MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

7220 Trade Street, Suite 295, San Diego, CA 92121 ▸ p 619-650-0010 ▸ *mulhernkulp.com*

CALCULATION PACKAGE

December 6, 2023

JayMarc Homes

Su Residence
Mercer Island, WA

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

Prepared By:

Blake F. Durham, E.I.T. *Staff Engineer*

Richard J. Zabel, P.E. *Project Manager + Director of Engineering*

Signature, Seal & Date

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

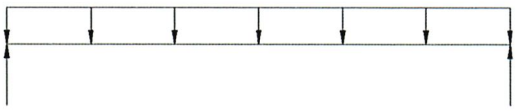
PROJECT NAME: SU RESIDENCE
JAYMARC HOMES
M&K PROJECT #: 154-23011
ENGINEER: BFD
DATE: 28-NOV-23

BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: TYP. HDR (WORST CASE LOAD) — B1

PARAMETERS:

L = 5 FT
W = 1.0 KLF
P = — K



ANALYSIS:

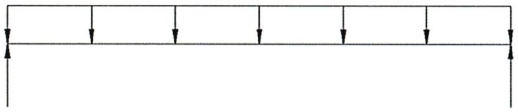
R_{MAX} =	2.5 K	V_D =	— K	< V_{ALL} =	4.5 K	✓ ADEQUATE
M_{MAX} =	3.1 K-FT	< M_{ALL} =	5.2 K-FT			✓ ADEQUATE
Δ_{TL} =	0.04 IN.	L/	999+	< L/240		✓ ADEQUATE

4X10 DF #2

BEAM DESCRIPTION: TYP. HDR (WORST CASE LENGTH) — B1

PARAMETERS:

L = 8 FT
W = 0.25 KLF
P = — K



ANALYSIS:

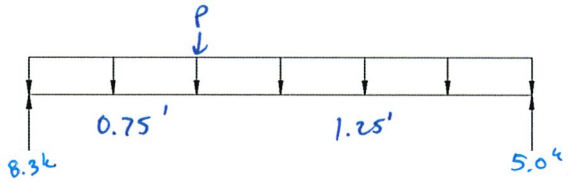
R_{MAX} =	1.0 K	V_D =	— K	< V_{ALL} =	4.5 K	✓ ADEQUATE
M_{MAX} =	2.0 K-FT	< M_{ALL} =	5.2 K-FT			✓ ADEQUATE
Δ_{TL} =	0.06 IN.	L/	999+	< L/240		✓ ADEQUATE

4X10 DF #2

BEAM DESCRIPTION: ROOF FRMG - HDR @ BATH 3 — B2

PARAMETERS:

L = 2 FT
W = 0.08 KLF
P = 13.1 K



ANALYSIS:

R_{MAX} =	8.3 K	V_D =	— K	< V_{ALL} =	10.1 K	✓ ADEQUATE
M_{MAX} =	6.2 K-FT	< M_{ALL} =	17.1 K-FT			✓ ADEQUATE
Δ_{TL} =	0.01 IN.	L/	999+	< L/240		✓ ADEQUATE

5 1/2" X 9 " GLB

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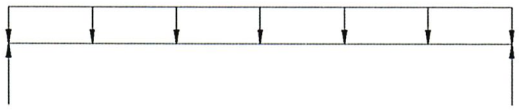
M&K PROJECT #: 154-23011
ENGINEER: BFD
DATE: 28-NOV-23

BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: ROOF FRMG - HDR @ PRIMARY BED (B3)

PARAMETERS:

L = 10 FT
W = 0.93 KLF
P = — K



ANALYSIS:

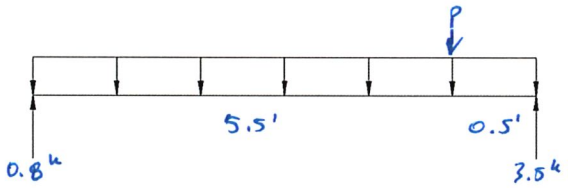
R_{MAX} =	4.7 K	V_D =	— K	< V_{ALL} =	11.7 K	✓	ADEQUATE
M_{MAX} =	11.6 K-FT	< M_{ALL} =	23.3 K-FT			✓	ADEQUATE
Δ_{TL} =	0.22 IN.	L/	549	< L/240		✓	ADEQUATE

5 1/2" x 10 1/2" GLB

BEAM DESCRIPTION: ROOF FRMG - HDR @ REJUVINATION (B4)

PARAMETERS:

L = 6 FT
W = 0.17 KLF
P = 3.3 K



ANALYSIS:

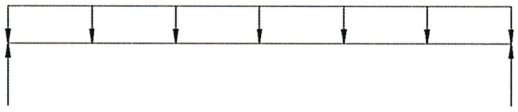
R_{MAX} =	3.5 K	V_D =	— K	< V_{ALL} =	4.5 K	✓	ADEQUATE
M_{MAX} =	1.8 K-FT	< M_{ALL} =	5.2 K-FT			✓	ADEQUATE
Δ_{TL} =	0.03 IN.	L/	999+	< L/240		✓	ADEQUATE

4x10 DF #2

BEAM DESCRIPTION: ROOF FRMG - DROPPED BM OUTSIDE BED 5 (WORST CASE) (B5)

PARAMETERS:

L = 13.5 FT
W = 0.11 KLF
P = — K



ANALYSIS:

R_{MAX} =	0.74 K	V_D =	— K	< V_{ALL} =	3.5 K	✓	ADEQUATE
M_{MAX} =	2.5 K-FT	< M_{ALL} =	3.4 K-FT			✓	ADEQUATE
Δ_{TL} =	0.46 IN.	L/	351	< L/240		✓	ADEQUATE

4x8 DF #2

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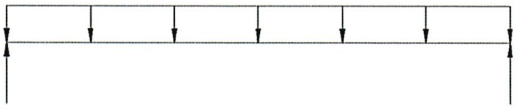
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLR FRMG - FLUSH BM @ GREAT ROOM

B6

PARAMETERS:

L = 18.5 FT
W = 0.09 KLF
P = – K



ANALYSIS:

R_{MAX} =	0.84 K	V_D =	– K	< V_{ALL} =	11.1 K	☑ ADEQUATE
M_{MAX} =	3.85 K-FT	< M_{ALL} =	37.8 K-FT			☑ ADEQUATE
Δ_{TL} =	0.08 IN.	L/	999+	< L/240		☑ ADEQUATE

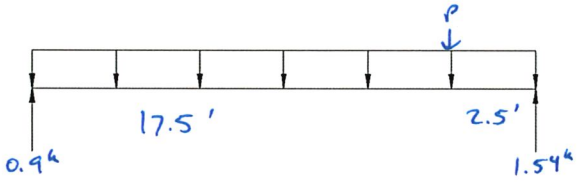
3½" x 18" GLB

BEAM DESCRIPTION: UPPER FLR FRMG - FLUSH BM @ GREAT ROOM TO STAIRS

B7

PARAMETERS:

L = 20 FT
W = 0.08 KLF
P = 0.84 K



ANALYSIS:

R_{MAX} =	1.54 K	V_D =	– K	< V_{ALL} =	11.1 K	☑ ADEQUATE
M_{MAX} =	5.06 K-FT	< M_{ALL} =	37.8 K-FT			☑ ADEQUATE
Δ_{TL} =	0.12 IN.	L/	999+	< L/240		☑ ADEQUATE

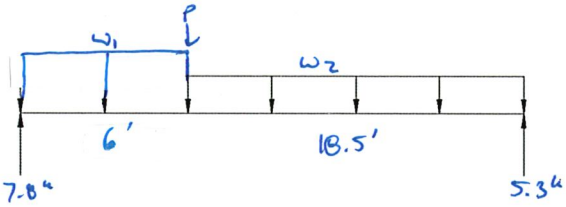
3½" x 18" GLB

BEAM DESCRIPTION: UPPER FLR FRMG - FLUSH BM @ KITCHEN TO GREAT ROOM

B8

PARAMETERS:

L = 24.5 FT
W_1 = 0.83 KLF, W_2 = 0.39 klf
P = 0.9 K



ANALYSIS:

R_{MAX} =	7.8 K	V_D =	– K	< V_{ALL} =	70.2/70.5 K	☑ ADEQUATE
M_{MAX} =	36.4 K-FT	< M_{ALL} =	142/110 K-FT			☑ ADEQUATE
Δ_{TL} =	0.43/0.44 IN.	L/	683/670	< L/240		☑ ADEQUATE

W12x40 / W16x26

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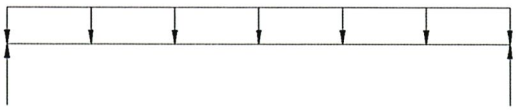
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLR FRMG - SGD HDR @ GREAT ROOM

B9

PARAMETERS:

L = 15 FT
W = 1.1 KLF
P = — K



ANALYSIS:

R_{MAX} =	8.3 K	V_D =	— K	< V_{ALL} =	32.8 K	✓ ADEQUATE
M_{MAX} =	30.9 K-FT	< M_{ALL} =	139.9 K-FT			✓ ADEQUATE
Δ_{TL} =	0.11 IN.	L/	999+	< L/240		✓ ADEQUATE

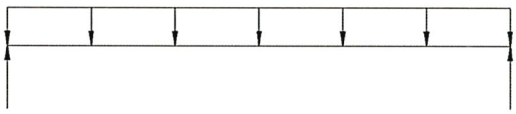
6 3/4" x 24" GLB

BEAM DESCRIPTION: UPPER FLR FRMG - FLUSH BM @ NOOK

B10

PARAMETERS:

L = 12.25 FT
W = 1.1 KLF
P = — K



ANALYSIS:

R_{MAX} =	6.7 K	V_D =	— K	< V_{ALL} =	20.1 K	✓ ADEQUATE
M_{MAX} =	20.6 K-FT	< M_{ALL} =	68.3 K-FT			✓ ADEQUATE
Δ_{TL} =	0.12 IN.	L/	999+	< L/240		✓ ADEQUATE

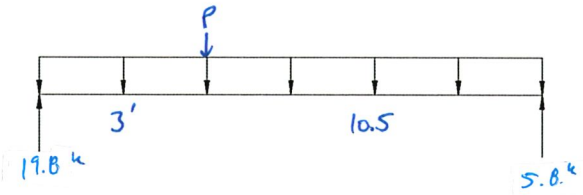
5 1/2" x 18" GLB

BEAM DESCRIPTION: UPPER FLR FRMG - FLUSH BM @ FOYER / POWDER

B11

PARAMETERS:

L = 13.5 FT
W = 0.09 KLF
P = 25.2 K



ANALYSIS:

R_{MAX} =	19.8 K	V_D =	— K	< V_{ALL} =	24.7 K	✓ ADEQUATE
M_{MAX} =	59.2 K-FT	< M_{ALL} =	81.9 K-FT			✓ ADEQUATE
Δ_{TL} =	0.25 IN.	L/	660	< L/240		✓ ADEQUATE

6 3/4" x 18" GLB

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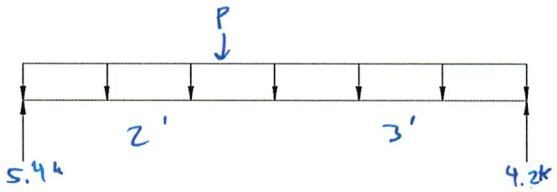
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLR FRMG- HDR @ FOYER / STUDY

B12

PARAMETERS:

L = 5 FT
W = 0.60 KLF
P = 6.2 K



ANALYSIS:

R_{MAX} =	5.4 K	V_D =	– K	< V_{ALL} =	10.1 K	✓ ADEQUATE
M_{MAX} =	9.5 K-FT	< M_{ALL} =	17.1 K-FT			✓ ADEQUATE
Δ_{TL} =	0.06 IN.	L/	950	< L/240		✓ ADEQUATE

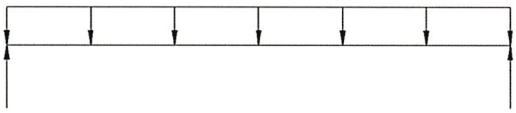
5½" x 9" GLB

BEAM DESCRIPTION: UPPER FLR FRMG- DROPPED BM @ DINING

B13

PARAMETERS:

L = 10 FT
W = 0.63 KLF
P = – K



ANALYSIS:

R_{MAX} =	3.15 K	V_D =	– K	< V_{ALL} =	7.2 K	✓ ADEQUATE
M_{MAX} =	7.9 K-FT	< M_{ALL} =	8.8 K-FT			✓ ADEQUATE
Δ_{TL} =	0.15 IN.	L/	767	< L/240		✓ ADEQUATE

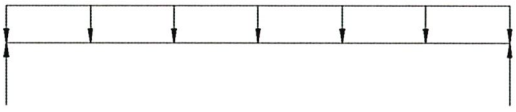
6x12 DF #2

BEAM DESCRIPTION: UPPER FLR FRMG- DROPPED BM @ COVERED PATIO

B14

PARAMETERS:

L = 17.5 FT
W = 0.44 KLF
P = – K



ANALYSIS:

R_{MAX} =	3.9 K	V_D =	– K	< V_{ALL} =	13.4 K	✓ ADEQUATE
M_{MAX} =	16.8 K-FT	< M_{ALL} =	30.4 K-FT			✓ ADEQUATE
Δ_{TL} =	0.65 IN.	L/	323	< L/240		✓ ADEQUATE

5½" x 12" GLB

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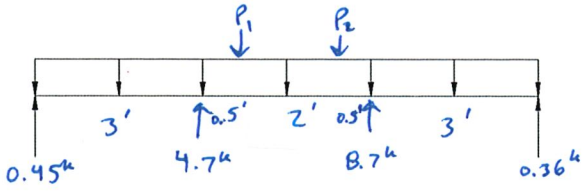
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLR FRMG CONT. HDR @ STUDY

B15

PARAMETERS:

L = 9 FT
W = 0.42 KLF
P_1 = 1.2 K, P_2 = 8.4K



ANALYSIS:

R_{MAX} =	8.7 K	V_D =	6.1 K	< V_{ALL} =	10.1 K	☑ ADEQUATE
M_{MAX} =	3.1 K-FT	< M_{ALL} =	17.1 K-FT			☑ ADEQUATE
Δ_{TL} =	0.01 IN.	L/	999+	< L/240		☑ ADEQUATE

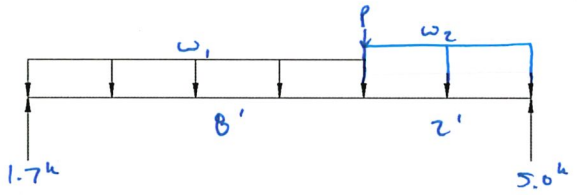
5½" x 9" GLB

BEAM DESCRIPTION: UPPER FLR FRMG - FLUSH BM @ GARAGE UNDER W/C

B16

PARAMETERS:

L = 10 FT
W_1 = 0.17 KLF, W_2 = 1.0 KLF
P = 3.3 K



ANALYSIS:

R_{MAX} =	5.0 K	V_D =	- K	< V_{ALL} =	20.1 K	☑ ADEQUATE
M_{MAX} =	8.0 K-FT	< M_{ALL} =	68.3 K-FT			☑ ADEQUATE
Δ_{TL} =	0.03 IN.	L/	999+	< L/240		☑ ADEQUATE

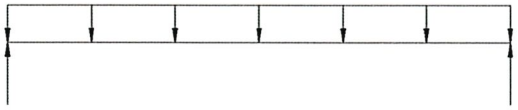
5½" x 18" GLB

BEAM DESCRIPTION: UPPER FLR FRMG - FLUSH BM @ GARAGE UNDER BED 3 SIDE WALL

B17

PARAMETERS:

L = 5 FT
W = 0.6 KLF
P = - K



ANALYSIS:

R_{MAX} =	1.5 K	V_D =	- K	< V_{ALL} =	12.8 K	☑ ADEQUATE
M_{MAX} =	1.9 K-FT	< M_{ALL} =	43.5 K-FT			☑ ADEQUATE
Δ_{TL} =	0.01 IN.	L/	999+	< L/240		☑ ADEQUATE

3½" x 18" GLB

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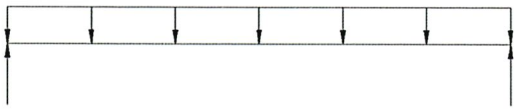
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLR FRMG – FLUSH BM @ GARAGE UNDER BED 3 FRONT WALL (B18)

PARAMETERS:

L = 20 FT
W = KLF
P = K

SEE ENERCALC OUTPUT



ANALYSIS:

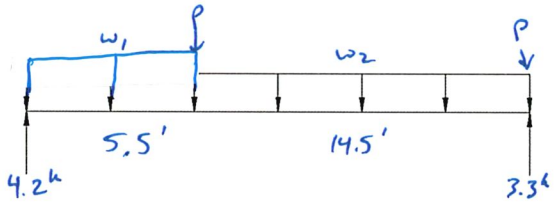
R_{MAX} =	K	V_D = – K	< V_{ALL} =	K	☑	ADEQUATE
M_{MAX} =	K-FT	< M_{ALL} =	K-FT		☑	ADEQUATE
Δ_{TL} =	IN.	L/	< L/240		☑	ADEQUATE

5½"x18" GLB

BEAM DESCRIPTION: UPPER FLR FRMG- FLUSH BM @ GARAGE UNDER BATH 3/BED 3 (B19)

PARAMETERS:

L = 20 FT
W_1 = 0.34 KLF, w_2 = 0.05 klf
P = 1.6 K



ANALYSIS:

R_{MAX} = 4.2	K	V_D = – K	< V_{ALL} = 12.8	K	☑	ADEQUATE
M_{MAX} = 17.6	K-FT	< M_{ALL} = 43.5	K-FT		☑	ADEQUATE
Δ_{TL} = 0.35	IN.	L/ 689	< L/240		☑	ADEQUATE

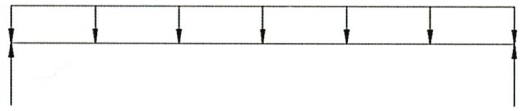
3½"x18" GLB

BEAM DESCRIPTION: UPPER FLR FRMG- DROPPED BM @ GARAGE (B20)

PARAMETERS:

L = 24 FT
W = KLF
P = K

SEE ENERCALC OUTPUT



ANALYSIS:

R_{MAX} =	K	V_D = K	< V_{ALL} =	K	☑	ADEQUATE
M_{MAX} =	K-FT	< M_{ALL} =	K-FT		☑	ADEQUATE
Δ_{TL} =	IN.	L/	< L/240		☑	ADEQUATE

6¾" x30" GLB

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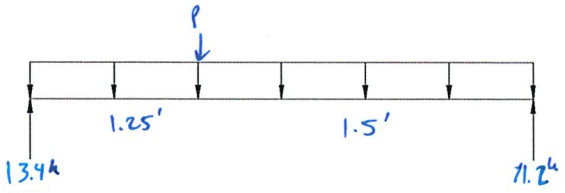
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLR FRMG - INT. HDR @ GARAGE

B21

PARAMETERS:

L = 2.75 FT
W = 0.07 KLF
P = 24.4 K



ANALYSIS:

R_{MAX} =	13.4 K	V_D =	— K	< V_{ALL} =	23.5 K	✓ ADEQUATE
M_{MAX} =	16.3 K-FT	< M_{ALL} =	93.0 K-FT			✓ ADEQUATE
Δ_{TL} =	0.01 IN.	L/	999+	< L/240		✓ ADEQUATE

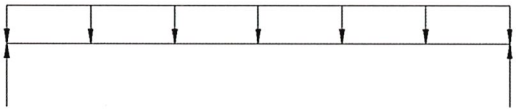
5½" x 21" GLB

BEAM DESCRIPTION: UPPER FLR FRMG - KNEE WALL BM @ PORCH

B22

PARAMETERS:

L = 7 FT
W = 0.90 KLF
P = — K



ANALYSIS:

R_{MAX} =	1.7 K	V_D =	— K	< V_{ALL} =	20.1 K	✓ ADEQUATE
M_{MAX} =	2.9 K-FT	< M_{ALL} =	68.3 K-FT			✓ ADEQUATE
Δ_{TL} =	0.01 IN.	L/	999+	< L/240		✓ ADEQUATE

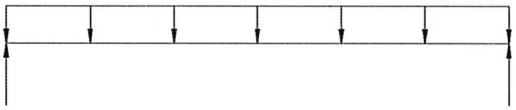
5½" x 18" GLB

BEAM DESCRIPTION: UPPER FLR FRMG - 16' GARAGE DOOR HDR

B23

PARAMETERS:

L = 16 FT
W = 0.13 KLF
P = — K



ANALYSIS:

R_{MAX} =	1.0 K	V_D =	— K	< V_{ALL} =	5.4 K	✓ ADEQUATE
M_{MAX} =	4.2 K-FT	< M_{ALL} =	7.0 K-FT			✓ ADEQUATE
Δ_{TL} =	0.29 IN.	L/	659	< L/240		✓ ADEQUATE

4x12 DF #2

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

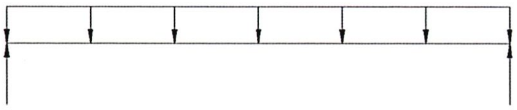
PROJECT NAME: SU RESIDENCE
JAYMARC HOMES
M&K PROJECT #: 154-23011
ENGINEER: BFD
DATE: 28-NOV-23

BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLR FRMG- TYP. DROPPED BM @ PORCH (WORST CASE) B24

PARAMETERS:

L = 15 FT
W = 0.25 KLF
P = – K



ANALYSIS:

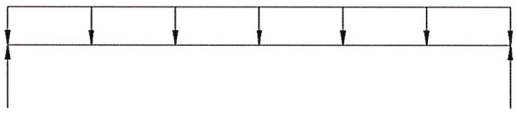
R_{MAX} = 1.9 K V_D = – K < V_{ALL} = 5.4 K ☑ ADEQUATE
M_{MAX} = 7.0 K-FT < M_{ALL} = 7.0 K-FT ☑ ADEQUATE
Δ_{TL} = 0.43 IN. L/ 422 < L/240 ☑ ADEQUATE

4x12 DF#2

BEAM DESCRIPTION: MAIN FLR FRMG- TYP. DROPPED BM (WORST CASE) B25

PARAMETERS:

L = 7 FT
W = 0.58 KLF
P = – K



ANALYSIS:

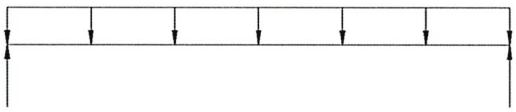
R_{MAX} = 2.0 K V_D = – K < V_{ALL} = 3.9 K ☑ ADEQUATE
M_{MAX} = 3.6 K-FT < M_{ALL} = 4.5 K-FT ☑ ADEQUATE
Δ_{TL} = 0.09 IN. L/ 977 < L/240 ☑ ADEQUATE

4x10 DF #2

BEAM DESCRIPTION: MAIN FLR FRMG- TYP. DROPPED BM UNDER B.W.A. (WORST CASE) B26

PARAMETERS:

L = 4 FT
W = 1.4 KLF
P = – K



ANALYSIS:

R_{MAX} = 2.8 K V_D = – K < V_{ALL} = 3.9 K ☑ ADEQUATE
M_{MAX} = 2.8 K-FT < M_{ALL} = 4.5 K-FT ☑ ADEQUATE
Δ_{TL} = 0.02 IN. L/ 999+ < L/240 ☑ ADEQUATE

4x10 DF #2

Wood Beam

Project File: Su Residence.ec6

DESCRIPTION: B18

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

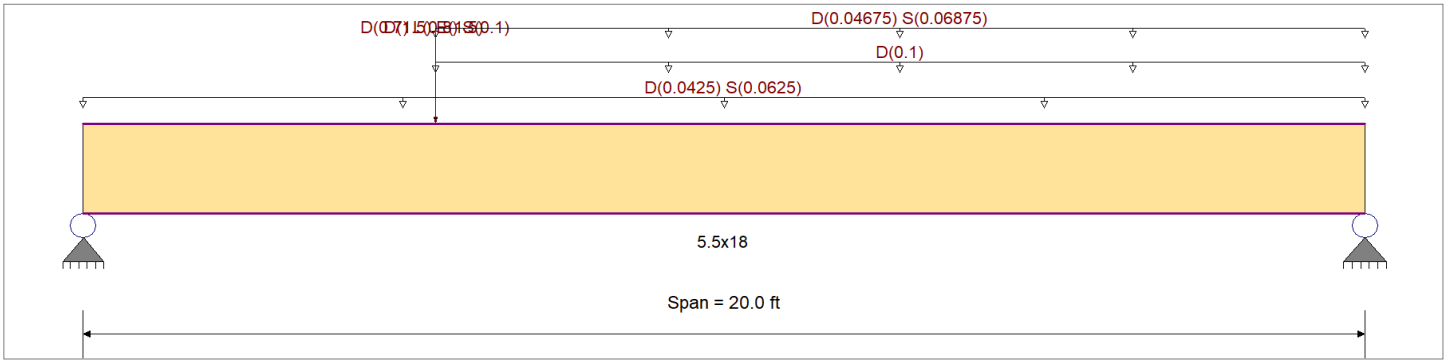
Wood Species : DF/DF
Wood Grade : 24F - V4

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

Fb +	2,880.0 psi
Fb -	2,220.0 psi
Fc - Prll	1,980.0 psi
Fc - Perp	780.0 psi
Fv	318.0 psi
Ft	1,320.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0170, S = 0.0250 ksf, Tributary Width = 2.50 ft, (low roof)
Uniform Load : D = 0.10 k/ft, Extent = 5.50 -->> 20.0 ft, Tributary Width = 1.0 ft, (wall)
Uniform Load : D = 0.0170, S = 0.0250 ksf, Extent = 5.50 -->> 20.0 ft, Tributary Width = 2.750 ft, (high roof)
Point Load : D = 0.70, L = 0.80, S = 0.10 k @ 5.50 ft, (B17)
Point Load : D = 1.50, E = 1.50 k @ 5.50 ft, (OS)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.287 : 1	Maximum Shear Stress Ratio	=	0.169 : 1
Section used for this span		5.5x18	Section used for this span		5.5x18
fb: Actual	=	910.20 psi	fv: Actual	=	61.72 psi
F'b	=	3,173.46 psi	F'v	=	365.70 psi
Load Combination		+D+0.750L+0.750S+H	Load Combination		+D+0.750L+0.750S+H
Location of maximum on span	=	7.956 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	0.094 in	Ratio =	2544	>=360	Span: 1 : S Only
Max Upward Transient Deflection	-0.068 in	Ratio =	3528	>=360	Span: 1 : E Only * -1.0
Max Downward Total Deflection	0.371 in	Ratio =	646	>=300	Span: 1 : +D+0.750L+0.750S+0.5250E+H
Max Upward Total Deflection	0 in	Ratio =	0	<300	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H														0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.261	0.154	0.90	1.00	1.00	1.00	0.958	1.00	1.00	1.00	16.05	648.7	2,483.6	2.91	44.1	286.2
+D+L+H					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.277	0.166	1.00	1.00	1.00	1.00	0.958	1.00	1.00	1.00	18.89	763.0	2,759.5	3.49	52.9	318.0
+D+Lr+H					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.188	0.111	1.25	1.00	1.00	1.00	0.958	1.00	1.00	1.00	16.05	648.7	3,449.4	2.91	44.1	397.5
+D+S+H					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0

DESCRIPTION: B18

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 20.0 ft	1	0.282	0.161	1.15	1.00	1.00	1.00	0.958	1.00	1.00	1.00	22.12	893.6	3,173.5	3.88	58.8	365.7
+D+0.750Lr+0.750L+H					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.213	0.128	1.25	1.00	1.00	1.00	0.958	1.00	1.00	1.00	18.16	733.6	3,449.4	3.35	50.7	397.5
+D+0.750L+0.750S+H					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.287	0.169	1.15	1.00	1.00	1.00	0.958	1.00	1.00	1.00	22.53	910.2	3,173.5	4.07	61.7	365.7
+D+0.60W+H					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.147	0.087	1.60	1.00	1.00	1.00	0.958	1.00	1.00	1.00	16.05	648.7	4,415.3	2.91	44.1	508.8
+D-0.60W+H					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.147	0.087	1.60	1.00	1.00	1.00	0.958	1.00	1.00	1.00	16.05	648.7	4,415.3	2.91	44.1	508.8
+D+0.750Lr+0.750L+0.450W-					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.166	0.100	1.60	1.00	1.00	1.00	0.958	1.00	1.00	1.00	18.16	733.6	4,415.3	3.35	50.7	508.8
+D+0.750Lr+0.750L-0.450W+					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.166	0.100	1.60	1.00	1.00	1.00	0.958	1.00	1.00	1.00	18.16	733.6	4,415.3	3.35	50.7	508.8
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.206	0.121	1.60	1.00	1.00	1.00	0.958	1.00	1.00	1.00	22.53	910.2	4,415.3	4.07	61.7	508.8
+D+0.750L+0.750S-0.450W+					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.206	0.121	1.60	1.00	1.00	1.00	0.958	1.00	1.00	1.00	22.53	910.2	4,415.3	4.07	61.7	508.8
+0.60D+0.60W+0.60H					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.088	0.052	1.60	1.00	1.00	1.00	0.958	1.00	1.00	1.00	9.63	389.2	4,415.3	1.75	26.5	508.8
+0.60D-0.60W+0.60H					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.088	0.052	1.60	1.00	1.00	1.00	0.958	1.00	1.00	1.00	9.63	389.2	4,415.3	1.75	26.5	508.8
+D+0.70E+0.60H					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.181	0.109	1.60	1.00	1.00	1.00	0.958	1.00	1.00	1.00	19.82	800.7	4,415.3	3.67	55.7	508.8
+D-0.70E+0.60H					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.116	0.064	1.60	1.00	1.00	1.00	0.958	1.00	1.00	1.00	12.69	512.6	4,415.3	2.15	32.6	508.8
+D+0.750L+0.750S+0.5250E-					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.231	0.138	1.60	1.00	1.00	1.00	0.958	1.00	1.00	1.00	25.22	1,018.9	4,415.3	4.64	70.4	508.8
+D+0.750L+0.750S-0.5250E+					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.183	0.104	1.60	1.00	1.00	1.00	0.958	1.00	1.00	1.00	19.99	807.6	4,415.3	3.50	53.1	508.8
+0.60D+0.70E+H					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.124	0.075	1.60	1.00	1.00	1.00	0.958	1.00	1.00	1.00	13.53	546.5	4,415.3	2.51	38.0	508.8
+0.60D-0.70E+H					1.00	1.00	1.00	0.958	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.059	0.032	1.60	1.00	1.00	1.00	0.958	1.00	1.00	1.00	6.40	258.5	4,415.3	1.09	16.5	508.8

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.5250E+H	1	0.3713	9.635		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	4.806	3.949
Max Upward from Load Combinations	4.806	3.949
Max Upward from Load Cases	3.006	2.601
Max Downward from all Load Conditio	-1.088	-0.413
Max Downward from Load Cases (Resis	-1.088	-0.413
+D+H	3.006	2.601
+D+L+H	3.586	2.821
+D+Lr+H	3.006	2.601
+D+S+H	4.065	3.889
+D+0.750Lr+0.750L+H	3.441	2.766
+D+0.750L+0.750S+H	4.235	3.732

DESCRIPTION: B18

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
+D+0.60W+H	3.006	2.601
+D-0.60W+H	3.006	2.601
+D+0.750Lr+0.750L+0.450W+H	3.441	2.766
+D+0.750Lr+0.750L-0.450W+H	3.441	2.766
+D+0.750L+0.750S+0.450W+H	4.235	3.732
+D+0.750L+0.750S-0.450W+H	4.235	3.732
+0.60D+0.60W+0.60H	1.804	1.561
+0.60D-0.60W+0.60H	1.804	1.561
+D+0.70E+0.60H	3.767	2.890
+D-0.70E+0.60H	2.245	2.312
+D+0.750L+0.750S+0.5250E+H	4.806	3.949
+D+0.750L+0.750S-0.5250E+H	3.664	3.516
+0.60D+0.70E+H	2.565	1.849
+0.60D-0.70E+H	1.042	1.272
D Only	3.006	2.601
L Only	0.580	0.220
S Only	1.059	1.288
E Only	1.088	0.413
E Only * -1.0	-1.088	-0.413
H Only		

Wood Beam

Project File: Su Residence.ec6

DESCRIPTION: B20

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

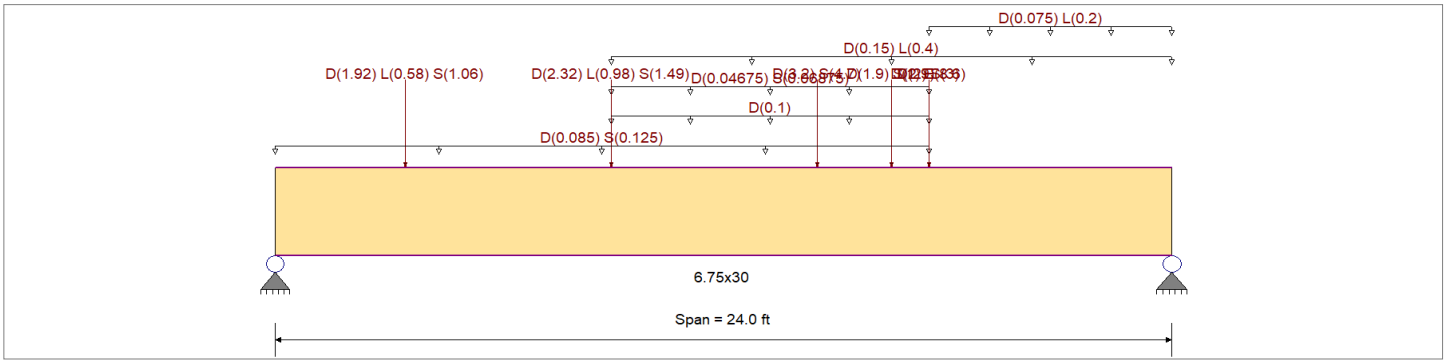
Wood Species : DF/DF
Wood Grade : 24F - V4

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

Fb +	2,880.0 psi
Fb -	2,220.0 psi
Fc - Prll	1,980.0 psi
Fc - Perp	780.0 psi
Fv	318.0 psi
Ft	1,320.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.0170, S = 0.0250 ksf, Extent = 0.0 -->> 17.50 ft, Tributary Width = 5.0 ft, (low roof)
Uniform Load : D = 0.10 k/ft, Extent = 9.0 -->> 17.50 ft, Tributary Width = 1.0 ft, (wall)
Uniform Load : D = 0.0170, S = 0.0250 ksf, Extent = 9.0 -->> 17.50 ft, Tributary Width = 2.750 ft, (high roof)
Point Load : D = 1.920, L = 0.580, S = 1.060 k @ 3.50 ft, (B18)
Point Load : D = 2.320, L = 0.980, S = 1.490 k @ 9.0 ft, (B19)
Point Load : D = 2.0, S = 3.0 k @ 17.50 ft, (B16)
Point Load : D = 3.20, S = 4.70 k @ 14.50 ft, (p.a.)
Point Load : D = 1.90, S = 2.90 k @ 16.50 ft, (p.a.)
Uniform Load : D = 0.0150, L = 0.040 ksf, Extent = 9.0 -->> 24.0 ft, Tributary Width = 10.0 ft, (floor)
Uniform Load : D = 0.0150, L = 0.040 ksf, Extent = 17.50 -->> 24.0 ft, Tributary Width = 5.0 ft, (floor)
Point Load : D = 1.0, E = 8.60 k @ 17.50 ft, (OS)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.590 : 1	Maximum Shear Stress Ratio	=	0.394 : 1
Section used for this span		6.75x30	Section used for this span		6.75x30
fb: Actual	=	1,712.13 psi	fv: Actual	=	144.12 psi
F'b	=	2,900.92 psi	F'v	=	365.70 psi
Load Combination		+D+0.750L+0.750S+H	Load Combination		+D+0.750L+0.750S+H
Location of maximum on span	=	14.453 ft	Location of maximum on span	=	21.547 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.237 in	Ratio =	1217 >=360	Span: 1 : S Only
Max Upward Transient Deflection	-0.117 in	Ratio =	2460 >=360	Span: 1 : E Only * -1.0
Max Downward Total Deflection	0.581 in	Ratio =	495 >=300	Span: 1 : +D+0.750L+0.750S+0.5250E+H
Max Upward Total Deflection	0 in	Ratio =	0 <300	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
+D+H														0.0	0.00	0.0	0.0

Wood Beam

Project File: Su Residence.ec6

DESCRIPTION: B20

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 24.0 ft	1	0.377	0.250	0.90	1.00	1.00	1.00	0.876	1.00	1.00	1.00	72.20	855.7	2,270.3	9.64	71.4	286.2
+D+L+H					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.471	0.323	1.00	1.00	1.00	1.00	0.876	1.00	1.00	1.00	100.21	1,187.7	2,522.5	13.87	102.8	318.0
+D+Lr+H					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.271	0.180	1.25	1.00	1.00	1.00	0.876	1.00	1.00	1.00	72.20	855.7	3,153.2	9.64	71.4	397.5
+D+S+H					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.574	0.375	1.15	1.00	1.00	1.00	0.876	1.00	1.00	1.00	140.53	1,665.6	2,900.9	18.50	137.0	365.7
+D+0.750Lr+0.750L+H					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.350	0.239	1.25	1.00	1.00	1.00	0.876	1.00	1.00	1.00	93.21	1,104.7	3,153.2	12.82	94.9	397.5
+D+0.750L+0.750S+H					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.590	0.394	1.15	1.00	1.00	1.00	0.876	1.00	1.00	1.00	144.46	1,712.1	2,900.9	19.46	144.1	365.7
+D+0.60W+H					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.212	0.140	1.60	1.00	1.00	1.00	0.876	1.00	1.00	1.00	72.20	855.7	4,036.1	9.64	71.4	508.8
+D-0.60W+H					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.212	0.140	1.60	1.00	1.00	1.00	0.876	1.00	1.00	1.00	72.20	855.7	4,036.1	9.64	71.4	508.8
+D+0.750Lr+0.750L+0.450W+					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.274	0.187	1.60	1.00	1.00	1.00	0.876	1.00	1.00	1.00	93.21	1,104.7	4,036.1	12.82	94.9	508.8
+D+0.750Lr+0.750L-0.450W+I					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.274	0.187	1.60	1.00	1.00	1.00	0.876	1.00	1.00	1.00	93.21	1,104.7	4,036.1	12.82	94.9	508.8
+D+0.750L+0.750S+0.450W+I					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.424	0.283	1.60	1.00	1.00	1.00	0.876	1.00	1.00	1.00	144.46	1,712.1	4,036.1	19.46	144.1	508.8
+D+0.750L+0.750S-0.450W+I					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.424	0.283	1.60	1.00	1.00	1.00	0.876	1.00	1.00	1.00	144.46	1,712.1	4,036.1	19.46	144.1	508.8
+0.60D+0.60W+0.60H					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.127	0.084	1.60	1.00	1.00	1.00	0.876	1.00	1.00	1.00	43.32	513.4	4,036.1	5.79	42.9	508.8
+0.60D-0.60W+0.60H					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.127	0.084	1.60	1.00	1.00	1.00	0.876	1.00	1.00	1.00	43.32	513.4	4,036.1	5.79	42.9	508.8
+D+0.70E+0.60H					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.281	0.204	1.60	1.00	1.00	1.00	0.876	1.00	1.00	1.00	95.85	1,136.0	4,036.1	14.03	103.9	508.8
+D-0.70E+0.60H					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.145	0.104	1.60	1.00	1.00	1.00	0.876	1.00	1.00	1.00	49.37	585.1	4,036.1	7.16	53.0	508.8
+D+0.750L+0.750S+0.5250E+					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.476	0.331	1.60	1.00	1.00	1.00	0.876	1.00	1.00	1.00	162.16	1,921.9	4,036.1	22.75	168.5	508.8
+D+0.750L+0.750S-0.5250E+I					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.372	0.235	1.60	1.00	1.00	1.00	0.876	1.00	1.00	1.00	126.79	1,502.7	4,036.1	16.16	119.7	508.8
+0.60D+0.70E+H					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.197	0.148	1.60	1.00	1.00	1.00	0.876	1.00	1.00	1.00	67.07	794.9	4,036.1	10.18	75.4	508.8
+0.60D-0.70E+H					1.00	1.00	1.00	0.876	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 24.0 ft	1	0.065	0.072	1.60	1.00	1.00	1.00	0.876	1.00	1.00	1.00	22.24	263.5	4,036.1	4.95	36.6	508.8

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.5250E+H	1	0.5807	12.526		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	17.455	24.512
Max Upward from Load Combinations	17.455	24.512
Max Upward from Load Cases	8.563	10.303
Max Downward from all Load Conditio	-2.329	-6.271

DESCRIPTION: B20

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Downward from Load Cases (Resis	-2.329	-6.271
+D+H	8.563	10.303
+D+L+H	11.722	16.004
+D+Lr+H	8.563	10.303
+D+S+H	15.630	19.157
+D+0.750Lr+0.750L+H	10.932	14.579
+D+0.750L+0.750S+H	16.233	21.220
+D+0.60W+H	8.563	10.303
+D-0.60W+H	8.563	10.303
+D+0.750Lr+0.750L+0.450W+H	10.932	14.579
+D+0.750Lr+0.750L-0.450W+H	10.932	14.579
+D+0.750L+0.750S+0.450W+H	16.233	21.220
+D+0.750L+0.750S-0.450W+H	16.233	21.220
+0.60D+0.60W+0.60H	5.138	6.182
+0.60D-0.60W+0.60H	5.138	6.182
+D+0.70E+0.60H	10.193	14.693
+D-0.70E+0.60H	6.932	5.914
+D+0.750L+0.750S+0.5250E+H	17.455	24.512
+D+0.750L+0.750S-0.5250E+H	15.010	17.927
+0.60D+0.70E+H	6.768	10.571
+0.60D-0.70E+H	3.507	1.792
D Only	8.563	10.303
L Only	3.159	5.701
S Only	7.068	8.854
E Only	2.329	6.271
E Only * -1.0	-2.329	-6.271
H Only		

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING
7220 Trade Street, Suite 295, San Diego, CA 92121 ▸ p 619-650-0010 ▸ *mulhernkulp.com*

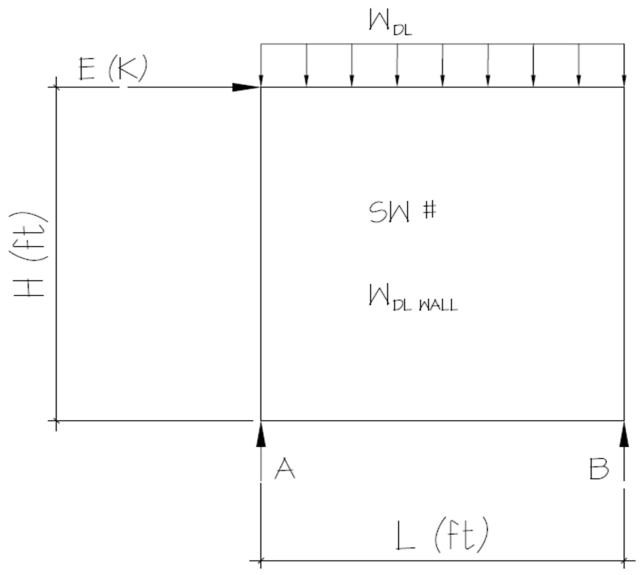
Project Name: JayMarc Homes
Su Residence
M&K Project #: 154-23011
Engineer: BFD
Date: 29-Nov-23

Overstrength Calculations

Wall Description/SW #: 206

Parameters:

L =	14.9	ft
H =	9.1	ft
E =	0.50	k
W_{DLWall} =	0.10	klf
W_{DL} =	0.102	klf
Ω_0 =	2.5	(ASCE TABLE 12.2.1 FOOTNOTE
SDS =	1.115	



analysis:

E (unfactored) = 0.71

$E_{mh} = \Omega 0 * E$ = 1.79 K

$E_v = 0.2*SDS*DL$ = 0.672 K

$E_m = E_{mh} + E_v$

$E_m = E_{mh} - E_v$

$E_m = E_{mh} + E_v$ = 2.458 K

$E_m = E_{mh} - E_v$ = 1.114 K

E_m (max) = $\sum M_A = 0$ = 2.46(9.1) + 0.202(14.92)(7.46) - Rb(14.92)

R_B = 1.5DL + 1.5E

Ra = 1.5DL - 1.5E

E_m (min) = $\sum M_A = 0$ = 1.11(9.1) + 0.202(14.92)(7.46) - Rb(14.92)

R_B = 1.5DL + 0.7E

Ra = 1.5DL - 0.7E

check beams for axial forces shown using load combos per section 12.4.3.1 (asd)

allowable stess permitted to be increased by 1.2

see following beam calcs for load application

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING
7220 Trade Street, Suite 295, San Diego, CA 92121 ▸ p 619-650-0010 ▸ mulhernkulp.com

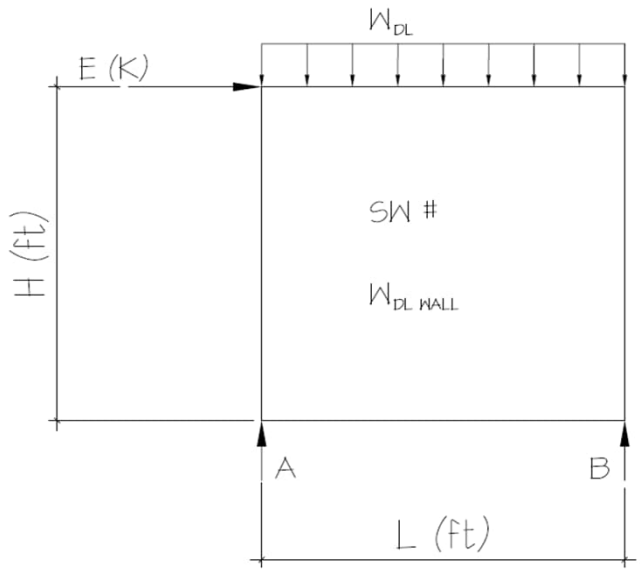
Project Name: JayMarc Homes
Su Residence
M&K Project #: 154-23011
Engineer: BFD
Date: 29-Nov-23

Overstrength Calculations

Wall Description/SW #: 209

Parameters:

L =	10.3	ft
H =	9.1	ft
E =	2.60	k
W_{DLWall} =	0.10	klf
W_{DL} =	0.102	klf
Ω_0 =	2.5	(ASCE TABLE 12.2.1 FOOTNOTE
SDS =	1.115	



analysis:

E (unfactored) = 3.71

$E_{mh} = \Omega 0 * E$ = 9.29 K

$E_v = 0.2*SDS*DL$ = 0.464 K

$E_m = E_{mh} + E_v$ = 9.750 K

$E_m = E_{mh} - E_v$ = 8.822 K

E_m (max) = $\sum M_A = 0$ = 9.75(9.1) + 0.202(10.3)(5.15) - Rb(10.3)

R_B = 1.0DL + 8.6E

Ra = 1.0DL - 8.6E

E_m (min) = $\sum M_A = 0$ = 8.82(9.1) + 0.202(10.3)(5.15) - Rb(10.3)

R_B = 1.0DL + 7.8E

Ra = 1.0DL - 7.8E

check beams for axial forces shown using load combos per section 12.4.3.1 (asd)

allowable stess permitted to be increased by 1.2

see following beam calcs for load application

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shear Wall Calculations - Wind

JayMarc Homes

Su Residence

Mercer Island, WA

Parameters:

Single Family Home

Design Wind Speed: 100 MPH

wind Exposure Category: C

Seismic Design Category: D

Code & Design Standard: 2018 IBC Ch. 1609, ASCE 7-16 Ch. 26-30

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

Richard J. Zabel, P.E., Project Manager

Blake F. Durham, Staff Engineer

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

WIND DESIGN SUMMARY PER ASCE 7-16

M+K Project #: 154-23011
Engineer: BFD

Parameters:

Wind Speed	100
Exposure Category	C
Risk Category	II
Wind Directionality Factor, K_d	0.85
Topographic Factor, K_{zt}	1.00
Gust Factor, G	0.85
Ground Elev. Above Sea Level [ft]	0
Design Type	ASD

0.60

Roof Geometry:

Trans. Roof Pitch	3.0	:12
Long. Roof Pitch	3.0	:12
Mean Roof Height, H	27.00	ft

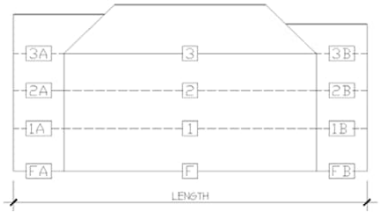
Building Geometry:

length	59	ft
Width	65	ft
Number of stories	2	

Transverse Direction (Perpendicular to Main Ridge Line)

Tributary Design Areas:

Diaphragm Level	Floor-to-Floor Height		Section A	Section O	Section B	
2	9.1 ft	Roof Surface	0	235	0	sq ft
		Wall surface	0	261	0	sq ft
1	11.56 ft	Roof Surface	0	142	0	sq ft
		Wall surface	0	644	0	sq ft
FND		Roof Surface	0	0	0	sq ft
		Wall surface	0	0	0	sq ft



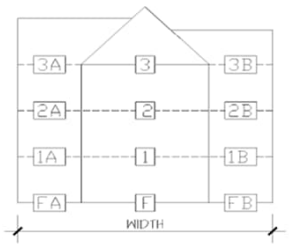
Tributary Design Loads: (0.6W)

	Section A	Section O	Section B	
Story Shear	0.00	4.66	0.00	kips
Total Shear	0.00	4.66	0.00	kips
		4.66		kips
Story Shear	0.00	8.88	0.00	kips
Total Shear	0.00	13.54	0.00	kips
		13.54		kips
Story Shear	0.00	0.00	0.00	kips
Total Shear	0.00	13.54	0.00	kips
		13.54		kips

Longitudinal Direction (Parallel to Main Ridge Line)

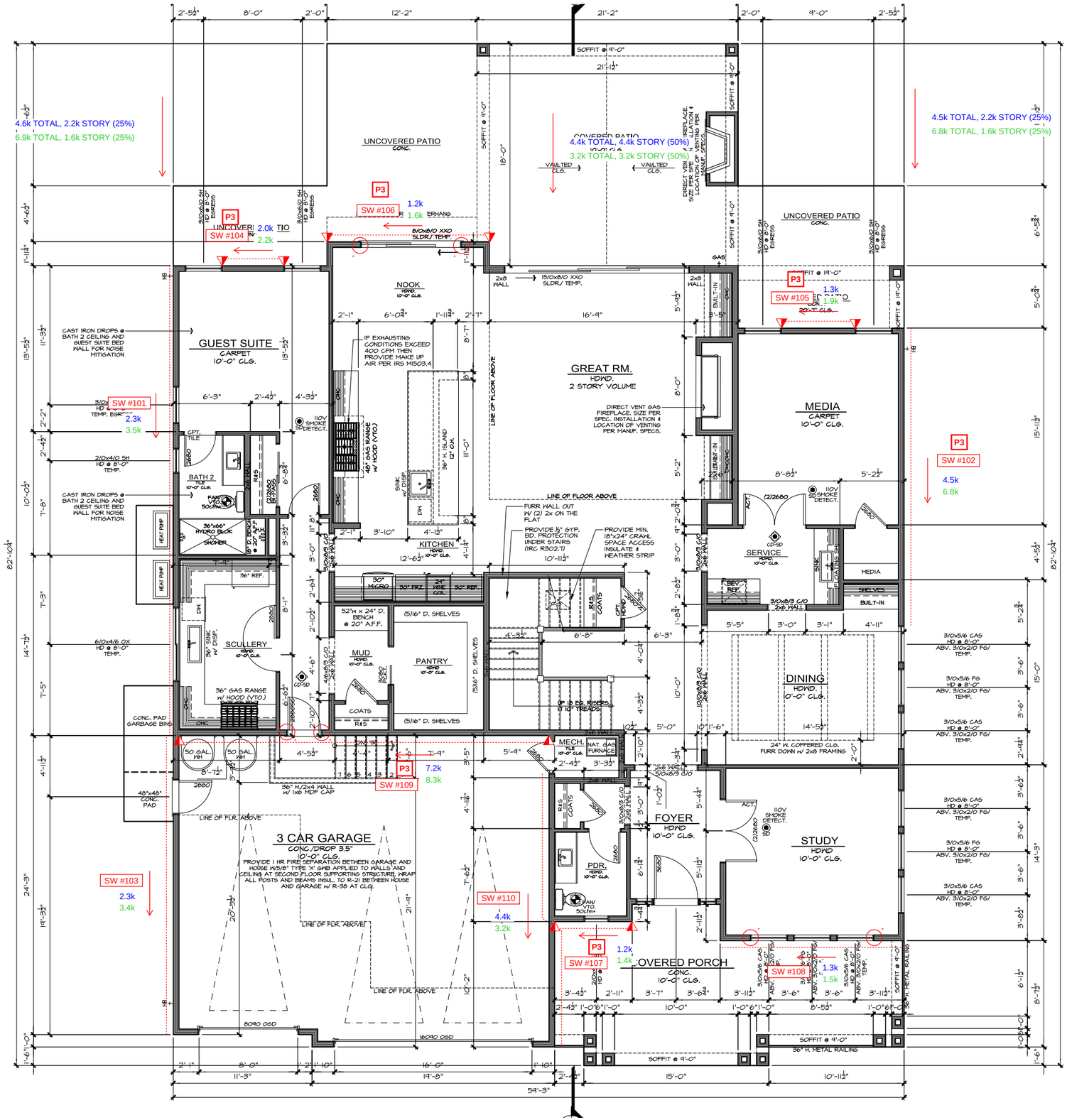
Tributary Design Areas:

Diaphragm Level	Floor-to-Floor Height		Section A	Section O	Section B	
2	9.1 ft	Roof Surface	0	216	0	sq ft
		Wall surface	0	255	0	sq ft
1	11.56 ft	Roof Surface	0	169	0	sq ft
		Wall surface	0	699	0	sq ft
FND		Roof Surface	0	0	0	sq ft
		Wall surface	0	0	0	sq ft



Tributary Design Loads: (0.6W)

	Section A	Section O	Section B	
Story Shear	0.00	4.55	0.00	kips
Total Shear	0.00	4.55	0.00	kips
		4.55		kips
Story Shear	0.00	9.88	0.00	kips
Total Shear	0.00	14.43	0.00	kips
		14.43		kips
Story Shear	0.00	0.00	0.00	kips
Total Shear	0.00	14.43	0.00	kips
		14.43		kips



JAYMARC HOMES
7525 SE 24th St., 487
Mercer Island, WA
98040
425.266.9100

Issue	Issue Date	By
Description		
△	.	.
.	.	.
.	.	.

9619 SE 34th St.
MERCER ISLAND, WA

Job Number:
JMCXXX

plan name: –
marketing name: XXXXX
plan number: JMCXXX
mark sys. number: –

Conditions not specifically represented graphically or in writing or which conflict with the current International Residential Code (IRC) or those of the local municipality then the current standards and requirements of each respectively shall govern.

The drawings in this set are instruments of service and shall remain the property of JayMarc Homes, LLC.

04.29.21
Submittal Date

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Sheet Title/Description

.
Design Firm

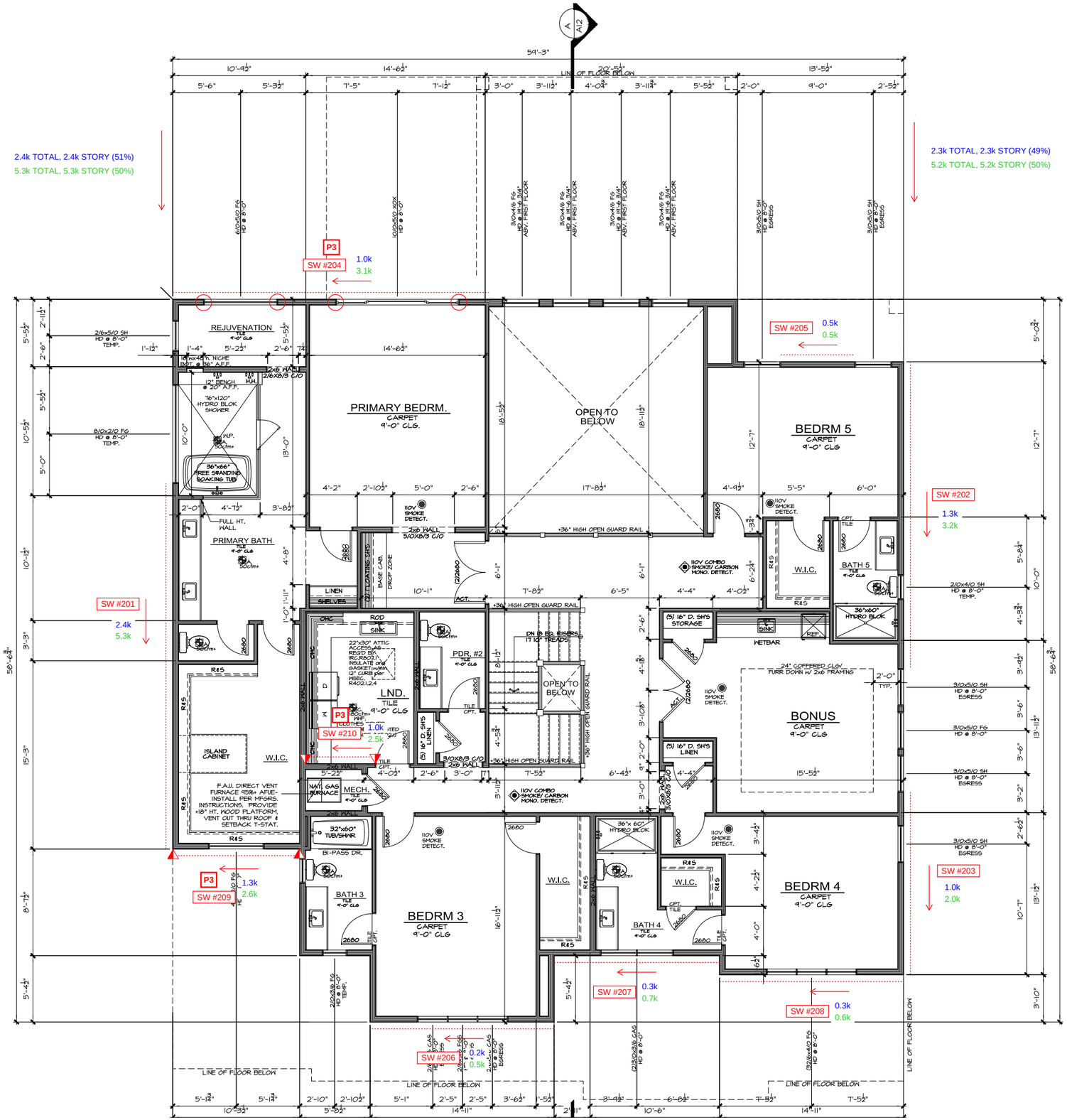
RCR
Drawn by:

SK
Checked by:

1/4 SCALE
Primary Scale

A5
of: .

Sheet Number/Title/Description



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04.29.21
Submittal Date

. Sheet Title/Description

. Design Firm

RCR
Drawn by:

SK
Checked by:

1/4 SCALE
Primary Scale

A7
of: .

Sheet Title/Description

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 201: 2nd - Side Ext. Wall @ Primary Bath/WIC

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	29.6	ft.	Qualifying Wall Length, L	29.6	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2400 lbs	<	9946 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	202	plf	Overturning Moment	21.8	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	90.4	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 202: 2nd - Side Ext. Wall @ Bed 5/Bonus

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, Hc	4.0	ft.		
Wall Length, L	24.9	ft.	Qualifying Wall Length, L	22.9	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1300 lbs	<	7683 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	202	plf	Overturning Moment	11.8	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	65.2	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 203: 2nd - Side Ext. Wall @ Bed 4/Bonus

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, H_c	5.0	ft.		
Wall Length, L	14.8	ft.	Qualifying Wall Length, L	11.8	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1000 lbs	<	3959 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	202	plf	Overturning Moment	9.1	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	25.2	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 204: 2nd - Rear Ext. Wall @ Primary Bed

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, Hc	5.0	ft.		
Wall Length, L	25.6	ft.	Qualifying Wall Length, L	9.6	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1000 lbs	<	6056 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	412	plf	Overturning Moment	9.1	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	130.9	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 205: 2nd - Rear Ext. Wall @ Bed 5

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	6.0	ft.	Qualifying Wall Length, L	6.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
500 lbs	<	2015 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	307	plf	Overturning Moment	4.6	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	7.1	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 206: 2nd - Front Ext. Wall @ Bed 3

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, Hc	5.5	ft.		
Wall Length, L	14.9	ft.	Qualifying Wall Length, L	7.6	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
200 lbs	<	2548 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	202	plf	Overturning Moment	1.8	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	25.6	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 207: 2nd - Front Ext. Wall @ Bath 4

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, H_c	3.5	ft.		
Wall Length, L	13.4	ft.	Qualifying Wall Length, L	7.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
300 lbs	<	2519 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	202	plf	Overturning Moment	2.7	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	21.2	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 208: 2nd - Front Ext. Wall @ Bed 4

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, Hc	4.0	ft.		
Wall Length, L	14.9	ft.	Qualifying Wall Length, L	7.6	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
300 lbs	<	2548 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	202	plf	Overturning Moment	2.7	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	25.6	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 209: 2nd - Front Ext. Wall @ WIC

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, H_c	2.0	ft.		
Wall Length, L	10.3	ft.	Qualifying Wall Length, L	5.8	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1300 lbs	<	3649 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	202	plf	Overturning Moment	11.8	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	600	lbs	Resistive Moment	15.2	k-ft	Holdown Capacity	1705	lbs

Hold-down Specification

No Holdown Required

Shearwall 210: 2nd - Rear Int. Wall @ Laundry/Mech

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	5.7	ft.	Qualifying Wall Length, L	5.7	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1000 lbs	<	3573 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	115	plf	Overturning Moment	9.1	k-ft	Hold Down Design Load	1177	lbs
DL at ends of wall	150	lbs	Resistive Moment	2.4	k-ft	Holdown Capacity	4645	lbs

Hold-down Specification

SIMPSON MSTC66 STRAP TIE (20" END LENGTH)

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 101: 1st - Side Ext. Wall @ Guest/Scullery

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_c	6.0	ft.		
Wall Length, L	38.1	ft.	Qualifying Wall Length, L	27.1	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2300 lbs	<	9018 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	399	plf	Overturning Moment	23.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	274.3	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 102: 1st - Side Ext. Wall @ Media

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	24.3	ft.	Qualifying Wall Length, L	24.3	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
4500 lbs	<	15282 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	411	plf	Overturning Moment	56.5	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	1000	lbs	Resistive Moment	130.5	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 103: 1st - Side Ext. Wall @ Garage

Shearwall Properties:

Wall height, H	13.1	ft.	Max wall opening ht, H_c	8.0	ft.		
Wall Length, L	24.3	ft.	Qualifying Wall Length, L	21.4	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2300 lbs	<	7154 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	219	plf	Overturning Moment	30.1	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	66.7	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 104: 1st - Rear Ext. Wall @ Guest

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	5.0	ft.	Qualifying Wall Length, L	5.0	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2000 lbs	<	3151 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	422	plf	Overturning Moment	20.0	k-ft	Hold Down Design Load	2691	lbs
DL at ends of wall	400	lbs	Resistive Moment	6.5	k-ft	Holdown Capacity	4935	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 105: 1st - Rear Ext. Wall @ Media

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	6.0	ft.	Qualifying Wall Length, L	6.0	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1400 lbs	<	3781 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	422	plf	Overturning Moment	18.6	k-ft	Hold Down Design Load	1593	lbs
DL at ends of wall	400	lbs	Resistive Moment	9.0	k-ft	Holdown Capacity	4935	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

Shearwall 106: 1st - Rear Ext. Wall @ Nook

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	8.0	ft.		
Wall Length, L	13.2	ft.	Qualifying Wall Length, L	5.2	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1300 lbs	<	2692 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	126	plf	Overturning Moment	13.0	k-ft	Hold Down Design Load	63	lbs
DL at ends of wall	200	lbs	Resistive Moment	12.2	k-ft	Holdown Capacity	4935	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 107: 1st - Front Ext. Wall @ Powder

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_c	4.5	ft.		
Wall Length, L	6.3	ft.	Qualifying Wall Length, L	4.3	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1200 lbs	<	2648 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	402	plf	Overturning Moment	12.0	k-ft	Hold Down Design Load	410	lbs
DL at ends of wall	400	lbs	Resistive Moment	9.4	k-ft	Holdown Capacity	4935	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

Shearwall 108: 1st - Front Ext. Wall @ Study

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	7.5	ft.		
Wall Length, L	14.9	ft.	Qualifying Wall Length, L	4.9	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1300 lbs	<	2694 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	385	plf	Overturning Moment	15.7	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	800	lbs	Resistive Moment	49.3	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 109: 1st - Front Int. Wall @ Garage

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_c	8.0	ft.		
Wall Length, L	30.0	ft.	Qualifying Wall Length, L	27.2	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
7200 lbs	<	17123 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	115	plf	Overturning Moment	72.0	k-ft	Hold Down Design Load	308	lbs
DL at ends of wall	600	lbs	Resistive Moment	62.8	k-ft	Holdown Capacity	4935	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

Shearwall 110: 1st - Side Ext./Int. Wall @ Garage/Porch

Shearwall Properties:

Wall height, H	13.1	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	22.1	ft.	Qualifying Wall Length, L	22.1	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
4400 lbs	<	7435 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	266	plf	Overturning Moment	57.6	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	66.6	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shear Wall Calculations - Seismic

JayMarc Homes

Su Residence

Mercer Island, WA

Parameters:

Single Family Home

Design Wind Speed: 100 MPH

wind Exposure Category: C

Seismic Design Category: D

Code & Design Standard: 2018 IBC Ch. 1609, ASCE 7-16 Ch. 26-30

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

Richard J. Zabel, P.E., Project Manager

Blake F. Durham, Staff Engineer

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SEISMIC CALCULATION - ASCE 7-16

M+K Project #: 154-23011
Engineer: BFD

Seismic Design Category:

User Inputs:

Site Class	D
Spectral Response Acceleration 0.2 sec, **Ss**	1.394
Spectral Response Acceleration 1.0 sec, **S1**	0.485
Occupancy Category	II

Variables:

Site coefficient, Fa	1.20
Site coefficient, Fv	1.82

Calculated Values:

Maximum spectral response acceleration, S_{ms}	1.673
Maximum spectral response acceleration, S_{m1}	0.880
Design spectral response acceleration, S_{ds}	1.115
Design spectral response acceleration, S_{d1}	0.587
Seismic Design Category (short term)	D
Seismic Design Category (1.0 second term)	D

Building period Determination:

User Inputs:

Building period coefficient, C_t	0.020
Long-Period Trans Period, T_L (sec)	6
Ht. abv base to highest level, h_n	21

Calculated Values:

Approximate Fundamental Period, T_a	0.194
T_0	0.105
T_s	0.526
Spectral Response Acc., S_a (g)	1.115

Site Class Assumption

Yes — Per ASCE 7-16 Section 11.4.3 the Site Class may be assumed to be D

Equivalent lateral force procedure

Dead Load Calculation:

Level	Story Ht. (ft.)	Area (ft^2)	Dead Load (psf)	DL of ext wall trib. to level (kips)	Total level DL
1	11.6	4006	15	12.9	73 k
2	9.1	3669	17	5.4	68 k
3	0.0	0	0	0.0	0 k
4	0.0	0	0	0.0	0 k
5	0.0	0	0	0.0	0 k
6	0.0	0	0	0.0	0 k
7	0.0	0	0	0.0	0 k
8	0.0	0	0	0.0	0 k
9	0.0	0	0	0.0	0 k
10	0.0	0	0	0.0	0 k
11	0.0	0	0	0.0	0 k
12	0.0	0	0	0.0	0 k
13	0.0	0	0	0.0	0 k
14	0.0	0	0	0.0	0 k
15	0.0	0	0	0.0	0 k

Total Dead Load Of Structure 141 Kips

Seismic Response Coefficient:

	Transverse	Longitudinal
Response modification factor, **R**	6.5	6.5
Occupancy Importance Factor, I_E	1.00	1.00
Seismic Response Coefficient, C_s	0.172	0.172

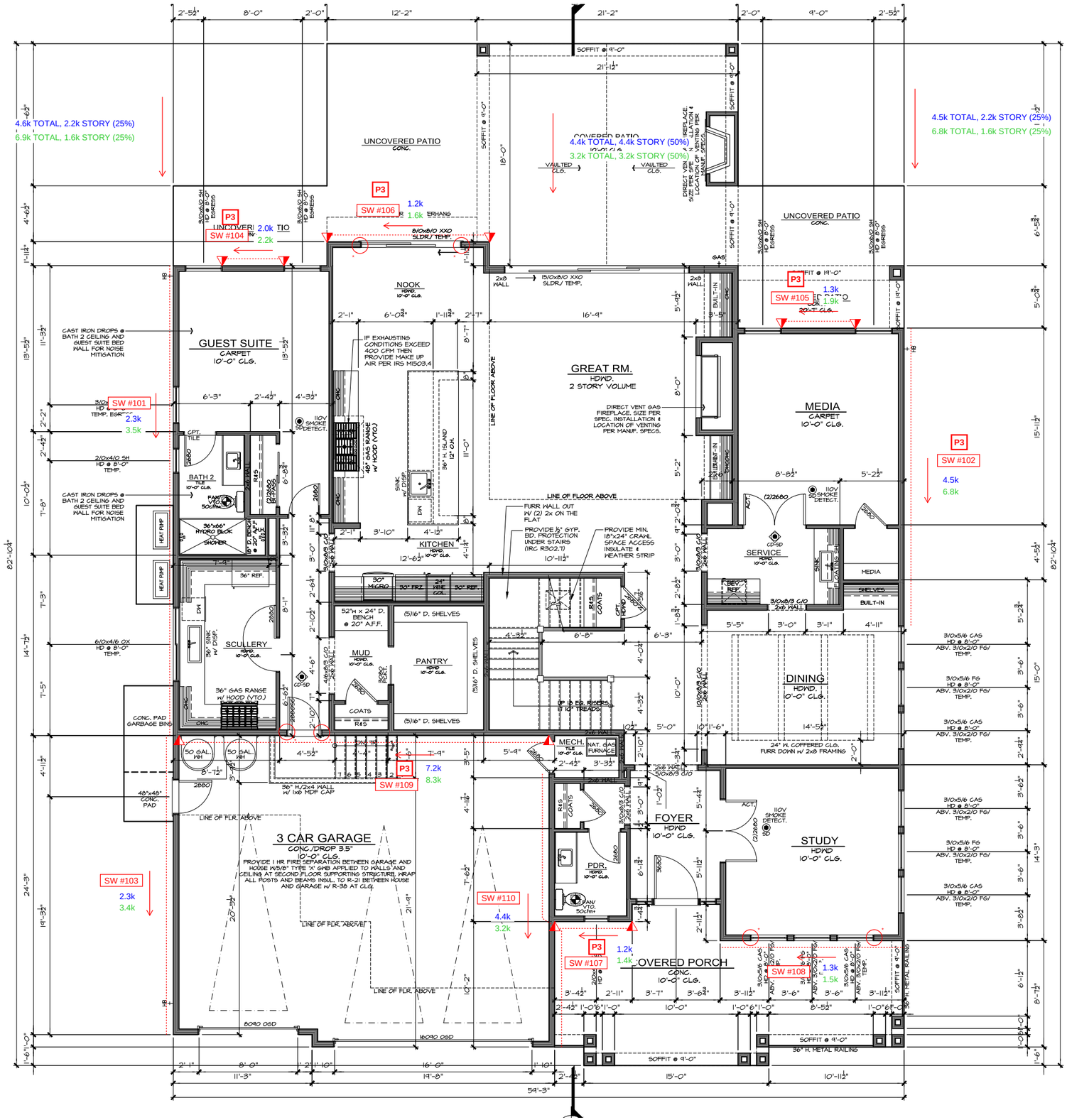
Base Shears:

Ultimate Loads				x 0.7 =	Allowable Loads		
Transverse		Longitudinal			Transverse		Longitudinal	
24	k	24	k		16.9	k	16.9	k

Story Shear Calculation:

Distribution exponent, k = 1.00

Level	Vert. Dist. Factor, C_{vx}	Ultimate Loads: Transverse *Story Shear, F_x*		Ultimate Loads: Longitudinal *Story Shear, F_x*		x 0.7 = Allowable Loads: Transverse *Story Shear, F_x*		*Σ Story Shear*		Allowable Loads: Longitudinal *Story Shear, F_x*		*Σ Story Shear*	
1	0.376	9.1	k	9.1	k	6.4	k	16.9	k	6.4	k	16.9	k
2	0.624	15.1	k	15.1	k	10.5	k	10.5	k	10.5	k	10.5	k
3	0.000	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k
4	0.000	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k
5	0.00	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k
6	0.00	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k
7	0.00	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k
8	0.00	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k
9	0.00	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k
10	0.00	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k
11	0.00	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k
12	0.00	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k
13	0.00	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k
14	0.00	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k
15	0.00	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k	0.0	k



JAYMARC HOMES
7525 SE 24th St., 487
Mercer Island, WA
98040
425.266.9100

Issue	Issue Date	By
Description		
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.	.	.

9619 SE 34th St.
MERCER ISLAND, WA

Job Number:
JMCXXX

plan name: –
marketing name: XXXXX
plan number: JMCXXX
mark sys. number: –

Conditions not specifically represented graphically or in writing or which conflict with the current International Residential Code (IRC) or those of the local municipality then the current standards and requirements of each respectively shall govern.

The drawings in this set are instruments of service and shall remain the property of JayMarc Homes, LLC.

04.29.21
Submittal Date

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Sheet Title/Description

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Design Firm

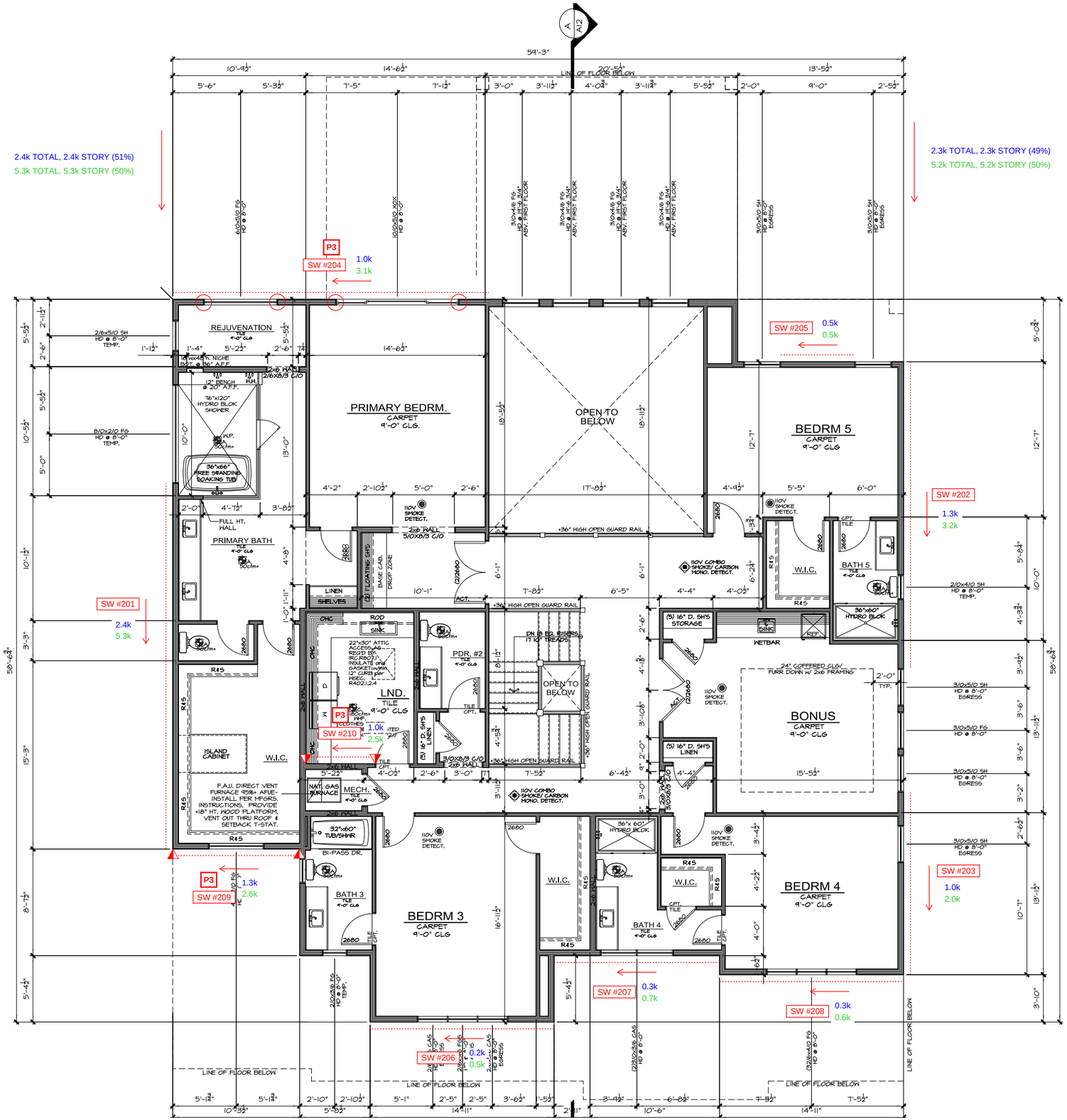
RCR
Drawn by:

SK
Checked by:

1/4 SCALE
Primary Scale

A5
of: .

Sheet Number/Title/Description



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04.29.21
Submittal Date

. Sheet Title/Description

. Design Firm

RCR
Drawn by:

SK
Checked by:

1/4 SCALE
Primary Scale

A7
of: .

Sheet Title/Description

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 201: 2nd - Side Ext. Wall @ Primary Bath/WIC

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, H_c	2.0	ft.		
Wall Length, L	29.6	ft.	Qualifying Wall Length, L	29.6	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
5300 lbs	<	7105 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	202	plf	Overturning Moment	48.2	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	66.9	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 202: 2nd - Side Ext. Wall @ Bed 5/Bonus

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, Hc	4.0	ft.		
Wall Length, L	24.9	ft.	Qualifying Wall Length, L	22.9	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
3200 lbs	<	5488 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	202	plf	Overturning Moment	29.1	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	48.3	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 203: 2nd - Side Ext. Wall @ Bed 4/Bonus

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, H_c	5.0	ft.		
Wall Length, L	14.8	ft.	Qualifying Wall Length, L	11.8	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2000 lbs	<	2828 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	202	plf	Overturning Moment	18.2	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	18.6	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 204: 2nd - Rear Ext. Wall @ Primary Bed

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, Hc	5.0	ft.		
Wall Length, L	25.6	ft.	Qualifying Wall Length, L	9.6	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
3100 lbs	<	4326 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	412	plf	Overturning Moment	28.2	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	96.9	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 205: 2nd - Rear Ext. Wall @ Bed 5

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	6.0	ft.	Qualifying Wall Length, L	6.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
500 lbs	<	1439 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	307	plf	Overturning Moment	4.6	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	5.3	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 206: 2nd - Front Ext. Wall @ Bed 3

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, Hc	5.5	ft.		
Wall Length, L	14.9	ft.	Qualifying Wall Length, L	7.6	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
500 lbs	<	1820 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	202	plf	Overturning Moment	4.6	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	18.9	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 207: 2nd - Front Ext. Wall @ Bath 4

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, H_c	3.5	ft.		
Wall Length, L	13.4	ft.	Qualifying Wall Length, L	7.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
700 lbs	<	1799 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	202	plf	Overturning Moment	6.4	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	15.7	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 208: 2nd - Front Ext. Wall @ Bed 4

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, Hc	4.0	ft.		
Wall Length, L	14.9	ft.	Qualifying Wall Length, L	7.6	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
600 lbs	<	1820 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	202	plf	Overturning Moment	5.5	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	18.9	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 209: 2nd - Front Ext. Wall @ WIC

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, H_c	2.0	ft.		
Wall Length, L	10.3	ft.	Qualifying Wall Length, L	5.8	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2600 lbs	<	2606 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	202	plf	Overturning Moment	23.7	k-ft	Hold Down Design Load	1208	lbs
DL at ends of wall	600	lbs	Resistive Moment	11.2	k-ft	Holdown Capacity	1705	lbs

Hold-down Specification

SIMPSON CS16 STRAP TIE (14" END LENGTH)

Shearwall 210: 2nd - Rear Int. Wall @ Laundry/Mech

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	5.7	ft.	Qualifying Wall Length, L	5.7	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2500 lbs	<	2552 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	115	plf	Overturning Moment	22.8	k-ft	Hold Down Design Load	3695	lbs
DL at ends of wall	150	lbs	Resistive Moment	1.8	k-ft	Holdown Capacity	4645	lbs

Hold-down Specification

SIMPSON MSTC66 STRAP TIE (20" END LENGTH)

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 101: 1st - Side Ext. Wall @ Guest/Scullery

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_c	6.0	ft.		
Wall Length, L	38.1	ft.	Qualifying Wall Length, L	27.1	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
3500 lbs	<	6441 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	399	plf	Overturning Moment	35.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	202.9	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 102: 1st - Side Ext. Wall @ Media

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	24.3	ft.	Qualifying Wall Length, L	24.3	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
6800 lbs	<	10916 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	411	plf	Overturning Moment	96.4	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	1000	lbs	Resistive Moment	96.6	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 103: 1st - Side Ext. Wall @ Garage

Shearwall Properties:

Wall height, H	13.1	ft.	Max wall opening ht, H_c	8.0	ft.		
Wall Length, L	24.3	ft.	Qualifying Wall Length, L	21.4	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
3400 lbs	<	5110 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	219	plf	Overturning Moment	44.5	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	49.3	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 104: 1st - Rear Ext. Wall @ Guest

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	5.0	ft.	Qualifying Wall Length, L	5.0	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2200 lbs	<	2251 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	422	plf	Overturning Moment	22.0	k-ft	Hold Down Design Load	3431	lbs
DL at ends of wall	400	lbs	Resistive Moment	4.8	k-ft	Holdown Capacity	3695	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 105: 1st - Rear Ext. Wall @ Media

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	6.0	ft.	Qualifying Wall Length, L	6.0	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1900 lbs	<	2701 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	422	plf	Overturning Moment	23.6	k-ft	Hold Down Design Load	2816	lbs
DL at ends of wall	400	lbs	Resistive Moment	6.7	k-ft	Holdown Capacity	3695	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

Shearwall 106: 1st - Rear Ext. Wall @ Nook

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	8.0	ft.		
Wall Length, L	13.2	ft.	Qualifying Wall Length, L	5.2	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1600 lbs	<	1923 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	126	plf	Overturning Moment	16.0	k-ft	Hold Down Design Load	531	lbs
DL at ends of wall	200	lbs	Resistive Moment	9.0	k-ft	Holdown Capacity	3695	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 107: 1st - Front Ext. Wall @ Powder

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_c	4.5	ft.		
Wall Length, L	6.3	ft.	Qualifying Wall Length, L	4.3	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1400 lbs	<	1892 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	402	plf	Overturning Moment	14.0	k-ft	Hold Down Design Load	1118	lbs
DL at ends of wall	400	lbs	Resistive Moment	7.0	k-ft	Holdown Capacity	3695	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

Shearwall 108: 1st - Front Ext. Wall @ Study

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	7.5	ft.		
Wall Length, L	14.9	ft.	Qualifying Wall Length, L	4.9	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1500 lbs	<	1924 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	385	plf	Overturning Moment	20.5	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	800	lbs	Resistive Moment	36.5	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 154-23011
Engineer: BFD

Shearwall 109: 1st - Front Int. Wall @ Garage

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_c	8.0	ft.		
Wall Length, L	30.0	ft.	Qualifying Wall Length, L	27.2	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
8300 lbs	<	12230 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	115	plf	Overturning Moment	83.0	k-ft	Hold Down Design Load	1219	lbs
DL at ends of wall	600	lbs	Resistive Moment	46.4	k-ft	Holdown Capacity	3695	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

Shearwall 110: 1st - Side Ext./Int. Wall @ Garage/Porch

Shearwall Properties:

Wall height, H	13.1	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	22.1	ft.	Qualifying Wall Length, L	22.1	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
3200 lbs	<	5310 lbs

Shearwall Assembly Specification

P1 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	266	plf	Overturning Moment	41.9	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	49.3	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required