



MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

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CALCULATION PACKAGE

October 24, 2024

Milestone NW

Mercer Island
Lot 2

Mercer Island,
Washington

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

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Signature, Seal & Date



BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: TYP. EXT. HDR @ ROOF FRAMING

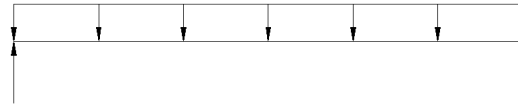
H3-1

PARAMETERS:

L = 7.75 FT

W = 0.63 KLF

P = - K



ANALYSIS:

R_{MAX} = 2.44 K

V_D = - K

< V_{ALL} = 4.47 K

☒ ADEQUATE

M_{MAX} = 4.73 K-FT < M_{ALL} = 5.17 K-FT

☒ ADEQUATE

Δ_{TL} = 0.13 IN. L/ 715 < L/240

☒ ADEQUATE

4X10 DF NO. 2

BEAM DESCRIPTION: EXT. HDR @ BED 2 - ROOF FRAMING

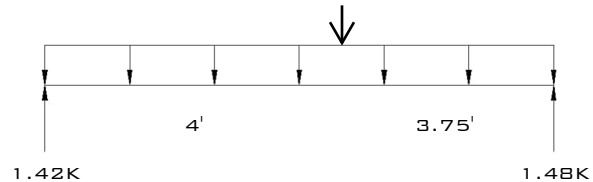
H3-2

PARAMETERS:

L = 7.75 FT

W = 0.12 KLF

P = 1.97 K



ANALYSIS:

R_{MAX} = 1.48 K

V_D = - K

< V_{ALL} = 4.47 K

☒ ADEQUATE

M_{MAX} = 4.72 K-FT < M_{ALL} = 5.17 K-FT

☒ ADEQUATE

Δ_{TL} = 0.14 IN. L/ 673 < L/240

☒ ADEQUATE

4X10 DF-L NO. 2

BEAM DESCRIPTION: EXT. HDR @ BED 2 - ROOF FRAMING

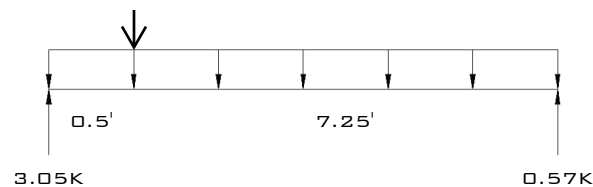
H3-3

PARAMETERS:

L = 7.75 FT

W = 0.10 KLF

P = 2.84 K



ANALYSIS:

R_{MAX} = 3.05 K

V_D = - K

< V_{ALL} = 4.47 K

☒ ADEQUATE

M_{MAX} = 1.62 K-FT < M_{ALL} = 5.17 K-FT

☒ ADEQUATE

Δ_{TL} = 0.05 IN. L/ 999+ < L/240

☒ ADEQUATE

4X10 DF-L NO. 2



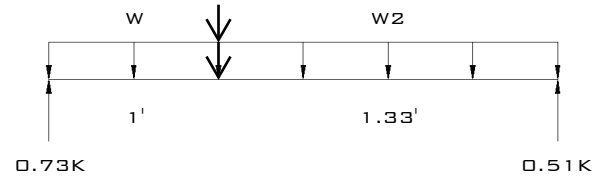
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: INT. HDR @ BED 3 - ROOF FRAMING

H3-4

PARAMETERS:

L = 2.33 FT
W = 0.26 KLF W2=0.08KLF
P = 0.87 K



ANALYSIS:

$R_{MAX} = 0.73$ K $V_D = -$ K $< V_{ALL} = 4.47$ K ☒ ADEQUATE
 $M_{MAX} = 0.60$ K-FT $< M_{ALL} = 5.17$ K-FT ☒ ADEQUATE
 $\Delta_{TL} = 0.01$ IN. $L/999+$ $< L/240$ ☒ ADEQUATE

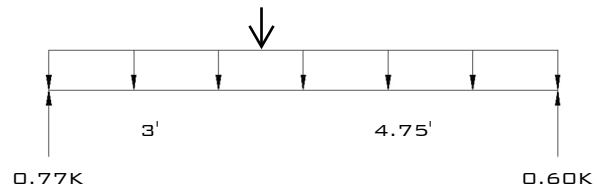
4x10 DF-L NO. 2

BEAM DESCRIPTION: EXT. HDR @ BED 3 - ROOF FRAMING

H3-5

PARAMETERS:

L = 7.75 FT
W = 0.08 KLF
P = 0.75 K



ANALYSIS:

$R_{MAX} = 0.77$ K $V_D = -$ K $< V_{ALL} = 4.47$ K ☒ ADEQUATE
 $M_{MAX} = 1.95$ K-FT $< M_{ALL} = 5.17$ K-FT ☒ ADEQUATE
 $\Delta_{TL} = 0.06$ IN. $L/999+$ $< L/240$ ☒ ADEQUATE

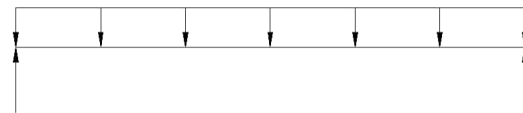
4x10 DF-L NO. 2

BEAM DESCRIPTION: TYP. EXT. HDR @ 2ND FRAMING

H2-1

PARAMETERS:

L = 5.25 FT
W = 0.51 KLF
P = - K



ANALYSIS:

$R_{MAX} = 1.34$ K $V_D = -$ K $< V_{ALL} = 3.89$ K ☒ ADEQUATE
 $M_{MAX} = 1.76$ K-FT $< M_{ALL} = 4.49$ K-FT ☒ ADEQUATE
 $\Delta_{TL} = 0.02$ IN. $L/999+$ $< L/240$ ☒ ADEQUATE

4x10 DF-L NO. 2



BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: EXT. HDR @ DINING - 2ND FLR FRAMING

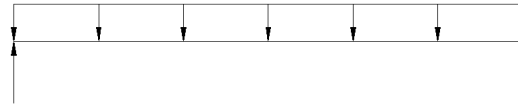
H2-2

PARAMETERS:

L = 10.33 FT

W = 0.78 KLF

P = - K



ANALYSIS:

R_{MAX} = 4.03 K

V_D = - K

< V_{ALL} = 6.49 K

☒ ADEQUATE

M_{MAX} = 10.40 K-FT

< M_{ALL} = 12.86 K-FT

☒ ADEQUATE

Δ_{TL} = 0.31 IN.

L/ 400 < L/240

☒ ADEQUATE

3-1/2"x10-1/2" 24F-V4 GLB

BEAM DESCRIPTION: EXT. HDR @ GARAGE - 2ND FLR FRAMING

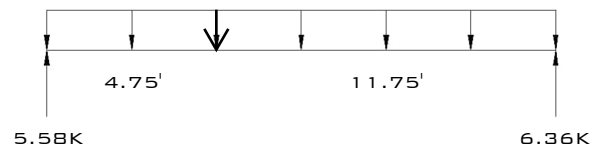
H2-3

PARAMETERS:

L = 16.5 FT

W = 0.56 KLF W2=0.79KLF

P = - K



ANALYSIS:

R_{MAX} = 6.36 K

V_D = - K

< V_{ALL} = 14.58 K

☒ ADEQUATE

M_{MAX} = 25.60 K-FT

< M_{ALL} = 47.45 K-FT

☒ ADEQUATE

Δ_{TL} = 0.43 IN.

L/ 464 < L/240

☒ ADEQUATE

5-1/2"x15" 24F-V4 GLB

BEAM DESCRIPTION: INT. HDR @ GARAGE - 2ND FLR FRAMING

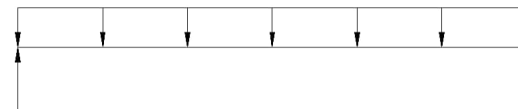
H2-4

PARAMETERS:

L = 4.92 FT

W = 0.67 KLF

P = - K



ANALYSIS:

R_{MAX} = 1.65 K

V_D = - K

< V_{ALL} = 3.89 K

☒ ADEQUATE

M_{MAX} = 2.03 K-FT

< M_{ALL} = 4.49 K-FT

☒ ADEQUATE

Δ_{TL} = 0.02 IN.

L/ 999+ < L/240

☒ ADEQUATE

4x10 DF-L NO.2



BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: EXT. HDR @ ENTRY - 2ND FLR FRAMING

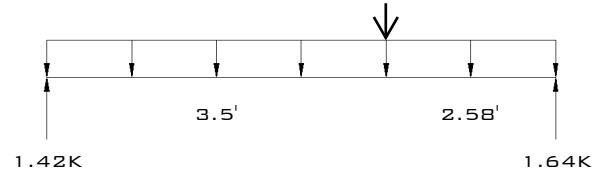
H2-5

PARAMETERS:

L = 6.08 FT

W = 0.27 KLF

P = 1.42 K



ANALYSIS:

R_{MAX} = 1.64 K

V_D = - K

< V_{ALL} = 4.47 K

☒ ADEQUATE

M_{MAX} = 3.33 K-FT

< M_{ALL} = 5.17 K-FT

☒ ADEQUATE

Δ_{TL} = 0.06 IN.

L/ 999+ < L/240

☒ ADEQUATE

4x10 DF-L NO. 2

BEAM DESCRIPTION: EXT. HDR @ W.I.C. - 2ND FLR FRAMING

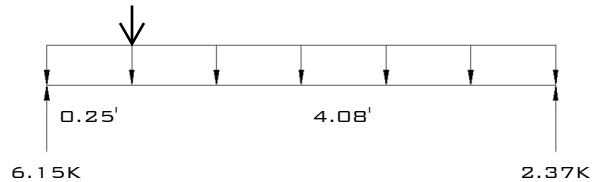
H2-6

PARAMETERS:

L = 4.33 FT

W = 0.98 KLF

P = 4.28 K



ANALYSIS:

R_{MAX} = 6.15 K

V_D = 3.43 K

< V_{ALL} = 4.47 K

☒ ADEQUATE

M_{MAX} = 2.87 K-FT

< M_{ALL} = 5.17 K-FT

☒ ADEQUATE

Δ_{TL} = 0.03 IN.

L/ 999+ < L/240

☒ ADEQUATE

4x10 DF-L NO. 2

BEAM DESCRIPTION: FLUSH BM @ KITCHEN - 2ND FLR FRAMING

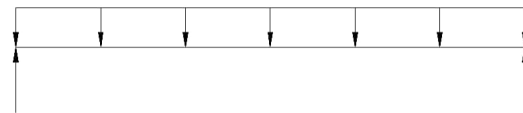
B2-1

PARAMETERS:

L = 5.25 FT

W = 0.68 KLF

P = - K



ANALYSIS:

R_{MAX} = 1.79 K

V_D = - K

< V_{ALL} = 3.89 K

☒ ADEQUATE

M_{MAX} = 2.34 K-FT

< M_{ALL} = 4.49 K-FT

☒ ADEQUATE

Δ_{TL} = 0.03 IN.

L/ 999+ < L/240

☒ ADEQUATE

4x10 DF-L NO. 2



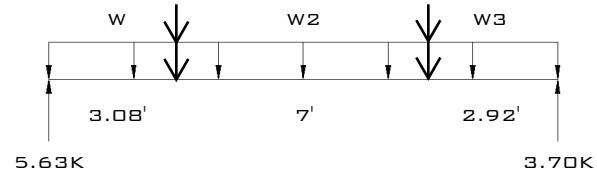
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: DROPPED BM @ COVERED PORCH - 2ND FLR FRAMING

B2-2

PARAMETERS:

L = 13 FT
W = 0.75 KLF
P = 2.34 K
W3=0.20KLF
W2=0.44KLF
P2=1.02K



ANALYSIS:

R_{MAX} = 5.63 K V_D = - K < V_{ALL} = 11.73 K ☒ ADEQUATE
M_{MAX} = 14.89 K-FT < M_{ALL} = 23.25 K-FT ☒ ADEQUATE
Δ_{TL} = 0.45 IN. L/ 347 < L/240 ☒ ADEQUATE

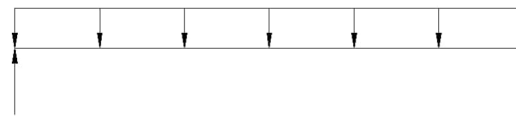
5-1/2"x10-1/2" 24F-V4 GLB

BEAM DESCRIPTION: DROPPED BM @ COVERED PORCH - 2ND FLR FRAMING

B2-3

PARAMETERS:

L = 13.25 FT
W = 0.69 KLF
P = - K



ANALYSIS:

R_{MAX} = 4.57 K V_D = - K < V_{ALL} = 11.73 K ☒ ADEQUATE
M_{MAX} = 15.14 K-FT < M_{ALL} = 23.25 K-FT ☒ ADEQUATE
Δ_{TL} = 0.47 IN. L/ 338 < L/240 ☒ ADEQUATE

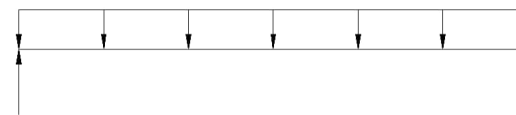
5-1/2"x10-1/2" 24F-V4 GLB

BEAM DESCRIPTION: DROPPED BM @ COVERED PORCH - 2ND FLR FRAMING

B2-4

PARAMETERS:

L = 1.83 FT
W = 0.20 KLF
P = - K



ANALYSIS:

R_{MAX} = 0.18 K V_D = - K < V_{ALL} = 11.73 K ☒ ADEQUATE
M_{MAX} = 0.08 K-FT < M_{ALL} = 23.25 K-FT ☒ ADEQUATE
Δ_{TL} = 0.01 IN. L/ 999+ < L/240 ☒ ADEQUATE

5-1/2"x10-1/2" 24F-V4 GLB



BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: FLUSH BM @ STAIR - 2ND FLR FRAMING

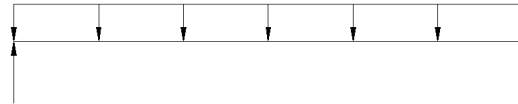
B2-5

PARAMETERS:

L = 7.42 FT

W = 0.12 KLF

P = - K



ANALYSIS:

R_{MAX} = 0.45 K

V_D = - K

< V_{ALL} = 10.64 K

☒ ADEQUATE

M_{MAX} = 0.83 K-FT

< M_{ALL} = 31.11 K-FT

☒ ADEQUATE

Δ_{TL} = 0.01 IN.

L/ 999+ < L/240

☒ ADEQUATE

3-1/2"x16" LVL

BEAM DESCRIPTION: FLUSH BM @ GREAT ROOM - 2ND FLR FRAMING

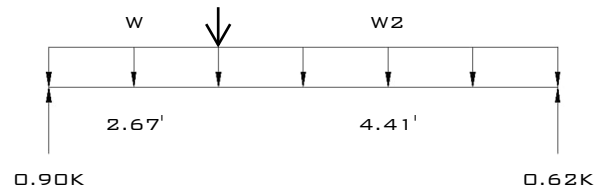
B2-6

PARAMETERS:

L = 7.08 FT

W = 0.22 KLF W2=0.11 KLF

P = 0.45 K



ANALYSIS:

R_{MAX} = 0.90 K

V_D = - K

< V_{ALL} = 10.64 K

☒ ADEQUATE

M_{MAX} = 1.62 K-FT

< M_{ALL} = 31.11 K-FT

☒ ADEQUATE

Δ_{TL} = 0.01 IN.

L/ 999+ < L/240

☒ ADEQUATE

3-1/2"x16" LVL

BEAM DESCRIPTION: FLUSH BM @ GREAT ROOM - 2ND FLR FRAMING

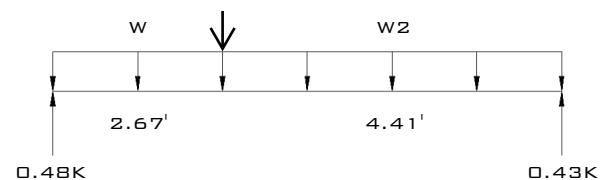
B2-7

PARAMETERS:

L = 7.08 FT

W = 0.04 KLF W2=0.08 KLF

P = 0.45 K



ANALYSIS:

R_{MAX} = 0.48 K

V_D = - K

< V_{ALL} = 10.64 K

☒ ADEQUATE

M_{MAX} = 1.13 K-FT

< M_{ALL} = 31.11 K-FT

☒ ADEQUATE

Δ_{TL} = 0.01 IN.

L/ 999+ < L/240

☒ ADEQUATE

3-1/2"x16" LVL



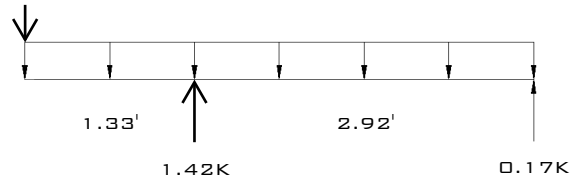
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: CANT'D FLUSH BM @ ENTRY - 2ND FLR FRAMING

B2-8

PARAMETERS:

L = 4.25 FT
W = 0.26 KLF
P = 0.44 K



ANALYSIS:

$R_{MAX} = 1.42$ K $V_D = 0.81$ K $< V_{ALL} = 10.64$ K ☒ ADEQUATE
 $M_{MAX} = 0.82$ K-FT $< M_{ALL} = 31.11$ K-FT ☒ ADEQUATE
 $\Delta_{TL} = 0.01$ IN. $L/999+ < L/240$ ☒ ADEQUATE

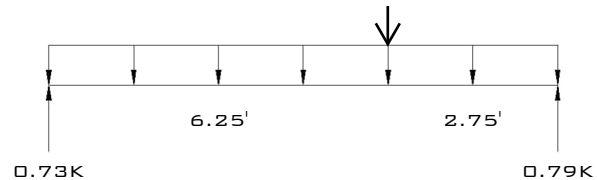
3-1/2"x16" LVL

BEAM DESCRIPTION: FLUSH BM @ GREAT ROOM - 2ND FLR FRAMING

B2-9

PARAMETERS:

L = 9 FT
W = 0.15 KLF
P = 0.17 K



ANALYSIS:

$R_{MAX} = 0.79$ K $V_D = -$ K $< V_{ALL} = 10.64$ K ☒ ADEQUATE
 $M_{MAX} = 1.78$ K-FT $< M_{ALL} = 31.11$ K-FT ☒ ADEQUATE
 $\Delta_{TL} = 0.01$ IN. $L/999+ < L/240$ ☒ ADEQUATE

3-1/2"x16" LVL

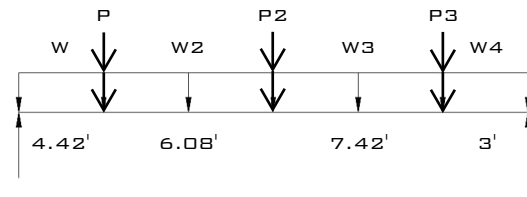
BEAM DESCRIPTION: FLUSH BM @ GREAT ROOM - 2ND FLR FRAMING

B2-10

PARAMETERS:

L = 20.92 FT
W = - KLF
P = - K

SEE ENERCALC
OUTPUT FOR
OVERSTRENGTH
CALC



ANALYSIS:

$R_{MAX} = -$ K $V_D = -$ K $< V_{ALL} = -$ K ☒ ADEQUATE
 $M_{MAX} = -$ K-FT $< M_{ALL} = -$ K-FT ☒ ADEQUATE
 $\Delta_{TL} = 0.51$ IN. $L/494 < L/240$ ☒ ADEQUATE

W14x34



BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: FLUSH BM @ GREAT ROOM - 2ND FLR FRAMING

B2-11

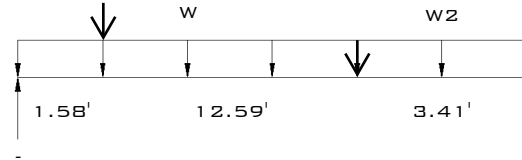
PARAMETERS:

L = 17.58 FT

W = - KLF

P = - K

SEE ENERCALC
OUTPUT FOR
OVERSTRENGTH
CALC



ANALYSIS:

R_{MAX} = - K

V_D = - K

< V_{ALL} = - K

☒ ADEQUATE

M_{MAX} = - K-FT

< M_{ALL} = - K-FT

☒ ADEQUATE

Δ_{TL} = 0.32 IN.

L/ 669 < L/240

☒ ADEQUATE

W14x26 STEEL BEAM

BEAM DESCRIPTION: DROPPED BM @ ENTRY - 2ND FLR FRAMING

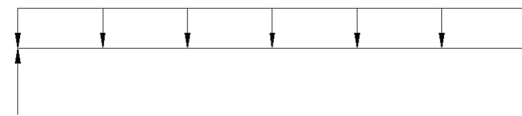
B2-12

PARAMETERS:

L = 8.33 FT

W = 0.07 KLF

P = - K



ANALYSIS:

R_{MAX} = 0.29 K

V_D = - K

< V_{ALL} = 4.49 K

☒ ADEQUATE

M_{MAX} = 0.61 K-FT

< M_{ALL} = 5.17 K-FT

☒ ADEQUATE

Δ_{TL} = 0.02 IN.

L/ 999+ < L/240

☒ ADEQUATE

4x10 DF-L NO. 2

BEAM DESCRIPTION: DROPPED BM @ ENTRY - 2ND FLR FRAMING

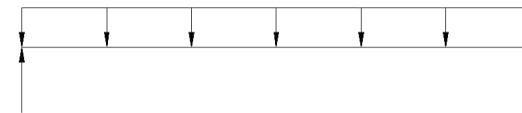
B2-13

PARAMETERS:

L = 4.75 FT

W = 0.05 KLF

P = - K



ANALYSIS:

R_{MAX} = 0.12 K

V_D = - K

< V_{ALL} = 4.49 K

☒ ADEQUATE

M_{MAX} = 0.14 K-FT

< M_{ALL} = 5.17 K-FT

☒ ADEQUATE

Δ_{TL} = 0.01 IN.

L/ 999+ < L/240

☒ ADEQUATE

4x10 DF-L NO. 2



BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: FLUSH BM @ BATH 2 - 2ND FLR FRAMING

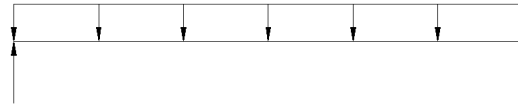
B2-14

PARAMETERS:

L = 9.58 FT

W = 0.24 KLF

P = - K



ANALYSIS:

R_{MAX} = 1.15 K

V_D = - K

< V_{ALL} = 10.64 K

☒ ADEQUATE

M_{MAX} = 2.75 K-FT

< M_{ALL} = 31.11 K-FT

☒ ADEQUATE

Δ_{TL} = 0.02 IN.

L/ 999+ < L/240

☒ ADEQUATE

3-1/2"x16" LVL

BEAM DESCRIPTION: DROPPED BM @ GARAGE - 2ND FLR FRAMING

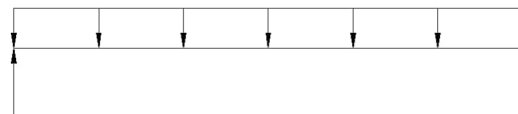
B2-16

PARAMETERS:

L = 18.58 FT

W = 0.07 KLF

P = - K



ANALYSIS:

R_{MAX} = 0.65 K

V_D = - K

< V_{ALL} = 4.47 K

☒ ADEQUATE

M_{MAX} = 3.02 K-FT

< M_{ALL} = 5.17 K-FT

☒ ADEQUATE

Δ_{TL} = 0.51 IN.

L/ 439 < L/240

☒ ADEQUATE

4x10 DF-L NO. 2

BEAM DESCRIPTION: EXT. HDR @ BASEMENT - 1ST FLR FRAMING

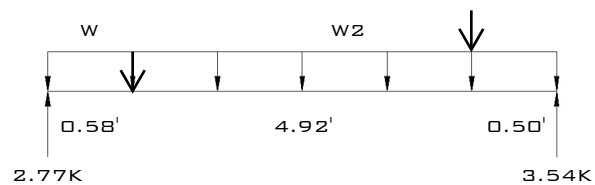
H1-1

PARAMETERS:

L = 6 FT

W = 0.73 KLF W2=0.94KLF

P = 0.79 K



ANALYSIS:

R_{MAX} = 3.54 K

V_D = - K

< V_{ALL} = 3.89 K

☒ ADEQUATE

M_{MAX} = 4.42 K-FT

< M_{ALL} = 4.49 K-FT

☒ ADEQUATE

Δ_{TL} = 0.08 IN.

L/ 928 < L/240

☒ ADEQUATE

4x10 DF-L NO. 2



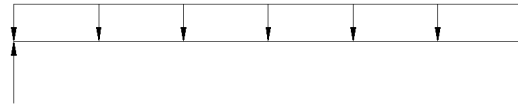
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: TYP. DROPPED BEAM @ CRAWLSPACE

B1-1

PARAMETERS:

L = 4.5 FT
W = 1.54 KLF
P = - K



ANALYSIS:

$R_{MAX} = 3.47$ K $V_D = -$ K $< V_{ALL} = 3.89$ K ☒ ADEQUATE
 $M_{MAX} = 3.90$ K-FT $< M_{ALL} = 4.49$ K-FT ☒ ADEQUATE
 $\Delta_{TL} = 0.04$ IN. $L/999+$ $< L/240$ ☒ ADEQUATE

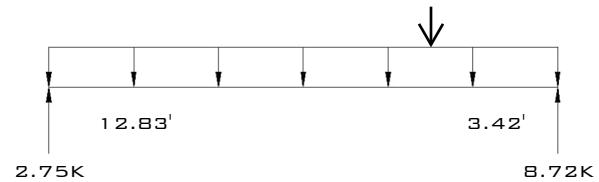
4x10 DF-L NO. 2

BEAM DESCRIPTION: FLUSH BM @ BASEMENT - 1ST FLR FRAMING

B1-2

PARAMETERS:

L = 16.25 FT
W = 0.07 KLF
P = 10.33 K



ANALYSIS:

$R_{MAX} = 8.72$ K $V_D = -$ K $< V_{ALL} = 15.96$ K ☒ ADEQUATE
 $M_{MAX} = 29.51$ K-FT $< M_{ALL} = 46.67$ K-FT ☒ ADEQUATE
 $\Delta_{TL} = 0.41$ IN. $L/473$ $< L/240$ ☒ ADEQUATE

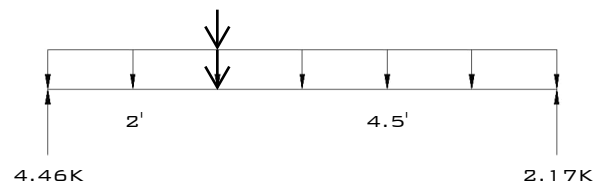
5-1/4"x16" LVL

BEAM DESCRIPTION: DROPPED BM @ CRAWLSPACE - 1ST FLR FRAMING

B1-3

PARAMETERS:

L = 6.5 FT
W = 1.54 KLF $W2=0.39$ KLF
P = 1.79 K



ANALYSIS:

$R_{MAX} = 4.46$ K $V_D = -$ K $< V_{ALL} = 4.73$ K ☒ ADEQUATE
 $M_{MAX} = 5.84$ K-FT $< M_{ALL} = 6.09$ K-FT ☒ ADEQUATE
 $\Delta_{TL} = 0.07$ IN. $L/999+$ $< L/240$ ☒ ADEQUATE

4x12 DF-L NO. 2



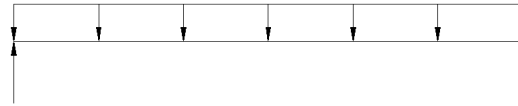
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: DROPPED BEAM @ CRAWLSPACE

B1-4

PARAMETERS:

L = 7.54 FT
W = 0.61 KLF
P = - K



ANALYSIS:

$R_{MAX} = 2.30$ K $V_D = -$ K $< V_{ALL} = 3.89$ K ☒ ADEQUATE
 $M_{MAX} = 4.33$ K-FT $< M_{ALL} = 4.49$ K-FT ☒ ADEQUATE
 $\Delta_{TL} = 0.12$ IN. $L/754 < L/240$ ☒ ADEQUATE

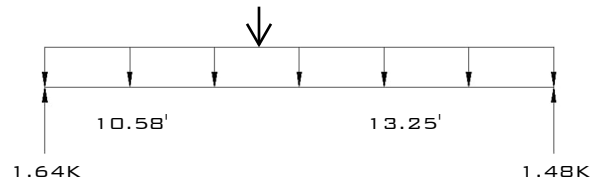
4x10 DF-L NO. 2

BEAM DESCRIPTION: FLUSH BM @ BASEMENT - 1ST FLR FRAMING

B1-5

PARAMETERS:

L = 23.83 FT
W = 0.07 KLF
P = 1.45 K



ANALYSIS:

$R_{MAX} = 1.64$ K $V_D = -$ K $< V_{ALL} = 15.96$ K ☒ ADEQUATE
 $M_{MAX} = 13.44$ K-FT $< M_{ALL} = 46.67$ K-FT ☒ ADEQUATE
 $\Delta_{TL} = 0.40$ IN. $L/708 < L/240$ ☒ ADEQUATE

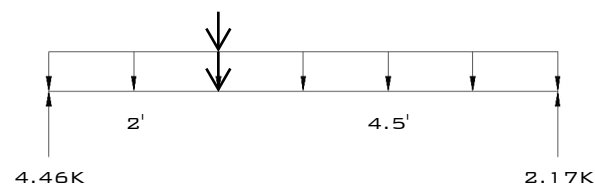
5-1/4"x16" LVL

BEAM DESCRIPTION: DROPPED BM @ CRAWLSPACE - 1ST FLR FRAMING

B1-6

PARAMETERS:

L = 6.5 FT
W = 1.54 KLF $W2=0.39$ KLF
P = 1.79 K



ANALYSIS:

$R_{MAX} = 4.46$ K $V_D = -$ K $< V_{ALL} = 4.73$ K ☒ ADEQUATE
 $M_{MAX} = 5.84$ K-FT $< M_{ALL} = 6.09$ K-FT ☒ ADEQUATE
 $\Delta_{TL} = 0.07$ IN. $L/999+ < L/240$ ☒ ADEQUATE

4x12 DF-L NO. 2



BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: VALLEY BM @ HALL - ROOF FRAMING

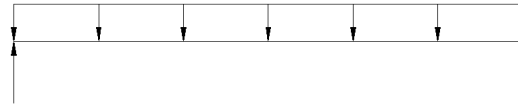
B3-1

PARAMETERS:

L = 7.17 FT

W = 0.16 KLF

P = - K



ANALYSIS:

R_{MAX} = 0.58 K

V_D = - K

< V_{ALL} = 3.51 K

☒ ADEQUATE

M_{MAX} = 1.05 K-FT

< M_{ALL} = 3.83 K-FT

☒ ADEQUATE

Δ_{TL} = 0.04 IN.

L/ 999+ < L/240

☒ ADEQUATE

(2)2x10 HF. NO. 2

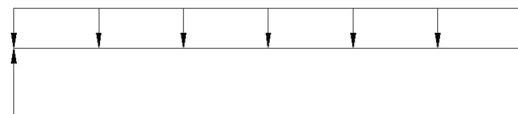
BEAM DESCRIPTION: -

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

Δ_{TL} = - IN.

L/ - < L/240

☐ ADEQUATE

-

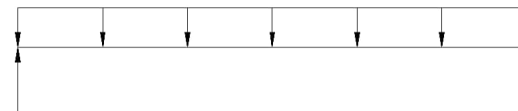
BEAM DESCRIPTION: -

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

Δ_{TL} = - IN.

L/ - < L/240

☐ ADEQUATE

-



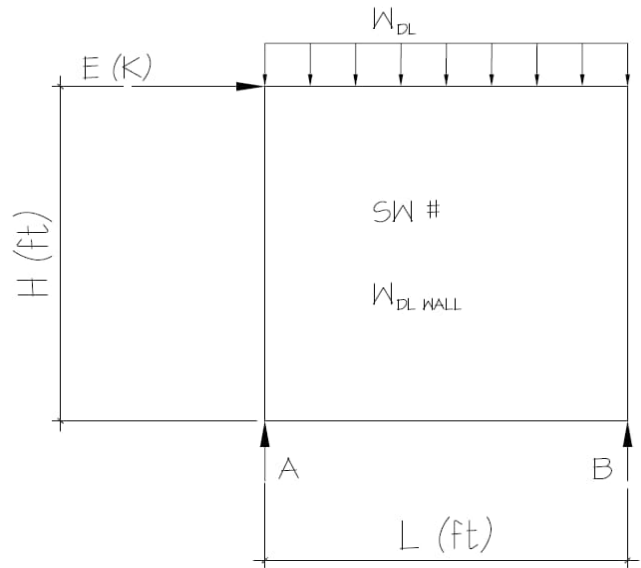
OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #:

205

PARAMETERS:

L = 16.0 FT
H = 9.1 FT
E = 0.64 K
W_{DL WALL} = 0.10 KLF
W_{DL} = 0.166 KLF
Ω₀ = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE)
SDS = 1.108



ANALYSIS:

E (UNFACTORED) = 0.91
E_{MH} = Ω₀ * E = 2.29 K
E_M = E_{MH} + E_v = 3.229 K
E_M = E_{MH} - E_v = 1.343 K
E_v = 0.2 * SDS * DL = 0.943 K
E_M = E_{MH} + E_v = 3.229 K
E_M = E_{MH} - E_v = 1.343 K

E_M (MAX) = ΣM_A = 0 = 3.23(9.1) + 0.266(16)(8) - R_B(16) R_B = 2.1 DL + 1.8E
R_A = 2.1 DL - 1.8E
E_M (MIN) = ΣM_A = 0 = 1.34(9.1) + 0.266(16)(8) - R_B(16) R_B = 2.1 DL + 0.8E
R_A = 2.1 DL - 0.8E

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



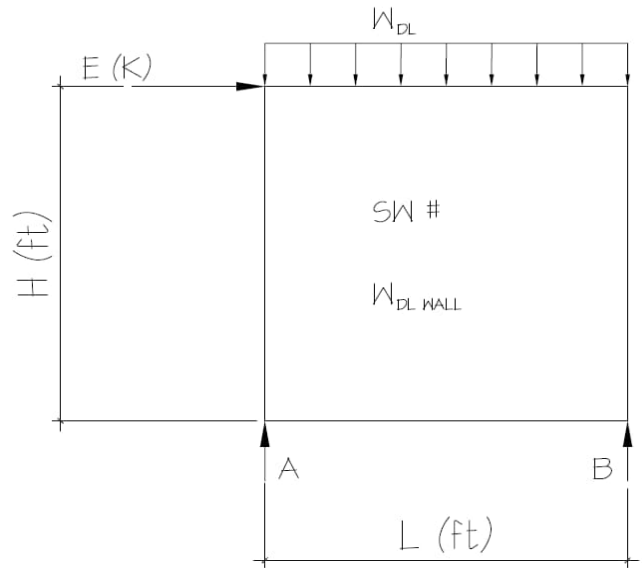
OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #:

207

PARAMETERS:

L = 12.6 FT
H = 9.1 FT
E = 1.80 K
W_{DL WALL} = 0.10 KLF
W_{DL} = 0.255 KLF
Ω₀ = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE)
SDS = 1.108



ANALYSIS:

E (UNFACTORED) = 2.57
E_{MH} = Ω₀ * E = 6.43 K
E_M = E_{MH} + E_V = 7.420 K
E_M = E_{MH} - E_V = 5.437 K
E_V = 0.2 * SDS * DL = 0.991 K
E_M = E_{MH} + E_V = 7.420 K
E_M = E_{MH} - E_V = 5.437 K

E_M (MAX) = ΣM_A = 0 = 7.42(9.1) + 0.355(12.6)(6.3) - R_B(12.6) R_B = 2.2DL + 5.3E
R_A = 2.2DL - 5.3E
E_M (MIN) = ΣM_A = 0 = 5.44(9.1) + 0.355(12.6)(6.3) - R_B(12.6) R_B = 2.2DL + 3.9E
R_A = 2.2DL - 3.9E

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



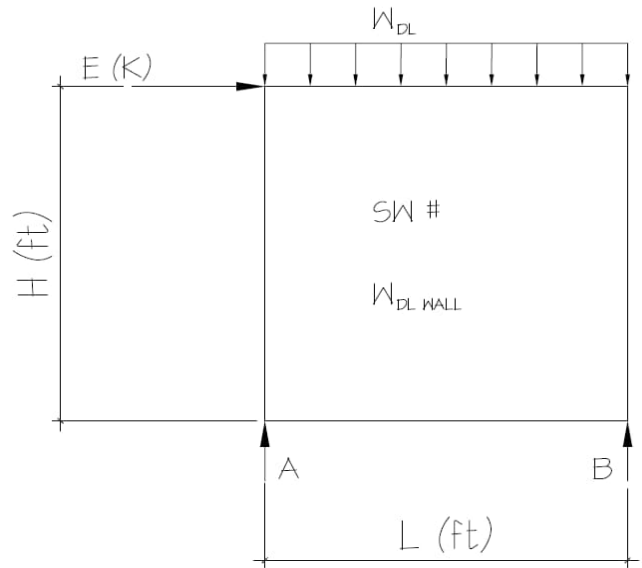
OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #:

207

PARAMETERS:

L = 12.6 FT
H = 9.1 FT
E = 1.80 K
W_{DL WALL} = 0.10 KLF
W_{DL} = 0.255 KLF
Ω₀ = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE)
SDS = 1.108



ANALYSIS:

E (UNFACTORED) = 2.57
E_{MH} = Ω₀ * E = 6.43 K
E_M = E_{MH} + E_V = 7.420 K
E_M = E_{MH} - E_V = 5.437 K
E_V = 0.2 * SDS * DL = 0.991 K
E_M = E_{MH} + E_V = 7.420 K
E_M = E_{MH} - E_V = 5.437 K

E_M (MAX) = ΣM_A = 0 = 7.42(9.1) + 0.355(12.6)(6.3) - R_B(12.6) R_B = 2.2DL + 5.3E
R_A = 2.2DL - 5.3E
E_M (MIN) = ΣM_A = 0 = 5.44(9.1) + 0.355(12.6)(6.3) - R_B(12.6) R_B = 2.2DL + 3.9E
R_A = 2.2DL - 3.9E

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

Steel Beam

Project File: beam calcs with overstrength.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: B2-11 OS 205

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : ASCE 7-16

Material Properties

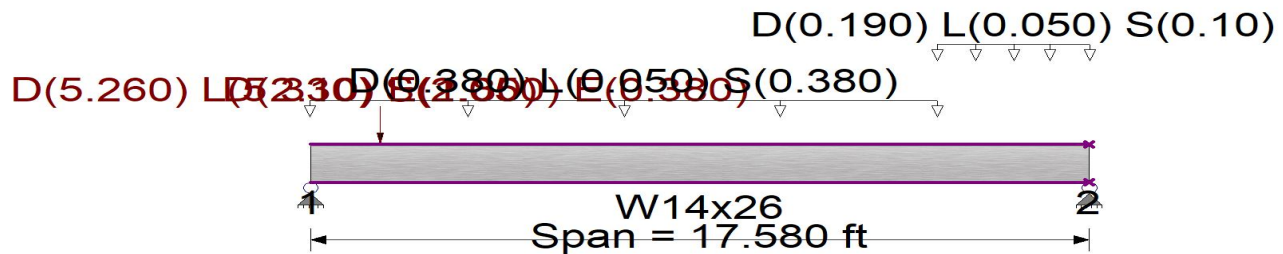
Analysis Method : Allowable Strength Design

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 = 0.380, L = 0.050, S = 0.380 k/ft, Extent = 0.0 --> 14.170 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.190, L = 0.050, S = 0.10 k/ft, Extent = 14.170 --> 17.580 ft, Tributary Width = 1.0 ft

Point Load : D = 5.260, L = 5.330, S = 2.050, E = 0.380 k @ 1.580 ft

Point Load : D = 2.10, E = 1.80 k @ 1.580 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =		0.415 : 1	Maximum Shear Stress Ratio =		0.284 : 1
Section used for this span		W14x26	Section used for this span		W14x26
Ma : Applied		41.673 k-ft	Va : Applied		20.120 k
Mn / Omega : Allowable		100.299 k-ft	Vn/Omega : Allowable		70.890 k
Load Combination		+1.105D+0.750L+0.750S+0.5250E		+1.105D+0.750L+0.750S+0.5250E	
Span # where maximum occurs		Span # 1		Location of maximum on span	
				0.000 ft	
		Span # where maximum occurs		Span # 1	
Maximum Deflection					
Max Downward Transient Deflection		0.123 in	Ratio =	1,711	>=360
Max Upward Transient Deflection		0 in	Ratio =	0	<360
Max Downward Total Deflection		0.315 in	Ratio =	669	>=180
Max Upward Total Deflection		0 in	Ratio =	0	<180
				Span: 1 : S Only	
				n/a	
				Span: 1 : +D+0.750L+0.750S+0.5250E+H	
				n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 17.58 ft	1	0.215	0.144	21.59		21.59	167.50	100.30	1.00	1.00	10.20	106.34	70.89
+D+L+H													
Dsgn. L = 17.58 ft	1	0.286	0.219	28.68		28.68	167.50	100.30	1.00	1.00	15.49	106.34	70.89
+D+Lr+H													
Dsgn. L = 17.58 ft	1	0.215	0.144	21.59		21.59	167.50	100.30	1.00	1.00	10.20	106.34	70.89
+D+S+H													
Dsgn. L = 17.58 ft	1	0.370	0.216	37.07		37.07	167.50	100.30	1.00	1.00	15.32	106.34	70.89
+D+0.750Lr+0.750L+H													
Dsgn. L = 17.58 ft	1	0.268	0.200	26.88		26.88	167.50	100.30	1.00	1.00	14.17	106.34	70.89
+D+0.750L+0.750S+H													
Dsgn. L = 17.58 ft	1	0.382	0.254	38.31		38.31	167.50	100.30	1.00	1.00	18.01	106.34	70.89
+D+0.60W+H													
Dsgn. L = 17.58 ft	1	0.215	0.144	21.59		21.59	167.50	100.30	1.00	1.00	10.20	106.34	70.89
+D+0.750Lr+0.750L+0.450W+H													
Dsgn. L = 17.58 ft	1	0.268	0.200	26.88		26.88	167.50	100.30	1.00	1.00	14.17	106.34	70.89
+D+0.750L+0.750S+0.450W+H													
Dsgn. L = 17.58 ft	1	0.382	0.254	38.31		38.31	167.50	100.30	1.00	1.00	18.01	106.34	70.89
+0.60D+0.60W+0.60H													
Dsgn. L = 17.58 ft	1	0.129	0.086	12.96		12.96	167.50	100.30	1.00	1.00	6.12	106.34	70.89

Steel Beam

Project File: beam calcs with overstrength.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: B2-11 OS 205

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+0.70E+0.60H													
Dsgn. L = 17.58 ft	1	0.230	0.164	23.07		23.07	167.50	100.30	1.00	1.00	11.59	106.34	70.89
+D-0.70E+0.60H													
Dsgn. L = 17.58 ft	1	0.201	0.124	20.17		20.17	167.50	100.30	1.00	1.00	8.82	106.34	70.89
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 17.58 ft	1	0.393	0.269	39.41		39.41	167.50	100.30	1.00	1.00	19.05	106.34	70.89
+D+0.750L+0.750S-0.5250E+H													
Dsgn. L = 17.58 ft	1	0.371	0.239	37.23		37.23	167.50	100.30	1.00	1.00	16.97	106.34	70.89
+0.60D+0.70E+H													
Dsgn. L = 17.58 ft	1	0.144	0.106	14.44		14.44	167.50	100.30	1.00	1.00	7.51	106.34	70.89
+0.60D-0.70E+H													
Dsgn. L = 17.58 ft	1	0.115	0.067	11.54		11.54	167.50	100.30	1.00	1.00	4.73	106.34	70.89
+1.140D+0.70E													
Dsgn. L = 17.58 ft	1	0.260	0.184	26.09		26.09	167.50	100.30	1.00	1.00	13.02	106.34	70.89
+1.140D-0.70E													
Dsgn. L = 17.58 ft	1	0.231	0.145	23.19		23.19	167.50	100.30	1.00	1.00	10.24	106.34	70.89
+1.105D+0.750L+0.750S+0.5250E													
Dsgn. L = 17.58 ft	1	0.415	0.284	41.67		41.67	167.50	100.30	1.00	1.00	20.12	106.34	70.89
+1.105D+0.750L+0.750S-0.5250E													
Dsgn. L = 17.58 ft	1	0.394	0.254	39.50		39.50	167.50	100.30	1.00	1.00	18.04	106.34	70.89
+0.460D+0.70E													
Dsgn. L = 17.58 ft	1	0.114	0.086	11.43		11.43	167.50	100.30	1.00	1.00	6.08	106.34	70.89
+0.460D-0.70E													
Dsgn. L = 17.58 ft	1	0.085	0.047	8.53		8.53	167.50	100.30	1.00	1.00	3.31	106.34	70.89

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	0.3154	8.388		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	19.049	6.434
Max Upward from Load Combinations	19.049	6.434
Max Upward from Load Cases	10.204	3.645
Max Downward from all Load Conditions (Resistii	-1.984	-0.196
Max Downward from Load Cases (Resisting Upli	-1.984	-0.196
+D+H	10.204	3.645
+D+L+H	15.495	4.564
+D+Lr+H	10.204	3.645
+D+S+H	15.318	6.307
+D+0.750Lr+0.750L+H	14.172	4.334
+D+0.750L+0.750S+H	18.007	6.331
+D+0.60W+H	10.204	3.645
+D+0.750Lr+0.750L+0.450W+H	14.172	4.334
+D+0.750L+0.750S+0.450W+H	18.007	6.331
+0.60D+0.60W+0.60H	6.123	2.187
+D+0.70E+0.60H	11.593	3.782
+D-0.70E+0.60H	8.816	3.508
+D+0.750L+0.750S+0.5250E+H	19.049	6.434
+D+0.750L+0.750S-0.5250E+H	16.966	6.228
+0.60D+0.70E+H	7.512	2.324
+0.60D-0.70E+H	4.734	2.050
D Only	10.204	3.645
L Only	5.290	0.919
S Only	5.113	2.662
E Only	1.984	0.196
E Only * -1.0	-1.984	-0.196
H Only		

Project File: beam calcs with overstrength.ec6

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Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 20.92 ft	1	0.225	0.079	30.62		30.62	227.50	136.23	1.00	1.00	6.33	119.70	79.80
+D+L+H													
Dsgn. L = 20.92 ft	1	0.420	0.140	57.16		57.16	227.50	136.23	1.00	1.00	11.16	119.70	79.80
+D+Lr+H													
Dsgn. L = 20.92 ft	1	0.225	0.079	30.62		30.62	227.50	136.23	1.00	1.00	6.33	119.70	79.80
+D+S+H													
Dsgn. L = 20.92 ft	1	0.321	0.113	43.70		43.70	227.50	136.23	1.00	1.00	9.05	119.70	79.80
+D+0.750Lr+0.750L+H													
Dsgn. L = 20.92 ft	1	0.371	0.125	50.48		50.48	227.50	136.23	1.00	1.00	9.95	119.70	79.80
+D+0.750L+0.750S+H													
Dsgn. L = 20.92 ft	1	0.442	0.150	60.16		60.16	227.50	136.23	1.00	1.00	11.99	119.70	79.80
+D+0.60W+H													
Dsgn. L = 20.92 ft	1	0.225	0.079	30.62		30.62	227.50	136.23	1.00	1.00	6.33	119.70	79.80
+D+0.750Lr+0.750L+0.450W+H													

Steel Beam

Project File: beam calcs with overstrength.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: B2-10 OS 205

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 20.92 ft	1	0.371	0.125	50.48		50.48	227.50	136.23	1.00	1.00	9.95	119.70	79.80
+D+0.750L+0.750S+0.450W+H													
Dsgn. L = 20.92 ft	1	0.442	0.150	60.16		60.16	227.50	136.23	1.00	1.00	11.99	119.70	79.80
+0.60D+0.60W+0.60H													
Dsgn. L = 20.92 ft	1	0.135	0.048	18.37		18.37	227.50	136.23	1.00	1.00	3.80	119.70	79.80
+D+0.70E+0.60H													
Dsgn. L = 20.92 ft	1	0.249	0.092	33.88		33.88	227.50	136.23	1.00	1.00	7.32	119.70	79.80
+D-0.70E+0.60H													
Dsgn. L = 20.92 ft	1	0.202	0.067	27.54		27.54	227.50	136.23	1.00	1.00	5.33	119.70	79.80
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 20.92 ft	1	0.458	0.160	62.44		62.44	227.50	136.23	1.00	1.00	12.74	119.70	79.80
+D+0.750L+0.750S-0.5250E+H													
Dsgn. L = 20.92 ft	1	0.425	0.141	57.93		57.93	227.50	136.23	1.00	1.00	11.24	119.70	79.80
+0.60D+0.70E+H													
Dsgn. L = 20.92 ft	1	0.159	0.060	21.69		21.69	227.50	136.23	1.00	1.00	4.79	119.70	79.80
+0.60D-0.70E+H													
Dsgn. L = 20.92 ft	1	0.113	0.036	15.35		15.35	227.50	136.23	1.00	1.00	2.89	119.70	79.80
+1.140D+0.70E													
Dsgn. L = 20.92 ft	1	0.280	0.103	38.16		38.16	227.50	136.23	1.00	1.00	8.21	119.70	79.80
+1.140D-0.70E													
Dsgn. L = 20.92 ft	1	0.234	0.078	31.82		31.82	227.50	136.23	1.00	1.00	6.22	119.70	79.80
+1.105D+0.750L+0.750S+0.5250E													
Dsgn. L = 20.92 ft	1	0.482	0.168	65.66		65.66	227.50	136.23	1.00	1.00	13.40	119.70	79.80
+1.105D+0.750L+0.750S-0.5250E													
Dsgn. L = 20.92 ft	1	0.449	0.149	61.13		61.13	227.50	136.23	1.00	1.00	11.91	119.70	79.80
+0.460D+0.70E													
Dsgn. L = 20.92 ft	1	0.128	0.049	17.45		17.45	227.50	136.23	1.00	1.00	3.90	119.70	79.80
+0.460D-0.70E													
Dsgn. L = 20.92 ft	1	0.082	0.027	11.11		11.11	227.50	136.23	1.00	1.00	2.15	119.70	79.80

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	0.5077	10.221		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	12.736	11.147
Max Upward from Load Combinations	12.736	11.147
Max Upward from Load Cases	6.328	5.529
Max Downward from all Load Conditions (Resisting Uplift)	-1.420	-0.380
Max Downward from Load Cases (Resisting Uplift)	-1.420	-0.380
+D+H	6.328	5.263
+D+L+H	11.156	10.793
+D+Lr+H	6.328	5.263
+D+S+H	9.049	7.312
+D+0.750Lr+0.750L+H	9.949	9.410
+D+0.750L+0.750S+H	11.990	10.947
+D+0.60W+H	6.328	5.263
+D+0.750Lr+0.750L+0.450W+H	9.949	9.410
+D+0.750L+0.750S+0.450W+H	11.990	10.947
+0.60D+0.60W+0.60H	3.797	3.158
+D+0.70E+0.60H	7.321	5.529
+D-0.70E+0.60H	5.334	4.997
+D+0.750L+0.750S+0.5250E+H	12.736	11.147
+D+0.750L+0.750S-0.5250E+H	11.245	10.747
+0.60D+0.70E+H	4.790	3.424
+0.60D-0.70E+H	2.803	2.892
D Only	6.328	5.263
L Only	4.828	5.529
S Only	2.722	2.049
E Only	1.420	0.380
E Only * -1.0	-1.420	-0.380

Steel Beam

Project File: beam calcs with overstrength.ec6

LIC# : KW-06017913, Build:20.24.09.03 MULHERN & KULP STRUCTURAL ENGINEERING INC (c) ENERCALC, LLC 1982-2024

DESCRIPTION: B2-10 OS 205

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
H Only		

Project File: beam calcs with overstrength.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

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DESCRIPTION: B2-11 OS 207

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : ASCE 7-16

Material Properties

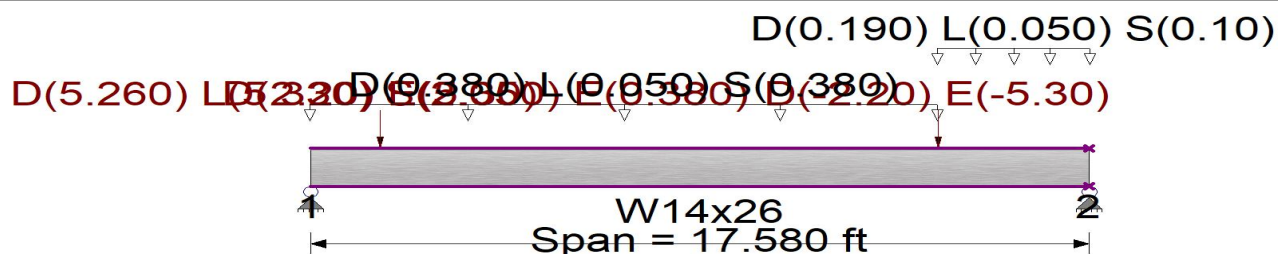
Analysis Method : Allowable Strength Design

F_y : 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 = 0.380, L = 0.050, S = 0.380 k/ft, Extent = 0.0 -->> 14.170 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.190, L = 0.050, S = 0.10 k/ft, Extent = 14.170 -->> 17.580 ft, Tributary Width = 1.0 ft

Point Load : D = 5.260, L = 5.330, S = 2.050, E = 0.380 k @ 1.580 ft

Point Load : D = 2.20, E = 5.30 k @ 1.580 ft

Point Load : $D = -2.20$, $E = -5.30 \text{ k @ } 14.170 \text{ ft}$

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio = 0.383 : 1		Maximum Shear Stress Ratio = 0.295 : 1	
Section used for this span	W14x26	Section used for this span	W14x26
Ma : Applied	38.401 k-ft	Va : Applied	20.882 k
Mn / Omega : Allowable	100.299 k-ft	Vn/Omega : Allowable	70.890 k
Load Combination	+1.105D+0.750L+0.750S-0.5250E	Load Combination	+1.105D+0.750L+0.750S+0.5250E
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.123 in	Ratio =	1,711	>=360	Span: 1: S Only
Max Upward Transient Deflection	-0.045 in	Ratio =	4,660	>=360	Span: 1: E Only
Max Downward Total Deflection	0.275 in	Ratio =	768	>=180	Span: 1: +D+0.750L+0.750S+H
Max Upward Total Deflection	0 in	Ratio =	0	<180	n/a

Maximum Forces & Stresses for Load Combinations

[illegible]

Steel Beam

Project File: beam calcs with overstrength.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

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DESCRIPTION: B2-11 OS 207

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
Dsgn. L = 17.58 ft	1		0.113	0.084	11.36		11.36	167.50	100.30	1.00	1.00	5.92	106.34 70.89
+D+0.70E+0.60H													
Dsgn. L = 17.58 ft	1		0.202	0.180	20.25	-3.80	20.25	167.50	100.30	1.00	1.00	12.77	106.34 70.89
+D-0.70E+0.60H													
Dsgn. L = 17.58 ft	1		0.204	0.098	20.47		20.47	167.50	100.30	1.00	1.00	6.97	106.34 70.89
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 17.58 ft	1		0.354	0.280	35.52		35.52	167.50	100.30	1.00	1.00	19.85	106.34 70.89
+D+0.750L+0.750S-0.5250E+H													
Dsgn. L = 17.58 ft	1		0.364	0.219	36.46		36.46	167.50	100.30	1.00	1.00	15.50	106.34 70.89
+0.60D+0.70E+H													
Dsgn. L = 17.58 ft	1		0.136	0.124	13.63	-5.87	13.63	167.50	100.30	1.00	1.00	8.82	106.34 70.89
+0.60D-0.70E+H													
Dsgn. L = 17.58 ft	1		0.138	0.053	13.85		13.85	167.50	100.30	1.00	1.00	3.76	106.34 70.89
+1.140D+0.70E													
Dsgn. L = 17.58 ft	1		0.227	0.200	22.73	-3.07	22.73	167.50	100.30	1.00	1.00	14.15	106.34 70.89
+1.140D-0.70E													
Dsgn. L = 17.58 ft	1		0.229	0.118	22.94		22.94	167.50	100.30	1.00	1.00	8.35	106.34 70.89
+1.105D+0.750L+0.750S+0.5250E													
Dsgn. L = 17.58 ft	1		0.374	0.295	37.50		37.50	167.50	100.30	1.00	1.00	20.88	106.34 70.89
+1.105D+0.750L+0.750S-0.5250E													
Dsgn. L = 17.58 ft	1		0.383	0.233	38.40		38.40	167.50	100.30	1.00	1.00	16.53	106.34 70.89
+0.460D+0.70E													
Dsgn. L = 17.58 ft	1		0.115	0.105	11.51	-6.59	11.51	167.50	100.30	1.00	1.00	7.44	106.34 70.89
+0.460D-0.70E													
Dsgn. L = 17.58 ft	1		0.119	0.049	11.92		11.92	167.50	100.30	1.00	1.00	3.50	106.34 70.89

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.450W+H	1	0.2747	8.187		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	19.846	6.541
Max Upward from Load Combinations	19.846	6.541
Max Upward from Load Cases	9.869	3.761
Max Downward from all Load Conditions (Resisti	-4.141	-3.761
Max Downward from Load Combinations (Resisti		-1.505
Max Downward from Load Cases (Resisting Upli	-4.141	-3.761
+D+H	9.869	1.881
+D+L+H	15.159	2.799
+D+Lr+H	9.869	1.881
+D+S+H	14.982	4.543
+D+0.750Lr+0.750L+H	13.837	2.570
+D+0.750L+0.750S+H	17.672	4.566
+D+0.60W+H	9.869	1.881
+D+0.750Lr+0.750L+0.450W+H	13.837	2.570
+D+0.750L+0.750S+0.450W+H	17.672	4.566
+0.60D+0.60W+0.60H	5.921	1.129
+D+0.70E+0.60H	12.768	-0.752
+D-0.70E+0.60H	6.970	4.514
+D+0.750L+0.750S+0.5250E+H	19.846	2.592
+D+0.750L+0.750S-0.5250E+H	15.497	6.541
+0.60D+0.70E+H	8.820	-1.505
+0.60D-0.70E+H	3.022	3.762
D Only	9.869	1.881
L Only	5.290	0.919
S Only	5.113	2.662
E Only	4.141	-3.761
E Only * -1.0	-4.141	3.761
H Only		

Cantilevered Retaining Wall

Project File: Foundation Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typical Basement Wall

Code Reference:

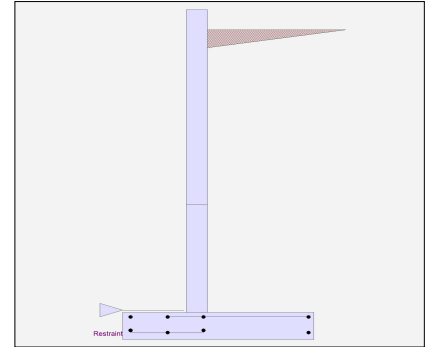
Calculations per IBC 2018 1807.3, CBC 2019, SDPWS 2015

Criteria

Retained Height	=	10.50 ft
Wall height above soil	=	0.75 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 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	=	80.500
Total Seismic Force	=	925.750

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

Cantilevered Retaining Wall

Project File: Foundation Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typical Basement Wall

Design Summary

Wall Stability Ratios

Overturning	=	2.23	OK
Slab Resists All Sliding !			
Global Stability	=	1.60	
Total Bearing Load	=	6,897 lbs	
...resultant ecc.	=	8.96 in	
Eccentricity within middle third			
Soil Pressure @ Toe	=	2,008 psf	NG
Soil Pressure @ Heel	=	291 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Exceeds Allowable!			
ACI Factored @ Toe	=	2,394 psf	
ACI Factored @ Heel	=	347 psf	
Footing Shear @ Toe	=	25.3 psi	OK
Footing Shear @ Heel	=	33.3 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	2,962.4 lbs
ALLOWABLE SOIL BEARING PRESSURE CAN BE INCREASED BY 33% DUE TO SEISMIC SURCHARGE. THEREFOR SOIL PRESSURE @ TOE IS OK		

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

Design Height Above Ftg

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	=	6.5 in	6.5 in		

Design Data

fb/FB + fa/Fa	=	0.498	0.947
---------------	---	-------	-------

Total Force @ Section

Service Level	lbs =		
Strength Level	lbs =	1,706.3	3,932.3

Moment....Actual

Service Level	ft-# =		
Strength Level	ft-# =	4,263.7	15,242.1

Moment.....Allowable	ft-# =	8,557.2	16,093.8
----------------------	--------	---------	----------

Shear.....Actual

Service Level	psi =		
Strength Level	psi =	21.9	50.4
Shear.....Allowable	psi =	75.0	75.0
Anet (Masonry)	in2 =		
Wall Weight	psf =	100.0	100.0
Rebar Depth 'd'	in =	6.50	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

Project File: Foundation Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typical Basement Wall

Concrete Stem Rebar Area Details

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>
2nd Stem		
As (based on applied moment) :	0.1533 in2/ft	
(4/3) * As :	0.2044 in2/ft	Min Stem T&S Reinf Area 1.392 in2
200bd/fy : 200(12)(6.5)/60000 :	0.26 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 :	0.2044 in2/ft	#4@ 12.50 in #4@ 25.00 in
Provided Area :	0.31 in2/ft	#5@ 19.38 in #5@ 38.75 in
Maximum Area :	0.8805 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) :	0.548 in2/ft	
(4/3) * As :	0.7306 in2/ft	Min Stem T&S Reinf Area 0.768 in2
200bd/fy : 200(12)(6.5)/60000 :	0.26 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 :	0.548 in2/ft	#4@ 12.50 in #4@ 25.00 in
Provided Area :	0.62 in2/ft	#5@ 19.38 in #5@ 38.75 in
Maximum Area :	0.8805 in2/ft	#6@ 27.50 in #6@ 55.00 in

Footing Data

Toe Width	=	2.00 ft
Heel Width	=	4.00
Total Footing Width	=	6.00
Footing Thickness	=	12.00 in

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	=	2,394	347 psf
Mu' : Upward	=	4,334	4,035 ft-#
Mu' : Downward	=	360	14,149 ft-#
Mu: Design	=	3,974	10,113 ft-#
φ Mn	=	22,203	13,673 ft-#
Actual 1-Way Shear	=	25.25	33.35 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	# 5 @ 6.00 in	
Heel Reinforcing	=	# 5 @ 11.39 in	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, φ Tn	=		0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46.29 in, #10@ 58.79 in

Heel: #4@ 7.35 in, #5@ 11.39 in, #6@ 16.17 in, #7@ 22.06 in, #8@ 29.04 in, #9@ 36.76 in, #10@ 46.69 in

Key: No key defined

Min footing T&S reinf Area	1.56 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

Cantilevered Retaining Wall

Project File: Foundation Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typical Basement Wall

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	2,314.4	3.83	8,871.8	Soil Over HL (ab. water tbl)	3,850.0	4.33	16,683.3
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		4.33	16,683.3
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	=	648.0	5.75	3,726.1	Surcharge Over Toe	=	
	=			Stem Weight(s)	=	1,125.0	2.33
				Earth @ Stem Transitions	=		2,625.0
				Footing Weight	=	900.0	3.00
				Key Weight	=		2,700.0
				Vert. Component	=	1,021.6	6.00

* 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) 0.105 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 Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typical Basement Wall

Rebar Lap & Embedment Lengths Information

Stem Design Segment: 2nd

Stem Design Height: 4.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.3a) =	23.40 in
Development length for #5 bar specified in this stem design segment =	18.00 in

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.3a) =	23.40 in
Development length for #5 bar specified in this stem design segment =	18.00 in

Hooked embedment length into footing for #5 bar specified in this stem design segment =	9.28 in
As Provided =	0.6200 in ² /ft
As Required =	0.5480 in ² /ft

Project File: Foundation Retaining.ec6

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Project File: Foundation Retaining.ec6

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typical Basement Wall

Cantilevered Retaining Wall

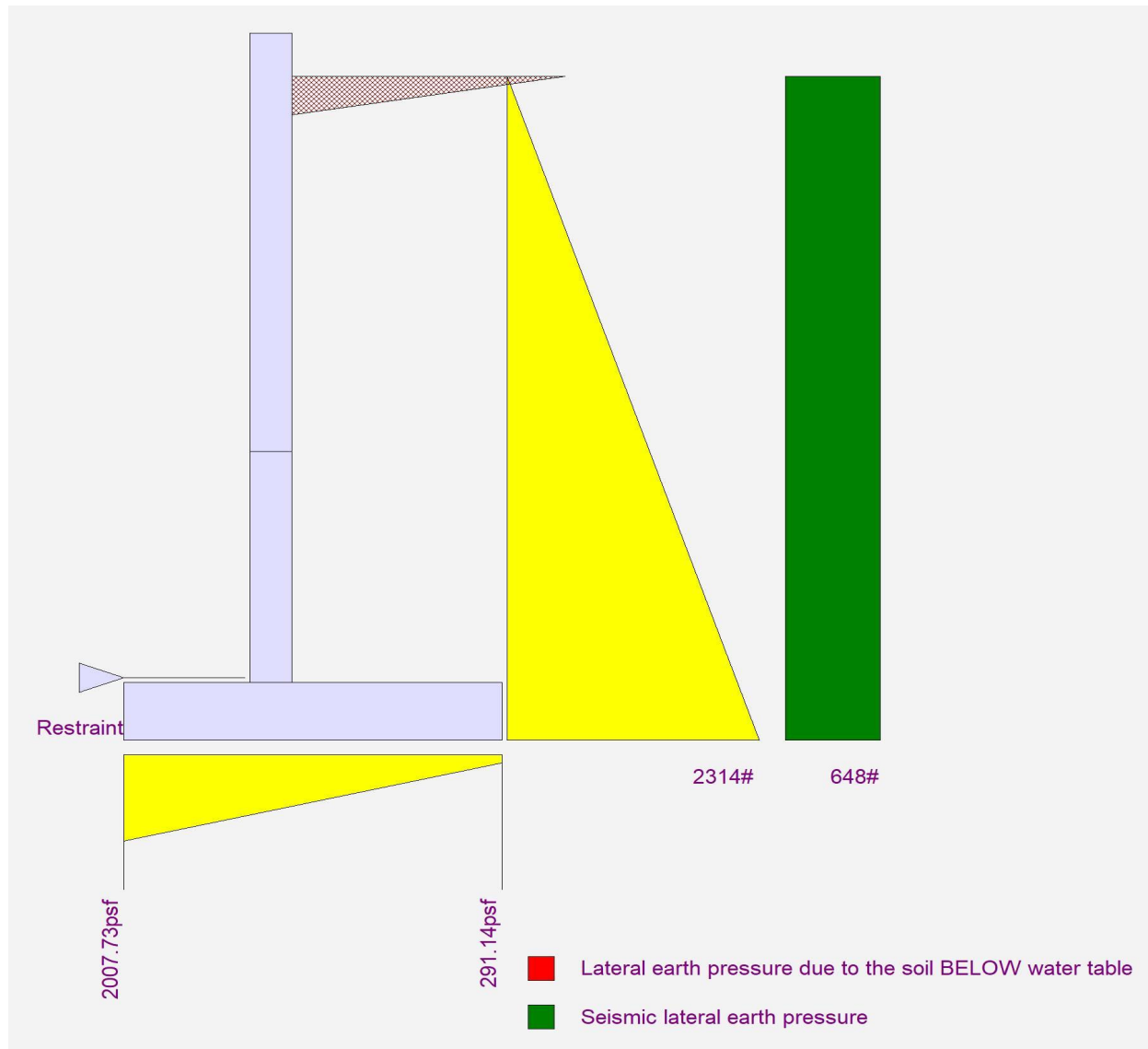
Project File: Foundation Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

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(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typical Basement Wall



Cantilevered Retaining Wall

Project File: Foundation Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typical Basement/Crawl Wall

Code Reference:

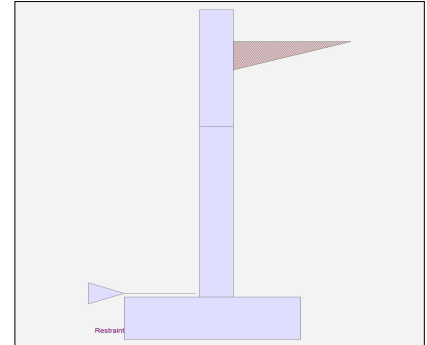
Calculations per IBC 2018 1807.3, CBC 2019, SDPWS 2015

Criteria

Retained Height	=	6.00 ft
Wall height above soil	=	0.75 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 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

Project File: Foundation Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typical Basement/Crawl Wall

Design Summary

Wall Stability Ratios			
Overturing	=	2.10	OK
Slab Resists All Sliding !			
Global Stability	=	1.77	
Total Bearing Load	=	2,459 lbs	
...resultant ecc.	=	5.71 in	
Eccentricity within middle third			
Soil Pressure @ Toe	=	1,275 psf	OK
Soil Pressure @ Heel	=	130 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,510 psf	
ACI Factored @ Heel	=	154 psf	
Footing Shear @ Toe	=	7.8 psi	OK
Footing Shear @ Heel	=	11.3 psi	OK
Allowable	=	75.0 psi	
Sliding Calcs			
Lateral Sliding Force	=	1,097.6 lbs	

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		Stem OK	Stem OK		
	ft =	4.00	0.00		
Wall Material Above "Ht"	=	Concrete	Concrete		
Design Method	=	SD	SD	SD	SD
Thickness	=	8.00	8.00		
Rebar Size	=	# 4	# 4		
Rebar Spacing	=	12.00	12.00		
Rebar Placed at	=	6.5 in	6.5 in		
Design Data					
fb/FB + fa/Fa	=	0.030	0.514		
Total Force @ Section					
Service Level	lbs =				
Strength Level	lbs =	210.0	1,302.0		
Moment....Actual					
Service Level	ft-# =				
Strength Level	ft-# =	172.7	2,898.0		
Moment.....Allowable	ft-# =	5,637.6	5,637.6		
Shear.....Actual					
Service Level	psi =				
Strength Level	psi =	2.7	16.7		
Shear.....Allowable	psi =	75.0	75.0		
Anet (Masonry)	in2 =				
Wall Weight	psf =	100.0	100.0		
Rebar Depth 'd'	in =	6.50	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

Project File: Foundation Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typical Basement/Crawl Wall

Concrete Stem Rebar Area Details

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>
2nd Stem		
As (based on applied moment) :	0.0062 in2/ft	
(4/3) * As :	0.0083 in2/ft	Min Stem T&S Reinf Area 0.528 in2
200bd/fy : 200(12)(6.5)/60000 :	0.26 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 :	0.2 in2/ft	#5@ 19.38 in #5@ 38.75 in
Maximum Area :	0.8805 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) :	0.1042 in2/ft	
(4/3) * As :	0.1389 in2/ft	Min Stem T&S Reinf Area 0.768 in2
200bd/fy : 200(12)(6.5)/60000 :	0.26 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 :	0.2 in2/ft	#5@ 19.38 in #5@ 38.75 in
Maximum Area :	0.8805 in2/ft	#6@ 27.50 in #6@ 55.00 in

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	2.00
Total Footing Width	=	3.50
Footing Thickness	=	12.00 in

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	=	1,510	154 psf
Mu' : Upward	=	1,481	290 ft-#
Mu' : Downward	=	203	1,672 ft-#
Mu: Design	=	1,279	1,382 ft-#
φ Mn	=	2,500	2,500 ft-#
Actual 1-Way Shear	=	7.76	11.27 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, φ Tn	=		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	0.91	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 Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typical Basement/Crawl Wall

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				RESISTING.....			
Item	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)	880.0	2.83	2,493.3
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.83	2,493.3
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)	=	675.0	1.83
				Earth @ Stem Transitions	=		1,237.5
				Footing Weight	=	525.0	1.75
				Key Weight	=		918.8
				Vert. Component	=	378.5	3.50
							1,324.8
Total	=	1,097.6	O.T.M.	=			
Resisting/Overturning Ratio		=	2.10				
Vertical Loads used for Soil Pressure =		2,458.5	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) 0.068 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 Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typical Basement/Crawl Wall

Rebar Lap & Embedment Lengths Information

Stem Design Segment: 2nd

Stem Design Height: 4.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	18.72 in
Development length for #4 bar specified in this stem design segment =	14.40 in

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	18.72 in
Development length for #4 bar specified in this stem design segment =	14.40 in

Hooked embedment length into footing for #4 bar specified in this stem design segment =	7.26 in
As Provided =	0.2000 in ² /ft
As Required =	0.1728 in ² /ft

Cantilevered Retaining Wall

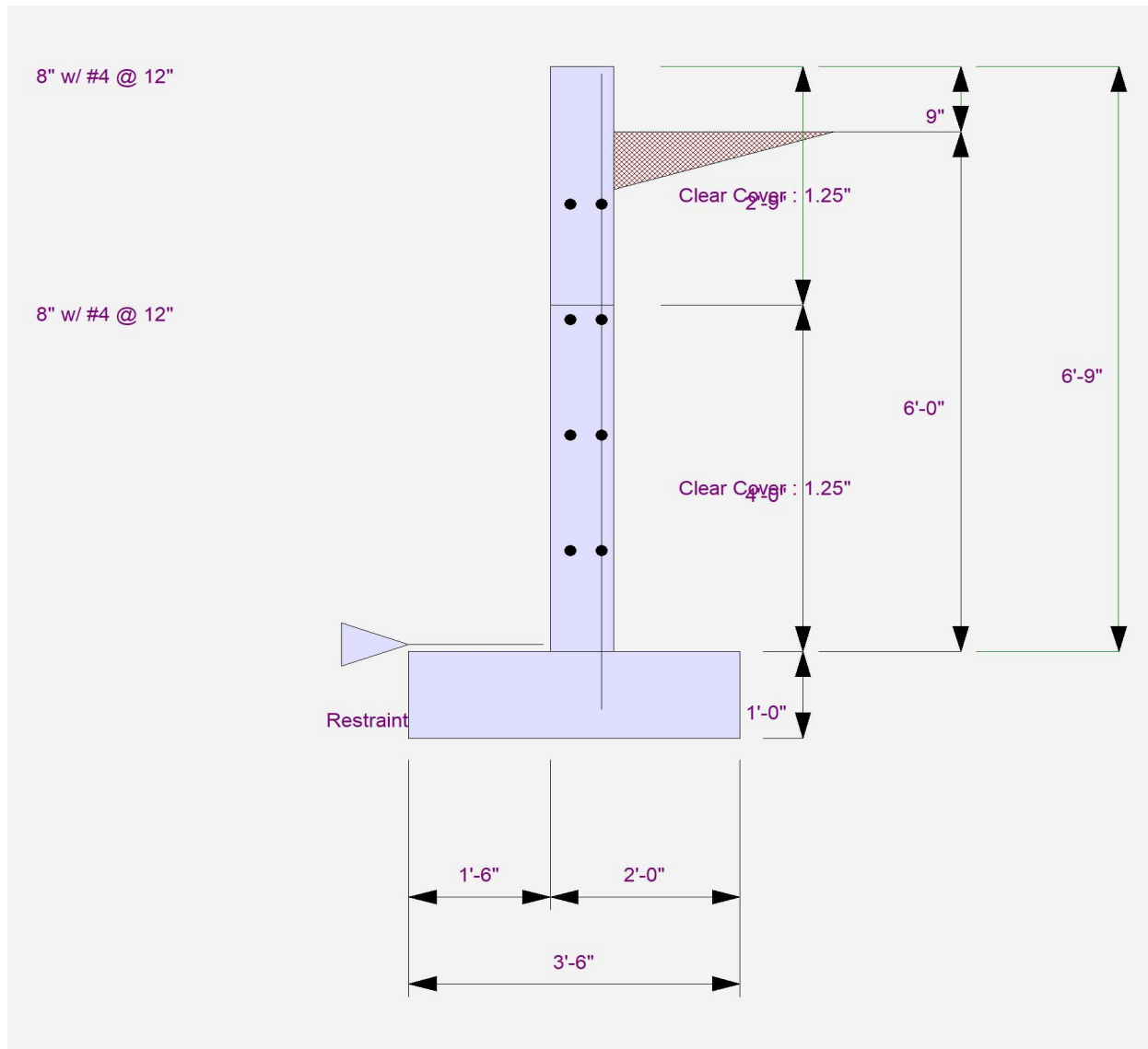
Project File: Foundation Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typical Basement/Crawl Wall



Cantilevered Retaining Wall

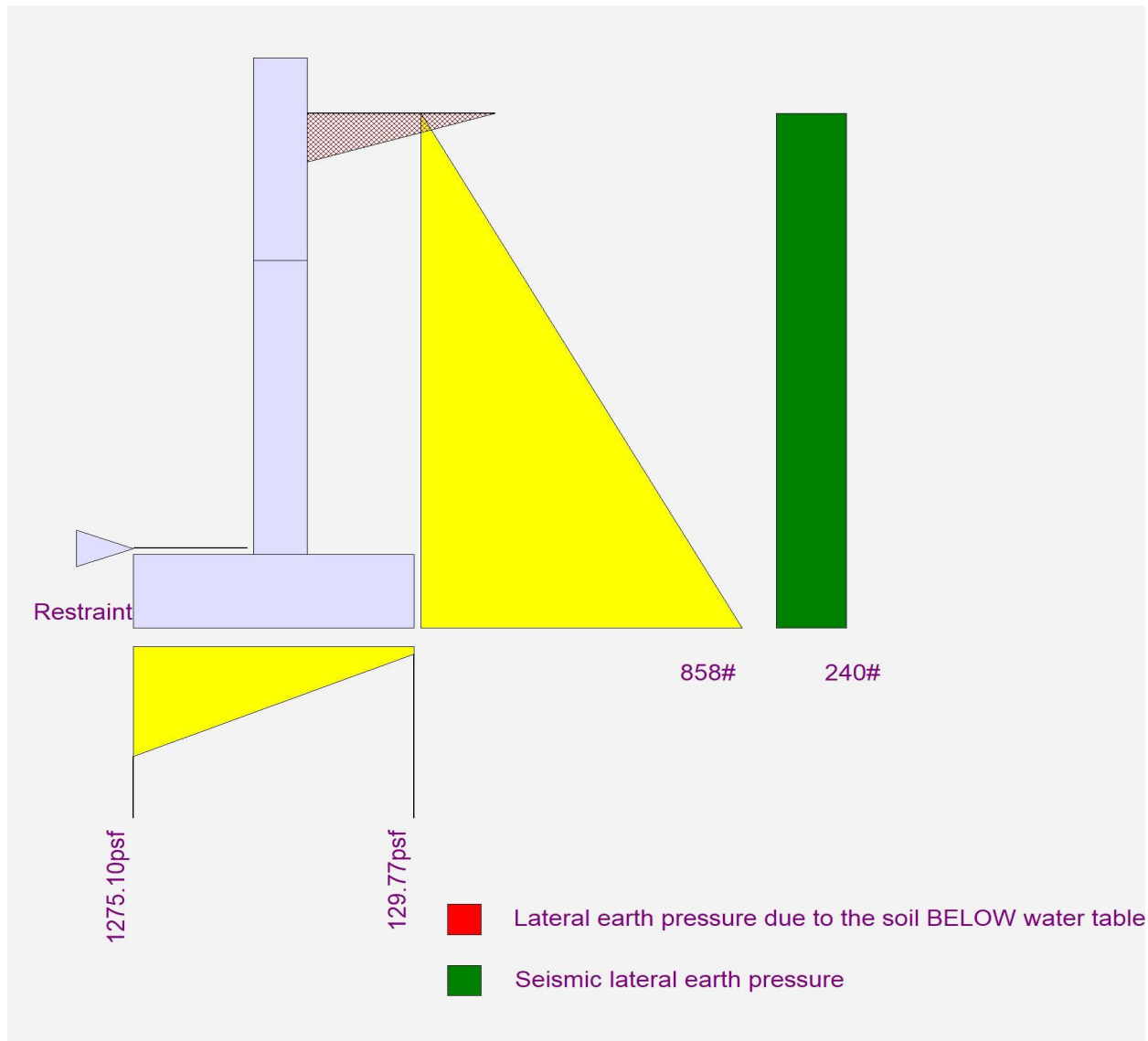
Project File: Foundation Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Typical Basement/Crawl Wall



Cantilevered Retaining Wall

Project File: Foundation Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

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DESCRIPTION: Window Well

Code Reference:

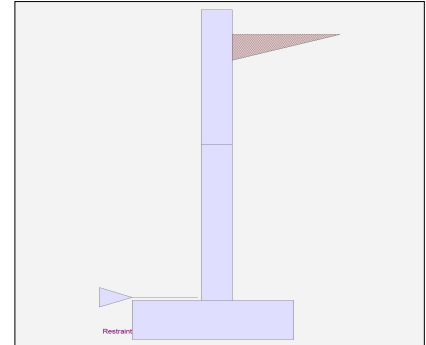
Calculations per IBC 2018 1807.3, CBC 2019, SDPWS 2015

Criteria

Retained Height	=	6.83 ft
Wall height above soil	=	0.63 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 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	=	54.810
Total Seismic Force	=	429.162

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

Project File: Foundation Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Window Well

Design Summary

Wall Stability Ratios

Overturning	=	1.71	OK
Slab Resists All Sliding !			
Global Stability	=	1.61	
Total Bearing Load	=	2,746 lbs	
...resultant ecc.	=	8.74 in	
Eccentricity outside middle third			
Soil Pressure @ Toe	=	1,792 psf	NG
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Exceeds Allowable!			
ACI Factored @ Toe	=	2,076 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	10.7 psi	OK
Footing Shear @ Heel	=	16.1 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	1.373.3 lbs
ALLOWABLE SOIL BEARING PRESSURE CAN BE INCREASED BY 33% DUE TO SEISMIC SURCHARGE. THEREFOR SOIL PRESSURE @ TOE IS OK		

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

Design Height Above Ftg

Wall Material Above "Ht"	=	Concrete	Concrete
Design Method	=	SD	SD
Thickness	=	8.00	8.00
Rebar Size	=	# 5	# 5
Rebar Spacing	=	16.00	16.00
Rebar Placed at	=	6.5 in	6.5 in

Design Data

fb/FB + fa/Fa	=	0.066	0.652
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Total Force @ Section

Service Level	lbs =		
Strength Level	lbs =	379.4	1,680.5

Moment....Actual

Service Level	ft-# =		
Strength Level	ft-# =	431.0	4,252.1

Moment.....Allowable

ft-# =	6,513.6	6,513.6
--------	---------	---------

Shear.....Actual

Service Level	psi =		
Strength Level	psi =	4.9	21.5

Shear.....Allowable

psi =	75.0	75.0
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Anet (Masonry)

in2 =		
-------	--	--

Wall Weight

psf =	100.0	100.0
-------	-------	-------

Rebar Depth 'd'

in =	6.50	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

Project File: Foundation Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Window Well

Concrete Stem Rebar Area Details

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>
2nd Stem		
As (based on applied moment) :	0.0155 in ² /ft	
(4/3) * As :	0.0207 in ² /ft	Min Stem T&S Reinf Area 0.664 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 :	0.1728 in ² /ft	#4@ 12.50 in #4@ 25.00 in
Provided Area :	0.2325 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

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>
Bottom Stem		
As (based on applied moment) :	0.1529 in ² /ft	
(4/3) * As :	0.2038 in ² /ft	Min Stem T&S Reinf Area 0.768 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 :	0.2038 in ² /ft	#4@ 12.50 in #4@ 25.00 in
Provided Area :	0.2325 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	=	2.00
Total Footing Width	=	3.50
Footing Thickness	=	12.00 in

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	=	2,076	0 psf
Mu' : Upward	=	1,955	82 ft-#
Mu' : Downward	=	203	1,972 ft-#
Mu: Design	=	1,752	1,890 ft-#
φ Mn	=	2,500	2,500 ft-#
Actual 1-Way Shear	=	10.74	16.05 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, φ Tn	=		0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe: $\phi Mn = \phi * 5 * \lambda * \sqrt{fc} * Sm$

Heel: $\phi Mn = \phi * 5 * \lambda * \sqrt{fc} * Sm$

Key: No key defined

Min footing T&S reinf Area	0.91 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

Project File: Foundation Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Window Well

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	1,072.9	2.61	2,800.3	Soil Over HL (ab. water tbl)	1,001.7	2.83	2,838.2
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.83	2,838.2
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	=	300.4	3.92	1,176.1	Surcharge Over Toe	=	
	=			Stem Weight(s)	=	746.0	1.83
				Earth @ Stem Transitions	=		
				Footing Weight	=	525.0	1.75
				Key Weight	=		
				Vert. Component	=	473.6	3.50

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) 0.106 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 Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Window Well

Rebar Lap & Embedment Lengths Information

Stem Design Segment: 2nd

Stem Design Height: 4.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.3a) =	23.40 in
Development length for #5 bar specified in this stem design segment =	18.00 in

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.3a) =	23.40 in
Development length for #5 bar specified in this stem design segment =	18.00 in

Hooked embedment length into footing for #5 bar specified in this stem design segment =	9.20 in
As Provided =	0.2325 in2/ft
As Required =	0.2038 in2/ft

Cantilevered Retaining Wall

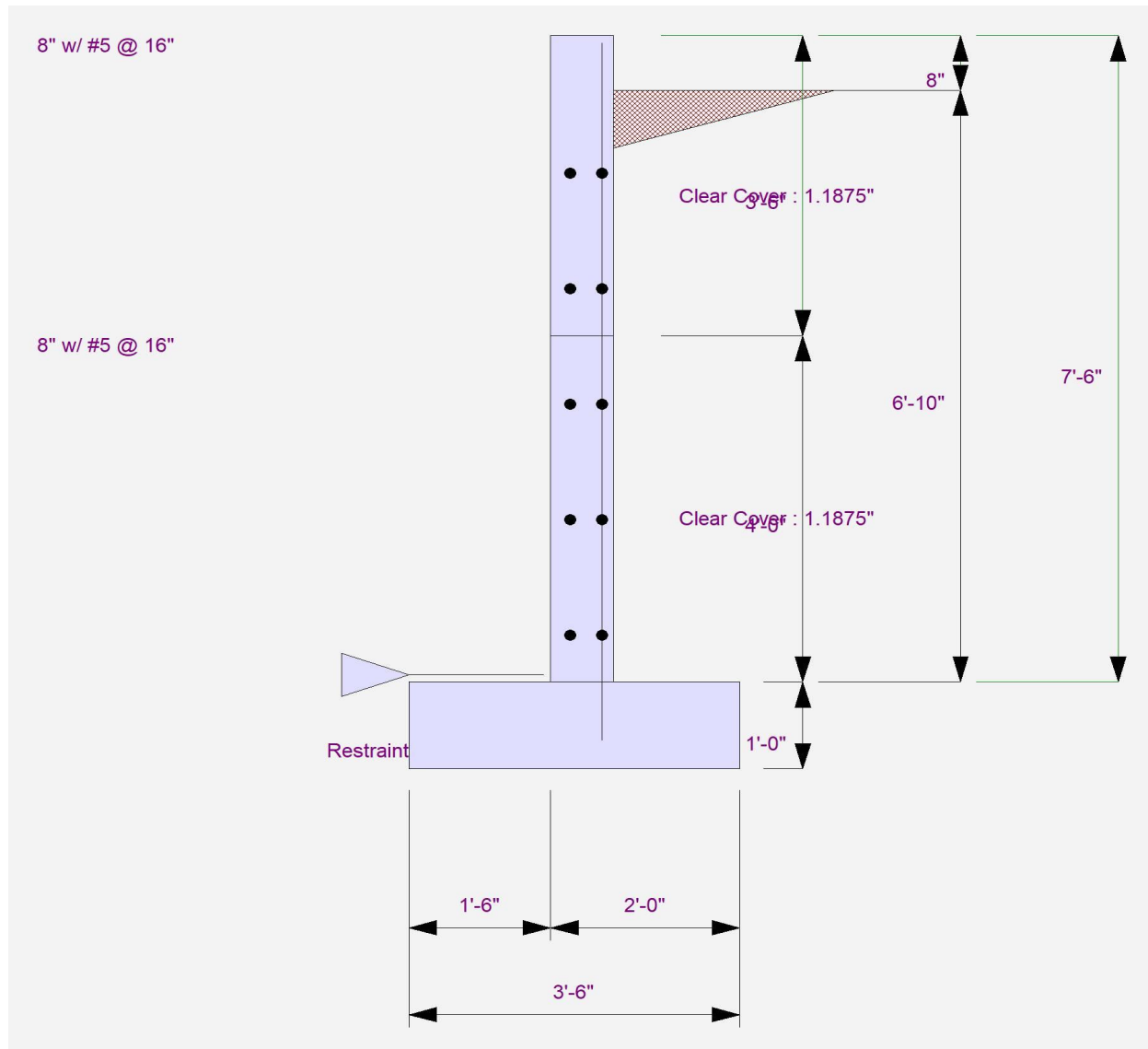
Project File: Foundation Retaining.ec6

LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Window Well



Cantilevered Retaining Wall

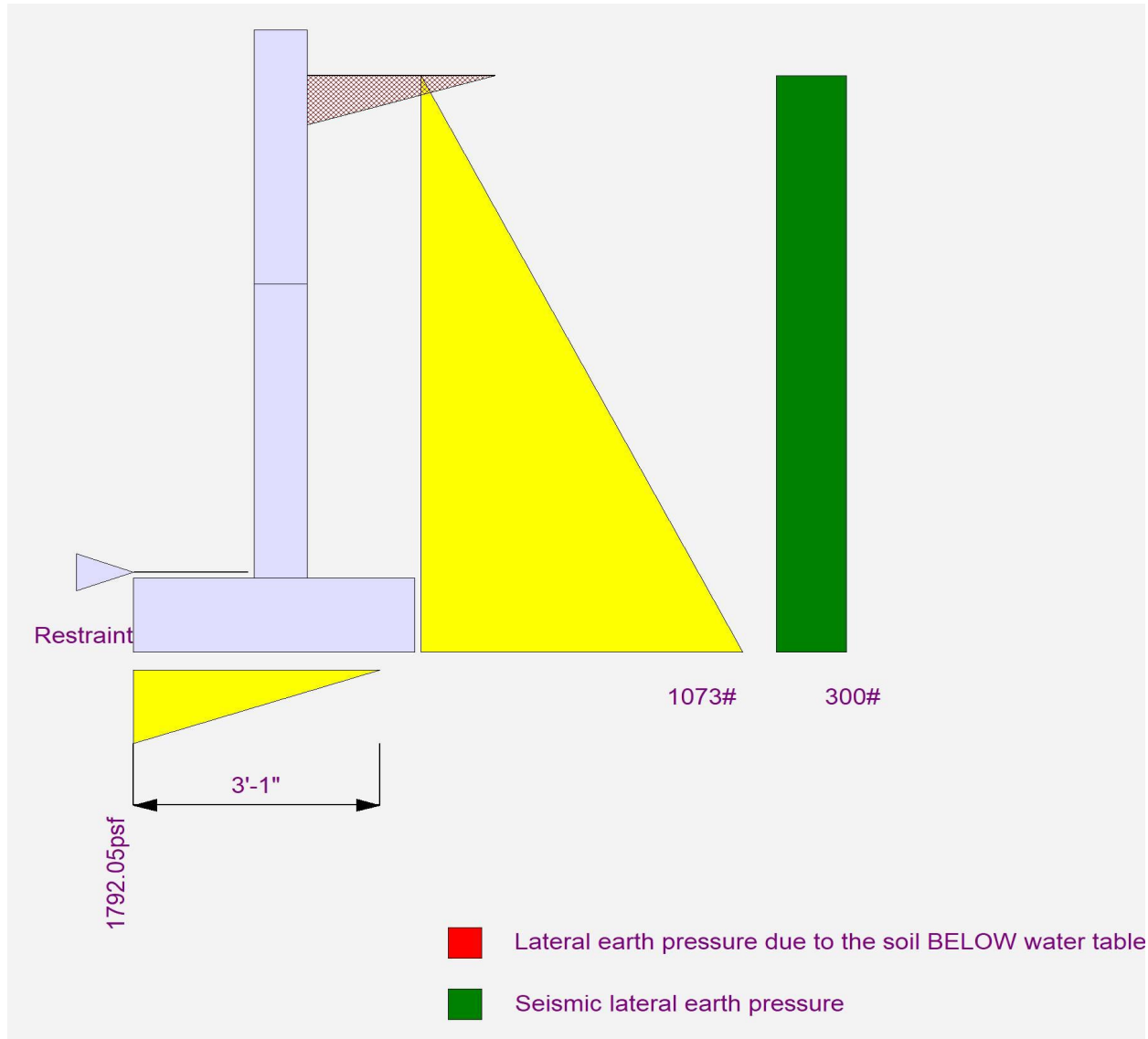
Project File: Foundation Retaining.ec6

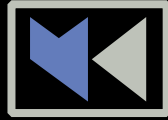
LIC# : KW-06017913, Build:20.24.09.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Window Well





MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEAR WALL CALCULATIONS WIND

MILESTONE NW

MERCER ISLAND - LOT 1

MERCER ISLAND, WA

PARAMETERS:

SINGLE FAMILY HOME

DESIGN WIND SPEED: 110 MPH

WIND EXPOSURE CATEGORY: B

SEISMIC DESIGN CATEGORY: D1

CODE & DESIGN STANDARD: 2021 IBC CH. 1609, ASCE 7-16 CH. 26-30

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

NICHOLAS MARTIGNETTI, P.E., PROJECT MANAGER

RYAN CHAN, E.I.T., STAFF ENGINEER



WIND DESIGN SUMMARY PER ASCE 7-16

M+K PROJECT #: 203-24019
ENGINEER: RSC

PARAMETERS:

WIND SPEED	100
EXPOSURE CATEGORY	C
RISK CATEGORY	II
WIND DIRECTIONALITY FACTOR, K_d	0.85
TOPOGRAPHIC FACTOR, K_{zt}	1.00
GUST FACTOR, G	0.85
GROUND ELEV. ABOVE SEA LEVEL (FT)	0
DESIGN TYPE	ASD

0.60

ROOF GEOMETRY:

TRANS. ROOF PITCH	3.5	:12
LONG. ROOF PITCH	3.5	:12
MEAN ROOF HEIGHT, H	23.08	FT

BUILDING GEOMETRY:

LENGTH	64	FT
WIDTH	53	FT
NUMBER OF STORIES	2	

TRANSVERSE DIRECTION (PERPENDICULAR TO MAIN RIDGE LINE)

DIAPHRAGM
LEVEL

FLOOR-TO-
FLOOR
HEIGHT

TRIBUTARY DESIGN AREAS:

SECTION

A O B

2

9.08

FT

ROOF SURFACE

0 143 0 SQ FT

WALL SURFACE

0 355 0 SQ FT

1

11.4

FT

ROOF SURFACE

0 0 0 SQ FT

WALL SURFACE

0 652 0 SQ FT

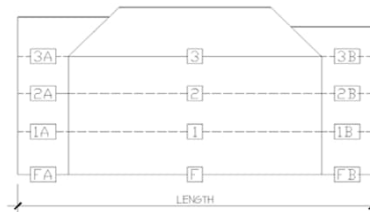
FND

ROOF SURFACE

0 0 0 SQ FT

WALL SURFACE

0 0 0 SQ FT



**TRIBUTARY DESIGN LOADS:
(0.6W)**

SECTION

A O B

STORY SHEAR

0.00 5.47 0.00 KIPS

TOTAL SHEAR

0.00 5.47 0.00 KIPS

5.47 KIPS

STORY SHEAR

0.00 8.28 0.00 KIPS

TOTAL SHEAR

0.00 13.75 0.00 KIPS

13.75 KIPS

STORY SHEAR

0.00 0.00 0.00 KIPS

TOTAL SHEAR

0.00 13.75 0.00 KIPS

13.75 KIPS

LONGITUDINAL DIRECTION (PARALLEL TO MAIN RIDGE LINE)

DIAPHRAGM
LEVEL

FLOOR-TO-
FLOOR
HEIGHT

TRIBUTARY DESIGN AREAS:

SECTION

A O B

2

9.08

FT

ROOF SURFACE

0 142 0 SQ FT

WALL SURFACE

0 274 0 SQ FT

1

11.4

FT

ROOF SURFACE

0 0 0 SQ FT

WALL SURFACE

0 579 0 SQ FT

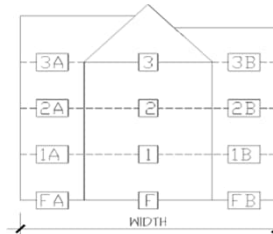
FND

ROOF SURFACE

0 0 0 SQ FT

WALL SURFACE

0 0 0 SQ FT



**TRIBUTARY DESIGN LOADS:
(0.6W)**

SECTION

A O B

STORY SHEAR

0.00 4.30 0.00 KIPS

TOTAL SHEAR

0.00 4.30 0.00 KIPS

4.30 KIPS

STORY SHEAR

0.00 7.10 0.00 KIPS

TOTAL SHEAR

0.00 11.40 0.00 KIPS

11.40 KIPS

STORY SHEAR

0.00 0.00 0.00 KIPS

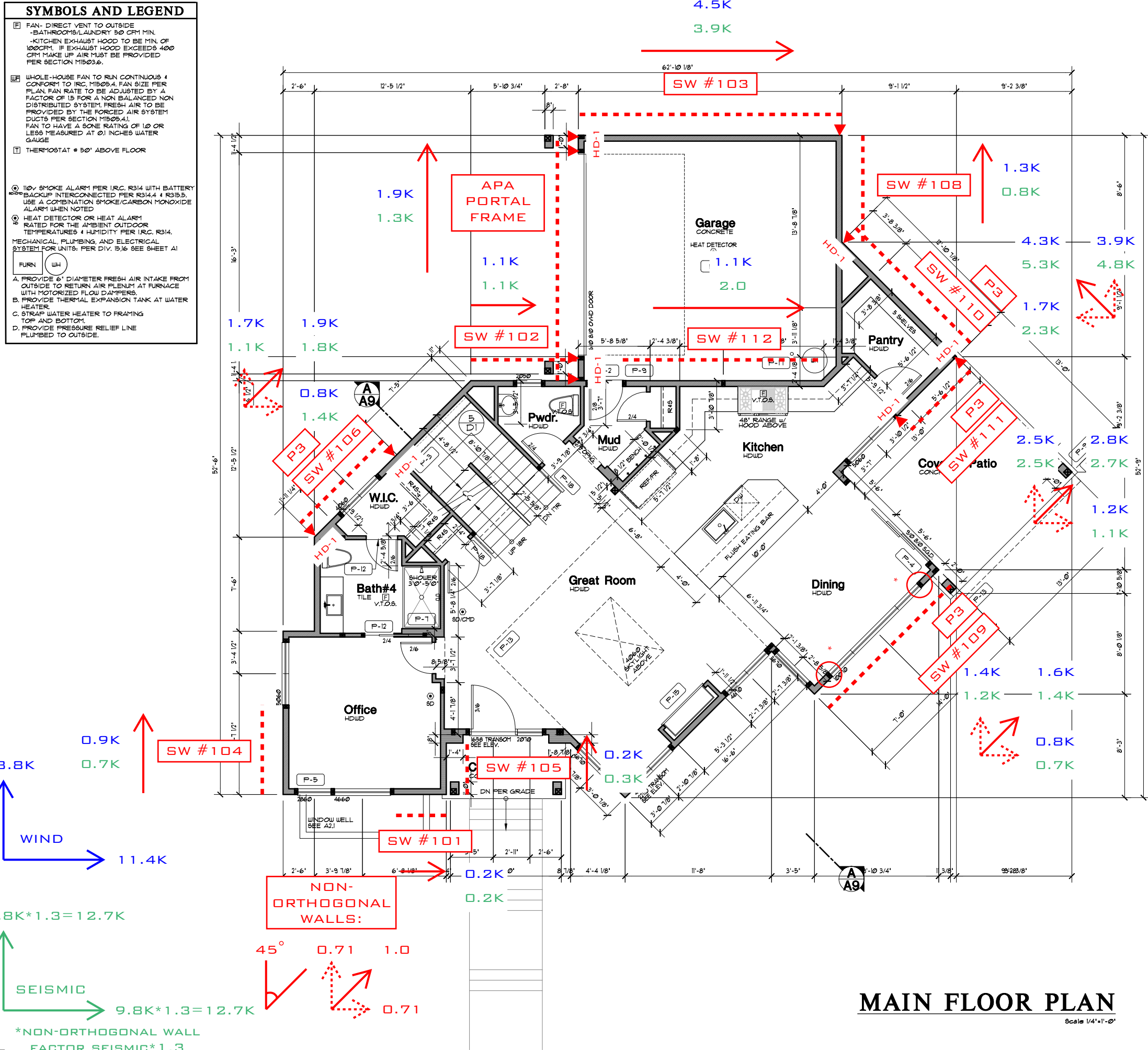
TOTAL SHEAR

0.00 11.40 0.00 KIPS

11.40 KIPS

SYMBOLS AND LEGEND

- [F] FAN - DIRECT VENT TO OUTSIDE
-BATHROOMS/LAUNDRY 50 CFM MIN.
-KITCHEN EXHAUST HOOD TO BE MIN. OF 100CFM. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR MUST BE PROVIDED PER SECTION M1503.6.
- [WH] WHOLE-HOUSE FAN TO RUN CONTINUOUS 4 CONFORM TO IRC M1505.4. FAN SIZE PER PLAN FAN RATE TO BE ADJUSTED BY A FACTOR OF 15 FOR A NON-BALANCED NON-DISTRIBUTED SYSTEM. FRESH AIR TO BE PROVIDED BY THE FORCED AIR SYSTEM DUCTS PER SECTION M1505.4.1. FAN TO HAVE A SONE RATING OF 10 OR LESS MEASURED AT 0.1 INCHES WATER GAUGE.
- [T] THERMOSTAT @ 50" ABOVE FLOOR
- [S] 110V SMOKE ALARM PER IRC R314 WITH BATTERY BACKUP INTERCONNECTED PER R314.4 & R315.5. USE A COMBINATION SMOKE/CARBON MONOXIDE ALARM WHEN NOTED.
- [H] HEAT DETECTOR OR HEAT ALARM RATED FOR THE AMBIENT OUTDOOR TEMPERATURES & HUMIDITY PER IRC R314. MECHANICAL, PLUMBING, AND ELECTRICAL SYSTEM FOR UNITS. PER DIV. 15.16 SEE SHEET A1.
- FURN (FURNITURE) WH (WATER HEATER)
- A. PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR FLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.
B. PROVIDE THERMAL EXPANSION TANK AT WATER HEATER.
C. STRAP WATER HEATER TO FRAMING TOP AND BOTTOM.
D. PROVIDE PRESSURE RELIEF LINE PLUMBED TO OUTSIDE.



GENERAL PLAN NOTES

- SEE SHEET A-1 FOR ALL GENERAL NOTES AND REQUIREMENTS.
- ENERGY AND AIR QUALITY INFORMATION SEE DIV. 11 SHEET A-1
- SEE BUILDING ELEVATION FOR WINDOW OPERATION SEE DIV. 8 SHEET A-1
- SEE TYP. MATERIALS LIST ON SECTION SHEET
- SEE SHEET A-1 FOR ALL NOTES AND REQUIREMENTS CONCERNING MECHANICAL, PLUMBING AND ELECTRICAL.

FLOOR PLAN KEY NOTES

- [P-1] OCCUPANCY SEPARATION:
APPLY (1) LAYER OF 1/2" G.W.B. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY. APPLY (1) LAYER OF 1/2" TYPE 'X' G.W.B. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS. DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL SEE DIV. 01002.6.A, SHEET A-1.
- [P-2] 1/2" MIN. SELF-CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE-RATED DOOR SEE DIV. 01002.6.B, SHEET A-1
- [P-3] STAIR ASSEMBLY NOTES: PER IRC SECTION R311.1
A. HEADROOM MIN. 6'-8" (6'-0" MIN. CLEARANCE)
B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT, RISERS 7/8" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1 1/4" ON STAIRS WITH SOLID RISERS.
C. HANDRAIL MIN. 34" TO MAX. 38" ABOVE TREAD NOSING. HANDRAIL TYPE I CIRCULAR TO HAVE 1 1/4" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL, RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 LBS. POINT LOAD IN ANY DIRECTION PER IRC TABLE R302.5
D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER IRC SECTION R302.1.1
E. COVERS USABLE SPACE UNDER STAIR W/ 1/2" G.W.B. PER IRC SECTION R302.1
F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
G. PROVIDE STAIRWAY ILLUMINATION PER IRC SECTION R303.1
SEE DIV. 01002.1 SHEET A-1
- [P-4] SAFETY GLAZING PER IRC, SECTION R308
A. WINDOWS WITHIN 18" OF FLOOR
B. WINDOWS WITHIN A 24" ARC OF DOORS
C. WINDOWS AT TUBS AND SHOWERS
D. GLAZING IN DOORS
E. LESS THAN 60" HORIZ. FROM THE BOT. STAIR TREAD NOSING, 4 BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE SEE DIV. 08000 SHEET A-1
- [P-5] EGRESS WINDOW PER IRC, SECTION R310 SEE DIV. 08000 SHEET A-1
- [P-6] IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1
- [P-7] COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 12" ABOVE DRAIN INLETS, PER IRC, SECTION 3012.2 SEE DIV. 09250 SHEET A-1
- [P-8] (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- [P-9] 1 3/4" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER IRC, SECTION R311.1.8. SEE DIV. 01002.1 SHEET A-1
- [P-10] 18"x24" CRAWL SPACE ACCESS, INSULATE AND WEATHER STRIP. SEE DIV. 01002.1 SHEET A-1
- [P-11] 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE, INSULATE AND WEATHER STRIP. SEE DIV. 01002.2 SHEET A-1
- [P-12] FLOOR MATERIAL BREAK LINE
- [P-13] WALL LINE ABOVE
- [P-14] WALL LINE BELOW
- [P-15] FIREPLACE ASSEMBLY NOTES:
A. DIRECT VENT GAS FIREPLACES MUST BE LISTED, LABELED & INSTALLED PER MFG. SPECIFICATIONS, SHALL CONFORM TO IRC REQUIREMENTS. SEE DIV. 01002.12 SHEET A-1
B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO IRC REQUIREMENTS. SEE DIV. 01002.12 SHEET A-1
C. HEARTH SHALL CONFORM TO IRC REQUIREMENT SEE DIV. 01002.12
D. FIREBLOCK OPENINGS AROUND PENETRATIONS @ EACH FLOOR PER IRC, SECTION R1003.13.
E. FIREPLACE MUST COMPLY WITH UL 121 TESTING
- [P-16] SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS
- [P-17] 3" DIAMETER STEEL POST
- [P-18] 36" GUARDRAIL PER IRC SECTION R312 & TABLE R301.5 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 200 LBS. LOAD ON TOP RAIL, ACTING IN ANY DIRECTION.
- [P-19] 1" VENT FOR MECHANICAL, 1" CLEARANCE ALL SIDES PER IRC, SECTION R302.1.1. SEE DIV. 15 SHEET A-1
- [P-20] PLANT SHELF
- [P-21] UPPER AND LOWER LINEN CABINETS
- [P-22] SOFFIT AREA
- [P-23] INTEGRATED MAKE UP AIR
- [P-24] 2x6 STUDS W/ R-21 INSULATION MIN.

SQUARE FOOTAGE

MAIN FLOOR	1315 SF
UPPER FLOOR	1541 SF
BASEMENT	590 SF
TOTAL	3446 SF
GARAGE	405 SF
PORCH/DECK	44/170 SF

SQUARE FOOTAGE IS MEASURED TO THE OUTSIDE FACE OF WALLS. STAIRS ARE COUNTED ONCE IN CALCULATIONS, OPEN TO BELOW SPACES AND GARAGES ARE NOT INCLUDED IN CALCULATIONS.

Milestone NW
Mercer Island Lot 1

7621 SE 22nd ST. Mercer Island, WA 98040

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TITLE

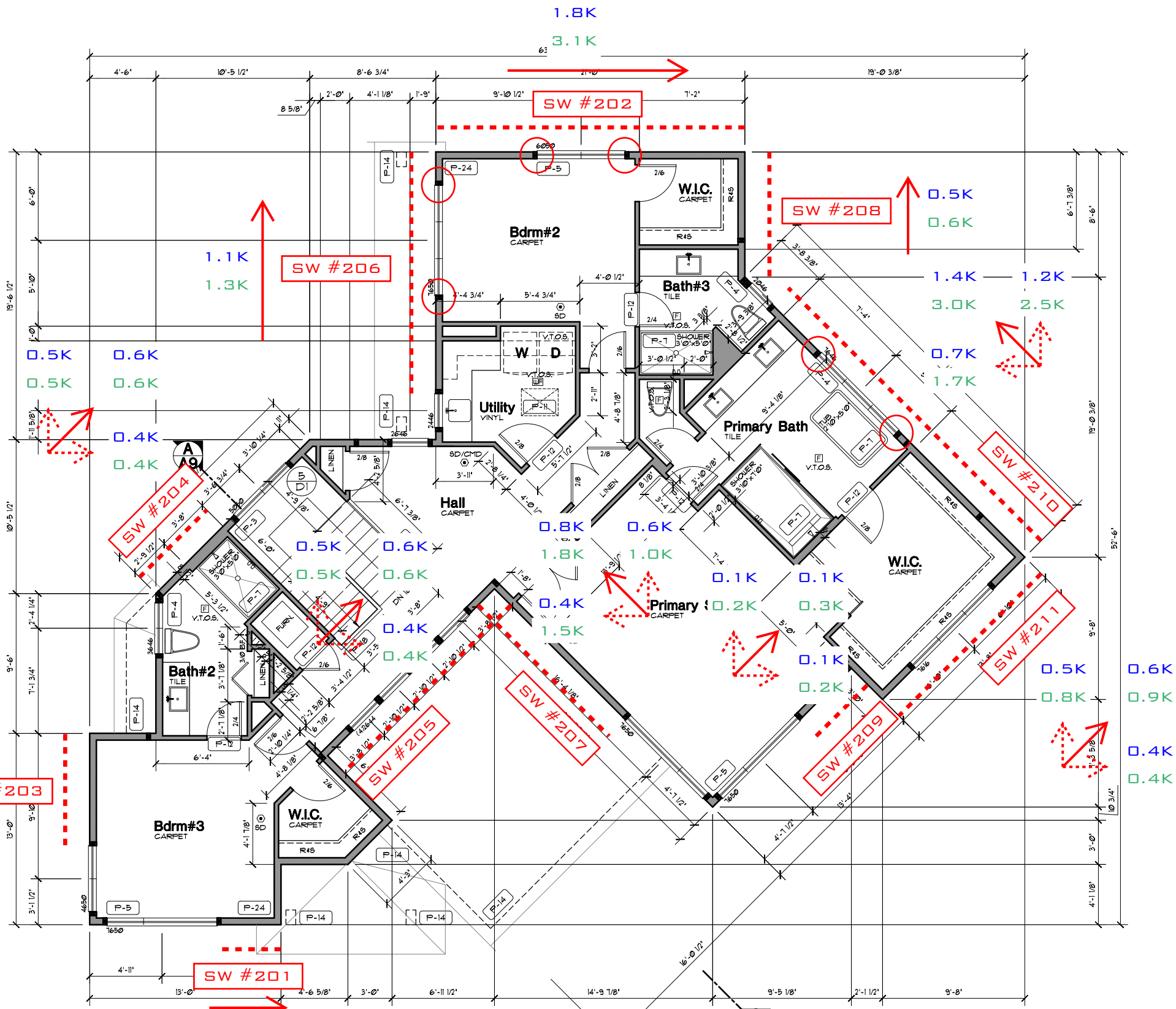
JOB NO.: 2102245
STARTING NO.: 2102245

SHEET

A3

SYMBOLS AND LEGEND

- [F] FAN - DIRECT VENT TO OUTSIDE
-BATHROOMS/LAUNDRY 50 CFM MIN.
-KITCHEN EXHAUST HOOD TO BE MIN. OF 100CFM. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR MUST BE PROVIDED PER SECTION M1503.6.
- [WH] WHOLE-HOUSE FAN TO RUN CONTINUOUS 4 CONFORM TO IRC M1505.4. FAN SIZE PER PLAN FAN RATE TO BE ADJUSTED BY A FACTOR OF 15 FOR A NON BALANCED NON DISTRIBUTED SYSTEM. FRESH AIR TO BE PROVIDED BY THE FORCED AIR SYSTEM DUCTS PER SECTION M1505.4.1. FAN TO HAVE A SONE RATING OF 10 OR LESS MEASURED AT 0.1 INCHES WATER GAUGE
- [T] THERMOSTAT @ 5'0" ABOVE FLOOR
- [S] 110V SMOKE ALARM PER IRC R314 WITH BATTERY BACKUP INTERCONNECTED PER R314.4 & R315.5. USE A COMBINATION SMOKE/CARBON MONOXIDE ALARM WHEN NOTED
- [H] HEAT DETECTOR OR HEAT ALARM RATED FOR THE AMBIENT OUTDOOR TEMPERATURES & HUMIDITY PER IRC R314.
- MECHANICAL, PLUMBING, AND ELECTRICAL SYSTEM FOR UNITS. PER DIV. 15.16 SEE SHEET A1
- FURN WH
- A. PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR FLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.
- B. PROVIDE THERMAL EXPANSION TANK AT WATER HEATER
- C. STRAP WATER HEATER TO FRAMING TOP AND BOTTOM.
- D. PROVIDE PRESSURE RELIEF LINE PLUMBED TO OUTSIDE.



6.1K * 1.3 = 7.9K

WIND

SEISMIC

6.1K * 1.3 = 7.9K

*NON-ORTHOGONAL WALL FACTOR SEISMIC * 1.3

45°

0.71

1.0

0.71

UPPER FLOOR PLAN

Scale 1/4"=1'-0"

GENERAL PLAN NOTES

- SEE SHEET A-1 FOR ALL GENERAL NOTES AND REQUIREMENTS.
- ENERGY AND AIR QUALITY INFORMATION SEE DIV. 11 SHEET A-1
- SEE BUILDING ELEVATION FOR WINDOW OPERATION SEE DIV. 8 SHEET A-1
- SEE TYP. MATERIALS LIST ON SECTION SHEET
- SEE SHEET A-1 FOR ALL NOTES AND REQUIREMENTS CONCERNING MECHANICAL, PLUMBING AND ELECTRICAL.

FLOOR PLAN KEY NOTES

- [P-1] OCCUPANCY SEPARATION:
APPLY (1) LAYER OF 1/2" G.W.B. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY. APPLY (1) LAYER OF 1/2" TYPE 'X' G.W.B. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS. DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL SEE DIV. 01002.6.4, SHEET A-1.
- [P-2] 1 1/2" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR SEE DIV. 01002.6.5, SHEET A-1
- [P-3] STAIR ASSEMBLY NOTES: PER IRC SECTION R301.1
A. HEADROOM MIN. 6'-8" WIDTH MIN. 3'-0".
B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT, RISERS 7/8" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1 1/4" ON STAIRS WITH SOLID RISERS.
C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE 1 CIRCULAR TO HAVE 1 1/4" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL, RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER IRC TABLE R301.5
D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER IRC SECTION R301.1.
E. COVER USABLE SPACE UNDER STAIR W/ 1/2" G.W.B. PER IRC SECTION R302.1.
F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
G. PROVIDE STAIRWAY ILLUMINATION PER IRC SECTION R303.1. SEE DIV. 01002.1 SHEET A-1.
- [P-4] SAFETY GLAZING PER IRC, SECTION R308
A. WINDOWS WITHIN 18" OF FLOOR
B. WINDOWS WITHIN A 24" ARC OF DOORS
C. WINDOWS AT TUBS AND SHOWERS
D. GLAZING IN DOORS
E. LESS THAN 60" HORIZ. FROM THE BOT. STAIR TREAD NOSING, 4 BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE SEE DIV. 08000 SHEET A-1
- [P-5] EGRESS WINDOW PER IRC, SECTION R310 SEE DIV. 08000 SHEET A-1
- [P-6] IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1
- [P-7] COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL 2" ABOVE DRAIN INLETS, PER IRC, SECTION 3012. SEE DIV. 09250 SHEET A-1
- [P-8] (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- [P-9] 1 3/4" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER IRC, SECTION R301.1.8. SEE DIV. 01002.1 SHEET A-1
- [P-10] 18"x24" CRAWL SPACE ACCESS, INSULATE AND WEATHER STRIP. SEE DIV. 01002.1 SHEET A-1
- [P-11] 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE, INSULATE AND WEATHER STRIP. SEE DIV. 01002.2 SHEET A-1
- [P-12] FLOOR MATERIAL BREAK LINE
- [P-13] WALL LINE ABOVE
- [P-14] WALL LINE BELOW
- [P-15] FIREPLACE ASSEMBLY NOTES:
A. DIRECT VENT GAS FIREPLACES, MUST BE LISTED, LABELED & INSTALLED PER MFG. SPECIFICATIONS, SHALL CONFORM TO IRC REQUIREMENTS. SEE DIV. 01002.12 SHEET A-1
B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO IRC REQUIREMENTS. SEE DIV. 01002.12 SHT A-1
C. HEARTH SHALL CONFORM TO IRC REQUIREMENT SEE DIV. 01002.12
D. FIREBLOCK OPENINGS AROUND PENETRATIONS @ EACH FLOOR PER IRC, SECTION R1003.15.
E. FIREPLACE MUST COMPLY WITH UL 121 TESTING
- [P-16] SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS
- [P-17] 3" DIAMETER STEEL POST
- [P-18] 36" GUARDRAIL PER IRC SECTION R302.4 TABLE R301.5 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 200LB LOAD ON TOP RAIL ACTING IN ANY DIRECTION PER IRC, SECTION R302.11. SEE DIV. 15 SHEET A-1
- [P-19] 'B' VENT FOR MECHANICAL, 1" CLEARANCE ALL SIDES PER IRC, SECTION R302.11. SEE DIV. 15 SHEET A-1
- [P-20] PLANT SHELF
- [P-21] UPPER AND LOWER LINEN CABINETS
- [P-22] SOFFIT AREA
- [P-23] INTEGRATED MAKE UP AIR
- [P-24] 2x6 STUDS W/ R-21 INSULATION MIN.

Milestone NW

Mercer Island Lot 1

7621 SE 22nd ST. Mercer Island, WA 98040

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TITLE

JOB NO.: 21022.05

STARTING NO.: 21022.05

SHEET

A5



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019

ENGINEER: RSC

SHEARWALL 201: 2ND - FRONT EXT. WALL @ BED 3

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	0.0	FT.
WALL LENGTH, L	4.3	FT.	QUALIFYING WALL LENGTH, L	4.3	FT.

SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
100	LBS	<	1441	LBS

SHEARWALL ASSEMBLY SPECIFICATION

P1 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"D.C. PANEL EDGES & 12"D.C. PANEL FIELD - EDGES BLOCKED
ADEQUATE

OVERTURNING EVALUATION:

RESISTIVE DL	125	PLF	OVERTURNING MOMENT	0.9	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	2.6	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 202: 2ND - REAR EXT. WALL @ BED 2 - W.I.C.

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	5.0	FT.
WALL LENGTH, L	21.0	FT.	QUALIFYING WALL LENGTH, L	15.0	FT.

SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
1800	LBS	<	5037	LBS

SHEARWALL ASSEMBLY SPECIFICATION

P1 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"D.C. PANEL EDGES & 12"D.C. PANEL FIELD - EDGES BLOCKED
ADEQUATE

OVERTURNING EVALUATION:

RESISTIVE DL	151	PLF	OVERTURNING MOMENT	16.3	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	37.5	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 203: 2ND - SIDE EXT. WALL @ BED 3

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	7.6	FT.	QUALIFYING WALL LENGTH, L	7.6	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	500	LBS	<	ALLOWABLE SHEARWALL CAPACITY	2562	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	134	PLF	OVERTURNING MOMENT	4.5	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	6.3	K-FT	HOLD DOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 204: 2ND - SIDE EXT. WALL @ BATH 2

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	6.5	FT.	QUALIFYING WALL LENGTH, L	6.5	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	640	LBS	<	ALLOWABLE SHEARWALL CAPACITY	2169	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	266	PLF	OVERTURNING MOMENT	5.8	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	7.3	K-FT	HOLD DOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 205: 2ND - SIDE EXT. WALL @ HALL

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	4.3	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	16.0	FT.	QUALIFYING WALL LENGTH, L	4.9	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	640	LBS	<	ALLOWABLE SHEARWALL CAPACITY	1652	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	266	PLF	OVERTURNING MOMENT	5.8	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	36.6	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 206: 2ND - SIDE EXT. WALL @ BED 2 - UTILITY

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	5.0	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	16.4	FT.	QUALIFYING WALL LENGTH, L	8.9	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	1100	LBS	<	ALLOWABLE SHEARWALL CAPACITY	2971	LBS
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SHEARWALL ASSEMBLY SPECIFICATION

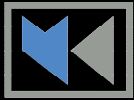
P1 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - EDGES BLOCKED
ADEQUATE

OVERTURNING EVALUATION:

RESISTIVE DL	169	PLF	OVERTURNING MOMENT	10.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	200	LBS	RESISTIVE MOMENT	23.4	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 207: 2ND - SIDE EXT. WALL @ PRIMARY SUITE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	12.6	FT.	QUALIFYING WALL LENGTH, L	12.6	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
720	LBS	<	4234	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	355	PLF	OVERTURNING MOMENT	6.5	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	29.9	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 208: 2ND - SIDE EXT. WALL @ W.I.C. - BATH 3

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	8.5	FT.	QUALIFYING WALL LENGTH, L	8.5	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
500	LBS	<	2854	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	136	PLF	OVERTURNING MOMENT	4.5	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	7.5	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 209: 2ND - SIDE EXT. WALL @ PRIMARY SUITE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	
WALL LENGTH, L	5.0	FT.	QUALIFYING WALL LENGTH, L	5.0	FT.	SHEARWALL ASSEMBLY P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
140	LBS	< 1662
		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	181	PLF	OVERTURNING MOMENT	1.3	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	3.8	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 210: 2ND - SIDE EXT. WALL @ PRIMARY BATH - W.I.C.

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	4.5	FT.	
WALL LENGTH, L	24.3	FT.	QUALIFYING WALL LENGTH, L	16.8	FT.	SHEARWALL ASSEMBLY P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1390	LBS	< 5628
		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	292	PLF	OVERTURNING MOMENT	12.6	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	200	LBS	RESISTIVE MOMENT	82.0	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 211: 2ND - SIDE EXT. WALL @ W.I.C.

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	1.5	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	13.7	FT.	QUALIFYING WALL LENGTH, L	6.2	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	640	LBS	<	ALLOWABLE SHEARWALL CAPACITY	2072	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	147	PLF	OVERTURNING MOMENT	5.8	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	17.3	K-FT	HOLD DOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL : BASEMENT - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H	0.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	PO
WALL LENGTH, L	0.0	FT.	QUALIFYING WALL LENGTH, L	0.0	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	0	LBS	###	ALLOWABLE SHEARWALL CAPACITY	#DIV/0!	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	0	PLF	OVERTURNING MOMENT	#DIV/0!	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	0	LBS	RESISTIVE MOMENT	0.0	K-FT	HOLD DOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 101: 1ST - FRONT EXT. WALL @ OFFICE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.
WALL LENGTH, L	4.4	FT.	QUALIFYING WALL LENGTH, L	4.4	FT.

SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
200	LBS	<	1440	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	318	PLF	OVERTURNING MOMENT	2.9	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	6.0	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 102: 1ST - REAR EXT. WALL @ PWDR

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	5.0	FT.
WALL LENGTH, L	8.6	FT.	QUALIFYING WALL LENGTH, L	6.5	FT.

SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
1100	LBS	<	2193	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	283	PLF	OVERTURNING MOMENT	11.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	15.5	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 103: 1ST - REAR EXT. WALL @ GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	21.0	FT.	QUALIFYING WALL LENGTH, L	21.0	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
4500	LBS	<	7052	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	271	PLF	OVERTURNING MOMENT	61.3	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	68.9	K-FT	HOLDOWN CAPACITY	4935	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 104: 1ST - SIDE EXT. WALL @ OFFICE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	7.1	FT.	QUALIFYING WALL LENGTH, L	7.1	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
900	LBS	<	2391	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	254	PLF	OVERTURNING MOMENT	9.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	600	LBS	RESISTIVE MOMENT	9.6	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 105: 1ST - SIDE EXT. WALL @ OFFICE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.
WALL LENGTH, L	4.1	FT.	QUALIFYING WALL LENGTH, L	4.1	FT.

SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
200	LBS	<	1297	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	254	PLF	OVERTURNING MOMENT	2.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	4.9	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 106: 1ST - SIDE EXT. WALL @ W.I.C.

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	6.0	FT.
WALL LENGTH, L	9.3	FT.	QUALIFYING WALL LENGTH, L	5.3	FT.

SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
1900	LBS	<	3137	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	443	PLF	OVERTURNING MOMENT	27.4	K-FT	HOLD DOWN DESIGN LOAD	373	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	23.9	K-FT	HOLDOWN CAPACITY	4935	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL : BASEMENT - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H	0.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	P0
WALL LENGTH, L	0.0	FT.	QUALIFYING WALL LENGTH, L	0.0	FT.		

CAPACITY EVALUATION:

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

P0 - 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	0	PLF	OVERTURNING MOMENT	#DIV/0!	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	0	LBS	RESISTIVE MOMENT	0.0	K-FT	HOLD DOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 108: 1ST - SIDE EXT. WALL @ GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	8.5	FT.	QUALIFYING WALL LENGTH, L	8.5	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	1300	LBS	ALLOWABLE SHEARWALL CAPACITY	2854	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	392	PLF	OVERTURNING MOMENT	17.5	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	18.9	K-FT	HOLD DOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 109: 1ST - SIDE EXT. WALL @ DINING

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	7.0	FT.	SHEARWALL ASSEMBLY	P3
WALL LENGTH, L	14.0	FT.	QUALIFYING WALL LENGTH, L	4.0	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	1600	LBS	<	ALLOWABLE SHEARWALL CAPACITY	2048	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	451	PLF	OVERTURNING MOMENT	19.6	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	44.8	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 110: 1ST - SIDE EXT. WALL @ PANTRY

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	P3
WALL LENGTH, L	12.9	FT.	QUALIFYING WALL LENGTH, L	12.9	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	4300	LBS	<	ALLOWABLE SHEARWALL CAPACITY	8136	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	475	PLF	OVERTURNING MOMENT	43.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	44.9	K-FT	HOLDOWN CAPACITY	4935	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 111: 1ST - SIDE EXT. WALL @ PANTRY

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.		
WALL LENGTH, L	6.9	FT.	QUALIFYING WALL LENGTH, L	6.9	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
2800	LBS	<	4355	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	241	PLF	OVERTURNING MOMENT	28.0	K-FT	HOLD DOWN DESIGN LOAD	2943	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	7.7	K-FT	HOLDOWN CAPACITY	4935	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STD14RJ HOLDOWN

SHEARWALL 112: 1ST - FRONT INT. WALL @ GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.		
WALL LENGTH, L	15.8	FT.	QUALIFYING WALL LENGTH, L	15.8	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
1100	LBS	<	5306	LBS

SHEARWALL ASSEMBLY SPECIFICATION

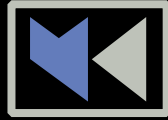
P1 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - EDGES BLOCKED
ADEQUATE

OVERTURNING EVALUATION:

RESISTIVE DL	275	PLF	OVERTURNING MOMENT	11.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	200	LBS	RESISTIVE MOMENT	33.7	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEAR WALL CALCULATIONS SEISMIC

MILESTONE NW

MERCER ISLAND - LOT 1

MERCER ISLAND, WA

PARAMETERS:

SINGLE FAMILY HOME

DESIGN WIND SPEED: 110 MPH

WIND EXPOSURE CATEGORY: B

SEISMIC DESIGN CATEGORY: D1

CODE & DESIGN STANDARD: 2021 IBC CH. 1609, ASCE 7-16 CH. 26-30

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

NICHOLAS MARTIGNETTI, P.E., PROJECT MANAGER

RYAN CHAN, E.I.T., STAFF ENGINEER



SEISMIC CALCULATION - ASCE 7-16

M+K PROJECT #: 203-24019

ENGINEER: RSC

SEISMIC DESIGN CATEGORY:

USER INPUTS:

SITE CLASS	D
SPECTRAL RESPONSE ACCELERATION 0.2 SEC, $S_{0.2}$	1.385
SPECTRAL RESPONSE ACCELERATION 1.0 SEC, S_1	0.483
OCCUPANCY CATEGORY	II

VARIABLES:

SITE COEFFICIENT, F_A	1.20
SITE COEFFICIENT, F_V	1.82

CALCULATED VALUES:

MAXIMUM SPECTRAL RESPONSE ACCELERATION, S_{MS}	1.662
MAXIMUM SPECTRAL RESPONSE ACCELERATION, S_{M1}	0.878
DESIGN SPECTRAL RESPONSE ACCELERATION, S_{DS}	1.108
DESIGN SPECTRAL RESPONSE ACCELERATION, S_{D1}	0.585
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	20

CALCULATED VALUES:

APPROXIMATE FUNDAMENTAL PERIOD, T_A	0.193
T_D	0.106
T_B	0.528
SPECTRAL RESPONSE ACC., S_A (G)	1.108

SITE CLASS ASSUMPTION

Yes	PER ASCE 7-16 SECTION 11.4.3 THE SITE CLASS MAY BE ASSUMED TO BE D
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EQUIVALENT LATERAL FORCE PROCEDURE

DEAD LOAD CALCULATION:

LEVEL	STORY HT. (FT.)	AREA (FT ²)	DEAD LOAD (PSF)	DL OF EXT WALL TRIB. TO LEVEL (KIPS)	TOTAL LEVEL DL
1	11.4	2074	15	12.1	43 K
2	9.1	1976	17	5.8	39 K
3	0.0	0	0	0.0	0 K
4	0.0	0	0	0.0	0 K
5	0.0	0	0	0.0	0 K
6	0.0	0	0	0.0	0 K
7	0.0	0	0	0.0	0 K
8	0.0	0	0	0.0	0 K
9	0.0	0	0	0.0	0 K
10	0.0	0	0	0.0	0 K
11	0.0	0	0	0.0	0 K
12	0.0	0	0	0.0	0 K
13	0.0	0	0	0.0	0 K
14	0.0	0	0	0.0	0 K
15	0.0	0	0	0.0	0 K

TOTAL DEAD LOAD OF STRUCTURE 83 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	0.170	0.170

BASE SHEARS:

ULTIMATE LOADS

x 0.7 =

ALLOWABLE LOADS

TRANSVERSE	LONGITUDINAL	TRANSVERSE	LONGITUDINAL
14 K	14 K	9.8 K	9.8 K

STORY SHEAR CALCULATION:

DISTRIBUTION EXPONENT, N 1.00

ULTIMATE LOADS

x 0.7 =

ALLOWABLE LOADS

LEVEL	VERT. DIST. FACTOR, D_{vh}	TRANSVERSE STORY SHEAR, F_x	LONGITUDINAL STORY SHEAR, F_x	TRANSVERSE STORY SHEAR, F_x	LONGITUDINAL STORY SHEAR, F_x	TRANSVERSE STORY SHEAR, F_x	LONGITUDINAL STORY SHEAR, F_x
1	0.379	5.3 K	5.3 K	3.7 K	9.8 K	3.7 K	9.8 K
2	0.621	8.7 K	8.7 K	6.1 K	6.1 K	6.1 K	6.1 K
3	0.000	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K
4	0.000	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K
5	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K
6	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K
7	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K
8	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K
9	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K
10	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K
11	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K
12	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K
13	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K
14	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K
15	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019

ENGINEER: RSC

SHEARWALL 201: 2ND - FRONT EXT. WALL @ BED 3

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	4.3	FT.	QUALIFYING WALL LENGTH, L	4.3	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
200	LBS	<	1029	LBS

SHEARWALL ASSEMBLY SPECIFICATION

P1 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"D.C. PANEL EDGES & 12"D.C. PANEL FIELD - EDGES BLOCKED
ADEQUATE

OVERTURNING EVALUATION:

RESISTIVE DL	125	PLF	OVERTURNING MOMENT	1.8	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	1.9	K-FT	HOLD DOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 202: 2ND - REAR EXT. WALL @ BED 2 - W.I.C.

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	5.0	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	21.0	FT.	QUALIFYING WALL LENGTH, L	15.0	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
3000	LBS	<	3598	LBS

SHEARWALL ASSEMBLY SPECIFICATION

P1 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"D.C. PANEL EDGES & 12"D.C. PANEL FIELD - EDGES BLOCKED
ADEQUATE

OVERTURNING EVALUATION:

RESISTIVE DL	151	PLF	OVERTURNING MOMENT	27.2	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	27.8	K-FT	HOLD DOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 203: 2ND - SIDE EXT. WALL @ BED 3

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	7.6	FT.	QUALIFYING WALL LENGTH, L	7.6	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	500	LBS	<	ALLOWABLE SHEARWALL CAPACITY	1830	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	134	PLF	OVERTURNING MOMENT	4.5	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	4.6	K-FT	HOLD DOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 204: 2ND - SIDE EXT. WALL @ BATH 2

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	6.5	FT.	QUALIFYING WALL LENGTH, L	6.5	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	640	LBS	<	ALLOWABLE SHEARWALL CAPACITY	1549	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	266	PLF	OVERTURNING MOMENT	5.8	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	500	LBS	RESISTIVE MOMENT	5.9	K-FT	HOLD DOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 205: 2ND - SIDE EXT. WALL @ HALL

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	4.3	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	16.0	FT.	QUALIFYING WALL LENGTH, L	4.9	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	640	LBS	<	ALLOWABLE SHEARWALL CAPACITY	1180	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	266	PLF	OVERTURNING MOMENT	5.8	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	27.1	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 206: 2ND - SIDE EXT. WALL @ BED 2 - UTILITY

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	5.0	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	16.4	FT.	QUALIFYING WALL LENGTH, L	8.9	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	1900	LBS	<	ALLOWABLE SHEARWALL CAPACITY	2122	LBS
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SHEARWALL ASSEMBLY SPECIFICATION

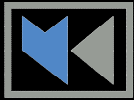
P1 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - EDGES BLOCKED
ADEQUATE

OVERTURNING EVALUATION:

RESISTIVE DL	169	PLF	OVERTURNING MOMENT	17.3	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	200	LBS	RESISTIVE MOMENT	17.4	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 207: 2ND - SIDE EXT. WALL @ PRIMARY SUITE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	12.6	FT.	QUALIFYING WALL LENGTH, L	12.6	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	1800	LBS	<	ALLOWABLE SHEARWALL CAPACITY	3025	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	355	PLF	OVERTURNING MOMENT	16.3	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	22.2	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 208: 2ND - SIDE EXT. WALL @ W.I.C. - BATH 3

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	8.5	FT.	QUALIFYING WALL LENGTH, L	8.5	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	600	LBS	<	ALLOWABLE SHEARWALL CAPACITY	2039	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	136	PLF	OVERTURNING MOMENT	5.4	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	5.5	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 209: 2ND - SIDE EXT. WALL @ PRIMARY SUITE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	0.0	FT.
WALL LENGTH, L	5.0	FT.	QUALIFYING WALL LENGTH, L	5.0	FT.

SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
300	LBS	<	1187	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	181	PLF	OVERTURNING MOMENT	2.7	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	2.8	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 210: 2ND - SIDE EXT. WALL @ PRIMARY BATH - W.I.C.

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	4.5	FT.
WALL LENGTH, L	24.3	FT.	QUALIFYING WALL LENGTH, L	16.8	FT.

SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
3000	LBS	<	4020	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	292	PLF	OVERTURNING MOMENT	27.2	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	200	LBS	RESISTIVE MOMENT	60.8	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 211: 2ND - SIDE EXT. WALL @ W.I.C.

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H _c	1.5	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	13.7	FT.	QUALIFYING WALL LENGTH, L	6.2	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	900	LBS	<	ALLOWABLE SHEARWALL CAPACITY	1480	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	147	PLF	OVERTURNING MOMENT	8.2	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	12.8	K-FT	HOLD DOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL : BASEMENT - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H	0.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	PO
WALL LENGTH, L	0.0	FT.	QUALIFYING WALL LENGTH, L	0.0	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	0	LBS	###	ALLOWABLE SHEARWALL CAPACITY	#DIV/0!	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	0	PLF	OVERTURNING MOMENT	#DIV/0!	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	0	LBS	RESISTIVE MOMENT	0.0	K-FT	HOLD DOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 101: 1ST - FRONT EXT. WALL @ OFFICE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.
WALL LENGTH, L	4.4	FT.	QUALIFYING WALL LENGTH, L	4.4	FT.

SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	200	LBS	<	ALLOWABLE SHEARWALL CAPACITY	1028	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	318	PLF	OVERTURNING MOMENT	3.9	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	4.4	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 102: 1ST - REAR EXT. WALL @ PWDR

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	5.0	FT.
WALL LENGTH, L	8.6	FT.	QUALIFYING WALL LENGTH, L	6.5	FT.

SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	1100	LBS	<	ALLOWABLE SHEARWALL CAPACITY	1566	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	283	PLF	OVERTURNING MOMENT	11.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	11.5	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 103: 1ST - REAR EXT. WALL @ GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	21.0	FT.	QUALIFYING WALL LENGTH, L	21.0	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
3900	LBS	<	5037	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	271	PLF	OVERTURNING MOMENT	66.2	K-FT	HOLD DOWN DESIGN LOAD	722	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	51.1	K-FT	HOLDOWN CAPACITY	3695	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STD14RJ HOLDOWN

SHEARWALL 104: 1ST - SIDE EXT. WALL @ OFFICE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	P1
WALL LENGTH, L	7.1	FT.	QUALIFYING WALL LENGTH, L	7.1	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
700	LBS	<	1708	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	254	PLF	OVERTURNING MOMENT	7.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	600	LBS	RESISTIVE MOMENT	7.1	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 105: 1ST - SIDE EXT. WALL @ OFFICE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.
WALL LENGTH, L	4.1	FT.	QUALIFYING WALL LENGTH, L	4.1	FT.

SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
300	LBS	<	926	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	254	PLF	OVERTURNING MOMENT	3.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	3.6	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 106: 1ST - SIDE EXT. WALL @ W.I.C.

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	6.0	FT.
WALL LENGTH, L	9.3	FT.	QUALIFYING WALL LENGTH, L	5.3	FT.

SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
1800	LBS	<	2241	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	443	PLF	OVERTURNING MOMENT	26.4	K-FT	HOLD DOWN DESIGN LOAD	663	LBS
DL AT ENDS OF WALL	1200	LBS	RESISTIVE MOMENT	20.2	K-FT	HOLDOWN CAPACITY	3695	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL : BASEMENT - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H	0.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	
WALL LENGTH, L	0.0	FT.	QUALIFYING WALL LENGTH, L	0.0	FT.	SHEARWALL ASSEMBLY P0

CAPACITY EVALUATION:

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

SHEARWALL ASSEMBLY SPECIFICATION

P0 - 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	0	PLF	OVERTURNING MOMENT	0.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	0	LBS	RESISTIVE MOMENT	0.0	K-FT	HOLD DOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 108: 1ST - SIDE EXT. WALL @ GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	
WALL LENGTH, L	8.5	FT.	QUALIFYING WALL LENGTH, L	8.5	FT.	SHEARWALL ASSEMBLY P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	800	LBS	ALLOWABLE SHEARWALL CAPACITY	2039	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	392	PLF	OVERTURNING MOMENT	13.4	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	14.0	K-FT	HOLD DOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 109: 1ST - SIDE EXT. WALL @ DINING

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	7.0	FT.	SHEARWALL ASSEMBLY	P3
WALL LENGTH, L	14.0	FT.	QUALIFYING WALL LENGTH, L	4.0	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	1400	LBS	<	ALLOWABLE SHEARWALL CAPACITY	1463	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	451	PLF	OVERTURNING MOMENT	21.7	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	33.2	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 110: 1ST - SIDE EXT. WALL @ PANTRY

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.	SHEARWALL ASSEMBLY	P3
WALL LENGTH, L	12.9	FT.	QUALIFYING WALL LENGTH, L	12.9	FT.		

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL	5300	LBS	<	ALLOWABLE SHEARWALL CAPACITY	5811	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	475	PLF	OVERTURNING MOMENT	53.0	K-FT	HOLD DOWN DESIGN LOAD	1525	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	33.3	K-FT	HOLDOWN CAPACITY	3695	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN



SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24019
ENGINEER: RSC

SHEARWALL 111: 1ST - SIDE EXT. WALL @ PANTRY

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.		
WALL LENGTH, L	6.9	FT.	QUALIFYING WALL LENGTH, L	6.9	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
2700	LBS	<	3110	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	241	PLF	OVERTURNING MOMENT	27.0	K-FT	HOLD DOWN DESIGN LOAD	3085	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	5.7	K-FT	HOLDOWN CAPACITY	3695	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STD14RJ HOLDOWN

SHEARWALL 112: 1ST - FRONT INT. WALL @ GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H _c	0.0	FT.		
WALL LENGTH, L	15.8	FT.	QUALIFYING WALL LENGTH, L	15.8	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY		
2000	LBS	<	3790	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	275	PLF	OVERTURNING MOMENT	20.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	200	LBS	RESISTIVE MOMENT	25.0	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED