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Structural Calculations

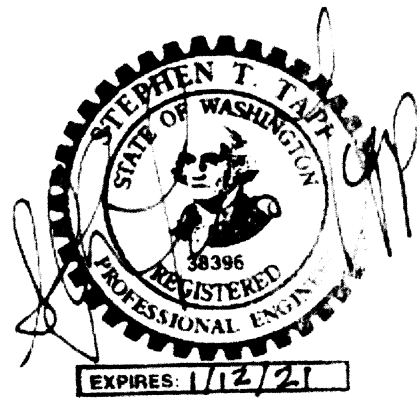
Full height studs at stairwell

for

New Residence

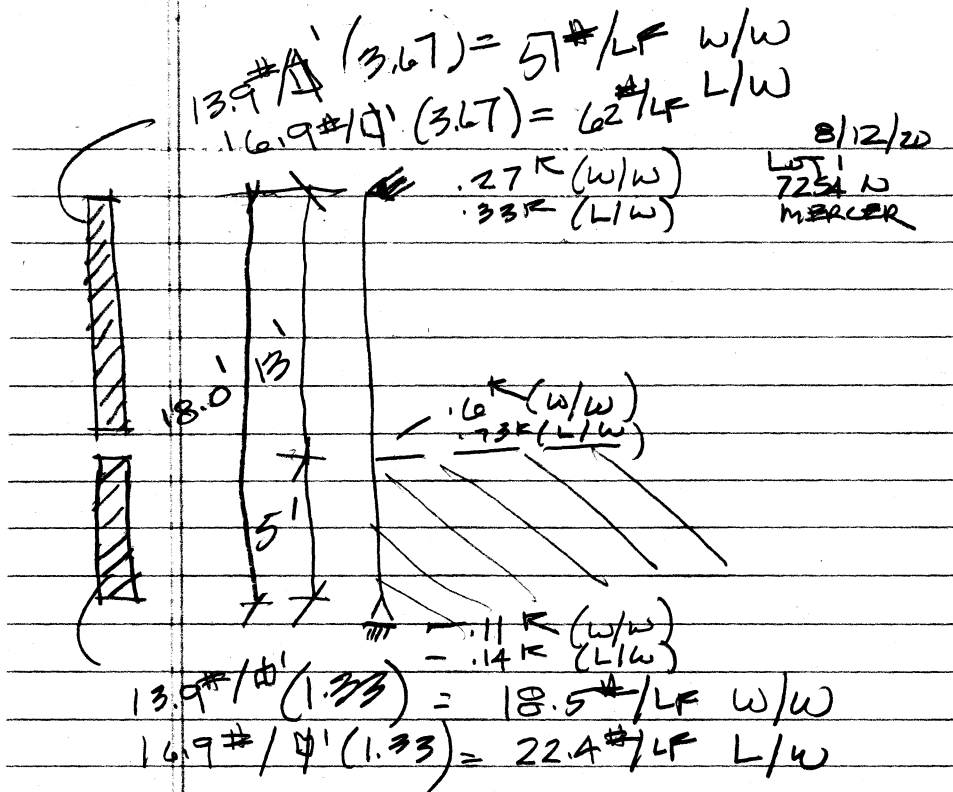
7254 North Mercer Way
Mercer Island, Washington

Date: July 2020
Project: T18I5
Building Code Reference: 2015 IBC



STEPHEN TAPP
ARCHITECT/P.E.
 2330 East Madison Street
 SEATTLE, WA 98112
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JOB 7254 N. MERCER WAY 2
 SHEET NO. _____ OF _____
 CALCULATED BY STT DATE 8/12/20
 CHECKED BY _____ DATE _____
 SCALE _____



DBL END STUDS

New Residence
 7254 North Mercer Way
 Mercer Island, Washington
 0
 0
 0

Project Title:
 Engineer: STT
 Project ID:
 Project Descr: New single family residence

Wood Beam

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Lic. #: KW-06011595

stephen tapp architect/pe

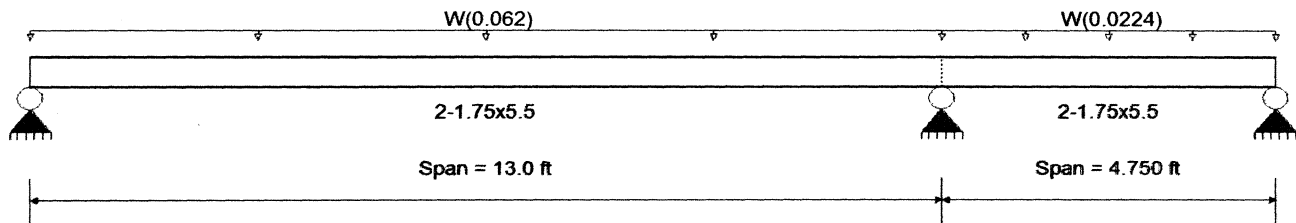
DESCRIPTIO 18' studs at stair well-

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : ASCE 7-05

Material Properties

Analysis Method	Allowable Stress Design	Fb +	2,600.0 psi	E : Modulus of Elasticity	
Load Combination	ASCE 7-05	Fb -	2,600.0 psi	Ebend- xx	1,900.0 ksi
Wood Species	Trus Joist	Fc - Prll	2,510.0 psi	Eminbend - x	965.71 ksi
Wood Grade	MicroLam LVL 1.9 E	Fc - Perp	750.0 psi		
		Fv	285.0 psi		
		Ft	1,555.0 psi	Density	42.010 pcf
Beam Bracing	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Load for Span Number 1
 Uniform Load : W = 0.0620 , Tributary Width = 1.0 ft
 Load for Span Number 2
 Uniform Load : W = 0.02240 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.160 : 1	Maximum Shear Stress Ratio	=	0.077 : 1
Section used for this span	=	2-1.75x5.5	Section used for this span	=	2-1.75x5.5
	=	663.83 psi		=	35.15 psi
	=	4,160.00 psi		=	456.00 psi
Load Combination	=	+D+W+H	Load Combination	=	+D+W+H
Location of maximum on span	=	13.000 ft	Location of maximum on span	=	12.564 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.244 in	Ratio =	638	>=360
Max Upward Transient Deflection		-0.024 in	Ratio =	2360	>=360
Max Downward Total Deflection		0.244 in	Ratio =	638	>=180
Max Upward Total Deflection		-0.024 in	Ratio =	2360	>=180

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios							Moment Values			Shear Values				
			M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	Fb	V	fv	Fv
D Only																	
	Length = 13.0 ft	1			0.90	1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
	Length = 4.750 ft	2			0.90	1.000	1.00	1.00	1.00	1.00	1.00		2340.00		0.00	0.00	256.50
+D+L+H																	
	Length = 13.0 ft	1			1.00	1.000	1.00	1.00	1.00	1.00	1.00		2600.00		0.00	0.00	285.00
	Length = 4.750 ft	2			1.00	1.000	1.00	1.00	1.00	1.00	1.00		2600.00		0.00	0.00	285.00
+D+Lr+H																	
	Length = 13.0 ft	1			1.25	1.000	1.00	1.00	1.00	1.00	1.00		3250.00		0.00	0.00	356.25
	Length = 4.750 ft	2			1.25	1.000	1.00	1.00	1.00	1.00	1.00		3250.00		0.00	0.00	356.25
+D+S+H																	
	Length = 13.0 ft	1			1.15	1.000	1.00	1.00	1.00	1.00	1.00		2990.00		0.00	0.00	327.75

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 0
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DESCRIPTIO 18' studs at stair well-

Load Combination	Segment Length	Span #	Max Stress Ratios							Moment Values			Shear Values					
			M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F _b	V	f _v	F _v	
Length = 4.750 ft	2				1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2990.00	0.00	0.00	327.75
+D+0.750Lr+0.750L+H						1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	
Length = 13.0 ft	1				1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3250.00	0.00	0.00	356.25	
Length = 4.750 ft	2				1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3250.00	0.00	0.00	356.25	
+D+0.750L+0.750S+H						1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	
Length = 13.0 ft	1				1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2990.00	0.00	0.00	327.75	
Length = 4.750 ft	2				1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2990.00	0.00	0.00	327.75	
+D+W+H						1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	
Length = 13.0 ft	1		0.160	0.077	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.98	663.83	4160.00	0.45	35.15	456.00
Length = 4.750 ft	2		0.160	0.077	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.98	663.83	4160.00	0.25	35.15	456.00
+D+0.70E+H						1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	
Length = 13.0 ft	1				1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4160.00	0.00	0.00	456.00	
Length = 4.750 ft	2				1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4160.00	0.00	0.00	456.00	
+D+0.750Lr+0.750L+0.750W-						1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	
Length = 13.0 ft	1		0.120	0.058	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.73	497.88	4160.00	0.34	26.36	456.00
Length = 4.750 ft	2		0.120	0.058	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.73	497.88	4160.00	0.19	26.36	456.00
+D+0.750L+0.750S+0.750W+						1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	
Length = 13.0 ft	1		0.120	0.058	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.73	497.88	4160.00	0.34	26.36	456.00
Length = 4.750 ft	2		0.120	0.058	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.73	497.88	4160.00	0.19	26.36	456.00
+D+0.750Lr+0.750L+0.5250E						1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	
Length = 13.0 ft	1				1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4160.00	0.00	0.00	456.00	
Length = 4.750 ft	2				1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4160.00	0.00	0.00	456.00	
+D+0.750L+0.750S+0.5250E-						1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	
Length = 13.0 ft	1				1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4160.00	0.00	0.00	456.00	
Length = 4.750 ft	2				1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4160.00	0.00	0.00	456.00	
+0.60D+W+H						1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	
Length = 13.0 ft	1		0.160	0.077	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.98	663.83	4160.00	0.45	35.15	456.00
Length = 4.750 ft	2		0.160	0.077	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.98	663.83	4160.00	0.25	35.15	456.00
+0.60D+0.70E+H						1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	
Length = 13.0 ft	1				1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4160.00	0.00	0.00	456.00	
Length = 4.750 ft	2				1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4160.00	0.00	0.00	456.00	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	0.2445	5.883		0.0000	0.000
	2	0.0000	5.883	W Only	-0.0241	1.964

Vertical Reactions

Support notation : Far left is #

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.328	0.737	-0.152
Overall MINimum	0.328	0.737	-0.152
+D+W+H	0.328	0.737	-0.152
+D+0.750Lr+0.750L+0.750W+H	0.246	0.553	-0.114
+D+0.750L+0.750S+0.750W+H	0.246	0.553	-0.114
+0.60D+W+H	0.328	0.737	-0.152
W Only	0.328	0.737	-0.152
H Only			