

Ronald Roberts Associates, Inc.
Consulting Engineers

STRUCTURAL DESIGN CALCULATIONS

PROJECT: **SCOOTERS COFFEE**

LOCATION: **1816 N REYNOLDS RD.**
BRYANT, ARKANSAS 72022

BUILDING CODE: **2012 INTERNATIONAL BUILDING CODE**

DESIGN LOADS:

115 MPH	**DESIGN WIND SPEED (ULTIMATE)**
20 PSF	**ROOF DEAD LOAD**
20 PSF	**ROOF LIVE LOAD**

DATE: **AUGUST 31, 2022**

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Ronald Roberts Associates, Inc. Consulting Engineers

PROJECT: SCOOTERS COFFEE JOB NO.: 22434

SUBJECT: DESIGN LOADS DATE: 8/31/2022

BY: CMB

ALL DESIGN LOADS PER THE 2012 INTERNATIONAL BUILDING CODE AND ASCE 7-10.

- ROOF LIVE LOAD (TABLE 4.3-1, ASCE7-10)
  - ORDINARY FLAT, PITCHED, AND CURVED ROOFS: **20 PSF**

- ROOF DEAD LOAD (TABLE C3-1, ASCE7-10)

ROOFING (BITUMINOUS):	1.5	PSF
ROOF DECK (3/4" PLYWOOD):	2.4	PSF
INSULATION (3" RIGID):	4.5	PSF
WOOD JOIST:	4.0	PSF
HVAC ALLOWANCE:	4.0	PSF
CEILING SYSTEM, LIGHTING, ETC.:	3.6	PSF
∑=	**20**	**PSF**

- GROUND SNOW LOAD, P_g
  - **P_g = 10 PSF**

- MAIN WIND-FORCE RESISTING SYSTEM (SIMPLE DIAPHRAGM, LOW-RISE BUILDING) PER TABLE 28.5-1 OF ASCE 7-10

STEP 1: DETERMINE RISK CATEGORY OF BUILDING OR OTHER STRUCTURE

RISK CATEGORY II (TABLE 1.5-1)

STEP 2: DETERMINE THE BASIC WIND SPEED, V, FOR APPLICABLE RISK CATEGORY

V_{ULT} = 115 MPH, $V_{ASD} = \sqrt{0.6}V_{ULT} = \sqrt{0.6}(115) = 89$ MPH (FIGURE 26.5-1B)

STEP 3: DETERMINE WIND LOAD PARAMETERS

EXPOSURE CATEGORY B (SECTION 26.7)

K_{zt} = 1.0 (SECTION 26.8)

STEP 4: ENTER FIGURE TO DETERMINE WIND PRESSURES FOR h=30 FT, P_{S30} (FIGURE 28.6-1) (ROOF ANGLE 0 TO 5°)

P_{S30} =	+21.0	PSF	ZONE A
=	-10.9	PSF	ZONE B
=	+13.9	PSF	ZONE C
=	-6.5	PSF	ZONE D
=	-25.2	PSF	ZONE E
=	-14.3	PSF	ZONE F
=	-17.5	PSF	ZONE G
=	-11.1	PSF	ZONE H
=	-35.3	PSF	OVERHANG, ZONE E
=	-27.6	PSF	OVERHANG, ZONE G

STEP 5: ENTER FIGURE TO DETERMINE ADJUSTMENT FOR BUILDING HEIGHT AND EXPOSURE, λ

λ = 1.00 (H = 13.0 FT, EXPOSURE B) – FIGURE 28.6-1

STEP 6: DETERMINE ADJUSTED WIND PRESSURES, P_S

$P_S = \lambda K_{zt} P_{s30}$ (EQUATION 28.6-1)

P_S =	+21.0	PSF	ZONE A
=	-10.9	PSF	ZONE B
=	+13.9	PSF	ZONE C
=	-6.5	PSF	ZONE D
=	-25.2	PSF	ZONE E
=	-14.3	PSF	ZONE F
=	-17.5	PSF	ZONE G
=	-11.1	PSF	ZONE H
=	-35.3	PSF	OVERHANG, ZONE E
=	-27.6	PSF	OVERHANG, ZONE G

PER SECTION 28.6.4 OF ASCE 7-10, THE LOAD EFFECTS OF THE DESIGN WIND PRESSURES FROM SECTION 28.6.3 SHALL NOT BE LESS THAN A MINIMUM LOAD DEFINED BY ASSUMING THE PRESSURES, P_s, FOR ZONES A AND C EQUAL TO +16 PSF, ZONES B AND D EQUAL TO +8 PSF, WHILE ASSUMING P_S FOR ZONES E, F, G, AND H ARE EQUAL TO 0 PSF.

MINIMUM WIND PRESSURES, P_S

P_S =	+16.0	PSF	ZONE A
=	+8.0	PSF	ZONE B
=	+16.0	PSF	ZONE C
=	+8.0	PSF	ZONE D
=	0	PSF	ZONE E
=	0	PSF	ZONE F
=	0	PSF	ZONE G
=	0	PSF	ZONE H

- COMPONENTS & CLADDING (SIMPLIFIED METHOD) PER TABLE 30.5-1 OF ASCE 7-10

STEP 1: DETERMINE RISK CATEGORY OF BUILDING OR OTHER STRUCTURE

RISK CATEGORY II (TABLE 1.5-1)

STEP 2: DETERMINE THE BASIC WIND SPEED, V, FOR APPLICABLE RISK CATEGORY

V_{ULT} = 115 MPH, $V_{ASD} = \sqrt{0.6}V_{ULT} = \sqrt{0.6}(115) = 89$ MPH (FIGURE 26.5-1B)

STEP 3: DETERMINE WIND LOAD PARAMETERS

EXPOSURE CATEGORY B (SECTION 26.7)
K_{zt} = 1.0 (SECTION 26.8)

STEP 4: ENTER FIGURE TO DETERMINE WIND PRESSURES AT h=30 FT, P_{NET30} (FIGURE 30.5-1) (ROOF ANGLE 0 TO 7°)

P_{NET30} = +7.7 PSF ZONE 1, EFFECTIVE AREA = 100 FT^2
-21.8 PSF

= +7.7 PSF ZONE 2, EFFECTIVE AREA = 100 FT^2
-25.8 PSF

= +7.7 PSF ZONE 3, EFFECTIVE AREA = 100 FT^2
-25.8 PSF

= +22.7 PSF WALL, ZONE 4, EFFECTIVE AREA = 20 FT^2
-24.7 PSF

= +22.7 PSF WALL, ZONE 5, EFFECTIVE AREA = 20 FT^2
-29.7 PSF

STEP 5: ENTER FIGURE TO DETERMINE ADJUSTMENT FOR BUILDING HEIGHT AND EXPOSURE, λ

λ = 1.0 (H = 13.6 FT, EXPOSURE B) – FIGURE 30.5-1

STEP 6: DETERMINE ADJUSTED WIND PRESSURES, P_{NET}

$P_{NET} = \lambda K_{zt} P_{NET30}$ (EQUATION 30.5-1)

P_{NET} = +7.7 PSF ZONE 1, EFFECTIVE AREA = 100 FT^2
-21.8 PSF

= +7.7 PSF ZONE 2, EFFECTIVE AREA = 100 FT^2
-25.8 PSF

= +7.7 PSF ZONE 3, EFFECTIVE AREA = 100 FT^2
-25.8 PSF

= +22.7 PSF WALL, ZONE 4, EFFECTIVE AREA = 20 FT^2
-24.7 PSF

= +22.7 PSF WALL, ZONE 5, EFFECTIVE AREA = 20 FT^2
-29.7 PSF

PER SECTION 30.2.2 OF ASCE 7-10, THE DESIGN WIND PRESSURE FOR COMPONENTS AND CLADDING OF BUILDINGS SHALL NOT BE LESS THAN A NET PRESSURE OF 16 PSF ACTING IN EITHER DIRECTION NORMAL TO THE SURFACE.

- MAIN WIND-FORCE RESISTING SYSTEM (PARAPETS) PER SECTION 28.3.2 OF ASCE 7-10

P_P = q_P (GC_{PN}) (EQUATION 28.3-2)

$q_P = 0.00256K_ZK_{Zt}K_dV^2$ (EQUATION 26.10-1)

K_Z = 0.70 (H =19 FT, EXPOSURE B, TABLE 28.3-1)
K_{Zt} = 1.0 (SECTION 26.8.2)
K_d = 0.85 (TABLE 26.6-1)
V_{ULT} = 115 MPH (FIGURE 26.5-1B)

$q_P = 0.00256(0.70)(1.0)(0.85)(115)^2 = 20.1$ PSF

P_P = 20.1 PSF (+1.5) = +30.2 PSF (WINDWARD PARAPET)
P_P = 20.1 PSF (-1.0) = -20.1 PSF (LEEWARD PARAPET)

- COMPONENTS & CLADDING (PARAPETS) PER TABLE 30.9-1 OF ASCE 7-10

STEP 1: DETERMINE RISK CATEGORY OF BUILDING OR OTHER STRUCTURE

RISK CATEGORY II (TABLE 1.5-1)

STEP 2: DETERMINE THE BASIC WIND SPEED, V, FOR APPLICABLE RISK CATEGORY

V_{ULT} = 115 MPH, $V_{ASD} = \sqrt{0.6}V_{ULT} = \sqrt{0.6}(115) = 89$ MPH (FIGURE 26.5-1B)

STEP 3: DETERMINE WIND LOAD PARAMETERS

K_d = 0.85 (TABLE 26.6-1)

EXPOSURE CATEGORY B (SECTION 26.7)
K_{zt} = 1.0 (SECTION 26.8)

ENCLOSED BUILDING (SECTION 26.10)

INTERNAL PRESSURE COEFFICIENT, GC_{pi} = ±0.18 (TABLE 26.11-1)

STEP 4: DETERMINE VELOCITY PRESSURE EXPOSURE COEFFICIENT

K_h = 0.70 (H = 19 FT, EXPOSURE B, TABLE 30.3-1)

STEP 5: DETERMINE VELOCITY PRESSURE q_p

$$q_P = 0.00256K_hK_{Zt}K_dV^2 \text{ (EQUATION 30.3-1)}$$

$$q_P = 0.00256(0.70)(1.0)(0.85)(115)^2 = 20.1 \text{ PSF}$$

STEP 6: DETERMINE EXTERNAL PRESSURE COEFFICIENT FOR WALL AND ROOF SURFACES ADJACENT TO PARAPET, (GC_P)

GC_P = +0.9 (WALL, ZONE 5, EFFECTIVE AREA = 20 FT^2)
= -1.3 (WALL, ZONE 5, EFFECTIVE AREA = 20 FT^2)

= -1.1 (ROOF, ZONE 3, EFFECTIVE AREA = 100 FT^2)

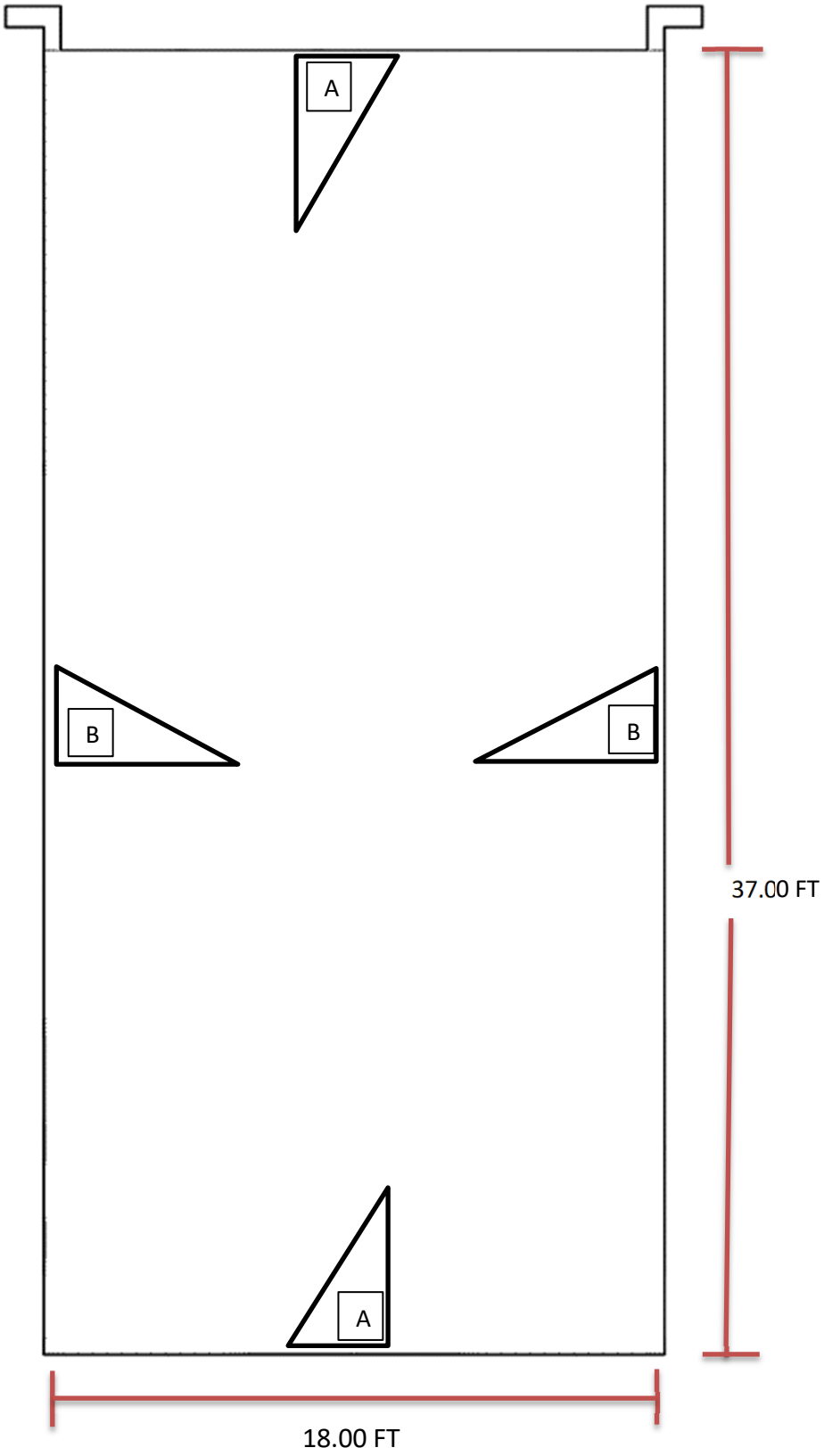
STEP 7: CALCULATE WIND PRESSURE, P

LOAD CASE A: +0.9-(-1.1) = +2.0
$P = q_P(GC_P - GC_{Pi})$ (EQUATION 30.9-1)
P = 20.1 PSF (+2.0 + 0.18)
P = 43.8 PSF

LOAD CASE B: +0.9-(-1.3) = +2.2
P = 20.1 PSF (+2.2 + 0.18)
P = 47.8 PSF

B.O. DECK: 12.85 FT
T. O. PARAPET: 18.25 FT

PARAPET HEIGHT: 5.40 FT



B.O. DECK: 13.60 FT
T. O. PARAPET: 19.00 FT

PARAPET HEIGHT: 5.40 FT

GROUND SNOW LOAD (P_g) : 10.0 PSF (ASCE 7-10: 7.2)

FLAT ROOF SNOW LOAD (ASCE 7-10: 7.3)

$P_f = .7C_eC_tI_sP_g$ Equation 7.3-1

C_e 1.0
C_t = 1.0
I_s = 1.0
P_g = 10.0 PSF

P_f = 7.0 PSF

MINIMUM SNOW LOAD FOR LOW- SLOPE ROOFS (ASCE7-10: 7.3.4)

$P_m = 20 * I_s$ for Ground Snow > 20
$P_m = I_sP_g$ for Ground Snow < 20

I_s = 1.0
P_g = 10.0 PSF

P_m = 10.0 PSF

SNOW DENSITY

$\gamma = .013P_g+14$ but no more than 30 pcf (ASCE 7-10 : 7.7-1)

P_g = 10.0 PSF

γ= 14.13 PCF

BASE SNOW HEIGHT

$h_b = {}^{P_f}/_{\gamma}$

P_f = 10.0 PSF
γ= 14.13 PCF

h_b = 0.71 FT

SNOW DRIFT A

FULL DRIFT

$$h_d = .43\sqrt[3]{l_u}\sqrt[4]{P_g + 10} - 1.5$$ (ASCE 7-10 : FIG. 7-9)

l_u = 37.00 FT if less than 20 FT use 20 FT

P_g = 10.0 PSF

h_d = 1.53 FT

MULTIPLY BY 0.75 FOR PARAPET

$0.75h_d$ = 1.15 FT

LESS THAN PARAPET HEIGHT: 5.40 FT

THEREFORE FULL DRIFT POSSIBLE TRUE

MAXIMUM INTENSITY OF DRIFT SURCHARGE LOAD

$$P_d = h_d\gamma$$

h_d =1.15 FT

γ = 14.13 PCF

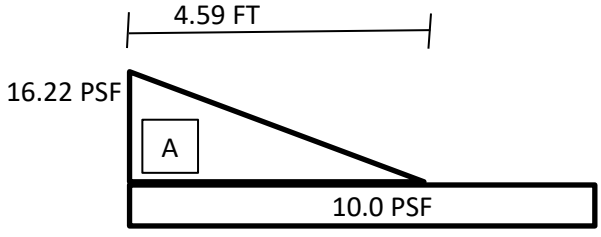
P_d = 16.22 PSF

DRIFT LENGTH

$$w = 4h_d$$

h_d = 1.15 FT

w= 4.59 FT



SNOW DRIFT B

FULL DRIFT

$$h_d = .43\sqrt[3]{l_u}\sqrt[4]{P_g + 10} - 1.5$$ (ASCE 7-10 : FIG. 7-9)

l_u = 20.00 FT — 20 if less than 20 FT use 20 FT

P_g = 10.0 PSF

$\mathbf{h_d = 0.97\ FT}$

MULTIPLY BY 0.75 FOR PARAPET

$\mathbf{0.75h_d = 0.73\ FT}$

LESS THAN PARAPET HEIGHT: 5.40 FT

THEREFORE FULL DRIFT POSSIBLE TRUE

MAXIMUM INTENSITY OF DRIFT SURCHARGE LOAD

$$P_d = h_d\gamma$$

h_d =0.73 FT

γ = 14.13 PCF

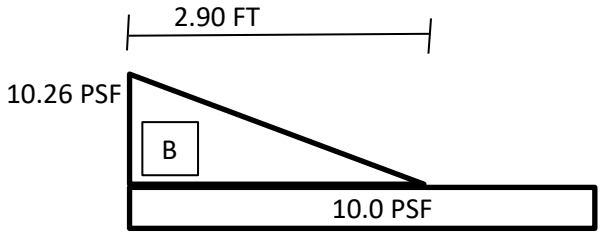
$\mathbf{P_d = 10.26\ PSF}$

DRIFT LENGTH

$$w = 4h_d$$

h_d = 0.73 FT

w= 2.90 FT



- HEADER (A)

ROOF DEAD LOAD:	20	PSF	TRIBUTARY WIDTH (ROOF) = 8’ – 6”
ROOF LIVE LOAD:	20	PSF	TRIBUTARY WIDTH (WALL) = 9’ – 1”
WALL LOAD:	15	PSF	
			SPAN = 6’ – 6”

USE (3) 2x10 W/ ½’’ PLYWOOD SPACERS*

- HEADER (B)

ROOF DEAD LOAD:	20	PSF	TRIBUTARY WIDTH (ROOF) = 1’ – 0”
ROOF LIVE LOAD:	20	PSF	TRIBUTARY WIDTH (WALL) = 9’ – 1”
WALL LOAD:	15	PSF	
			SPAN = 6’ – 0”

USE (3) 2x8 W/ ½” PLYWOOD SPACERS*

- HEADER (C)

ROOF DEAD LOAD:	20	PSF	TRIBUTARY WIDTH (ROOF) = 1’ – 0”
ROOF LIVE LOAD:	20	PSF	TRIBUTARY WIDTH (WALL) = 9’ – 1”
WALL LOAD:	15	PSF	
			SPAN = 3’ – 4”

USE (3) 2x6 W/ ½” PLYWOOD SPACERS*

*REFER TO ATTACHED ENERCALC OUTPUT FOR DESIGN DETAILS

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: HEADER A

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method : Load Resistance Factor D
Load Combination : ASCE 7-10

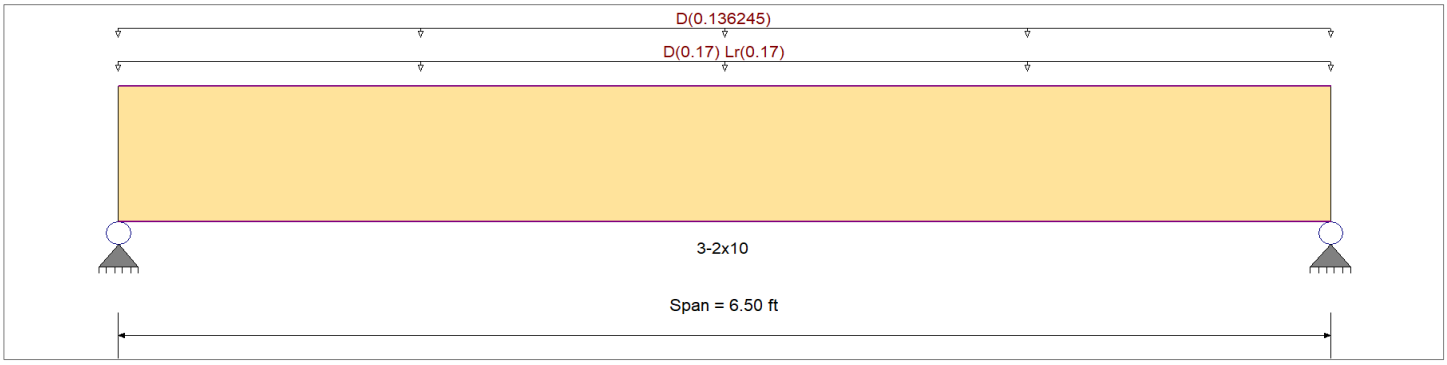
Wood Species : Southern Pine
Wood Grade : No.2: 2"-4" Thick: 10" Wide

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

Fb +	800.0 psi
Fb -	800.0 psi
Fc - Prll	1,300.0 psi
Fc - Perp	565.0 psi
Fv	175.0 psi
Ft	475.0 psi

E : Modulus of Elasticity

Ebend- xx	1,400.0 ksi
Eminbend - xx	510.0 ksi
Density	34.330 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.020 ksf, Tributary Width = 8.50 ft, (ROOF LOAD)
Uniform Load : D = 0.0150 ksf, Tributary Width = 9.083 ft, (WALL LOAD)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.465 : 1	Maximum Shear Stress Ratio	=	0.193 : 1
Section used for this span		3-2x10	Section used for this span		3-2x10
fb: Actual	=	643.31 psi	fv: Actual	=	58.47 psi
Fb: Allowable	=	1,382.40 psi	Fv: Allowable	=	302.40 psi
Load Combination		+1.20D+1.60Lr	Load Combination		+1.20D+1.60Lr
Location of maximum on span	=	3.250 ft	Location of maximum on span	=	5.741 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.017 in	Ratio =	4719 >=360	Span: 1 : Lr Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.047 in	Ratio =	1650 >=180	Span: 1 : +D+Lr
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	λ	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values Mu	fb	Fb	Shear Values Vu	fv	Fv
+1.40D													0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.422	0.175	0.60	1.000	1.00	1.00	1.00	1.00	1.00	2.34	437.14	1036.80	1.10	39.73	226.80
+1.20D+0.50Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.332	0.138	0.80	1.000	1.00	1.00	1.00	1.00	1.00	2.45	458.64	1382.40	1.16	41.69	302.40
+1.20D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.271	0.113	0.80	1.000	1.00	1.00	1.00	1.00	1.00	2.00	374.69	1382.40	0.95	34.06	302.40
+1.20D+1.60Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.465	0.193	0.80	1.000	1.00	1.00	1.00	1.00	1.00	3.44	643.31	1382.40	1.62	58.47	302.40
+0.90D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.163	0.068	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.50	281.02	1728.00	0.71	25.54	378.00

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: HEADER A

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0473	3.274		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.580	1.580
Overall MINimum	0.553	0.553
D Only	1.028	1.028
+D+Lr	1.580	1.580
+D+0.750Lr	1.442	1.442
+0.60D	0.617	0.617
Lr Only	0.553	0.553

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

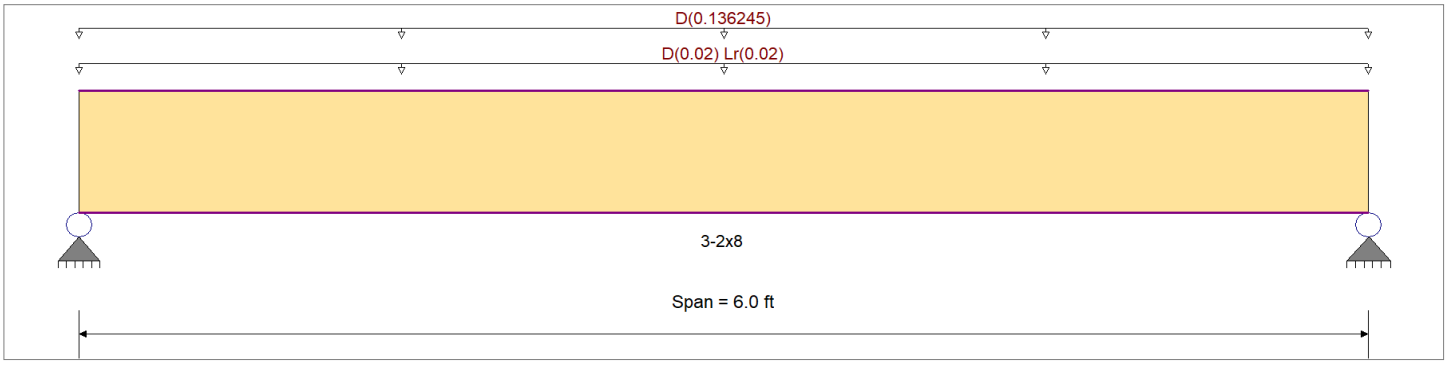
DESCRIPTION: HEADER B

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	925.0 psi	*E : Modulus of Elasticity*	
Load Combination :	ASCE 7-10	Fb -	925.0 psi	Ebend- xx	1,400.0 ksi
		Fc - Prll	1,350.0 psi	Eminbend - xx	510.0 ksi
Wood Species :	Southern Pine	Fc - Perp	565.0 psi		
Wood Grade :	No.2: 2"-4" Thick: 8" Wide	Fv	175.0 psi		
		Ft	550.0 psi	Density	34.330 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 loading
Uniform Load : D = 0.020, Lr = 0.020 , Tributary Width = 1.0 ft, (ROOF LOAD)
Uniform Load : D = 0.0150 ksf, Tributary Width = 9.083 ft, (WALL LOAD)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.270 : 1	Maximum Shear Stress Ratio	=	0.115 : 1
Section used for this span		3-2x8	Section used for this span		3-2x8
fb: Actual	=	224.68 psi	fv: Actual	=	18.17 psi
Fb: Allowable	=	832.50 psi	Fv: Allowable	=	157.50 psi
Load Combination		D Only	Load Combination		D Only
Location of maximum on span	=	3.000 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	0.003 in	Ratio =	24556	>=360	Span: 1 : Lr Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.027 in	Ratio =	2668	>=180	Span: 1 : +D+Lr
Max Upward Total Deflection	0 in	Ratio =	0	<180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.270	0.115	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.74	224.68	832.50	0.40	18.17	157.50
+D+Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.218	0.093	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.83	252.07	1156.25	0.44	20.38	218.75
+D+0.750Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.212	0.091	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.81	245.23	1156.25	0.43	19.83	218.75
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.091	0.039	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.44	134.81	1480.00	0.24	10.90	280.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0270	3.022		0.0000	0.000

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: HEADER B

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.552	0.552
Overall MINimum	0.060	0.060
D Only	0.492	0.492
+D+Lr	0.552	0.552
+D+0.750Lr	0.537	0.537
+0.60D	0.295	0.295
Lr Only	0.060	0.060

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: HEADER C

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10

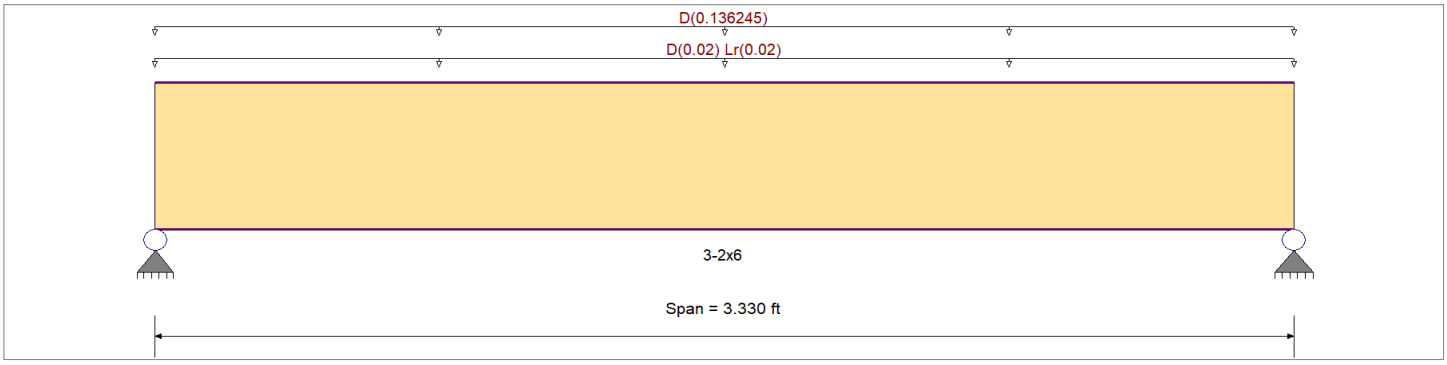
Wood Species : Southern Pine
Wood Grade : No.2: 2"-4" Thick: 5"-6" Wide

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

Fb +	1,000.0 psi
Fb -	1,000.0 psi
Fc - Prll	1,400.0 psi
Fc - Perp	565.0 psi
Fv	175.0 psi
Ft	600.0 psi

E : Modulus of Elasticity

Ebend- xx	1,400.0 ksi
Eminbend - xx	510.0 ksi
Density	34.330 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.020 , Tributary Width = 1.0 ft, (ROOF LOAD)
Uniform Load : D = 0.0150 ksf, Tributary Width = 9.083 ft, (WALL LOAD)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.132 : 1	Maximum Shear Stress Ratio	=	0.076 : 1
Section used for this span		3-2x6	Section used for this span		3-2x6
fb: Actual	=	118.88 psi	fv: Actual	=	11.94 psi
Fb: Allowable	=	900.00 psi	Fv: Allowable	=	157.50 psi
Load Combination		D Only	Load Combination		D Only
Location of maximum on span	=	1.665 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 in	Ratio =	0 <360	n/a
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.006 in	Ratio =	6886 >=180	Span: 1 : +D+Lr
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 3.330 ft	1	0.132	0.076	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.22	118.88	900.00	0.20	11.94	157.50
+D+Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.330 ft	1	0.107	0.061	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.25	133.54	1250.00	0.22	13.42	218.75
+D+0.750Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.330 ft	1	0.104	0.060	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.25	129.87	1250.00	0.22	13.05	218.75
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.330 ft	1	0.045	0.026	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.13	71.33	1600.00	0.12	7.17	280.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0058	1.677		0.0000	0.000

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: HEADER C

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.303	0.303
Overall MINimum	0.033	0.033
D Only	0.270	0.270
+D+Lr	0.303	0.303
+D+0.750Lr	0.295	0.295
+0.60D	0.162	0.162
Lr Only	0.033	0.033

- ROOF JOIST: TYPICAL

ROOF DEAD LOAD:	20	PSF	TRIBUTARY WIDTH (ROOF) = 1’ – 4”
ROOF LIVE LOAD:	20	PSF	
			SPAN = 17’ – 0”
			USE: 2X12*

- ROOF JOIST: AHU

ROOF DEAD LOAD:	20	PSF	TRIBUTARY WIDTH (ROOF) = 1’ – 4”
ROOF LIVE LOAD:	20	PSF	
MECH LOAD:	62.5	LBS	@ 7’ – 9”
MECH LOAD:	62.5	LBS	@ 11’ – 9”
			SPAN = 17’ – 0”
			USE: 2X12*

- ROOF JOIST: MECH @ HEADERED JOIST

ROOF DEAD LOAD:	20	PSF	TRIBUTARY WIDTH (ROOF) = 1’ – 4”
ROOF LIVE LOAD:	20	PSF	
MECH LOAD:	83.3	LBS	@ 11’ – 3”
			SPAN = 17’ – 0”
			USE: 2X12*

- ROOF JOIST: WATER HEATER

ROOF DEAD LOAD:	20	PSF	TRIBUTARY WIDTH (ROOF) = 1’ – 4”
ROOF LIVE LOAD:	20	PSF	
WATER HEATER LOAD:	300	LBS	@ 16’ – 0”
			SPAN = 17’ – 0”
			USE: 2X12*

*REFER TO ATTACHED ENERCALC OUTPUT FOR DESIGN DETAILS

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

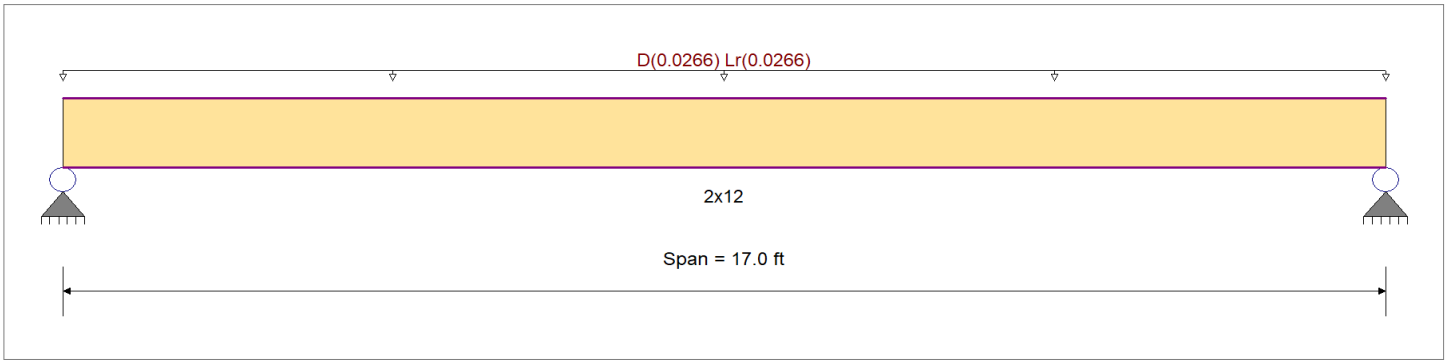
DESCRIPTION: ROOF JOIST: TYPICAL

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	750.0 psi	*E : Modulus of Elasticity*	
Load Combination :	ASCE 7-10	Fb -	750.0 psi	Ebend- xx	1,400.0 ksi
		Fc - Prll	1,250.0 psi	Eminbend - xx	510.0 ksi
Wood Species :	Southern Pine	Fc - Perp	565.0 psi		
Wood Grade :	No.2: 2"-4" Thick: 12" Wide	Fv	175.0 psi		
		Ft	450.0 psi	Density	34.330 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.020 ksf, Tributary Width = 1.330 ft, (ROOF LOAD)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.727 : 1	Maximum Shear Stress Ratio	=	0.176 : 1
Section used for this span		2x12	Section used for this span		2x12
fb: Actual	=	784.00 psi	fv: Actual	=	38.50 psi
Fb: Allowable	=	1,078.13 psi	Fv: Allowable	=	218.75 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	8.500 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	0.202 in	Ratio =	1010 >=360	Span: 1 : Lr Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.434 in	Ratio =	469 >=180	Span: 1 : +D+Lr
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.540	0.131	0.90	1.000	1.00	1.15	1.00	1.00	1.00	1.11	419.56	776.25	0.23	20.60	157.50
+D+Lr					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.727	0.176	1.25	1.000	1.00	1.15	1.00	1.00	1.00	2.07	784.00	1078.13	0.43	38.50	218.75
+D+0.750Lr					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.643	0.156	1.25	1.000	1.00	1.15	1.00	1.00	1.00	1.83	692.89	1078.13	0.38	34.03	218.75
+0.60D					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.182	0.044	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.66	251.74	1380.00	0.14	12.36	280.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.4341	8.562		0.0000	0.000

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: ROOF JOIST: TYPICAL

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.486	0.486
Overall MINimum	0.226	0.226
D Only	0.260	0.260
+D+Lr	0.486	0.486
+D+0.750Lr	0.430	0.430
+0.60D	0.156	0.156
Lr Only	0.226	0.226

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: ROOF JOIST: AHU

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10

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

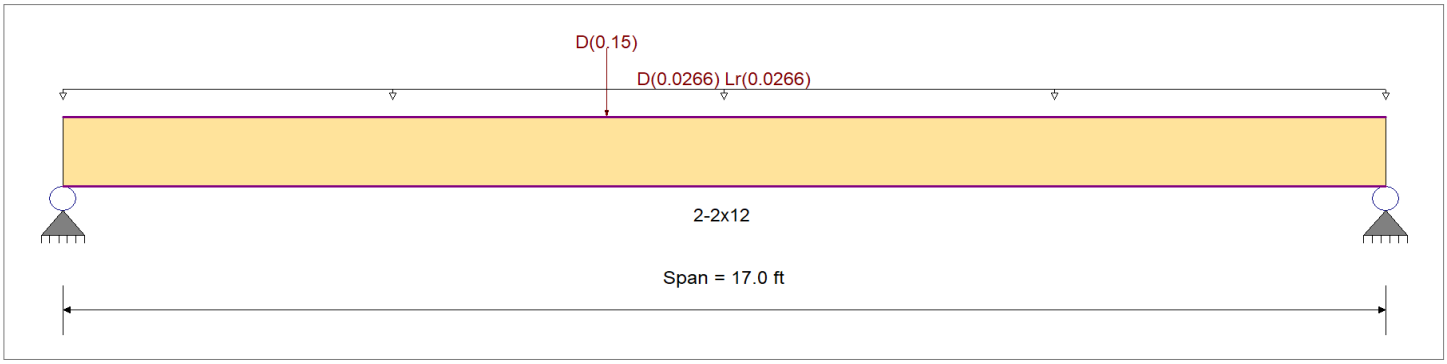
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	750.0 psi
Fb -	750.0 psi
Fc - Prll	1,250.0 psi
Fc - Perp	565.0 psi
Fv	175.0 psi
Ft	450.0 psi

E : Modulus of Elasticity

Ebend- xx	1,400.0 ksi
Eminbend - xx	510.0 ksi
Density	34.330 pcf

Repetitive Member Stress Increase



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.020 ksf, Tributary Width = 1.330 ft, (ROOF LOAD)
Point Load : D = 0.150 k @ 7.0 ft, (MECH LOAD)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.487 : 1	Maximum Shear Stress Ratio	=	0.112 : 1
Section used for this span		2-2x12	Section used for this span		2-2x12
fb: Actual	=	525.02 psi	fv: Actual	=	24.53 psi
Fb: Allowable	=	1,078.13 psi	Fv: Allowable	=	218.75 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	7.507 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	0.101 in	Ratio =	2021 >=360	Span: 1 : Lr Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.284 in	Ratio =	719 >=180	Span: 1 : +D+Lr
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.447	0.099	0.90	1.000	1.00	1.15	1.00	1.00	1.00	1.83	347.05	776.25	0.35	15.58	157.50
+D+Lr					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.487	0.112	1.25	1.000	1.00	1.15	1.00	1.00	1.00	2.77	525.02	1078.13	0.55	24.53	218.75
+D+0.750Lr					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.445	0.102	1.25	1.000	1.00	1.15	1.00	1.00	1.00	2.53	480.18	1078.13	0.50	22.29	218.75
+0.60D					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.151	0.033	1.60	1.000	1.00	1.15	1.00	1.00	1.00	1.10	208.23	1380.00	0.21	9.35	280.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.2835	8.438		0.0000	0.000

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: ROOF JOIST: AHU

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.609	0.582
Overall MINimum	0.226	0.226
D Only	0.383	0.356
+D+Lr	0.609	0.582
+D+0.750Lr	0.552	0.526
+0.60D	0.230	0.214
Lr Only	0.226	0.226

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: ROOF JOIST: CU

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10

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

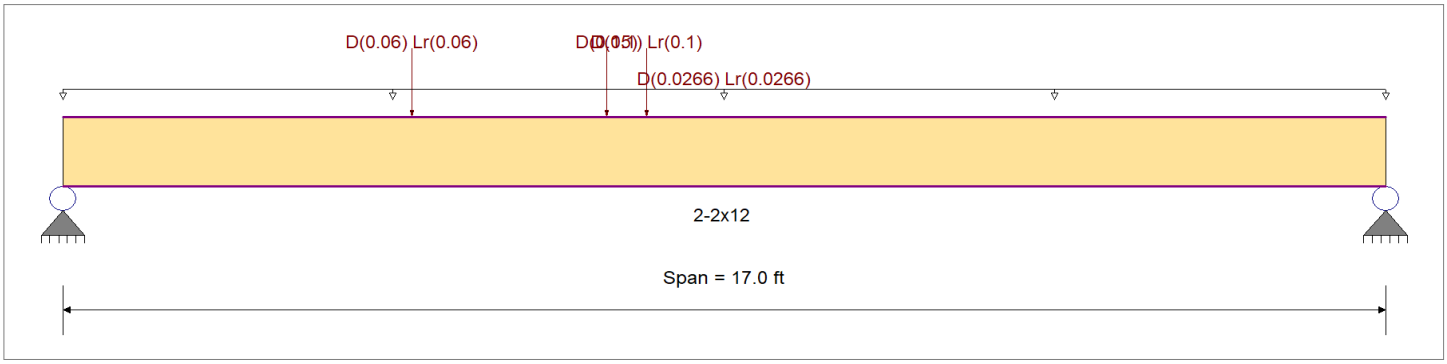
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	750.0 psi
Fb -	750.0 psi
Fc - Prll	1,250.0 psi
Fc - Perp	565.0 psi
Fv	175.0 psi
Ft	450.0 psi

E : Modulus of Elasticity

Ebend- xx	1,400.0 ksi
Eminbend - xx	510.0 ksi
Density	34.330 pcf

Repetitive Member Stress Increase



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.020 ksf, Tributary Width = 1.330 ft, (ROOF LOAD)
Point Load : D = 0.150 k @ 7.0 ft, (MECH LOAD)
Point Load : D = 0.060, Lr = 0.060 k @ 4.50 ft, (HEADER LOAD 1)
Point Load : D = 0.10, Lr = 0.10 k @ 7.50 ft, (HEADER LOAD 2)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.687 : 1	Maximum Shear Stress Ratio	=	0.153 : 1
Section used for this span		2-2x12	Section used for this span		2-2x12
fb: Actual	=	741.03 psi	fv: Actual	=	33.41 psi
Fb: Allowable	=	1,078.13 psi	Fv: Allowable	=	218.75 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	7.507 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	0.151 in	Ratio =	1347 >=360	Span: 1 : Lr Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.385 in	Ratio =	530 >=180	Span: 1 : +D+Lr
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.584	0.127	0.90	1.000	1.00	1.15	1.00	1.00	1.00	2.39	453.29	776.25	0.45	20.02	157.50
+D+Lr					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.687	0.153	1.25	1.000	1.00	1.15	1.00	1.00	1.00	3.91	741.03	1078.13	0.75	33.41	218.75
+D+0.750Lr					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.621	0.137	1.25	1.000	1.00	1.15	1.00	1.00	1.00	3.53	669.09	1078.13	0.68	30.07	218.75
+0.60D					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.197	0.043	1.60	1.000	1.00	1.15	1.00	1.00	1.00	1.43	271.97	1380.00	0.27	12.01	280.00

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: ROOF JOIST: CU

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.3846	8.314		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.809	0.702
Overall MINimum	0.326	0.286
D Only	0.483	0.416
+D+Lr	0.809	0.702
+D+0.750Lr	0.727	0.631
+0.60D	0.290	0.250
Lr Only	0.326	0.286

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

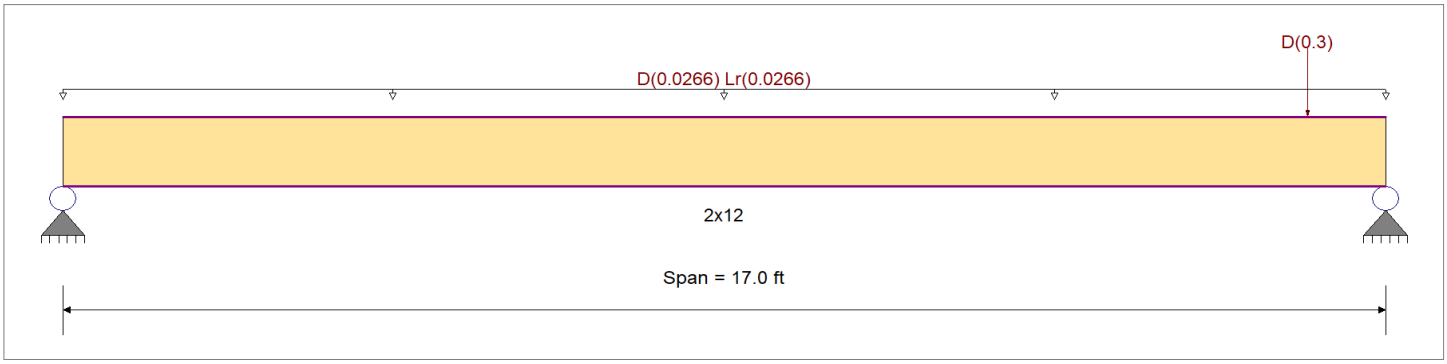
DESCRIPTION: ROOF JOIST: WATER HEATER

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	750.0 psi	*E : Modulus of Elasticity*	
Load Combination :	ASCE 7-10	Fb -	750.0 psi	Ebend- xx	1,400.0 ksi
		Fc - Prll	1,250.0 psi	Eminbend - xx	510.0 ksi
Wood Species :	Southern Pine	Fc - Perp	565.0 psi		
Wood Grade :	No.2: 2"-4" Thick: 12" Wide	Fv	175.0 psi		
		Ft	450.0 psi	Density	34.330 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.020 ksf, Tributary Width = 1.330 ft, (ROOF LOAD)
Point Load : D = 0.30 k @ 16.0 ft, (WATER HEATER LOAD)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.781 : 1	Maximum Shear Stress Ratio	=	0.291 : 1
Section used for this span		2x12	Section used for this span		2x12
fb: Actual	=	841.92 psi	fv: Actual	=	63.60 psi
Fb: Allowable	=	1,078.13 psi	Fv: Allowable	=	218.75 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	8.810 ft	Location of maximum on span	=	16.069 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.202 in	Ratio =	1010 >=360	Span: 1 : Lr Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.472 in	Ratio =	432 >=180	Span: 1 : +D+Lr
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.616	0.290	0.90	1.000	1.00	1.15	1.00	1.00	1.00	1.26	478.37	776.25	0.51	45.70	157.50
+D+Lr					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.781	0.291	1.25	1.000	1.00	1.15	1.00	1.00	1.00	2.22	841.92	1078.13	0.72	63.60	218.75
+D+0.750Lr					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.697	0.270	1.25	1.000	1.00	1.15	1.00	1.00	1.00	1.98	750.94	1078.13	0.67	59.13	218.75
+0.60D					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.208	0.098	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.76	287.02	1380.00	0.31	27.42	280.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.4718	8.624		0.0000	0.000

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: ROOF JOIST: WATER HEATER

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.504	0.769
Overall MINimum	0.226	0.226
D Only	0.278	0.543
+D+Lr	0.504	0.769
+D+0.750Lr	0.448	0.712
+0.60D	0.167	0.326
Lr Only	0.226	0.226

- GRADE BEAM (WORST CASE)

ROOF DEAD LOAD:	20	PSF	TRIBUTARY WIDTH (ROOF) = 8’ – 6”
ROOF LIVE LOAD:	20	PSF	TRIBUTARY WIDTH (WALL) = 18’ – 0”
WALL LOAD:	20	PSF	
GRADE BEAM WIDTH:	1’ – 6”		

TOTAL LOAD = (20 + 20) PSF (8.5’) + (20) PSF (18.0’) = 700 PLF

ALLOWABLE = 1’ – 4” (2,500) = 3,333 PLF > 680 PLF **OK**

USE 1’-4” x 2’-0” GRADE BEAM W/ (2) #5 TOP, BOT. & INT. W/ #3 STIRRUPS AT 18” O.C.

*REFER TO ATTACHED ENERCALC OUTPUT FOR THESE REACTIONS

- WOOD STUDS: LOAD CASE A

HEIGHT: 19' – 0" TRIBUTARY WIDTH (SPACING) = 16" O.C.
LATERAL WIND LOAD:

PARAPET:	43.8 PSF (LOAD CASE A C&C PARAPET: ULT)	13.6 FT TO 19 FT
MAIN BLDG:	22.7 PSF (WALL ZONE 5 C&C: ULT.)	0 FT TO 13.6 FT

USE 2X6 STUDS @ 16" O.C.*

- WOOD STUDS: LOAD CASE B

HEIGHT: 19' – 0" TRIBUTARY WIDTH (SPACING) = 16" O.C.
LATERAL WIND LOAD:

PARAPET:	47.8 PSF (LOAD CASE B C&C PARAPET: ULT)	13.5 FT TO 19 FT
MAIN BLDG:	29.7 PSF (WALL ZONE 5 C&C: ULT.)	0 FT TO 13.5 FT

USE 2X6 STUDS @ 16" O.C.*

- WOOD STUDS: LOAD CASE A

HEIGHT: 18' – 3" TRIBUTARY WIDTH (SPACING) = 16" O.C.
LATERAL WIND LOAD:

PARAPET:	43.8 PSF (LOAD CASE A C&C PARAPET: ULT)	12.9 FT TO 18.3 FT
MAIN BLDG:	22.7 PSF (WALL ZONE 5 C&C: ULT.)	0 FT TO 12.9 FT

USE 2X6 STUDS @ 16" O.C.*

- WOOD STUDS: LOAD CASE B

HEIGHT: 18' – 3" TRIBUTARY WIDTH (SPACING) = 16" O.C.
LATERAL WIND LOAD:

PARAPET:	47.8 PSF (LOAD CASE B C&C PARAPET: ULT)	12.9 FT TO 18.3 FT
MAIN BLDG:	29.7 PSF (WALL ZONE 5 C&C: ULT.)	0 FT TO 12.9 FT

USE 2X6 STUDS @ 16" O.C.*

*REFER TO ATTACHED ENERCALC OUTPUT FOR THESE REACTIONS

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: Load Case A: Wood Stud: 19'-0"

CODE REFERENCES

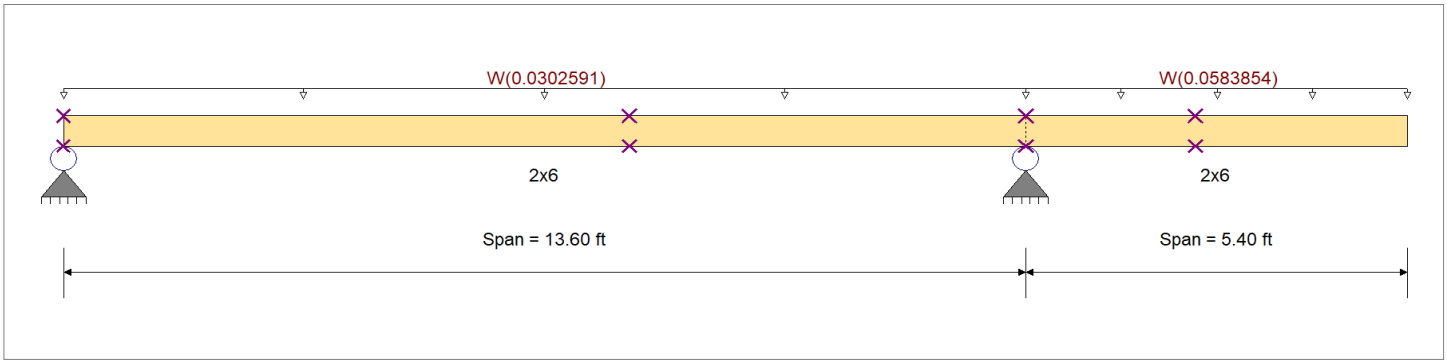
Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	1,000.0 psi	*E : Modulus of Elasticity*	
Load Combination :	ASCE 7-10	Fb -	1,000.0 psi	Ebend- xx	1,400.0 ksi
		Fc - Prll	1,400.0 psi	Eminbend - xx	510.0 ksi
Wood Species :	Southern Pine	Fc - Perp	565.0 psi		
Wood Grade :	No.2: 2"-4" Thick: 5"-6" Wide	Fv	175.0 psi		
		Ft	600.0 psi	Density	34.330 pcf
Beam Bracing :	Beam bracing is defined as a set spacing over all spans			Repetitive Member Stress Increase	

Unbraced Lengths

First Brace starts at 8.0 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 8.0 ft



Applied Loads

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

Beam self weight NOT internally calculated and added
Load for Span Number 1
Uniform Load : W = 0.02270 ksf, Tributary Width = 1.333 ft
Load for Span Number 2
Uniform Load : W = 0.04380 ksf, Tributary Width = 1.333 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.521 : 1	Maximum Shear Stress Ratio	=	0.123 : 1
Section used for this span		2x6	Section used for this span		2x6
fb: Actual	=	810.45 psi	fv: Actual	=	34.39 psi
Fb: Allowable	=	1,555.12 psi	Fv: Allowable	=	280.00 psi
Load Combination		+0.60W	Load Combination		+0.60W
Location of maximum on span	=	13.600 ft	Location of maximum on span	=	13.600 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.587 in	Ratio =	220 >=120	Span: 2 : W Only
Max Upward Transient Deflection	-0.015 in	Ratio =	10650 >=120	Span: 1 : W Only
Max Downward Total Deflection	0.352 in	Ratio =	366 >=120	Span: 2 : +0.60W
Max Upward Total Deflection	-0.009 in	Ratio =	17751 >=120	Span: 1 : +0.60W

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
													0.00	0.00	0.00	0.00
Length = 7.978 ft	1			0.90	1.000	1.00	1.15	1.00	1.00	0.91			942.32	0.00	0.00	157.50
Length = 5.622 ft	1			0.90	1.000	1.00	1.15	1.00	1.00	0.95			986.07	0.00	0.00	157.50
Length = 2.383 ft	2			0.90	1.000	1.00	1.15	1.00	1.00	0.98			1018.93	0.00	0.00	157.50
Length = 3.017 ft	2			0.90	1.000	1.00	1.15	1.00	1.00	0.98			1013.11	0.00	0.00	157.50
+0.60W					1.000	1.00	1.15	1.00	1.00	0.98			0.00	0.00	0.00	0.00
Length = 7.978 ft	1	0.253	0.056	1.60	1.000	1.00	1.15	1.00	1.00	0.69	0.20	322.46	1276.67	0.09	15.62	280.00

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: Load Case A: Wood Stud: 19'-0"

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
Length = 5.622 ft	**1**	0.521	0.123	1.60	1.000	1.00	1.15	1.00	1.00	0.85	0.51	810.45	1555.12	0.19	34.39	280.00
Length = 2.383 ft	**2**	0.456	0.123	1.60	1.000	1.00	1.15	1.00	1.00	0.97	0.51	810.45	1776.22	0.19	34.39	280.00
Length = 3.017 ft	**2**	0.145	0.123	1.60	1.000	1.00	1.15	1.00	1.00	0.95	0.16	252.94	1745.48	0.11	34.39	280.00
+0.450W					1.000	1.00	1.15	1.00	1.00	0.95			0.00	0.00	0.00	0.00
Length = 7.978 ft	**1**	0.189	0.042	1.60	1.000	1.00	1.15	1.00	1.00	0.69	0.15	241.84	1276.67	0.06	11.71	280.00
Length = 5.622 ft	**1**	0.391	0.092	1.60	1.000	1.00	1.15	1.00	1.00	0.85	0.38	607.84	1555.12	0.14	25.80	280.00
Length = 2.383 ft	**2**	0.342	0.092	1.60	1.000	1.00	1.15	1.00	1.00	0.97	0.38	607.84	1776.22	0.14	25.80	280.00
Length = 3.017 ft	**2**	0.109	0.092	1.60	1.000	1.00	1.15	1.00	1.00	0.95	0.12	189.71	1745.48	0.08	25.80	280.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	0.2417	5.318	W Only	-0.0153	12.688
W Only	2	0.5873	5.400		0.0000	12.688

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.143	0.584	
Overall MINimum	0.143	0.584	
+0.60W	0.086	0.350	
+0.450W	0.064	0.263	
W Only	0.143	0.584	

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: Load Case B: Wood Stud: 19'-0"

CODE REFERENCES

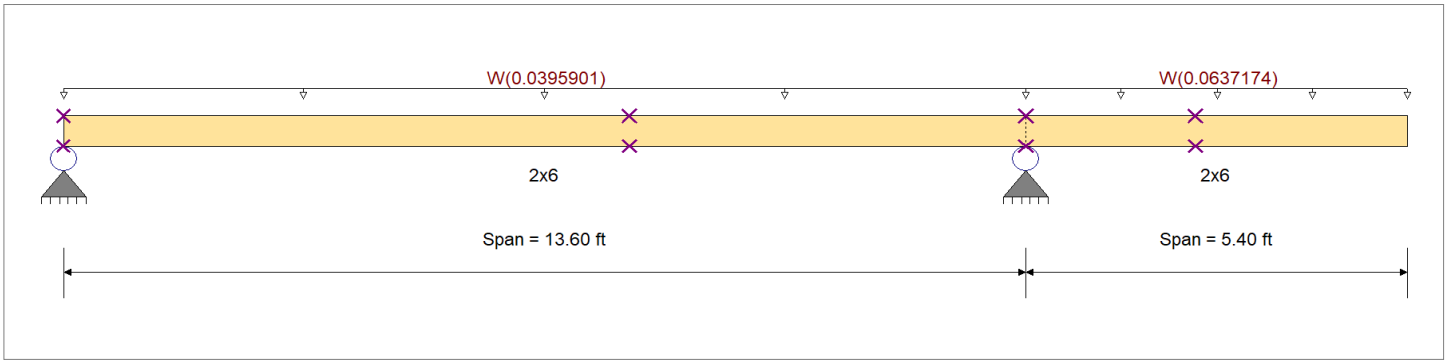
Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	1,000.0 psi	*E : Modulus of Elasticity*	
Load Combination :	ASCE 7-10	Fb -	1,000.0 psi	Ebend- xx	1,400.0 ksi
		Fc - Prll	1,400.0 psi	Eminbend - xx	510.0 ksi
Wood Species :	Southern Pine	Fc - Perp	565.0 psi		
Wood Grade :	No.2: 2"-4" Thick: 5"-6" Wide	Fv	175.0 psi		
		Ft	600.0 psi	Density	34.330 pcf
Beam Bracing :	Beam bracing is defined as a set spacing over all spans			Repetitive Member Stress Increase	

Unbraced Lengths

First Brace starts at 8.0 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 8.0 ft



Applied Loads

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

Beam self weight NOT internally calculated and added
Load for Span Number 1
Uniform Load : W = 0.02970 ksf, Tributary Width = 1.333 ft
Load for Span Number 2
Uniform Load : W = 0.04780 ksf, Tributary Width = 1.333 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.569 : 1		Maximum Shear Stress Ratio	=	0.124 : 1	
Section used for this span		2x6		Section used for this span		2x6	
fb: Actual	=	884.47 psi		fv: Actual	=	34.85 psi	
Fb: Allowable	=	1,555.12 psi		Fv: Allowable	=	280.00 psi	
Load Combination		+0.60W		Load Combination		+0.60W	
Location of maximum on span	=	13.600 ft		Location of maximum on span	=	13.144 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	

Maximum Deflection

Max Downward Transient Deflection	0.420 in	Ratio =	308 >=120	Span: 2 : W Only
Max Upward Transient Deflection	0 in	Ratio =	0 <120	n/a
Max Downward Total Deflection	0.252 in	Ratio =	512 >=120	Span: 2 : +0.60W
Max Upward Total Deflection	0 in	Ratio =	0 <120	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
													0.00	0.00	0.00	0.00
Length = 7.978 ft	1			0.90	1.000	1.00	1.15	1.00	1.00	0.91			942.32	0.00	0.00	157.50
Length = 5.622 ft	1			0.90	1.000	1.00	1.15	1.00	1.00	0.95			986.07	0.00	0.00	157.50
Length = 2.383 ft	2			0.90	1.000	1.00	1.15	1.00	1.00	0.98			1018.93	0.00	0.00	157.50
Length = 3.017 ft	2			0.90	1.000	1.00	1.15	1.00	1.00	0.98			1013.11	0.00	0.00	157.50
+0.60W					1.000	1.00	1.15	1.00	1.00	0.98			0.00	0.00	0.00	0.00
Length = 7.978 ft	1	0.380	0.071	1.60	1.000	1.00	1.15	1.00	1.00	0.69	0.31	485.31	1276.67	0.11	19.95	280.00

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: Load Case B: Wood Stud: 19'-0"

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
Length = 5.622 ft	**1**	0.569	0.124	1.60	1.000	1.00	1.15	1.00	1.00	0.85	0.56	884.47	1555.12	0.19	34.85	280.00
Length = 2.383 ft	**2**	0.498	0.124	1.60	1.000	1.00	1.15	1.00	1.00	0.97	0.56	884.47	1776.22	0.19	34.85	280.00
Length = 3.017 ft	**2**	0.158	0.124	1.60	1.000	1.00	1.15	1.00	1.00	0.95	0.17	276.04	1745.48	0.12	34.85	280.00
+0.450W					1.000	1.00	1.15	1.00	1.00	0.95			0.00	0.00	0.00	0.00
Length = 7.978 ft	**1**	0.285	0.053	1.60	1.000	1.00	1.15	1.00	1.00	0.69	0.23	363.99	1276.67	0.08	14.96	280.00
Length = 5.622 ft	**1**	0.427	0.093	1.60	1.000	1.00	1.15	1.00	1.00	0.85	0.42	663.35	1555.12	0.14	26.14	280.00
Length = 2.383 ft	**2**	0.373	0.093	1.60	1.000	1.00	1.15	1.00	1.00	0.97	0.42	663.35	1776.22	0.14	26.14	280.00
Length = 3.017 ft	**2**	0.119	0.093	1.60	1.000	1.00	1.15	1.00	1.00	0.95	0.13	207.03	1745.48	0.09	26.14	280.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	0.4313	5.774		0.0000	0.000
W Only	2	0.4203	5.400		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.201	0.682	
Overall MINimum	0.201	0.682	
+0.60W	0.121	0.409	
+0.450W	0.090	0.307	
W Only	0.201	0.682	

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: Load Case A: Wood Stud: 18'-3"

CODE REFERENCES

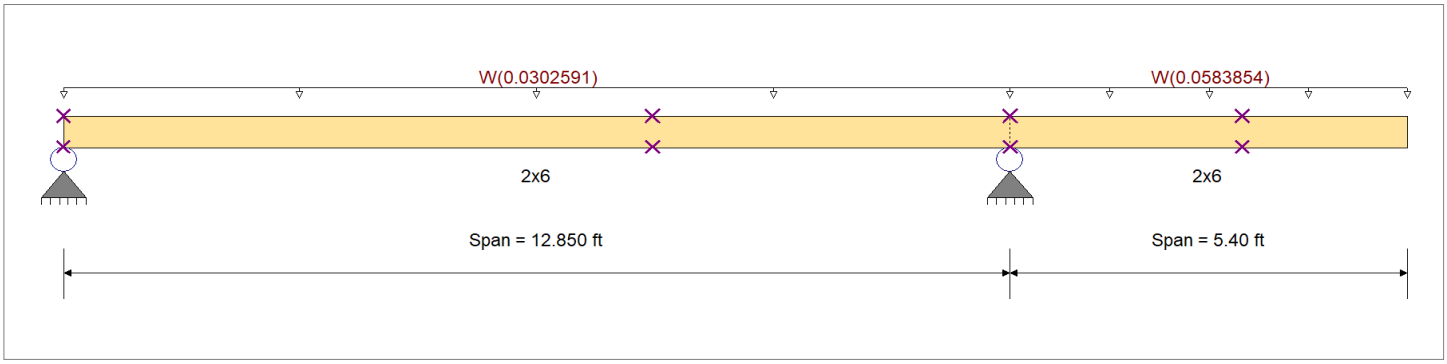
Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	1,000.0 psi	*E : Modulus of Elasticity*	
Load Combination :	ASCE 7-10	Fb -	1,000.0 psi	Ebend- xx	1,400.0 ksi
		Fc - Prll	1,400.0 psi	Eminbend - xx	510.0 ksi
Wood Species :	Southern Pine	Fc - Perp	565.0 psi		
Wood Grade :	No.2: 2"-4" Thick: 5"-6" Wide	Fv	175.0 psi		
		Ft	600.0 psi	Density	34.330 pcf
Beam Bracing :	Beam bracing is defined as a set spacing over all spans			Repetitive Member Stress Increase	

Unbraced Lengths

First Brace starts at 8.0 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 8.0 ft



Applied Loads

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

Beam self weight NOT internally calculated and added
Load for Span Number 1
Uniform Load : W = 0.02270 ksf, Tributary Width = 1.333 ft
Load for Span Number 2
Uniform Load : W = 0.04380 ksf, Tributary Width = 1.333 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.499 : 1	Maximum Shear Stress Ratio	=	0.113 : 1
Section used for this span		2x6	Section used for this span		2x6
fb: Actual	=	810.45 psi	fv: Actual	=	31.51 psi
Fb: Allowable	=	1,624.27 psi	Fv: Allowable	=	280.00 psi
Load Combination		+0.60W	Load Combination		+0.60W
Location of maximum on span	=	12.850 ft	Location of maximum on span	=	12.850 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.678 in	Ratio =	190 >=120	Span: 2 : W Only
Max Upward Transient Deflection	-0.036 in	Ratio =	4270 >=120	Span: 1 : W Only
Max Downward Total Deflection	0.407 in	Ratio =	318 >=120	Span: 2 : +0.60W
Max Upward Total Deflection	-0.022 in	Ratio =	7116 >=120	Span: 1 : +0.60W

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
													0.00	0.00	0.00	0.00
Length = 7.968 ft	1			0.90	1.000	1.00	1.15	1.00	1.00	0.91			942.54	0.00	0.00	157.50
Length = 4.882 ft	1			0.90	1.000	1.00	1.15	1.00	1.00	0.96			995.09	0.00	0.00	157.50
Length = 3.137 ft	2			0.90	1.000	1.00	1.15	1.00	1.00	0.98			1011.90	0.00	0.00	157.50
Length = 2.263 ft	2			0.90	1.000	1.00	1.15	1.00	1.00	0.99			1019.95	0.00	0.00	157.50
+0.60W					1.000	1.00	1.15	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 7.968 ft	1	0.202	0.045	1.60	1.000	1.00	1.15	1.00	1.00	0.69	0.16	258.43	1277.78	0.07	12.56	280.00

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: Load Case A: Wood Stud: 18'-3"

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
Length = 4.882 ft	**1**	0.499	0.113	1.60	1.000	1.00	1.15	1.00	1.00	0.88	0.51	810.45	1624.27	0.17	31.51	280.00
Length = 3.137 ft	**2**	0.466	0.113	1.60	1.000	1.00	1.15	1.00	1.00	0.94	0.51	810.45	1738.54	0.17	31.51	280.00
Length = 2.263 ft	**2**	0.080	0.113	1.60	1.000	1.00	1.15	1.00	1.00	0.97	0.09	142.28	1781.15	0.08	31.51	280.00
+0.450W					1.000	1.00	1.15	1.00	1.00	0.97			0.00	0.00	0.00	0.00
Length = 7.968 ft	**1**	0.152	0.034	1.60	1.000	1.00	1.15	1.00	1.00	0.69	0.12	193.82	1277.78	0.05	9.42	280.00
Length = 4.882 ft	**1**	0.374	0.084	1.60	1.000	1.00	1.15	1.00	1.00	0.88	0.38	607.84	1624.27	0.13	23.63	280.00
Length = 3.137 ft	**2**	0.350	0.084	1.60	1.000	1.00	1.15	1.00	1.00	0.94	0.38	607.84	1738.54	0.13	23.63	280.00
Length = 2.263 ft	**2**	0.060	0.084	1.60	1.000	1.00	1.15	1.00	1.00	0.97	0.07	106.71	1781.15	0.06	23.63	280.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	0.1446	4.594	W Only	-0.0361	11.414
W Only	2	0.6781	5.400		0.0000	11.414

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.128	0.576	
Overall MINimum	0.128	0.576	
+0.60W	0.077	0.346	
+0.450W	0.058	0.259	
W Only	0.128	0.576	

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: Load Case B: Wood Stud: 18'-3"

CODE REFERENCES

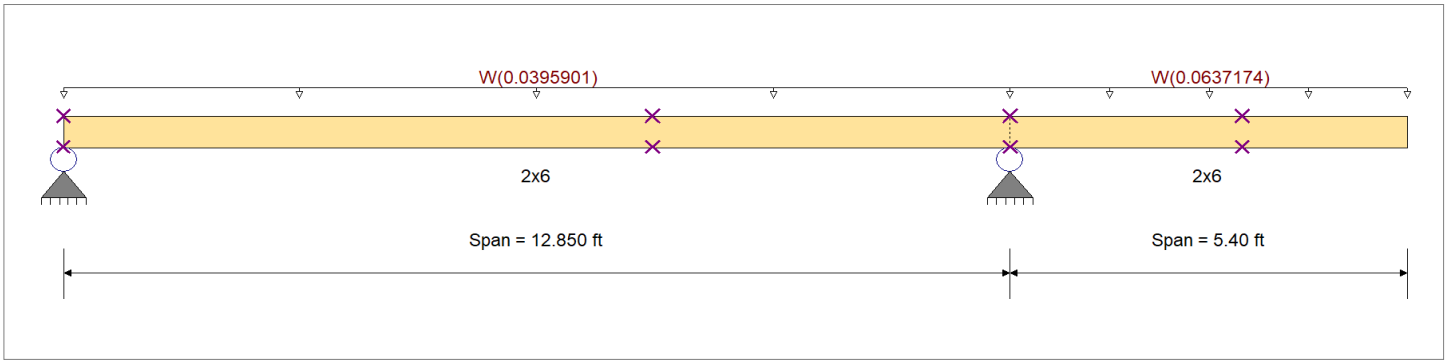
Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	1,000.0 psi	*E : Modulus of Elasticity*	
Load Combination :	ASCE 7-10	Fb -	1,000.0 psi	Ebend- xx	1,400.0 ksi
		Fc - Prll	1,400.0 psi	Eminbend - xx	510.0 ksi
Wood Species :	Southern Pine	Fc - Perp	565.0 psi		
Wood Grade :	No.2: 2"-4" Thick: 5"-6" Wide	Fv	175.0 psi		
		Ft	600.0 psi	Density	34.330 pcf
Beam Bracing :	Beam bracing is defined as a set spacing over all spans			Repetitive Member Stress Increase	

Unbraced Lengths

First Brace starts at 8.0 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 8.0 ft



Applied Loads

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

Beam self weight NOT internally calculated and added
Load for Span Number 1
Uniform Load : W = 0.02970 ksf, Tributary Width = 1.333 ft
Load for Span Number 2
Uniform Load : W = 0.04780 ksf, Tributary Width = 1.333 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.545 : 1	Maximum Shear Stress Ratio	=	0.123 : 1
Section used for this span		2x6	Section used for this span		2x6
fb: Actual	=	884.47 psi	fv: Actual	=	34.39 psi
Fb: Allowable	=	1,624.27 psi	Fv: Allowable	=	280.00 psi
Load Combination		+0.60W	Load Combination		+0.60W
Location of maximum on span	=	12.850 ft	Location of maximum on span	=	12.850 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.554 in	Ratio =	232 >=120	Span: 2 : W Only
Max Upward Transient Deflection	-0.005 in	Ratio =	34050 >=120	Span: 1 : W Only
Max Downward Total Deflection	0.332 in	Ratio =	388 >=120	Span: 2 : +0.60W
Max Upward Total Deflection	-0.003 in	Ratio =	56750 >=120	Span: 1 : +0.60W

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
													0.00	0.00	0.00	0.00
Length = 7.968 ft	1			0.90	1.000	1.00	1.15	1.00	1.00	0.91			942.54	0.00	0.00	157.50
Length = 4.882 ft	1			0.90	1.000	1.00	1.15	1.00	1.00	0.96			995.09	0.00	0.00	157.50
Length = 3.137 ft	2			0.90	1.000	1.00	1.15	1.00	1.00	0.98			1011.90	0.00	0.00	157.50
Length = 2.263 ft	2			0.90	1.000	1.00	1.15	1.00	1.00	0.99			1019.95	0.00	0.00	157.50
+0.60W					1.000	1.00	1.15	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 7.968 ft	1	0.312	0.064	1.60	1.000	1.00	1.15	1.00	1.00	0.69	0.25	398.59	1277.78	0.10	18.00	280.00

Wood Beam

Project File: 22434 scooters framing.ec6

LIC# : KW-06017501, Build:20.22.8.17 RONALD A. ROBERTS ASSOCIATES (c) ENERCALC INC 1983-2022

DESCRIPTION: Load Case B: Wood Stud: 18'-3"

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
Length = 4.882 ft	1	0.545	0.123	1.60	1.000	1.00	1.15	1.00	1.00	0.88	0.56	884.47	1624.27	0.19	34.39	280.00
Length = 3.137 ft	2	0.509	0.123	1.60	1.000	1.00	1.15	1.00	1.00	0.94	0.56	884.47	1738.54	0.19	34.39	280.00
Length = 2.263 ft	2	0.087	0.123	1.60	1.000	1.00	1.15	1.00	1.00	0.97	0.10	155.27	1781.15	0.09	34.39	280.00
+0.450W					1.000	1.00	1.15	1.00	1.00	0.97			0.00	0.00	0.00	0.00
Length = 7.968 ft	1	0.234	0.048	1.60	1.000	1.00	1.15	1.00	1.00	0.69	0.19	298.95	1277.78	0.07	13.50	280.00
Length = 4.882 ft	1	0.408	0.092	1.60	1.000	1.00	1.15	1.00	1.00	0.88	0.42	663.35	1624.27	0.14	25.79	280.00
Length = 3.137 ft	2	0.382	0.092	1.60	1.000	1.00	1.15	1.00	1.00	0.94	0.42	663.35	1738.54	0.14	25.79	280.00
Length = 2.263 ft	2	0.065	0.092	1.60	1.000	1.00	1.15	1.00	1.00	0.97	0.07	116.46	1781.15	0.06	25.79	280.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	0.2878	5.169	W Only	-0.0045	12.347
W Only	2	0.5540	5.400		0.0000	12.347

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.182	0.671	
Overall MINimum	0.182	0.671	
+0.60W	0.109	0.402	
+0.450W	0.082	0.302	
W Only	0.182	0.671	

USE SDS25412 SCREWS

- MINIMUM EDGE DISTANCE: C_Δ = 0.5 FOR 2D AND C_Δ = 1.0 FOR 4D (TABLE 12.5.1A, NDS)

  D = SCREW DIAMETER = 0.25”
  0.25” x 2 = 0.5”
  0.2” x 4 = 1.0”

  IF INSTALLED IN THE MIDDLE OF THE 2X EDGE DISTANCE = 0.75 INCHES OR 3D. INTEREPLATING BETWEEN 2D AND 4D, C_Δ = 0.75 INCHES

- SPACING REQUIREMENTS: 4D FOR C_Δ = 1.0 (TABLE 12.5.1B, NDS) = 4 (0.25”) = 1”

- LOADED EDGE 4D = 1.0 INCH (CHECK PER TABLE 12.5.1C)

- MINIMUM PENETRATION: 8D = 8 x 0.25’’ = 2 INCHES
  SDS25412 = 4 ½’’ – 1 ½’’ = 3’’ > 2 INCHES **OK**

- SHEAR CAPACITY OF SINGLE SDS25412 SCREW

  $Z' = Z(C_D)(C_m)(C_E)(C_g)(C_\Delta)$

  Z = 350 LBS (PER ESR-2236)
  C_D = 1.0
  C_m = 1.0
  C_E = 1.0
  C_g = 1.0
  C_Δ = 0.75

  Z’ = 350 LBS (1.0)(1.0)(1.0)(1.0)(0.75) = 262 LBS

- REQUIRED LOAD = 769 LBS (REFER TO WORST CASE JOIST CALCULATION)

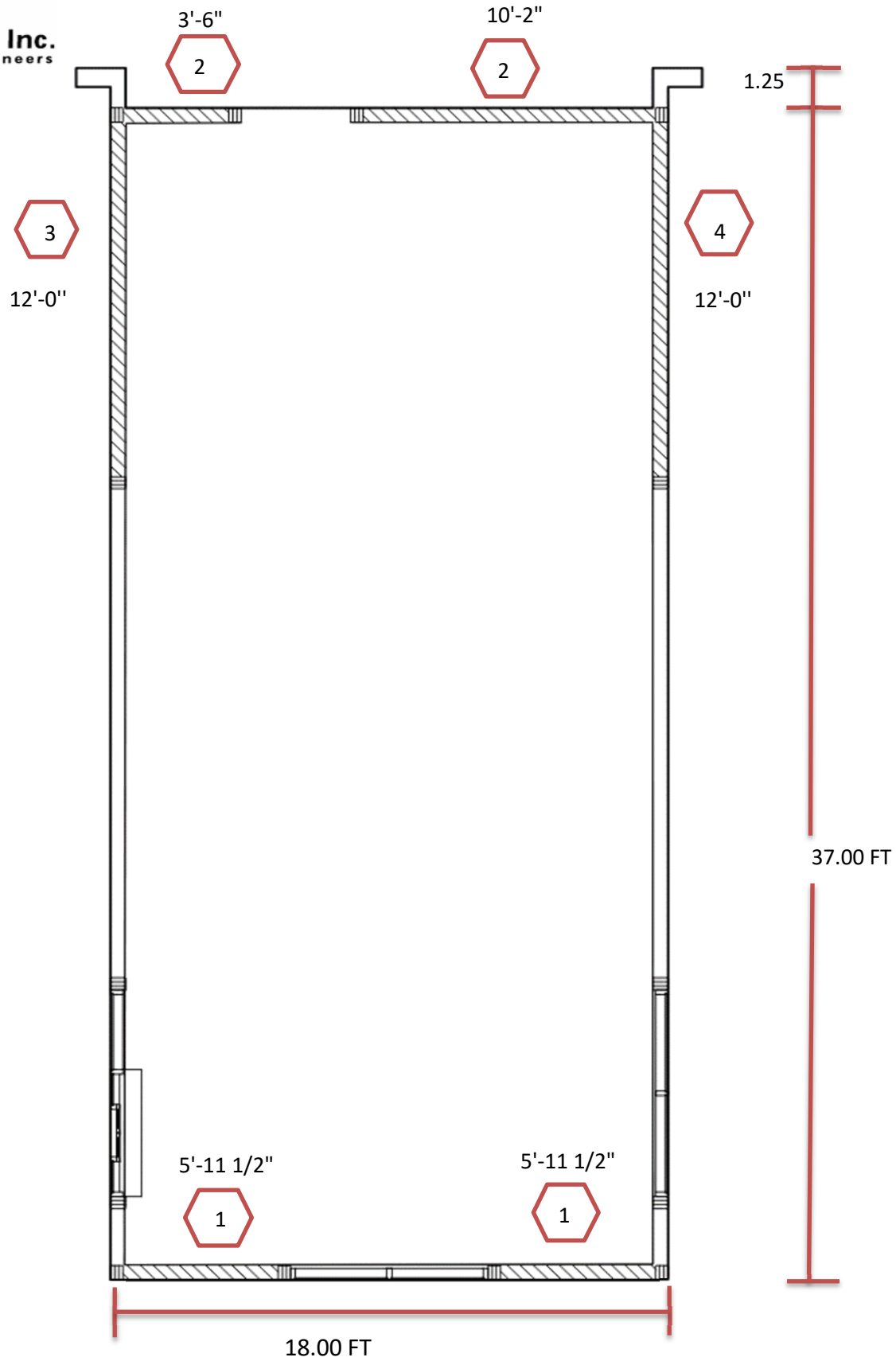
- REQUIRED NUMBER OF SCREWS

  (769 LBS)/(262 LBS/SCREW) = 2.94 => USE 3 SCREWS MINIMUM
  (5 SCREWS USED IN TYPICAL DESIGN)
  USE: (5) SDS25412 SCREWS/STUD

Ronald Roberts Associates, Inc.
Consulting Engineers

SHEARWALL LAYOUT
SCOOTERS

JOB NO.22434
39



EDGE DISTANCE:

a = 10% LEAST HORIZONTAL DIMENSION OR .4 DECK HEIGHT BUT NOT LESS THAN 3 FT

		a
LEAST HORIZONTAL DIMENSION:	18.00'	1.8 FT
DECK HEIGHT:	13.00'	5.2 FT

USE: 5.2 FT

AVERAGE TOP OF PARAPET : 18.50 FT

Ronald Roberts Associates, Inc.
Consulting Engineers

BUILDING WEIGHT
SCOOTERS

JOB NO.22434

	Weights of Materials Per ASCE 7-10 Table C3-1							
EXTERIOR WALLS:			LINEAR FEET		HEIGHT			
2X6 STUD	2.20 PSF		112.50 FT	X	18.5 FT	=	2081.3 SF	
INSULATION	0.70 PSF							
5/8" GYP	2.50 PSF							
1/2 PLYWOOD SHEATHING	1.60 PSF						2081.3 SF	
ADHERED STONE	10.00 PSF							
2" EIFS	1.50 PSF							
TOTAL:	18.50 PSF	X	2081.3 SF	=	38503 LBS			
INTERIOR WALLS:					ESTIMATED WALL	=	50.0 FT	
2X6 STUD WALLS	2.20 PSF				HEIGHT	=	12.0 FT	
5/8" GYP BOARD X 2 SIDES	5.50 PSF						600.0 SF	
TOTAL:	7.70 PSF	X	600.0 FT	=	4,620 LBS			
ROOF:			WIDTH		LENGTH			
SINGLE PLY MEMBRANE	0.70 PSF		18.0 FT	X	37.0 FT	=	666.0 SF	
3/4" PLYWOOD ROOF DECK	2.40 PSF							
MECHANICAL/LIGHTING	4.00 PSF							
MECHANICAL/LIGHTING	4.00 PSF							
RIGID INSULATION	4.15 PSF							
SPRINKLER	2.00 PSF							
GYPSUM CEILING	2.75 PSF							
TOTAL:	20.0 PSF	X	666.0 SF	=	13,320 LBS			
MECHANICAL UNITS:								
TOTAL OF ALL UNITS:	1,000 LBS							

TOTAL WEIGHT: **57443 LBS**

SIMPLIFIED DESIGN PROCEDURE CHECKLIST (12.14.1.1)

1) THE STRUCUTRE SHALL QUALIFY FOR RISK CATEGORY I OR II IN ACCORDANCE WITH ☑
2) THE SITE CLASS, DEFINED IN CHAPTER 20, SHALL NOT BE CLASS E OR F. ☑
3) THE STRUCTURE SHALL NOT EXCEED THREE STORIES ABOVE GRADE PLANE. ☑
4) THE SEISMIC FORCE- RESISTING SYSTEM SHALL BE EITHER A BEARING WALL SYSTEM OR BUILDING FRAME SYSTEM, AS INDICATED IN TABLE 12.14-1. ☑
5) THE STRUCTURE SHALL HAVE AT LEAST TWO LINES OF LATERAL RESISTANCE IN EACH OF THE TWO MAJOR AXIS DIRECTIONS. ☑
6) AT LEAST ONE LINE OF RESISTANCE SHALL BE PROVIDED ON EACH SIDE OF THE CENTER OF MASS IN EACH DIRECTION. ☑
7) FOR STRUCUTRES WITH FLEXIBLE DIAPHRAGMS, OVERHANGS BEYONG THE OUSDIE LINE OF SHEAR WALLS OR BRACED SHALL SATISFY THE FOLLOWING: ☑

$$a \leq d/5$$

a = the distance perpendicular to the forces being considered from the extreme edge of the diaphragm to the line of vertical resistance closest to that edge
d = the depth of the diaprgam parallel to the forces being considered at the line of the vertical resistance closest to the edge.

8) FOR BUILDINGS WITH A DIAPHRAGM THAT IS NOT FLEXIBLE, THE DISTANCE BETWEENT HE CENTER OF RIGIDITY AND THE CENTER OF MASS PARALLEL TO EACH MAJOR AXIS SHALL NOT EXCEED 15 PERCENT OF THE GREATEST WIDTH OF THE DIAPHRAGM n/a
9) LINES OF RESISTANCE OF THE SEISMIC FORCE-RESISTING SYSTEM SHALL BE ORIENTED AT ANGLE OF NO MORE THAN 15 DEGREES FROM ALIGMENT WITH THE MAJOR ORTHOGONAL HORIZONTAL AXES OF THE BUILDING. ☑
10) THE SIMPLIFIED DESIGN PROCEDURE SHALL BE USED FOR EACH MAJOR ORTHOGONAL HORIZONTAL AAXIS DIRECTION OF THE BUILDING. ☑
11) SYSTEM IRREGULARITIES CASUED BY IN-PLANE OR OUT-OF-PLANE OFFSETS OF LATERAL FORCE- RESISTING ELEMENTS SHALL NOT BE PERMITTED. ☑
EXCEPTION: OUT-OF-PLANE AND IN-PLANE OFFSETS OF SHEAR WALLS ARE PERMITTED IN TWO-STORY BUILDINGS OF LIGHT-FRAME CONSTRUCTION PROVIDED THAT THE FRAMING SUPPORTING THE UPPER WALL IS DESINGED FOR SEISMIC FORCE EFFECTS FROM OVERTURNING OF THE WALL AMPLIFIED BY A FACTOR OF 2.5.

12) THE LATERAL LOAD RESISTANCE OF ANY STORY SHALL NOT BE LESS THAN 80 PERCENT OF THE STORY ABOVE. ☑

DETERMINE SEISMIC BASE SHEAR:

$$V = \frac{FS_{ds}W}{R}$$ Equation 12.14-11

F = 1.00 Per ASCE 7-10, 12.14.8.1

S_{ds} = *0.28*

R = 6.50

W = 57,443 LBS FROM CALCULATION ABOVE

R=6.5 (Light framed wood walls sheathed in plywood)

TOTAL BASE SHEAR = 2,466 LBS

DETERMINE SHEAR TO WALLS

SHEARWALL 1

PERCENT TO WALL: 50.00% X 2,466 LBS = 1233 LBS

SHEARWALL 2

PERCENT TO WALL: 50.00% X 2,466 LBS = 1233 LBS

SHEARWALL 3

PERCENT TO WALL: 50.00% X 2,466 LBS = 1233 LBS

SHEARWALL 4

PERCENT TO WALL: 50.00% x 2,466 LBS = 1233 LBS

AVERAGE TOP OF SHEAR WALL :	13 FT
TOP OF PARAPET (WORST CASE)	19 FT

MAIN BUILDING WIND PRESSURE :	21.0 PSF	END ZONE (A)
	13.9 PSF	INTERIOR ZONE (C)
PARAPET WIND PRESSURE :	30.2 PSF	(WINDWARD)
	20.1 PSF	(LEEWARD)
	50.3 PSF	TOTAL PARAPET

W = 21.0 PSF (13FT/2) + 50.3 PSF (19FT - 13FT) = 438.3 PLF (ZONE A)

W = 13.9 PSF (13FT/2) + 50.3 PSF (19FT - 13FT) = 392.2 PLF (ZONE C)

DETERMINE SHEAR TO SIDES

SHEARWALL 1

SHEAR (V) = 392.2 PLF (37FT /2- 5.2FT) + 438.3 PLF (5.2 FT) = 7,495 LBS

SHEARWALL 2

SHEAR (V) = 392.2 PLF (37FT /2- 5.2FT) + 438.3 PLF (5.2 FT+1.25FT) = 8,043 LBS

SHEARWALL 3

SHEAR (V) = 392.2 PLF (18FT /2- 5.2FT) + 438.3 PLF (5.2 FT) = 3,769 LBS

SHEARWALL 4

SHEAR (V) = 392.2 PLF (18FT /2- 5.2FT) + 438.3 PLF (5.2 FT) = 3,769 LBS

ULTIMATE VALUES SHOWN

AVERAGE TOP OF SHEAR WALL : 13 FT
TOP OF PARAPET (WORST CASE) : 19 FT

MINIMUM

MAIN BUILDING WIND PRESSURE :	16.0	PSF	END ZONE (A)
	16.0	PSF	INTERIOR ZONE (C)
PARAPET WIND PRESSURE :	30.2	PSF	(WINDWARD)
	20.1	PSF	(LEEWARD)
	50.3	PSF	TOTAL PARAPET

W = 16 PSF (13FT/2) + 50.3 PSF (19FT - 13FT) = 405.8 PLF

DETERMINE SHEAR TO SIDES

SHEARWALL 1
SHEAR (V) = 405.8 PLF (37 FT /2) = 7,507 LBS

SHEARWALL 2
SHEAR (V) = 405.8 PLF (37 FT /2 + 1.25FT) = 8,015 LBS

SHEARWALL 3
SHEAR (V) = 405.8 PLF (18 FT /2) = 3,652 LBS

SHEARWALL 4
SHEAR (V) = 405.8 PLF (18 FT /2) = 3,652 LBS

	SHEAR LOADS			
SHEAR WALL	SEISMIC	WIND PRESSURE	MINIMUM WIND PRESSURE	USE
WALL 1	1233 LBS	7,495 LBS	7,507 LBS	7,507 LBS
WALL 2	1233 LBS	8,043 LBS	8,015 LBS	8,043 LBS
WALL 3	1233 LBS	3,769 LBS	3,652 LBS	3,769 LBS
WALL 4	1233 LBS	3,769 LBS	3,652 LBS	3,769 LBS

ULTIMATE VALUES SHOWN

WALL 1

		(ULTIMATE)		(ASD)
SHEAR (V)	=	7,507 LBS X	.6 =	4504 LBS
NAILING LENGTH (LN)	=	11.9 FT		
ANCHOR LENGTH (LA)	=	9.9 FT		
HEIGHT (H)	=	13.5 FT		

NAILING REQUIREMENTS

$$V/LN = \frac{4504\ PLF}{11.9\ FT} = 378\ LBS$$

USE 10d NAILS @ 6" O.C. (CAPACITY = 435 PLF)

NDS15 : Table 4.3A USING 15/32 PANEL SHEATING

HOLDOWN REQUIREMENTS

$$(VH)/LA = \frac{60809\ LBS\text{- }FT}{9.9\ FT} = 6130\ LBS$$

USE HDU8-SDS2.5 (CAPACITY = 7,870 LBS)

2019 - 2020 SIMPSON CATALOG

ANCHOR REQUIREMENTS (AR)

$$AR = V/LA = \frac{7507\ LBS}{9.9\ FT} = 757\ PLF$$

PER NDS 2015 TABLE 12E: 5/8" BOLT WITH 1.5" THICK DOUGLAS FIR-LARCH SIDE MEMBER ALLOWABLE SHEAR WITH WIND LOAD

5/8" DIA. ANCHOR ALLOW. LOAD: 1488 LBS/ANCHOR

$$\frac{(A.B.ALLOW * 12INCHES/FT)}{AR} = \frac{1488\ LBS * 12\ IN/FT}{757\ LBS/ANCHOR} = 24\ IN$$

USE 5/8" DIAMETER ANCHORS AT 24" O.C.

ALLOWABLE VALUES SHOWN

WALL 2

		(ULTIMATE)		(ASD)
SHEAR (V)	=	8,043 LBS X	.6 =	4,826 LBS
NAILING LENGTH (LN)	=	13.7 FT		
ANCHOR LENGTH (LA)	=	11.7 FT		
HEIGHT (H)	=	13.0 FT		

NAILING REQUIREMENTS

$$V/LN = \frac{4826\ PLF}{13.7\ FT} = 353\ LBS$$

USE 10d NAILS @ 6" O.C. (CAPACITY = 435 PLF)

NDS15 : Table 4.3A USING 15/32 PANEL SHEATING

HOLDOWN REQUIREMENTS

$$(VH)/LA = \frac{62733\ LBS\text{- }FT}{11.7\ FT} = 5377\ LBS$$

USE HDU5-SDS2.5 (CAPACITY = 5,645 LBS)

2019 - 2020 SIMPSON CATALOG

ANCHOR REQUIREMENTS (AR)

$$AR = V/LA = \frac{8043\ LBS}{11.7\ FT} = 689\ PLF$$

PER NDS 2015 TABLE 12E: 5/8" BOLT WITH 1.5" THICK DOUGLAS FIR-LARCH SIDE MEMBER ALLOWABLE SHEAR WITH WIND LOAD

5/8" DIA. ANCHOR ALLOW. LOAD: 1488 LBS/ANCHOR

$$\frac{(A.B.ALLOW * 12INCHES/FT)}{AR} = \frac{1488\ LBS * 12\ IN/FT}{689\ LBS/ANCHOR} = 26\ IN$$

USE 5/8" DIAMETER ANCHORS AT 24" O.C.

ALLOWABLE VALUES SHOWN

WALL 3

		(ULTIMATE)		(ASD)
SHEAR (V)	=	3,769 LBS X	.6 =	2,262 LBS
NAILING LENGTH (LN)	=	12.0 FT		
ANCHOR LENGTH (LA)	=	11.0 FT		
HEIGHT (H)	=	12.5 FT		

NAILING REQUIREMENTS

$$V/LN = \frac{2262\ PLF}{12.0\ FT} = 188\ LBS$$

USE 10d NAILS @ 6" O.C. (CAPACITY = 435 PLF)

NDS15 : Table 4.3A USING 15/32 PANEL SHEATING

HOLDOWN REQUIREMENTS

$$(VH)/LA = \frac{28270\ LBS\text{-}FT}{11.0\ FT} = 2570\ LBS$$

USE HDU2-SDS2.5 (CAPACITY = 3,075 LBS)

2019 - 2020 SIMPSON CATALOG

ANCHOR REQUIREMENTS (AR)

$$AR = V/LA = \frac{3769\ LBS}{11.0\ FT} = 343\ PLF$$

PER NDS 2015 TABLE 12E: 5/8" BOLT WITH 1.5" THICK DOUGLAS FIR-LARCH SIDE MEMBER ALLOWABLE SHEAR WITH WIND LOAD

5/8" DIA. ANCHOR ALLOW. LOAD: 1488 LBS/ANCHOR

$$\frac{(A.B.ALLOW * 12INCHES/FT)}{AR} = \frac{1488\ LBS * 12\ IN/FT}{343\ LBS/ANCHOR} = 52\ IN$$

USE 5/8" DIAMETER ANCHORS AT 32" O.C.

ALLOWABLE VALUES SHOWN

WALL 4

		(ULTIMATE)		(ASD)
SHEAR (V)	=	3,769 LBS X	.6 =	2,262 LBS
NAILING LENGTH (LN)	=	12.0 FT		
ANCHOR LENGTH (LA)	=	11.0 FT		
HEIGHT (H)	=	12.5 FT		

NAILING REQUIREMENTS

$$V/LN = \frac{2262\ PLF}{12.0\ FT} = 188\ LBS$$

USE 10d NAILS @ 6" O.C. (CAPACITY = 435 PLF)

NDS15 : Table 4.3A USING 15/32 PANEL SHEATING

HOLDOWN REQUIREMENTS

$$(VH)/LA = \frac{28270\ LBS\text{- }FT}{11.0\ FT} = 2570\ LBS$$

USE HDU2-SDS2.5 (CAPACITY = 3,075 LBS)

2019 - 2020 SIMPSON CATALOG

ANCHOR REQUIREMENTS (AR)

$$AR = V/LA = \frac{3769\ LBS}{11.0\ FT} = 343\ PLF$$

PER NDS 2015 TABLE 12E: 5/8" BOLT WITH 1.5" THICK DOUGLAS FIR-LARCH SIDE MEMBER ALLOWABLE SHEAR WITH WIND LOAD

5/8" DIA. ANCHOR ALLOW. LOAD: 1488 LBS/ANCHOR

$$\frac{(A.B.ALLOW * 12INCHES/FT)}{AR} = \frac{1488\ LBS * 12\ IN/FT}{343\ LBS/ANCHOR} = 52\ IN$$

USE 5/8" DIAMETER ANCHORS AT 32" O.C.

ALLOWABLE VALUES SHOWN

DIAPHARGM

WALL 1 &2: 4,826 LBS/ 18 FT = 268.09 PLF
(WORST CASE)

CASE 1: ALLOWABLE : 400 PLF

WALL 3 & 4 2,262 LBS/ 37 FT = 61.12 PLF

CASE 3 ALLOWABLE : 300 PLF

USE 10d NAILS @ 6 O.C. AT DIAPHRAGM BOUNDARIES (UN-BLOCKED) U.N.O

CHORD

Chord Along Wall 1 and 2

$$\frac{(3{,}769 \text{ LBS} + 3{,}769 \text{ LBS}) \times 18 \text{ FT}}{8 \times 37 \text{ FT}} = 458 \text{ LBS} \quad (.6) = 275.1 \text{ LBS}$$

USE 2X8 (MIN) LEDGER

FT = 575 TALLOW = 575*10.875 = 6,253 LBS > 458 LBS

Chord Along Wall 3 and 4

$$\frac{(8{,}043 \text{ LBS} + 7{,}495 \text{ LBS}) \times 37 \text{ FT}}{8 \times 18 \text{ FT}} = 3{,}992 \text{ LBS} \quad (.6) = 2395 \text{ LBS}$$

USE 2X12 (MIN) LEDGER

FT = 575 TALLOW = 575*16.875 = 9,703 LBS > 2,395 LBS

USE SIMPSON MSTI48 STRAP @ SPLICE

CAPACITY : 5,070 LBS

ULTIMATE VALUES SHOWN