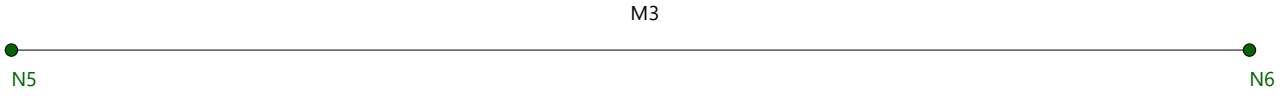
Material:	A36 Gr.36	Therm. Coeff. ($1e^5°F^{-1}$):	0.65	R_y:	1.5
E (ksi):	29000	Density (k/ft^3):	0.49	F_u (ksi):	58
G (ksi):	11154	F_y (ksi):	36	R_t:	1.2
Nu:	0.3				

Shape Properties:

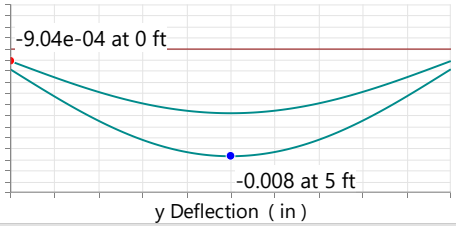
d (in):	15	I_{zz} (in^4):	315	C_w (in^6):	358
b_f (in):	3.4	Area (in^2):	10	J (in^4):	1.01
t_f (in):	0.65	Z_{yy} (in^3):	6.19	$\bar{x}$ (in):	0.788
t_w (in):	0.4	Z_{zz} (in^3):	50.8	e_o (in):	0.896
I_{yy} (in^4):	8.07				

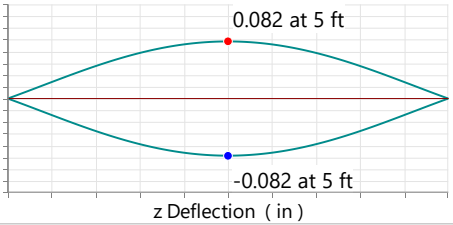
Design Properties:

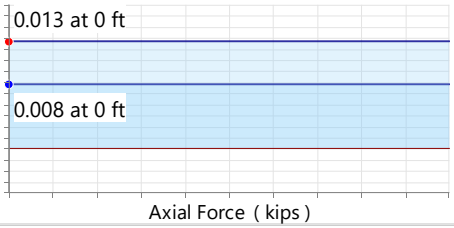
$L_{b\ y-y}$ (ft):	N/A	K_{y-y}:	1	Max Defl Ratio:	L/10000
$L_{b\ z-z}$ (ft):	N/A	K_{z-z}:	1	Max Defl Location:	0
$L_{comp\ top}$ (ft):	Lbyy	y sway:	No	Span:	N/A
$L_{comp\ bot}$ (ft):	N/A	z sway:	No		
L_{torque} (ft):	N/A	Function:	Lateral		
		Seismic DR:	None		

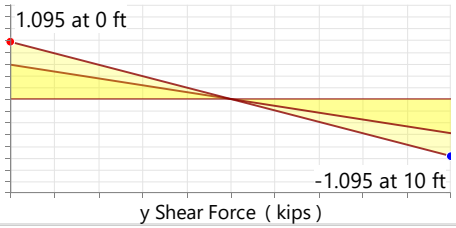


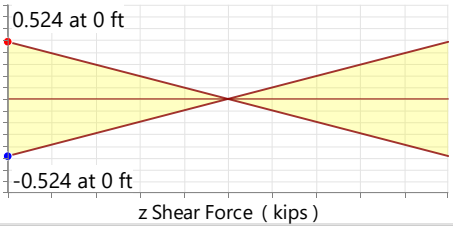
Diagrams:

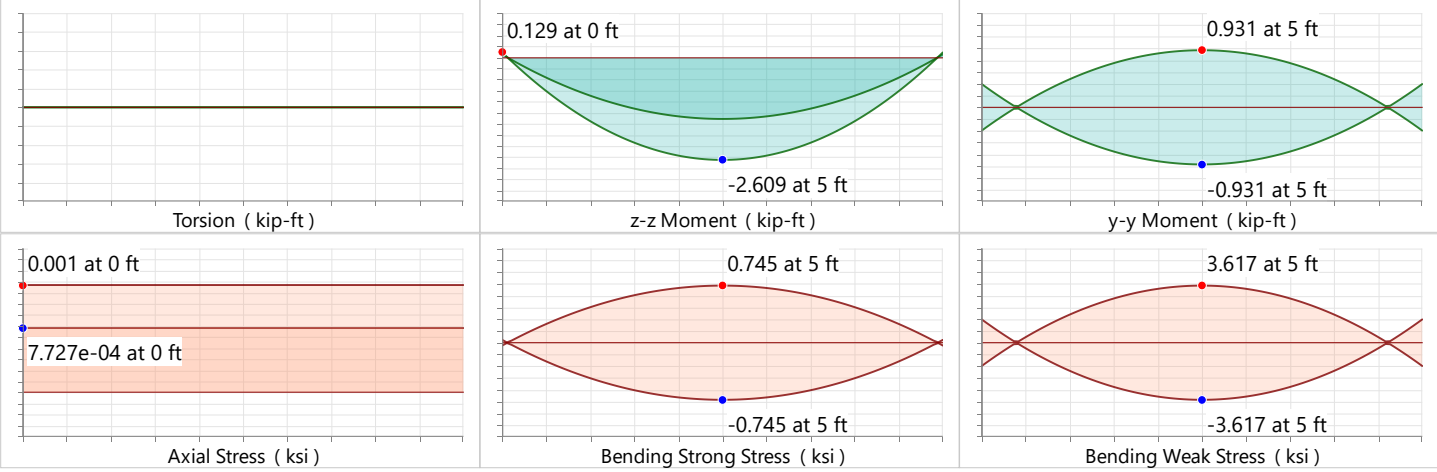








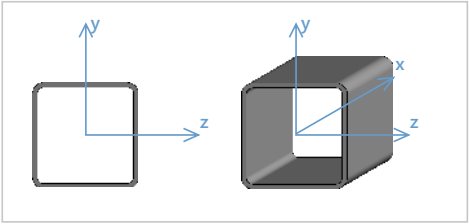




AISC 15th (360-16): LRFD Code Check

Limit State	Gov. LC	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	4	-	-	-	-
Applied Loading - Shear + Torsion	12	-	-	-	-
Axial Tension Analysis	4	0.000 k	324 k	-	-
Axial Compression Analysis	4	0.013 k	126.642 k	-	-
Flexural Analysis (Strong Axis)	4	2.609 k-ft	118.456 k-ft	-	-
Flexural Analysis (Weak Axis)	4	0.931 k-ft	13.347 k-ft	-	-
Shear Analysis (Major Axis y)	12	1.095 k	116.64 k	0.009	Pass
Shear Analysis (Minor Axis z)	12	0.197 k	85.925 k	0.002	Pass
Bending & Axial Interaction Check (UC Bending Max)	4	-	-	0.092	Pass

Detail Report: M1 **Unity Check:** 0.04 (LC 4) **Load Combination:** Envelope



Input Data:

Shape:	HSS5X5X4	I Node:	N1
Member Type:	Column	J Node:	N2
Length (ft):	15	I Release:	Fixed
Material Type:	Hot Rolled Steel	J Release:	Fixed
Design Rule:	Typical	I Offset (in):	N/A
Number of Internal Sections:	97	J Offset (in):	N/A

Material Properties:

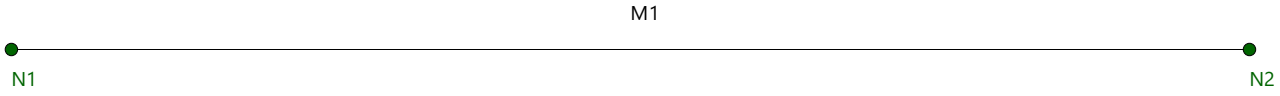
Material:	A500 Gr.B Rect	Therm. Coeff. ($1e^5°F^{-1}$):	0.65	R_y:	1.4
E (ksi):	29000	Density (k/ft^3):	0.527	F_u (ksi):	58
G (ksi):	11154	F_y (ksi):	46	R_t:	1.3
Nu:	0.3				

Shape Properties:

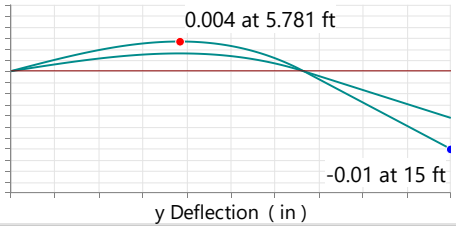
d (in):	5	I_{yy} (in^4):	16	Area (in^2):	4.3
b_f (in):	5	I_{zz} (in^4):	16	J (in^4):	25.8
t (in):	0.233				

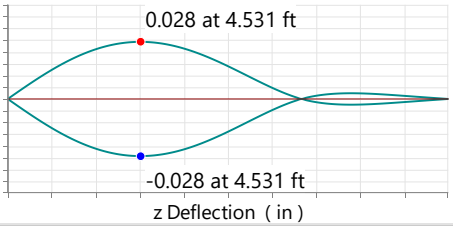
Design Properties:

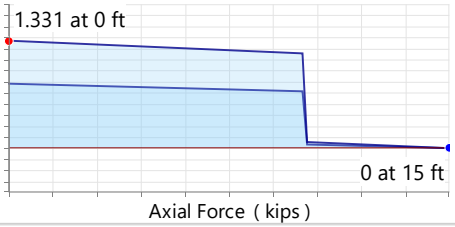
$L_{b\ y-y}$ (ft):	N/A	K_{y-y}:	1	Max Defl Ratio:	L/0
$L_{b\ z-z}$ (ft):	N/A	K_{z-z}:	1	Max Defl Location:	0
$L_{comp\ top}$ (ft):	Lbyy	y sway:	No	Span:	N/A
$L_{comp\ bot}$ (ft):	N/A	z sway:	No		
L_{torque} (ft):	N/A	Function:	Lateral		
		Seismic DR:	None		

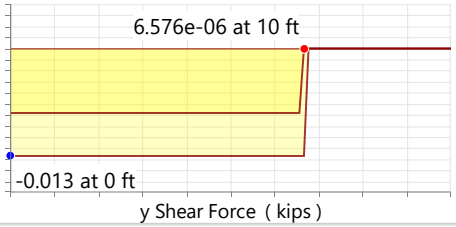


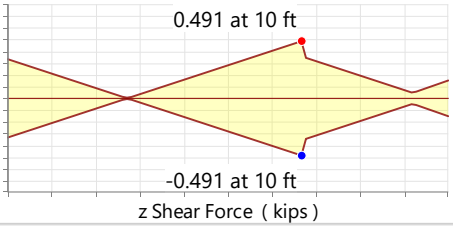
Diagrams:

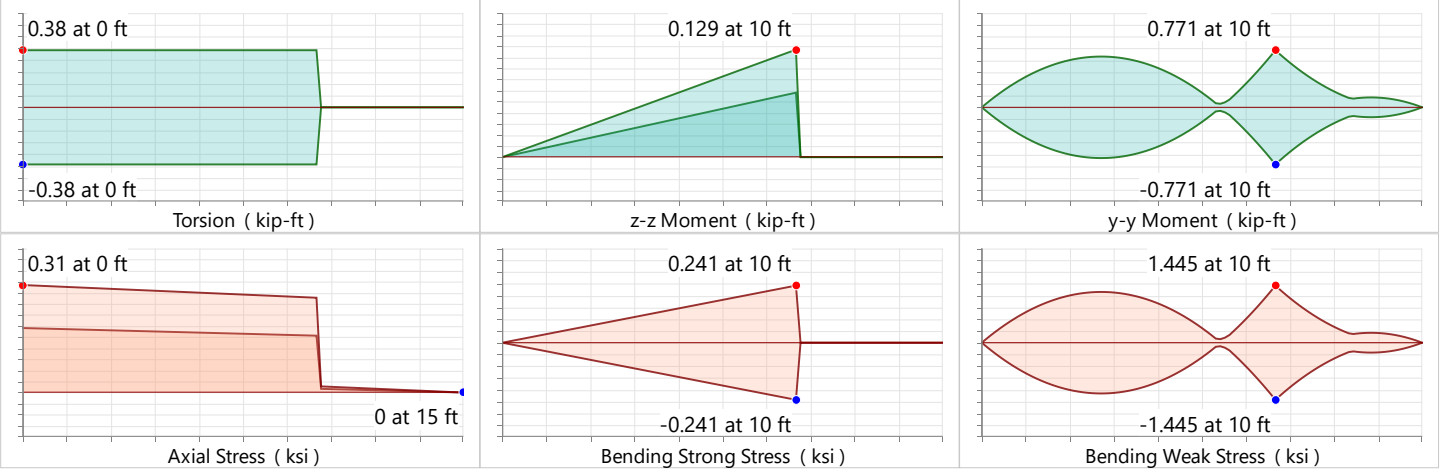












AISC 15th (360-16): LRFD Code Check

Limit State	Gov. LC	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	4	-	-	-	-
Applied Loading - Shear + Torsion	8	-	-	-	-
Axial Tension Analysis	4	0.000 k	178.02 k	-	-
Axial Compression Analysis	4	1.174 k	99.103 k	-	-
Flexural Analysis (Strong Axis)	4	0.129 k-ft	26.254 k-ft	-	-
Flexural Analysis (Weak Axis)		0.771 k-ft	26.254 k-ft	-	-
Shear Analysis (Major Axis y)	8	0.87 k	49.786 k	0.017	Pass
Shear Analysis (Minor Axis z)	8	1.354 k	49.786 k	0.027	Pass
Bending & Axial Interaction Check (UC Bending Max)	4	-	-	0.04	Pass
Torsional Analysis	4	0.38 k-ft	21.819 k-ft	0.017	Pass

3). Header to Wall Anchorage.

Gravity: (185 pf)(16"/12) = 247 #/Anchor

Lateral: (152 pf)(16"/12) = 203 #/Anchor

Use 3/4" ϕ Adhesive Anchor:

Allowable Shear = 4090 #
Allowable Tension = 3810 #
Combined: $\frac{247\#}{4090\#} + \frac{203\#}{3810\#} = 0.11 < 1.0$ ✓

4). HSS Col to Wall Anchorage

F = 1.354 k (see RISA M1 Results)
Anchors @ 32" o.c. → # of Anchors = 12'/32" ≈ 5
∴ 1.354 k / 5 anchors = 271 #/anchor
By inspection, anchors can handel 271 # in shear.

PCS Structural Solutions

Project: PRCA20220091 JEEP Job No:

Subject: Sheet Name: DCT

Originating Office: ☐ Seattle ☐ Tacoma ☐ Portland Date: 7/14/21

SERVICE BAY FASCIA

LOADS → $P_D = 15 psf$

AT WALL, $P_W = 20.1 psf$

AT PARAPET, $p_w = \begin{cases} 16 + 42.9 psf = 58.9 psf \\ 16 + 20.1 psf = 36.1 psf \end{cases}_{MAX}$

TRY 400S162-43 @ 24" oc

$w_w = \begin{cases} 20.1 psf (2ft) = 40.2 \#/ft \\ 58.9 psf (\ " \ ) = 117.8 \#/ft \end{cases}$

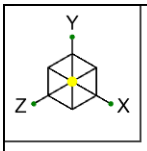
$w_D = 15 psf (2ft) = 30 \#/ft$

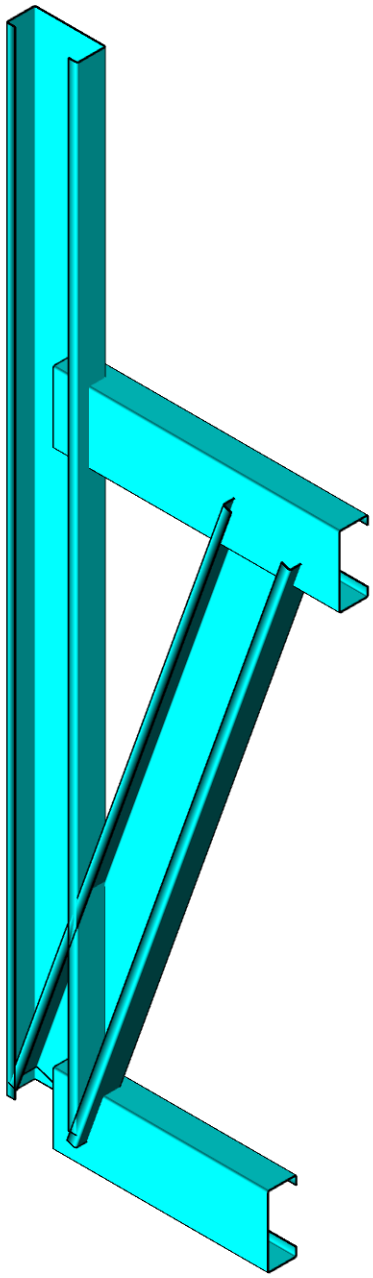
PER RISA

$DCR_{MAX} = 0.13 < 1 \therefore OK$

$\therefore$ MEMBERS OK

PRCA20220091

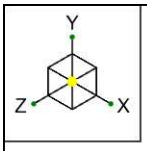


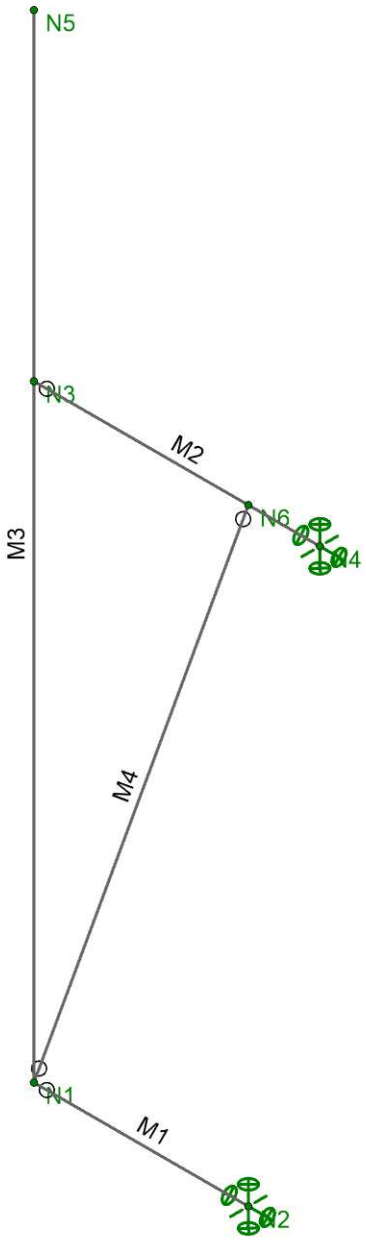


Envelope Only Solution

<Licensed Company>		SK-1
dtappel		Sep 15, 2021
		Service Bay Fascia.r3d

PRCA20220091

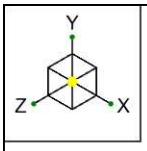


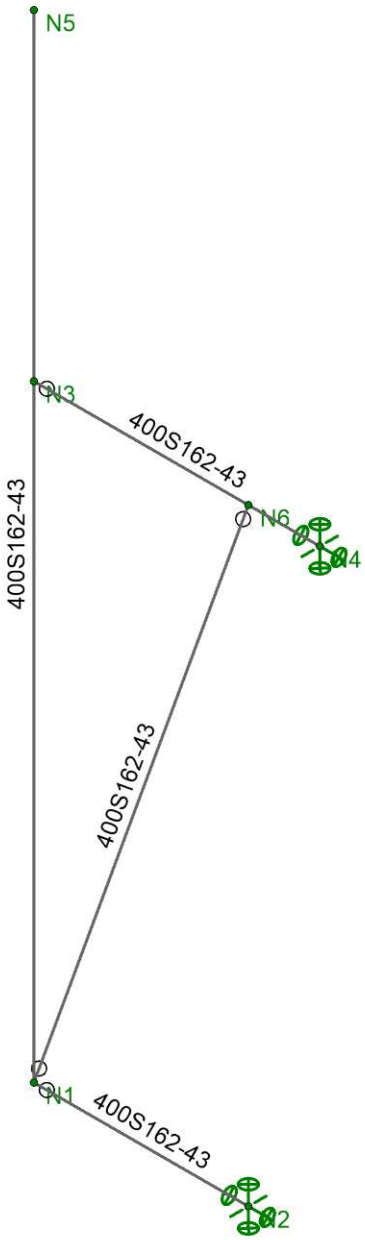


Envelope Only Solution

<Licensed Company>		SK-2
dtappel		Sep 15, 2021
		Service Bay Fascia.r3d

PRCA20220091

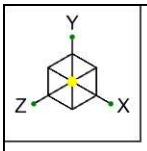


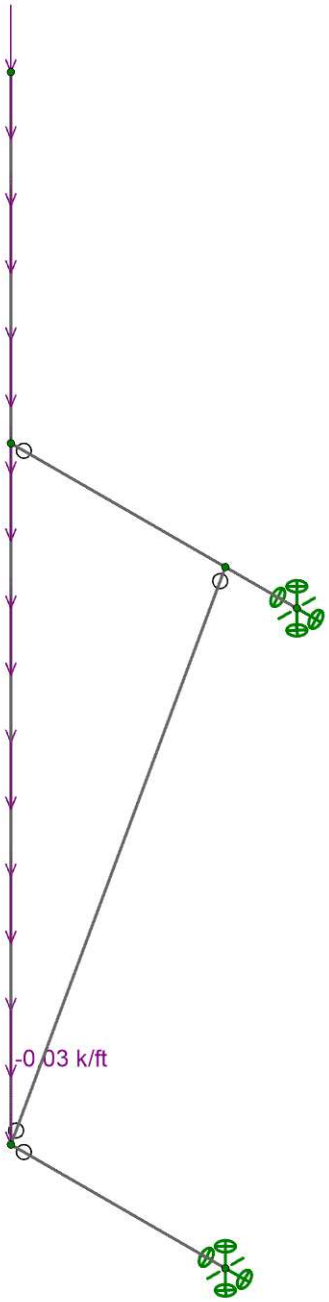


Envelope Only Solution

<Licensed Company>		SK-3
dtappel		Sep 15, 2021
		Service Bay Fascia.r3d

PRCA20220091

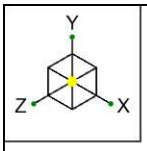


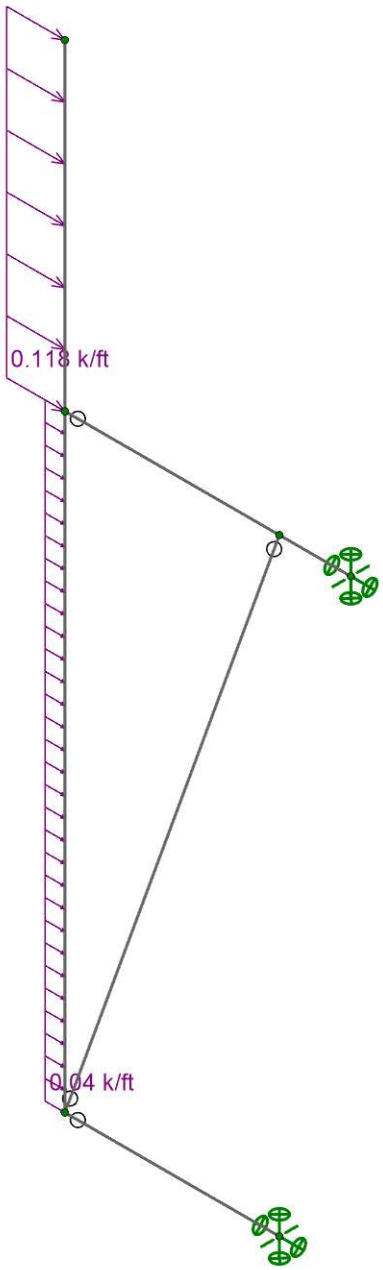


Loads: BLC 1, Dead Load
Envelope Only Solution

<Licensed Company>		SK-4
dtappel		Sep 15, 2021
		Service Bay Fascia.r3d

PRCA20220091

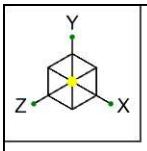




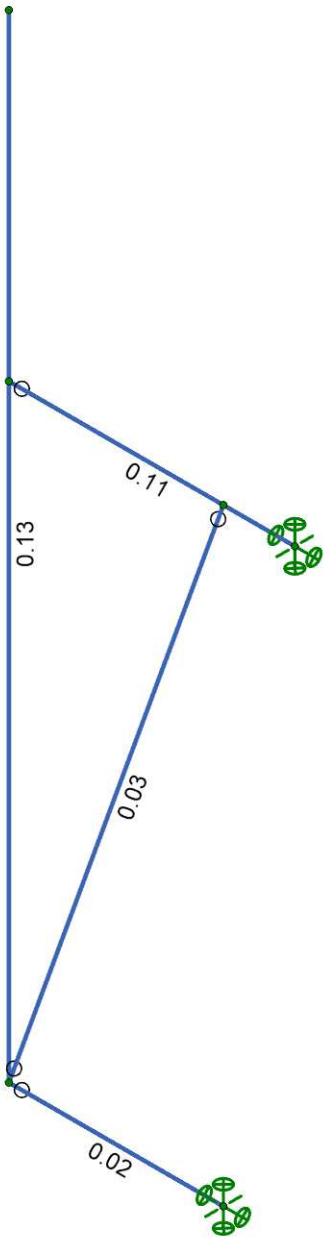
Loads: BLC 2, Wind Load
Envelope Only Solution

<Licensed Company>		SK-5
dtappel		Sep 15, 2021
		Service Bay Fascia.r3d

PRCA20220091



Code Check
(Env)
No Calc
> 1.0
.90-1.0
.75-.90
.50-.75
0.-.50



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

<Licensed Company>		SK-6
dtappel		Sep 15, 2021
		Service Bay Fascia.r3d

Cold Formed Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	Typ Stud	400S162-43	Beam	CS	A653 SS Gr33	Typical	0.357	0.131	0.892	0.000242

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	N1	0	0	0	
2	N2	1	0	0	
3	N3	0	2.8333	0	
4	N4	1.3333	2.8333	0	
5	N5	0	4.3333	0	
6	N6	1	2.8333	0	

Member Primary Data

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
1	M1	N2	N1	Typ Stud	Beam	CS	A653 SS Gr33	Typical
2	M2	N4	N3	Typ Stud	Beam	CS	A653 SS Gr33	Typical
3	M3	N1	N5	Typ Stud	Beam	CS	A653 SS Gr33	Typical
4	M4	N1	N6	Typ Stud	Beam	CS	A653 SS Gr33	Typical

Cold Formed Steel Design Parameters

	Label	Shape	Length [ft]	Lcomp top [ft]	Function
1	M1	Typ Stud	1	Lbyy	Lateral
2	M2	Typ Stud	1.333	Lbyy	Lateral
3	M3	Typ Stud	4.333	Lbyy	Lateral
4	M4	Typ Stud	3.005	Lbyy	Lateral

Member Advanced Data

	Label	I Release	J Release	Physical	Deflection Ratio Options	Seismic DR
1	M1		BenPIN	Yes	Default	None
2	M2		BenPIN	Yes	Default	None
3	M3			Yes	Default	None
4	M4	BenPIN	BenPIN	Yes	Default	None

Node Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot [k-ft/rad]	Y Rot [k-ft/rad]
1	N4	Reaction	Reaction	Reaction	Reaction	Reaction
2	N2	Reaction	Reaction	Reaction	Reaction	Reaction

Basic Load Cases

	BLC Description	Category	Distributed
1	Dead Load	DL	1
2	Wind Load	WL	2

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor
1	IBC 16-12 (a) (a)	Yes	Y	DL	1	WL	0.6
2	IBC 16-12 (a) (b)	Yes	Y	DL	1	WL	-0.6
3	IBC 16-15 (a)	Yes	Y	DL	0.6	WL	0.6
4	IBC 16-15 (b)	Yes	Y	DL	0.6	WL	-0.6

Envelope Node Reactions

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N4	max	0.2295	2	0.13	1	0	4	0	4	0	4	0	4
2		min	-0.1316	3	0.078	4	0	1	0	1	0	1	0	1
3	N2	max	-0.0308	4	0	4	0	4	0	4	0	4	0	4
4		min	-0.0671	1	0	1	0	1	0	1	0	1	0	1
5	Totals:	max	0.1742	4	0.13	2	0	4						
6		min	-0.1742	3	0.078	3	0	1						

Envelope AISI S100-16: ASD Member Cold Formed Steel Code Checks

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	Pn/Om[k]	Tn/Om[k]	Mnyy/Om[k-ft]	Mnzz/Om[k-ft]	Vny/Om[k]	Vnz/Om[k]	Cb	Eqn
1	M1	400S162-43	0.0182	1	1	0	1	y	4	3.6759	7.0545	0.194	0.6614	1.7396	1.5542	1	H1.2-1
2	M2	400S162-43	0.1083	0.3333	1	0.0748	0.3194	y	1	3.6759	7.0545	0.194	0.6934	1.7396	1.5542	1.3636	H1.2-1
3	M3	400S162-43	0.1348	2.7986	1	0.0606	2.8437	y	2	3.5946	7.0545	0.194	0.705	1.7396	1.5542	1.8937	H1.2-1
4	M4	400S162-43	0.0261	3.0046	1	0	3.0046	y	4	3.6759	7.0545	0.1079	0.7344	1.7396	1.5542	1	H1.1-1

PCS Structural Solutions

Project: PRCA20220091 JEEP Job No:

Subject: Sheet Name: DCT

Originating Office: ☐ Seattle ☐ Tacoma ☐ Portland Date: 9/14/21

DETERMINE CONN TO WALL

AT TOP

$V_{RY} = 130^{\#}$ (VERTICAL)

$V_{RX} = 223^{\#}$ (HORIZONTAL)

TRY (2) #8 SCREWS TO T&G DECK AT (E) ROOF, AND (2) #8 SCREWS TO JST AT NEW ROOF

PER AWC CALCULATOR

$V_a = 147^{\#}$ (2 SCREWS) $= 294^{\#} > V_{RX}$ ∴ OK

NOTE: CONNECTOR CAPACITY IN WOOD CONTROLS OVER CAPACITY IN STEEL

∴ USE (2) #8 SCREWS

AT BOT

$V_{RY} = 0^{\#}$

$V_{RX} = 67^{\#}$

TRY 12GA CLIP w/ (2) HILTI KWIK CON II + ANCHORS TO CMU, & (2) #8 SCREWS TO STUD

CHECK CLIP

$M_R = 67^{\#}(1_{IN}) = 67^{\#\text{-IN}}$

PRCA20220091

	Allowable Stress Design (ASD)
Connection Type	Lateral loading
Fastener Type	Wood Screw
Loading Scenario	Single Shear
	Submit Initial Values

Main Member Type	Douglas Fir-Larch
Main Member Thickness	1.5 in.
Main Member: Angle of Load to Grain	0
Side Member Type	Steel
Side Member Thickness	16 gage
Side Member: Angle of Load to Grain	0
Wood Screw Number	8 (D = 0.164 in.)
Length	2.5 in.
Load Duration Factor	C_D = 1.6
Wet Service Factor	C_M = 1.0
End Grain Factor	C_eg = 1.0
Temperature Factor	C_t = 1.0

Calculate Connection Capacity

Connection Yield Mode Descriptions | Limits of Use

Diaphragm Factor Help | Load Duration Factor Help | Technical Help

Show Printable View

Connection Yield Modes

Im	665 lbs.
Is	354 lbs.
II	270 lbs.
IIIm	291 lbs.
IIIs	147 lbs.
IV	201 lbs.

Adjusted ASD Capacity	**147 lbs.**
Fastener length exceeds total connection thickness	

- Wood Screw bending yield strength of 90000 psi is assumed.
- Dowel bearing strengths for wood screws with nominal diameter greater than 1/4 in. are calculated and rounded to the nearest 50 psi in accordance with NDS Table 11.3.2.
- Length of tapered tip is assumed to be two times the nominal wood screw diameter for calculating dowel bearing length in the main member.
- ASTM A36 Steel is assumed for steel side members 1/4 in. thick, and ASTM A653 Grade 33 Steel is assumed for steel side members less than 1/4 in. thick.

The Connection Calculator was designed and created by Cameron Knudson, Michael Dodson and David Pollock at Washington State University. Support for development of the Connection Calculator was provided by American Wood Council.

DESIGN INFORMATION IN CONCRETE PER ALLOWALBLE STRESS DESIGN

Table 1 — Tension and shear allowable loads in concrete [1,2]

Nominal anchor diameter (in.)	Nominal embedment in. (mm)	f'_c = 2,000 psi		f'_c = 4,000 psi		f'_c = 6,000 psi	
		Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
3/16	1 (25)	100 (0.44)	260 (1.16)	125 (0.56)	260 (1.16)	185 (0.82)	280 (1.25)
3/16	1-3/4 (44)	275 (1.22)	260 (1.16)	295 (1.31)	265 (1.18)	325 (1.45)	300 (1.33)
1/4	1 (25)	190 (0.85)	325 (1.45)	240 (1.07)	390 (1.73)	275 (1.22)	540 (2.40)
1/4	1-3/4 (44)	425 (1.89)	560 (2.49)	475 (2.1)	600 (2.82)	525 (2.3)	600 (2.67)

1 Screws installed in holes drilled with Hilti TKC carbide bits.
2 Allowable loads are based on a safety factor of 4.

Table 2 — Tension and shear ultimate loads in concrete[1]

Nominal anchor diameter (in.)	Nominal embedment in. (mm)	f'_c = 2,000 psi		f'_c = 4,000 psi		f'_c = 6,000 psi	
		Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
3/16	1 (25)	400 (1.78)	1,050 (4.67)	500 (2.22)	1,050 (4.67)	750 (3.34)	1,150 (5.12)
3/16	1-3/4 (44)	1,100 (4.89)	1,050 (4.67)	1,180 (5.25)	1,070 (4.76)	1,300 (5.78)	1,200 (5.34)
1/4	1 (25)	760 (3.38)	1,300 (5.78)	970 (4.31)	1,575 (7.01)	1,100 (4.89)	2,175 (9.68)
1/4	1-3/4 (44)	1,700 (7.56)	2,250 (10.0)	1,900 (8.5)	2,400 (10.7)	2,100 (9.3)	2,400 (10.7)

1 Screws installed in holes drilled with TKC bits.

Table 3 — Tension and shear allowable loads in hollow block[1,2,3,4]

Nominal anchor diameter (in.)	Nominal embedment in. (mm)	Tension lb (kN)	Shear lb (kN)
3/16	1 (25)	150 (0.67)	225 (1.00)
3/16	1-3/4 (44)	290 (1.29)	300 (1.33)
1/4	1 (25)	165 (0.73)	275 (1.22)
1/4	1-3/4 (44)	310 (1.38)	400 (1.78)

1 All values for anchors installed in hollow concrete masonry with a minimum prism strength of 1,500 psi. Concrete block may be lightweight, medium-weight or normal-weight conforming to ASTM C90.
2 Screws installed in holes drilled with TKB bits.
3 Allowable loads calculated using a factor of safety of 4.
4 Installation in the mortar joints is outside the scope of the published data.

Table 4 — Tension and shear allowable loads in red brick[1,2,3]

Nominal anchor diameter (in.)	Nominal embedment in. (mm)	Tension lb (kN)	Shear lb (kN)
3/16	1 (25)	125 (0.56)	235 (1.05)
3/16	1-3/4 (44)	350 (1.56)	300 (1.33)
1/4	1 (25)	205 (0.91)	415 (1.85)
1/4	1-3/4 (44)	350 (1.56)	500 (2.22)

1 This test was performed on individual specimens of ASTM C62 common red brick. Due to the wide variations encountered in the compressive strength of brick, these values should be considered guide values.
2 Allowable loads are based on a safety factor of 4.
3 Installation in the mortar joints is outside the scope of the published data.

Load values are for anchors installed a minimum of sixteen diameters on center and a minimum edge distance of sixteen diameters. Anchor spacing may be reduced to twelve diameters provided loads are reduced by 20 percent. Edge distance may be reduced to six diameters provided loads are reduced by 20 percent in tension and 70 percent in shear.

Combined shear and tension loading

$$\left(\frac{N_d}{N_{rec}}\right) + \left(\frac{V_d}{V_{rec}}\right) \leq 1.0$$

INSTALLATION INSTRUCTIONS

Installation Instructions For Use (IFU) / Operating Instructions (OI) throughout the document are included with each product package. They can also be viewed or downloaded online at www.hilti.com. Because of the possibility of changes, always verify that downloaded IFU are current when used. Proper installation is critical to achieve full performance. Training is available on request. Contact Hilti Technical Services for applications and conditions not addressed in the (IFU)/Operating Instructions (OI).

PCS Structural Solutions

Project: PRCA20220091 JEEP Job No:

Subject: Sheet Name: DCT

Originating Office: ☐ Seattle ☐ Tacoma ☐ Portland Date: 9/14/21

$$L_R = \frac{67^{\#-H}(1.67)6}{50{,}000\,psi\,(0.1017\,in)^2} = 1.3in \Rightarrow USE\ 1\tfrac{1}{2}"\ MIN$$

∴ USE 12 GA 2"Lₙ x 0'-1 1/2" MIN

CHECK ANCHORS

$T_R = 67^{\#}(2in/1in) = 134^{\#}$

PER HILTI

$T_a = 310^{\#}$

∴ BY INSPECTION, USE (2) 1/4" ϕ HILTI KWIK CON II+ ANCHORS (1 3/4" EMBED)

CHECK SCREWS TO STUD

$V_R = 67^{\#}$

PER SSMA

$V_a = 244^{\#}$

∴ BY INSPECTION, USE (2) # 8 SCREWS

Screw Capacities

Table Notes

1. Capacities based on AISI S100 Section E4.
2. When connecting materials of different steel thicknesses or tensile strengths, use the lowest values. Tabulated values assume two sheets of equal thickness are connected.
3. Capacities are based on Allowable Strength Design (ASD) and include safety factor of 3.0.
4. Where multiple fasteners are used, screws are assumed to have a center-to-center spacing of at least 3 times the nominal diameter (d).
5. Screws are assumed to have a center-of-screw to edge-of-steel dimension of at least 1.5 times the nominal diameter (d) of the screw.
6. Pull-out capacity is based on the lesser of pull-out capacity in sheet closest to screw tip or tension strength of screw.
7. Pull-over capacity is based on the lesser of pull-over capacity for sheet closest to screw header or tension strength of screw.
8. Values are for pure shear or tension loads. See AISI Section E4.5 for combined shear and pull-over.
9. Screw Shear (Pss), tension (Pts), diameter, and head diameter are from CFSEI Tech Note (F701-12).
10. Screw shear strength is the average value, and tension strength is the lowest value listed in CFSEI Tech Note (F701-12).
11. Higher values for screw strength (Pss, Pts), may be obtained by specifying screws from a specific manufacturer.

Allowable Screw Connection Capacity (lbs)

Thickness (Mils)	Design Thickness	Fy Yield (ksi)	Fu Tensile (ksi)	#6 Screw (Pss = 643 lbs, Pts = 419 lbs) 0.138" dia, 0.272" Head			#8 Screw (Pss= 1278 lbs, Pts = 586 lbs) 0.164" dia, 0.272" Head			#10 Screw (Pss= 1644 lbs, Pts = 1158 lbs) 0.190" dia, 0.340" Head			#12 Screw (Pss= 2330 lbs, Pts = 2325 lbs) 0.216" dia, 0.340" Head			¼" Screw (Pss= 3048 lbs, Pts = 3201 lbs) 0.250" dia, 0.409" Head		
				Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over
18	0.0188	33	33	44	24	84	48	29	84	52	33	105	55	38	105	60	44	127
27	0.0283	33	33	82	37	127	89	43	127	96	50	159	102	57	159	110	66	191
30	0.0312	33	33	95	40	140	103	48	140	111	55	175	118	63	175	127	73	211
33	0.0346	33	45	151	61	140	164	72	195	177	84	265	188	95	265	203	110	318
43	0.0451	33	45	214	79	140	244	94	195	263	109	345	280	124	345	302	144	415
54	0.0566	33	45	214	100	140	344	118	195	370	137	386	394	156	433	424	180	521
68	0.0713	33	45	214	125	140	426	149	195	523	173	386	557	196	545	600	227	656
97	0.1017	33	45	214	140	140	426	195	195	548	246	386	777	280	775	1,016	324	936
118	0.1242	33	45	214	140	140	426	195	195	548	301	386	777	342	775	1,016	396	1,067
54	0.0566	50	65	214	140	140	426	171	195	534	198	386	569	225	625	613	261	752
68	0.0713	50	65	214	140	140	426	195	195	548	249	386	777	284	775	866	328	948
97	0.1017	50	65	214	140	140	426	195	195	548	356	386	777	405	775	1,016	468	1,067
118	0.1242	50	65	214	140	140	426	195	195	548	386	386	777	494	775	1,016	572	1,067

Weld Capacities

Table Notes

1. Capacities based on the AISI S100 Specification Sections E2.4 for fillet welds and E2.5 for flare groove welds.
2. When connecting materials of different steel thicknesses or tensile strengths, use the lowest values.
3. Capacities are based on Allowable Strength Design (ASD).
4. Weld capacities are based on E60 electrodes. For material thinner than 68 mil, 0.030" to 0.035" diameter wire electrodes may provide best results.
5. Longitudinal capacity is considered to be loading in the direction of the length of the weld.
6. Transverse capacity is loading in perpendicular direction of the length of the weld.
7. For flare groove welds, the effective throat of weld is conservatively assumed to be less than 2t.
8. For longitudinal fillet welds, a minimum value of EQ E2.4-1, E2.4-2, and E2.4-4 was used.
9. For transverse fillet welds, a minimum value of EQ E2.4-3 and E2.4-4 was used.
10. For longitudinal flare groove welds, a minimum value of EQ E2.5-2 and E2.5-3 was used.

Allowable Weld Capacity (lbs / in)

Thickness (Mils)	Design Thickness	Fy Yield (ksi)	Fu Tensile (ksi)	Fillet Welds		Flare Groove Welds	
				Longitudinal	Transverse	Longitudinal	Transverse
43	0.0451	33	45	499	864	544	663
54	0.0566	33	45	626	1084	682	832
68	0.0713	33	45	789	1365	859	1048
97	0.1017	33	45	1125	1269	-[1]	-[1]
54	0.0566	50	65	905	1566	985	1202
68	0.0713	50	65	1140	1972	1241	1514
97	0.1017	50	65	1269	1269	-[1]	-[1]

[1] *Weld capacity for material thickness greater than 0.10" requires engineering judgment to determine leg of welds, W1 and W2.*

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TRY 12 GA CLIP w/ (2) #8 SCREWS TO BLKG & (2) #8 SCREWS TO STUD

CHECK SCREWS TO BLKG

FROM PREV. CALCS

$T_R = 134\#$

PER AWC CALCULATOR

$T_q = 312\#\,(2\ \text{SCREWS}) = 624\# > T_R \therefore \text{OK}$

$\therefore$ USE (2) #8 SCREWS

PRCA20220091

Design Method	Allowable Stress Design (ASD)
Connection Type	Withdrawal loading
Fastener Type	Wood Screw
Loading Scenario	N/A
	Submit Initial Values

Main Member Type	Douglas Fir-Larch
Main Member Thickness	3.5 in.
Side Member Type	Steel
Side Member Thickness	12 gage
Wood Screw Number	8 (D = 0.164 in.)
Length	2.5 in.
Load Duration Factor	C_D = 1.6
Wet Service Factor	C_M = 1.0
Temperature Factor	C_t = 1.0

Calculate Connection Capacity

Connection Yield Mode Descriptions | Limits of Use

Diaphragm Factor Help | Load Duration Factor Help | Technical Help

Show Printable View

Adjusted ASD Capacity	**312 lbs.**

- The Adjusted ASD Capacity does not apply for wood screws installed in the end grain of wood members.
- The Adjusted ASD Capacity only applies to withdrawal of the fastener from the main member. It does not address head pull-through capacity of the fastener in the side member.

While every effort has been made to insure the accuracy of the information presented, and special effort has been made to assure that the information reflects the state-of-the-art, neither the American Wood Council nor its members assume any responsibility for any particular design prepared from this on-line Connection Calculator. Those using this on-line Connection Calculator assume all liability from its use.

The Connection Calculator was designed and created by Cameron Knudson, Michael Dodson and David Pollock at Washington State University. Support for development of the Connection Calculator was provided by American Wood Council.

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PCS Structural Solutions

Project: LARSON JEEP Job No:

Subject: Sheet Name: DCT

Originating Office: ☐ Seattle ☐ Tacoma ☐ Portland Date: 9/14/21

DETERMINE CONN BETWEEN STUDS

$P_R = 230^{\#}$ } MAX ALL MEMBERS AND LOAD COMB'S

$V_R = 130^{\#}$ }

$\therefore V_{RES} = \sqrt{(230^{\#})^2 + (130^{\#})^2} = 264^{\#}$

FROM PREV CALCS

$V_a = 244^{\#}$

$\#\text{ OF SCREWS} = \frac{264^{\#}}{244^{\#}/\text{SCREW}} = 1.1 \Rightarrow$ USE (2) #8 SCREWS MIN

$\therefore$ USE (2) #8 SCREWS MIN