L2 ENGINEERS, LLC
17848 NE 198th Place
Woodinville, WA 98072

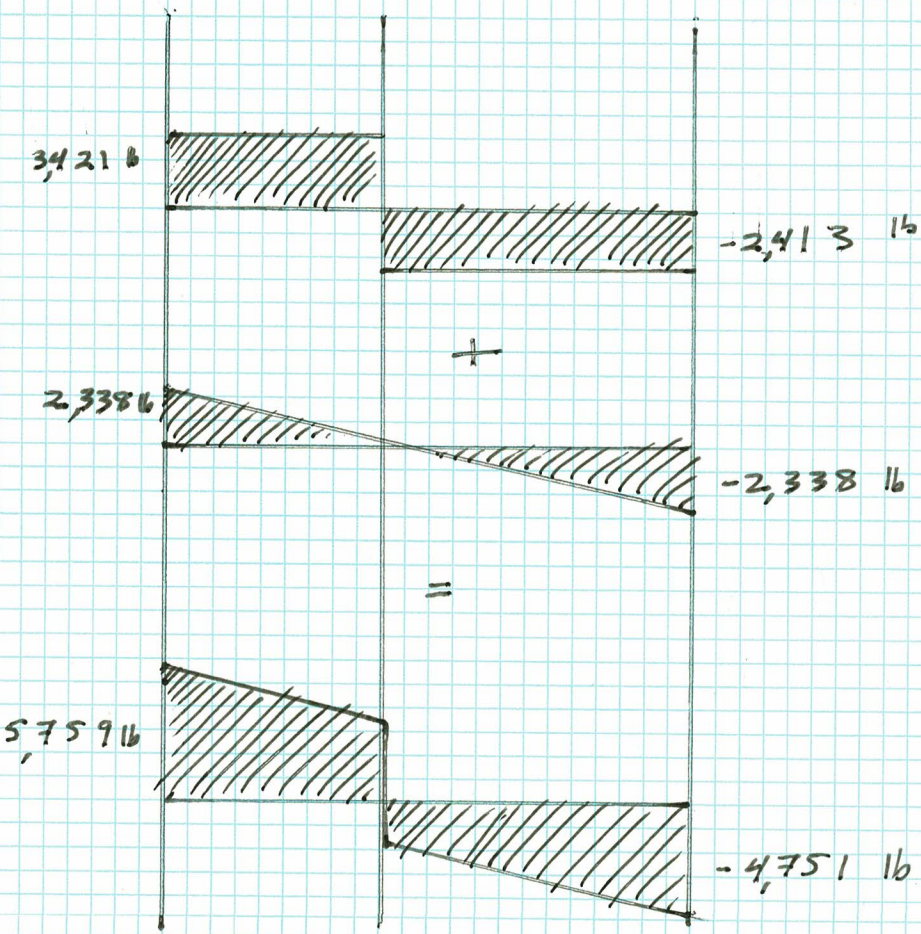
STRUCTURAL CALCULATIONS – COMMENT RESPONSE

Chen Residence
5024 Mercer Way
Mercer Island, WA 98040

Harvey Chen
Project # 20-084
June 13, 2022

06/13/2022

0.6



V_{max} = 5759 lb

V_{max} = 5759 / 31 = 185 plf

Use 15/32 w/ 10d @ 6" O.C. ASD capacity = 215 plf

∴ OK

Diaphragm checked Garage Front

CC Wind Loading

Clrs Story Studs

From Wind Load Calcs $q_z = 32.0$ psf

$p = q_z (G C_p) - q_i (G C_{pi})$ $q_z = q_i$ (30.6.2)

$= 32 (0.9 - (-0.9)) = 32(1.8) = 57.8$ psf

Ref ASCE Fig. 30.6-1

Calc Studs in Enveale

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: Chen.ec6

LIC# : KW-06016908, Build:20.22.5.16 — L2 Engineers —

DESCRIPTION: Clerestory Studs

Code References

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

General Information

Analysis Method	Allowable Stress Design
End Fixities	Top & Bottom Pinned
Overall Column Height	19.6 ft
(Used for non-slender calculations)	
Wood Species	iLevel Truss Joist
Wood Grade	TimberStrand LSL 1.3E - Beam/Co

Fb +	1700 psi	Fv	400 psi
Fb -	1700 psi	Ft	1075 psi
Fc - Prll	1400 psi	Density	45.01 pcf
Fc - Perp	680 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1300	1300	1300 ksi
Minimum	660.75	660.75	

Wood Section Name	**1.75x5.5**		
Wood Grading/Manuf.	Trus Joist		
Wood Member Type	TimberStrand LSL		
Exact Width	**1.750** in	Allow Stress Modification Factors	
Exact Depth	**5.50** in	Cf or Cv for Bending	1.0
Area	9.625 in^2	Cf or Cv for Compressio	1.0
Ix	24.263 in^4	Cf or Cv for Tension	1.0
Iy	2.456 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	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 : Unbraced Length for buckling ABOUT X-X Axis = 10 ft, k

Applied Loads

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

Column self weight included : 58.966 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 19.60 ft, D = 0.2650, S = 0.1750 k
BENDING LOADS . . .
Lat. Uniform Load creating Mx-x, W = 0.0580 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.8620 : 1**

Load Combination	+D+0.60W
Governing NDS Forumla	Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base	9.734 ft
At maximum location values are .	
Applied Axial	0.3240 k
Applied Mx	1.671 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,048.66 psi

PASS Maximum Shear Stress Ratio = **0.08305 : 1**

Load Combination	+D+0.60W
Location of max.above base	0.0 ft
Applied Design Shear	53.149 psi
Allowable Shear	640.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.5684 k	Bottom along Y-Y	0.5684 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 6.172 in at 9.866 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

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					0.324				
+D+S					0.499				
+D+0.750S					0.455				
+D+0.60W			0.341	0.341	0.324				
+D+0.450W			0.256	0.256	0.324				
+D+0.750S+0.450W			0.256	0.256	0.455				
+0.60D+0.60W			0.341	0.341	0.194				
+0.60D					0.194				
S Only					0.175				

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ximum Reactions

Note: Only non-zero reactions are listed.

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W Only				0.568	0.568					