



MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

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CALCULATION PACKAGE

December 30, 2022

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MULHERN & KULP STRUCTURAL ENGINEERING, INC.

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Signature, Seal & Date



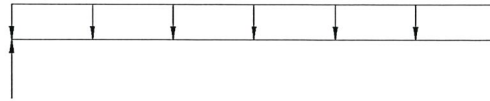
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: ROOF FRAMING - TYP. HDR

B1

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

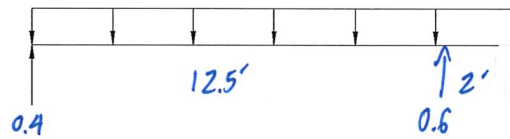
$R_{MAX} =$ K $V_D =$ K $< V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT $< M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $L/$ $< L/240$ ADEQUATE

BEAM DESCRIPTION: ROOF FRAMING - TYP. RAFTER

B2

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

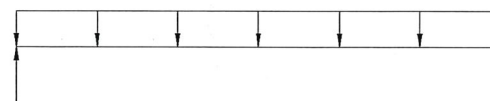
$R_{MAX} =$ K $V_D =$ K $< V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT $< M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $L/$ $< L/240$ ADEQUATE

BEAM DESCRIPTION: ROOF FRAMING - TYP. VALLEY

B3

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

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



BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: ROOF FRAMING - TYP. RIDGE

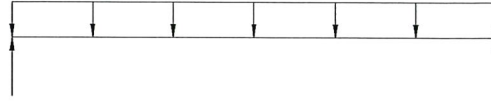
B4

PARAMETERS:

L = 6.5 FT

W = 0.44 KLF

P = - K



ANALYSIS:

R_{MAX} = 1.4 K V_D = - K < V_{ALL} = 5.4 K ADEQUATE

M_{MAX} = 2.3 K-FT < M_{ALL} = 7.0 K-FT ADEQUATE

Δ_{TL} = 0.03 IN. L/1000+ < L/240 ADEQUATE

4x12 DF#2

BEAM DESCRIPTION: ROOF FRAMING - FLUSH BM @ BED

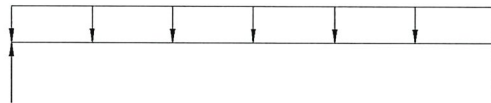
B5

PARAMETERS:

L = 9.5 FT

W = 0.5 KLF

P = - K



ANALYSIS:

R_{MAX} = 2.4 K V_D = - K < V_{ALL} = 5.4 K ADEQUATE

M_{MAX} = 5.6 K-FT < M_{ALL} = 7.0 K-FT ADEQUATE

Δ_{TL} = 0.14 IN. L/814 < L/240 ADEQUATE

4x12 DF#2

BEAM DESCRIPTION: ROOF FRAMING - TYP. INT. HDR

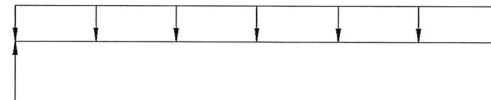
B6

PARAMETERS:

L = 3 FT

W = 0.23 KLF

P = - K



ANALYSIS:

R_{MAX} = 0.4 K V_D = - K < V_{ALL} = 4.5 K ADEQUATE

M_{MAX} = 0.3 K-FT < M_{ALL} = 5.2 K-FT ADEQUATE

Δ_{TL} = 0.001 IN. L/1000+ < L/240 ADEQUATE

4x10 DF#2



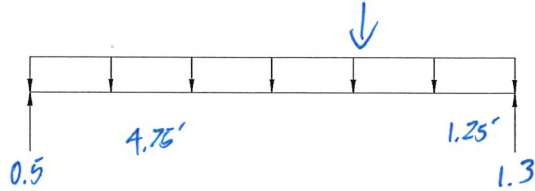
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: ROOF FRAMING - CLOSET HDR @ RIDGE

B7

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

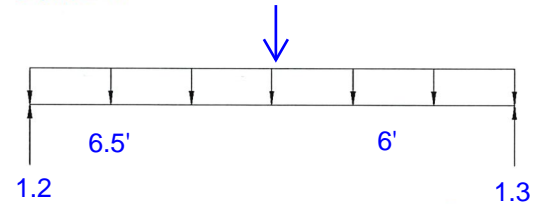
$R_{MAX} =$ K $V_D =$ K $< V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT $< M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $L/$ $< L/240$ ADEQUATE

BEAM DESCRIPTION: ROOF FRAMING - BMS @ FAMILY

B8

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

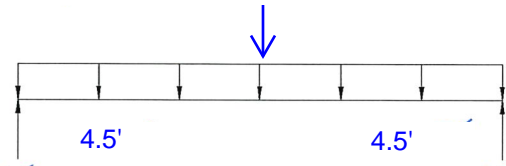
$R_{MAX} =$ K $V_D =$ K $< V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT $< M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $L/$ $< L/240$ ADEQUATE

BEAM DESCRIPTION: ROOF FRAMING - HDR @ FAMILY

B9

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

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



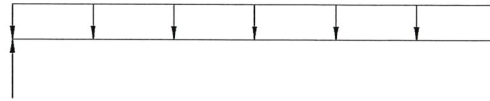
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: ROOF FRAMING - BM @ DECK

B10

PARAMETERS:

L = 10.25 FT
W = 0.2 KLF
P = - K



ANALYSIS:

$R_{MAX} = 1.0$ K $V_D = -$ K $< V_{ALL} = 4.5$ K ADEQUATE
 $M_{MAX} = 2.6$ K-FT $< M_{ALL} = 5.2$ K-FT ADEQUATE
 $\Delta_{TL} = 0.13$ IN. $L/946 < L/240$ ADEQUATE

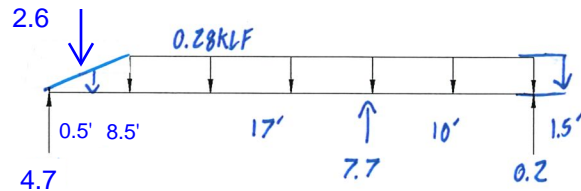
4x10 DF#2

BEAM DESCRIPTION: ROOF FRAMING - RIDGE @ CLOSET

B11

PARAMETERS:

L = 26 FT
W = 7 KLF
P = - K



ANALYSIS:

$R_{MAX} = 7.7$ K $V_D = -$ K $< V_{ALL} = 16.8$ K ADEQUATE
 $M_{MAX} = -17.9$ K-FT $< M_{ALL} = -36.6$ K-FT ADEQUATE
 $\Delta_{TL} = 0.55$ IN. $L/566 < L/240$ ADEQUATE

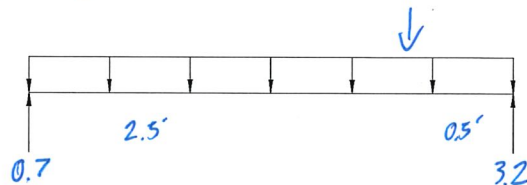
5 1/2" x 15" GLB

BEAM DESCRIPTION: ROOF FRAMING - HDR @ RIDGE

B12

PARAMETERS:

L = 3 FT
W = 0.1 KLF
P = 3.6 K



ANALYSIS:

$R_{MAX} = 3.2$ K $V_D = -$ K $< V_{ALL} = 4.5$ K ADEQUATE
 $M_{MAX} = 1.4$ K-FT $< M_{ALL} = 5.2$ K-FT ADEQUATE
 $\Delta_{TL} = 0.006$ IN. $L/1000+ < L/240$ ADEQUATE

4x10 DF#2



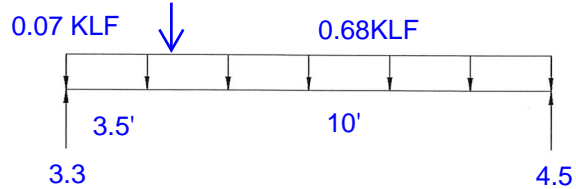
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLOOR FRAMING- REAR DECK BM @ EDGE

B13

PARAMETERS:

L = 13.5 FT
W = → KLF
P = 0.8 K



ANALYSIS:

$R_{MAX} = 4.5$ K $V_D = -$ K $< V_{ALL} = 7.9$ K ADEQUATE
 $M_{MAX} = 14.9$ K-FT $< M_{ALL} = 17.9$ K-FT ADEQUATE
 $\Delta_{TL} = 0.5$ IN. $L/324 < L/240$ ADEQUATE

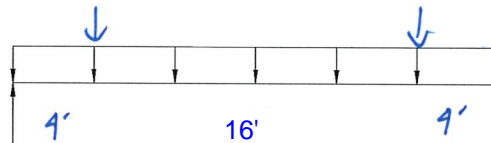
(2) 1 3/4" x 11 7/8" LVL

BEAM DESCRIPTION: UPPER FLOOR FRAMING- REAR DECK BM

B14

PARAMETERS:

L = 24 FT
W = 0.1 KLF
P = 3.3 K



ANALYSIS:

$R_{MAX} = 4.5$ K $V_D = -$ K $< V_{ALL} = 17.5$ K ADEQUATE
 $M_{MAX} = 20.4$ K-FT $< M_{ALL} = 59.4$ K-FT ADEQUATE
 $\Delta_{TL} = 0.44$ IN. $L/654 < L/240$ ADEQUATE

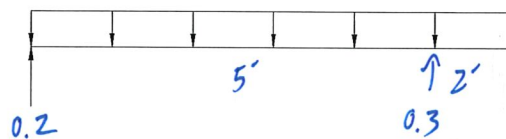
5 1/2" x 18" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING- TYP. RAFTER

B15

PARAMETERS:

L = 7 FT
W = 0.07 KLF
P = - K



ANALYSIS:

$R_{MAX} = 0.3$ K $V_D = -$ K $< V_{ALL} = 0.95$ K ADEQUATE
 $M_{MAX} = 0.3$ K-FT $< M_{ALL} = 0.92$ K-FT ADEQUATE
 $\Delta_{TL} = 0.1$ IN. $L/600 < L/240$ ADEQUATE

2x6 HF #2 @ 24" o.c.



BEAM & HEADER CALCULATIONS

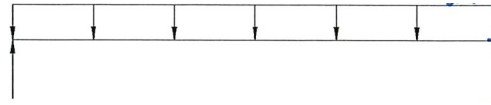
BEAM DESCRIPTION: UPPER FLOOR FRAMING - GREAT / OFFICE BM

B16

PARAMETERS:

L = FT
W = KLF
P = K

SEE ENERCALC
OUTPUT



ANALYSIS:

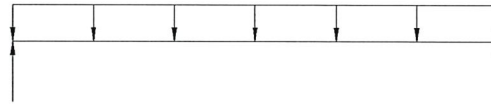
$R_{MAX} =$ K $V_D =$ K < $V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT < $M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $L /$ < $L/240$ ADEQUATE

BEAM DESCRIPTION: UPPER FLOOR FRAMING - DINING BM @ BRG. ABOVE

B17

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

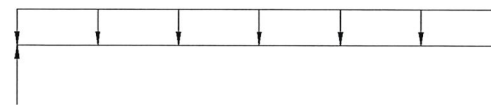
$R_{MAX} =$ K $V_D =$ K < $V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT < $M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $L /$ < $L/240$ ADEQUATE

BEAM DESCRIPTION: UPPER FLOOR FRAMING - DINING BM @ DECK ABOVE

B18

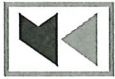
PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

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



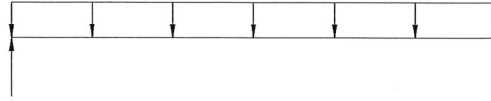
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLOOR FRAMING - BM PRIMARY DECK

B19

PARAMETERS:

L = 10 FT
W = 0.17 KLF
P = - K



ANALYSIS:

$R_{MAX} = 0.9$ K $V_D = -$ K $< V_{ALL} = 3.95$ K ADEQUATE
 $M_{MAX} = 2.1$ K-FT $< M_{ALL} = 8.9$ K-FT ADEQUATE
 $\Delta_{TL} = 0.08$ IN. L/1000+ $< L/240$ ADEQUATE

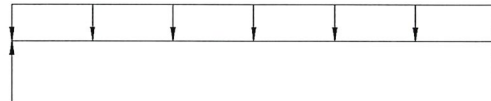
1 3/4" x 11 7/8" LVL

BEAM DESCRIPTION: UPPER FLOOR FRAMING - REAR DINING HDR

B20

PARAMETERS:

L = 9 FT
W = 0.28 KLF
P = - K



ANALYSIS:

$R_{MAX} = 1.3$ K $V_D = -$ K $< V_{ALL} = 3.9$ K ADEQUATE
 $M_{MAX} = 2.8$ K-FT $< M_{ALL} = 4.5$ K-FT ADEQUATE
 $\Delta_{TL} = 0.11$ IN. L/982 $< L/240$ ADEQUATE

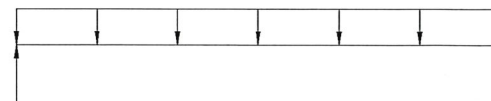
4x10 DF#2

BEAM DESCRIPTION: UPPER FLOOR FRAMING - KITCHEN BM @ WALL ABOVE @ COFFER

B21

PARAMETERS:

L = 17 FT
W = 0.22 KLF
P = - K



ANALYSIS:

$R_{MAX} = 1.9$ K $V_D = -$ K $< V_{ALL} = 9.1$ K ADEQUATE
 $M_{MAX} = 7.9$ K-FT $< M_{ALL} = 20.5$ K-FT ADEQUATE
 $\Delta_{TL} = 0.92$ IN. L/986 $< L/240$ ADEQUATE

(2) 1 3/4" x 11 7/8" LVL



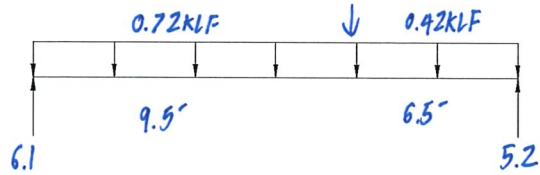
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLOOR FRAMING - PANTRY BM @ EXT WALL ABOVE

B22

PARAMETERS:

L = 16 FT
W = 7 KLF
P = 1.7 K



ANALYSIS:

$R_{MAX} = 6.1$ K $V_D = -$ K $< V_{ALL} = 12.8$ K ADEQUATE
 $M_{MAX} = 25.6$ K-FT $< M_{ALL} = 43.5$ K-FT ADEQUATE
 $\Delta_{TL} = 0.39$ IN. $L/492 < L/240$ ADEQUATE

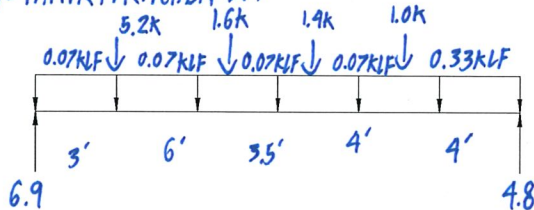
3 1/2" x 18" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING - PANTRY/KITCHEN BM

B23

PARAMETERS:

L = 20.5 FT
W = 7 KLF
P = 7 K



ANALYSIS:

$R_{MAX} = 6.9$ K $V_D = -$ K $< V_{ALL} = 20.1$ K ADEQUATE
 $M_{MAX} = 27.9$ K-FT $< M_{ALL} = 68.3$ K-FT ADEQUATE
 $\Delta_{TL} = 0.44$ IN. $L/559 < L/240$ ADEQUATE

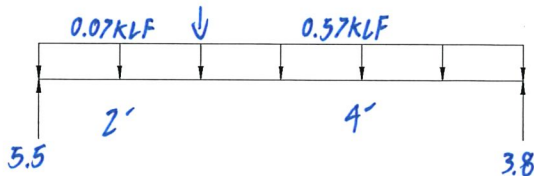
5 1/2" x 18" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING - PANTRY HDR @ BM ABOVE

B24

PARAMETERS:

L = 6 FT
W = 7 KLF
P = 6.9 K



ANALYSIS:

$R_{MAX} = 5.5$ K $V_D = -$ K $< V_{ALL} = 6.9$ K ADEQUATE
 $M_{MAX} = 2.7$ K-FT $< M_{ALL} = 6.8$ K-FT ADEQUATE
 $\Delta_{TL} = 0.03$ IN. $L/1000+ < L/240$ ADEQUATE

6 x 10 DF#2



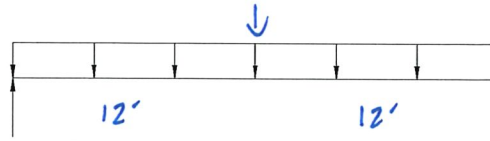
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLOOR FRAMING - GARAGE BM@ P.A.

B25

PARAMETERS:

L = 24 FT
W = 0.08 KLF
P = 7.7 K



ANALYSIS:

$R_{MAX} = 1.8$ K $V_D = -$ K $< V_{ALL} = 70.5$ K ADEQUATE
 $M_{MAX} = 51.8$ K-FT $< M_{ALL} = 110$ K-FT ADEQUATE
 $\Delta_{TL} = 0.49$ IN. $L/588 < L/240$ ADEQUATE

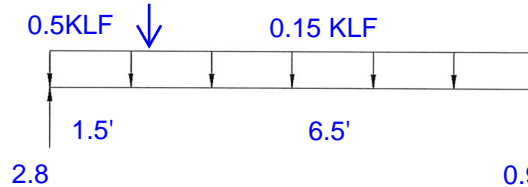
W16x26

BEAM DESCRIPTION: UPPER FLOOR FRAMING - 8' GARAGE HDR

B26

PARAMETERS:

L = 8 FT
W = → KLF
P = 2.0 K



ANALYSIS:

$R_{MAX} = 2.8$ K $V_D = -$ K $< V_{ALL} = 4.5$ K ADEQUATE
 $M_{MAX} = 2.7$ K-FT $< M_{ALL} = 5.2$ K-FT ADEQUATE
 $\Delta_{TL} = 0.08$ IN. $L/1000+ < L/240$ ADEQUATE

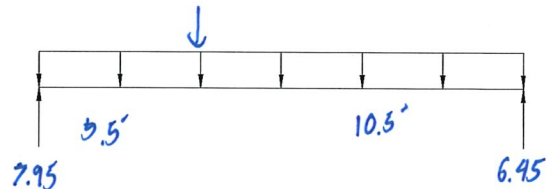
4x10 DF#2

BEAM DESCRIPTION: UPPER FLOOR FRAMING - 16' GARAGE HDR

B27

PARAMETERS:

L = 16 FT
W = 0.6 KLF
P = 1.8 K



ANALYSIS:

$R_{MAX} = 7.95$ K $V_D = -$ K $< V_{ALL} = 18.4$ K ADEQUATE
 $M_{MAX} = 34.7$ K-FT $< M_{ALL} = 57.4$ K-FT ADEQUATE
 $\Delta_{TL} = 0.43$ IN. $L/447 < L/240$ ADEQUATE

5 1/2" x 16 1/2" GLB



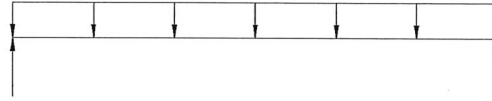
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLOOR FRAMING - REAR KITCHEN HDR

B28

PARAMETERS:

L = 15 FT
W = 0.17 KLF
P = - K



ANALYSIS:

$R_{MAX} = 1.3$ K $V_D = -$ K $< V_{ALL} = 5.4$ K ADEQUATE
 $M_{MAX} = 4.8$ K-FT $< M_{ALL} = 7.2$ K-FT ADEQUATE
 $\Delta_{TL} = 0.29$ IN. $L/621 < L/240$ ADEQUATE

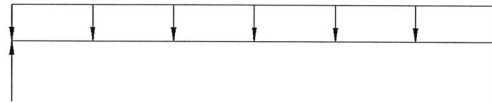
4x12 DF#2

BEAM DESCRIPTION: UPPER FLOOR FRAMING - REAR LOW ROOF BM

B29

PARAMETERS:

L = 15 FT
W = 0.12 KLF
P = - K



ANALYSIS:

$R_{MAX} = 0.9$ K $V_D = -$ K $< V_{ALL} = 4.5$ K ADEQUATE
 $M_{MAX} = 3.4$ K-FT $< M_{ALL} = 5.2$ K-FT ADEQUATE
 $\Delta_{TL} = 0.37$ IN. $L/486 < L/240$ ADEQUATE

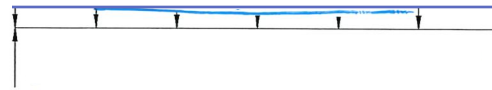
4x10 DF#2

BEAM DESCRIPTION: UPPER FLOOR FRAMING - REAR DECK BM

B30

PARAMETERS:

L = 16 FT
W = 0.1 KLF
P = - K



ANALYSIS:

$R_{MAX} = 0.8$ K $V_D = -$ K $< V_{ALL} = 4.5$ K ADEQUATE
 $M_{MAX} = 3.2$ K-FT $< M_{ALL} = 10.3$ K-FT ADEQUATE
 $\Delta_{TL} = 0.3$ IN. $L/640 < L/240$ ADEQUATE

1 3/4"x11 7/8" LVL



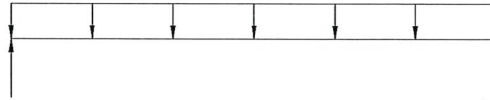
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLOOR FRAMING - TYP. HDR

B31

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

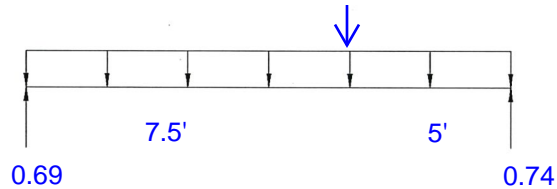
$R_{MAX} =$ K $V_D =$ K $< V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT $< M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $L/$ $< L/240$ ADEQUATE

BEAM DESCRIPTION: UPPER FLOOR FRAMING - ROOF BM @ STAIR

B32

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

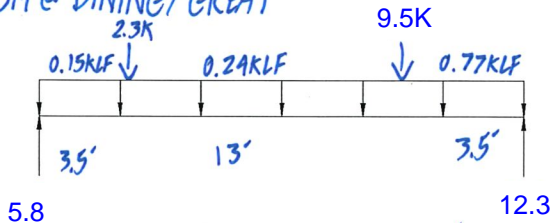
$R_{MAX} =$ K $V_D =$ K $< V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT $< M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $L/$ $< L/240$ ADEQUATE

BEAM DESCRIPTION: UPPER FLOOR FRAMING - BM @ DINING / GREAT

B33

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

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



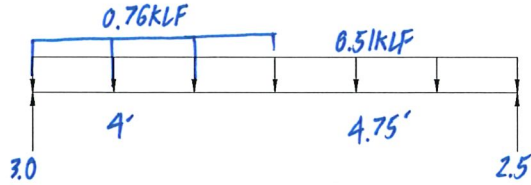
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLOOR FRAMING - BM @ STAIR

B34

PARAMETERS:

L = 8.75 FT
W = 7 KLF
P = - K



ANALYSIS:

$R_{MAX} = 3.0$ K $V_D = -$ K $< V_{ALL} = 11.1$ K ADEQUATE
 $M_{MAX} = 5.8$ K-FT $< M_{ALL} = 37.8$ K-FT ADEQUATE
 $\Delta_{TL} = 0.03$ IN. $L/1000+$ $< L/240$ ADEQUATE

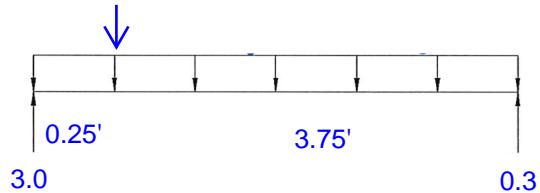
3 1/2" x 18" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING - HDR @ ENTRY

B35

PARAMETERS:

L = 4 FT
W = 0.07 KLF
P = 3.0 K



ANALYSIS:

$R_{MAX} = 3.0$ K $V_D = -$ K $< V_{ALL} = 3.9$ K ADEQUATE
 $M_{MAX} = 0.6$ K-FT $< M_{ALL} = 4.5$ K-FT ADEQUATE
 $\Delta_{TL} = 0.005$ IN. $L/1000+$ $< L/240$ ADEQUATE

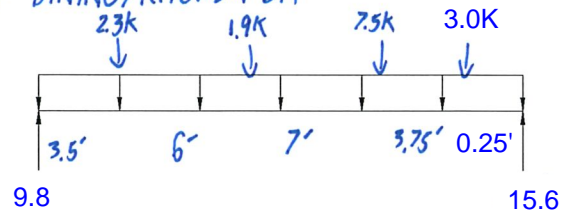
4x10 DF#2

BEAM DESCRIPTION: UPPER FLOOR FRAMING - DINING/KITCHEN BM

B36

PARAMETERS:

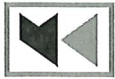
L = 20.5 FT
W = 0.52 KLF
P = 7 K



ANALYSIS:

$R_{MAX} = 15.6$ K $V_D = -$ K $< V_{ALL} = 70.5$ K ADEQUATE
 $M_{MAX} = 56.3$ K-FT $< M_{ALL} = 110$ K-FT ADEQUATE
 $\Delta_{TL} = 0.48$ IN. $L/513$ $< L/240$ ADEQUATE

W16x26



BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLOOR FRAMING-OFFICE BMS @ WALL ABOVE

B37

PARAMETERS:

L = 11 FT
W = 7 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
 $\Delta_{TL} =$ [] IN. $L /$ [] $< L/240$ ADEQUATE

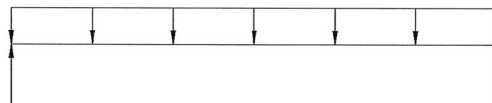
3 1/2" x 18" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING-INT. HDR

B38

PARAMETERS:

L = 3.5 FT
W = 0.8 KLF
P = - K



ANALYSIS:

$R_{MAX} =$ 1.4 K $V_D =$ [-] K $< V_{ALL} =$ 3.9 K ADEQUATE
 $M_{MAX} =$ 1.2 K-FT $< M_{ALL} =$ 4.5 K-FT ADEQUATE
 $\Delta_{TL} =$ 0.01 IN. $L /$ 1000+ $< L/240$ ADEQUATE

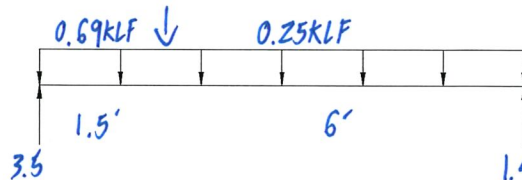
4x10 DF#2

BEAM DESCRIPTION: UPPER FLOOR FRAMING-GREAT ROOM/OFFICE BM

B39

PARAMETERS:

L = 7.5 FT
W = 7 KLF
P = 2.4 K



ANALYSIS:

$R_{MAX} =$ 3.5 K $V_D =$ [-] K $< V_{ALL} =$ 3.9 K ADEQUATE
 $M_{MAX} =$ 3.9 K-FT $< M_{ALL} =$ 4.5 K-FT ADEQUATE
 $\Delta_{TL} =$ 0.1 IN. $L /$ 900 $< L/240$ ADEQUATE

4x10 DF#2

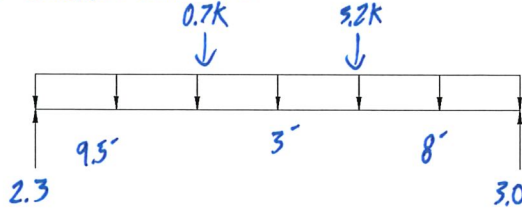


BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLOOR FRAMING- KITCHEN BM @ P.A. B40

PARAMETERS:

L = FT
W = KLF
P = K



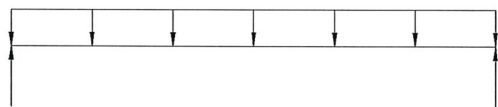
ANALYSIS:

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

BEAM DESCRIPTION: UPPER FLOOR FRAMING- MUD BM @ WALL ABOVE B41

PARAMETERS:

L = FT SEE ENERCALC OUTPUT
W = KLF
P = K



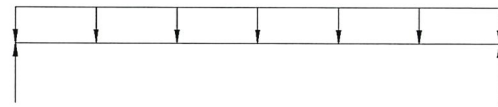
ANALYSIS:

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

BEAM DESCRIPTION: UPPER FLOOR FRAMING- GARAGE BM @ DECK B42

PARAMETERS:

L = FT SEE ENERCALC OUTPUT
W = KLF
P = K



ANALYSIS:

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



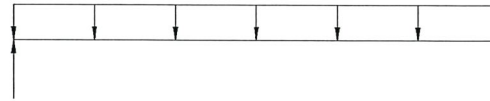
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLOOR FRAMING- WIND BM@ STAIR

B43

PARAMETERS:

L = 12.75 FT
W = 0.1 KLF
P = - K



ANALYSIS:

$R_{MAX} = 0.6$ K $V_D = -$ K $< V_{ALL} = 24.3$ K ADEQUATE
 $M_{MAX} = 2.0$ K-FT $< M_{ALL} = 17.5$ K-FT ADEQUATE
 $\Delta_{TL} = 0.15$ IN. $L/1000+$ $< L/240$ ADEQUATE

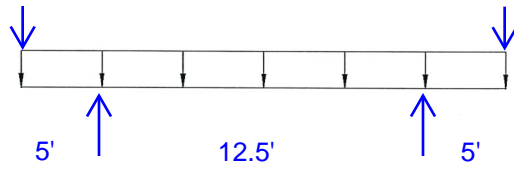
5 1/2" x 18" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING- FRONT ENTRY FASCIA

B44

PARAMETERS:

L = 22.5 FT
W = 0.1 KLF
P = 0.3 K



ANALYSIS:

$R_{MAX} = 1.4$ K $V_D = -$ K $< V_{ALL} = 8.5$ K ADEQUATE
 $M_{MAX} = -1.9$ K-FT $< M_{ALL} = -14.9$ K-FT ADEQUATE
 $\Delta_{TL} = 0.08$ IN. $2 L/1000+$ $< L/240$ ADEQUATE

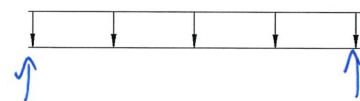
3 1/2" x 12" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING- SIDE ENTRY FASCIA

B45

PARAMETERS:

L = 6.5 FT
W = 0.1 KLF
P = - K



ANALYSIS:

$R_{MAX} = 0.3$ K $V_D = -$ K $< V_{ALL} = 5.4$ K ADEQUATE
 $M_{MAX} = 0.5$ K-FT $< M_{ALL} = 7.0$ K-FT ADEQUATE
 $\Delta_{TL} = 0.12$ IN. $L/1000+$ $< L/240$ ADEQUATE

4x12 DF#2



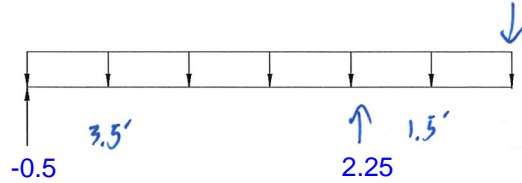
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLOOR FRAMING - CANT'D BMS@ ENTRY

B46

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

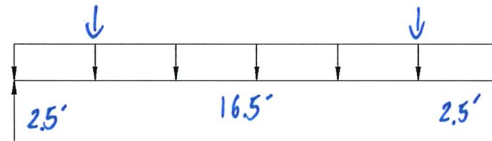
$R_{MAX} =$ K $V_D =$ K $< V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT $< M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $2 L /$ $< L/240$ ADEQUATE

BEAM DESCRIPTION: UPPER FLOOR FRAMING - REAR HDR@ GRAND

B47

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

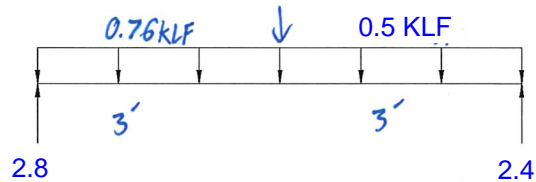
$R_{MAX} =$ K $V_D =$ K $< V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT $< M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $L /$ $< L/240$ ADEQUATE

BEAM DESCRIPTION: UPPER FLOOR FRAMING - GARAGE WINDOW HDR@ BM

B48

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

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



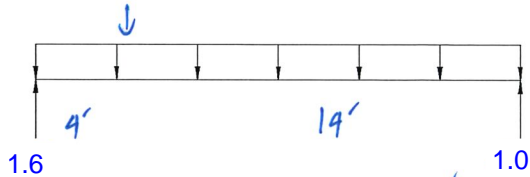
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: MAIN FLOOR FRAMING - BONUS BM @ P.A.

B49

PARAMETERS:

L = 18 FT
W = 0.07 KLF
P = 1.3 K



ANALYSIS:

$R_{MAX} = 1.6$ K $V_D = -$ K $< V_{ALL} = 11.1$ K ADEQUATE
 $M_{MAX} = 7.1$ K-FT $< M_{ALL} = 37.8$ K-FT ADEQUATE
 $\Delta_{TL} = 0.14$ IN. $L/1000+$ $< L/240$ ADEQUATE

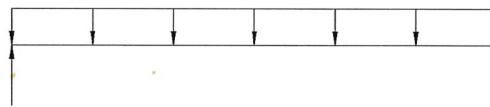
3 1/2"x18" GLB

BEAM DESCRIPTION: MAIN FLOOR FRAMING - BAR/BONUS BM

B50

PARAMETERS:

L = 20.5 FT
W = 0.97 KLF
P = - K



ANALYSIS:

$R_{MAX} = 9.9$ K $V_D = -$ K $< V_{ALL} = 70.5$ K ADEQUATE
 $M_{MAX} = 50.9$ K-FT $< M_{ALL} = 110$ K-FT ADEQUATE
 $\Delta_{TL} = 0.44$ IN. $L/559$ $< L/240$ ADEQUATE

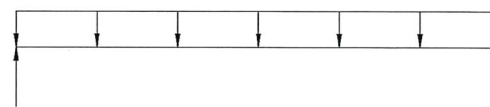
W16x26

BEAM DESCRIPTION: MAIN FLOOR FRAMING - TYP. HDR

B51

PARAMETERS:

L = 8 FT
W = 0.26 KLF
P = - K



ANALYSIS:

$R_{MAX} = 1.0$ K $V_D = -$ K $< V_{ALL} = 3.9$ K ADEQUATE
 $M_{MAX} = 2.1$ K-FT $< M_{ALL} = 4.5$ K-FT ADEQUATE
 $\Delta_{TL} = 0.07$ IN. $L/1000+$ $< L/240$ ADEQUATE

4x10 DF#2



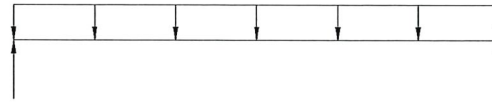
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: MAIN FLOOR FRAMING - TYP. INT. HDR/BM

B52

PARAMETERS:

L = 5 FT
W = 0.48 KLF
P = - K



ANALYSIS:

$R_{MAX} = 1.2$ K $V_D = -$ K $< V_{ALL} = 3.9$ K ADEQUATE
 $M_{MAX} = 1.5$ K-FT $< M_{ALL} = 4.5$ K-FT ADEQUATE
 $\Delta_{TL} = 0.02$ IN. $L/1000+$ $< L/240$ ADEQUATE

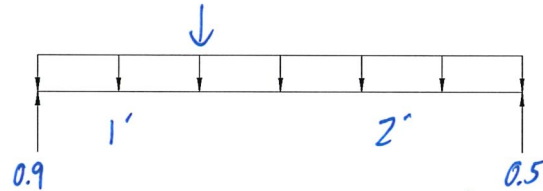
4x10 DF#2

BEAM DESCRIPTION: MAIN FLOOR FRAMING - STORAGE HDR @ BM

B53

PARAMETERS:

L = 3 FT
W = 0.07 KLF
P = 1.2 K



ANALYSIS:

$R_{MAX} = 0.9$ K $V_D = -$ K $< V_{ALL} = 3.9$ K ADEQUATE
 $M_{MAX} = 0.9$ K-FT $< M_{ALL} = 4.5$ K-FT ADEQUATE
 $\Delta_{TL} = 0.004$ IN. $L/1000+$ $< L/240$ ADEQUATE

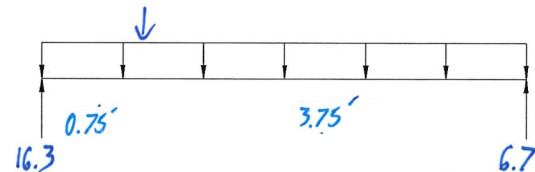
4x10 DF#2

BEAM DESCRIPTION: MAIN FLOOR FRAMING - BONUS BM @ P.A.

B54

PARAMETERS:

L = 4.5 FT
W = 1.9 KLF
P = 14.4 K



ANALYSIS:

$R_{MAX} = 16.3$ K $V_D = 8.2$ K $< V_{ALL} = 11.1$ K ADEQUATE
 $M_{MAX} = 11.8$ K-FT $< M_{ALL} = 37.8$ K-FT ADEQUATE
 $\Delta_{TL} = 0.01$ IN. $L/1000+$ $< L/240$ ADEQUATE

3 1/2" x 18" GLB



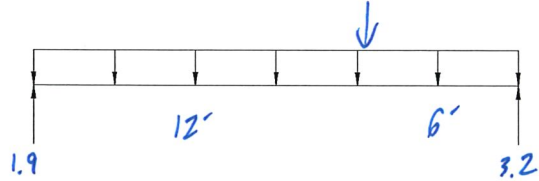
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: MAIN FLOOR FRAMING- MECH BM @ P.A.

B55

PARAMETERS:

L = 18 FT
W = 0.07 KLF
P = 3.8 K



ANALYSIS:

$R_{MAX} = 3.2$ K $V_D = -$ K $< V_{ALL} = 12.8$ K ADEQUATE
 $M_{MAX} = 17.3$ K-FT $< M_{ALL} = 43.5$ K-FT ADEQUATE
 $\Delta_{TL} = 0.3$ IN. $L/720 < L/240$ ADEQUATE

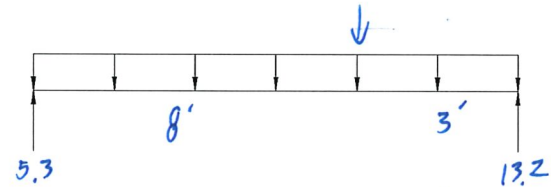
3 1/2" x 18" GLB

BEAM DESCRIPTION: MAIN FLOOR FRAMING- STORAGE BM @ PA

B56

PARAMETERS:

L = 11 FT
W = 0.11 KLF
P = 16.1 K



ANALYSIS:

$R_{MAX} = 13.2$ K $V_D = -$ K $< V_{ALL} = 20.1$ K ADEQUATE
 $M_{MAX} = 39.1$ K-FT $< M_{ALL} = 68.3$ K-FT ADEQUATE
 $\Delta_{TL} = 0.14$ IN. $L/961 < L/240$ ADEQUATE

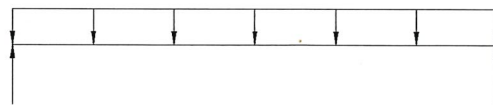
5 1/2" x 18" GLB

BEAM DESCRIPTION: MAIN FLOOR FRAMING- BM @ EDGE OF DECK

B57

PARAMETERS:

L = 17.5 FT
W = 0.15 KLF
P = - K



ANALYSIS:

$R_{MAX} = 1.3$ K $V_D = -$ K $< V_{ALL} = 7.9$ K ADEQUATE
 $M_{MAX} = 5.7$ K-FT $< M_{ALL} = 17.9$ K-FT ADEQUATE
 $\Delta_{TL} = 0.32$ IN. $L/656 < L/240$ ADEQUATE

(2) 1 3/4" x 11 3/8" LVL



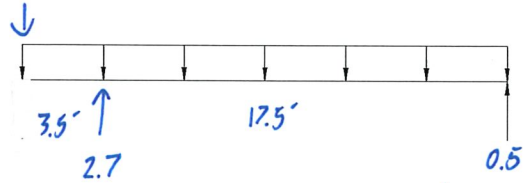
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: MAIN FLOOR FRAMING - CANT'D BMS @ EDGE OF DECK

B58

PARAMETERS:

L = 21 FT
W = 0.09 KLF
P = 1.3 K



ANALYSIS:

$R_{MAX} = 2.7$ K $V_D = -$ K $< V_{ALL} = 7.9$ K ADEQUATE
 $M_{MAX} = 2.8$ K-FT $< M_{ALL} = 17.9$ K-FT ADEQUATE
 $\Delta_{TL} = 0.19$ IN. $L/442 < L/240$ ADEQUATE

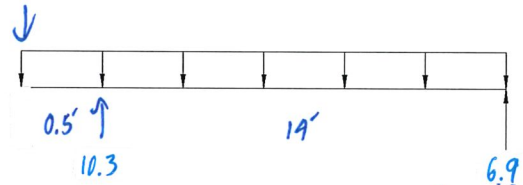
(2) 1 3/4" x 11 7/8" LVL

BEAM DESCRIPTION: MAIN FLOOR FRAMING - CANT'D BMS @ DECK

B59

PARAMETERS:

L = 14.5 FT
W = 1.0 KLF
P = 2.7 K



ANALYSIS:

$R_{MAX} = 10.3$ K $V_D = -$ K $< V_{ALL} = 11.9$ K ADEQUATE
 $M_{MAX} = 24.5$ K-FT $< M_{ALL} = 26.8$ K-FT ADEQUATE
 $\Delta_{TL} = 0.5$ IN. $L/336 < L/240$ ADEQUATE

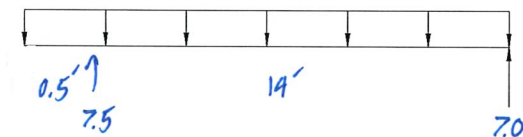
(3) 1 3/4" x 11 7/8" LVL

BEAM DESCRIPTION: MAIN FLOOR FRAMING - MID DECK BM

B60

PARAMETERS:

L = 14.5 FT
W = 1.0 KLF
P = - K



ANALYSIS:

$R_{MAX} = 7.5$ K $V_D = -$ K $< V_{ALL} = 11.9$ K ADEQUATE
 $M_{MAX} = 24.5$ K-FT $< M_{ALL} = 26.8$ K-FT ADEQUATE
 $\Delta_{TL} = 0.5$ IN. $L/336 < L/240$ ADEQUATE

(3) 1 3/4" x 11 7/8" LVL



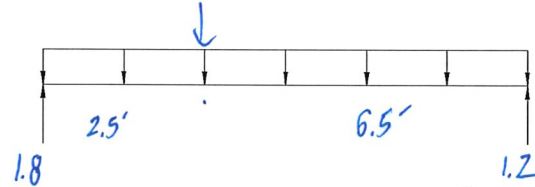
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: MAIN FLOOR FRAMING - GUEST HDR @ BM

B61

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

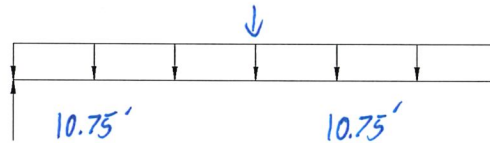
$R_{MAX} =$ K $V_D =$ K $< V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT $< M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $L/$ $< L/240$ ADEQUATE

BEAM DESCRIPTION: MAIN FLOOR FRAMING - REAR BONUS HDR

B62

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

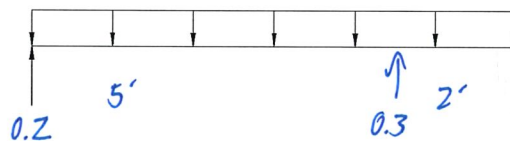
$R_{MAX} =$ K $V_D =$ K $< V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT $< M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $L/$ $< L/240$ ADEQUATE

BEAM DESCRIPTION: UPPER FLOOR FRAMING - TYP. HIP

B63

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

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



BEAM & HEADER CALCULATIONS

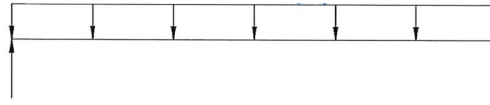
BEAM DESCRIPTION: MAIN FLOOR FRAMING - BM @ SW ABOVE

B64

PARAMETERS:

L = FT
W = KLF
P = K

SEE ENERCALC
OUTPUR



ANALYSIS:

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

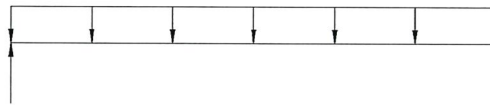
3 1/2"x18" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING - GREAT BM

B65

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

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

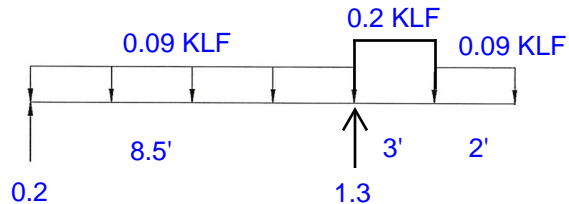
(2) 1 3/4"x11 7/8" LVL

BEAM DESCRIPTION: MAIN FLOOR FRAMING - CANT'D BM @ DECK STAIR

B66

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

$R_{MAX} =$ K $V_D =$ K < $V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT < $M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $2 L/$ < $L/240$ ADEQUATE

(3) 1 3/4"x11 7/8" LVL



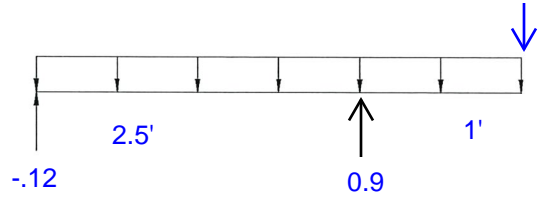
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: MAIN FLOOR FRAMING - DECK LANDING BMS

B67

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

$R_{MAX} =$ K $V_D =$ K < $V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT < $M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $2 L/$ < $L/240$ ADEQUATE

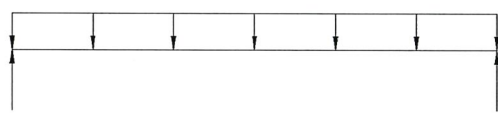
4x12 DF#2

BEAM DESCRIPTION: ROOF FRAMING - RIDGE/VALLEY @ FAMILY

B68

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

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

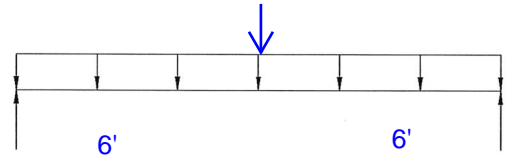
4x12 DF#2

BEAM DESCRIPTION: ROOF FRAMING - BM @ PITCH CHANGE @ FAMILY

B69

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

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

4x12 DF#2

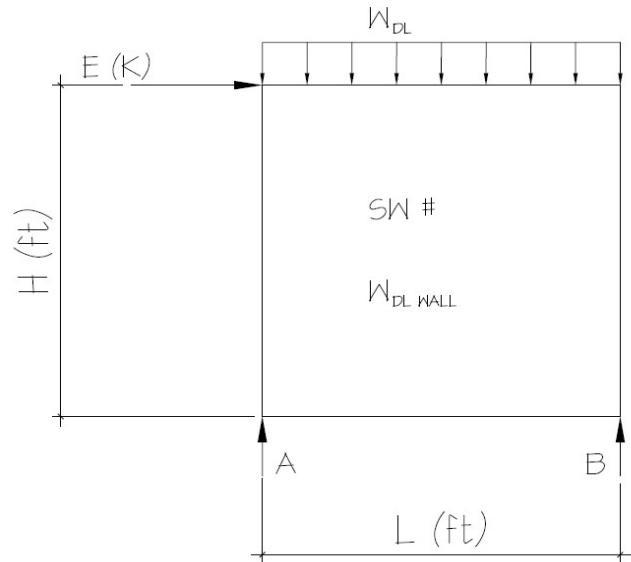


OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #: 105

PARAMETERS:

L = 19.8 FT
H = 11.3 FT
E = 1.50 K
W_{DL WALL} = 0.10 KLF
W_{DL} = 0.000 KLF
Ω₀ = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE G)
SDS = 1.176



ANALYSIS:

$E_{MH} = \Omega_0 * E = 3.75$ K $E_v = 0.2 * SDS * DL = 0.465$ K
 $E_M = E_{MH} + E_v = 4.215$ K
 $E_M = E_{MH} - E_v = 3.285$ K

$E_M (MAX) = \sum M_A = 0 = 4.21(11.3) + 0.1(19.75)(9.875) - R_B(19.75)$ $R_B = 1.0DL + 2.4E$
 $R_A = 1.0DL - 2.4E$
 $E_M (MIN) = \sum M_A = 0 = 3.29(11.3) + 0.1(19.75)(9.875) - R_B(19.75)$ $R_B = 1.0DL + 1.9E$
 $R_A = 1.0DL - 1.9E$

CHECK BEAMS FOR AXIAL FORCES SHOWN USING LOAD COMBOS PER SECTION 12.4.3.1 (ASD)

ALLOWABLE STRESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM
CALCS FOR LOAD
APPLICATION

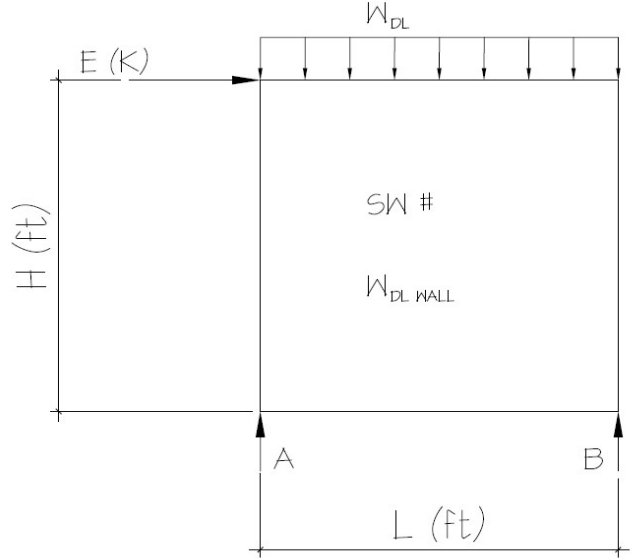


OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #: 110

PARAMETERS:

- L = 8.3 FT
- H = 9.5 FT
- E = 0.50 K
- W_{DL WALL} = 0.10 KLF
- W_{DL} = 0.000 KLF
- Ω₀ = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE G)
- SDS = 1.176



ANALYSIS:

$E_{MH} = \Omega_0 * E = 1.25 \text{ K}$ $E_v = 0.2 * SDS * DL = 0.196 \text{ K}$
 $E_M = E_{MH} + E_v = 1.446 \text{ K}$
 $E_M = E_{MH} - E_v = 1.054 \text{ K}$

$E_M (\text{MAX}) = \sum M_A = 0 = 1.45(9.5) + 0.1(8.33)(4.165) - R_B(8.33)$ $R_B = 0.4DL + 1.6E$
 $R_A = 0.4DL - 1.6E$
 $E_M (\text{MIN}) = \sum M_A = 0 = 1.05(9.5) + 0.1(8.33)(4.165) - R_B(8.33)$ $R_B = 0.4DL + 1.2E$
 $R_A = 0.4DL - 1.2E$

CHECK BEAMS FOR AXIAL FORCES SHOWN USING LOAD COMBOS PER SECTION 12.4.3.1 (ASD)

ALLOWABLE STRESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM
CALCS FOR LOAD
APPLICATION



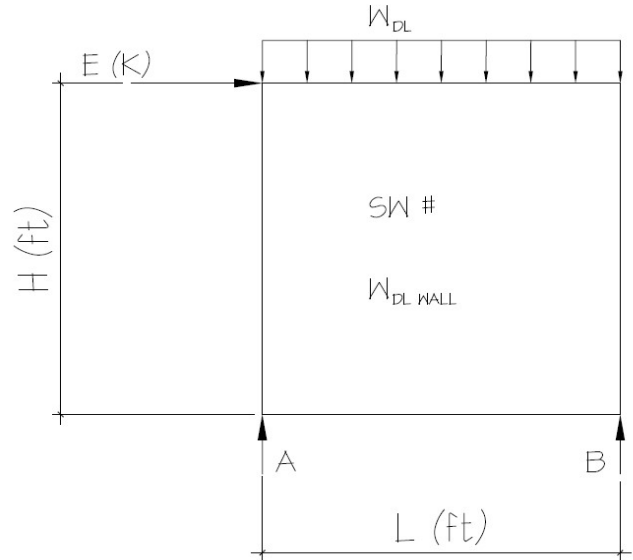
OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #:

201

PARAMETERS:

L = 20.8 FT
H = 11.0 FT
E = 1.70 K
W_{DL WALL} = 0.10 KLF
W_{DL} = 0.020 KLF
Ω₀ = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE G)
SDS = 1.176



ANALYSIS:

$E_{MH} = \Omega_0 * E = 4.25$ K $E_v = 0.2 * SDS * DL = 0.586$ K
 $E_M = E_{MH} + E_v = 4.836$ K
 $E_M = E_{MH} - E_v = 3.664$ K

$E_M (MAX) = \sum M_A = 0 = 4.84(11.0) + 0.12(20.75)(10.375) - R_B(20.75)$ $R_B = 1.2DL + 2.6E$
 $R_A = 1.2DL - 2.6E$

$E_M (MIN) = \sum M_A = 0 = 3.66(11.0) + 0.12(20.75)(10.375) - R_B(20.75)$ $R_B = 1.2DL + 1.9E$
 $R_A = 1.2DL - 1.9E$

CHECK BEAMS FOR AXIAL FORCES SHOWN USING LOAD COMBOS PER SECTION 12.4.3.1 (ASD)

ALLOWABLE STRESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM
CALCS FOR LOAD
APPLICATION



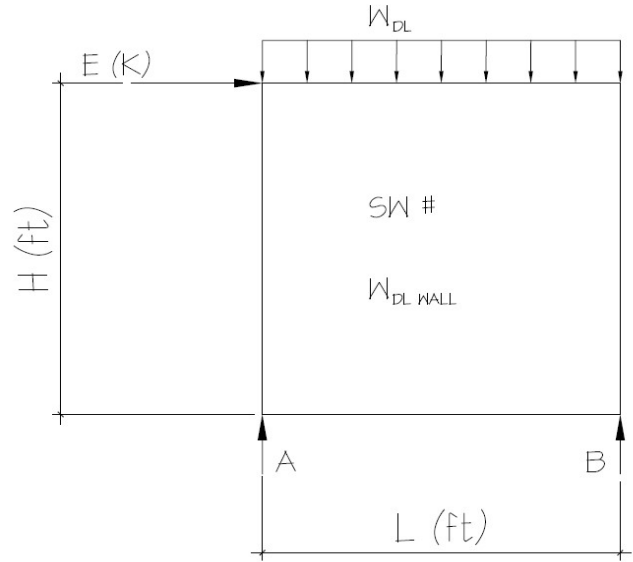
OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #:

203

PARAMETERS:

L = 27.8 FT
H = 8.0 FT
E = 4.20 K
W_{DL WALL} = 0.10 KLF
W_{DL} = 0.045 KLF
Ω₀ = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE G)
SDS = 1.176



ANALYSIS:

$E_{MH} = \Omega_0 * E = 10.50$ K
 $E_v = 0.2 * SDS * DL = 0.946$ K
 $E_M = E_{MH} + E_v = 11.446$ K
 $E_M = E_{MH} - E_v = 9.554$ K

$E_M (MAX) = \sum M_A = 0 = 11.45(8.0) + 0.145(27.75)(13.875) - R_B(27.75)$ $R_B = 2.0DL + 3.3E$
 $R_A = 2.0DL - 3.3E$

$E_M (MIN) = \sum M_A = 0 = 9.55(8.0) + 0.145(27.75)(13.875) - R_B(27.75)$ $R_B = 2.0DL + 2.8E$
 $R_A = 2.0DL - 2.8E$

CHECK BEAMS FOR AXIAL FORCES SHOWN USING LOAD COMBOS PER SECTION 12.4.3.1 (ASD)

ALLOWABLE STRESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM
CALCS FOR LOAD
APPLICATION



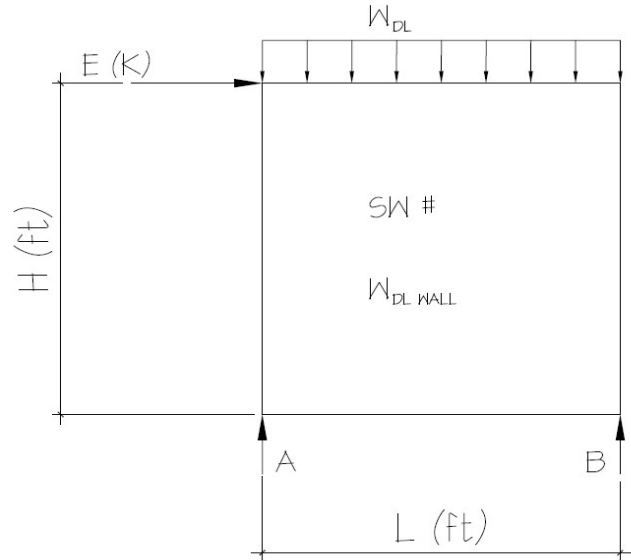
OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #:

204

PARAMETERS:

L = 26.8 FT
H = 8.0 FT
E = 1.00 K
W_{DL WALL} = 0.10 KLF
W_{DL} = 0.045 KLF
Ω₀ = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE G)
SDS = 1.176



ANALYSIS:

$E_{MH} = \Omega_0 * E = 2.50$ K $E_v = 0.2 * SDS * DL = 0.912$ K
 $E_M = E_{MH} + E_v = 3.412$ K
 $E_M = E_{MH} - E_v = 1.588$ K

$E_M (MAX) = \sum M_A = 0 = 3.41(8.0) + 0.145(26.75)(13.375) - R_B(26.75)$ $R_B = 1.9DL + 1.0E$
 $R_A = 1.9DL - 1.0E$
 $E_M (MIN) = \sum M_A = 0 = 1.59(8.0) + 0.145(26.75)(13.375) - R_B(26.75)$ $R_B = 1.9DL + 0.5E$
 $R_A = 1.9DL - 0.5E$

CHECK BEAMS FOR AXIAL FORCES SHOWN USING LOAD COMBOS PER SECTION 12.4.3.1 (ASD)

ALLOWABLE STRESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM
CALCS FOR LOAD
APPLICATION



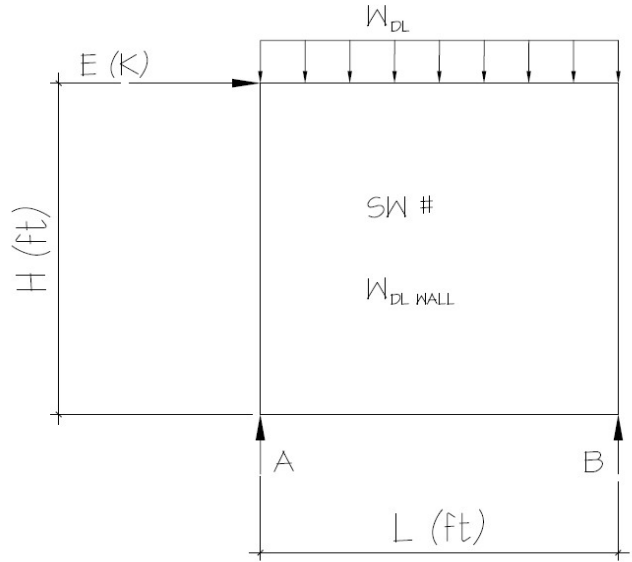
OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #:

205

PARAMETERS:

- L = 8.0 FT
- H = 8.0 FT
- E = 1.00 K
- W_{DLWALL} = 0.10 KLF
- W_{DL} = 0.080 KLF
- Ω_0 = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE G)
- SDS = 1.176



ANALYSIS:

$E_{MH} = \Omega_0 * E = 2.50$ K $E_v = 0.2 * SDS * DL = 0.339$ K

$E_M = E_{MH} + E_v = 2.839$ K

$E_M = E_{MH} - E_v = 2.161$ K

$E_M (MAX) = \sum M_A = 0 = 2.84(8.0) + 0.18(B)(4) - R_B(B)$ $R_B = 0.7DL + 2.8E$

$R_A = 0.7DL - 2.8E$

$E_M (MIN) = \sum M_A = 0 = 2.16(8.0) + 0.18(B)(4) - R_B(B)$ $R_B = 0.7DL + 2.2E$

$R_A = 0.7DL - 2.2E$

CHECK BEAMS FOR AXIAL FORCES SHOWN USING LOAD COMBOS PER SECTION 12.4.3.1 (ASD)

ALLOWABLE STRESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM
CALCS FOR LOAD
APPLICATION



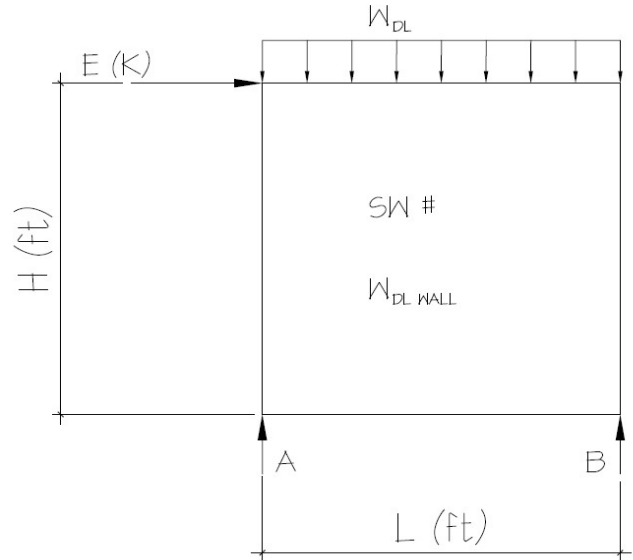
OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #:

207

PARAMETERS:

L = 20.0 FT
H = 9.5 FT
E = 1.10 K
W_{DL WALL} = 0.10 KLF
W_{DL} = 0.050 KLF
Ω₀ = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE G)
SDS = 1.176



ANALYSIS:

$E_{MH} = \Omega_0 * E = 2.75$ K $E_v = 0.2 * SDS * DL = 0.706$ K
 $E_M = E_{MH} + E_v = 3.456$ K
 $E_M = E_{MH} - E_v = 2.044$ K

$E_M (MAX) = \sum M_A = 0 = 3.46(9.5) + 0.15(20)(10) - R_B(20)$ $R_B = 1.5DL + 1.6E$
 $R_A = 1.5DL - 1.6E$
 $E_M (MIN) = \sum M_A = 0 = 2.04(9.5) + 0.15(20)(10) - R_B(20)$ $R_B = 1.5DL + 1.0E$
 $R_A = 1.5DL - 1.0E$

CHECK BEAMS FOR AXIAL FORCES SHOWN USING LOAD COMBOS PER SECTION 12.4.3.1 (ASD)

ALLOWABLE STRESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM
CALCS FOR LOAD
APPLICATION



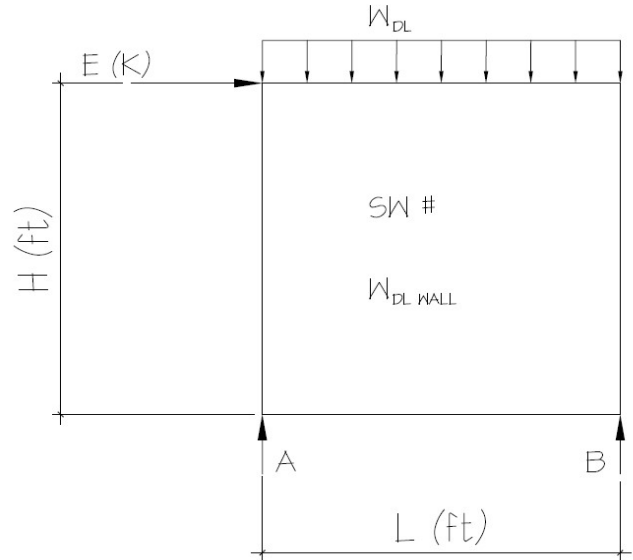
OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #:

208

PARAMETERS:

- L = 13.8 FT
- H = 8.0 FT
- E = 2.00 K
- W_{DL WALL} = 0.10 KLF
- W_{DL} = 0.068 KLF
- Ω₀ = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE G)
- SDS = 1.176



ANALYSIS:

$$E_{MH} = \Omega_0 * E = 5.00 \text{ K}$$

$$E_v = 0.2 * SDS * DL = 0.543 \text{ K}$$

$$E_M = E_{MH} + E_v = 5.543 \text{ K}$$

$$E_M = E_{MH} - E_v = 4.457 \text{ K}$$

$$E_M (\text{MAX}) = \sum M_A = 0 = 5.54(8.0) + 0.168(13.75)(6.875) - R_B(13.75)$$

$$R_B = 1.2DL + 3.2E$$

$$R_A = 1.2DL - 3.2E$$

$$E_M (\text{MIN}) = \sum M_A = 0 = 4.46(8.0) + 0.168(13.75)(6.875) - R_B(13.75)$$

$$R_B = 1.2DL + 2.6E$$

$$R_A = 1.2DL - 2.6E$$

CHECK BEAMS FOR AXIAL FORCES SHOWN USING LOAD COMBOS PER SECTION 12.4.3.1 (ASD)

ALLOWABLE STRESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM
CALCS FOR LOAD
APPLICATION



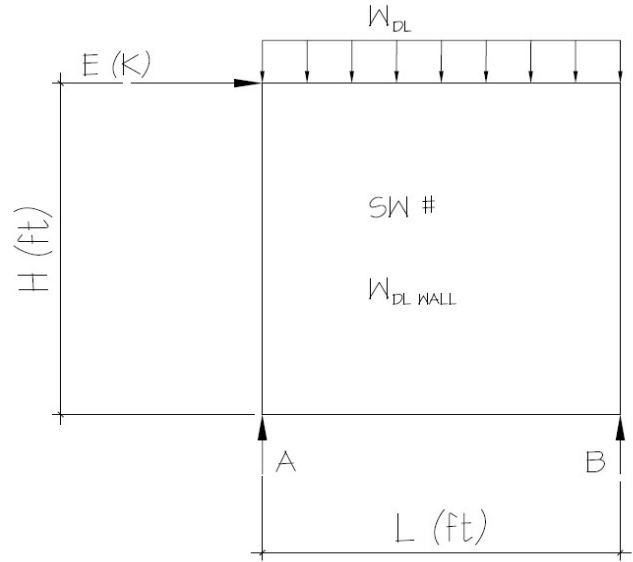
OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #:

209

PARAMETERS:

L = 16.3 FT
H = 8.0 FT
E = 2.40 K
W_{DL WALL} = 0.10 KLF
W_{DL} = 0.063 KLF
Ω₀ = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE G)
SDS = 1.176



ANALYSIS:

$E_{MH} = \Omega_0 * E = 6.00$ K
 $E_v = 0.2 * SDS * DL = 0.626$ K
 $E_M = E_{MH} + E_v = 6.626$ K
 $E_M = E_{MH} - E_v = 5.374$ K

$E_M (MAX) = \sum M_A = 0 = 6.63(8.0) + 0.163(16.33)(8.165) - R_B(16.33)$ $R_B = 1.3DL + 3.2E$
 $R_A = 1.3DL - 3.2E$
 $E_M (MIN) = \sum M_A = 0 = 5.37(8.0) + 0.163(16.33)(8.165) - R_B(16.33)$ $R_B = 1.3DL + 2.6E$
 $R_A = 1.3DL - 2.6E$

CHECK BEAMS FOR AXIAL FORCES SHOWN USING LOAD COMBOS PER SECTION 12.4.3.1 (ASD)

ALLOWABLE STRESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM
CALCS FOR LOAD
APPLICATION



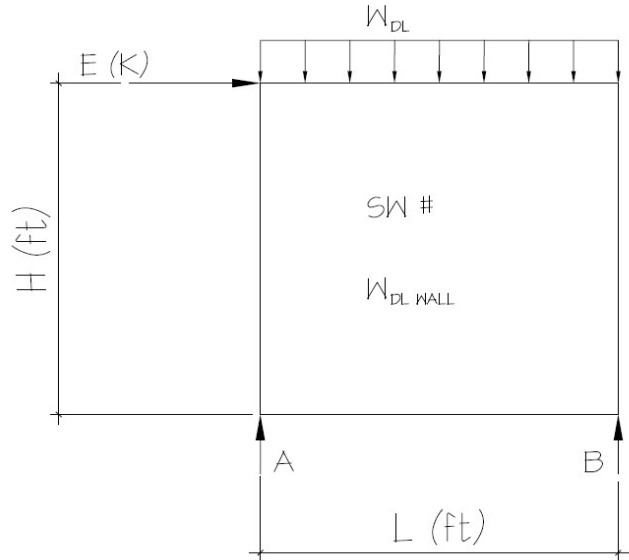
OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #:

210

PARAMETERS:

L = 6.3 FT
H = 10.3 FT
E = 1.80 K
W_{DL WALL} = 0.10 KLF
W_{DL} = 0.020 KLF
Ω₀ = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE G)
SDS = 1.176



ANALYSIS:

$E_{MH} = \Omega_0 * E = 4.50$ K $E_v = 0.2 * SDS * DL = 0.179$ K
 $E_M = E_{MH} + E_v = 4.679$ K
 $E_M = E_{MH} - E_v = 4.321$ K

$E_M (MAX) = \sum M_A = 0 = 4.68(10.3) + 0.12(6.33)(3.165) - R_B(6.33)$ $R_B = 0.4DL + 7.6E$
 $R_A = 0.4DL - 7.6E$
 $E_M (MIN) = \sum M_A = 0 = 4.32(10.3) + 0.12(6.33)(3.165) - R_B(6.33)$ $R_B = 0.4DL + 7.0E$
 $R_A = 0.4DL - 7.0E$

CHECK BEAMS FOR AXIAL FORCES SHOWN USING LOAD COMBOS PER SECTION 12.4.3.1 (ASD)

ALLOWABLE STRESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM
CALCS FOR LOAD
APPLICATION

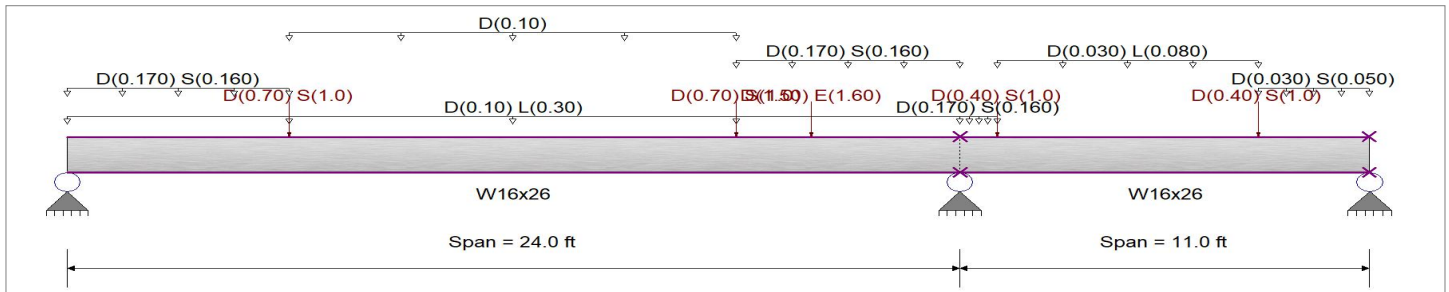
DESCRIPTION: B16

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	E : Modulus :	29,000.0 ksi
Bending Axis : Major Axis Bending		



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 = 0.10, L = 0.30 k/ft, Tributary Width = 1.0 ft

Point Load : D = 0.70, S = 1.0 k @ 6.0 ft

Point Load : D = 0.70, S = 1.0 k @ 18.0 ft

Uniform Load : D = 0.170, S = 0.160 k/ft, Extent = 0.0 -->> 6.0 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.170, S = 0.160 k/ft, Extent = 18.0 -->> 24.0 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.10 k/ft, Extent = 6.0 -->> 18.0 ft, Tributary Width = 1.0 ft

Point Load : D = 1.50, E = 1.60 k @ 20.0 ft

Load for Span Number 2

Uniform Load : D = 0.170, S = 0.160 k/ft, Extent = 0.0 -->> 1.0 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.030, S = 0.050 k/ft, Extent = 8.0 -->> 11.0 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.030, L = 0.080 k/ft, Extent = 1.0 -->> 8.0 ft, Tributary Width = 1.0 ft

Point Load : D = 0.40, S = 1.0 k @ 1.0 ft

Point Load : D = 0.40, S = 1.0 k @ 8.0 ft

Wellmon Residence
 Lochwood Lozier
 RJD
 268-22010
 11-21-22

Steel Beam

Project File: beam calcs with overstrength.ec6

LIC#: KW-06017913, Build:20.23.2.14

MULHERN & KULP STRUCTURAL ENGINEERING INC

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DESCRIPTION: B16

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =		0.346 : 1	Maximum Shear Stress Ratio =		0.164 : 1
Section used for this span		W16x26	Section used for this span		W16x26
Ma : Applied		38.192 k-ft	Va : Applied		11.543 k
Mn / Omega : Allowable		110.279 k-ft	Vn/Omega : Allowable		70.509 k
Load Combination: 0.750L+0.750S+0.5250E+H, LL Comb Run (LL)			Load Combination: 0.750L+0.750S+0.5250E+H, LL Comb Run (LL)		
Location of maximum on span			Location of maximum on span		24.000 ft
Span # where maximum occurs		Span # 1	Span # where maximum occurs		Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.154 in	Ratio =	1,875	>=360
Max Upward Transient Deflection		-0.023 in	Ratio =	5,740	>=360
Max Downward Total Deflection		0.345 in	Ratio =	835	>=180
Max Upward Total Deflection		-0.050 in	Ratio =	2621	>=180
Span: 2 : L Only, LL Comb Run (L*)					
Span: 2 : L Only, LL Comb Run (L*)					
Span: 2 : +D+0.750L+0.750S+0.5250E+H, LL Comb Run					
Span: 2 : +D+0.750L+0.750S+0.5250E+H, LL Comb Run					

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx
+D+H													
Dsgn. L = 24.00 ft	1	0.174	0.083	15.80	-19.19	19.19	184.17	110.28	1.00	1.00	5.88	117.75	70.51
Dsgn. L = 11.00 ft	2	0.174	0.038		-19.19	19.19	184.17	110.28	1.00	1.00	2.66	117.75	70.51
+D+L+H, LL Comb Run (*L)													
Dsgn. L = 24.00 ft	1	0.177	0.084	15.68	-19.51	19.51	184.17	110.28	1.00	1.00	5.89	117.75	70.51
Dsgn. L = 11.00 ft	2	0.177	0.043		-19.51	19.51	184.17	110.28	1.00	1.00	3.02	117.75	70.51
+D+L+H, LL Comb Run (L*)													
Dsgn. L = 24.00 ft	1	0.308	0.143	30.62	-34.00	34.00	184.17	110.28	1.00	1.00	10.10	117.75	70.51
Dsgn. L = 11.00 ft	2	0.308	0.057		-34.00	34.00	184.17	110.28	1.00	1.00	4.01	117.75	70.51
+D+L+H, LL Comb Run (LL)													
Dsgn. L = 24.00 ft	1	0.311	0.143	30.50	-34.32	34.32	184.17	110.28	1.00	1.00	10.11	117.75	70.51
Dsgn. L = 11.00 ft	2	0.311	0.062		-34.32	34.32	184.17	110.28	1.00	1.00	4.36	117.75	70.51
+D+Lr+H, LL Comb Run (*L)													
Dsgn. L = 24.00 ft	1	0.174	0.083	15.80	-19.19	19.19	184.17	110.28	1.00	1.00	5.88	117.75	70.51
Dsgn. L = 11.00 ft	2	0.174	0.038		-19.19	19.19	184.17	110.28	1.00	1.00	2.66	117.75	70.51
+D+Lr+H, LL Comb Run (L*)													
Dsgn. L = 24.00 ft	1	0.174	0.083	15.80	-19.19	19.19	184.17	110.28	1.00	1.00	5.88	117.75	70.51
Dsgn. L = 11.00 ft	2	0.174	0.038		-19.19	19.19	184.17	110.28	1.00	1.00	2.66	117.75	70.51
+D+Lr+H, LL Comb Run (LL)													
Dsgn. L = 24.00 ft	1	0.174	0.083	15.80	-19.19	19.19	184.17	110.28	1.00	1.00	5.88	117.75	70.51
Dsgn. L = 11.00 ft	2	0.174	0.038		-19.19	19.19	184.17	110.28	1.00	1.00	2.66	117.75	70.51
+D+S+H													
Dsgn. L = 24.00 ft	1	0.245	0.116	21.79	-27.05	27.05	184.17	110.28	1.00	1.00	8.17	117.75	70.51
Dsgn. L = 11.00 ft	2	0.245	0.067		-27.05	27.05	184.17	110.28	1.00	1.00	4.73	117.75	70.51
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 24.00 ft	1	0.176	0.084	15.71	-19.43	19.43	184.17	110.28	1.00	1.00	5.89	117.75	70.51
Dsgn. L = 11.00 ft	2	0.176	0.042		-19.43	19.43	184.17	110.28	1.00	1.00	2.93	117.75	70.51
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 24.00 ft	1	0.275	0.128	26.92	-30.30	30.30	184.17	110.28	1.00	1.00	9.04	117.75	70.51
Dsgn. L = 11.00 ft	2	0.275	0.052		-30.30	30.30	184.17	110.28	1.00	1.00	3.67	117.75	70.51
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 24.00 ft	1	0.277	0.128	26.82	-30.54	30.54	184.17	110.28	1.00	1.00	9.05	117.75	70.51
Dsgn. L = 11.00 ft	2	0.277	0.056		-30.54	30.54	184.17	110.28	1.00	1.00	3.94	117.75	70.51
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 24.00 ft	1	0.230	0.108	20.16	-25.32	25.32	184.17	110.28	1.00	1.00	7.61	117.75	70.51
Dsgn. L = 11.00 ft	2	0.230	0.064		-25.32	25.32	184.17	110.28	1.00	1.00	4.48	117.75	70.51
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 24.00 ft	1	0.328	0.153	31.25	-36.20	36.20	184.17	110.28	1.00	1.00	10.76	117.75	70.51
Dsgn. L = 11.00 ft	2	0.328	0.074		-36.20	36.20	184.17	110.28	1.00	1.00	5.22	117.75	70.51
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 24.00 ft	1	0.330	0.153	31.16	-36.43	36.43	184.17	110.28	1.00	1.00	10.77	117.75	70.51
Dsgn. L = 11.00 ft	2	0.330	0.078		-36.43	36.43	184.17	110.28	1.00	1.00	5.49	117.75	70.51
+D+0.60W+H													
Dsgn. L = 24.00 ft	1	0.174	0.083	15.80	-19.19	19.19	184.17	110.28	1.00	1.00	5.88	117.75	70.51
Dsgn. L = 11.00 ft	2	0.174	0.038		-19.19	19.19	184.17	110.28	1.00	1.00	2.66	117.75	70.51
+D+0.750Lr+0.750L+0.450W+H, LL Comb													
Dsgn. L = 24.00 ft	1	0.176	0.084	15.71	-19.43	19.43	184.17	110.28	1.00	1.00	5.89	117.75	70.51
Dsgn. L = 11.00 ft	2	0.176	0.042		-19.43	19.43	184.17	110.28	1.00	1.00	2.93	117.75	70.51

Wellmon Residence
 Lochwood Lozier
 RJD
 268-22010
 11-21-22

Steel Beam

Project File: beam calcs with overstrength.ec6

LIC# : KW-06017913, Build:20.23.2.14

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: B16

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values					Summary of Shear Values				
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega Cb	Rm	Va Max	Vnx/Vnx/Omega		
+D+0.750Lr+0.750L+0.450W+H, I	Dsgn. L = 24.00 ft	1	0.275	0.128	26.92	-30.30	30.30	184.17	110.28	1.00	1.00	9.04	117.75	70.51
	Dsgn. L = 11.00 ft	2	0.275	0.052		-30.30	30.30	184.17	110.28	1.00	1.00	3.67	117.75	70.51
+D+0.750Lr+0.750L+0.450W+H, I	Dsgn. L = 24.00 ft	1	0.277	0.128	26.82	-30.54	30.54	184.17	110.28	1.00	1.00	9.05	117.75	70.51
	Dsgn. L = 11.00 ft	2	0.277	0.056		-30.54	30.54	184.17	110.28	1.00	1.00	3.94	117.75	70.51
+D+0.750L+0.750S+0.450W+H, L	Dsgn. L = 24.00 ft	1	0.230	0.108	20.16	-25.32	25.32	184.17	110.28	1.00	1.00	7.61	117.75	70.51
	Dsgn. L = 11.00 ft	2	0.230	0.064		-25.32	25.32	184.17	110.28	1.00	1.00	4.48	117.75	70.51
+D+0.750L+0.750S+0.450W+H, L	Dsgn. L = 24.00 ft	1	0.328	0.153	31.25	-36.20	36.20	184.17	110.28	1.00	1.00	10.76	117.75	70.51
	Dsgn. L = 11.00 ft	2	0.328	0.074		-36.20	36.20	184.17	110.28	1.00	1.00	5.22	117.75	70.51
+D+0.750L+0.750S+0.450W+H, L	Dsgn. L = 24.00 ft	1	0.330	0.153	31.16	-36.43	36.43	184.17	110.28	1.00	1.00	10.77	117.75	70.51
	Dsgn. L = 11.00 ft	2	0.330	0.078		-36.43	36.43	184.17	110.28	1.00	1.00	5.49	117.75	70.51
+0.60D+0.60W+0.60H	Dsgn. L = 24.00 ft	1	0.104	0.050	9.48	-11.51	11.51	184.17	110.28	1.00	1.00	3.53	117.75	70.51
	Dsgn. L = 11.00 ft	2	0.104	0.023		-11.51	11.51	184.17	110.28	1.00	1.00	1.60	117.75	70.51
+D+0.70E+0.60H	Dsgn. L = 24.00 ft	1	0.195	0.098	16.67	-21.54	21.54	184.17	110.28	1.00	1.00	6.91	117.75	70.51
	Dsgn. L = 11.00 ft	2	0.195	0.041		-21.54	21.54	184.17	110.28	1.00	1.00	2.87	117.75	70.51
+D-0.70E+0.60H	Dsgn. L = 24.00 ft	1	0.153	0.069	14.97	-16.84	16.84	184.17	110.28	1.00	1.00	4.85	117.75	70.51
	Dsgn. L = 11.00 ft	2	0.153	0.035		-16.84	16.84	184.17	110.28	1.00	1.00	2.45	117.75	70.51
+D+0.750L+0.750S+0.5250E+H, I	Dsgn. L = 24.00 ft	1	0.246	0.119	20.74	-27.08	27.08	184.17	110.28	1.00	1.00	8.38	117.75	70.51
	Dsgn. L = 11.00 ft	2	0.246	0.066		-27.08	27.08	184.17	110.28	1.00	1.00	4.64	117.75	70.51
+D+0.750L+0.750S+0.5250E+H, I	Dsgn. L = 24.00 ft	1	0.344	0.164	31.87	-37.96	37.96	184.17	110.28	1.00	1.00	11.53	117.75	70.51
	Dsgn. L = 11.00 ft	2	0.344	0.076		-37.96	37.96	184.17	110.28	1.00	1.00	5.38	117.75	70.51
+D+0.750L+0.750S+0.5250E+H, I	Dsgn. L = 24.00 ft	1	0.346	0.164	31.78	-38.19	38.19	184.17	110.28	1.00	1.00	11.54	117.75	70.51
	Dsgn. L = 11.00 ft	2	0.346	0.080		-38.19	38.19	184.17	110.28	1.00	1.00	5.65	117.75	70.51
+D+0.750L+0.750S-0.5250E+H, L	Dsgn. L = 24.00 ft	1	0.214	0.097	19.61	-23.56	23.56	184.17	110.28	1.00	1.00	6.83	117.75	70.51
	Dsgn. L = 11.00 ft	2	0.214	0.061		-23.56	23.56	184.17	110.28	1.00	1.00	4.32	117.75	70.51
+D+0.750L+0.750S-0.5250E+H, L	Dsgn. L = 24.00 ft	1	0.312	0.142	30.64	-34.44	34.44	184.17	110.28	1.00	1.00	9.99	117.75	70.51
	Dsgn. L = 11.00 ft	2	0.312	0.072		-34.44	34.44	184.17	110.28	1.00	1.00	5.06	117.75	70.51
+D+0.750L+0.750S-0.5250E+H, L	Dsgn. L = 24.00 ft	1	0.314	0.142	30.55	-34.67	34.67	184.17	110.28	1.00	1.00	10.00	117.75	70.51
	Dsgn. L = 11.00 ft	2	0.314	0.076		-34.67	34.67	184.17	110.28	1.00	1.00	5.33	117.75	70.51

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	0.3451	11.040		0.0000	0.000
	2	0.0000	11.040	+D+0.750L+0.750S+0.5250E+H	-0.0504	4.488

Vertical Reactions

Load Combination	Support notation : Far left is #'			Values in KIPS
	Support 1	Support 2	Support 3	
Max Upward from all Load Conditions	6.810	17.194	0.240	
Max Upward from Load Combinations	6.810	17.194		
Max Upward from Load Cases	3.282	8.541	0.240	
Max Downward from all Load Conditions (Resis)	-0.013		-2.449	
Max Downward from Load Combinations (Resis)			-2.449	
Max Downward from Load Cases (Resisting Up)	-0.013		-1.346	
+D+H	3.282	8.541	-1.103	
+D+L+H, LL Comb Run (*L)	3.269	8.913	-0.902	
+D+L+H, LL Comb Run (L*)	6.265	14.104	-2.449	
+D+L+H, LL Comb Run (LL)	6.252	14.477	-2.249	
+D+Lr+H, LL Comb Run (*L)	3.282	8.541	-1.103	
+D+Lr+H, LL Comb Run (L*)	3.282	8.541	-1.103	
+D+Lr+H, LL Comb Run (LL)	3.282	8.541	-1.103	

Wellmon Residence
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Steel Beam

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LIC# : KW-06017913, Build:20.23.2.14

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: B16

Vertical Reactions

Support notation : Far left is #

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+S+H	4.915	12.898	-0.863
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	3.273	8.820	-0.953
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	5.520	12.713	-2.113
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	5.510	12.993	-1.962
+D+0.750L+0.750S+H, LL Comb Run (*L)	4.497	12.088	-0.772
+D+0.750L+0.750S+H, LL Comb Run (L*)	6.744	15.981	-1.933
+D+0.750L+0.750S+H, LL Comb Run (LL)	6.734	16.261	-1.782
+D+0.60W+H	3.282	8.541	-1.103
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur	3.273	8.820	-0.953
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur	5.520	12.713	-2.113
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur	5.510	12.993	-1.962
+D+0.750L+0.750S+0.450W+H, LL Comb Run	4.497	12.088	-0.772
+D+0.750L+0.750S+0.450W+H, LL Comb Run	6.744	15.981	-1.933
+D+0.750L+0.750S+0.450W+H, LL Comb Run	6.734	16.261	-1.782
+0.60D+0.60W+0.60H	1.969	5.124	-0.662
+D+0.70E+0.60H	3.371	9.785	-1.316
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur	4.564	13.021	-0.932
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur	6.810	16.915	-2.093
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur	6.801	17.194	-1.942
+0.60D+0.70E+H	2.058	6.369	-0.875
D Only	3.282	8.541	-1.103
L Only, LL Comb Run (*L)	-0.013	0.373	0.201
L Only, LL Comb Run (L*)	2.983	5.564	-1.346
L Only, LL Comb Run (LL)	2.970	5.936	-1.146
S Only	1.632	4.357	0.240
E Only	0.127	1.778	-0.305
H Only			

Wellmon Residence
 Lochwood Lozier
 RJD
 268-22010
 11-21-22

Wood Beam

Project File: beam calcs with overstrength.ec6

LIC#: KW-06017913, Build:20.23.2.14

MULHERN & KULP STRUCTURAL ENGINEERING INC

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DESCRIPTION: B37

CODE REFERENCES

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

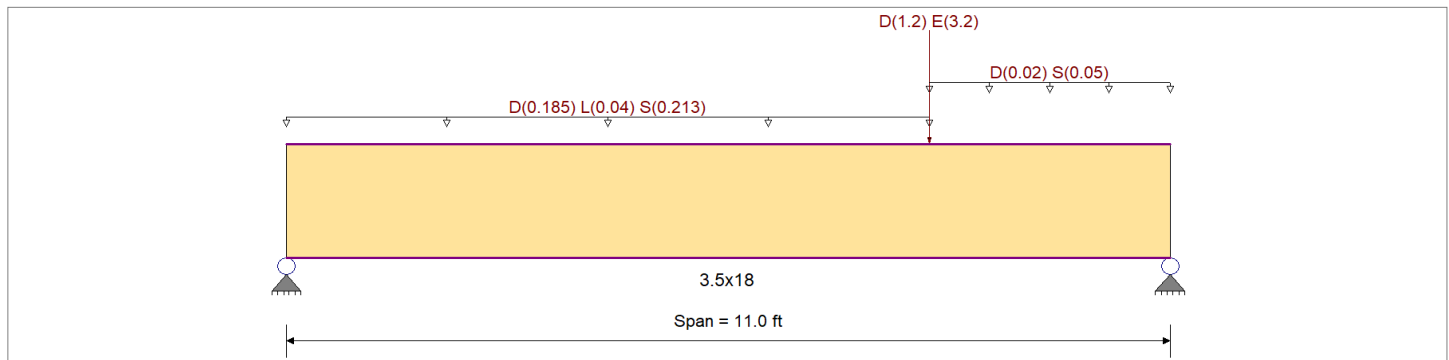
Material Properties

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	<i>E : Modulus of Elasticity</i>	
Fb -	2,220.0 psi	Ebend- xx	1,800.0ksi
Fc - Prll	1,980.0 psi	Eminbend - xx	950.0ksi
Fc - Perp	780.0 psi	Ebend- yy	1,600.0ksi
Fv	318.0 psi	Eminbend - yy	850.0ksi
Ft	1,320.0 psi	Density	31.210pcf



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 = 0.1850, L = 0.040, S = 0.2130 k/ft, Extent = 0.0 --> 8.0 ft, Tributary Width = 1.0 ft
 Uniform Load : D = 0.020, S = 0.050 k/ft, Extent = 8.0 --> 11.0 ft, Tributary Width = 1.0 ft
 Point Load : D = 1.20, E = 3.20 k @ 8.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.141 : 1	Maximum Shear Stress Ratio	=	0.155 : 1
Section used for this span		3.5x18	Section used for this span		3.5x18
fb: Actual	=	465.62psi	fv: Actual	=	78.65 psi
F'b	=	3,312.00psi	F'v	=	508.80 psi
Load Combination		+D+S+H	Load Combination		+D+0.750L+0.750S+0.5250E+H
Location of maximum on span	=	5.982ft	Location of maximum on span	=	9.515 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.038 in	Ratio =	3507 >=360	Span: 1 : E Only
Max Upward Transient Deflection		0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection		0.070 in	Ratio =	1892 >=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										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
+D+H	Length = 11.0 ft	1	0.113	0.124	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.60	292.3	2,592.0	0.0	0.00	0.0	0.0	286.2
+D+L+H	Length = 11.0 ft	1				1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.07	322.1	2,880.0	0.0	0.00	0.0	0.0	318.0
+D+Lr+H	Length = 11.0 ft	1				1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.60	292.3	3,600.0	0.0	0.00	0.0	0.0	397.5
+D+S+H	Length = 11.0 ft	1	0.081	0.089	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.33	465.6	3,312.0	0.0	0.00	0.0	0.0	365.7

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MULHERN & KULP STRUCTURAL ENGINEERING INC

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DESCRIPTION: B37

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	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
+D+0.750Lr+0.750L+H						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.087	0.094	1.25	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.95	314.5	3,600.0	1.58	37.5	397.5
+D+0.750L+0.750S+H						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.134	0.136	1.15	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.01	445.1	3,312.0	2.08	49.6	365.7
+D+0.60W+H						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.063	0.070	1.60	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.60	292.3	4,608.0	1.49	35.4	508.8
+D+0.750Lr+0.750L+0.450W-						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.068	0.074	1.60	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.95	314.5	4,608.0	1.58	37.5	508.8
+D+0.750L+0.750S+0.450W+						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.097	0.097	1.60	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.01	445.1	4,608.0	2.08	49.6	508.8
+0.60D+0.60W+0.60H						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.038	0.042	1.60	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.76	175.4	4,608.0	0.89	21.3	508.8
+D+0.70E+0.60H						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.129	0.146	1.60	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	9.35	593.3	4,608.0	3.12	74.2	508.8
+D-0.70E+0.60H						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.019	0.040	1.60	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.38	87.9	4,608.0	0.85	20.1	508.8
+D+0.750L+0.750S+0.5250E-						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.138	0.155	1.60	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	10.03	637.1	4,608.0	3.30	78.6	508.8
+D+0.750L+0.750S-0.5250E+						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.062	0.061	1.60	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.53	287.5	4,608.0	1.30	30.9	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	0.0697	5.741		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	2.792	3.409
Max Upward from Load Combinations	2.792	3.409
Max Upward from Load Cases	1.352	2.327
+D+H	1.352	1.538
+D+L+H	1.556	1.654
+D+Lr+H	1.352	1.538
+D+S+H	2.457	2.287
+D+0.750Lr+0.750L+H	1.505	1.625
+D+0.750L+0.750S+H	2.334	2.187
+D+0.60W+H	1.352	1.538
+D+0.750Lr+0.750L+0.450W+H	1.505	1.625
+D+0.750L+0.750S+0.450W+H	2.334	2.187
+0.60D+0.60W+0.60H	0.811	0.923
+D+0.70E+0.60H	1.963	3.167
+D+0.750L+0.750S+0.5250E+H	2.792	3.409
+0.60D+0.70E+H	1.422	2.552
D Only	1.352	1.538
L Only	0.204	0.116
S Only	1.105	0.749
E Only	0.873	2.327
H Only		

Wellmon Residence
 Lochwood Lozier
 RJD
 268-22010
 11-21-22

Wood Beam

Project File: beam calcs with overstrength.ec6

LIC# : KW-06017913, Build:20.23.2.14

MULHERN & KULP STRUCTURAL ENGINEERING INC

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DESCRIPTION: B41

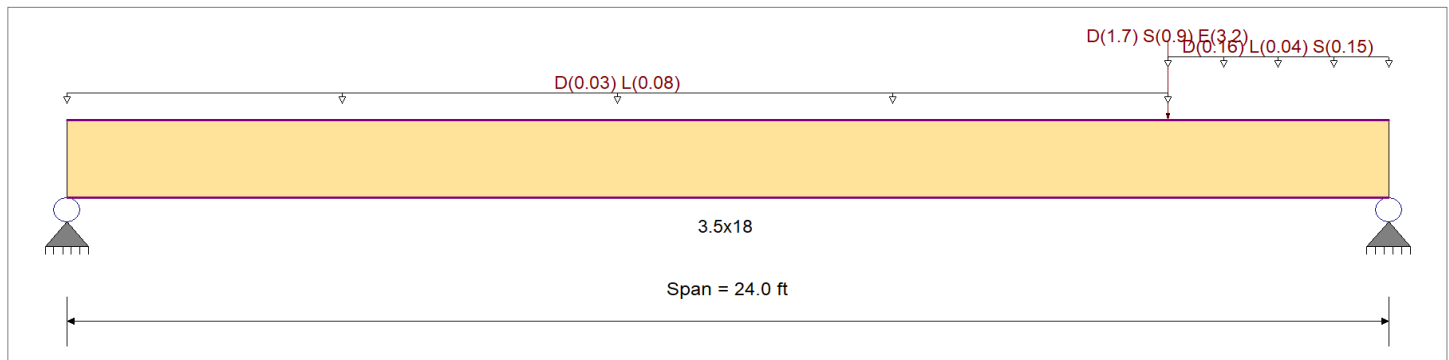
CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,880.0 psi	E : Modulus of Elasticity
Load Combination : ASCE 7-16	Fb -	2,220.0 psi	Ebend- xx
	Fc - Prll	1,980.0 psi	Eminbend - xx
Wood Species : DF/DF	Fc - Perp	780.0 psi	Ebend- yy
Wood Grade : 24F - V4	Fv	318.0 psi	Eminbend - yy
	Ft	1,320.0 psi	Density
			31.210pcf

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
 Point Load : D = 1.70, S = 0.90, E = 3.20 k @ 20.0 ft
 Uniform Load : D = 0.030, L = 0.080 k/ft, Extent = 0.0 --> 20.0 ft, Tributary Width = 1.0 ft
 Uniform Load : D = 0.160, L = 0.040, S = 0.150 k/ft, Extent = 20.0 --> 24.0 ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.292	1	Maximum Shear Stress Ratio	=	0.231	: 1
Section used for this span		3.5x18		Section used for this span		3.5x18	
fb: Actual	=	829.21 psi		fv: Actual	=	117.41 psi	
F'b	=	2,834.96 psi		F'v	=	508.80 psi	
Load Combination		+D+L+H		Load Combination		+D+0.750L+0.750S+0.5250E+H	
Location of maximum on span	=	14.540ft		Location of maximum on span	=	22.511 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.257 in	Ratio =	1120	>=360	Span: 1 : E Only	
Max Upward Transient Deflection		0 in	Ratio =	0	<360	n/a	
Max Downward Total Deflection		0.612 in	Ratio =	470	>=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										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
+D+H	Length = 24.0 ft	1	0.206	0.180	0.90	1.00	1.00	1.00	0.984	1.00	1.00	1.00	8.29	526.1	2,551.5	0.0	0.00	0.0	0.0
+D+L+H	Length = 24.0 ft	1	0.292	0.218	1.00	1.00	1.00	1.00	0.984	1.00	1.00	1.00	13.06	829.2	2,835.0	0.0	0.00	0.0	0.0
+D+Lr+H	Length = 24.0 ft	1	0.148	0.129	1.25	1.00	1.00	1.00	0.984	1.00	1.00	1.00	8.29	526.1	3,543.7	0.0	0.00	0.0	0.0
+D+S+H	Length = 24.0 ft	1	0.239	0.211	1.15	1.00	1.00	1.00	0.984	1.00	1.00	1.00	12.27	779.3	3,260.2	0.0	0.00	0.0	0.0
+D+0.750Lr+0.750L+H						1.00	1.00	1.00	0.984	1.00	1.00	1.00				0.0	0.00	0.0	0.0

Wellmon Residence
 Lochwood Lozier
 RJD
 268-22010
 11-21-22

Wood Beam

Project File: beam calcs with overstrength.ec6

LIC# : KW-06017913, Build:20.23.2.14

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: B41

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
Length = 24.0 ft	1	0.210	0.163	1.25	1.00	1.00	1.00	0.984	1.00	1.00	1.00	11.75	745.8	3,543.7	2.72	64.9	397.5	
+D+0.750L+0.750S+H														0.0	0.00	0.0	0.0	
Length = 24.0 ft	1	0.275	0.230	1.15	1.00	1.00	1.00	0.984	1.00	1.00	1.00	14.11	896.1	3,260.2	3.53	84.1	365.7	
+D+0.60W+H														0.0	0.00	0.0	0.0	
Length = 24.0 ft	1	0.116	0.101	1.60	1.00	1.00	1.00	0.984	1.00	1.00	1.00	8.29	526.1	4,535.9	2.16	51.4	508.8	
+D+0.750Lr+0.750L+0.450W-														0.0	0.00	0.0	0.0	
Length = 24.0 ft	1	0.164	0.127	1.60	1.00	1.00	1.00	0.984	1.00	1.00	1.00	11.75	745.8	4,535.9	2.72	64.9	508.8	
+D+0.750L+0.750S+0.450W+														0.0	0.00	0.0	0.0	
Length = 24.0 ft	1	0.198	0.165	1.60	1.00	1.00	1.00	0.984	1.00	1.00	1.00	14.11	896.1	4,535.9	3.53	84.1	508.8	
+0.60D+0.60W+0.60H														0.0	0.00	0.0	0.0	
Length = 24.0 ft	1	0.070	0.061	1.60	1.00	1.00	1.00	0.984	1.00	1.00	1.00	4.97	315.6	4,535.9	1.30	30.8	508.8	
+D+0.70E+0.60H														0.0	0.00	0.0	0.0	
Length = 24.0 ft	1	0.220	0.188	1.60	1.00	1.00	1.00	0.984	1.00	1.00	1.00	15.74	999.1	4,535.9	4.03	95.8	508.8	
+D-0.70E+0.60H														0.0	0.00	0.0	0.0	
Length = 24.0 ft	1	0.037	0.019	1.60	1.00	1.00	1.00	0.984	1.00	1.00	1.00	2.61	165.6	4,535.9	0.41	9.8	508.8	
+D+0.750L+0.750S+0.5250E-														0.0	0.00	0.0	0.0	
Length = 24.0 ft	1	0.268	0.231	1.60	1.00	1.00	1.00	0.984	1.00	1.00	1.00	19.11	1,213.5	4,535.9	4.93	117.4	508.8	
+D+0.750L+0.750S-0.5250E+														0.0	0.00	0.0	0.0	
Length = 24.0 ft	1	0.138	0.100	1.60	1.00	1.00	1.00	0.984	1.00	1.00	1.00	9.87	626.7	4,535.9	2.13	50.7	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	0.6115	12.964		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	1.991	5.402
Max Upward from Load Combinations	1.991	5.402
Max Upward from Load Cases	0.947	2.667
+D+H	0.851	2.417
+D+L+H	1.797	3.231
+D+Lr+H	0.851	2.417
+D+S+H	1.051	3.717
+D+0.750Lr+0.750L+H	1.561	3.027
+D+0.750L+0.750S+H	1.711	4.002
+D+0.60W+H	0.851	2.417
+D+0.750Lr+0.750L+0.450W+H	1.561	3.027
+D+0.750L+0.750S+0.450W+H	1.711	4.002
+0.60D+0.60W+0.60H	0.510	1.450
+D+0.70E+0.60H	1.224	4.284
+D+0.750L+0.750S+0.5250E+H	1.991	5.402
+0.60D+0.70E+H	0.884	3.317
D Only	0.851	2.417
L Only	0.947	0.813
S Only	0.200	1.300
E Only	0.533	2.667
H Only		

Wellmon Residence
 Lochwood Lozier
 RJD
 268-22010
 11-21-22

Wood Beam

Project File: beam calcs with overstrength.ec6

LIC# : KW-06017913, Build:20.23.2.14

MULHERN & KULP STRUCTURAL ENGINEERING INC

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DESCRIPTION: B42

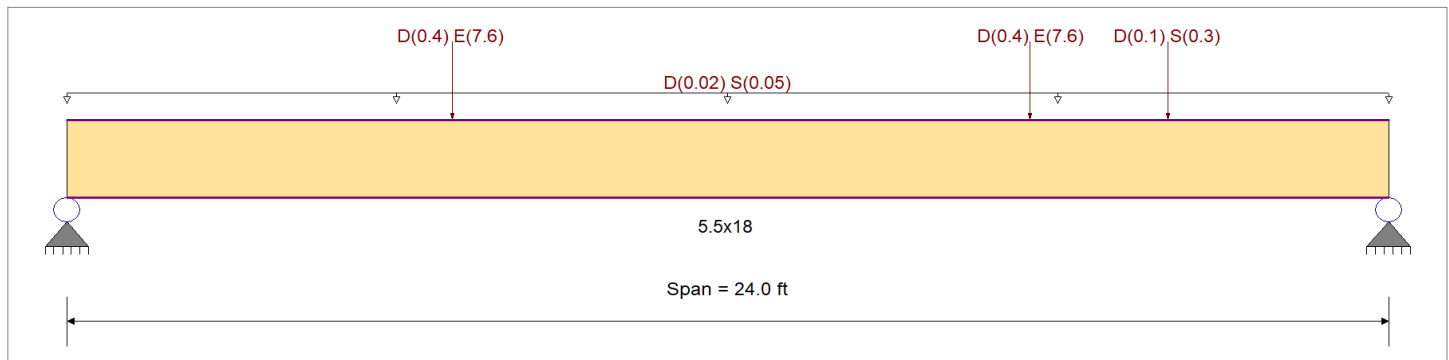
CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,880.0 psi	E : Modulus of Elasticity
Load Combination : ASCE 7-16	Fb -	2,220.0 psi	Ebend- xx
	Fc - Prll	1,980.0 psi	Eminbend - xx
Wood Species : DF/DF	Fc - Perp	780.0 psi	Ebend- yy
Wood Grade : 24F-V4	Fv	318.0 psi	Eminbend - yy
	Ft	1,320.0 psi	Density
			31.210pcf

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
 Point Load : D = 0.40, E = 7.60 k @ 7.0 ft
 Point Load : D = 0.10, S = 0.30 k @ 20.0 ft
 Uniform Load : D = 0.020, S = 0.050, Tributary Width = 1.0 ft
 Point Load : D = 0.40, E = 7.60 k @ 17.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.391 : 1	Maximum Shear Stress Ratio =	0.189 : 1
Section used for this span	5.5x18	Section used for this span	5.5x18
fb: Actual =	1,693.80psi	fv: Actual =	96.34 psi
F'b =	4,335.48psi	F'v =	508.80 psi
Load Combination	+D+0.70E+0.60H	Load Combination	+D+0.70E+0.60H
Location of maximum on span =	9.547ft	Location of maximum on span =	22.511 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.093 in Ratio =	3093 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in Ratio =	0 <360	n/a
Max Downward Total Deflection	0.226 in Ratio =	1276 >=180	Span: 1 : +D+S+H
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										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
+D+H	Length = 24.0 ft	1	0.098	0.049	0.90	1.00	1.00	1.00	0.941	1.00	1.00	1.00	5.89	237.8	2,438.7	0.00	0.00	0.0	0.0	286.2
+D+L+H	Length = 24.0 ft	1	0.088	0.044	1.00	1.00	1.00	1.00	0.941	1.00	1.00	1.00	5.89	237.8	2,709.7	0.00	0.00	0.0	0.0	318.0
+D+Lr+H	Length = 24.0 ft	1	0.070	0.035	1.25	1.00	1.00	1.00	0.941	1.00	1.00	1.00	5.89	237.8	3,387.1	0.00	0.00	0.0	0.0	397.5
+D+S+H	Length = 24.0 ft	1	0.131	0.071	1.15	1.00	1.00	1.00	0.941	1.00	1.00	1.00	10.10	408.2	3,116.1	1.70	25.8	365.7	0.0	0.0

Wellmon Residence
 Lochwood Lozier
 RJD
 268-22010
 11-21-22

Wood Beam

Project File: beam calcs with overstrength.ec6

LIC# : KW-06017913, Build:20.23.2.14

MULHERN & KULP STRUCTURAL ENGINEERING INC

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DESCRIPTION: B42

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
+D+0.750Lr+0.750L+H	Length = 24.0 ft	1	0.070	0.035	1.25	1.00	1.00	1.00	0.941	1.00	1.00	1.00	5.89	237.8	3,387.1	0.93	14.1	397.5
+D+0.750L+0.750S+H	Length = 24.0 ft	1	0.117	0.063	1.15	1.00	1.00	1.00	0.941	1.00	1.00	1.00	9.05	365.6	3,116.1	1.51	22.9	365.7
+D+0.60W+H	Length = 24.0 ft	1	0.055	0.028	1.60	1.00	1.00	1.00	0.941	1.00	1.00	1.00	5.89	237.8	4,335.5	0.93	14.1	508.8
+D+0.750Lr+0.750L+0.450W-	Length = 24.0 ft	1	0.055	0.028	1.60	1.00	1.00	1.00	0.941	1.00	1.00	1.00	5.89	237.8	4,335.5	0.93	14.1	508.8
+D+0.750L+0.750S+0.450W+	Length = 24.0 ft	1	0.084	0.045	1.60	1.00	1.00	1.00	0.941	1.00	1.00	1.00	9.05	365.6	4,335.5	1.51	22.9	508.8
+0.60D+0.60W+0.60H	Length = 24.0 ft	1	0.033	0.017	1.60	1.00	1.00	1.00	0.941	1.00	1.00	1.00	3.53	142.7	4,335.5	0.56	8.4	508.8
+D+0.70E+0.60H	Length = 24.0 ft	1	0.391	0.189	1.60	1.00	1.00	1.00	0.941	1.00	1.00	1.00	41.92	1,693.8	4,335.5	6.36	96.3	508.8
+D-0.70E+0.60H	Length = 24.0 ft	1	0.376	0.143	1.60	1.00	1.00	1.00	0.941	1.00	1.00	1.00	31.14	1,258.1	3,341.9	4.81	72.9	508.8
+D+0.750L+0.750S+0.5250E-	Length = 24.0 ft	1	0.335	0.166	1.60	1.00	1.00	1.00	0.941	1.00	1.00	1.00	35.98	1,453.6	4,335.5	5.58	84.6	508.8
+D+0.750L+0.750S-0.5250E+	Length = 24.0 ft	1	0.236	0.098	1.60	1.00	1.00	1.00	0.941	1.00	1.00	1.00	19.53	788.9	3,341.9	3.28	49.7	508.8

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.2256	12.175		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	7.442	7.758
Max Upward from Load Combinations	6.115	6.420
Max Upward from Load Cases	7.442	7.758
+D+H	0.906	0.989
+D+L+H	0.906	0.989
+D+Lr+H	0.906	0.989
+D+S+H	1.556	1.839
+D+0.750Lr+0.750L+H	0.906	0.989
+D+0.750L+0.750S+H	1.393	1.627
+D+0.60W+H	0.906	0.989
+D+0.750Lr+0.750L+0.450W+H	0.906	0.989
+D+0.750L+0.750S+0.450W+H	1.393	1.627
+0.60D+0.60W+0.60H	0.543	0.593
+D+0.70E+0.60H	6.115	6.420
+D+0.750L+0.750S+0.5250E+H	5.300	5.700
+0.60D+0.70E+H	5.753	6.024
D Only	0.906	0.989
S Only	0.650	0.850
E Only	7.442	7.758
H Only		

Wood Beam

LIC# : KW-06017913, Build:20.23.2.14

MULHERN & KULP STRUCTURAL ENGINEERING INC

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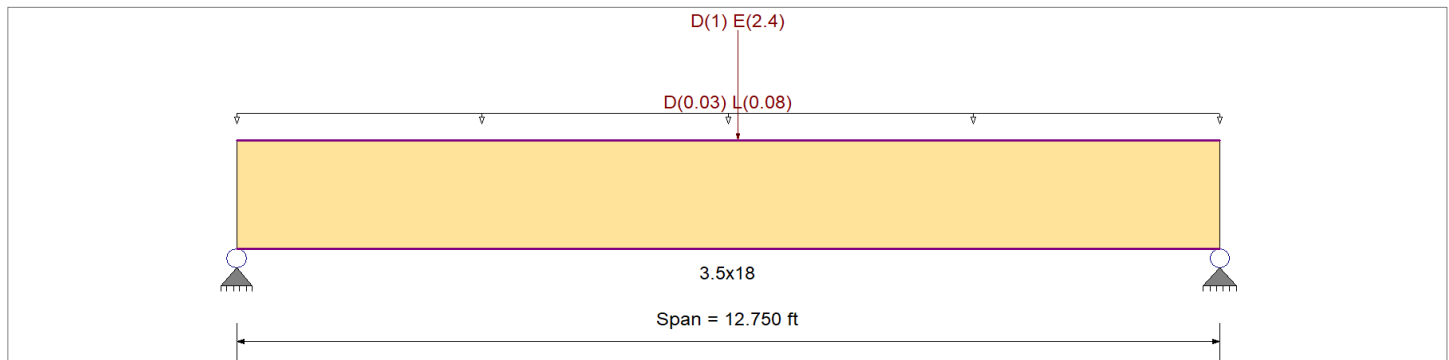
DESCRIPTION: B49

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	Fb +	2,880.0 psi	E : Modulus of Elasticity	
Load Combination : ASCE 7-16	Fb -	2,220.0 psi	Ebend- xx	1,800.0ksi
	Fc - Prll	1,980.0 psi	Eminbend - xx	950.0ksi
Wood Species : DF/DF	Fc - Perp	780.0 psi	Ebend- yy	1,600.0ksi
Wood Grade : 24F - V4	Fv	318.0 psi	Eminbend - yy	850.0ksi
	Ft	1,320.0 psi	Density	31.210pcf
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 = 0.030, L = 0.080 , Tributary Width = 1.0 ft
 Point Load : D = 1.0, E = 2.40 k @ 6.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.130 : 1	Maximum Shear Stress Ratio	=	0.083 : 1
Section used for this span		3.5x18	Section used for this span		3.5x18
fb: Actual	=	597.20psi	fv: Actual	=	26.52 psi
F'b	=	4,608.00psi	F'v	=	318.00 psi
Load Combination		+D+0.70E+0.60H	Load Combination		+D+L+H
Location of maximum on span	=	6.515ft	Location of maximum on span	=	11.261 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.059 in Ratio = 2603 >=360	Span: 1 : E Only		
Max Upward Transient Deflection		0 in Ratio = 0 <360	n/a		
Max Downward Total Deflection		0.076 in Ratio = 2023 >=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										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
+D+H	Length = 12.750 ft	1	0.100	0.060	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.07	258.1	2,592.0	0.0	0.00	0.0	0.0
+D+L+H	Length = 12.750 ft	1	0.125	0.083	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.69	361.3	2,880.0	0.0	0.00	0.0	0.0
+D+Lr+H	Length = 12.750 ft	1	0.072	0.043	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.07	258.1	3,600.0	0.0	0.00	0.0	0.0
+D+S+H	Length = 12.750 ft	1	0.078	0.047	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.07	258.1	3,312.0	0.0	0.00	0.0	0.0
+D+0.750Lr+0.750L+H						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0	

Wellmon Residence
 Lochwood Lozier
 RJD
 268-22010
 11-21-22

Wood Beam

Project File: beam calcs with overstrength.ec6

LIC# : KW-06017913, Build:20.23.2.14

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: B49

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
Length = 12.750 ft	1	0.093	0.061	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5.28	335.5	3,600.0	1.02	24.2	397.5
+D+0.750L+0.750S+H							1.00	1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.750 ft	1	0.101	0.066	1.15	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5.28	335.5	3,312.0	1.02	24.2	365.7
+D+0.60W+H							1.00	1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.750 ft	1	0.056	0.034	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4.07	258.1	4,608.0	0.72	17.2	508.8
+D+0.750Lr+0.750L+0.450W-							1.00	1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.750 ft	1	0.073	0.048	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5.28	335.5	4,608.0	1.02	24.2	508.8
+D+0.750L+0.750S+0.450W+							1.00	1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.750 ft	1	0.073	0.048	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5.28	335.5	4,608.0	1.02	24.2	508.8
+0.60D+0.60W+0.60H							1.00	1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.750 ft	1	0.034	0.020	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.44	154.9	4,608.0	0.43	10.3	508.8
+D+0.70E+0.60H							1.00	1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.750 ft	1	0.130	0.074	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	9.41	597.2	4,608.0	1.58	37.6	508.8
+D-0.70E+0.60H							1.00	1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.750 ft	1	0.023	0.016	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.27	80.9	3,552.0	0.34	8.1	508.8
+D+0.750L+0.750S+0.5250E-							1.00	1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.750 ft	1	0.128	0.078	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	9.29	589.8	4,608.0	1.66	39.5	508.8
+D+0.750L+0.750S-0.5250E+							1.00	1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.750 ft	1	0.019	0.018	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.37	87.1	4,608.0	0.38	9.0	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	0.0756	6.422		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	1.769	1.813
Max Upward from Load Combinations	1.769	1.813
Max Upward from Load Cases	1.176	1.224
+D+H	0.768	0.788
+D+L+H	1.278	1.298
+D+Lr+H	0.768	0.788
+D+S+H	0.768	0.788
+D+0.750Lr+0.750L+H	1.151	1.171
+D+0.750L+0.750S+H	1.151	1.171
+D+0.60W+H	0.768	0.788
+D+0.750Lr+0.750L+0.450W+H	1.151	1.171
+D+0.750L+0.750S+0.450W+H	1.151	1.171
+0.60D+0.60W+0.60H	0.461	0.473
+D+0.70E+0.60H	1.592	1.645
+D+0.750L+0.750S+0.5250E+H	1.769	1.813
+0.60D+0.70E+H	1.285	1.329
D Only	0.768	0.788
L Only	0.510	0.510
E Only	1.176	1.224
H Only		

Wood Beam

DESCRIPTION: B64

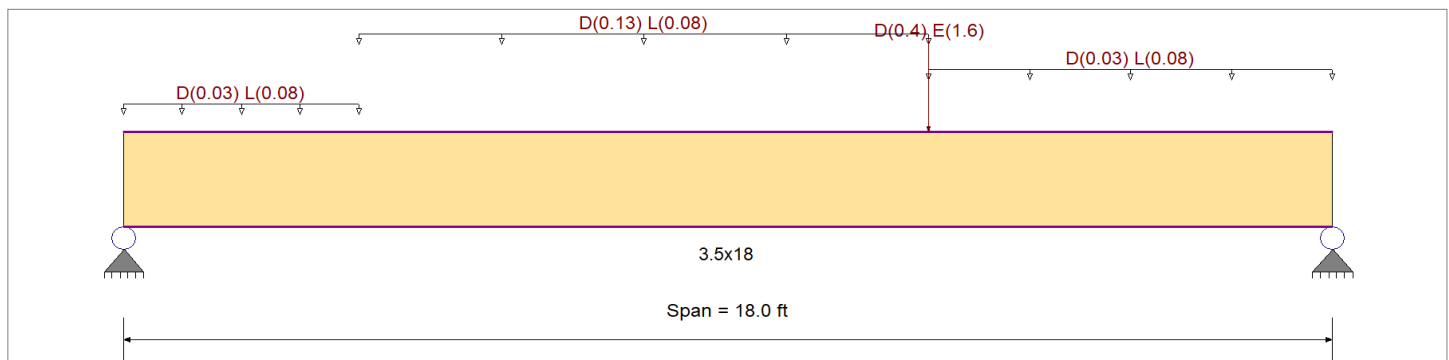
CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,880.0 psi	E : Modulus of Elasticity
Load Combination : ASCE 7-16	Fb -	2,220.0 psi	Ebend- xx
	Fc - Prll	1,980.0 psi	Eminbend - xx
Wood Species : DF/DF	Fc - Perp	780.0 psi	Ebend- yy
Wood Grade : 24F - V4	Fv	318.0 psi	Eminbend - yy
	Ft	1,320.0 psi	Density
			31.210pcf

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

Load for Span Number 1

- Uniform Load : D = 0.030, L = 0.080 k/ft, Extent = 0.0 --> 3.50 ft, Tributary Width = 1.0 ft
- Uniform Load : D = 0.030, L = 0.080 k/ft, Extent = 12.0 --> 18.0 ft, Tributary Width = 1.0 ft
- Uniform Load : D = 0.130, L = 0.080 k/ft, Extent = 3.50 --> 12.0 ft, Tributary Width = 1.0 ft
- Point Load : D = 0.40, E = 1.60 k @ 12.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.200 < 1	Maximum Shear Stress Ratio	=	0.117 < 1
Section used for this span		3.5x18	Section used for this span		3.5x18
fb: Actual	=	575.35psi	fv: Actual	=	37.31 psi
F'b	=	2,880.00psi	F'v	=	318.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	9.328ft	Location of maximum on span	=	16.555 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.095 in	Ratio =	2277 >=360	Span: 1 : E Only	
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a	
Max Downward Total Deflection	0.205 in	Ratio =	1053 >=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									Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
+D+H	Length = 18.0 ft	1	0.143	0.080	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.83	370.0	2,592.0	0.00	0.00	0.0	0.0
+D+L+H	Length = 18.0 ft	1	0.200	0.117	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	9.06	575.4	2,880.0	1.57	37.3	318.0	0.0
+D+Lr+H	Length = 18.0 ft	1	0.103	0.058	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.83	370.0	3,600.0	0.96	22.9	397.5	0.0
+D+S+H	Length = 18.0 ft	1				1.00	1.00	1.00	1.000	1.00	1.00	1.00				0.00	0.00	0.0	0.0

Wellmon Residence
 Lochwood Lozier
 RJD
 268-22010
 11-21-22

Wood Beam

Project File: beam calcs with overstrength.ec6

LIC# : KW-06017913, Build:20.23.2.14

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: B64

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
Length = 18.0 ft	1	0.112	0.063	1.15	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5.83	370.0	3,312.0	0.96	22.9	365.7
+D+0.750Lr+0.750L+H							1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.0 ft	1	0.146	0.085	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	8.25	524.0	3,600.0	1.42	33.7	397.5
+D+0.750L+0.750S+H							1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.0 ft	1	0.158	0.092	1.15	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	8.25	524.0	3,312.0	1.42	33.7	365.7
+D+0.60W+H							1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.0 ft	1	0.080	0.045	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5.83	370.0	4,608.0	0.96	22.9	508.8
+D+0.750Lr+0.750L+0.450W-							1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.0 ft	1	0.114	0.066	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	8.25	524.0	4,608.0	1.42	33.7	508.8
+D+0.750L+0.750S+0.450W+							1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.0 ft	1	0.114	0.066	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	8.25	524.0	4,608.0	1.42	33.7	508.8
+0.60D+0.60W+0.60H							1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.0 ft	1	0.048	0.027	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3.50	222.0	4,608.0	0.58	13.7	508.8
+D+0.70E+0.60H							1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.0 ft	1	0.136	0.080	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	9.85	625.2	4,608.0	1.71	40.7	508.8
+D-0.70E+0.60H							1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.0 ft	1	0.038	0.034	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.78	176.4	4,608.0	0.73	17.4	508.8
+D+0.750L+0.750S+0.5250E-							1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.0 ft	1	0.152	0.092	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	11.06	702.1	4,608.0	1.98	47.0	508.8
+D+0.750L+0.750S-0.5250E+							1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.0 ft	1	0.080	0.052	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5.83	370.3	4,608.0	1.12	26.7	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	0.2050	9.263		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	1.830	2.126
Max Upward from Load Combinations	1.830	2.126
Max Upward from Load Cases	1.010	1.067
+D+H	1.010	1.026
+D+L+H	1.730	1.746
+D+Lr+H	1.010	1.026
+D+S+H	1.010	1.026
+D+0.750Lr+0.750L+H	1.550	1.566
+D+0.750L+0.750S+H	1.550	1.566
+D+0.60W+H	1.010	1.026
+D+0.750Lr+0.750L+0.450W+H	1.550	1.566
+D+0.750L+0.750S+0.450W+H	1.550	1.566
+0.60D+0.60W+0.60H	0.606	0.615
+D+0.70E+0.60H	1.384	1.772
+D+0.750L+0.750S+0.5250E+H	1.830	2.126
+0.60D+0.70E+H	0.979	1.362
D Only	1.010	1.026
L Only	0.720	0.720
E Only	0.533	1.067
H Only		

LOCHWOOD LOZIER
WELLMON RESIDENCE

MERCER ISLAND, WA

SHEAR WALL CALCULATIONS - WIND

REVIEWED BY: RJZ

NOVEMBER 21, 2022

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
RESIDENTIAL STRUCTURAL ENGINEERING



WIND DESIGN SUMMARY PER ASCE 7-16

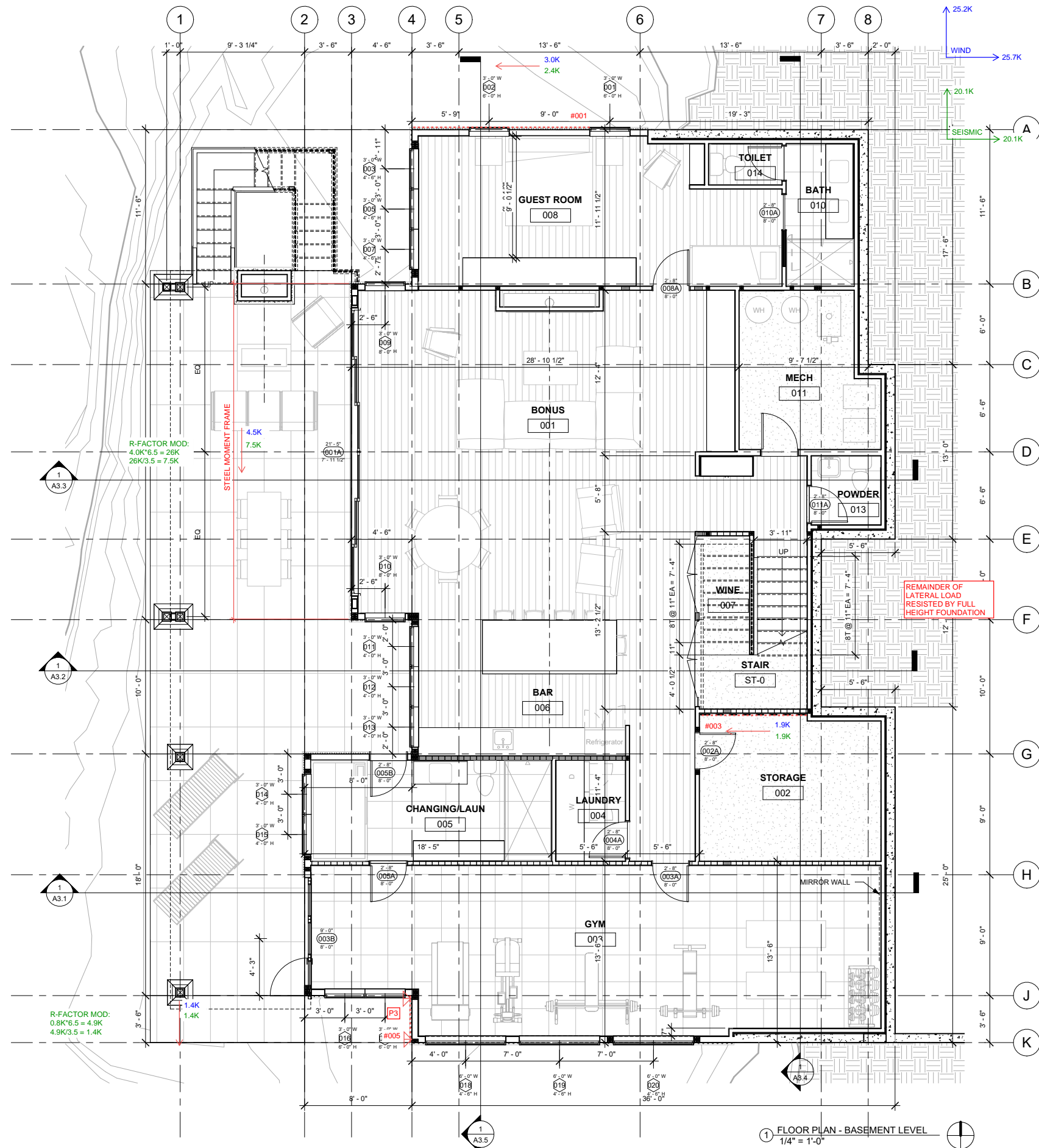
PARAMETERS:		ROOF GEOMETRY:		BUILDING GEOMETRY:	
WIND SPEED	100	TRANS. ROOF PITCH	6.0 :12	LENGTH	68 FT
EXPOSURE CATEGORY	C	LONG. ROOF PITCH	12.0 :12	WIDTH	79 FT
RISK CATEGORY	II	MEAN ROOF HEIGHT, H	30.00 FT	NUMBER OF STORIES	2
WIND DIRECTIONALITY FACTOR, K_D	0.85				
TOPOGRAPHIC FACTOR, K_{ZT}	1.00				
GUST FACTOR, G	0.85				
GROUND ELEV. ABOVE SEA LEVEL (FT)	0				
DESIGN TYPE	ASD 0.60				

TRANSVERSE DIRECTION (PERPENDICULAR TO MAIN RIDGE LINE)

DIAPHRAGM LEVEL	FLOOR-TO-FLOOR HEIGHT	SECTION	TRIBUTARY DESIGN AREAS:			sq ft	TRIBUTARY DESIGN LOADS: (0.6W)			kips	
			A	O	B		A	O	B		
2	8 FT	Roof Surface	0	239	0	sq ft	Story Shear	0.00	8.57	0.00	kips
		Wall surface	0	493	0	sq ft	Total Shear	0.00	8.57	0.00	kips
1	9.67 FT	Roof Surface	0	115	0	sq ft	Story Shear	0.00	7.63	0.00	kips
		Wall surface	0	520	0	sq ft	Total Shear	0.00	16.20	0.00	kips
FND		Roof Surface	0	0	0	sq ft	Story Shear	0.00	9.49	0.00	kips
		Wall surface	0	751	0	sq ft	Total Shear	0.00	25.69	0.00	kips

LONGITUDINAL DIRECTION (PARALLEL TO MAIN RIDGE LINE)

DIAPHRAGM LEVEL	FLOOR-TO-FLOOR HEIGHT	SECTION	TRIBUTARY DESIGN AREAS:			sq ft	TRIBUTARY DESIGN LOADS: (0.6W)			kips	
			A	O	B		A	O	B		
2	8 FT	Roof Surface	0	596	0	sq ft	Story Shear	0.00	11.25	0.00	kips
		Wall surface	0	359	0	sq ft	Total Shear	0.00	11.25	0.00	kips
1	9.67 FT	Roof Surface	0	206	0	sq ft	Story Shear	0.00	9.36	0.00	kips
		Wall surface	0	548	0	sq ft	Total Shear	0.00	20.62	0.00	kips
FND		Roof Surface	0	0	0	sq ft	Story Shear	0.00	4.60	0.00	kips
		Wall surface	0	354	0	sq ft	Total Shear	0.00	25.21	0.00	kips



1 FLOOR PLAN - BASEMENT LEVEL
1/4" = 1'-0"

PLAN NOTES:

1. THIS PROJECT SHALL BE DESIGNED, ENGINEERED, AND CONSTRUCTED IN FULL COMPLIANCE WITH ALL CODES AND REGULATIONS.
2. ALL EXTERIOR WALLS TO BE FRAMED WITH 2X6 H.F. (STUD GRADE OR BETTER) UNO. PROVIDE R-21 BATT INSULATION MIN. UNO.
3. ALL INTERIOR WALLS TO BE 2X4 UNO.
4. ALL HANDRAILS SHALL BE LOCATED AT 36" ABOVE STAIR NOSING WITH A GRASP DIMENSION BETWEEN 1 1/4" AND 2".
5. ALL HANDRAILS SHALL BE CONTINUOUS OR TERMINATE IN A NEWEL POST.
6. ALL GUARDRAILS SHALL BE 36" ABOVE FINISHED FLOOR AND DESIGNED SUCH THAT THE MAXIMUM OPENING WILL NOT ALLOW PASSAGE OF A 4" SPHERE.
7. ALL GUARDRAILS SHALL BE DESIGNED TO RESIST A 200LB CONCENTRATED LOAD AT THE TOP RAIL AND 50 PSF ON ALL GUARDRAIL INFILL COMPONENTS.
8. PROVIDE FIRE BLOCKING AT ALL PLUMBING PENETRATIONS AND WALL/ROOF INTERSECTIONS.
9. THE GARAGE SHALL BE SEPARATED FROM THE RESIDENCE AND ITS ATTIC AREA BY NO LESS THAN 1/2" GWB APPLIED TO THE GARAGE SIDE. LIVING AREAS ABOVE THE GARAGE SHALL BE SEPARATED FROM THE GARAGE WITH NO LESS THAN 5/8" TYPE X GWB. ALL SUPPORTING STRUCTURE SHALL BE PROTECTED BY NO LESS THAN 1/2" GWB.
10. FINISH ALL CEILINGS WITH 5/8" TYPE X GWB.
11. ACCESSIBLE SPACES UNDER STAIRS TO BE FINISHED WITH (2) LAYERS 5/8" TYPE X GWB.
12. PROVIDE 26 GA. GALVANIZED SHEET METAL FLASHING ABOVE WINDOWS AND DOORS, LAP BUILDING PAPER OVER.
13. WINDOWS TO BE SPECIFIED BY OWNER/CONTRACTOR. CONTRACTOR TO VERIFY ALL ROUGH OPENINGS PRIOR TO CONSTRUCTION.
14. ALL EXHAUST AIR SHALL VENT DIRECTLY TO THE EXTERIOR OF THE BUILDING PER M1501.1 AND M1506.2.
15. ALL NEW STAIRS SHALL MEET THE FOLLOWING REQUIREMENTS:
 - A) MINIMUM 36" WIDTH
 - B) MAXIMUM 7 3/4" RISER, MINIMUM 10" TREAD
 - C) MINIMUM 6'-8" HEADROOM
 - D) MINIMUM LANDING LENGTH 36"
16. WINDOW AND DOOR HEADERS SHALL BE INSULATED WITH A MINIMUM R-10 INSULATION.
17. HVAC DUCTS MUST NOT DISPLACE REQUIRED INSULATION AT ANY GIVEN LOCATION. PROVIDE REQUIRED FLOOR OR CEILING INSULATION ON UNHEATED SIDE OF DUCTS INSTALLED IN JOIST OR RAFTER CAVITIES WHERE UNHEATED SPACES ARE ABOVE OR BELOW.
18. ALL CONCEALED VOIDS TO BE FIRE AND DRAFT STOPPED PER 2015 IRC SECTION R602.8.
19. ALL TUBS AND SHOWER STALLS:
 - A) FIRE BLOCK BETWEEN STUDS
 - B) LIMIT SHOWER FLOW TO 2.5 GPM
 - C) WALLS SHALL BE WATERPROOFED TO A MIN. OF 70" ABOVE DRAIN INLET
 - D) ALL GLAZING, INCLUDING WINDOWS, WITHIN 70" OF DRAIN INLET SHALL BE SAFETY GLAZING
20. PROVIDE ELECTRIC ILLUMINATION AT OUTSIDE DOORS SWITCHED FROM INSIDE.
21. PROVIDE ELECTRIC ILLUMINATION AT STAIRWAY, INCLUDING LANDING, SWITCHED AT EACH FLOOR LEVEL.
22. DOORS FROM GARAGE TO LIVING SPACES TO BE 1 3/8" MIN. THICK. SOLID CORE DOOR WITH SELF CLOSER AND WEATHER STRIPPING, U-VALUE = 0.20 MAX.
23. (X) DENOTES 50 CFM EXHAUST FAN VENTED TO OUTSIDE.
24. (X) DENOTES 100 CFM MIN EXHAUST FAN VENTED TO OUTSIDE. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR SHALL BE PROVIDED.
25. (S) DENOTES 110 VOLT SMOKE DETECTOR WITH BATTERY BACK UP AND INTERCONNECTED. ADDITION OF "CM" DESIGNATION INCLUDES INTEGRATED CARBON MONOXIDE DETECTOR.
26. A DRAIN WATER HEAT RECOVERY UNIT SHALL BE INSTALLED, WHICH CAPTURES WASTE WATER HEAT FROM ALL THE SHOWERS, AND HAS A MINIMUM EFFICIENCY OF 40% IF INSTALLED FOR EQUAL FLOW OR A MINIMUM EFFICIENCY OF 52% IF INSTALLED FOR UNEQUAL FLOW. SUCH UNITS SHALL BE RATED IN ACCORDANCE CSA B55.1 AND BE SO LABELED.

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(425) 576-9200 | www.lochwoodlozier.com

DATE: 12/14/18
SCALE: 1/4" = 1'-0"

WELLMON SFR
6333 77TH AVE SE
MERCER ISLAND, WA 98040

PROJECT: 22069WEL

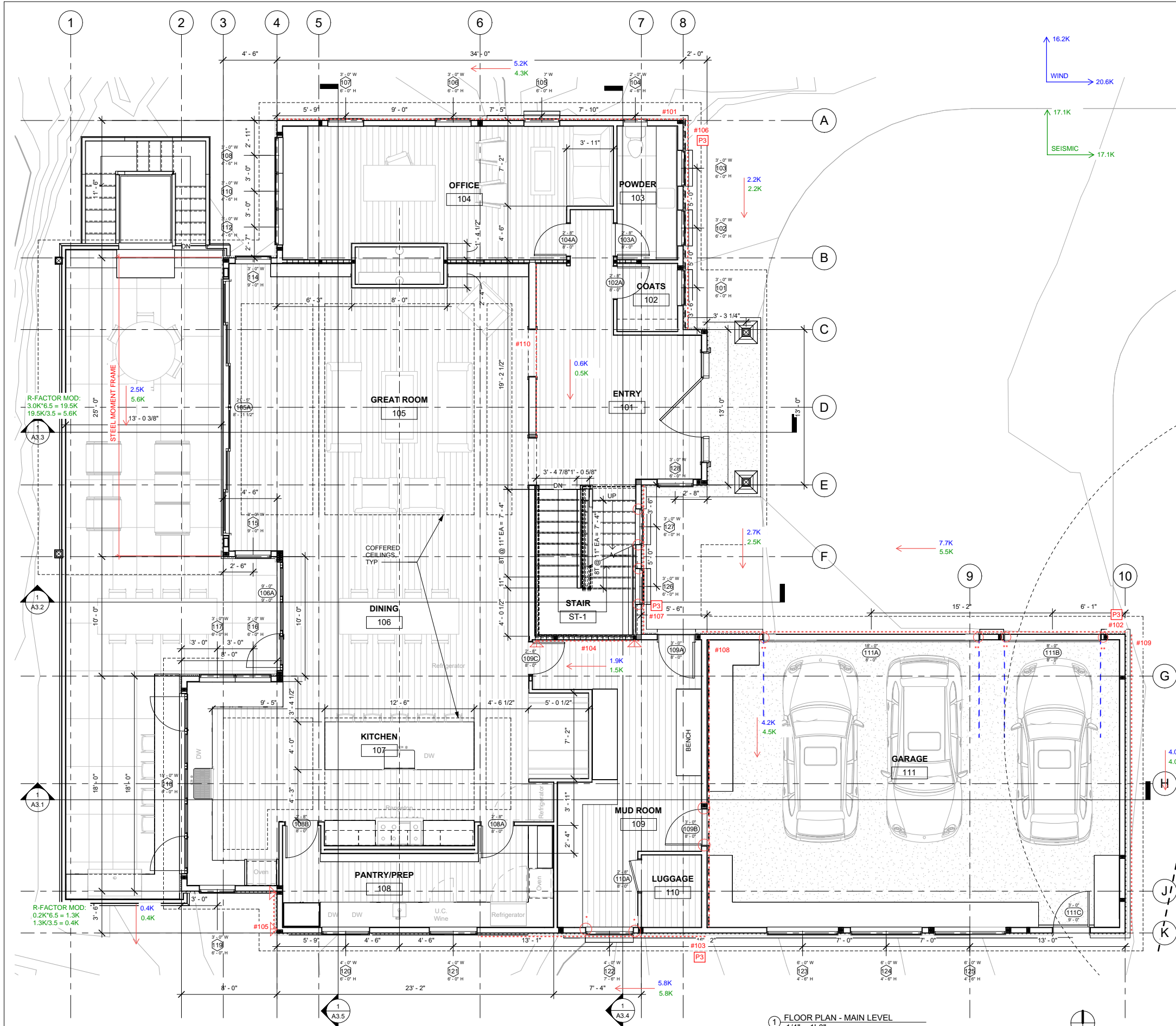
REV	DATE	ISSUE/REVISION
1	01/09/22 04/18/23	PRE-APP SUBMITTAL CONSULT COORD

FLOOR PLAN - BASEMENT LEVEL

REVISION NO. 1
SUPERSEDES ALL PREVIOUS REVISIONS

A1.1

NOT FOR CONSTRUCTION



PLAN NOTES:

1. THIS PROJECT SHALL BE DESIGNED, ENGINEERED, AND CONSTRUCTED IN FULL COMPLIANCE WITH ALL CODES AND REGULATIONS.
2. ALL EXTERIOR WALLS TO BE FRAMED WITH 2X6 H.F. (STUD GRADE OR BETTER) UNO. PROVIDE R-21 BATT INSULATION MIN. UNO.
3. ALL INTERIOR WALLS TO BE 2X4 UNO.
4. ALL HANDRAILS SHALL BE LOCATED AT 36" ABOVE STAIR NOSING WITH A GRASP DIMENSION BETWEEN 1 1/4" AND 2".
5. ALL HANDRAILS SHALL BE CONTINUOUS OR TERMINATE IN A NEWEL POST.
6. ALL GUARDRAILS SHALL BE 36" ABOVE FINISHED FLOOR AND DESIGNED SUCH THAT THE MAXIMUM OPENING WILL NOT ALLOW PASSAGE OF A 4" SPHERE.
7. ALL GUARDRAILS SHALL BE DESIGNED TO RESIST A 200LB CONCENTRATED LOAD AT THE TOP RAIL AND 50 PSF ON ALL GUARDRAIL INFILL COMPONENTS.
8. PROVIDE FIRE BLOCKING AT ALL PLUMBING PENETRATIONS AND WALL/ROOF INTERSECTIONS.
9. THE GARAGE SHALL BE SEPARATED FROM THE RESIDENCE AND ITS ATTIC AREA BY NO LESS THAN 1/2" GWB APPLIED TO THE GARAGE SIDE. LIVING AREAS ABOVE THE GARAGE SHALL BE SEPARATED FROM THE GARAGE WITH NO LESS THAN 5/8" TYPE X GWB. ALL SUPPORTING STRUCTURE SHALL BE PROTECTED BY NO LESS THAN 1/2" GWB.
10. FINISH ALL CEILINGS WITH 5/8" TYPE X GWB.
11. ACCESSIBLE SPACES UNDER STAIRS TO BE FINISHED WITH (2) LAYERS 5/8" TYPE X GWB.
12. PROVIDE 26 GA. GALVANIZED SHEET METAL FLASHING ABOVE WINDOWS AND DOORS, LAP BUILDING PAPER OVER.
13. WINDOWS TO BE SPECIFIED BY OWNER/CONTRACTOR. CONTRACTOR TO VERIFY ALL ROUGH OPENINGS PRIOR TO CONSTRUCTION.
14. ALL EXHAUST AIR SHALL VENT DIRECTLY TO THE EXTERIOR OF THE BUILDING PER M1501.1 AND M1506.2.
15. ALL NEW STAIRS SHALL MEET THE FOLLOWING REQUIREMENTS:
 - A) MINIMUM 36" WIDTH
 - B) MAXIMUM 7 3/4" RISER, MINIMUM 10" TREAD
 - C) MINIMUM 8"-8" HEADROOM
 - D) MINIMUM LANDING LENGTH 36"
16. WINDOW AND DOOR HEADERS SHALL BE INSULATED WITH A MINIMUM R-10 INSULATION.
17. HVAC DUCTS MUST NOT DISPLACE REQUIRED INSULATION AT ANY GIVEN LOCATION. PROVIDE REQUIRED FLOOR OR CEILING INSULATION ON UNHEATED SIDE OF DUCTS INSTALLED IN JOIST OR RAFTER CAVITIES WHERE UNHEATED SPACES ARE ABOVE OR BELOW.
18. ALL CONCEALED VOIDS TO BE FIRE AND DRAFT STOPPED PER 2015 IRC SECTION R602.8.
19. ALL TUBS AND SHOWER STALLS:
 - A) FIRE BLOCK BETWEEN STUDS
 - B) LIMIT SHOWER FLOW TO 2.5 GPM
 - C) WALLS SHALL BE WATERPROOFED TO A MIN. OF 70" ABOVE DRAIN INLET
 - D) ALL GLAZING, INCLUDING WINDOWS, WITHIN 70" OF DRAIN INLET SHALL BE SAFETY GLAZING
20. PROVIDE ELECTRIC ILLUMINATION AT OUTSIDE DOORS SWITCHED FROM INSIDE.
21. PROVIDE ELECTRIC ILLUMINATION AT STAIRWAY, INCLUDING LANDING, SWITCHED AT EACH FLOOR LEVEL.
22. DOORS FROM GARAGE TO LIVING SPACES TO BE 1 3/8" MIN. THICK SOLID CORE DOOR WITH SELF CLOSER AND WEATHER STRIPPING, U-VALUE = 0.20 MAX.
23. ☒ DENOTES 50 CFM EXHAUST FAN VENTED TO OUTSIDE.
24. ☒ DENOTES 100 CFM MIN EXHAUST FAN VENTED TO OUTSIDE. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR SHALL BE PROVIDED.
25. (S) DENOTES 110 VOLT SMOKE DETECTOR WITH BATTERY BACK UP AND INTERCONNECTED. ADDITION OF "CM" DESIGNATION INCLUDES INTEGRATED CARBON MONOXIDE DETECTOR.
26. A DRAIN WATER HEAT RECOVERY UNIT SHALL BE INSTALLED, WHICH CAPTURES WASTE WATER HEAT FROM ALL THE SHOWERS, AND HAS A MINIMUM EFFICIENCY OF 40% IF INSTALLED FOR EQUAL FLOW OR A MINIMUM EFFICIENCY OF 52% IF INSTALLED FOR UNEQUAL FLOW. SUCH UNITS SHALL BE RATED IN ACCORDANCE CSA B55.1 AND BE SO LABELED.

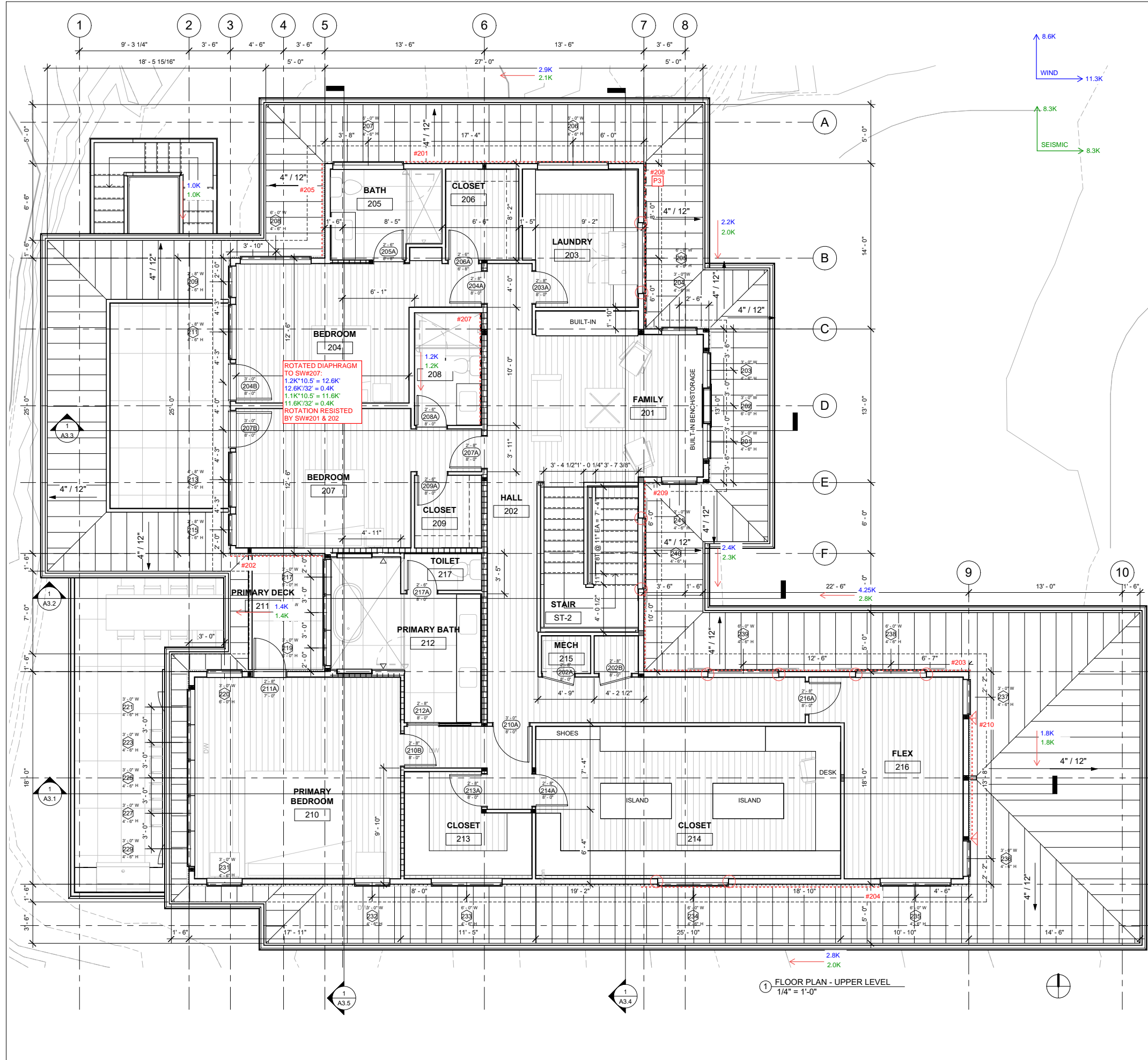
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REV	DATE	ISSUE/REVISION
1	01/09/22	PRE-APP SUBMITTAL
	04/18/23	CONSULT COORD

FLOOR PLAN - MAIN LEVEL

REVISION NO. **1**
 SUPERSEDES ALL PREVIOUS REVISIONS
A1.2



PLAN NOTES:

- THIS PROJECT SHALL BE DESIGNED, ENGINEERED, AND CONSTRUCTED IN FULL COMPLIANCE WITH ALL CODES AND REGULATIONS.
- ALL EXTERIOR WALLS TO BE FRAMED WITH 2X6 H.F. (STUD GRADE OR BETTER) UNO. PROVIDE R-21 BATT INSULATION MIN. UNO.
- ALL INTERIOR WALLS TO BE 2X4 UNO.
- ALL HANDRAILS SHALL BE LOCATED AT 36" ABOVE STAIR NOSING WITH A GRASP DIMENSION BETWEEN 1 1/4" AND 2".
- ALL HANDRAILS SHALL BE CONTINUOUS OR TERMINATE IN A NEWEL POST.
- ALL GUARDRAILS SHALL BE 36" ABOVE FINISHED FLOOR AND DESIGNED SUCH THAT THE MAXIMUM OPENING WILL NOT ALLOW PASSAGE OF A 4" SPHERE.
- ALL GUARDRAILS SHALL BE DESIGNED TO RESIST A 200LB CONCENTRATED LOAD AT THE TOP RAIL AND 50 PSF ON ALL GUARDRAIL INFILL COMPONENTS.
- PROVIDE FIRE BLOCKING AT ALL PLUMBING PENETRATIONS AND WALL/ROOF INTERSECTIONS.
- THE GARAGE SHALL BE SEPARATED FROM THE RESIDENCE AND ITS ATTIC AREA BY NO LESS THAN 1/2" GWB APPLIED TO THE GARAGE SIDE. LIVING AREAS ABOVE THE GARAGE SHALL BE SEPARATED FROM THE GARAGE WITH NO LESS THAN 5/8" TYPE X GWB. ALL SUPPORTING STRUCTURE SHALL BE PROTECTED BY NO LESS THAN 1/2" GWB.
- FINISH ALL CEILINGS WITH 5/8" TYPE X GWB.
- ACCESSIBLE SPACES UNDER STAIRS TO BE FINISHED WITH (2) LAYERS 5/8" TYPE X GWB.
- PROVIDE 26 GA. GALVANIZED SHEET METAL FLASHING ABOVE WINDOWS AND DOORS, LAP BUILDING PAPER OVER.
- WINDOWS TO BE SPECIFIED BY OWNER/CONTRACTOR. CONTRACTOR TO VERIFY ALL ROUGH OPENINGS PRIOR TO CONSTRUCTION.
- ALL EXHAUST AIR SHALL VENT DIRECTLY TO THE EXTERIOR OF THE BUILDING PER M1501.1 AND M1506.2.
- ALL NEW STAIRS SHALL MEET THE FOLLOWING REQUIREMENTS:
 A) MINIMUM 36" WIDTH
 B) MAXIMUM 7 3/4" RISER, MINIMUM 10" TREAD
 C) MINIMUM 6-8" HEADROOM
 D) MINIMUM LANDING LENGTH 36"
- WINDOW AND DOOR HEADERS SHALL BE INSULATED WITH A MINIMUM R-10 INSULATION.
- HVAC DUCTS MUST NOT DISPLACE REQUIRED INSULATION AT ANY GIVEN LOCATION. PROVIDE REQUIRED FLOOR OR CEILING INSULATION ON UNHEATED SIDE OF DUCTS INSTALLED IN JOIST OR RAFTER CAVITIES WHERE UNHEATED SPACES ARE ABOVE OR BELOW.
- ALL CONCEALED VOIDS TO BE FIRE AND DRAFT STOPPED PER 2015 IRC SECTION R602.8.
- ALL TUBS AND SHOWER STALLS:
 A) FIRE BLOCK BETWEEN STUDS
 B) LIMIT SHOWER FLOW TO 2.5 GPM
 C) WALLS SHALL BE WATERPROOFED TO A MIN. OF 70" ABOVE DRAIN INLET
 D) ALL GLAZING, INCLUDING WINDOWS, WITHIN 70" OF DRAIN INLET SHALL BE SAFETY GLAZING
- PROVIDE ELECTRIC ILLUMINATION AT OUTSIDE DOORS SWITCHED FROM INSIDE.
- PROVIDE ELECTRIC ILLUMINATION AT STAIRWAY, INCLUDING LANDING, SWITCHED AT EACH FLOOR LEVEL.
- DOORS FROM GARAGE TO LIVING SPACES TO BE 1 3/8" MIN. THICK SOLID CORE DOOR WITH SELF CLOSER AND WEATHER STRIPPING, U-VALUE = 0.20 MAX.
- ☒ DENOTES 50 CFM EXHAUST FAN VENTED TO OUTSIDE.
- ☒ DENOTES 100 CFM MIN EXHAUST FAN VENTED TO OUTSIDE. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR SHALL BE PROVIDED.
- Ⓢ DENOTES 110 VOLT SMOKE DETECTOR WITH BATTERY BACK UP AND INTERCONNECTED. ADDITION OF "CM" DESIGNATION INCLUDES INTEGRATED CARBON MONOXIDE DETECTOR.
- A DRAIN WATER HEAT RECOVERY UNIT SHALL BE INSTALLED, WHICH CAPTURES WASTE WATER HEAT FROM ALL THE SHOWERS, AND HAS A MINIMUM EFFICIENCY OF 40% IF INSTALLED FOR EQUAL FLOW OR A MINIMUM EFFICIENCY OF 52% IF INSTALLED FOR UNEQUAL FLOW. SUCH UNITS SHALL BE RATED IN ACCORDANCE CSA B55.1 AND BE SO LABELED.

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	04/18/23	CONSULT COORD

FLOOR PLAN - UPPER LEVEL

REVISION NO. **1**
 SUPERSEDES ALL PREVIOUS REVISIONS

A1.3



SHEARWALL DESIGN SUMMARY

SHEARWALL 201: 2ND - SIDE EXTERIOR BATH TO LAUNDRY

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 202: 2ND - SIDE EXTERIOR BEDROOM

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 203: 2ND - SIDE EXTERIOR FLEX/HALL

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 204: 2ND - SIDE EXTERIOR CLOSET/FLEX

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 205: 2ND - REAR EXTERIOR BATH

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

PO - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - UNBLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 206: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS
#DIV/0!

SHEARWALL ASSEMBLY SPECIFICATION

PO - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - UNBLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 207: 2ND - FRONT INTERIOR BATH TO CLOSET

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 208: 2ND - FRONT EXTERIOR LAUNDRY

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 209: 2ND - FRONT EXTERIOR STAIR

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 210: 2ND - FRONT EXTERIOR FLEX

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON GS16 STRAP TIE (14" END LENGTH)

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ### ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

PO - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - UNBLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 101: 1ST - SIDE EXTERIOR OFFICE/POWDER

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 102: 1ST - SIDE EXTERIOR GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 103: 1ST - SIDE EXTERIOR GARAGE/LUGGAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	<input type="text" value="9.8"/>	FT.	MAX WALL OPENING HT, H _c	<input type="text" value="7.5"/>	FT.		
WALL LENGTH, L	<input type="text" value="19.3"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="15.3"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P3"/>

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	<input type="text" value="5800"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="9608"/>	LBS
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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	<input type="text" value="340"/>	PLF	OVERTURNING MOMENT	<input type="text" value="56.6"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="0"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="400"/>	LBS	RESISTIVE MOMENT	<input type="text" value="64.1"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="0"/>	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 104: 1ST - SIDE INTERIOR STAIRS

SHEARWALL PROPERTIES:

WALL HEIGHT, H	<input type="text" value="9.8"/>	FT.	MAX WALL OPENING HT, H _c	<input type="text" value="0.0"/>	FT.		
WALL LENGTH, L	<input type="text" value="8.7"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="8.7"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P1"/>

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	<input type="text" value="1900"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="2913"/>	LBS
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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	<input type="text" value="280"/>	PLF	OVERTURNING MOMENT	<input type="text" value="18.5"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="324"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="800"/>	LBS	RESISTIVE MOMENT	<input type="text" value="15.7"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="1705"/>	LBS

HOLD-DOWN SPECIFICATION

SIMPSON GS16 STRAP TIE (14" END LENGTH)



SHEARWALL DESIGN SUMMARY

SHEARWALL 105: 1ST - REAR EXTERIOR PANTRY

SHEARWALL PROPERTIES:

WALL HEIGHT, H	<input type="text" value="9.8"/>	FT.	MAX WALL OPENING HT, H _c	<input type="text" value="0.0"/>	FT.		
WALL LENGTH, L	<input type="text" value="3.5"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="3.5"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P1"/>

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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	<input type="text" value="130"/>	PLF	OVERTURNING MOMENT	<input type="text" value="3.9"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="550"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="400"/>	LBS	RESISTIVE MOMENT	<input type="text" value="2.0"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="1705"/>	LBS

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H	<input type="text" value="0.0"/>	FT.	MAX WALL OPENING HT, H _c	<input type="text" value="0.0"/>	FT.		
WALL LENGTH, L	<input type="text" value="0.0"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="0.0"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="PO"/>

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ####! ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

PO - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - UNBLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL	<input type="text" value="0"/>	PLF	OVERTURNING MOMENT	<input type="text" value="#DIV/0!"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="0"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="0"/>	LBS	RESISTIVE MOMENT	<input type="text" value="0.0"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="0"/>	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 106: 1ST - FRONT EXTERIOR POWDER/COATS

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 107: 1ST - FRONT EXTERIOR STAIR

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 108: 1ST - FRONT INTERIOR GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 109: 1ST - FRONT EXTERIOR GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 110: 1ST - REAR INTERIOR ENTRY

SHEARWALL PROPERTIES:

WALL HEIGHT, H	<input type="text" value="9.5"/>	FT.	MAX WALL OPENING HT, H _c	<input type="text" value="8.0"/>	FT.		
WALL LENGTH, L	<input type="text" value="14.7"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="10.7"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P1"/>

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	<input type="text" value="600"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="3585"/>	LBS
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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	<input type="text" value="100"/>	PLF	OVERTURNING MOMENT	<input type="text" value="5.7"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="0"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="400"/>	LBS	RESISTIVE MOMENT	<input type="text" value="15.0"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="0"/>	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 001: - SIDE EXTERIOR GUEST ROOM

SHEARWALL PROPERTIES:

WALL HEIGHT, H	<input type="text" value="9.2"/>	FT.	MAX WALL OPENING HT, H _c	<input type="text" value="6.0"/>	FT.		
WALL LENGTH, L	<input type="text" value="13.3"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="10.3"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P1"/>

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	<input type="text" value="3000"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="3444"/>	LBS
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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	<input type="text" value="370"/>	PLF	OVERTURNING MOMENT	<input type="text" value="27.5"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="0"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="800"/>	LBS	RESISTIVE MOMENT	<input type="text" value="39.2"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="0"/>	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 002: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS
#####

SHEARWALL ASSEMBLY SPECIFICATION

PO - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - UNBLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 003: - SIDE INTERIOR STORAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS
#DIV/0!

SHEARWALL ASSEMBLY SPECIFICATION

PO - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - UNBLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 004: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS
#DIV/0!

SHEARWALL ASSEMBLY SPECIFICATION

PO - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - UNBLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 005: - REAR EXTERIOR GYM

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON STD14RJ HOLDOWN

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ####! ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

PO - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - UNBLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

LOCHWOOD LOZIER
WELLMON RESIDENCE

MERCER ISLAND, WA

SHEAR WALL CALCULATIONS - SEISMIC

REVIEWED BY: RJZ

NOVEMBER 21, 2022

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
RESIDENTIAL STRUCTURAL ENGINEERING

SEISMIC CALCULATION - ASCE 7-16

SEISMIC DESIGN CATEGORY:

USER INPUTS:

SITE CLASS	D
SPECTRAL RESPONSE ACCELERATION 0.2 SEC, S_B	1.470
SPECTRAL RESPONSE ACCELERATION 1.0 SEC, S₁	0.509
OCCUPANCY CATEGORY	II

VARIABLES:

SITE COEFFICIENT, F _A	1.20
SITE COEFFICIENT, F _V	1.79

CALCULATED VALUES:

MAXIMUM SPECTRAL RESPONSE ACCELERATION, S_{MS}	1.764
MAXIMUM SPECTRAL RESPONSE ACCELERATION, S_{M1}	0.912
DESIGN SPECTRAL RESPONSE ACCELERATION, S_{DS}	1.176
DESIGN SPECTRAL RESPONSE ACCELERATION, S_{D1}	0.608
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	27

CALCULATED VALUES:

APPROXIMATE FUNDAMENTAL PERIOD, T _A	0.236
T ₀	0.103
T _B	0.517
SPECTRAL RESPONSE ACC., S _A (G)	1.176

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	9.2	3170	15	0.0	48 K
2	9.7	4469	15	0.0	67 K
3	8.0	2956	15	0.0	44 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
16	0.0	0	0	0.0	0 K
17	0.0	0	0	0.0	0 K
18	0.0	0	0	0.0	0 K
19	0.0	0	0	0.0	0 K
20	0.0	0	0	0.0	0 K

TOTAL DEAD LOAD OF STRUCTURE 159 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	0.181	0.181

BASE SHEARS:

ULTIMATE LOADS

x 0.7 =

ALLOWABLE LOADS

TRANSVERSE	LONGITUDINAL	TRANSVERSE	LONGITUDINAL
29 K	29 K	20.1 K	20.1 K

STORY SHEAR CALCULATION:

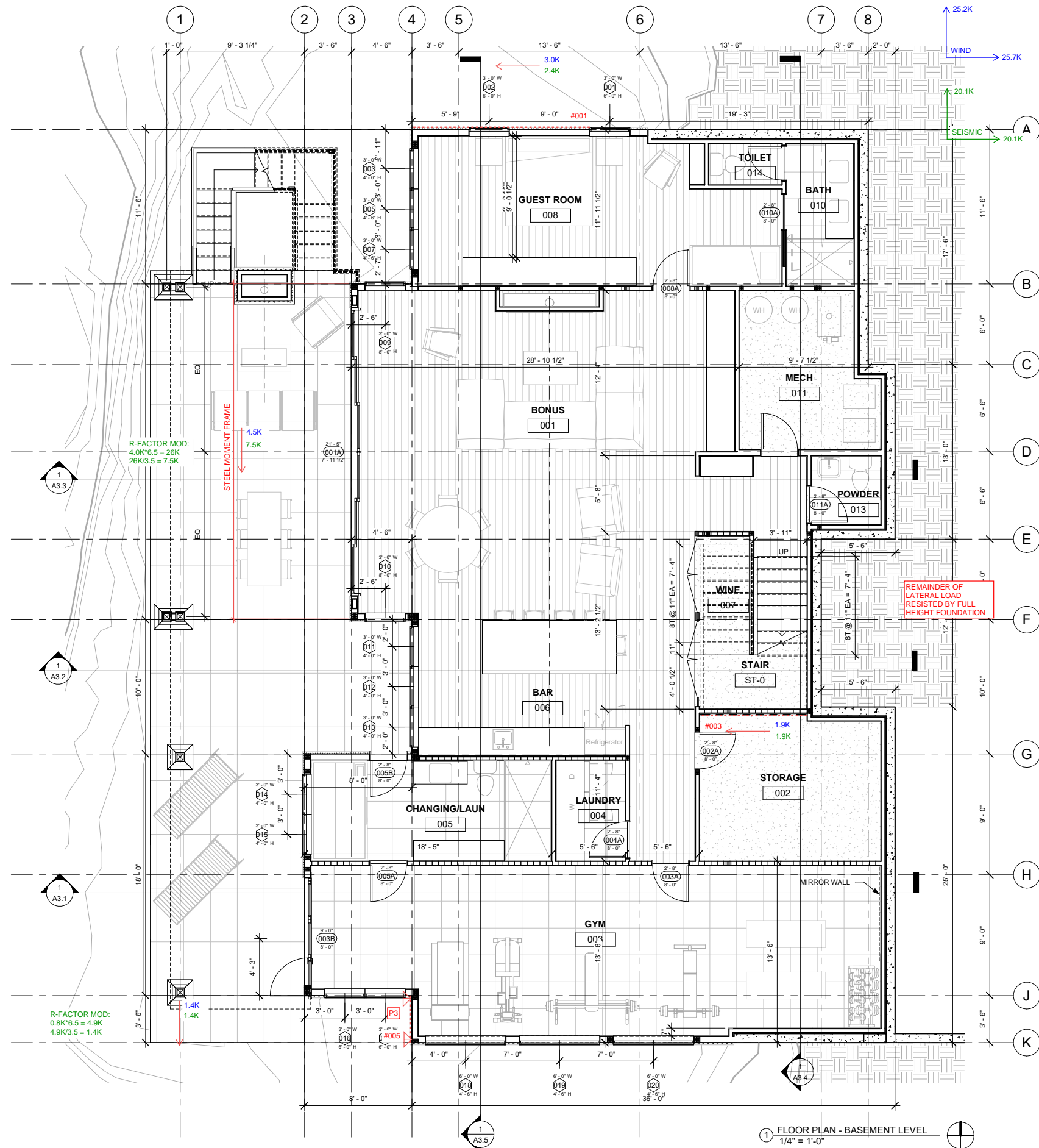
DISTRIBUTION EXPONENT, **1.00**

ULTIMATE LOADS

x 0.7 =

ALLOWABLE LOADS

LEVEL	VERT. DIST. FACTOR, C _{vk}	TRANSVERSE		LONGITUDINAL		TRANSVERSE		LONGITUDINAL	
		STORY SHEAR, F _v	STORY SHEAR, F _v	STORY SHEAR, F _v	STORY SHEAR, F _v	STORY SHEAR, F _v	STORY SHEAR, F _v		
1	0.151	4.3 K	4.3 K	3.0 K	20.1 K	3.0 K	20.1 K		
2	0.437	12.6 K	12.6 K	8.8 K	17.1 K	8.8 K	17.1 K		
3	0.412	11.8 K	11.8 K	8.3 K	8.3 K	8.3 K	8.3 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		
16	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
17	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
18	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
19	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
20	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		



1 FLOOR PLAN - BASEMENT LEVEL
1/4" = 1'-0"

PLAN NOTES:

- THIS PROJECT SHALL BE DESIGNED, ENGINEERED, AND CONSTRUCTED IN FULL COMPLIANCE WITH ALL CODES AND REGULATIONS.
- ALL EXTERIOR WALLS TO BE FRAMED WITH 2X6 H.F. (STUD GRADE OR BETTER) UNO. PROVIDE R-21 BATT INSULATION MIN. UNO.
- ALL INTERIOR WALLS TO BE 2X4 UNO.
- ALL HANDRAILS SHALL BE LOCATED AT 36" ABOVE STAIR NOSING WITH A GRASP DIMENSION BETWEEN 1 1/4" AND 2".
- ALL HANDRAILS SHALL BE CONTINUOUS OR TERMINATE IN A NEWEL POST.
- ALL GUARDRAILS SHALL BE 36" ABOVE FINISHED FLOOR AND DESIGNED SUCH THAT THE MAXIMUM OPENING WILL NOT ALLOW PASSAGE OF A 4" SPHERE.
- ALL GUARDRAILS SHALL BE DESIGNED TO RESIST A 200LB CONCENTRATED LOAD AT THE TOP RAIL AND 50 PSF ON ALL GUARDRAIL INFILL COMPONENTS.
- PROVIDE FIRE BLOCKING AT ALL PLUMBING PENETRATIONS AND WALL/ROOF INTERSECTIONS.
- THE GARAGE SHALL BE SEPARATED FROM THE RESIDENCE AND ITS ATTIC AREA BY NO LESS THAN 1/2" GWB APPLIED TO THE GARAGE SIDE. LIVING AREAS ABOVE THE GARAGE SHALL BE SEPARATED FROM THE GARAGE WITH NO LESS THAN 5/8" TYPE X GWB. ALL SUPPORTING STRUCTURE SHALL BE PROTECTED BY NO LESS THAN 1/2" GWB.
- FINISH ALL CEILINGS WITH 5/8" TYPE X GWB.
- ACCESSIBLE SPACES UNDER STAIRS TO BE FINISHED WITH (2) LAYERS 5/8" TYPE X GWB.
- PROVIDE 26 GA. GALVANIZED SHEET METAL FLASHING ABOVE WINDOWS AND DOORS, LAP BUILDING PAPER OVER.
- WINDOWS TO BE SPECIFIED BY OWNER/CONTRACTOR. CONTRACTOR TO VERIFY ALL ROUGH OPENINGS PRIOR TO CONSTRUCTION.
- ALL EXHAUST AIR SHALL VENT DIRECTLY TO THE EXTERIOR OF THE BUILDING PER M1501.1 AND M1506.2.
- ALL NEW STAIRS SHALL MEET THE FOLLOWING REQUIREMENTS:
 - MINIMUM 36" WIDTH
 - MAXIMUM 7 3/4" RISER, MINIMUM 10" TREAD
 - MINIMUM 6'-8" HEADROOM
 - MINIMUM LANDING LENGTH 36"
- WINDOW AND DOOR HEADERS SHALL BE INSULATED WITH A MINIMUM R-10 INSULATION.
- HVAC DUCTS MUST NOT DISPLACE REQUIRED INSULATION AT ANY GIVEN LOCATION. PROVIDE REQUIRED FLOOR OR CEILING INSULATION ON UNHEATED SIDE OF DUCTS INSTALLED IN JOIST OR RAFTER CAVITIES WHERE UNHEATED SPACES ARE ABOVE OR BELOW.
- ALL CONCEALED VOIDS TO BE FIRE AND DRAFT STOPPED PER 2015 IRC SECTION R602.8.
- ALL TUBS AND SHOWER STALLS:
 - FIRE BLOCK BETWEEN STUDS
 - LIMIT SHOWER FLOW TO 2.5 GPM
 - WALLS SHALL BE WATERPROOFED TO A MIN. OF 70" ABOVE DRAIN INLET
 - ALL GLAZING, INCLUDING WINDOWS, WITHIN 70" OF DRAIN INLET SHALL BE SAFETY GLAZING
- PROVIDE ELECTRIC ILLUMINATION AT OUTSIDE DOORS SWITCHED FROM INSIDE.
- PROVIDE ELECTRIC ILLUMINATION AT STAIRWAY, INCLUDING LANDING, SWITCHED AT EACH FLOOR LEVEL.
- DOORS FROM GARAGE TO LIVING SPACES TO BE 1 3/8" MIN. THICK. SOLID CORE DOOR WITH SELF CLOSER AND WEATHER STRIPPING, U-VALUE = 0.20 MAX.
- ☒ DENOTES 50 CFM EXHAUST FAN VENTED TO OUTSIDE.
- ☒ DENOTES 100 CFM MIN EXHAUST FAN VENTED TO OUTSIDE. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR SHALL BE PROVIDED.
- Ⓢ DENOTES 110 VOLT SMOKE DETECTOR WITH BATTERY BACK UP AND INTERCONNECTED. ADDITION OF "CM" DESIGNATION INCLUDES INTEGRATED CARBON MONOXIDE DETECTOR.
- A DRAIN WATER HEAT RECOVERY UNIT SHALL BE INSTALLED, WHICH CAPTURES WASTE WATER HEAT FROM ALL THE SHOWERS, AND HAS A MINIMUM EFFICIENCY OF 40% IF INSTALLED FOR EQUAL FLOW OR A MINIMUM EFFICIENCY OF 52% IF INSTALLED FOR UNEQUAL FLOW. SUCH UNITS SHALL BE RATED IN ACCORDANCE CSA B55.1 AND BE SO LABELED.

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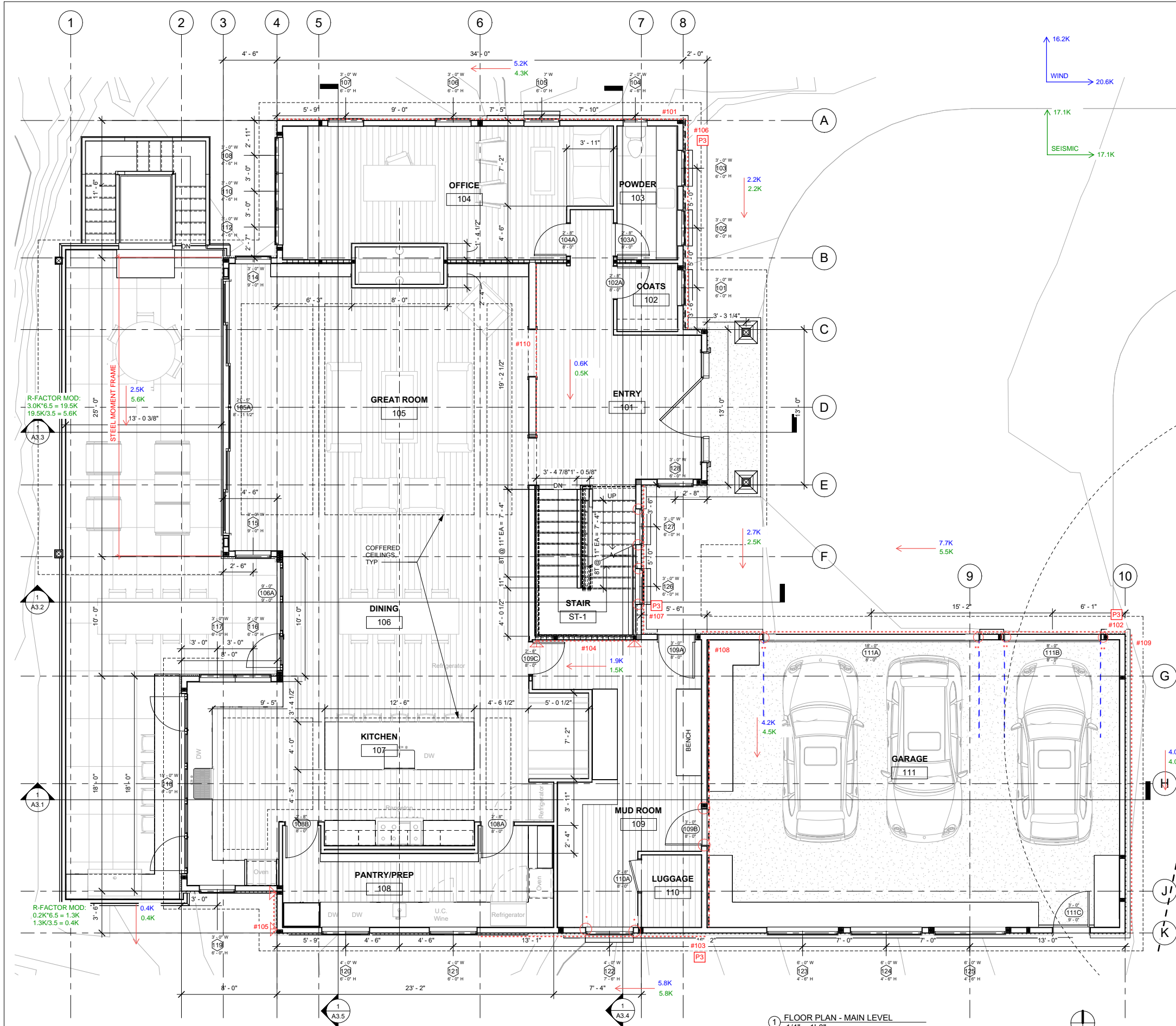
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REV	DATE	ISSUE/REVISION
1	01/09/22 04/18/23	PRE-APP SUBMITTAL CONSULT COORD

NOT FOR CONSTRUCTION

SHEET TITLE
FLOOR PLAN - BASEMENT LEVEL

REVISION NO. 1
SUPERSEDES ALL PREVIOUS REVISIONS
SHEET NO. **A1.1**



PLAN NOTES:

1. THIS PROJECT SHALL BE DESIGNED, ENGINEERED, AND CONSTRUCTED IN FULL COMPLIANCE WITH ALL CODES AND REGULATIONS.
2. ALL EXTERIOR WALLS TO BE FRAMED WITH 2X6 H.F. (STUD GRADE OR BETTER) UNO. PROVIDE R-21 BATT INSULATION MIN. UNO.
3. ALL INTERIOR WALLS TO BE 2X4 UNO.
4. ALL HANDRAILS SHALL BE LOCATED AT 36" ABOVE STAIR NOSING WITH A GRASP DIMENSION BETWEEN 1 1/4" AND 2".
5. ALL HANDRAILS SHALL BE CONTINUOUS OR TERMINATE IN A NEWEL POST.
6. ALL GUARDRAILS SHALL BE 36" ABOVE FINISHED FLOOR AND DESIGNED SUCH THAT THE MAXIMUM OPENING WILL NOT ALLOW PASSAGE OF A 4" SPHERE.
7. ALL GUARDRAILS SHALL BE DESIGNED TO RESIST A 200LB CONCENTRATED LOAD AT THE TOP RAIL AND 50 PSF ON ALL GUARDRAIL INFILL COMPONENTS.
8. PROVIDE FIRE BLOCKING AT ALL PLUMBING PENETRATIONS AND WALL/ROOF INTERSECTIONS.
9. THE GARAGE SHALL BE SEPARATED FROM THE RESIDENCE AND ITS ATTIC AREA BY NO LESS THAN 1/2" GWB APPLIED TO THE GARAGE SIDE. LIVING AREAS ABOVE THE GARAGE SHALL BE SEPARATED FROM THE GARAGE WITH NO LESS THAN 5/8" TYPE X GWB. ALL SUPPORTING STRUCTURE SHALL BE PROTECTED BY NO LESS THAN 1/2" GWB.
10. FINISH ALL CEILINGS WITH 5/8" TYPE X GWB.
11. ACCESSIBLE SPACES UNDER STAIRS TO BE FINISHED WITH (2) LAYERS 5/8" TYPE X GWB.
12. PROVIDE 26 GA. GALVANIZED SHEET METAL FLASHING ABOVE WINDOWS AND DOORS, LAP BUILDING PAPER OVER.
13. WINDOWS TO BE SPECIFIED BY OWNER/CONTRACTOR. CONTRACTOR TO VERIFY ALL ROUGH OPENINGS PRIOR TO CONSTRUCTION.
14. ALL EXHAUST AIR SHALL VENT DIRECTLY TO THE EXTERIOR OF THE BUILDING PER M1501.1 AND M1506.2.
15. ALL NEW STAIRS SHALL MEET THE FOLLOWING REQUIREMENTS:
 - A) MINIMUM 36" WIDTH
 - B) MAXIMUM 7 3/4" RISER, MINIMUM 10" TREAD
 - C) MINIMUM 6"-8" HEADROOM
 - D) MINIMUM LANDING LENGTH 36"
16. WINDOW AND DOOR HEADERS SHALL BE INSULATED WITH A MINIMUM R-10 INSULATION.
17. HVAC DUCTS MUST NOT DISPLACE REQUIRED INSULATION AT ANY GIVEN LOCATION. PROVIDE REQUIRED FLOOR OR CEILING INSULATION ON UNHEATED SIDE OF DUCTS INSTALLED IN JOIST OR RAFTER CAVITIES WHERE UNHEATED SPACES ARE ABOVE OR BELOW.
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 - C) WALLS SHALL BE WATERPROOFED TO A MIN. OF 70" ABOVE DRAIN INLET
 - D) ALL GLAZING, INCLUDING WINDOWS, WITHIN 70" OF DRAIN INLET SHALL BE SAFETY GLAZING
20. PROVIDE ELECTRIC ILLUMINATION AT OUTSIDE DOORS SWITCHED FROM INSIDE.
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22. DOORS FROM GARAGE TO LIVING SPACES TO BE 1 3/8" MIN. THICK SOLID CORE DOOR WITH SELF CLOSER AND WEATHER STRIPPING, U-VALUE = 0.20 MAX.
23. ☒ DENOTES 50 CFM EXHAUST FAN VENTED TO OUTSIDE.
24. ☒ DENOTES 100 CFM MIN EXHAUST FAN VENTED TO OUTSIDE. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR SHALL BE PROVIDED.
25. (S) DENOTES 110 VOLT SMOKE DETECTOR WITH BATTERY BACK UP AND INTERCONNECTED. ADDITION OF "CM" DESIGNATION INCLUDES INTEGRATED CARBON MONOXIDE DETECTOR.
26. A DRAIN WATER HEAT RECOVERY UNIT SHALL BE INSTALLED, WHICH CAPTURES WASTE WATER HEAT FROM ALL THE SHOWERS, AND HAS A MINIMUM EFFICIENCY OF 40% IF INSTALLED FOR EQUAL FLOW OR A MINIMUM EFFICIENCY OF 52% IF INSTALLED FOR UNEQUAL FLOW. SUCH UNITS SHALL BE RATED IN ACCORDANCE CSA B55.1 AND BE SO LABELED.

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DATE: 12/04/18
 SCALE: 1/4" = 1'-0"

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 MERCER ISLAND, WA 98040

22069WEL

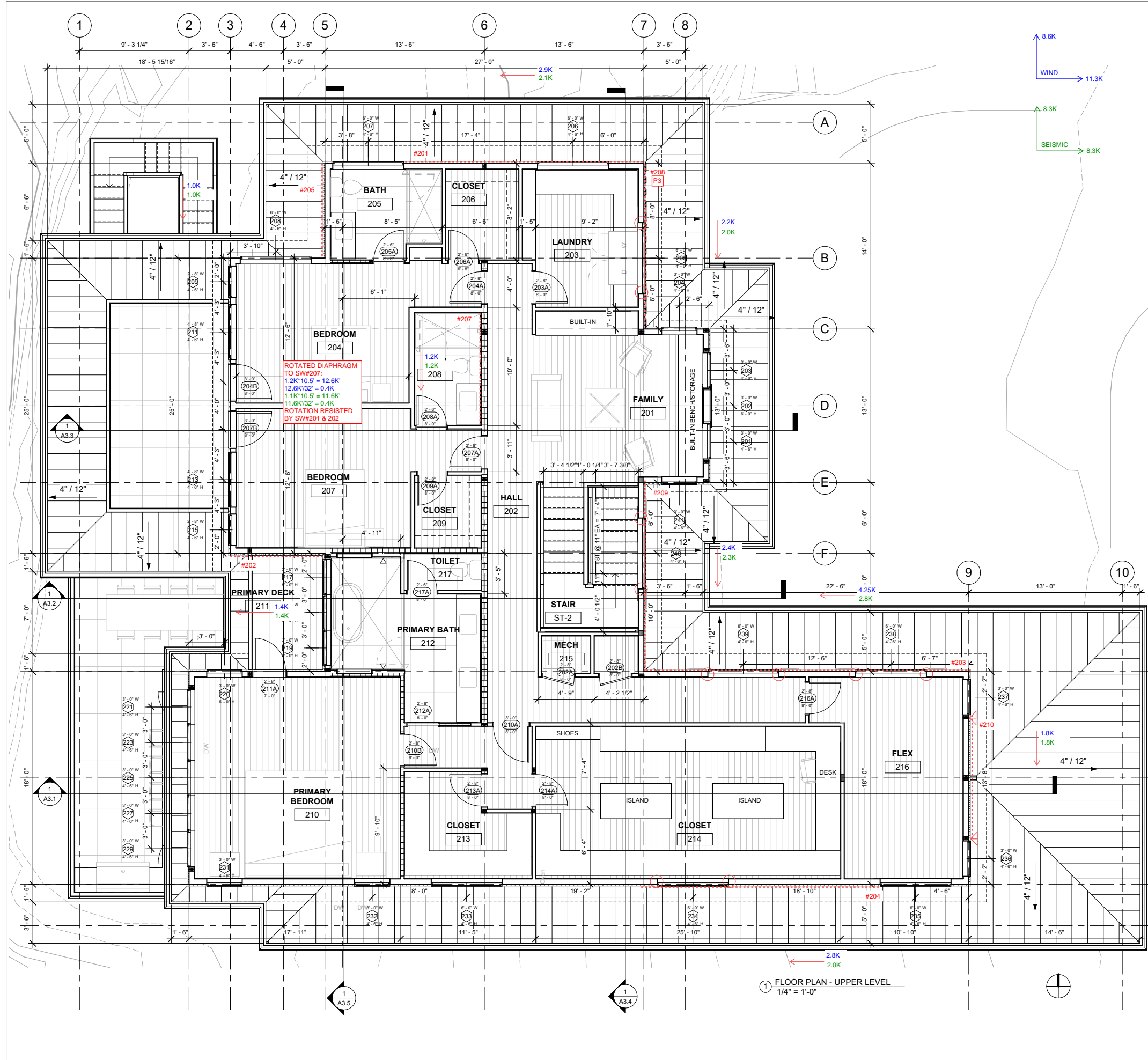
REV	DATE	ISSUE/REVISION
1	01/09/22 04/18/23	PRE-APP SUBMITTAL CONSULT COORD

FLOOR PLAN - MAIN LEVEL

REVISION NO. **1**
 SUPERSEDES ALL PREVIOUS REVISIONS

A1.2

NOT FOR CONSTRUCTION



PLAN NOTES:

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24. ☒ DENOTES 100 CFM MIN EXHAUST FAN VENTED TO OUTSIDE. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR SHALL BE PROVIDED.
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26. A DRAIN WATER HEAT RECOVERY UNIT SHALL BE INSTALLED, WHICH CAPTURES WASTE WATER HEAT FROM ALL THE SHOWERS, AND HAS A MINIMUM EFFICIENCY OF 40% IF INSTALLED FOR EQUAL FLOW OR A MINIMUM EFFICIENCY OF 52% IF INSTALLED FOR UNEQUAL FLOW. SUCH UNITS SHALL BE RATED IN ACCORDANCE CSA B55.1 AND BE SO LABELED.

ROTATED DIAPHRAGM TO SW#207
 1.2K'x10.5' = 12.6K'
 12.6K'/32' = 0.4K'
 1.1K'x10.5' = 11.6K'
 11.6K'/32' = 0.4K'
 ROTATION RESISTED BY SW#201 & 202

1 FLOOR PLAN - UPPER LEVEL
 1/4" = 1'-0"

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REV	DATE	ISSUE/REVISION
1	01/09/22	PRE-APP SUBMITTAL
	04/18/23	CONSULT COORD

FLOOR PLAN - UPPER LEVEL

REVISION NO. 1
 SHEET NO. A1.3



SHEARWALL DESIGN SUMMARY

SHEARWALL 201: 2ND - SIDE EXTERIOR BATH TO LAUNDRY

SHEARWALL PROPERTIES:

WALL HEIGHT, H	<input type="text" value="11.0"/>	FT.	MAX WALL OPENING HT, H _c	<input type="text" value="4.5"/>	FT.		
WALL LENGTH, L	<input type="text" value="20.3"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="14.3"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P1"/>

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	<input type="text" value="2100"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="3425"/>	LBS
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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	<input type="text" value="120"/>	PLF	OVERTURNING MOMENT	<input type="text" value="23.1"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="0"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="550"/>	LBS	RESISTIVE MOMENT	<input type="text" value="32.4"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="0"/>	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 202: 2ND - SIDE EXTERIOR BEDROOM

SHEARWALL PROPERTIES:

WALL HEIGHT, H	<input type="text" value="8.0"/>	FT.	MAX WALL OPENING HT, H _c	<input type="text" value="0.0"/>	FT.		
WALL LENGTH, L	<input type="text" value="8.0"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="8.0"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P1"/>

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	<input type="text" value="1400"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="1912"/>	LBS
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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	<input type="text" value="300"/>	PLF	OVERTURNING MOMENT	<input type="text" value="11.2"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="0"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="400"/>	LBS	RESISTIVE MOMENT	<input type="text" value="11.5"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="0"/>	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 203: 2ND - SIDE EXTERIOR FLEX/HALL

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 204: 2ND - SIDE EXTERIOR CLOSET/FLEX

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 205: 2ND - REAR EXTERIOR BATH

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

PO - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - UNBLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 206: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS
#DIV/0!

SHEARWALL ASSEMBLY SPECIFICATION

PO - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - UNBLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 207: 2ND - FRONT INTERIOR BATH TO CLOSET

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 208: 2ND - FRONT EXTERIOR LAUNDRY

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 209: 2ND - FRONT EXTERIOR STAIR

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 210: 2ND - FRONT EXTERIOR FLEX

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON GS16 STRAP TIE (14" END LENGTH)

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ####! ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

PO - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6" O.C. PANEL EDGES & 12" O.C. PANEL FIELD - UNBLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 101: 1ST - SIDE EXTERIOR OFFICE/POWDER

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 102: 1ST - SIDE EXTERIOR GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 103: 1ST - SIDE EXTERIOR GARAGE/LUGGAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 104: 1ST - SIDE INTERIOR STAIRS

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 105: 1ST - REAR EXTERIOR PANTRY

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS
**#DIV/0!**

SHEARWALL ASSEMBLY SPECIFICATION

PO - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - UNBLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 106: 1ST - FRONT EXTERIOR POWDER/COATS

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 107: 1ST - FRONT EXTERIOR STAIR

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 108: 1ST - FRONT INTERIOR GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 109: 1ST - FRONT EXTERIOR GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 110: 1ST - REAR INTERIOR ENTRY

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 001: - SIDE EXTERIOR GUEST ROOM

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 002: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS
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SHEARWALL ASSEMBLY SPECIFICATION

PO - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - UNBLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 003: - SIDE INTERIOR STORAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS
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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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS
#DIV/0!

SHEARWALL ASSEMBLY SPECIFICATION

PO - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - UNBLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 004: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS
#DIV/0!

SHEARWALL ASSEMBLY SPECIFICATION

PO - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - UNBLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 005: - REAR EXTERIOR GYM

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY 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 PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON STD14RJ HOLDOWN

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

PO - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - UNBLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT HOLD DOWN DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

Cantilevered Retaining Wall

Project File: Foundation.ec6

LIC# : KW-06017913, Build:20.22.10.25

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Typical Basement Wall

Code Reference

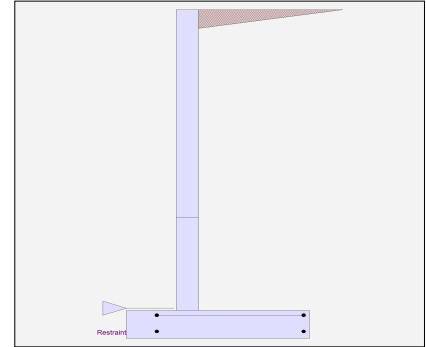
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	10.75 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Method	:	Uniform
Multiplier Used	=	6.500
(Multiplier used on soil density)		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Uniform Seismic Force	=	76.375
Total Seismic Force	=	897.406

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

DESCRIPTION: Typical Basement Wall

Design Summary

Wall Stability Ratios

Overturning	=	1.92	OK
Slab Resists All Sliding !			
Global Stability	=	1.57	
Total Bearing Load	=	6,908 lbs	
...resultant ecc.	=	8.22 in	
Eccentricity within middle third			
Soil Pressure @ Toe	=	1,856 psf	OK
Soil Pressure @ Heel	=	268 psf	OK
Allowable	=	2,000 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	2,599 psf	
ACI Factored @ Heel	=	375 psf	
Footing Shear @ Toe	=	14.9 psi	OK
Footing Shear @ Heel	=	31.0 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	3,044.3 lbs
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Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		2nd	Bottom		
Design Height Above Ftg	ft =	Stem OK	Stem OK		
		3.33	0.00		
Wall Material Above "Ht"	=	Concrete	Concrete		
Design Method	=	SD	SD	SD	SD
Thickness	=	8.00	8.00		
Rebar Size	=	# 5	# 5		
Rebar Spacing	=	12.00	6.00		
Rebar Placed at	=	Edge	6.5 in		
Design Data					
fb/FB + fa/Fa	=	0.728	0.994		
Total Force @ Section					
Service Level	lbs =				
Strength Level	lbs =	2,108.3	4,056.8		
Moment....Actual					
Service Level	ft-# =				
Strength Level	ft-# =	5,915.3	16,007.8		
Moment.....Allowable	ft-# =	8,121.3	16,093.8		
Shear.....Actual					
Service Level	psi =				
Strength Level	psi =	28.4	52.0		
Shear.....Allowable	psi =	75.0	75.0		
Anet (Masonry)	in2 =				
Wall Weight	psf =	100.0	100.0		
Rebar Depth 'd'	in =	6.19	6.50		

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,500.0	2,500.0
Fy	psi =	60,000.0	60,000.0

Cantilevered Retaining Wall

DESCRIPTION: Typical Basement Wall

Concrete Stem Rebar Area Details

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>
2nd Stem		
As (based on applied moment) :	0.224 in ² /ft	
(4/3) * As :	0.2986 in ² /ft	Min Stem T&S Reinf Area 1.425 in ²
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in ² /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in ² /ft
0.0018bh : 0.0018(12)(8) :	0.1728 in ² /ft	Horizontal Reinforcing Options :
	=====	<u>One layer of :</u> <u>Two layers of :</u>
Required Area :	0.2475 in ² /ft	#4@ 12.50 in #4@ 25.00 in
Provided Area :	0.31 in ² /ft	#5@ 19.38 in #5@ 38.75 in
Maximum Area :	0.8382 in ² /ft	#6@ 27.50 in #6@ 55.00 in

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>
Bottom Stem		
As (based on applied moment) :	0.5755 in ² /ft	
(4/3) * As :	0.7673 in ² /ft	Min Stem T&S Reinf Area 0.639 in ²
200bd/fy : 200(12)(6.5)/60000 :	0.26 in ² /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in ² /ft
0.0018bh : 0.0018(12)(8) :	0.1728 in ² /ft	Horizontal Reinforcing Options :
	=====	<u>One layer of :</u> <u>Two layers of :</u>
Required Area :	0.5755 in ² /ft	#4@ 12.50 in #4@ 25.00 in
Provided Area :	0.62 in ² /ft	#5@ 19.38 in #5@ 38.75 in
Maximum Area :	0.8805 in ² /ft	#6@ 27.50 in #6@ 55.00 in

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	4.00
Total Footing Width	=	5.50
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	2,599	375 psf
Mu' : Upward	=	2,696	4,581 ft-#
Mu' : Downward	=	203	14,571 ft-#
Mu: Design	=	2,494 OK	9,991 ft-# OK
phiMn	=	2,500	13,603 ft-#
Actual 1-Way Shear	=	14.90	31.05 psi
Allow 1-Way Shear	=	40.00	75.00 psi
Toe Reinforcing	=	None Spec'd	
Heel Reinforcing	=	# 4 @ 7.44 in	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: phiMn = phi'5'lambda'sqrt(fc)'Sm

Heel: #4@ 7.44 in, #5@ 11.53 in, #6@ 16.37 in, #7@ 22.33 in, #8@ 29.40 in, #9@ 37.21 in, #10@ 47.26 in

Key: No key defined

Min footing T&S reinf Area	1.43	in ²
Min footing T&S reinf Area per foot	0.26	in ² /ft
<u>If one layer of horizontal bars:</u>		<u>If two layers of horizontal bars:</u>
#4@ 9.26 in		#4@ 18.52 in
#5@ 14.35 in		#5@ 28.70 in
#6@ 20.37 in		#6@ 40.74 in

Cantilevered Retaining Wall

DESCRIPTION: Typical Basement Wall

Summary of Overturning & Resisting Forces & Moments

ItemOVERTURNING.....		RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	2,416.1	3.92	9,463.0	Soil Over HL (ab. water tbl)	3,941.7	3.83	15,109.7
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.83	15,109.7
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
Seismic Earth Load =	628.2	5.88	3,690.6	Surcharge Over Toe =			
=				Stem Weight(s) =	1,075.0	1.83	1,970.8
Total	= 3,044.3	O.T.M. =	13,153.6	Earth @ Stem Transitions =			
				Footing Weight =	825.0	2.75	2,268.8
				Key Weight =			
				Vert. Component =	1,066.5	5.50	5,865.8
				Total =	6,908.2 lbs	R.M. =	25,215.1

Resisting/Overturning Ratio

= **1.92**
 Vertical Loads used for Soil Pressure = 6,908.2 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.101	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

Project File: Foundation.ec6

LIC# : KW-06017913, Build:20.22.10.25

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 6'-0" Retaining Wall

Code Reference

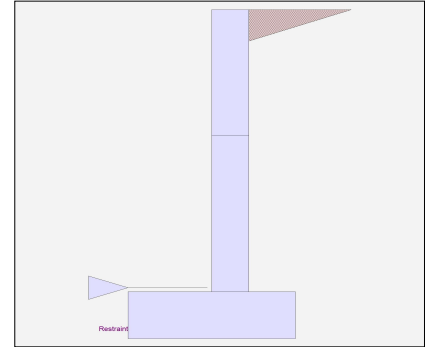
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	6.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Method	:	Uniform
Multiplier Used	=	7.000
(Multiplier used on soil density)		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Uniform Seismic Force	=	49.000
Total Seismic Force	=	343.000

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

DESCRIPTION: 6'-0" Retaining Wall

Design Summary

Wall Stability Ratios

Overturning	=	1.52	OK
Slab Resists All Sliding !			
Global Stability	=	1.58	
Total Bearing Load	=	1,979 lbs	
...resultant ecc.	=	6.82 in	
Eccentricity outside middle third			
Soil Pressure @ Toe	=	1,145 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	2,000 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,603 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	7.9 psi	OK
Footing Shear @ Heel	=	10.9 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	1,097.6 lbs
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Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		2nd	Bottom		
Design Height Above Ftg	ft =	Stem OK	Stem OK		
		3.33	0.00		
Wall Material Above "Ht"	=	Concrete	Concrete		
Design Method	=	SD	SD	SD	SD
Thickness	=	8.00	8.00		
Rebar Size	=	# 5	# 5		
Rebar Spacing	=	16.00	16.00		
Rebar Placed at	=	Edge	Edge		
Design Data					
fb/FB + fa/Fa	=	0.056	0.468		
Total Force @ Section					
Service Level	lbs =				
Strength Level	lbs =	330.4	1,302.0		
Moment....Actual					
Service Level	ft-# =				
Strength Level	ft-# =	352.3	2,898.0		
Moment.....Allowable	ft-# =	6,186.6	6,186.6		
Shear.....Actual					
Service Level	psi =				
Strength Level	psi =	4.5	17.5		
Shear.....Allowable	psi =	75.0	75.0		
Anet (Masonry)	in2 =				
Wall Weight	psf =	100.0	100.0		
Rebar Depth 'd'	in =	6.19	6.19		

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,500.0	2,500.0
Fy	psi =	60,000.0	60,000.0

Cantilevered Retaining Wall

DESCRIPTION: 6'-0" Retaining Wall

Concrete Stem Rebar Area Details

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>
2nd Stem		
As (based on applied moment) :	0.0133 in2/ft	
(4/3) * As :	0.0178 in2/ft	Min Stem T&S Reinf Area 0.513 in2
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :
	=====	<u>One layer of :</u> <u>Two layers of :</u>
Required Area :	0.1728 in2/ft	#4@ 12.50 in #4@ 25.00 in
Provided Area :	0.2325 in2/ft	#5@ 19.38 in #5@ 38.75 in
Maximum Area :	0.8382 in2/ft	#6@ 27.50 in #6@ 55.00 in

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>
Bottom Stem		
As (based on applied moment) :	0.1097 in2/ft	
(4/3) * As :	0.1463 in2/ft	Min Stem T&S Reinf Area 0.639 in2
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :
	=====	<u>One layer of :</u> <u>Two layers of :</u>
Required Area :	0.1728 in2/ft	#4@ 12.50 in #4@ 25.00 in
Provided Area :	0.2325 in2/ft	#5@ 19.38 in #5@ 38.75 in
Maximum Area :	0.8382 in2/ft	#6@ 27.50 in #6@ 55.00 in

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	1.50
Total Footing Width	=	3.00
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	1,603	0 psf
Mu' : Upward	=	1,481	24 ft-#
Mu' : Downward	=	203	842 ft-#
Mu: Design	=	1,279 OK	819 ft-# OK
phiMn	=	2,500	2,500 ft-#
Actual 1-Way Shear	=	7.89	10.86 psi
Allow 1-Way Shear	=	40.00	40.00 psi
Toe Reinforcing	=	None Spec'd	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: $\phi M_n = \phi'5' \lambda \sqrt{f_c} S_m$

Heel: $\phi M_n = \phi'5' \lambda \sqrt{f_c} S_m$

Key: No key defined

Min footing T&S reinf Area	0.78	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft
<u>If one layer of horizontal bars:</u>		<u>If two layers of horizontal bars:</u>
#4@ 9.26 in		#4@ 18.52 in
#5@ 14.35 in		#5@ 28.70 in
#6@ 20.37 in		#6@ 40.74 in

Cantilevered Retaining Wall

Project File: Foundation.ec6

LIC# : KW-06017913, Build:20.22.10.25

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 6'-0" Retaining Wall

Summary of Overturning & Resisting Forces & Moments

ItemOVERTURNING.....		RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	857.5	2.33	2,000.8	Soil Over HL (ab. water tbl)	550.0	2.58	1,420.8
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.58	1,420.8
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
Seismic Earth Load =	240.1	3.50	840.4	Surcharge Over Toe =			
=				Stem Weight(s) =	600.0	1.83	1,100.0
Total	= 1,097.6	O.T.M. =	2,841.2	Earth @ Stem Transitions =			
				Footing Weight =	450.0	1.50	675.0
				Key Weight =			
				Vert. Component =	378.5	3.00	1,135.5
				Total =	1,978.5 lbs	R.M. =	4,331.4
Resisting/Overturning Ratio		= 1.52					
Vertical Loads used for Soil Pressure =		1,978.5 lbs					

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
 Horizontal Defl @ Top of Wall (approximate only) 0.064 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

Project File: Foundation.ec6

LIC# : KW-06017913, Build:20.22.10.25

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 6'-0" Reverse Retaining Wall

Code Reference

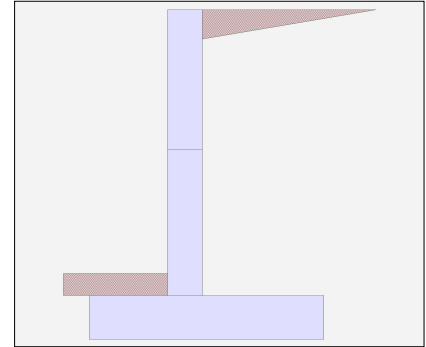
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	6.50 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	6.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Method	:	Uniform
Multiplier Used	=	7.000
(Multiplier used on soil density)		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Uniform Seismic Force	=	52.500
Total Seismic Force	=	393.750

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Wellmon Residence
 Lochwood Lozier
 RJD
 268-22010
 11-21-22

Cantilevered Retaining Wall

Project File: Foundation.ec6

LIC# : KW-06017913, Build:20.22.10.25

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 6'-0" Reverse Retaining Wall

Design Summary

F.O.S. 1.1 ACCEPTABLE w/ SEISMIC APPLIED

Wall Stability Ratios

Overtuning	=	2.94	OK
Sliding	=	1.24	Ratio < 1.5!
Global Stability	=	2.16	
Total Bearing Load	=	3,510	lbs
...resultant ecc.	=	0.49	in
Eccentricity within middle third			
Soil Pressure @ Toe	=	721	psf OK
Soil Pressure @ Heel	=	646	psf OK
Allowable	=	2,000	psf
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,009	psf
ACI Factored @ Heel	=	904	psf
Footing Shear @ Toe	=	4.8	psi OK
Footing Shear @ Heel	=	7.9	psi OK
Allowable	=	75.0	psi

Sliding Calcs

Lateral Sliding Force	=	1,260.0	lbs
less 100% Passive Force	=	156.3	lbs
less 100% Friction Force	=	1,404.1	lbs
Added Force Req'd	=	0.0	lbs OK
...for 1.5 Stability	=	329.6	lbs NG

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		2nd	Bottom		
Design Height Above Ftg	ft =	Stem OK	Stem OK		
Wall Material Above "Ht"	=	3.33	0.00		
Design Method	=	Concrete	Concrete	SD	SD
Thickness	=	SD	SD		
Rebar Size	=	8.00	8.00		
Rebar Spacing	=	# 5	# 5		
Rebar Placed at	=	16.00	16.00		
	=	Edge	Edge		
Design Data					
fb/FB + fa/Fa	=	0.090	0.593		
Total Force @ Section					
Service Level	lbs =				
Strength Level	lbs =	447.8	1,524.3		
Moment....Actual					
Service Level	ft-# =				
Strength Level	ft-# =	561.1	3,672.2		
Moment.....Allowable	ft-# =	6,186.6	6,186.6		
Shear.....Actual					
Service Level	psi =				
Strength Level	psi =	6.0	20.5		
Shear.....Allowable	psi =	75.0	75.0		
Anet (Masonry)	in2 =				
Wall Weight	psf =	100.0	100.0		
Rebar Depth 'd'	in =	6.19	6.19		

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,500.0	2,500.0
Fy	psi =	60,000.0	60,000.0

Wellmon Residence
 Lochwood Lozier
 RJD
 268-22010
 11-21-22

Cantilevered Retaining Wall

Project File: Foundation.ec6

LIC# : KW-06017913, Build:20.22.10.25

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 6'-0" Reverse Retaining Wall

Concrete Stem Rebar Area Details

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>
2nd Stem		
As (based on applied moment) :	0.0212 in2/ft	
(4/3) * As :	0.0283 in2/ft	Min Stem T&S Reinf Area 0.609 in2
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :
	=====	<u>One layer of :</u> <u>Two layers of :</u>
Required Area :	0.1728 in2/ft	#4@ 12.50 in #4@ 25.00 in
Provided Area :	0.2325 in2/ft	#5@ 19.38 in #5@ 38.75 in
Maximum Area :	0.8382 in2/ft	#6@ 27.50 in #6@ 55.00 in

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>
Bottom Stem		
As (based on applied moment) :	0.1391 in2/ft	
(4/3) * As :	0.1854 in2/ft	Min Stem T&S Reinf Area 0.639 in2
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :
	=====	<u>One layer of :</u> <u>Two layers of :</u>
Required Area :	0.1854 in2/ft	#4@ 12.50 in #4@ 25.00 in
Provided Area :	0.2325 in2/ft	#5@ 19.38 in #5@ 38.75 in
Maximum Area :	0.8382 in2/ft	#6@ 27.50 in #6@ 55.00 in

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	3.00
Total Footing Width	=	4.50
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm = 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	1,009	904 psf
Mu' : Upward	=	1,122	2,512 ft-#
Mu' : Downward	=	277	4,448 ft-#
Mu: Design	=	846 OK	1,936 ft-# OK
phiMn	=	2,500	2,500 ft-#
Actual 1-Way Shear	=	4.83	7.86 psi
Allow 1-Way Shear	=	40.00	40.00 psi
Toe Reinforcing	=	None Spec'd	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: $\phi Mn = \phi'5 \lambda \sqrt{f'c} S_m$

Heel: $\phi Mn = \phi'5 \lambda \sqrt{f'c} S_m$

Key: No key defined

Min footing T&S reinf Area 1.17 in2
 Min footing T&S reinf Area per foot 0.26 in2 /ft

If one layer of horizontal bars:

#4@ 9.26 in
 #5@ 14.35 in
 #6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
 #5@ 28.70 in
 #6@ 40.74 in

Wellmon Residence
 Lochwood Lozier
 RJD
 268-22010
 11-21-22

Cantilevered Retaining Wall

Project File: Foundation.ec6

LIC# : KW-06017913, Build:20.22.10.25

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 6'-0" Reverse Retaining Wall

Summary of Overturning & Resisting Forces & Moments

ItemOVERTURNING.....		RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	984.4	2.50	2,460.9	Soil Over HL (ab. water tbl)	1,668.3	3.33	5,561.1
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.33	5,561.1
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =	82.5	0.75	61.9
Seismic Earth Load =	275.6	3.75	1,033.6	Surcharge Over Toe =			
=				Stem Weight(s) =	650.0	1.83	1,191.7
Total =	1,260.0	O.T.M. =	3,494.5	Earth @ Stem Transitions =			
				Footing Weight =	675.0	2.25	1,518.8
				Key Weight =			
				Vert. Component =	434.5	4.50	1,955.3
Resisting/Overturning Ratio =			2.94	Total =	3,510.4 lbs	R.M.=	10,288.7
Vertical Loads used for Soil Pressure =		3,510.4 lbs					

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
 Horizontal Defl @ Top of Wall (approximate only) 0.029 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.