



MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

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

CALCULATION PACKAGE

Revised: November 5, 2025

JayMarc Homes
8446 SE 37th St
Dubey Residence

Mercer Island, Washington

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

Prepared By:

Adam J. Cervantes, E.I.T.

Staff Engineer

Richard J. Zabel, P.E.

Project Manager + Director of Engineering



Signature, Seal & Date




MULHERN-KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: 8434 SE 39th St
MERGER ISLAND, WA
M&K PROJECT #: 154-23001
ENGINEER: AJG
DATE: 03-MAY-23

BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: TYP EXT HDR B1

PARAMETERS:
 L = 9 FT
 W = 0.336 KLF
 P =  K

*D₁ = 169
L = 70
S = 50*

ANALYSIS:
 R_{MAX} = 1.51 K V₀ = K < V_{ALL} = 3.89 K ADEQUATE
 M_{MAX} = 3.4 K-FT < M_{ALL} = 4.49 K-FT ADEQUATE
 Δ_{TL} = 0.134 IN. L/805 < L/240 ADEQUATE

4 x 10 DF-L # 2

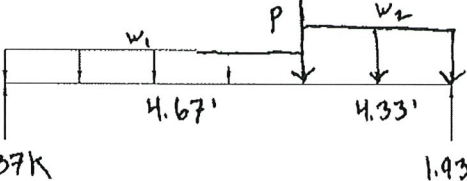
BEAM DESCRIPTION: HDR @ PRIMARY REAR WINDOW - ROOF B2

PARAMETERS:
 L = 9 FT
 W₁ = 0.108 KLF W₂ = 0.336
 P = 1.34 K (G.T.)

*D₁ = 44
S₁ = 64*

ANALYSIS:
 R_{MAX} = 1.93 K V₀ = K < V_{ALL} = 6.81 K ADEQUATE
 M_{MAX} = 5.22 K-FT < M_{ALL} = 6.94 K-FT C_D = 1.15 ADEQUATE
 Δ_{TL} = 0.149 IN. L/725 < L/240 ADEQUATE

6 x 10 DF-L # 2



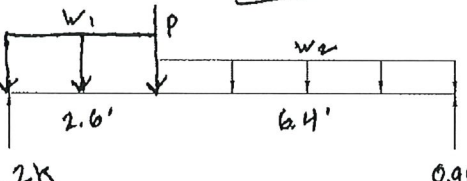
BEAM DESCRIPTION: HDR @ BED 2 REAR WINDOW - ROOF B3

PARAMETERS:
 L = 9 FT
 W₁ = 0.108 KLF W₂ = 0.092
 P = 1.56 K (G.T.)

*D₁ = 165
S₁ = 243*

ANALYSIS:
 R_{MAX} = 2.23 K V₀ = K < V_{ALL} = 4.47 K ADEQUATE
 M_{MAX} = 4.41 K-FT < M_{ALL} = 5.17 K-FT C_D = 1.15 ADEQUATE
 Δ_{TL} = 0.174 IN. L/621 < L/240 ADEQUATE

4 x 10 DF-L # 2





MULHERN-KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: 8434 SE 39th St
MERGER ISLAND, WA
M&K PROJECT #: 154-23001
ENGINEER: AJG
DATE: 03-MAY-23

BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: HDR @ W.I.C. FRONT WINDOW - ROOF B4

PARAMETERS:

L = 9 FT
 $D_1 = 52$
 $S_1 = 76$
 $w_1 = 0.128$ KLF $w_2 = 0.452$
 $P = 1.13$ K (HEP G.T.)

ANALYSIS:

$D_2 = 183$
 $S_2 = 269$
 $R_{MAX} = 2.25$ K $V_D =$ K $< V_{ALL} = 6.81$ K ADEQUATE
 $M_{MAX} = 5.60$ K-FT $< M_{ALL} = 6.94$ K-FT $C_D = 1.15$ ADEQUATE
 $\Delta_{TL} = 0.160$ IN. $L / 675 < L / 240$ ADEQUATE

6 x 10 PF-L # 2

BEAM DESCRIPTION: HDR @ STAIR SIDE WINDOW - ROOF B5

PARAMETERS:

L = 9 FT
 $D_1 = 35$
 $S_1 = 51$
 $w_1 = 0.086$ KLF $w_2 = 0.207$
 $P = 0.27$ K (G.T.)

ANALYSIS:

$D_2 = 84$
 $S_2 = 123$
 $R_{MAX} = 0.96$ K $V_D =$ K $< V_{ALL} = 4.47$ K ADEQUATE
 $M_{MAX} = 2.23$ K-FT $< M_{ALL} = 5.17$ K-FT $C_D = 1.15$ ADEQUATE
 $\Delta_{TL} = 0.088$ IN. $L / 999 < L / 240$ ADEQUATE

4 x 10 DF-L # 2

BEAM DESCRIPTION: HDR @ COVERED DECK SGD - ROOF B6

PARAMETERS:

L = 9.17 FT
 $D_1 = 57$
 $S_1 = 84$
 $w = 0.141$ KLF $w_2 = 0.336$
 $P = 1.34$ K (G.T.)

ANALYSIS:

$D_2 = 136$
 $S_2 = 200$
 $R_{MAX} = 2.37$ K $V_D =$ K $< V_{ALL} = 4.47$ K ADEQUATE
 $M_{MAX} = 4.51$ K-FT $< M_{ALL} = 5.17$ K-FT $C_D = 1.15$ ADEQUATE
 $\Delta_{TL} = 0.185$ IN. $L / 595 < L / 240$ ADEQUATE

4 x 10 DF-L # 2



MULHERN + KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: 8434 SE 39th St
MERGER ISLAND, WA
M&K PROJECT #: 154-23001
ENGINEER: AJO
DATE: 03-MAY-23

BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: HDR @ GARAGE REAR WINDOW - UPPER B7

PARAMETERS:
 L = 9 FT
 $D_1 = 217$
 $L_1 = 233$
 $w_1 = 0.392$ KLF $w_2 = 0.678$
 P = 1.93 K (B2)

ANALYSIS:
 $D_2 = 353$
 $L_2 = 233$
 $S_2 = 200$
 $R_{MAX} = 3.57$ K $V_D =$ K $< V_{ALL} = 8.24$ K ADEQUATE
 $M_{MAX} = 7.92$ K-FT $< M_{ALL} = 10.16$ K-FT $C_D = 1.15$ ADEQUATE
 $\Delta_{TL} = 0.127$ IN. $L/850 < L/240$ ADEQUATE

6 x 12 DF-L # 2

BEAM DESCRIPTION: FLUSH BM. @ PRIMARY COVERED DECK - UPPER B8

PARAMETERS:
 L = 5.5 FT
 $D = 229$
 $S = 153$
 W = 0.382 KLF
 P = / K

ANALYSIS:
 $R_{MAX} = 1.05$ K $V_D =$ K $< V_{ALL} = 12.91$ K ADEQUATE
 $M_{MAX} = 1.44$ K-FT $< M_{ALL} = 27.84$ K-FT $C_D = 1.15$ ADEQUATE
 $\Delta_{TL} = 0.002$ IN. $L/999+ < L/240$ ADEQUATE

5 1/4" x 11 1/4" LVL

BEAM DESCRIPTION: TYP. DECK JOIST @ CURD. DECK - UPPER B9

PARAMETERS:
 L = 5.5 FT
 $D = 33$
 $L = 80$
 W = / KLF
 P = / K

ANALYSIS:
 $R_{MAX} = 0.31$ K $V_D =$ K $< V_{ALL} = 1.39$ K ADEQUATE
 $M_{MAX} = 0.43$ K-FT $< M_{ALL} = 1.92$ K-FT $C_D = 1.15$ ADEQUATE
 $\Delta_{TL} = 0.018$ IN. $L/999+ < L/240$ ADEQUATE

2 x 12 HF # 2 @ 16" o.c. (9 1/2" MIN. DEPTH)



MULHERN-KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: 8434 SE 39th St
MERDER ISLAND, WA
M&K PROJECT #: 154-23001
ENGINEER: AJG
DATE: 03-MAY-23

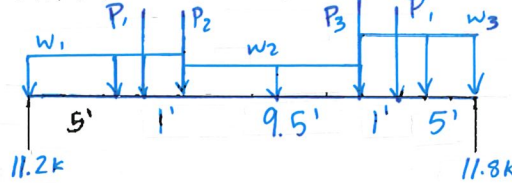
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: FLUSH BM. @ GARAGE - UPPER B10

PARAMETERS:

L = 21.5 FT
W₁ = 0.76 KLF
P₁ = 1.05 K

W₂ = 0.69
W₃ = 0.95
P₂ = 2.4
P₃ = 1.7



ANALYSIS:

R_{MAX} = 11.8 K V_D = K < V_{ALL} = 25.14 K
M_{MAX} = 61.1 K-FT < M_{ALL} = 99.3 K-FT C_D = 1.15, C_V = 0.93
Δ_{TL} = 0.591 IN. L/477 < L/240

ADEQUATE
 ADEQUATE
 ADEQUATE

5 1/2 x 22 1/2 GLB

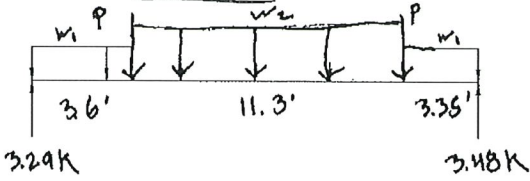
BEAM DESCRIPTION: GARAGE DOOR HDR - UPPER B11

PARAMETERS:

P₁ = 47
L₁ = 83

L = 18.25 FT
W₁ = 0.109 KLF
P = 1.05 K

W₂ = 0.364



ANALYSIS:

D₂ = 203
L₂ = 165
S₂ = 50

R_{MAX} = 3.48 K V_D = K < V_{ALL} = 16.8 K
M_{MAX} = 16.3 K-FT < M_{ALL} = 46.7 K-FT C_D = 1.15, C_V = 0.985
Δ_{TL} = 0.351 IN. L/624 < L/240

ADEQUATE
 ADEQUATE
 ADEQUATE

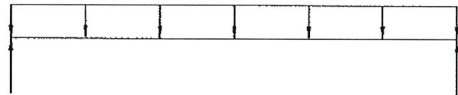
5 1/2" x 15" GLB

BEAM DESCRIPTION: FLUSH BM. @ STAIR OPENING - UPPER B12

PARAMETERS:

D = 22
L = 44

L = 8.95 FT
W = 0.066 KLF
P = K



ANALYSIS:

R_{MAX} = 0.30 K V_D = K < V_{ALL} = 11.1 K
M_{MAX} = 0.66 K-FT < M_{ALL} = 37.8 K-FT
Δ_{TL} = 0.003 IN. L/999+ < L/240

ADEQUATE
 ADEQUATE
 ADEQUATE

3 1/2" x 18" GLB



MULHERN-KULP
RESIDENTIAL STRUCTURAL ENGINEERING

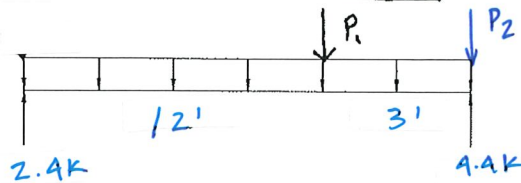
PROJECT NAME: 8434 SE 39th St
MERGER ISLAND, WA
M&K PROJECT #: 154-23001
ENGINEER: AJG
DATE: 03-MAY-23

BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: FLUSH BM. @ STAIR SIDE WALL - UPPER B13

PARAMETERS:

L = FT
W = KLF
P₁ = K (B12)



ANALYSIS:

R_{MAX} = K V₀ = K < V_{ALL} = K
M_{MAX} = K-FT < M_{ALL} = K-FT C_D = 1.15
Δ_{TL} = IN. L / < L/240

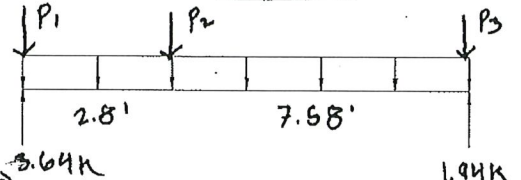
- ADEQUATE
- ADEQUATE
- ADEQUATE

5 1/2" x 18" GLB

BEAM DESCRIPTION: FLUSH BM. @ STAIR SIDE - UPPER B14

PARAMETERS:

L = FT
W = KLF
P₁ = K (G.T.)



ANALYSIS:

R_{MAX} = K V₀ = K < V_{ALL} = K
M_{MAX} = K-FT < M_{ALL} = K-FT C_D = 1.15
Δ_{TL} = IN. L / < L/240

- ADEQUATE
- ADEQUATE
- ADEQUATE

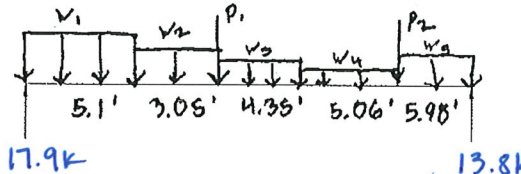
5 1/2" x 18" GLB

BEAM DESCRIPTION: FLUSH BM @ ENTRY, GRT. RM. - UPPER B15

PARAMETERS:

L = FT
W = KLF
P₁ = K (B13)

SEE
ENERCALC
OUTPUT



ANALYSIS:

R_{MAX} = K V₀ = K < V_{ALL} = K
M_{MAX} = K-FT < M_{ALL} = K-FT
Δ_{TL} = IN. L / < L/240

- ADEQUATE
- ADEQUATE
- ADEQUATE

W16x40



MULHERN-KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: 8434 SE 39th St
MERGER ISLAND, WA
M&K PROJECT #: 154-23001
ENGINEER: AJB
DATE: 03-MAY-23


BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: TYP LANDING JOIST - UPPER B16

PARAMETERS:

L = FT
 W = KLF
 P = K

*D=13
L=40*



ANALYSIS:

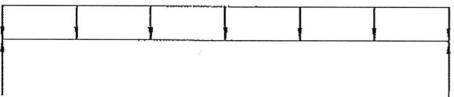
$R_{MAX} =$ K $V_D =$ K $< V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT $< M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $L/999+$ $< L/240$ ADEQUATE

BEAM DESCRIPTION: FLUSH BM. @ STAIR LANDING - UPPER B17

PARAMETERS:

L = FT
 W = KLF
 P = K

*D=25
L=75*



ANALYSIS:

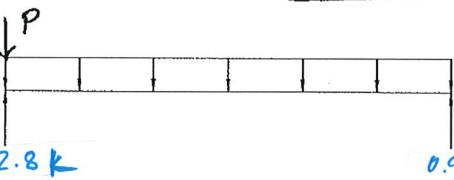
$R_{MAX} =$ K $V_D =$ K $< V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT $< M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $L/999+$ $< L/240$ ADEQUATE

BEAM DESCRIPTION: FLUSH BM. @ JUNIOR SUITE - UPPER B18

PARAMETERS:

L = FT
 W = KLF
 P = K

*D=25
L=75*



ANALYSIS:

$R_{MAX} =$ K $V_D =$ K $< V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT $< M_{ALL} =$ K-FT $C_D = 1.15$ ADEQUATE
 $\Delta_{TL} =$ IN. $L/999+$ $< L/240$ ADEQUATE



MULHERN-KULP
RESIDENTIAL STRUCTURAL ENGINEERING

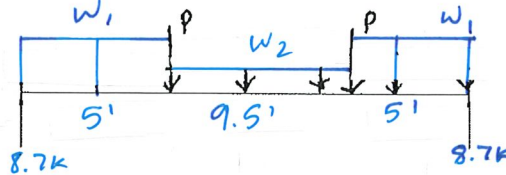
PROJECT NAME: 8434 SE 39th St
MERGER ISLAND, WA
M&K PROJECT #: 154-23001
ENGINEER: AJG
DATE: 03-MAY-23

BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: FLUSH DM. @ JUNIOR SUITE - UPPER B19

PARAMETERS:

L = FT
W₁ = KLF $w_2 = 0.523$
P = K



ANALYSIS:

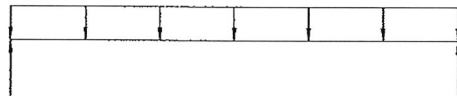
R_{MAX} = K V_D = K < V_{ALL} = K ADEQUATE
M_{MAX} = K-FT < M_{ALL} = K-FT ADEQUATE
Δ_{TL} = IN. L/ < L/240 ADEQUATE

5 1/2" x 18" GLB

BEAM DESCRIPTION: DROPPED DM. @ ENTRY LOW ROOF - UPPER B20

PARAMETERS:

P = 132
S = 144
L = FT
W = KLF
P = K



ANALYSIS:

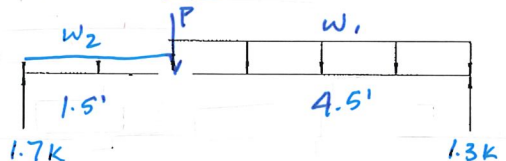
R_{MAX} = K V_D = K < V_{ALL} = K ADEQUATE
M_{MAX} = K-FT < M_{ALL} = K-FT C_D = 1.15 ADEQUATE
Δ_{TL} = IN. L/ < L/240 ADEQUATE

4x6 DF-L # 2

BEAM DESCRIPTION: BATH 2 EXT HDR - ROOF B21

PARAMETERS:

L = FT
W₁ = KLF $w_2 = 0.1$
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

4x10



MULHERN-KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: 8434 SE 39th St
MERGER ISLAND, WA
M&K PROJECT #: 154-23001
ENGINEER: AJO
DATE: 08-MAY-23

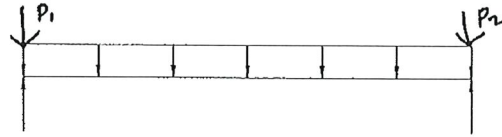
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: WINDOW HPR @ DINING - UPPER B22

D=242
L=285

PARAMETERS:

L = 9 FT
W = 0.927 KLF
P₁ = 2.2K K (03)



ANALYSIS:

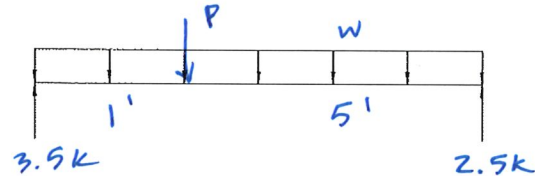
P₂ = 0.98 (03)
R_{MAX} = 4.57 K V_D = [] K < V_{ALL} = 5.92 K ADEQUATE
M_{MAX} = 5.34 K-FT < M_{ALL} = 6.03 K-FT ADEQUATE
Δ_{TL} = 0.152 IN. L/711 < L/240 ADEQUATE

6 x 10 DF-L # 2

BEAM DESCRIPTION: WNDW HPR @ KITCHEN - UPPER B23

PARAMETERS:

L = 6 FT
W = 0.762 KLF
P = 1.5 K



ANALYSIS:

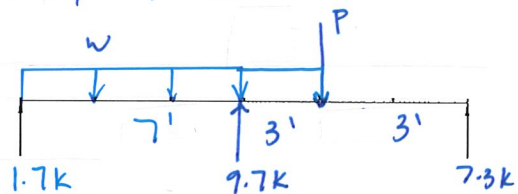
R_{MAX} = 3.5 K V_D = [] K < V_{ALL} = 3.89 K ADEQUATE
M_{MAX} = 3.3 K-FT < M_{ALL} = 4.49 K-FT ADEQUATE
Δ_{TL} = 0.098 IN. L/999 < L/240 ADEQUATE

4x10

BEAM DESCRIPTION: FLUSH BM @ STUDY - MAIN B24

PARAMETERS:

L = 13 FT
W = 0.48 KLF
P = 13.8 K



ANALYSIS:

R_{MAX} = 9.7 K V_D = 8.0 K < V_{ALL} = 20.11 K ADEQUATE
M_{MAX} = 21.9 K-FT < M_{ALL} = 68.31 K-FT ADEQUATE
Δ_{TL} = 0.022 IN. L/999 < L/240 ADEQUATE

5 1/2 x 8 GLB



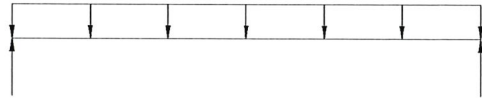
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: 1ST FLR FRMG - FLUSH BM @ STAIR LANDING

B25

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

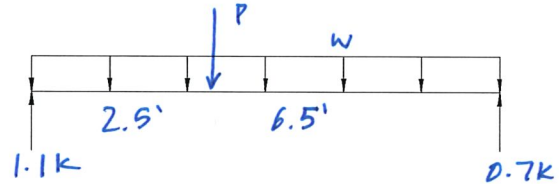
$R_{MAX} =$ K $V_D =$ K < $V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT < $M_{ALL} =$ K-FT ($C_D=1.0$) ADEQUATE
 $\Delta_{TL} =$ IN. $L/$ < $L/240$ ADEQUATE

BEAM DESCRIPTION: 1ST FLR FRMG - FLUSH BM @ STAIRS

B26

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

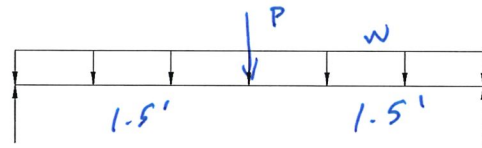
$R_{MAX} =$ K $V_D =$ K < $V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT < $M_{ALL} =$ K-FT ($C_D=1.0$) ADEQUATE
 $\Delta_{TL} =$ IN. $L/$ < $L/240$ ADEQUATE

BEAM DESCRIPTION: FLR FRMG - WORST CASE INT HDR

B27

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 ($C_D=1.0$) ADEQUATE
 $\Delta_{TL} =$ IN. $L/$ < $L/240$ ADEQUATE



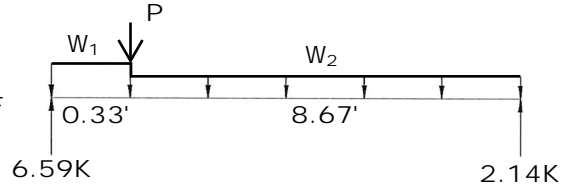
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: 1ST FLR FRMG - EXT. WINDOW HDR @ STUDY

B28

PARAMETERS:

L = 9 FT
W₁ = 1.12 KLF
W₂ = 0.438 KLF
P = 4.57 K



ANALYSIS:

R_{MAX} = 6.59 K V_D = 3.66 K < V_{ALL} = 5.92 K ADEQUATE
M_{MAX} = 5.24 K-FT < M_{ALL} = 6.03 K-FT (C_D=1.0) ADEQUATE
Δ_{TL} = 0.150 IN. L/720 < L/240 ADEQUATE

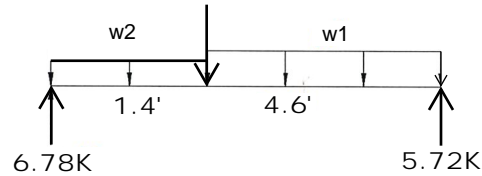
6x10 DF-L #2

BEAM DESCRIPTION: 1ST FLR FRMG - EXT WNDW HDR @ BED 3 / ADU

B29

PARAMETERS:

L = 6 FT
W₁ = 1.7 KLF W₂=1.2
P = 3.0 K



ANALYSIS:

R_{MAX} = 6.78 K V_D = K < V_{ALL} = 8.38 K ADEQUATE
M_{MAX} = 9.62 K-FT < M_{ALL} = 11.9 K-FT (C_D=1.15) ADEQUATE
Δ_{TL} = 0.179 IN. L/402 < L/240 ADEQUATE

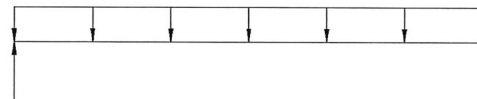
5 1/2" x 7 1/2" GLB

BEAM DESCRIPTION: 2ND FLR FRMG - DINING SGD HDR

B30

PARAMETERS:

L = 12.5 FT
W = 0.3 KLF
P = ✓ K



ANALYSIS:

R_{MAX} = 1.9 K V_D = K < V_{ALL} = 8.24 K ADEQUATE
M_{MAX} = 5.9 K-FT < M_{ALL} = 10.16 K-FT (C_D=1.15) ADEQUATE
Δ_{TL} = 0.193 IN. L/819 < L/240 ADEQUATE

6 x 12



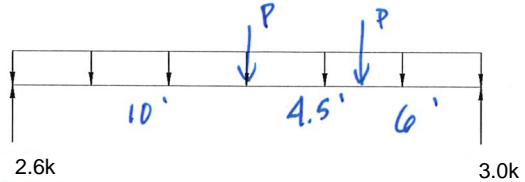
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: 1ST FLR FRMG - FLUSH BM @ STAIR LANDING

B31

PARAMETERS:

L = 20.5 FT
W = 0.173 KLF
P = 1.0 K



ANALYSIS:

$R_{MAX} = 3.0$ K $V_D =$ [] K < $V_{ALL} = 17.5$ K ADEQUATE
 $M_{MAX} = 17.35$ K-FT < $M_{ALL} = 56.8$ K-FT ($C_D=1.0$) ADEQUATE
 $\Delta_{TL} = 0.273$ IN. $L/902 < L/240$ ADEQUATE

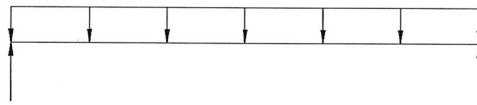
5 1/2 x 18 GLB

BEAM DESCRIPTION: TYP. DROPPED BM. - CRAWL

B32

PARAMETERS:

L = 6.4 FT
W = 0.389 KLF
P = - K



ANALYSIS:

$R_{MAX} = 1.24$ K $V_D =$ [] K < $V_{ALL} = 3.89$ K ADEQUATE
 $M_{MAX} = 1.99$ K-FT < $M_{ALL} = 4.49$ K-FT ($C_D=1.0$) ADEQUATE
 $\Delta_{TL} = 0.040$ IN. $L/999+ < L/240$ ADEQUATE

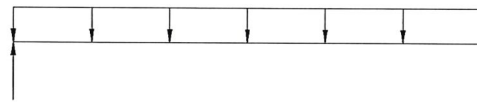
4x10 DF-L #2

BEAM DESCRIPTION:

B33

PARAMETERS:

L = [] FT
W = [] KLF
P = [] K



ANALYSIS:

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

[]

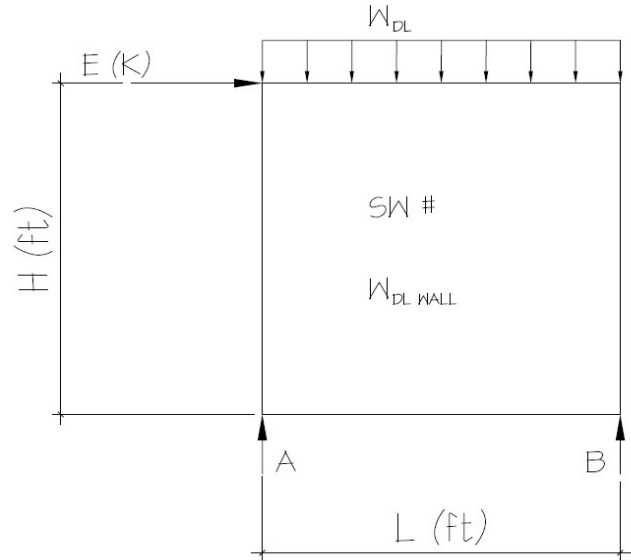


OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #: 302

PARAMETERS:

- L = 17.0 FT
- H = 9.1 FT
- E = 1.60 K
- W_{DLWALL} = 0.10 KLF
- W_{DL} = 0.108 KLF
- Ω_0 = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE G)
- SDS = 1.126



ANALYSIS:

$$E_{MH} = \Omega_0 * E = 4.00 \text{ K} \quad E_v = 0.2 * SDS * DL = 0.796 \text{ K}$$

$$E_M = E_{MH} + E_v = 4.796 \text{ K}$$

$$E_M = E_{MH} - E_v = 3.204 \text{ K}$$

$$E_M (\text{MAX}) = \sum M_A = 0 = 4.80(9.1) + 0.208(17)(8.5) - R_B(17) \quad R_B = 1.8DL + 2.6E$$

$$R_A = 1.8DL - 2.6E$$

$$E_M (\text{MIN}) = \sum M_A = 0 = 3.20(9.1) + 0.208(17)(8.5) - R_B(17) \quad R_B = 1.8DL + 1.7E$$

$$R_A = 1.8DL - 1.7E$$

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: OVERSTRENGTH.ec6

LIC# : KW-06017913, Build:20.23.2.14

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: B15 - 2ND FLR FRMG - FLUSH BM @ ENTRY / GREAT ROOM

CODE REFERENCES

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

Load Combination Set : ASCE 7-16

Material Properties

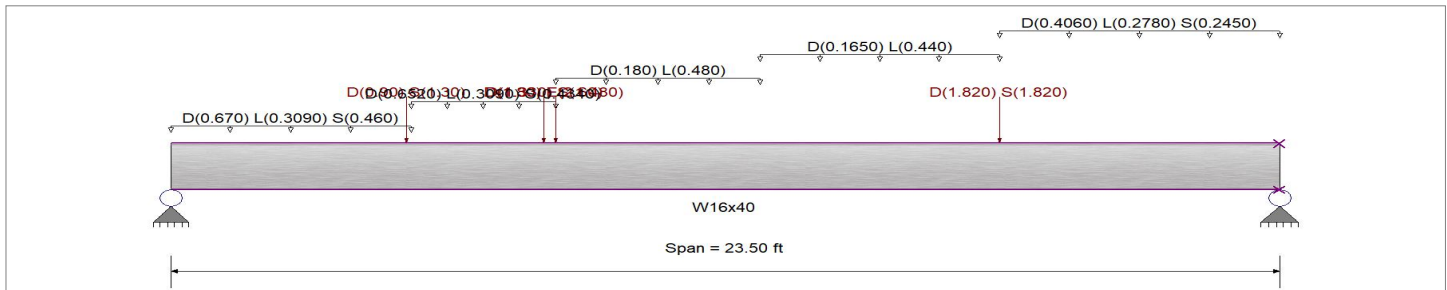
Analysis Method : Allowable Strength Design

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 NOT internally calculated and added

Load for Span Number 1

Uniform Load : D = 0.670, L = 0.3090, S = 0.460 k/ft, Extent = 0.0 -->> 5.10 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.6520, L = 0.3090, S = 0.4340 k/ft, Extent = 5.10 -->> 8.15 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.180, L = 0.480 k/ft, Extent = 8.15 -->> 12.50 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.1650, L = 0.440 k/ft, Extent = 12.50 -->> 17.56 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.4060, L = 0.2780, S = 0.2450 k/ft, Extent = 17.56 -->> 23.50 ft, Tributary Width = 1.0 ft

Point Load : D = 1.330, S = 1.480 k @ 8.15 ft

Point Load : D = 1.820, S = 1.820 k @ 17.56 ft

Point Load : D = 1.80, E = 2.60 k @ 7.90 ft, (SW#302 O.S.)

Point Load : D = 0.90, S = 1.30 k @ 5.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.525 : 1	Maximum Shear Stress Ratio =	0.183 : 1
Section used for this span	W16x40	Section used for this span	W16x40
Ma : Applied	95.640 k-ft	Va : Applied	17.899 k
Mn / Omega : Allowable	182.136 k-ft	Vn/Omega : Allowable	97.60 k
Load Combination	+1.090D+0.750L+0.750S+0.5250E	Load Combination	+1.090D+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	0.180 in	Ratio =	1,564	>=360
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360
Max Downward Total Deflection	0.625 in	Ratio =	451	>=180
Max Upward Total Deflection	0.000 in	Ratio =	0	<180

Span: 1 : L Only
Span: 1 : +1.090D+0.750L+0.750S+0.5250E

Steel Beam

Project File: OVERSTRENGTH.ec6

LIC#: KW-06017913, Build:20.23.2.14

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: B15 - 2ND FLR FRMG - FLUSH BM @ ENTRY / GREAT ROOM

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values					Summary of Shear Values				
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx/Vnx/Omega	
D Only	Dsgn. L = 23.50 ft	1	0.252	0.090	45.85		45.85	304.17	182.14	1.00	1.00	8.75	146.40	97.60
+D+L	Dsgn. L = 23.50 ft	1	0.391	0.133	71.20		71.20	304.17	182.14	1.00	1.00	13.01	146.40	97.60
+D+Lr	Dsgn. L = 23.50 ft	1	0.252	0.090	45.85		45.85	304.17	182.14	1.00	1.00	8.75	146.40	97.60
+D+S	Dsgn. L = 23.50 ft	1	0.400	0.148	72.84		72.84	304.17	182.14	1.00	1.00	14.43	146.40	97.60
+D+0.750Lr+0.750L	Dsgn. L = 23.50 ft	1	0.355	0.122	64.59		64.59	304.17	182.14	1.00	1.00	11.95	146.40	97.60
+D+0.750L+0.750S	Dsgn. L = 23.50 ft	1	0.464	0.166	84.49		84.49	304.17	182.14	1.00	1.00	16.21	146.40	97.60
+D+0.60W	Dsgn. L = 23.50 ft	1	0.252	0.090	45.85		45.85	304.17	182.14	1.00	1.00	8.75	146.40	97.60
+1.126D+0.70E	Dsgn. L = 23.50 ft	1	0.335	0.113	61.04		61.04	304.17	182.14	1.00	1.00	11.06	146.40	97.60
+1.126D-0.70E	Dsgn. L = 23.50 ft	1	0.232	0.089	42.25		42.25	304.17	182.14	1.00	1.00	8.65	146.40	97.60
+D+0.750Lr+0.750L+0.450W	Dsgn. L = 23.50 ft	1	0.355	0.122	64.59		64.59	304.17	182.14	1.00	1.00	11.95	146.40	97.60
+D+0.750L+0.750S+0.450W	Dsgn. L = 23.50 ft	1	0.464	0.166	84.49		84.49	304.17	182.14	1.00	1.00	16.21	146.40	97.60
+1.090D+0.750L+0.750S+0.5250E	Dsgn. L = 23.50 ft	1	0.525	0.183	95.64		95.64	304.17	182.14	1.00	1.00	17.90	146.40	97.60
+1.090D+0.750L+0.750S-0.5250E	Dsgn. L = 23.50 ft	1	0.449	0.165	81.75		81.75	304.17	182.14	1.00	1.00	16.09	146.40	97.60
+0.60D+0.60W	Dsgn. L = 23.50 ft	1	0.151	0.054	27.51		27.51	304.17	182.14	1.00	1.00	5.25	146.40	97.60
+0.470D+0.70E	Dsgn. L = 23.50 ft	1	0.170	0.055	31.01		31.01	304.17	182.14	1.00	1.00	5.32	146.40	97.60
+0.470D-0.70E	Dsgn. L = 23.50 ft	1	0.070	0.030	12.66		12.66	304.17	182.14	1.00	1.00	2.90	146.40	97.60

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+1.090D+0.750L+0.750S+0.5250E	1	0.6252	11.414		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	17.899	13.783
Max Upward from Load Combinations	17.899	13.783
Max Upward from Load Cases	8.751	6.534
D Only	8.751	6.534
+D+L	13.014	10.755
+D+Lr	8.751	6.534
+D+S	14.427	10.583
+D+0.750Lr+0.750L	11.949	9.700
+D+0.750L+0.750S	16.206	12.736
+D+0.60W	8.751	6.534
+1.126D+0.70E	11.062	7.969
+D+0.750Lr+0.750L+0.450W	11.949	9.700
+D+0.750L+0.750S+0.450W	16.206	12.736
+1.090D+0.750L+0.750S+0.5250E	17.899	13.783
+0.60D+0.60W	5.251	3.920
+0.470D+0.70E	5.321	3.683
D Only	8.751	6.534
L Only	4.263	4.221
S Only	5.676	4.049
E Only	1.726	0.874
H Only		

Cantilevered Retaining Wall

Project File: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10' CANT'D WALL @ SLAB

Code Reference

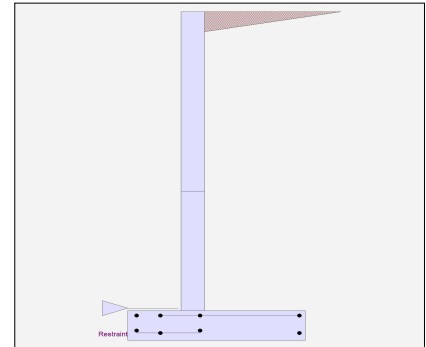
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	10.00 ft
Wall height above soil	=	0.00 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	=	8.000
(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	=	88.000
Total Seismic Force	=	968.000

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: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10' CANT'D WALL @ SLAB

Design Summary

Wall Stability Ratios

Overturning	=	1.70	OK
Slab Resists All Sliding !			
Global Stability	=	1.55	
Total Bearing Load	=	5,801 lbs	
...resultant ecc.	=	10.13 in	
Eccentricity outside middle third			
Soil Pressure @ Toe	=	1,959 psf	NG
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Exceeds Allowable!			
ACI Factored @ Toe	=	2,743 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	18.2 psi	OK
Footing Shear @ Heel	=	31.4 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	2,795.1 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

Design Height Above Ftg

ft =	Stem OK	Stem OK		
	4.00	0.00		
Wall Material Above "Ht"	=	Concrete	Concrete	
Design Method	=	SD	SD	SD SD
Thickness	=	8.00	8.00	
Rebar Size	=	# 5	# 5	
Rebar Spacing	=	12.00	6.00	
Rebar Placed at	=	6.5 in	6.5 in	

Design Data

fb/FB + fa/Fa	=	0.420	0.853
---------------	---	-------	-------

Total Force @ Section

Service Level	lbs =		
Strength Level	lbs =	1,536.0	3,680.0

Moment....Actual

Service Level	ft-# =		
Strength Level	ft-# =	3,600.0	13,733.3
Moment.....Allowable	ft-# =	8,557.2	16,093.8

Shear.....Actual

Service Level	psi =		
Strength Level	psi =	19.7	47.2
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

PLEASE NOTE 1/3 INCREASE UTILIZED IN SOIL BEARING DUE TO SEISMIC LOADING.

Cantilevered Retaining Wall

Project File: fnd.ec6

LIC#: KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10' CANT'D WALL @ SLAB

Concrete Stem Rebar Area Details

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>
2nd Stem		
As (based on applied moment) :	0.1294 in ² /ft	
(4/3) * As :	0.1726 in ² /ft	Min Stem T&S Reinf Area 1.152 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 :	0.31 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) :	0.4937 in ² /ft	
(4/3) * As :	0.6583 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 :	0.4937 in ² /ft	#4@ 12.50 in #4@ 25.00 in
Provided Area :	0.62 in ² /ft	#5@ 19.38 in #5@ 38.75 in
Maximum Area :	0.8805 in ² /ft	#6@ 27.50 in #6@ 55.00 in

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	3.50
Total Footing Width	=	5.00
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	2,743	0 psf
Mu' : Upward	=	2,775	2,023 ft-#
Mu' : Downward	=	203	10,258 ft-#
Mu: Design	=	2,573 OK	8,235 ft-# OK
phiMn	=	22,203	13,005 ft-#
Actual 1-Way Shear	=	18.20	31.40 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	# 5 @ 6.00 in	
Heel Reinforcing	=	# 5 @ 12.00 in	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe: #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@ 9.03 in, #5@ 13.99 in, #6@ 19.86 in, #7@ 27.09 in, #8@ 35.66 in, #9@ 45.15 in, #10@ 57.34 in

Key: No key defined

Min footing T&S reinf Area 1.30 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: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10' CANT'D WALL @ SLAB

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	2,117.5	3.67	7,764.2	Soil Over HL (ab. water tbl)	3,116.7	3.58	11,168.1
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.58	11,168.1
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
Seismic Earth Load =	677.6	5.50	3,726.8	Surcharge Over Toe =			
=				Stem Weight(s) =	1,000.0	1.83	1,833.3
Total	= 2,795.1	O.T.M. =	11,491.0	Earth @ Stem Transitions =			
				Footing Weight =	750.0	2.50	1,875.0
				Key Weight =			
				Vert. Component =	934.7	5.00	4,673.5
				Total =	5,801.4 lbs	R.M. =	19,549.9

Resisting/Overturning Ratio

= **1.70**
Vertical Loads used for Soil Pressure = 5,801.4 lbs

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

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

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.109 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: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10' CANT'D WALL @ SLAB

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 =	8.36 in
As Provided =	0.6200 in ² /ft
As Required =	0.4937 in ² /ft

Cantilevered Retaining Wall

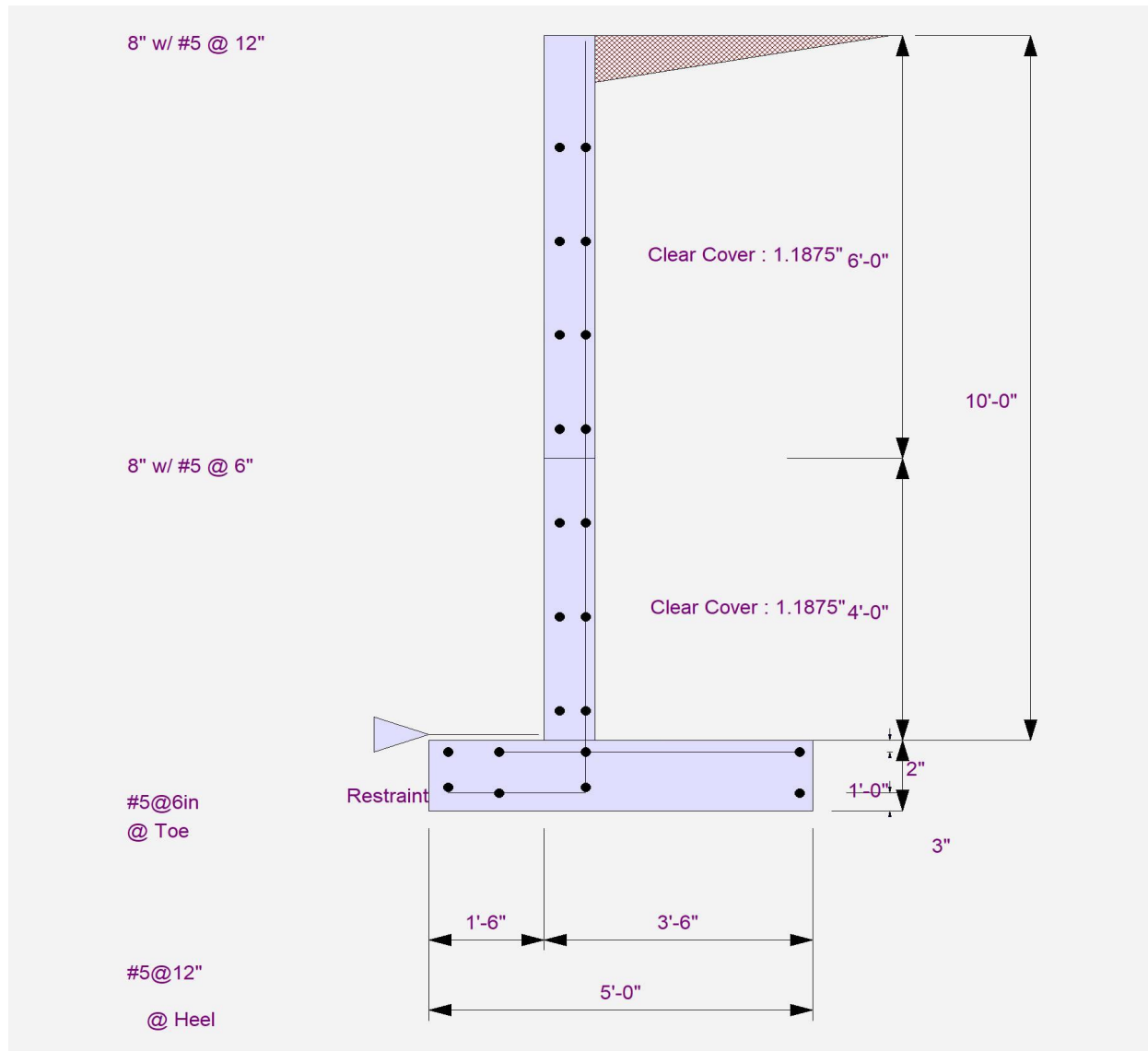
Project File: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10' CANT'D WALL @ SLAB



Cantilevered Retaining Wall

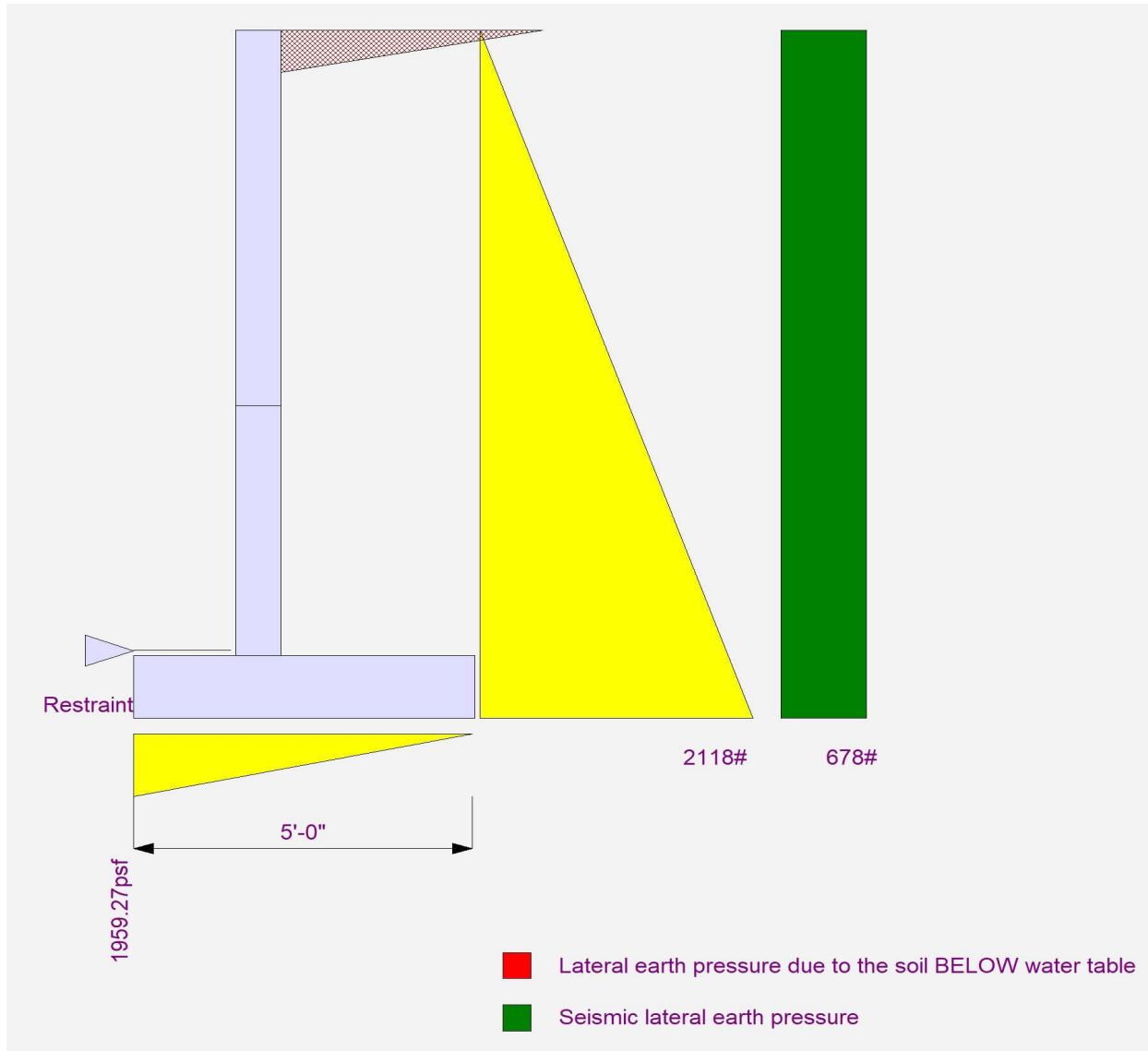
Project File: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10' CANT'D WALL @ SLAB



Cantilevered Retaining Wall

Project File: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10.67' CANT'D WALL @ SLAB

Code Reference

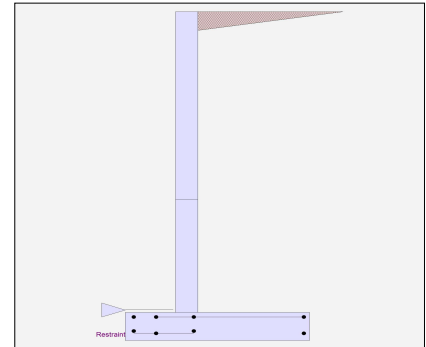
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	10.67 ft
Wall height above soil	=	0.00 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	=	8.000
(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	=	93.360
Total Seismic Force	=	1,089.511

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: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10.67' CANT'D WALL @ SLAB

Design Summary

Wall Stability Ratios

Overturning	=	1.82	OK
Slab Resists All Sliding !			
Global Stability	=	1.58	
Total Bearing Load	=	6,856 lbs	
...resultant ecc.	=	9.66 in	
Eccentricity within middle third			
Soil Pressure @ Toe	=	1,983 psf	NG
Soil Pressure @ Heel	=	128 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Exceeds Allowable!			
ACI Factored @ Toe	=	2,776 psf	
ACI Factored @ Heel	=	179 psf	
Footing Shear @ Toe	=	18.7 psi	OK
Footing Shear @ Heel	=	33.0 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	3,146.0 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

Design Height Above Ftg

ft =	Stem OK	Stem OK		
	4.00	4.00		
Wall Material Above "Ht"	=	Concrete	Concrete	
Design Method	=	SD	SD	SD SD
Thickness	=	8.00	8.00	
Rebar Size	=	# 5	# 6	
Rebar Spacing	=	12.00	6.00	
Rebar Placed at	=	6.5 in	6.5 in	

Design Data

fb/FB + fa/Fa	=	0.566	0.769
---------------	---	-------	-------

Total Force @ Section

Service Level	lbs =		
Strength Level	lbs =	1,868.4	4,183.9

Moment....Actual

Service Level	ft-# =		
Strength Level	ft-# =	4,846.3	16,652.3
Moment.....Allowable	ft-# =	8,557.2	21,627.9

Shear.....Actual

Service Level	psi =		
Strength Level	psi =	24.0	53.6
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

PLEASE NOTE 1/3 INCREASE UTILIZED IN SOIL BEARING DUE TO SEISMIC LOADING.

Cantilevered Retaining Wall

Project File: fnd.ec6

LIC#: KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10.67' CANT'D WALL @ SLAB

Concrete Stem Rebar Area Details

2nd Stem	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
As (based on applied moment) :	0.1742 in2/ft		
(4/3) * As :	0.2323 in2/ft	Min Stem T&S Reinf Area 1.281 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 :	0.2323 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

Bottom Stem	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
As (based on applied moment) :	0.5987 in2/ft		
(4/3) * As :	0.7982 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 :	0.5987 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.88 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	=	4.00
Total Footing Width	=	5.50
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	2,776	179 psf	
Mu' : Upward	=	2,857	3,910 ft-#	
Mu' : Downward	=	203	14,436 ft-#	
Mu: Design	=	2,654 OK	10,525 ft-#	OK
phiMn	=	30,055	19,126 ft-#	
Actual 1-Way Shear	=	18.70	32.96 psi	
Allow 1-Way Shear	=	75.00	75.00 psi	
Toe Reinforcing	=	# 6 @ 6.00 in		
Heel Reinforcing	=	# 5 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00 ft-lbs	
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs	

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

Other Acceptable Sizes & Spacings

Toe: #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@ 7.06 in, #5@ 10.95 in, #6@ 15.54 in, #7@ 21.19 in, #8@ 27.90 in, #9@ 35.32 in, #10@ 44.86 in

Key: No key defined

Min footing T&S reinf Area 1.43 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: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10.67' CANT'D WALL @ SLAB

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	2,383.3	3.89	9,271.1	Soil Over HL (ab. water tbl)	3,912.3	3.83	14,997.3
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.83	14,997.3
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 =	762.7	5.84	4,450.1	Surcharge Over Toe =			
=				Stem Weight(s) =	1,067.0	1.83	1,956.2
Total	= 3,146.0	O.T.M. =	13,721.2	Earth @ Stem Transitions =			
				Footing Weight =	825.0	2.75	2,268.8
				Key Weight =			
				Vert. Component =	1,052.0	5.50	5,786.2
				Total =	6,856.4 lbs	R.M. =	25,008.4

Resisting/Overturning Ratio

= **1.82**
Vertical Loads used for Soil Pressure = 6,856.4 lbs

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

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

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.107 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: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10.67' CANT'D WALL @ SLAB

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 #6 bar specified in this stem design segment (25.4.2.3a) = 28.08 in
Development length for #6 bar specified in this stem design segment = 21.60 in

Hooked embedment length into footing for #6 bar specified in this stem design segment = 8.57 in
As Provided = 0.8800 in²/ft
As Required = 0.5987 in²/ft

Cantilevered Retaining Wall

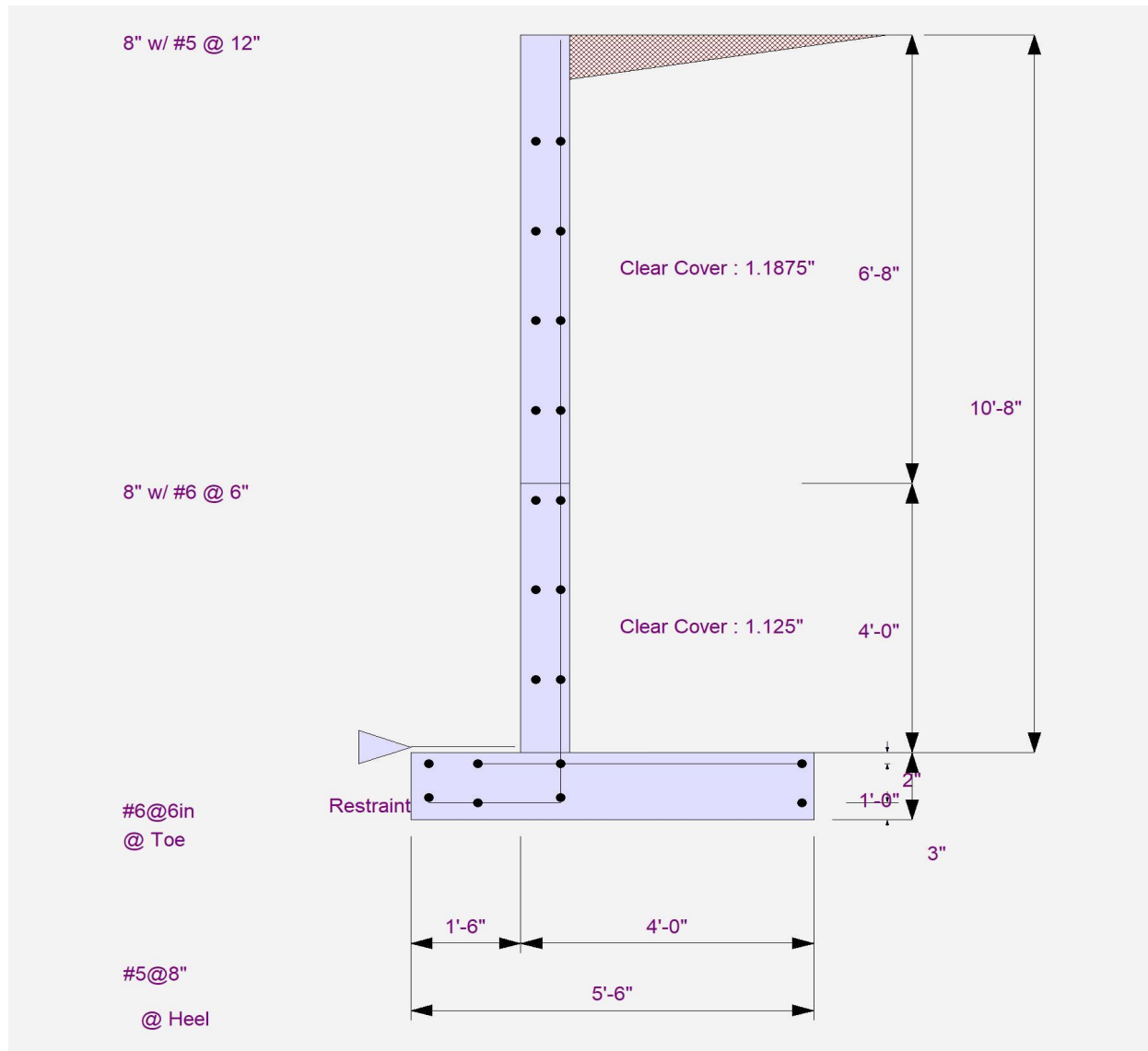
Project File: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10.67' CANT'D WALL @ SLAB



Cantilevered Retaining Wall

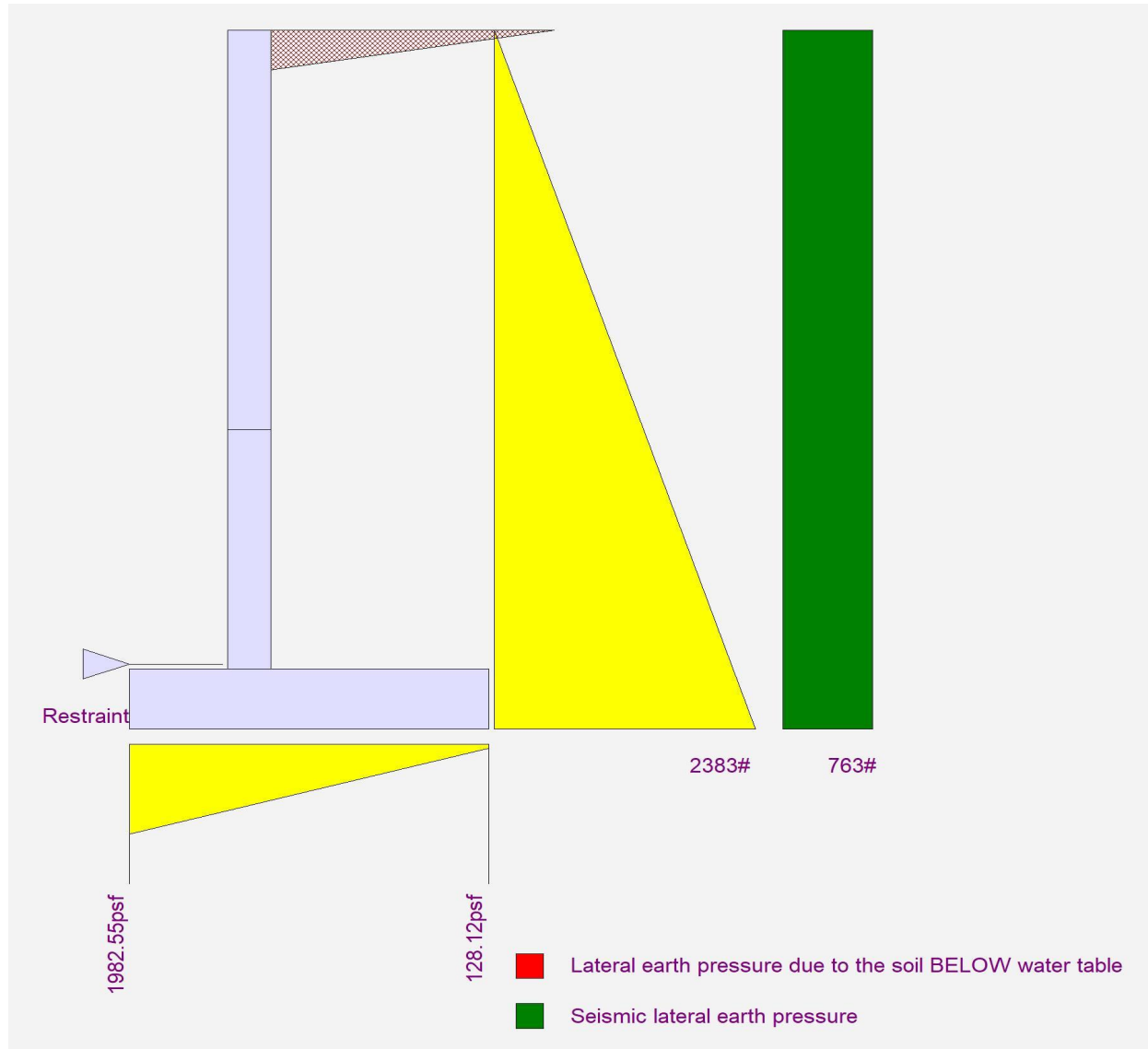
Project File: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10.67' CANT'D WALL @ SLAB



Cantilevered Retaining Wall

Project File: fnd.ecf

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 9' CANT'D WALL @ GRADE

Code Reference

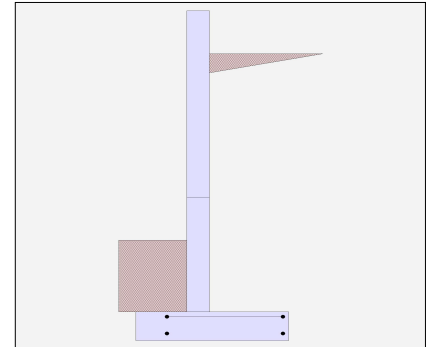
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	9.00 ft
Wall height above soil	=	1.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	30.00 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	=	8.000
(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	=	80.000
Total Seismic Force	=	800.000

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: fnd.ecf

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 9' CANT'D WALL @ GRADE

Design Summary

Wall Stability Ratios

Overtuning	=	1.73	OK
Sliding	=	1.51	OK
Global Stability	=	2.34	
Total Bearing Load	=	5,220 lbs	
...resultant ecc.	=	10.01 in	
Eccentricity outside middle third			
Soil Pressure @ Toe	=	2,094 psf	NG
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Exceeds Allowable!			
ACI Factored @ Toe	=	2,932 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	13.5 psi	OK
Footing Shear @ Heel	=	25.7 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	2,310.0 lbs	
less 100% Passive Force	=	1,406.3 lbs	
less 100% Friction Force	=	2,088.0 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	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

ft =	Stem OK	4.00	Stem OK	0.00
Wall Material Above "Ht"	=	Concrete	Concrete	
Design Method	=	SD	SD	SD SD
Thickness	=	8.00	8.00	
Rebar Size	=	# 5	# 5	
Rebar Spacing	=	16.00	8.00	
Rebar Placed at	=	6.5 in	6.5 in	

Design Data

fb/FB + fa/Fa	=	0.332	0.806
---------------	---	-------	-------

Total Force @ Section

Service Level	lbs =		
Strength Level	lbs =	1,100.0	2,988.0

Moment....Actual

Service Level	ft-# =		
Strength Level	ft-# =	2,166.7	10,044.0
Moment.....Allowable	ft-# =	6,513.6	12,453.1

Shear.....Actual

Service Level	psi =		
Strength Level	psi =	14.1	38.3
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

PLEASE NOTE 1/3 INCREASE UTILIZED IN SOIL BEARING DUE TO SEISMIC LOADING.

Cantilevered Retaining Wall

Project File: fnd.ecf

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 9' CANT'D WALL @ GRADE

Concrete Stem Rebar Area Details

2nd Stem	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
As (based on applied moment) :	0.0779 in2/ft		
(4/3) * As :	0.1039 in2/ft	Min Stem T&S Reinf Area 1.248 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 :	0.2325 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	0.8805 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Bottom Stem	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
As (based on applied moment) :	0.3611 in2/ft		
(4/3) * As :	0.4815 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 :	0.3611 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.465 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	=	3.00	
Total Footing Width	=	4.50	
Footing Thickness	=	12.00	in
Key Width	=	0.00	in
Key Depth	=	0.00	in
Key Distance from Toe	=	0.00	ft
f'c =	2,500	psi	Fy = 60,000
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	=	2,932	0	psf
Mu' : Upward	=	2,910	1,036	ft-#
Mu' : Downward	=	574	6,608	ft-#
Mu: Design	=	2,337	5,572	ft-# OK
phiMn	=	2,500	13,005	ft-#
Actual 1-Way Shear	=	13.45	25.74	psi
Allow 1-Way Shear	=	40.00	75.00	psi
Toe Reinforcing	=	None Spec'd		
Heel Reinforcing	=	# 5 @ 12.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=	0.00 ft-lbs		
Footing Allow. Torsion, phi Tu	=	0.00 ft-lbs		

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

Other Acceptable Sizes & Spacings

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

Heel: #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

Key: No key defined

Min footing T&S reinf Area	1.17	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft
<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: fnd.ecf

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 9' CANT'D WALL @ GRADE

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	1,750.0	3.33	5,833.3	Soil Over HL (ab. water tbl)	2,310.0	3.33	7,700.0
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.33	7,700.0
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 =	412.5	0.75	309.4
Seismic Earth Load =	560.0	5.00	2,800.0	Surcharge Over Toe =			
=				Stem Weight(s) =	1,050.0	1.83	1,925.0
Total =	2,310.0	O.T.M. =	8,633.3	Earth @ Stem Transitions =			
				Footing Weight =	675.0	2.25	1,518.8
				Key Weight =			
				Vert. Component =	772.5	4.50	3,476.2
Resisting/Overturning Ratio		=	1.73	Total =	5,220.0 lbs	R.M.=	14,929.3
Vertical Loads used for Soil Pressure =		5,220.0 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) 0.136 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: fnd.ecf

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 9' CANT'D WALL @ GRADE

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 = 8.15 in
As Provided = 0.4650 in²/ft
As Required = 0.3611 in²/ft

Cantilevered Retaining Wall

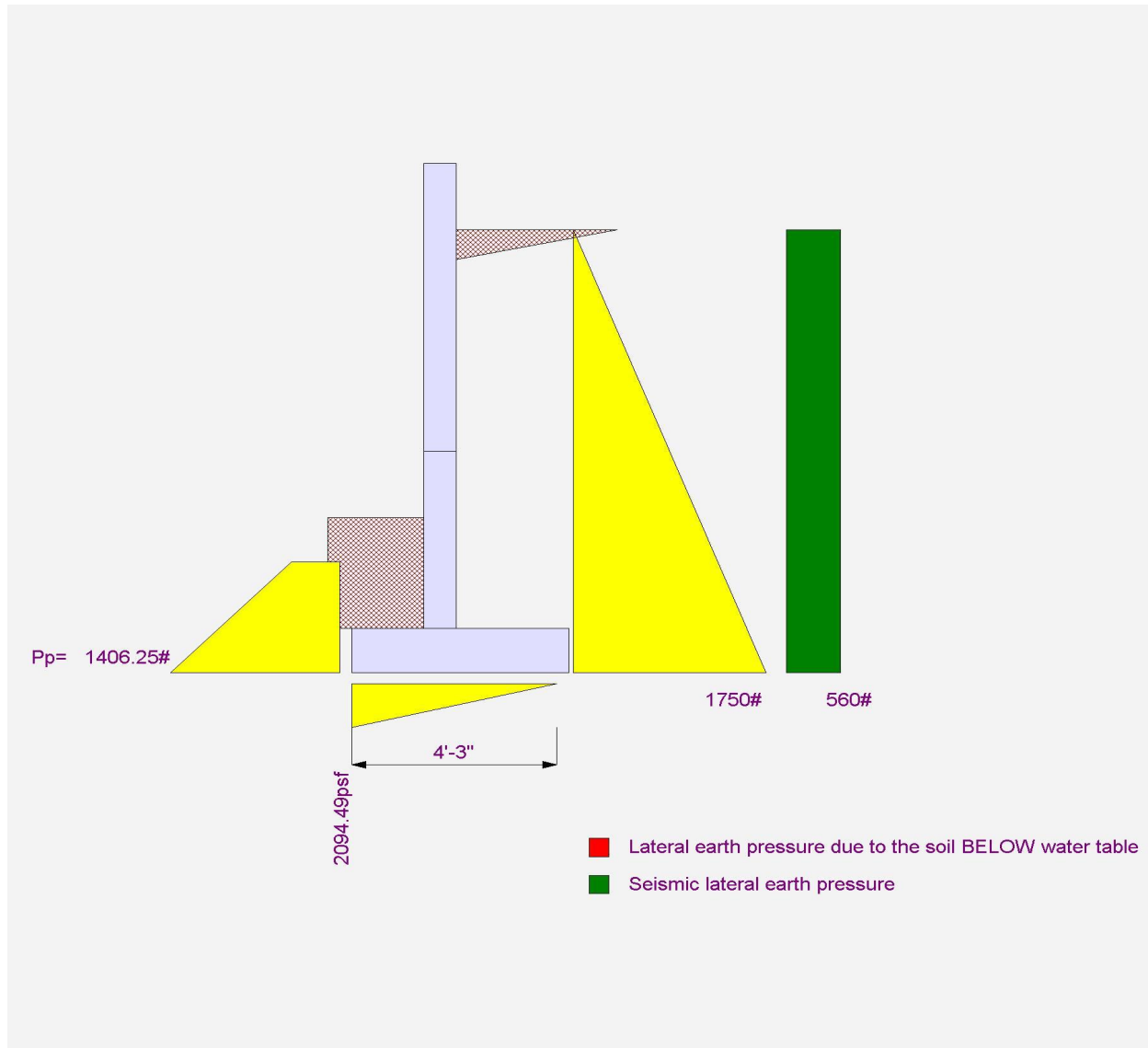
Project File: fnd.ecf

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 9' CANT'D WALL @ GRADE



Cantilevered Retaining Wall

Project File: fnd.ecf

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 9' CANT'D WALL @ SLAB

Code Reference

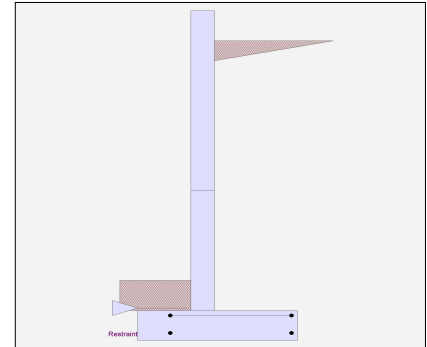
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	9.00 ft
Wall height above soil	=	1.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 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	=	8.000
(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	=	80.000
Total Seismic Force	=	800.000

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: fnd.ecf

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 9' CANT'D WALL @ SLAB

Design Summary

Wall Stability Ratios

Overturning	=	1.70	OK
Slab Resists All Sliding !			
Global Stability	=	1.85	
Total Bearing Load	=	4,922 lbs	
...resultant ecc.	=	9.60 in	
Eccentricity outside middle third			
Soil Pressure @ Toe	=	1,908 psf	NG
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Exceeds Allowable!			
ACI Factored @ Toe	=	2,671 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	13.7 psi	OK
Footing Shear @ Heel	=	26.0 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	2,310.0 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

Design Height Above Ftg

ft =	Stem OK	Stem OK		
	4.00	0.00		
Wall Material Above "Ht"	=	Concrete	Concrete	
Design Method	=	SD	SD	SD SD
Thickness	=	8.00	8.00	
Rebar Size	=	# 5	# 5	
Rebar Spacing	=	16.00	8.00	
Rebar Placed at	=	6.5 in	6.5 in	

Design Data

fb/FB + fa/Fa	=	0.332	0.806
---------------	---	-------	-------

Total Force @ Section

Service Level	lbs =		
Strength Level	lbs =	1,100.0	2,988.0

Moment....Actual

Service Level	ft-# =		
Strength Level	ft-# =	2,166.7	10,044.0
Moment.....Allowable	ft-# =	6,513.6	12,453.1

Shear.....Actual

Service Level	psi =		
Strength Level	psi =	14.1	38.3
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

PLEASE NOTE 1/3 INCREASE UTILIZED IN SOIL BEARING DUE TO SEISMIC LOADING.

Cantilevered Retaining Wall

Project File: fnd.ecf

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 9' CANT'D WALL @ SLAB

Concrete Stem Rebar Area Details

2nd Stem	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
As (based on applied moment) :	0.0779 in2/ft		
(4/3) * As :	0.1039 in2/ft	Min Stem T&S Reinf Area 1.152 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 :	0.2325 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	0.8805 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Bottom Stem	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
As (based on applied moment) :	0.3611 in2/ft		
(4/3) * As :	0.4815 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 :	0.3611 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.465 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	=	3.00	
Total Footing Width	=	4.50	
Footing Thickness	=	12.00	in
Key Width	=	0.00	in
Key Depth	=	0.00	in
Key Distance from Toe	=	0.00	ft
f'c =	2,500	psi	Fy = 60,000
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	=	2,671	0	psf
Mu' : Upward	=	2,659	1,066	ft-#
Mu' : Downward	=	351	6,608	ft-#
Mu: Design	=	2,308	5,542	ft-# OK
phiMn	=	2,500	13,005	ft-#
Actual 1-Way Shear	=	13.67	26.00	psi
Allow 1-Way Shear	=	40.00	75.00	psi
Toe Reinforcing	=	None Spec'd		
Heel Reinforcing	=	# 5 @ 12.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=	0.00 ft-lbs		
Footing Allow. Torsion, phi Tu	=	0.00 ft-lbs		

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

Other Acceptable Sizes & Spacings

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

Heel: #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

Key: No key defined

Min footing T&S reinf Area	1.17	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft
<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: fnd.ecf

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 9' CANT'D WALL @ SLAB

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	1,750.0	3.33	5,833.3	Soil Over HL (ab. water tbl)	2,310.0	3.33	7,700.0
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.33	7,700.0
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 =	165.0	0.75	123.8
Seismic Earth Load =	560.0	5.00	2,800.0	Surcharge Over Toe =			
=				Stem Weight(s) =	1,000.0	1.83	1,833.3
Total =	2,310.0	O.T.M. =	8,633.3	Earth @ Stem Transitions =			
				Footing Weight =	675.0	2.25	1,518.8
				Key Weight =			
				Vert. Component =	772.5	4.50	3,476.2
Resisting/Overturning Ratio		=	1.70	Total =	4,922.5 lbs	R.M.=	14,652.0
Vertical Loads used for Soil Pressure =		4,922.5 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) 0.118 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: fnd.ecf

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 9' CANT'D WALL @ SLAB

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 = 8.15 in
As Provided = 0.4650 in²/ft
As Required = 0.3611 in²/ft

Cantilevered Retaining Wall

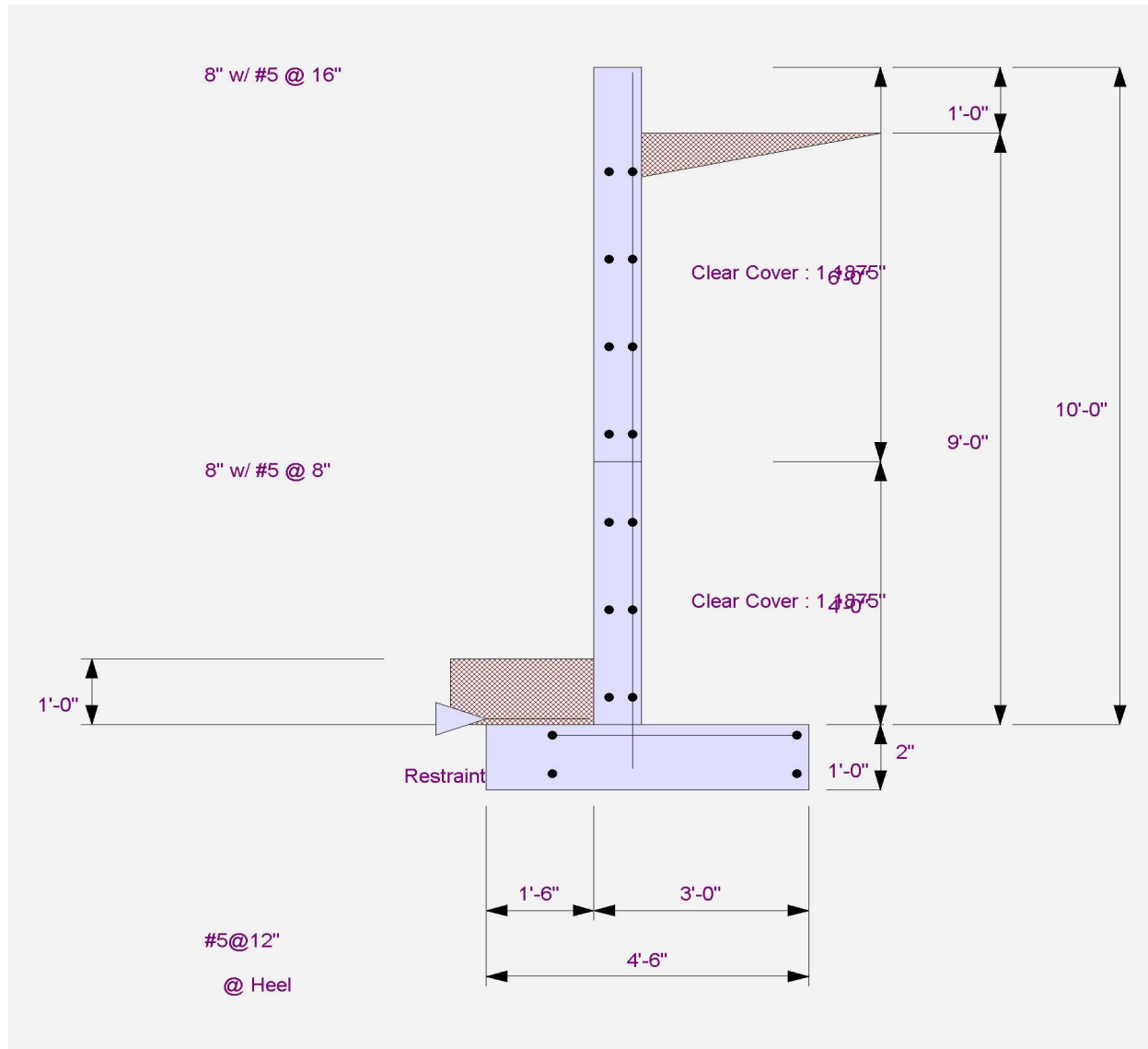
Project File: fnd.ecf

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 9' CANT'D WALL @ SLAB



Cantilevered Retaining Wall

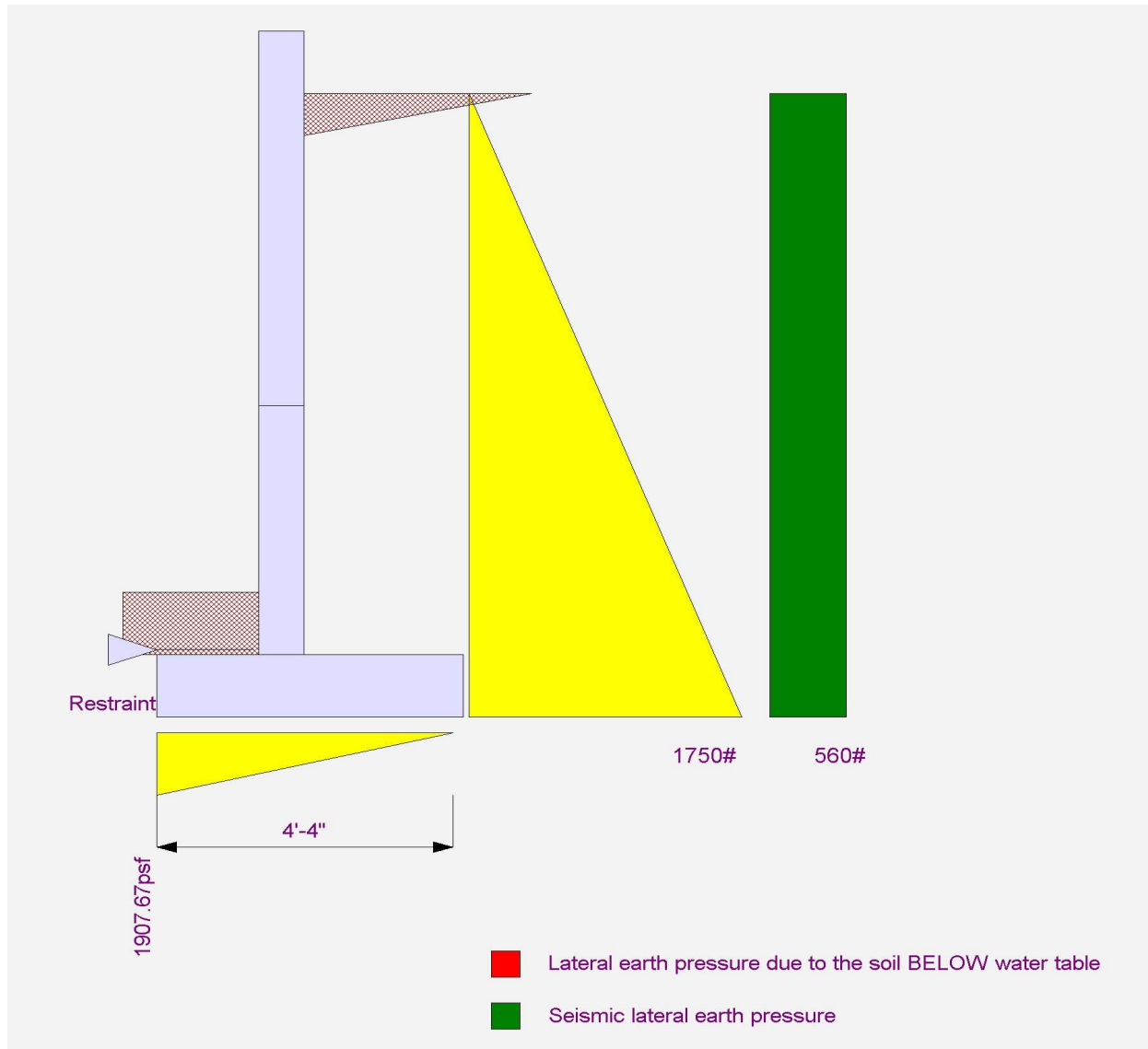
Project File: fnd.ecf

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 9' CANT'D WALL @ SLAB



Cantilevered Retaining Wall

Project File: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 8' CANT'D WALL @ GARAGE

Code Reference

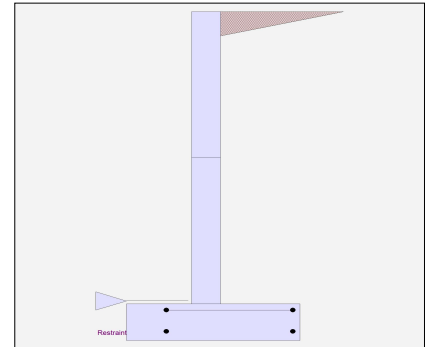
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	8.00 ft
Wall height above soil	=	0.00 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	=	8.000
(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	=	72.000
Total Seismic Force	=	648.000

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: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 8' CANT'D WALL @ GARAGE

Design Summary

Wall Stability Ratios

Overturning	=	1.61	OK
Slab Resists All Sliding !			
Global Stability	=	1.56	
Total Bearing Load	=	3,639 lbs	
...resultant ecc.	=	8.67 in	
Eccentricity outside middle third			
Soil Pressure @ Toe	=	1,572 psf	NG
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Exceeds Allowable!			
ACI Factored @ Toe	=	2,201 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	11.8 psi	OK
Footing Shear @ Heel	=	21.7 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	1,871.1 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

Design Height Above Ftg

ft =	Stem OK	Stem OK		
	4.00	4.00		
Wall Material Above "Ht"	=	Concrete	Concrete	
Design Method	=	SD	SD	SD SD
Thickness	=	8.00	8.00	
Rebar Size	=	# 5	# 5	
Rebar Spacing	=	16.00	8.00	
Rebar Placed at	=	6.5 in	6.5 in	

Design Data

fb/FB + fa/Fa	=	0.180	0.568
---------------	---	-------	-------

Total Force @ Section

Service Level	lbs =		
Strength Level	lbs =	736.0	2,368.0

Moment....Actual

Service Level	ft-# =		
Strength Level	ft-# =	1,173.3	7,082.7
Moment.....Allowable	ft-# =	6,513.6	12,453.1

Shear.....Actual

Service Level	psi =		
Strength Level	psi =	9.4	30.4
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

PLEASE NOTE 1/3 INCREASE UTILIZED IN SOIL BEARING DUE TO SEISMIC LOADING.

Cantilevered Retaining Wall

Project File: fnd.ec6

LIC#: KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 8' CANT'D WALL @ GARAGE

Concrete Stem Rebar Area Details

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>
2nd Stem		
As (based on applied moment) :	0.0422 in2/ft	
(4/3) * As :	0.0562 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 :	0.2325 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) :	0.2546 in2/ft	
(4/3) * As :	0.3395 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 :	0.26 in2/ft	#4@ 12.50 in #4@ 25.00 in
Provided Area :	0.465 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	=	2.50
Total Footing Width	=	4.00
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	2,201	0 psf
Mu' : Upward	=	2,153	443 ft-#
Mu' : Downward	=	203	3,913 ft-#
Mu: Design	=	1,951 OK	3,470 ft-# OK
phiMn	=	2,500	13,005 ft-#
Actual 1-Way Shear	=	11.83	21.66 psi
Allow 1-Way Shear	=	40.00	75.00 psi
Toe Reinforcing	=	None Spec'd	
Heel Reinforcing	=	# 5 @ 12.00 in	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

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

Heel: #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

Key: No key defined

Min footing T&S reinf Area	1.04	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: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 8' CANT'D WALL @ GARAGE

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	1,417.5	3.00	4,252.5	Soil Over HL (ab. water tbl)	1,613.3	3.08	4,974.4
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.08	4,974.4
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 =	453.6	4.50	2,041.2	Surcharge Over Toe =			
=				Stem Weight(s) =	800.0	1.83	1,466.7
Total =	1,871.1	O.T.M. =	6,293.7	Earth @ Stem Transitions =			
				Footing Weight =	600.0	2.00	1,200.0
				Key Weight =			
				Vert. Component =	625.7	4.00	2,502.8
				Total =	3,639.0 lbs	R.M. =	10,144.0

Resisting/Overturning Ratio

= **1.61**
Vertical Loads used for Soil Pressure = 3,639.0 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) 0.087 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: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 8' CANT'D WALL @ GARAGE

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 =	6.00 in
As Provided =	0.4650 in ² /ft
As Required =	0.2600 in ² /ft

Cantilevered Retaining Wall

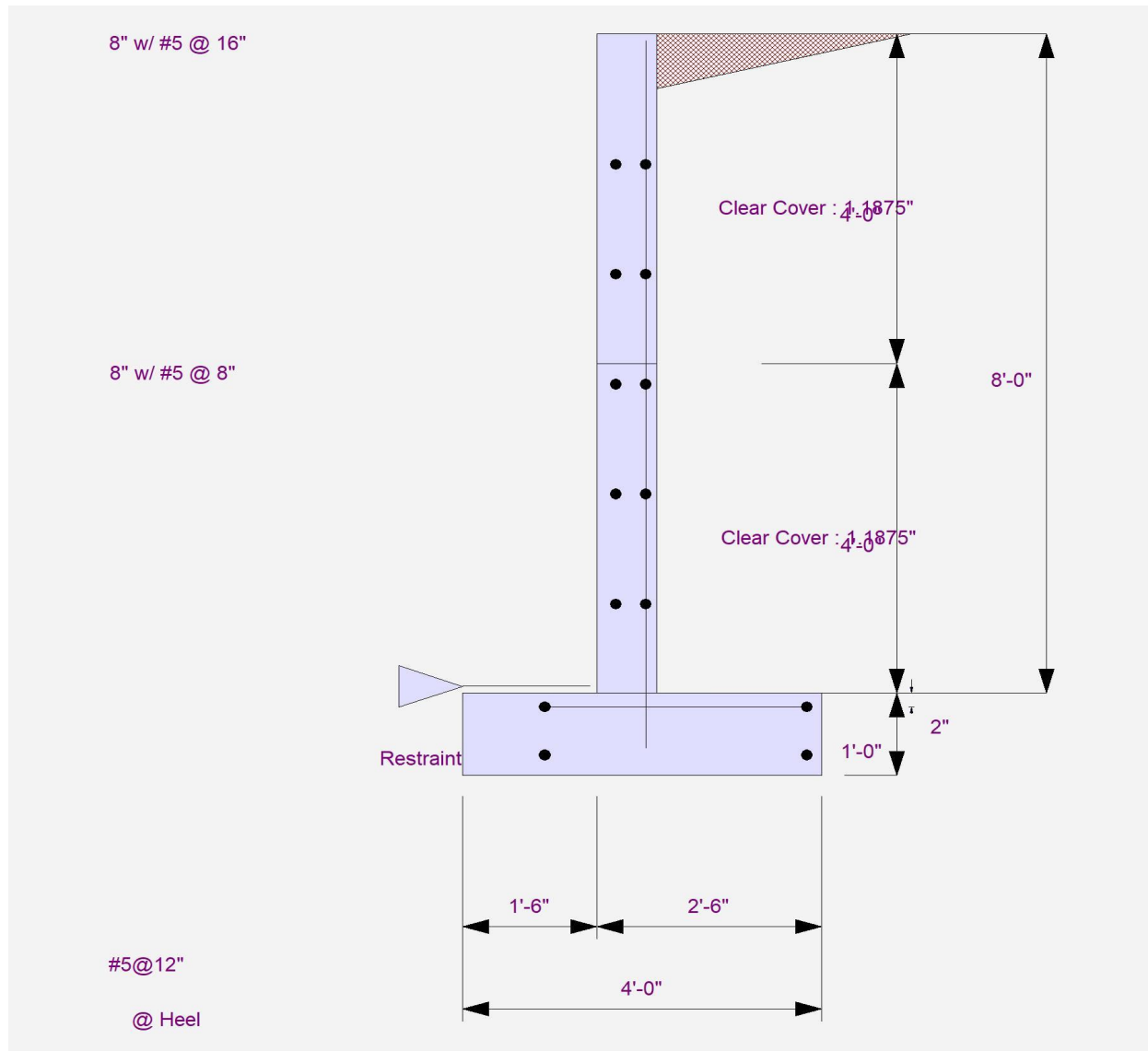
Project File: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 8' CANT'D WALL @ GARAGE



Cantilevered Retaining Wall

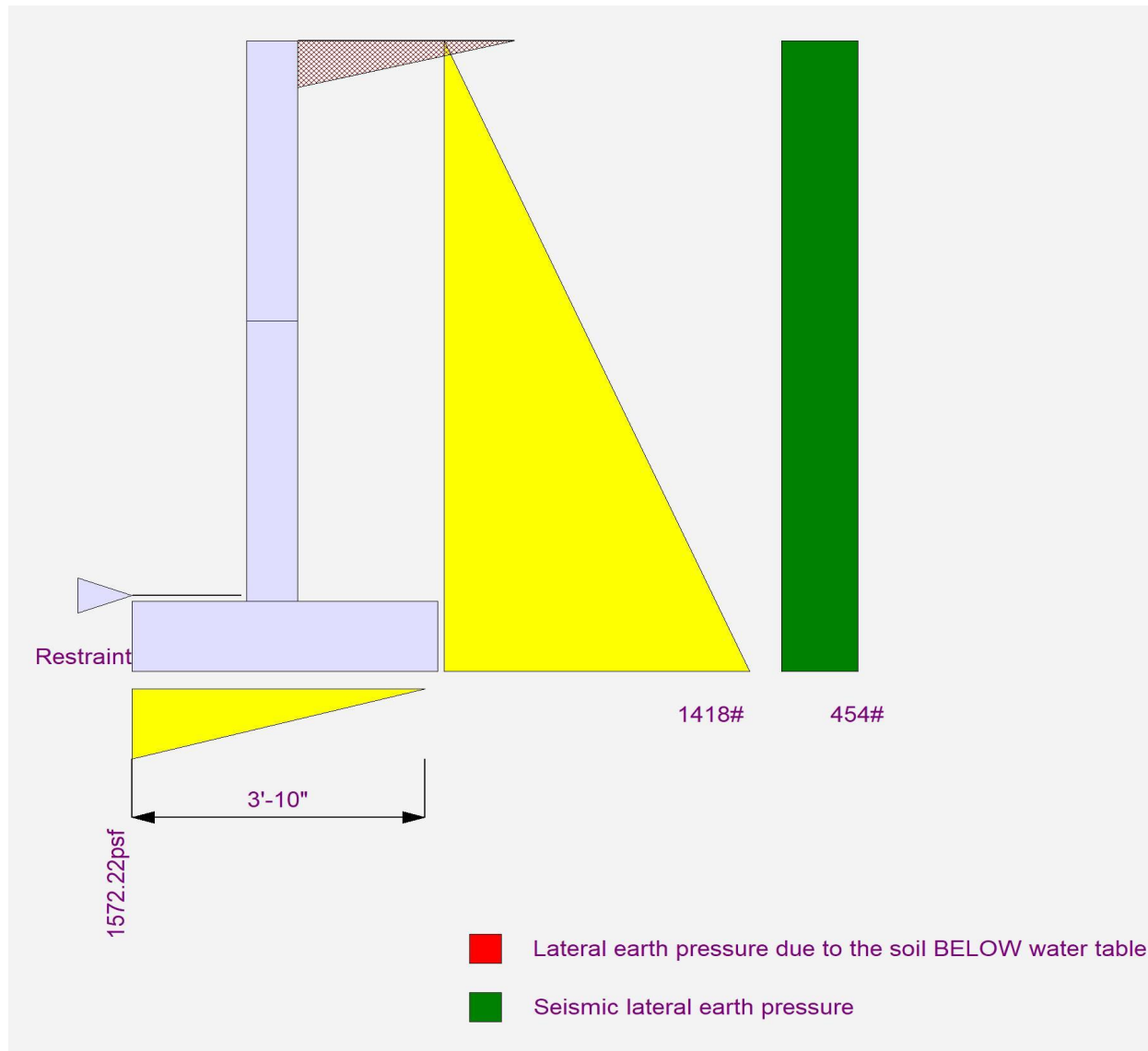
Project File: fnd.ec6

LIC# : KW-06017913, Build:20.23.04.05

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 8' CANT'D WALL @ GARAGE



Cantilevered Retaining Wall

Project File: fnd.ec6

LIC# : KW-06017913, Build:20.23.08.01

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 7' CANT'D WALL @ SLAB

Code Reference

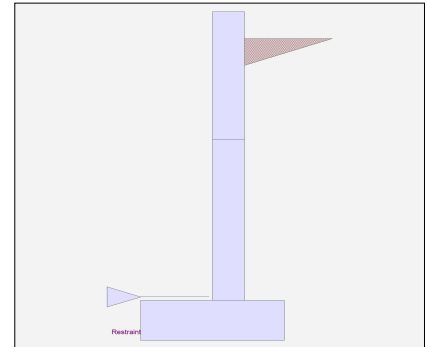
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	6.50 ft
Wall height above soil	=	0.67 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	=	8.000
(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	=	60.000
Total Seismic Force	=	450.000

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: fnd.ec6

LIC# : KW-06017913, Build:20.23.08.01

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 7' CANT'D WALL @ SLAB

Design Summary

Wall Stability Ratios

Overturning	=	1.33	Ratio < 1.5!
Slab Resists All Sliding !			
Global Stability	=	1.51	
Total Bearing Load	=	2,197 lbs	
...resultant ecc.	=	9.90 in	
Eccentricity outside middle third			
Soil Pressure @ Toe	=	1,741 psf	NG
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Exceeds Allowable!			
ACI Factored @ Toe	=	2,437 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	11.7 psi	OK
Footing Shear @ Heel	=	13.0 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	1,299.4 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

Design Height Above Ftg

Wall Material Above "Ht"

Design Method

Thickness

Rebar Size

Rebar Spacing

Rebar Placed at

Design Data

fb/FB + fa/Fa

Total Force @ Section

Service Level

Strength Level

Moment....Actual

Service Level

Strength Level

Moment.....Allowable

Shear.....Actual

Service Level

Strength Level

Shear.....Allowable

Anet (Masonry)

Wall Weight

Rebar Depth 'd'

Masonry Data

f'm

Fs

Solid Grouting

Modular Ratio 'n'

Equiv. Solid Thick.

Masonry Block Type

Masonry Design Method

Concrete Data

f'c

Fy

2nd

Bottom

Stem OK

4.00

Stem OK

0.00

Concrete

Concrete

SD

SD

SD

SD

SD

8.00

8.00

5

5

16.00

16.00

6.5 in

6.5 in

0.051

0.588

lbs =

325.0

1,573.0

ft-# =

333.3

3,830.7

ft-# =

6,513.6

6,513.6

psi =

4.2

20.2

psi =

75.0

75.0

in2 =

100.0

100.0

in =

6.50

6.50

psi =

psi =

=

=

=

=

= ASD

psi =

2,500.0

2,500.0

psi =

60,000.0

60,000.0

Cantilevered Retaining Wall

Project File: fnd.ec6

LIC# : KW-06017913, Build:20.23.08.01

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 7' CANT'D WALL @ SLAB

Concrete Stem Rebar Area Details

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>
2nd Stem		
As (based on applied moment) :	0.012 in ² /ft	
(4/3) * As :	0.016 in ² /ft	Min Stem T&S Reinf Area 0.609 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) :	0.1377 in ² /ft	
(4/3) * As :	0.1836 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 :	0.1836 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	=	1.50
Total Footing Width	=	3.00
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	2,437	0 psf
Mu' : Upward	=	2,065	0 ft-#
Mu' : Downward	=	203	940 ft-#
Mu: Design	=	1,862 OK	940 ft-# OK
phiMn	=	2,500	2,500 ft-#
Actual 1-Way Shear	=	11.75	13.00 psi
Allow 1-Way Shear	=	40.00	40.00 psi
Toe Reinforcing	=	None Spec'd	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

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

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

Key: No key defined

Min footing T&S reinf Area	0.78	in ²
Min footing T&S reinf Area per foot	0.26	in ² /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: fnd.ec6

LIC# : KW-06017913, Build:20.23.08.01

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 7' CANT'D WALL @ SLAB

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	984.4	2.50	2,460.9	Soil Over HL (ab. water tbl)	595.8	2.58	1,539.2
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.58	1,539.2
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 =	315.0	3.75	1,181.3	Surcharge Over Toe =			
=				Stem Weight(s) =	717.0	1.83	1,314.5
Total =	1,299.4	O.T.M. =	3,642.2	Earth @ Stem Transitions =			
				Footing Weight =	450.0	1.50	675.0
				Key Weight =			
				Vert. Component =	434.5	3.00	1,303.6
				Total =	2,197.4 lbs	R.M. =	4,832.3

Resisting/Overturning Ratio = **1.33**
 Vertical Loads used for Soil Pressure = 2,197.4 lbs

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

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

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
 Horizontal Defl @ Top of Wall (approximate only) 0.116 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: fnd.ec6

LIC# : KW-06017913, Build:20.23.08.01

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 7' CANT'D WALL @ SLAB

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 = 8.29 in
As Provided = 0.2325 in²/ft
As Required = 0.1836 in²/ft

Cantilevered Retaining Wall

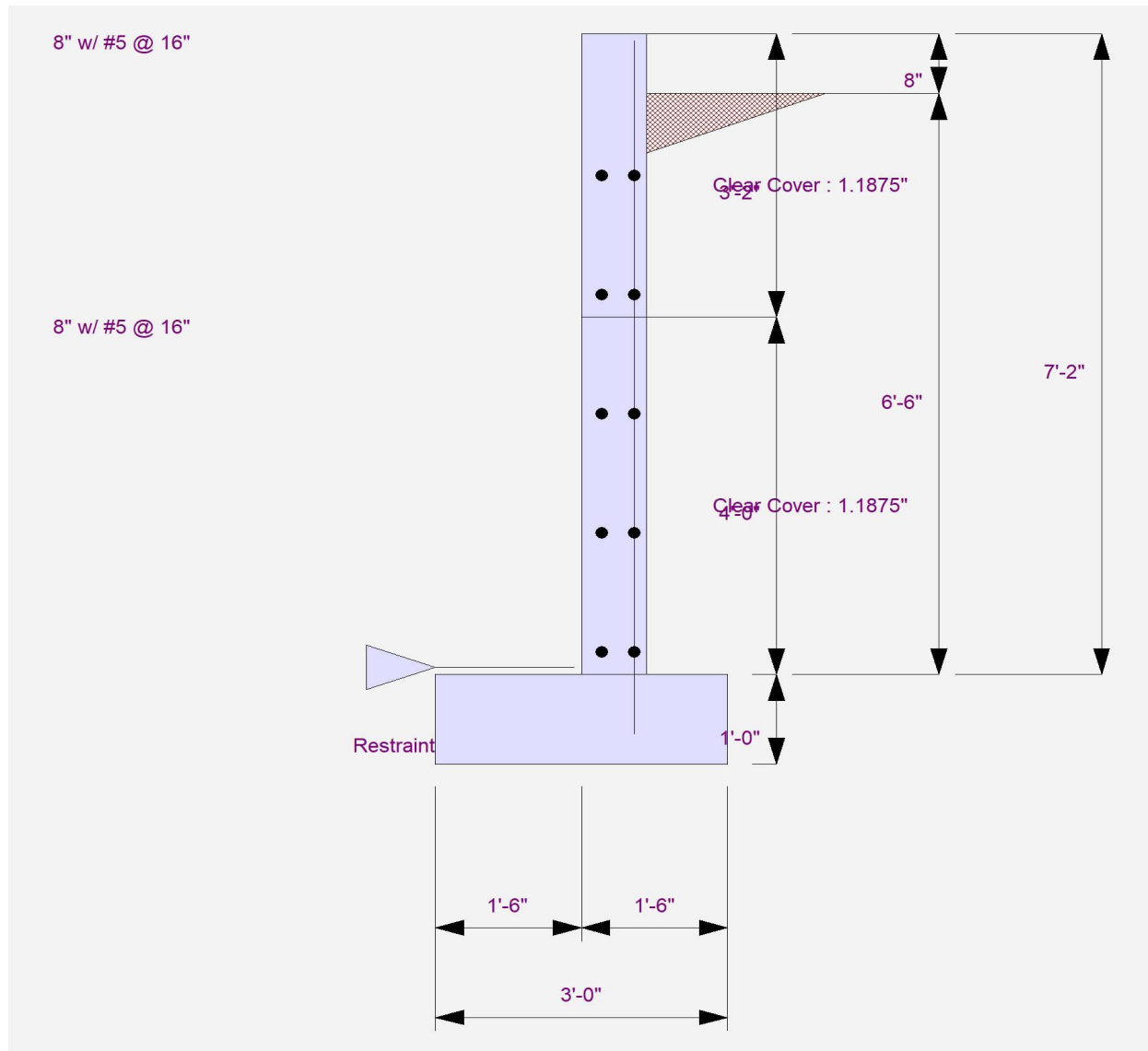
Project File: fnd.ec6

LIC# : KW-06017913, Build:20.23.08.01

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 7' CANT'D WALL @ SLAB



Cantilevered Retaining Wall

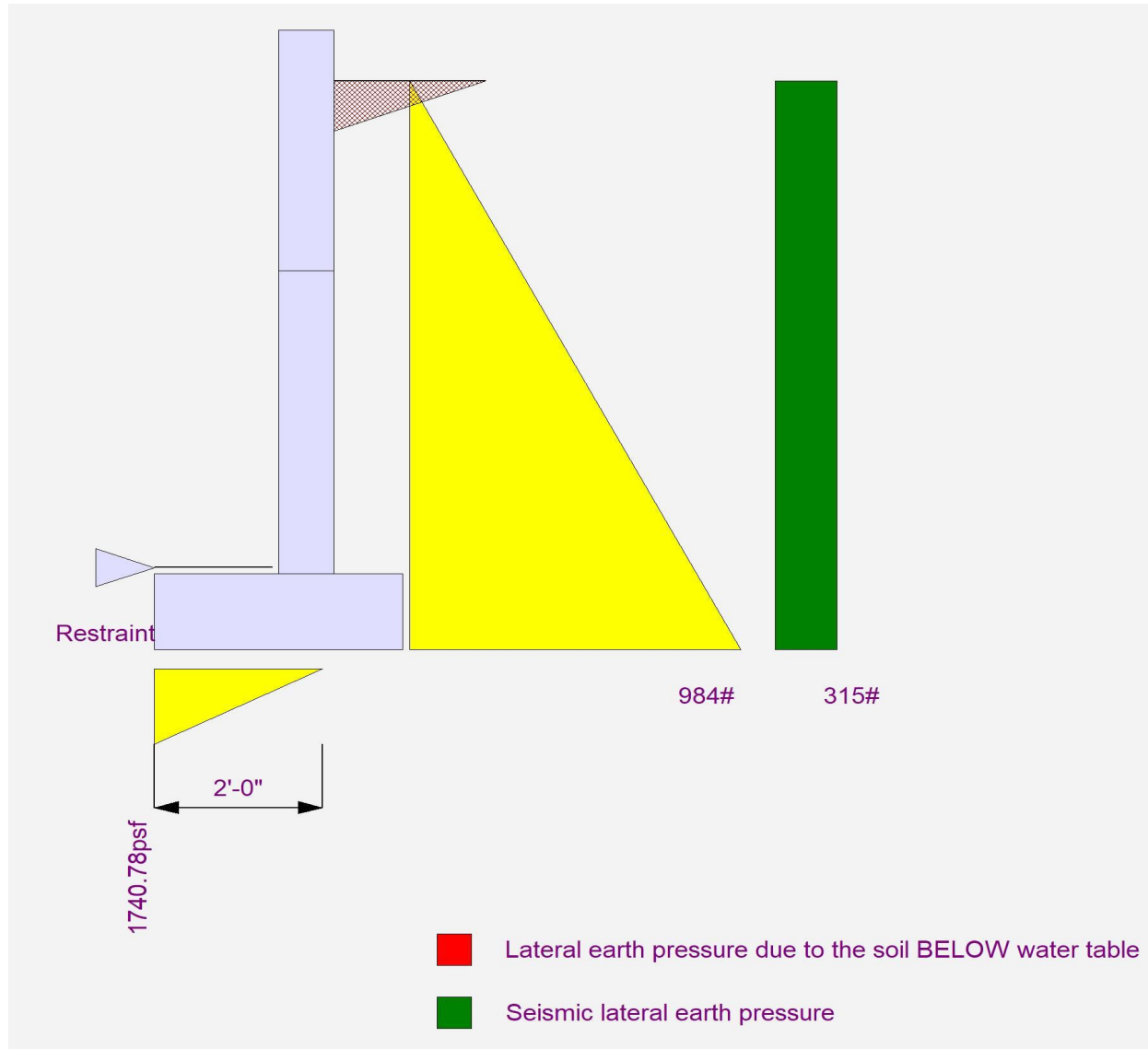
Project File: fnd.ec6

LIC# : KW-06017913, Build:20.23.08.01

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 7' CANT'D WALL @ SLAB



Cantilevered Retaining Wall

Project File: fnd.ec6

LIC# : KW-06017913, Build:20.24.02.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10' CANT'D WALL @ GRADE

Code Reference

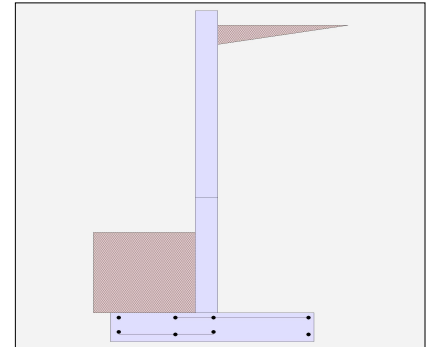
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	10.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	33.60 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	=	8.000
(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	=	88.000
Total Seismic Force	=	968.000

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: fnd.ec6

LIC# : KW-06017913, Build:20.24.02.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10' CANT'D WALL @ GRADE

Design Summary

Wall Stability Ratios

Overturning	=	2.31	OK
Sliding	=	1.57	OK
Global Stability	=	2.31	
Total Bearing Load	=	6,771 lbs	
...resultant ecc.	=	9.35 in	
Eccentricity within middle third			
Soil Pressure @ Toe	=	2,008 psf	NG
Soil Pressure @ Heel	=	249 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Exceeds Allowable!			
ACI Factored @ Toe	=	2,423 psf	
ACI Factored @ Heel	=	301 psf	
Footing Shear @ Toe	=	25.2 psi	OK
Footing Shear @ Heel	=	30.5 psi	OK
Allowable	=	75.0 psi	

PLEASE NOTE 1/3 INCREASE UTILIZED IN SOIL BEARING DUE TO SEISMIC LOADING.



Sliding Calcs

Lateral Sliding Force	=	2,795.1 lbs	
less 100% Passive Force	=	1,680.0 lbs	
less 100% Friction Force	=	2,708.5 lbs	
Added Force Req'd	=	0.0 lbs	OK
...for 1.5 Stability	=	0.0 lbs	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

ft =	Stem OK	Stem OK		
	4.00	0.00		
Wall Material Above "Ht"	=	Concrete	Concrete	
Design Method	=	SD	SD	SD SD
Thickness	=	8.00	8.00	
Rebar Size	=	# 5	# 5	
Rebar Spacing	=	12.00	6.00	
Rebar Placed at	=	6.5 in	6.5 in	

Design Data

fb/FB + fa/Fa	=	0.420	0.853
---------------	---	-------	-------

Total Force @ Section

Service Level	lbs =		
Strength Level	lbs =	1,536.0	3,680.0

Moment....Actual

Service Level	ft-# =		
Strength Level	ft-# =	3,600.0	13,733.3

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

Shear.....Actual

Service Level	psi =		
Strength Level	psi =	19.7	47.2

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: fnd.ec6

LIC# : KW-06017913, Build:20.24.02.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10' CANT'D WALL @ GRADE

Concrete Stem Rebar Area Details

2nd Stem	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
As (based on applied moment) :	0.1294 in2/ft		
(4/3) * As :	0.1726 in2/ft	Min Stem T&S Reinf Area 1.248 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 :	0.31 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	0.8805 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Bottom Stem	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
As (based on applied moment) :	0.4937 in2/ft		
(4/3) * As :	0.6583 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 :	0.4937 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	=	2.50 ft
Heel Width	=	3.50
Total Footing Width	=	6.00
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	2,423	301 psf	
Mu' : Upward	=	6,650	2,549 ft-#	
Mu' : Downward	=	1,718	10,258 ft-#	
Mu: Design	=	4,933 OK	7,709 ft-#	OK
phiMn	=	22,203	13,005 ft-#	
Actual 1-Way Shear	=	25.17	30.47 psi	
Allow 1-Way Shear	=	75.00	75.00 psi	
Toe Reinforcing	=	# 5 @ 6.00 in		
Heel Reinforcing	=	# 5 @ 12.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00 ft-lbs	
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs	

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

Other Acceptable Sizes & Spacings

Toe: #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@ 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

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

<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: fnd.ec6

LIC# : KW-06017913, Build:20.24.02.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10' CANT'D WALL @ GRADE

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	2,117.5	3.67	7,764.2	Soil Over HL (ab. water tbl)	3,116.7	4.58	14,284.7
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		4.58	14,284.7
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =	770.0	1.25	962.5
Seismic Earth Load =	677.6	5.50	3,726.8	Surcharge Over Toe =			
=				Stem Weight(s) =	1,050.0	2.83	2,975.0
Total =	2,795.1	O.T.M. =	11,491.0	Earth @ Stem Transitions =			
				Footing Weight =	900.0	3.00	2,700.0
				Key Weight =			
				Vert. Component =	934.7	6.00	5,608.2
				Total =	6,771.4 lbs	R.M.=	26,530.4

Resisting/Overturning Ratio = **2.31**
 Vertical Loads used for Soil Pressure = 6,771.4 lbs

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

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

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
 Horizontal Defl @ Top of Wall (approximate only) 0.098 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: fnd.ec6

LIC# : KW-06017913, Build:20.24.02.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10' CANT'D WALL @ GRADE

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 =	8.36 in
As Provided =	0.6200 in ² /ft
As Required =	0.4937 in ² /ft

Cantilevered Retaining Wall

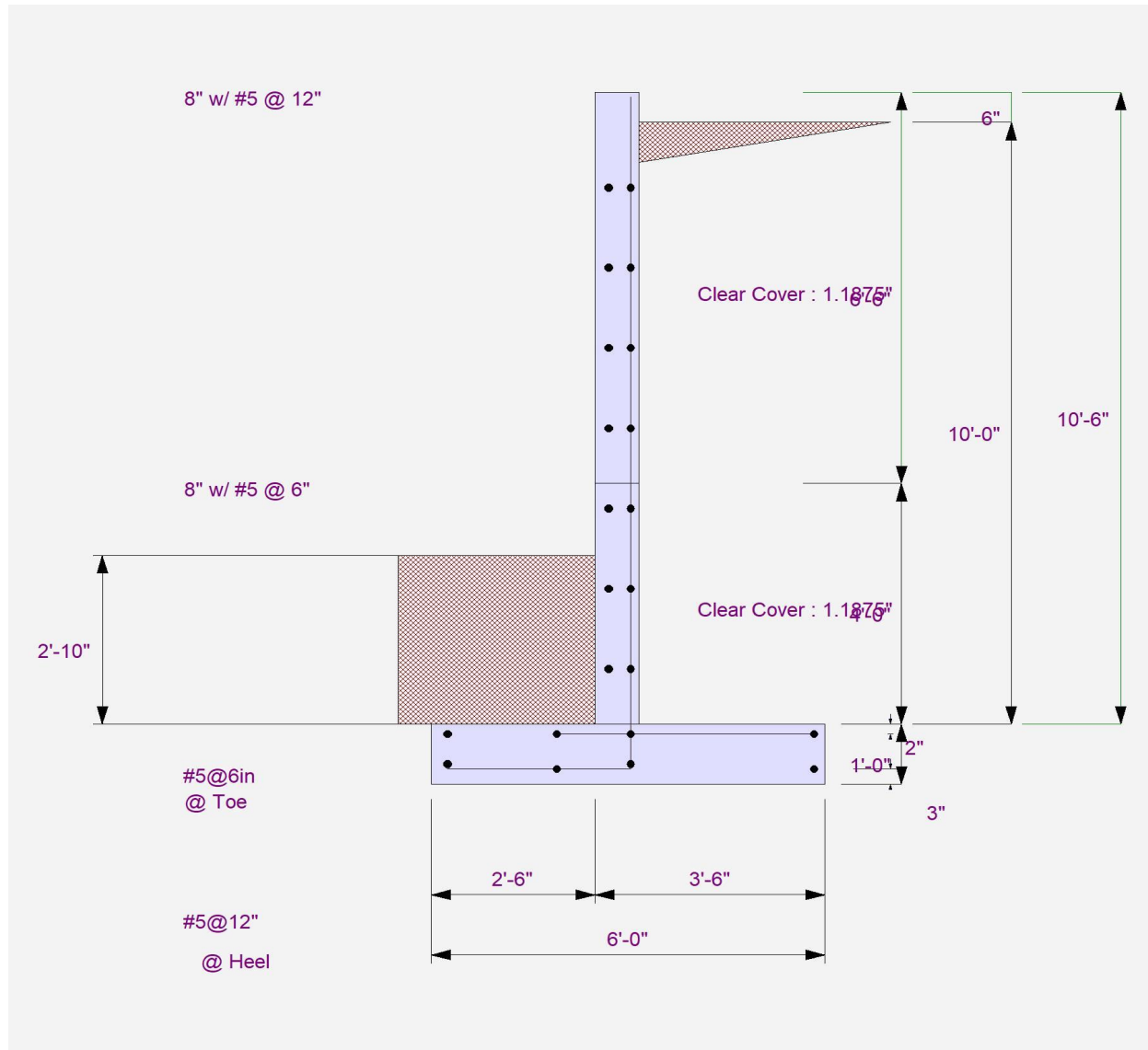
Project File: fnd.ec6

LIC# : KW-06017913, Build:20.24.02.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10' CANT'D WALL @ GRADE



Cantilevered Retaining Wall

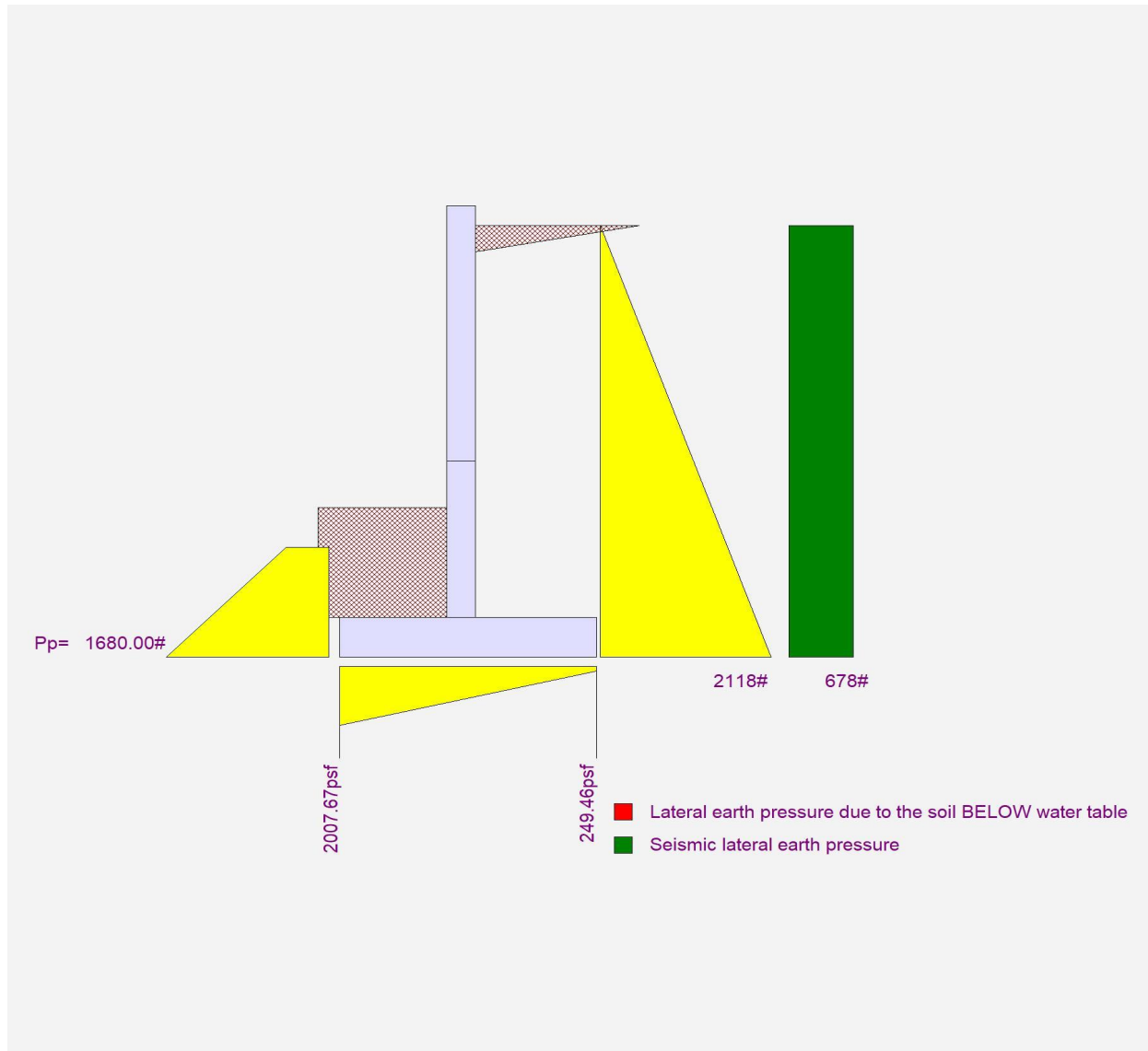
Project File: fnd.ec6

LIC# : KW-06017913, Build:20.24.02.03

MULHERN & KULP STRUCTURAL ENGINEERING INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: 10' CANT'D WALL @ GRADE



JAYMARC HOMES
DUBEY RESIDENCE

MERCER ISLAND, WA

SHEAR WALL CALCULATIONS - WIND

REVIEWED BY: RJZ

APRIL 27, 2023

PARAMETERS:

SINGLE FAMILY HOME

DESIGN WIND SPEED: 100 MPH

WIND EXPOSURE CATEGORY: B

SEISMIC DESIGN CATEGORY: D

CODE & DESIGN STANDARD: 2018 IBC CH. 1609, ASCE 7-16 CH. 26-30



MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

WIND DESIGN SUMMARY PER ASCE 7-16

PARAMETERS:				ROOF GEOMETRY:				BUILDING GEOMETRY:			
WIND SPEED	100	TRANS. ROOF PITCH	4.0 : 12	LENGTH	75	FT					
EXPOSURE CATEGORY	B	LONG. ROOF PITCH	4.0 : 12	WIDTH	37	FT					
RISK CATEGORY	II	MEAN ROOF HEIGHT, H	25.50	FT							
WIND DIRECTIONALITY FACTOR, K_d	0.85										
TOPOGRAPHIC FACTOR, K_{zt}	1.30										
GUST FACTOR, G	0.85										
GROUND ELEV. ABOVE SEA LEVEL [FT]	0										
DESIGN TYPE	ASD										
	0.60										

TRANSVERSE DIRECTION (PERPENDICULAR TO MAIN RIDGE LINE)												
		TRIBUTARY DESIGN AREAS:				TRIBUTARY DESIGN LOADS: (0.6W)						
DIAPHRAGM LEVEL	FLOOR-TO-FLOOR HEIGHT		SECTION			sq ft	SECTION			kips		
			A	Q	B		A	Q	B			
3	9.1	Roof Surface	0	181	0	sq ft	0.00	5.65	0.00	kips		
		Wall surface	0	357	0	sq ft	0.00	5.65	0.00	kips		
										Total Shear	5.65	kips
2	11.56	Roof Surface	0	0	0	sq ft	0.00	10.21	0.00	kips		
		Wall surface	0	834	0	sq ft	0.00	15.86	0.00	kips		
										Total Shear	15.86	kips
1	10.66	Roof Surface	0	0	0	sq ft	0.00	4.64	0.00	kips		
		Wall surface	0	405	0	sq ft	0.00	20.50	0.00	kips		
										Total Shear	20.50	kips
FND		Roof Surface	0	0	0	sq ft	0.00	0.00	0.00	kips		
		Wall surface	0	0	0	sq ft	0.00	20.50	0.00	kips		
										Total Shear	20.50	kips

LONGITUDINAL DIRECTION (PARALLEL TO MAIN RIDGE LINE)												
		TRIBUTARY DESIGN AREAS:				TRIBUTARY DESIGN LOADS: (0.6W)						
DIAPHRAGM LEVEL	FLOOR-TO-FLOOR HEIGHT		SECTION			sq ft	SECTION			kips		
			A	Q	B		A	Q	B			
3	9.1	Roof Surface	0	100	0	sq ft	0.00	2.31	0.00	kips		
		Wall surface	0	153	0	sq ft	0.00	2.31	0.00	kips		
										Total Shear	2.31	kips
2	11.56	Roof Surface	0	31	0	sq ft	0.00	3.90	0.00	kips		
		Wall surface	0	360	0	sq ft	0.00	6.21	0.00	kips		
										Total Shear	6.21	kips
1	10.66	Roof Surface	0	0	0	sq ft	0.00	1.84	0.00	kips		
		Wall surface	0	192	0	sq ft	0.00	8.03	0.00	kips		
										Total Shear	8.03	kips
FND		Roof Surface	0	0	0	sq ft	0.00	0.00	0.00	kips		
		Wall surface	0	0	0	sq ft	0.00	8.03	0.00	kips		
										Total Shear	8.03	kips



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

LOWER FLOOR PLAN NOTES

PLAN SPECIFIC 2018 WSEC, SECTION R406

R406.2 ADDITIONAL ENERGY EFFICIENCY REQUIREMENTS (MANDATORY). THIS RESIDENTIAL DWELLING SHALL COMPLY W/SUFFICIENT OPTIONS FROM TABLE R406.2 TO ACHIEVE THE FOLLOWING MIN. NUMBER OF CREDITS: 6 FOR A 1501sf to 4,999sf HOME.

CREDITS PROVIDED IN THIS HOME AS FOLLOWS:
EFFICIENT BUILDING ENVELOPE, OPT. 1.3, 0.5 CREDITS
PRESCRIPTIVE COMPLIANCE IS BASED ON TABLE R402.1.1 WITH FOLLOWING MODIFICATIONS:

VERTICAL FENESTRATION U = 0.28 WINDOWS
FLOORS TO BE R-38 and SLAB ON GRADE TO BE R-10 PERIMETER and UNDER ENTIRE SLAB BELOW GRADE.

AIRLEAKAGE & EFFICIENT VENTILATION, OPT. 2.1, 0.5 CREDITS
REDUCE THE TESTED AIR LEAKAGE TO 3.0 AIR CHANGES PER HOUR MAXIMUM @ 75 PA. THE I.R.G. OR EFFICIENCY ID WITH THE FURNACE FA INCLUDING A CONTROLLER MODE.

HIGH EFFICIENCY HVAC EQUIPMENT AND ASSOCIATED DUCT SYSTEM(S) INSTALLATION SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACE IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

HIGH EFFICIENCY HVAC DISTRIBUTION, OPT. 4.2, 1.0 CREDITS
HVAC EQUIPMENT AND ASSOCIATED DUCT SYSTEM(S) SHALL COMPLY WITH THE REQUIREMENTS OF SECT R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

SQUARE FOOTAGE SUMMARY

BASEMENT LIVING AREA	1,098	S.F.
LESS BASEMENT EXCLUSION	-1,098	S.F.
NET BASEMENT	0	S.F.
MAIN FLOOR LIVING AREA	1,454	S.F.
2 CAR GARAGE	475	S.F.
TOTAL MAIN FLOOR	1,934	S.F.
UPPER FLOOR AREA	1,554	S.F.
TOTAL NET AREA	3,488	S.F.
STAIR DEDUCTIONS	-208	S.F.
TOTAL FAR PROPOSED	3,280	S.F.
TOTAL LOT SIZE	8,462	S.F.
MAXIMUM FAR @ 40%	3,384	S.F.
LOT AREA	3,280	S.F.
TOTAL FAR PROPOSED	3,280	S.F.
COVD PORCH	27	S.F.

Updated: 10.21.25
Method for Calculating Square Footage - ANSI Z165-2013 except, no separate distinction of above-grade or below-grade areas and each level is measured to the outside of studs not the exterior finished surface.
Square Footage calculations for this house were made based on plan dimensions only and may vary from the finished square footage of the house as built.
See sheet "CODES" for additional Zoning required Area Calculations

Issue	Issue Date	By	Description
△	10.21.25		PLAN REVISIONS

Dubey - Dwivedi
8434 SE 39th ST.
Mercer Island, WA.
Job Number: JMC025

plan name: -
marketing name: -
plan number: -
mark sys. number: -

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

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

© 2017 JayMarc Homes, LLC; All rights reserved.

02.06.24
Submitted Date

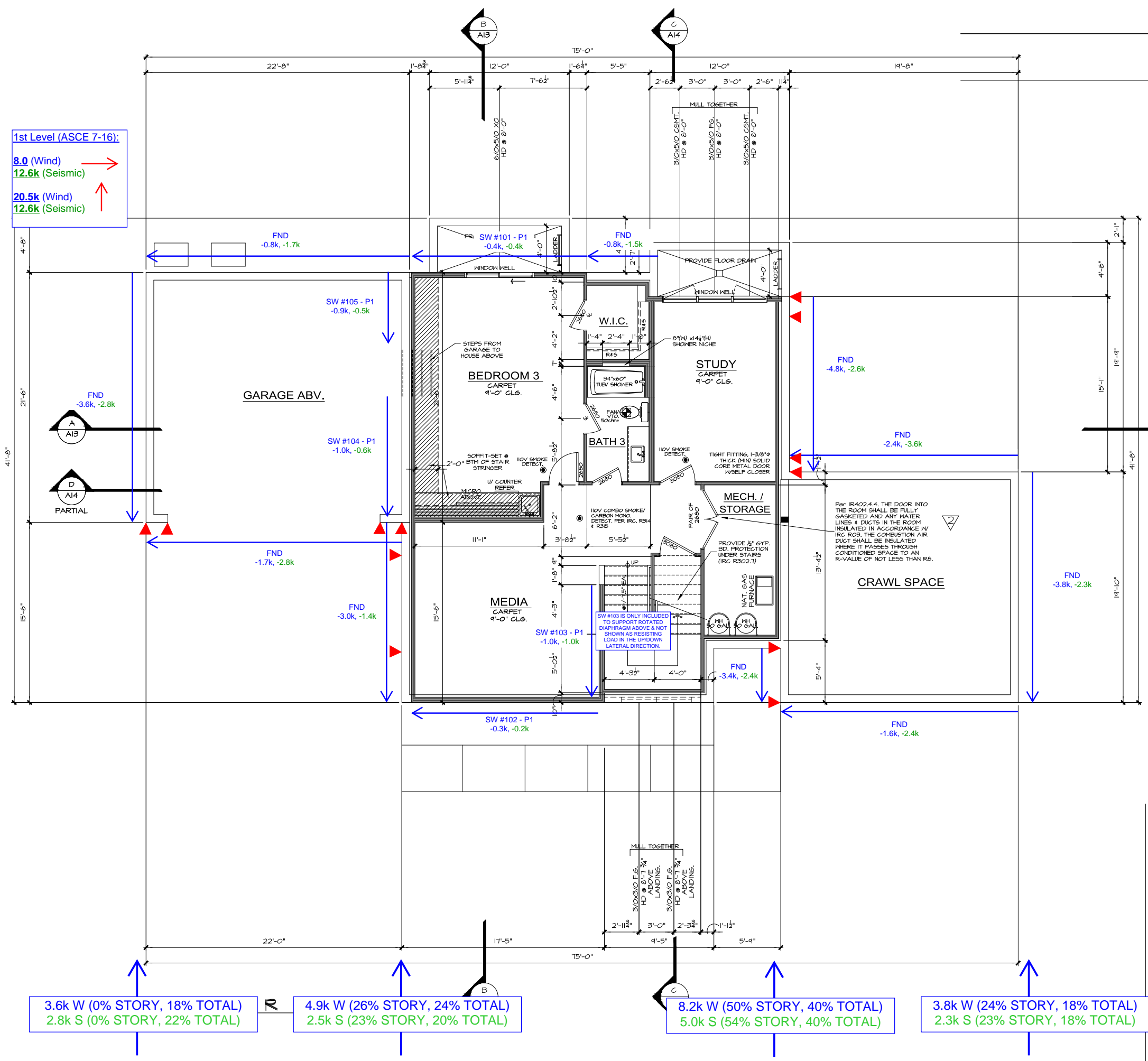
Sheet Title/Description
JAYMARC HOMES
Design Firm

R.K.N.
Drawn by:

Checked by:

Primary Scale

A4 of .



1st Level (ASCE 7-16):
8.0 (Wind) →
12.6k (Seismic) →
20.5k (Wind) ↑
12.6k (Seismic) ↑

2.0k W (22% STORY, 25% TOTAL)
3.6k S (23% STORY, 21% TOTAL)

4.1k W (50% STORY, 51% TOTAL)
6.4k S (46% STORY, 51% TOTAL)

1.9k W (28% STORY, 24% TOTAL)
2.6k S (31% STORY, 28% TOTAL)

3.6k W (0% STORY, 18% TOTAL)
2.8k S (0% STORY, 22% TOTAL)

4.9k W (26% STORY, 24% TOTAL)
2.5k S (23% STORY, 20% TOTAL)

8.2k W (50% STORY, 40% TOTAL)
5.0k S (54% STORY, 40% TOTAL)

3.8k W (24% STORY, 18% TOTAL)
2.3k S (23% STORY, 18% TOTAL)



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

MAIN FLOOR PLAN NOTES

PLAN SPECIFIC 2018 WSEC, SECTION R06

R406.2 ADDITIONAL ENERGY EFFICIENCY REQUIREMENTS (MANDATORY). THIS RESIDENTIAL DWELLING SHALL COMPLY WITH SUFFICIENT OPTIONS FROM TABLE R406.2 TO ACHIEVE THE FOLLOWING MIN. NUMBER OF CREDITS: 6 FOR A 1501sf to 4999sf HOME.

CREDITS PROVIDED IN THIS HOME AS FOLLOWS:
EFFICIENT BUILDING ENVELOPE, OPT. 1.3, 0.5 CREDITS
PRESCRIPTIVE COMPLIANCE IS BASED ON TABLE R402.11 WITH FOLLOWING MODIFICATIONS:
VERTICAL FENESTRATION U = 0.28 WINDOWS
FLOORS TO BE R-38 and SLAB ON GRADE TO BE R-10 PERIMETER and UNDER ENTIRE SLAB BELOW GRADE.

AIRLEAKAGE & EFFICIENT VENTILATION, OPT. 2.1, 0.5 CREDITS

REDUCE THE TESTED AIR LEAKAGE TO 3.0 AIR CHANGES PER HOUR MAXIMUM @ 75 PA. ALL EXHAUST AND INTAKE VENTILATION REQUIREMENTS SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING EXHAUST VENTILATION OUTSIDE OF THE CONDITIONED SPACE IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

HIGH EFFICIENCY HVAC EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING EXHAUST VENTILATION OUTSIDE OF THE CONDITIONED SPACE IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

HIGH EFFICIENCY HVAC DISTRIBUTION, OPT. 4.2, 1.0 CREDITS

HVAC EQUIPMENT AND ASSOCIATED DUCT SYSTEM(S) SHALL COMPLY WITH THE REQUIREMENTS OF SECT R403.3.7. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRANK SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1
WATER HEATING SYSTEM WITH ENERGY STAR RATED FOR TIER 1 OF 1
WATER HEATING SYSTEM WITH ENERGY STAR RATED FOR TIER 1 OF 1

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M501 and IMC R403.8 USING LAUNDRY ROOM EXHAUST FAN AS THE EXHAUST AIR HANDLER. SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

SYMBOL	LOCATION	MIN. FAN REQUIREMENTS (ALL FANS VENT TO OUTSIDE)
BATH #	BATH #	Min. 50cfm, INTERMITTENT at .025mg per TBL M507.4
KITCHEN	KITCHEN	Min. 100cfm, INTERMITTENT at .025mg per TBL M507.4
RANGE HOOD	RANGE HOOD	MIN. 100cfm, INTERMITTENT at .025mg per TBL M507.4
LAUNDRY ROOM	LAUNDRY ROOM	MIN. 360cfm, INTERMITTENT at .025mg TO FUNCTION AS WHOLE HOUSE FAN (WHF)

MECHANICAL CONTRACTOR TO SIZE WHF, FAN and SET OPERATING TIMER per TABLE M507.3(3) FOR A 3,001-4,500sf. DWELLING w/4-5 BEDRMS. TO OPERATE INTERMITTENTLY and CONTINUOUSLY per TABLE M507.3(2)
PROVIDE CONTROLS FOR WHF per M507.3.2 AFFIX LABEL TO CONTROLS THAT READS "WHOLE HOUSE VENTILATION - SEE OPERATING INSTRUCTIONS"

plan name:	marking name:	plan number:	mark sys. number:

Issue	Issue Date	By	Description
	10.21.25		PLAN REVISIONS

Dubey - Dwivedi
8434 SE 39th ST.
Mercer Island, WA.
Job Number: JMC025

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

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

© 2017 JayMarc Homes, LLC; All rights reserved.

02.06.24
Submission Date

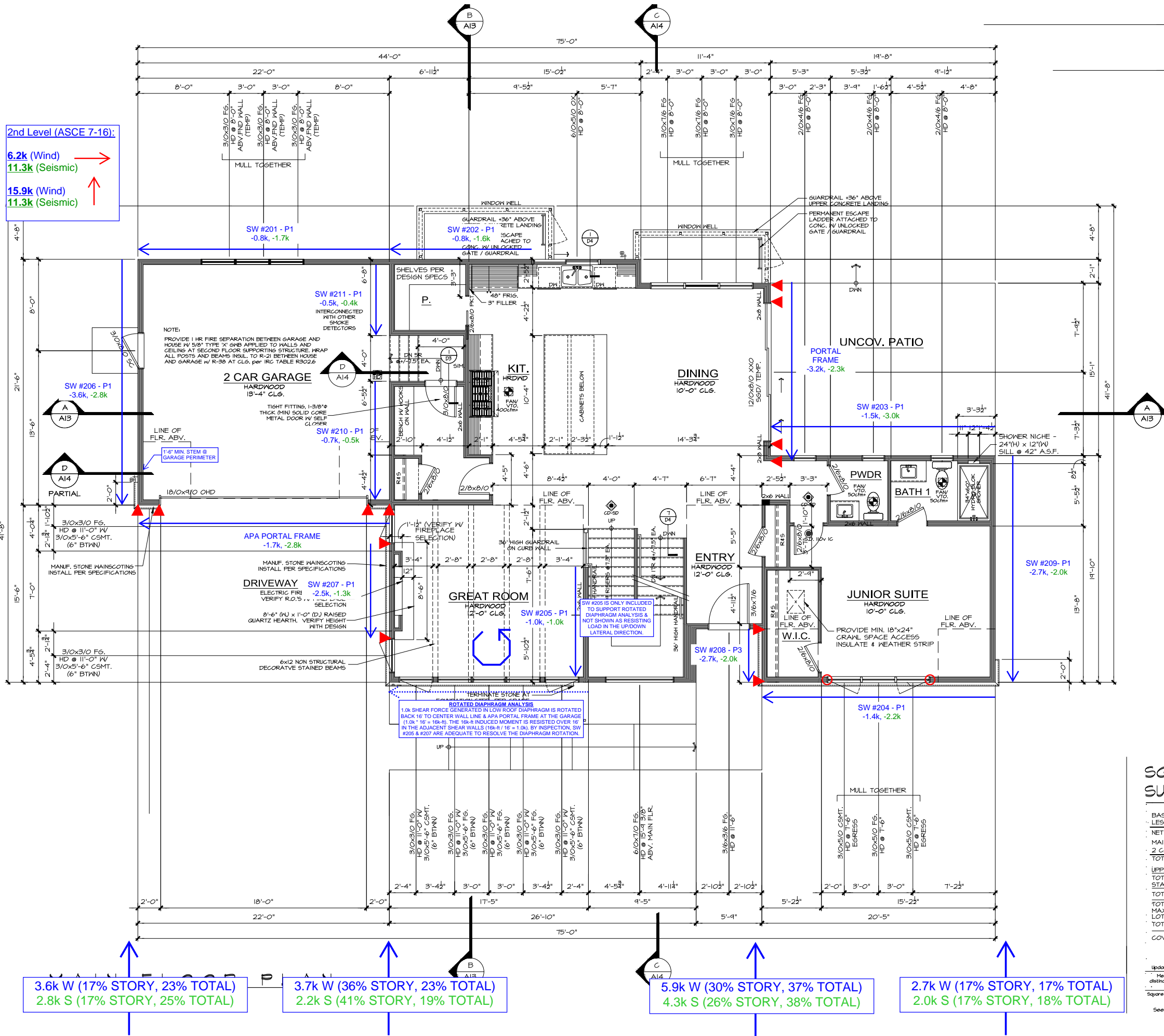
Sheet Title/Description
JAYMARC HOMES
Design Firm

R.K.N.
Drawn by:

Checked by:

Primary Scale

A6
of:



1.6k W (26% STORY, 26% TOTAL)
2.6k S (26% STORY, 29% TOTAL)

3.2k W (51% STORY, 51% TOTAL)
5.8k S (50% STORY, 51% TOTAL)

1.4k W (23% STORY, 23% TOTAL)
2.2k S (24% STORY, 20% TOTAL)

2nd Level (ASCE 7-16):
6.2k (Wind)
11.3k (Seismic)
15.9k (Wind)
11.3k (Seismic)

3.6k W (17% STORY, 23% TOTAL)
2.8k S (17% STORY, 25% TOTAL)

3.7k W (36% STORY, 23% TOTAL)
2.2k S (41% STORY, 19% TOTAL)

5.9k W (30% STORY, 37% TOTAL)
4.3k S (26% STORY, 38% TOTAL)

2.7k W (17% STORY, 17% TOTAL)
2.0k S (17% STORY, 18% TOTAL)

SQUARE FOOTAGE SUMMARY

BASEMENT LIVING AREA	1,098 S.F.
LESS BASEMENT EXCLUSION	-1,098 S.F.
NET BASEMENT	0 S.F.
MAIN FLOOR LIVING AREA	1,459 S.F.
2 CAR GARAGE	475 S.F.
TOTAL MAIN FLOOR	1,934 S.F.
UPPER FLOOR AREA	1,554 S.F.
TOTAL NET AREA	3,488 S.F.
STAIR DEDUCTIONS	-208 S.F.
TOTAL FAR PROPOSED	3,280 S.F.
TOTAL LOT SIZE:	8,462 S.F.
MAXIMUM FAR @ 40%:	3,384 S.F.
LOT AREA	3,384 S.F.
TOTAL FAR PROPOSED	3,280 S.F.
COVID PORCH	27 S.F.

Updated: 10.21.25
Method for Calculating Square Footage - ANSI Z765-2019 except, no separate distinction of above-grade or below-grade areas and each level is measured to the outside of finished walls and the exterior finished surface.
Square footage calculations for this house were made based on plan dimensions only and may vary from the finished square footage of the house as built.
See Sheet "CODES" for additional Zoning required Area Calculations

UPPER FLOOR PLAN NOTES:

PLAN SPECIFIC 2018 WSEC. SECTION R406
 R406.2 ADDITIONAL ENERGY EFFICIENCY REQUIREMENTS (MANDATORY). THIS RESIDENTIAL DWELLING SHALL COMPLY W/ SUFFICIENT OPTIONS FROM TABLE R406.2 TO ACHIEVE THE FOLLOWING MIN. NUMBER OF CREDITS:
 6 FOR a 1501sf to 4,999sf HOME.
 CREDITS PROVIDED IN THIS HOME AS FOLLOWS:

EFFICIENT BUILDING ENVELOPE OPT. 1.3: 0.5 CREDITS
 PRESCRIPTIVE COMPLIANCE IS BASED ON TABLE R402.1 WITH FOLLOWING MODIFICATIONS:
 VERTICAL PENETRATION U = 0.28 WINDOWS
 FLOORS TO BE R-38 and SLAB ON GRADE TO BE R-10 PERIMETER and UNDER ENTIRE SLAB BELOW GRADE.
AIRLEAKAGE & EFFICIENT VENTILATION OPT. 2.1: 0.5 CREDITS
 REDUCE THE TESTED AIR LEAKAGE TO 3.0 AIR CHANGES PER HOUR MAXIMUM @ 50 PASCALS AND ALL WHOLE HOUSE VENTILATION REQUIREMENTS AS DETERMINED BY SECTION M501.3 OF THE I.R.C. OR SECTION 404.8 OF THE I.M.C. SHALL BE MET WITH A HIGH EFFICIENCY FAN(S) (MAXIMUM OF 0.35 WATTS/CFM), NOT INTERLOCKED WITH THE FURNACE FAN (IF PRESENT). VENTILATION SYSTEMS USING A FURNACE INCLUDING AN I.M.C. MOTOR PROVIDED THAT THEY ARE CONTROLLABLE IN THE VENTILATION MODE.
0.6k W (26%)
1.9k S (32%)

HIGH EFFICIENT HVAC EQUIPMENT OPT. 4.1: 1.0 CREDITS
 HVAC EQUIPMENT(S) INSTALLATION SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN UNFINISHED ATTIC SPACE IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.
HIGH EFFICIENT HVAC DISTRIBUTION OPT. 4.2: 1.0 CREDITS
 HVAC EQUIPMENT AND ASSOCIATED DUCT SYSTEM(S) SHALL COMPLY WITH THE REQUIREMENTS OF SECT R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING 5.4: 1.5 CREDITS
 WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
 ELECTRIC HEAT PUMP WATER HEATER MEETING THE STANDARDS FOR Tier 1 of NEEA'S ADVANCED WATER HEATING SPECIFICATION, IF ONE WATER IS SERVING MORE THAN ONE DWELLING UNIT, ALL HOT WATER SUPPLY AND REGULATION PIPING SHALL BE INSULATED WITH R-8 MINIMUM PIPE INSULATION.

WHOLE HOUSE VENTILATION
 PROVIDE WHOLE HOUSE VENTILATION USING LAUNDRY ROOM EXHAUST FAN OR RANGE HOOD WITH DOWN DRAFT EXHAUST FAN RATED AT MIN. 100cfm, at 0.10mg/m³ MAY BE USED FOR EXHAUST FAN REGMT. EXHAUST HOODS IN EXCESS OF 400cfm. SHALL BE INTERLOCKED AND PROVIDE MAKE UP AIR per M503.4.
1.2k W (52%)
3.1k S (53%)

SYMBOL	LOCATION	MIN. FAN REQUIREMENTS (ALL FANS VENT TO OUTSIDE)
	BATH # POWDER	Min. 50cfm, INTERMITTENT at .025mg per TABLE M501.4
	KITCHEN	Min. 100cfm, INTERMITTENT at .025mg per TBL. M501.4
	RANGE HOOD or DOWN DRAFT EXHAUST FAN	RATED AT MIN. 100cfm, at 0.10mg/m³ MAY BE USED FOR EXHAUST FAN REGMT. EXHAUST HOODS IN EXCESS OF 400cfm. SHALL BE INTERLOCKED AND PROVIDE MAKE UP AIR per M503.4.
	LAUNDRY ROOM	MIN. 360cfm, INTERMITTENT at .025mg TO FUNCTION AS WHOLE HOUSE FAN (WHF.)

MECHANICAL CONTRACTOR TO SIZE WHF, FAN and SET OPERATING TIMER per TABLE M501.3.3(1) FOR A 3,001-4,500sf. DWELLING w/4-5 BEDRMS. TO OPERATE INTERMITTENTLY and CONTINUOUSLY per TABLE M501.3.3(2)
 PROVIDE CONTROLS FOR WHF, per M501.3.2 AFFIX LABEL TO CONTROLS THAT READS "WHOLE HOUSE VENTILATION - SEE OPERATING INSTRUCTIONS"

plan name: _____
 marking name: _____
 plan number: _____
 mark sys. number: _____

Issue Issue Date By
 Description

10.21.25
 PLAN REVISIONS

Dubey - Dwivedi
 8434 SE 39th ST.
 Mercer Island, WA.
 Job Number: JMC025

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

The drawings in this set are instruments of service and shall remain the property of JayMarc Homes, LLC.
 © 2017 JayMarc Homes, LLC; All rights reserved.

02.06.24
 Submittal Date

Sheet Title/Description

JAYMARC HOMES
 Design Firm

R.K.N.
 Drawn by:

Checked by:

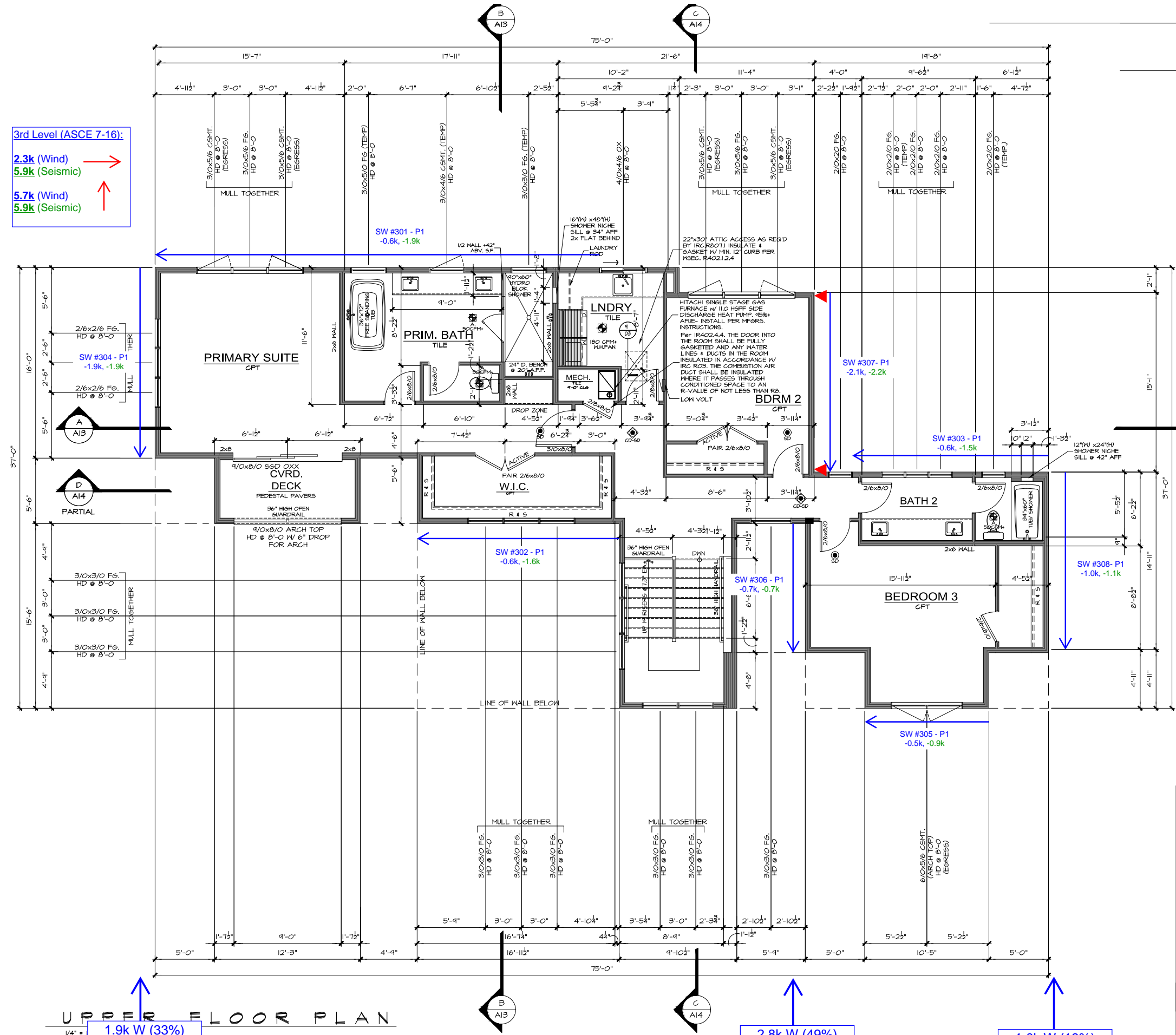
Primary Scale

A8 of:

SQUARE FOOTAGE SUMMARY

BASEMENT LIVING AREA	1,048	S.F.
LESS BASEMENT EXCLUSION	-1,048	S.F.
NET BASEMENT	0	S.F.
MAIN FLOOR LIVING AREA	1,459	S.F.
2 CAR GARAGE	475	S.F.
TOTAL MAIN FLOOR	1,934	S.F.
UPPER FLOOR AREA	1,554	S.F.
TOTAL NET AREA	3,488	S.F.
STAIR DEDUCTIONS	-208	S.F.
TOTAL FAR PROPOSED	3,280	S.F.
TOTAL LOT SIZE:	8,462	S.F.
MAXIMUM FAR @ 40%:	3,384	S.F.
LOT AREA	3,384	S.F.
TOTAL FAR PROPOSED	3,280	S.F.
COVID PORCH	27	S.F.

Updated: 10.21.25
 Method for Calculating Square Footage - ANSI Z165-2013 except, no separate distinction of 'above-grade or below-grade' areas and each level is measured to the outside of studs not the exterior finished surface.
 Square footage calculations for this home were made based on plan dimensions only and may vary from the finished square footage of the house as built.
 See Sheet 'CODES' for additional Zoning required Area Calculations



3rd Level (ASCE 7-16):
 2.3k (Wind) →
 5.9k (Seismic) →
 5.7k (Wind) ↑
 5.9k (Seismic) ↑

→
0.5k W (22%)
0.9k S (15%)

↑
1.9k W (33%)
1.9k S (32%)

↑
2.8k W (49%)
2.9k S (49%)

↑
1.0k W (18%)
1.1k S (19%)

UPPER FLOOR PLAN

Sheet Title/Description



Shearwall Design Summary

Shearwall 301: 3rd - Rear Ext. Wall @ Primary, Primary Bath, Laundry

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 302: 3rd - Front Ext. Wall @ W.I.C.

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 303: 3rd - Rear Ext. Wall @ Bath 2

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 304: 3rd - Side Ext. Wall @ Primary

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 305: 3rd - Front Ext. Wall @ Bed 3

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 306: 3rd - Side Ext. Wall @ Bed 3 (Left)

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 307: 3rd - Side Ext. Wall @ Bed 2

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

SIMPSON CS16 STRAP TIE (14" END LENGTH)

Shearwall #

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs #REF! Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

#REF!
#REF!
#REF!

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

#REF!



Shearwall Design Summary

Shearwall _____ #

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

Shearwall **308**: 3rd - Side Ext. Wall @ Bed 3 (Right)

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs Allowable Shearwall Capacity lbs

<

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification



Shearwall Design Summary

Shearwall 201: 2nd - Rear Ext. Wall @ Garage

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL plf Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 202: 2nd - Rear Ext. Wall @ Kitchen

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL plf Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 203: 2nd - Rear Ext. wall @ Powder, Bath 1

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 204: 2nd - Front Ext. Wall @ Junior Suite

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 205: 2nd - Side Int. Wall @ Great Rm.

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 206: 2nd - Side Ext. Wall @ Garage

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 207: 2nd - Side Ext. Wall @ Great Rm.

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

Shearwall 208: 2nd - Side Ext./Int. Wall @ Entry

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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 pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN



Shearwall Design Summary

Shearwall 209: 2nd - Side Ext. Wall @ Junior Suite

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 210: 2nd - Side Int. Wall @ Garage

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 101: 1st - Rear Ext. Wall @ Bed 3

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL plf Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 102: 1st - Front Ext Wall @ Play Rm.

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL plf Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 103: 1st - Side Int Wall @ Play Room

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL plf Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 211: 2nd - Side Int. Wall @ Garage

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL plf Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 104: 1st - Side Int Wall @ Garage

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 105: 1st - Side Int Wall @ Garage

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

JAYMARC HOMES
DUBEY RESIDENCE

MERCER ISLAND, WA

SHEAR WALL CALCULATIONS - SEISMIC

REVIEWED BY: RJZ

APRIL 27, 2023

PARAMETERS:

SINGLE FAMILY HOME

DESIGN WIND SPEED: 100 MPH

WIND EXPOSURE CATEGORY: B

SEISMIC DESIGN CATEGORY: D

CODE & DESIGN STANDARD: 2018 IBC CH. 1609, ASCE 7-16 CH. 26-30



MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SEISMIC CALCULATION - ASCE 7-16

SEISMIC DESIGN CATEGORY:

USER INPUTS:

SITE CLASS	D
SPECTRAL RESPONSE ACCELERATION 0.2 SEC, S_s	1.407
SPECTRAL RESPONSE ACCELERATION 1.0 SEC, S₁	0.489
OCCUPANCY CATEGORY	II

VARIABLES:

SITE COEFFICIENT, F _A	1.20
SITE COEFFICIENT, F _V	1.81

CALCULATED VALUES:

MAXIMUM SPECTRAL RESPONSE ACCELERATION, S_{MS}	1.688
MAXIMUM SPECTRAL RESPONSE ACCELERATION, S_{M1}	0.886
DESIGN SPECTRAL RESPONSE ACCELERATION, S_{DS}	1.126
DESIGN SPECTRAL RESPONSE ACCELERATION, S_{D1}	0.590
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	31

CALCULATED VALUES:

APPROXIMATE FUNDAMENTAL PERIOD, T _A	0.265
T ₀	0.105
T _S	0.525
SPECTRAL RESPONSE ACC., S _A (G)	1.126

SITE CLASS ASSUMPTION

YES PER ASCE 7-16 SECTION 11.4.3 THE SITE CLASS MAY BE ASSUMED TO BE D

EQUIVALENT LATERAL FORCE PROCEDURE

DEAD LOAD CALCULATION:

LEVEL	STORY HT. (FT.)	AREA (FT ²)	DEAD LOAD (PSF)	DL OF EXT WALL TRIB. TO LEVEL (KIPS)	TOTAL LEVEL DL
1	10.7	1402	15	1.9	23 K
2	11.6	2013	15	15.0	45 K
3	9.1	1647	17	7.5	35 K
4	0.0	0	0	0.0	0 K
5	0.0	0	0	0.0	0 K
6	0.0	0	0	0.0	0 K
7	0.0	0	0	0.0	0 K
8	0.0	0	0	0.0	0 K
9	0.0	0	0	0.0	0 K
10	0.0	0	0	0.0	0 K
11	0.0	0	0	0.0	0 K
12	0.0	0	0	0.0	0 K
13	0.0	0	0	0.0	0 K
14	0.0	0	0	0.0	0 K
15	0.0	0	0	0.0	0 K
16	0.0	0	0	0.0	0 K
17	0.0	0	0	0.0	0 K
18	0.0	0	0	0.0	0 K
19	0.0	0	0	0.0	0 K
20	0.0	0	0	0.0	0 K

TOTAL DEAD LOAD OF STRUCTURE 104 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	0.173	0.173

BASE SHEARS:

ULTIMATE LOADS

x 0.7 =

ALLOWABLE LOADS

TRANSVERSE	LONGITUDINAL	TRANSVERSE	LONGITUDINAL
18 K	18 K	12.6 K	12.6 K

STORY SHEAR CALCULATION:

DISTRIBUTION EXPONENT, **1.00**

ULTIMATE LOADS

x 0.7 =

ALLOWABLE LOADS

LEVEL	VERT. DIST. FACTOR, C _{vk}	TRANSVERSE		LONGITUDINAL		TRANSVERSE		LONGITUDINAL	
		STORY SHEAR, F _v	STORY SHEAR, F _v	STORY SHEAR, F _v	STORY SHEAR, F _v	STORY SHEAR, F _v	STORY SHEAR, F _v	STORY SHEAR, F _v	STORY SHEAR, F _v
1	0.103	1.9	1.9	1.3	1.3	12.6	12.6	1.3	1.3
2	0.426	7.6	7.6	5.3	5.3	11.3	11.3	5.3	5.3
3	0.471	8.4	8.4	5.9	5.9	5.9	5.9	5.9	5.9
4	0.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0



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

Issue	Issue Date	By	Description
10,21,25			PLAN REVISIONS

Dubey - Dwivedi
8434 SE 39th ST.
Mercer Island, WA.
Job Number: JMC025

plan name:	-
marketing name:	-
plan number:	-
mark sys. number:	-

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

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

© 2017 JayMarc Homes, LLC; All rights reserved.

02.06.24
Submitted Date

Sheet Title/Description
JAYMARC HOMES

Design Firm

R.K.N.
Drawn by:

Checked by:

Primary Scale

A4 of .

LOWER FLOOR PLAN NOTES

PLAN SPECIFIC 2018 WSEC, SECTION R406

R406.2 ADDITIONAL ENERGY EFFICIENCY REQUIREMENTS (MANDATORY). THIS RESIDENTIAL DWELLING SHALL COMPLY W/SUFFICIENT OPTIONS FROM TABLE R406.2 TO ACHIEVE THE FOLLOWING MIN. NUMBER OF CREDITS: 6 FOR A 1501sf to 4,999sf HOME.

CREDITS PROVIDED IN THIS HOME AS FOLLOWS:
EFFICIENT BUILDING ENVELOPE, OPT. 1.3, 0.5 CREDITS
PRESCRIPTIVE COMPLIANCE IS BASED ON TABLE R402.1.1 WITH FOLLOWING MODIFICATIONS:

VERTICAL FENESTRATION U = 0.28 WINDOWS
FLOORS TO BE R-38 and SLAB ON GRADE TO BE R-10 PERIMETER and UNDER ENTIRE SLAB BELOW GRADE.

AIRLEAKAGE & EFFICIENT VENTILATION, OPT. 2.1, 0.5 CREDITS
REDUCE THE TESTED AIR LEAKAGE TO 3.0 AIR CHANGES PER HOUR MAXIMUM @ 0.05 INCHES WATER GAGE DIFFERENTIAL.

HIGH EFFICIENCY HVAC EQUIPMENT AND ASSOCIATED DUCT SYSTEM(S) INSTALLATION SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN CONDITIONED CRAWL SPACE IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

HIGH EFFICIENCY HVAC DISTRIBUTION, OPT. 4.2, 1.0 CREDITS
HVAC EQUIPMENT AND ASSOCIATED DUCT SYSTEM(S) SHALL COMPLY WITH THE REQUIREMENTS OF SECT R403.3.1. LOCATING SYSTEM COMPONENTS IN UNCONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R408.4.1.1. WATER IS SUPPLY A MINIMUM FLOW RATE OF 0.5 GPM AT 120°F.

WATER HEATING EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R408.4.1.1. WATER IS SUPPLY A MINIMUM FLOW RATE OF 0.5 GPM AT 120°F.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

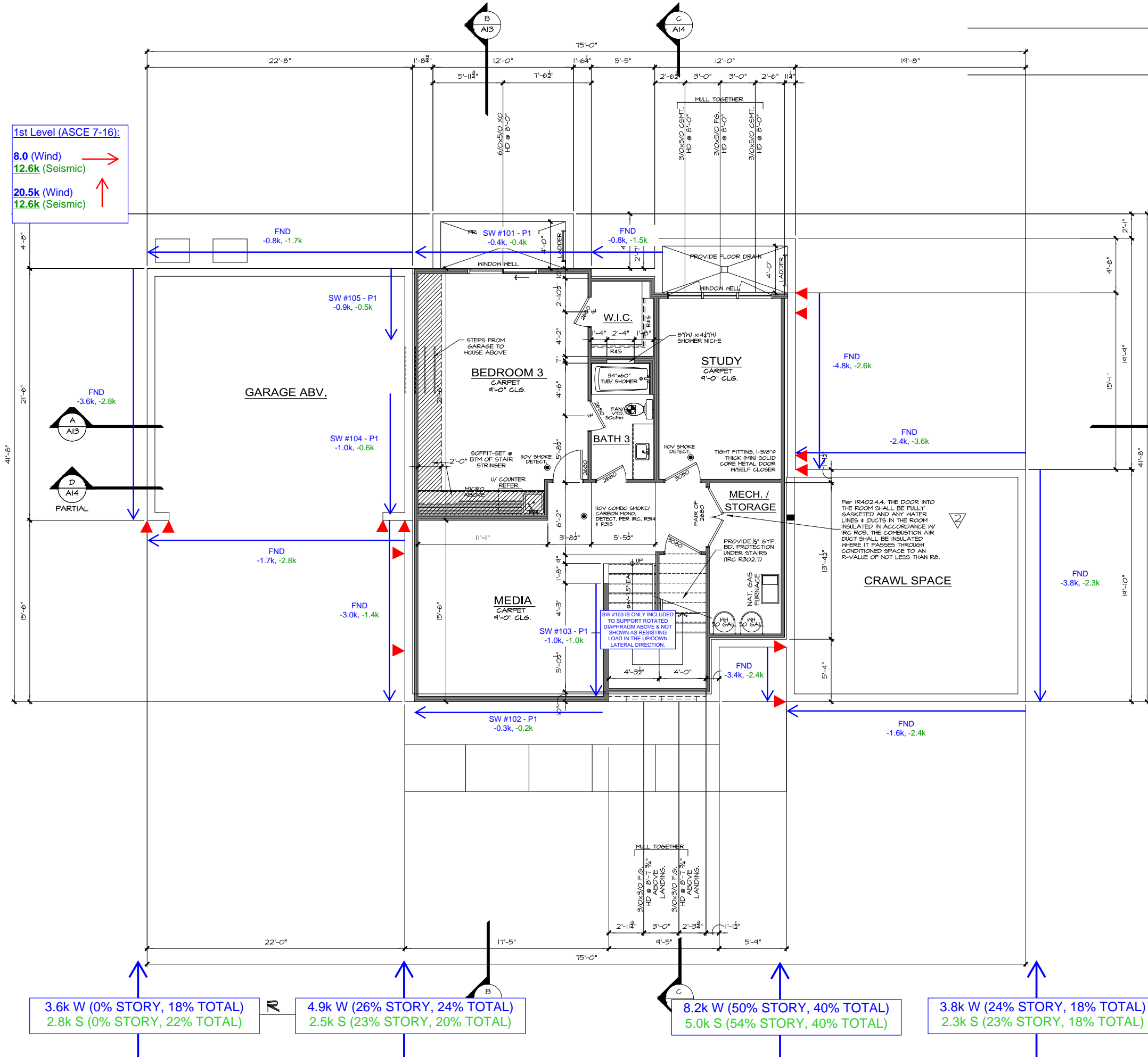
PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

PROVIDE WHOLE HOUSE VENTILATION per 2018 IRC, M507.2.2.1. R409.8 USING LAUNDRY ROOM EXHAUST FAN INTEGRATED INTO FRESH AIR SYSTEM (FAU) PROVIDE OUTDOOR FRESH AIR W/DUCTS CONNECTED TO THE RETURN SIDE OF THE AIR HANDLER.

SQUARE FOOTAGE SUMMARY

BASEMENT LIVING AREA	1,098	S.F.
LESS BASEMENT EXCLUSION	-1,098	S.F.
NET BASEMENT	0	S.F.
MAIN FLOOR LIVING AREA	1,454	S.F.
2 CAR GARAGE	475	S.F.
TOTAL MAIN FLOOR	1,934	S.F.
UPPER FLOOR AREA	1,554	S.F.
TOTAL NET AREA	3,488	S.F.
STAIR DEDUCTIONS	-208	S.F.
TOTAL FAR PROPOSED	3,280	S.F.
TOTAL LOT SIZE:	8,462	S.F.
MAXIMUM FAR @ 40%	3,384	S.F.
LOT AREA	3,280	S.F.
TOTAL FAR PROPOSED	3,280	S.F.
COVD PORCH	27	S.F.

Updated: 10.21.25
Method for Calculating Square Footage - ANSI Z165-2013 except, no separate distinction of above-grade or below-grade areas and each level is measured to the outside of studs not the exterior finished surface.
Square Footage calculations for this house were made based on plan dimensions only and may vary from the finished square footage of the house as built.
See sheet "CODES" for additional Zoning required Area Calculations



1st Level (ASCE 7-16):
8.0 (Wind) →
12.6k (Seismic) →
20.5k (Wind) ↑
12.6k (Seismic) ↑

2.0k W (22% STORY, 25% TOTAL)
3.6k S (23% STORY, 21% TOTAL)

4.1k W (50% STORY, 51% TOTAL)
6.4k S (46% STORY, 51% TOTAL)

1.9k W (28% STORY, 24% TOTAL)
2.6k S (31% STORY, 28% TOTAL)

3.6k W (0% STORY, 18% TOTAL)
2.8k S (0% STORY, 22% TOTAL)

4.9k W (26% STORY, 24% TOTAL)
2.5k S (23% STORY, 20% TOTAL)

8.2k W (50% STORY, 40% TOTAL)
5.0k S (54% STORY, 40% TOTAL)

3.8k W (24% STORY, 18% TOTAL)
2.3k S (23% STORY, 18% TOTAL)



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

Dubey - Dwivedi
8434 SE 39th ST.
Mercer Island, WA.
Job Number: JMC025

MAIN FLOOR PLAN NOTES

PLAN SPECIFIC 2018 WSEC, SECTION R06

R406.2 ADDITIONAL ENERGY EFFICIENCY REQUIREMENTS (MANDATORY). THIS RESIDENTIAL DWELLING SHALL COMPLY WITH SUFFICIENT OPTIONS FROM TABLE R406.2 TO ACHIEVE THE FOLLOWING MIN. NUMBER OF CREDITS: 6 FOR A 1501sf to 4999sf HOME.

CREDITS PROVIDED IN THIS HOME AS FOLLOWS:
EFFICIENT BUILDING ENVELOPE, OPT. 1.3, 0.5 CREDITS
PRESCRIPTIVE COMPLIANCE IS BASED ON TABLE R402.1 WITH FOLLOWING MODIFICATIONS:
VERTICAL FENESTRATION U = 0.28 WINDOWS
FLOORS TO BE R-38 and SLAB ON GRADE TO BE R-10 PERIMETER and UNDER ENTIRE SLAB BELOW GRADE.

AIRLEAKAGE & EFFICIENT VENTILATION, OPT. 2.1, 0.5 CREDITS
REDUCE THE TESTED AIR LEAKAGE TO 3.0 AIR CHANGES PER HOUR MAXIMUM @ 75 PA. ALL INTERIOR DOOR VENTILATION REQUIREMENTS SHALL BE MET.

HIGH EFFICIENCY HVAC DISTRIBUTION, OPT. 4.2, 1.0 CREDITS
HVAC EQUIPMENT AND ASSOCIATED DUCT SYSTEM(S) SHALL COMPLY WITH THE REQUIREMENTS OF SECT R403.3.7. LOCATING COMPONENTS IN CONDITIONED CRAWL SPACES IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

EFFICIENT WATER HEATING, 5.4, 1.5 CREDITS
WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
ELECTRIC WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
WATER HEAT PUMP WATER HEATER WITH ENERGY STAR RATED FOR TIER 1 OF 1.
MINIMUM 40 GPM.

Issue	Issue Date	By	Description
10.21.25			PLAN REVISIONS

plan name: _____
marking name: _____
plan number: _____
mark sys. number: _____

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

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

© 2017 JayMarc Homes, LLC; All rights reserved.

02.06.24
Submission Date

Sheet Title/Description

JAYMARC HOMES
Design Firm

R.K.N.
Drawn by:

Checked by:

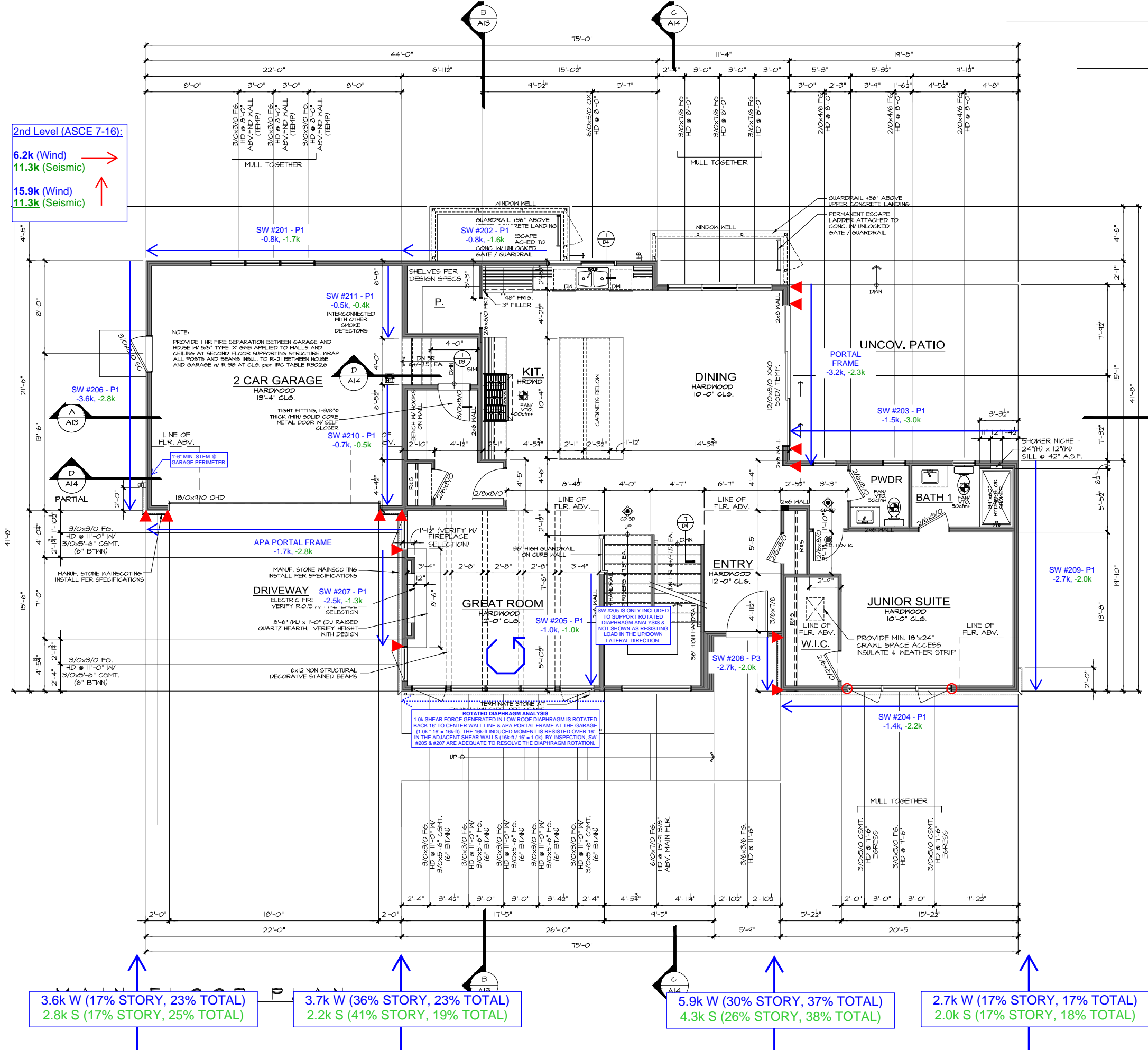
Primary Scale

A6
of:

SQUARE FOOTAGE SUMMARY

BASEMENT LIVING AREA	1,098 S.F.
LESS BASEMENT EXCLUSION	-1,098 S.F.
NET BASEMENT	0 S.F.
MAIN FLOOR LIVING AREA	1,459 S.F.
2 CAR GARAGE	475 S.F.
TOTAL MAIN FLOOR	1,934 S.F.
UPPER FLOOR AREA	1,554 S.F.
TOTAL NET AREA	3,488 S.F.
STAIR DEDUCTIONS	-208 S.F.
TOTAL FAR PROPOSED	3,280 S.F.
TOTAL LOT SIZE:	8,462 S.F.
MAXIMUM FAR @ 40%:	3,384 S.F.
LOT AREA	3,384 S.F.
TOTAL FAR PROPOSED	3,280 S.F.
COVERED PORCH	27 S.F.

Updated: 10.21.25
Method for Calculating Square Footage - ANSI Z765-2019 except, no separate distinction of above-grade or below-grade areas and each level is measured to the outside of finished walls and the exterior finished surface.
Square footage calculations for this house were made based on plan dimensions only and may vary from the finished square footage of the house as built.
See Sheet "CODES" for additional Zoning required Area Calculations



2nd Level (ASCE 7-16):
6.2k (Wind) →
11.3k (Seismic) →
15.9k (Wind) ↑
11.3k (Seismic) ↑

3.6k W (17% STORY, 23% TOTAL)
2.8k S (17% STORY, 25% TOTAL)

3.7k W (36% STORY, 23% TOTAL)
2.2k S (41% STORY, 19% TOTAL)

5.9k W (30% STORY, 37% TOTAL)
4.3k S (26% STORY, 38% TOTAL)

2.7k W (17% STORY, 17% TOTAL)
2.0k S (17% STORY, 18% TOTAL)

1.4k W (23% STORY, 23% TOTAL)
2.2k S (24% STORY, 20% TOTAL)

1.6k W (26% STORY, 26% TOTAL)
3.3k S (26% STORY, 29% TOTAL)

UPPER FLOOR PLAN NOTES:

PLAN SPECIFIC 2018 WSEC. SECTION R406
 R406.2 ADDITIONAL ENERGY EFFICIENCY REQUIREMENTS (MANDATORY). THIS RESIDENTIAL DWELLING SHALL COMPLY W/SUFFICIENT OPTIONS FROM TABLE R406.2 TO ACHIEVE THE FOLLOWING MIN. NUMBER OF CREDITS:
 6 FOR A 1501sf TO 4,999sf HOME.
 CREDITS PROVIDED IN THIS HOME AS FOLLOWS:

EFFICIENT BUILDING ENVELOPE - OPT. 1.3 - 0.5 CREDITS
 PRESCRIPTIVE COMPLIANCE IS BASED ON TABLE R402.1 WITH FOLLOWING MODIFICATIONS:
 VERTICAL PENETRATION U = 0.28 WINDOWS
 FLOORS TO BE R-38 and SLAB ON GRADE TO BE R-10 PERIMETER and UNDER ENTIRE SLAB BELOW GRADE.
AIRLEAKAGE & EFFICIENT VENTILATION - OPT. 2.1 - 0.5 CREDITS
 REDUCE THE TESTED AIR LEAKAGE TO 3.0 AIR CHANGES PER HOUR MAXIMUM @ 50 PASCALS AND ALL WHOLE HOUSE VENTILATION REQUIREMENTS AS DETERMINED BY SECTION M501.3 OF THE I.R.C. OR SECTION 404.8 OF THE I.M.C. SHALL BE MET WITH A HIGH EFFICIENCY FAN(S) (MAXIMUM OF 0.35 WATTS/CFM), NOT INTERLOCKED WITH THE FURNACE FAN (IF PRESENT). VENTILATION SYSTEMS USING A FURNACE INCLUDING AN I.M.C. MOTOR PROVIDED THAT THEY ARE CONTROLLABLE IN THE VENTILATION MODE.
HIGH EFFICIENT HVAC EQUIPMENT INSTALLATION - OPT. 4.2 - 1.0 CREDITS
 HVAC EQUIPMENT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN UNFINISHED ATTIC SPACE IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

WATER HEATING SYSTEM 5.4 - 1.5 CREDITS
 WATER HEATING SYSTEM SHALL INCLUDE ONE OF THE FOLLOWING:
 ELECTRIC HEAT PUMP WATER HEATER MEETING THE STANDARDS FOR Tier 1 of NEEA'S ADVANCED WATER HEATING SPECIFICATION, IF ONE WATER IS SERVING MORE THAN ONE DWELLING UNIT, ALL HOT WATER SUPPLY AND REGULATION PIPING SHALL BE INSULATED WITH R-8 MINIMUM PIPE INSULATION.

WHOLE HOUSE VENTILATION
 PROVIDE WHOLE HOUSE VENTILATION USING LAUNDRY ROOM EXHAUST FAN (AUX) PROVIDED TO THE SYSTEM (FAU) FROM SECTION R403.3.1. LOCATING SYSTEM COMPONENTS IN UNFINISHED ATTIC SPACE IS NOT PERMITTED UNDER THIS OPTION. ELECTRIC RESISTANCE HEAT AND DUCTLESS HEAT PUMPS ARE NOT PERMITTED UNDER THIS OPTION. DIRECT COMBUSTION HEATING EQUIPMENT WITH AFUE LESS THAN 80% IS NOT PERMITTED UNDER THIS OPTION.

SYMBOL	LOCATION	MIN. FAN REQUIREMENTS (ALL FANS VENT TO OUTSIDE)
	KITCHEN	Min. 100cfm, INTERMITTENT at .025mg per TBL. M501.4
	BATH & POWDER	Min. 50cfm, INTERMITTENT at .025mg per TBL. M501.4
	LAUNDRY ROOM	Min. 360cfm, INTERMITTENT at .025mg per TBL. M501.4

MECHANICAL CONTRACTOR TO SIZE WHF, FAN and SET OPERATING TIMER per TABLE M501.3.3(1) FOR A 3,001-4,500sf. DWELLING w/4-5 BEDRMS. TO OPERATE INTERMITTENTLY and CONTINUOUSLY per TABLE M501.3.3(2)
 PROVIDE CONTROLS FOR WHF, per M501.3.2 AFFIX LABEL TO CONTROLS THAT READS "WHOLE HOUSE VENTILATION - SEE OPERATING INSTRUCTIONS"

plan name: _____
 marking name: _____
 plan number: _____
 mark sys. number: _____

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

The drawings in this set are instruments of service and shall remain the property of JayMarc Homes, LLC.
 © 2017 JayMarc Homes, LLC; All rights reserved.

02.06.24
 Submission Date

Sheet Title/Description
 JAYMARC HOMES
 Design Firm

R.K.N.
 Drawn by:

Checked by:

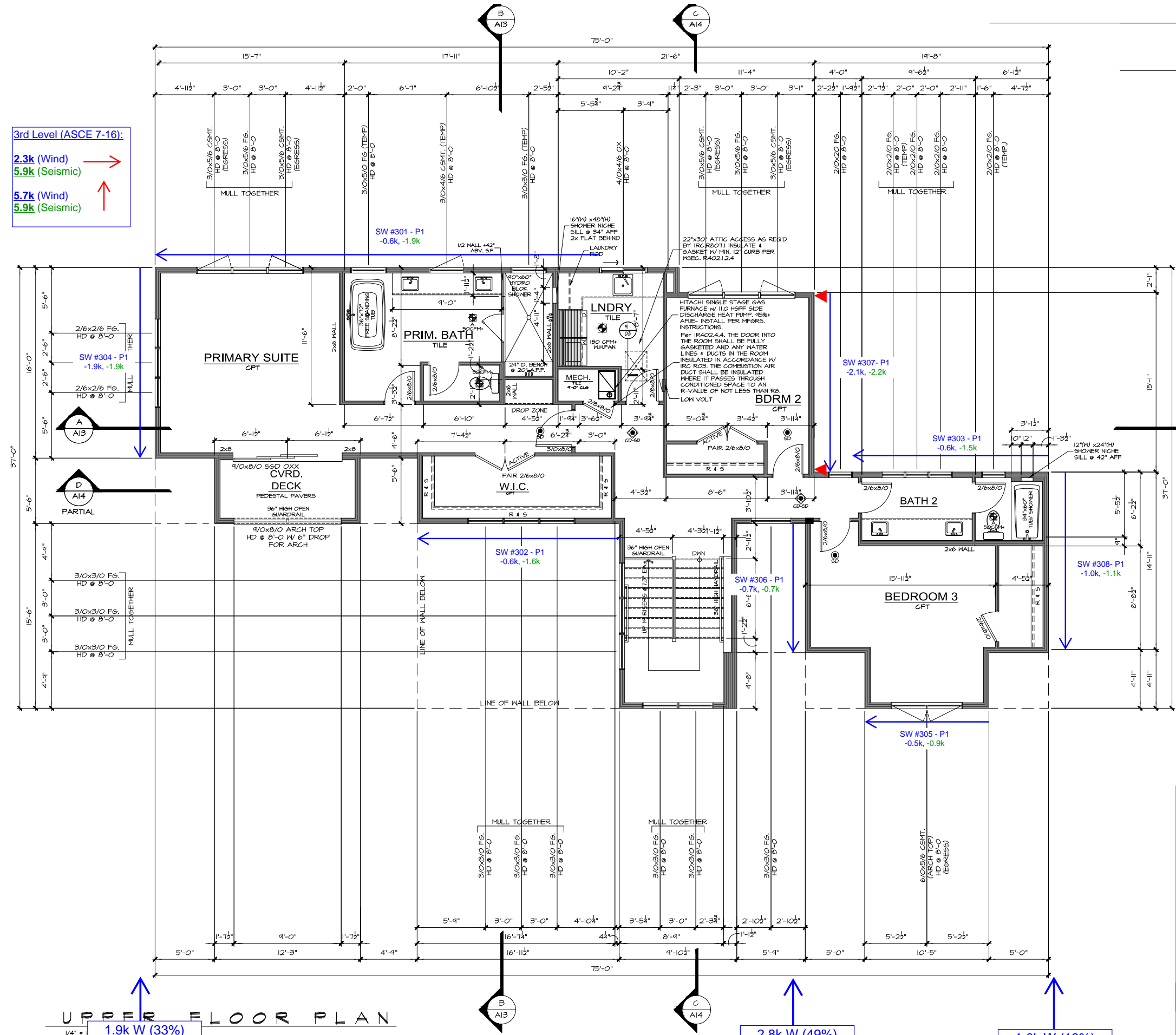
Primary Scale

Updated: 10.21.25
 Method for Calculating Square Footage - ANSI Z765-2019 except, no separate distinction of 'above-grade or below-grade' areas and each level is measured to the outside of studs not the exterior finished surface.
 Square footage calculations for this home were made based on plan dimensions only and may vary from the finished square footage of the house as built.
 See Sheet 'CODES' for additional Zoning required Area Calculations

SQUARE FOOTAGE SUMMARY

BASEMENT LIVING AREA	1,048	S.F.
LESS BASEMENT EXCLUSION	-1,048	S.F.
NET BASEMENT	0	S.F.
MAIN FLOOR LIVING AREA	1,459	S.F.
2 CAR GARAGE	475	S.F.
TOTAL MAIN FLOOR	1,934	S.F.
UPPER FLOOR AREA	1,554	S.F.
TOTAL NET AREA	3,488	S.F.
STAIR DEDUCTIONS	-208	S.F.
TOTAL FAR PROPOSED	3,280	S.F.
TOTAL LOT SIZE:	8,462	S.F.
MAXIMUM FAR @ 40%:	3,384	S.F.
LOT AREA	3,384	S.F.
TOTAL FAR PROPOSED	3,280	S.F.
COVID PORCH	27	S.F.

Updated: 10.21.25
 Method for Calculating Square Footage - ANSI Z765-2019 except, no separate distinction of 'above-grade or below-grade' areas and each level is measured to the outside of studs not the exterior finished surface.
 Square footage calculations for this home were made based on plan dimensions only and may vary from the finished square footage of the house as built.
 See Sheet 'CODES' for additional Zoning required Area Calculations



3rd Level (ASCE 7-16):
 2.3k (Wind) →
 5.9k (Seismic) →
 5.7k (Wind) ↑
 5.9k (Seismic) ↑

0.6k W (26%)
 1.9k S (32%)

1.2k W (52%)
 3.1k S (53%)

0.5k W (22%)
 0.9k S (15%)

1.9k W (33%)
 1.9k S (32%)

2.8k W (49%)
 2.9k S (49%)

1.0k W (18%)
 1.1k S (19%)

Dubey - Dwivedi
 8434 SE 39th ST.
 Mercer Island, WA.
 Job Number: JMC025

Sheet Title/Description

A8 of:



Shearwall Design Summary

Shearwall 301: 3rd - Rear Ext. Wall @ Primary, Primary Bath, Laundry

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 302: 3rd - Front Ext. Wall @ W.I.C.

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 303: 3rd - Rear Ext. Wall @ Bath 2

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 304: 3rd - Side Ext. Wall @ Primary

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 305: 3rd - Front Ext. Wall @ Bed 3

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 306: 3rd - Side Ext. Wall @ Bed 3 (Left)

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 307: 3rd - Side Ext. Wall @ Bed 2

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

SIMPSON CS16 STRAP TIE (14" END LENGTH)

Shearwall #

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs **#REF!** Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

#REF!
#REF!
#REF!

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

#REF!



Shearwall Design Summary

Shearwall _____ #

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

#REF!
#REF!
#REF!

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
 DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

#REF!

Shearwall 308: 3rd - Side Ext. Wall @ Bed 3 (Right)

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
 DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 201: 2nd - Rear Ext. Wall @ Garage

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 202: 2nd - Rear Ext. Wall @ Kitchen

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 203: 2nd - Rear Ext. wall @ Powder, Bath 1

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 204: 2nd - Front Ext. Wall @ Junior Suite

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 205: 2nd - Side Int. Wall @ Great Rm.

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 206: 2nd - Side Ext. Wall @ Garage

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 207: 2nd - Side Ext. Wall @ Great Rm.

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

Shearwall 208: 2nd - Side Ext./Int. Wall @ Entry

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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 pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN



Shearwall Design Summary

Shearwall 209: 2nd - Side Ext. Wall @ Junior Suite

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 210: 2nd - Side Int. Wall @ Garage

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 101: 1st - Rear Ext. Wall @ Bed 3

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL plf Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 102: 1st - Front Ext Wall @ Play Rm.

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL plf Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 103: 1st - Side Int Wall @ Play Room

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 211: 2nd - Side Int. Wall @ Garage

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required



Shearwall Design Summary

Shearwall 104: 1st - Side Int Wall @ Garage

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required

Shearwall 105: 1st - Side Int Wall @ Garage

Shearwall Properties:

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

Capacity Evaluation:

Total Shear Load on Wall lbs < Allowable Shearwall Capacity lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL pl f Overturning Moment k-ft Hold Down Design Load lbs
DL at ends of wall lbs Resistive Moment k-ft Hold down Capacity lbs

Hold-down Specification

No Hold down Required