MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

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

CALCULATION PACKAGE

December 19th, 2024

Architectural Innovations
Mercer Island Lot 3
7621 SE 22nd St.

Mercer Island,
Washington

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

Prepared By:

Ryan Chan, E.I.T. *Staff Engineer*

Nicholas J. Martignetti, P.E. *Associate Owner + San Diego Office Director*

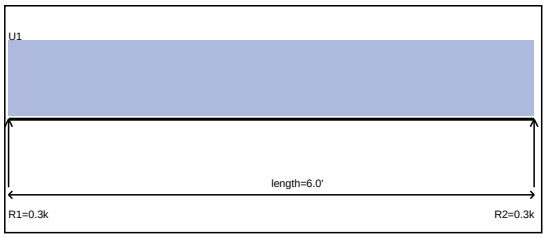
Signature, Seal & Date

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

BEAM & HEADER CALCULATIONS

M+K PROJECT #: 203-24024-T01 - Milestone - Mercer Island Lot 3
ENGINEER: Ryan Chan
Date: 12/19/2024

Description - Roof Framing - H3-1 - Header



Uniform 1 = 0.08 klf (0.0'-6.0')

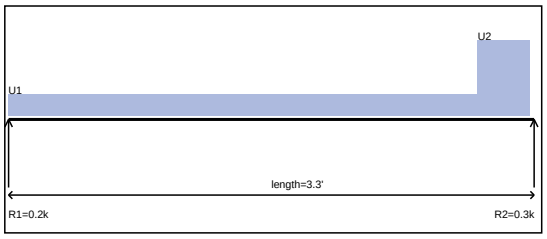
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.25k	Vall = 3.50k	Ratio = 0.07
M = 0.37k-ft	Mall = 3.44k-ft	Ratio = 0.11

Deflection
TL = 0.01" L/999+ > L/240 min
DL = 0.01"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Roof Framing - H3-2 - Header



Uniform 1 = 0.09 klf (0.0'-2.9')

Uniform 2 = 0.31 klf (2.9'-3.2')

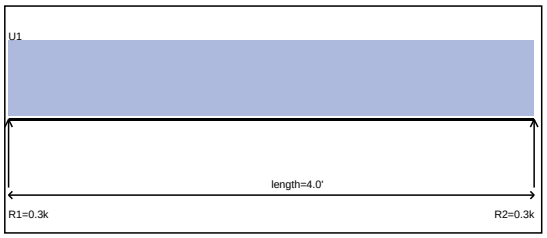
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.20k	Vall = 3.50k	Ratio = 0.06
M = 0.12k-ft	Mall = 3.44k-ft	Ratio = 0.03

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Roof Framing - H3-3 - Header



Uniform 1 = 0.12 klf (0.0'-4.0')

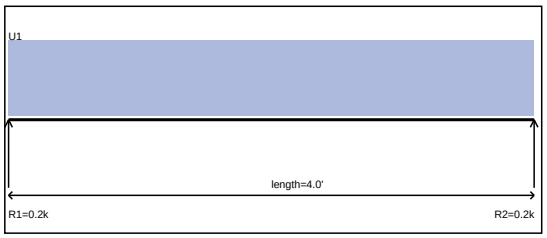
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.24k	Vall = 3.50k	Ratio = 0.07
M = 0.24k-ft	Mall = 3.44k-ft	Ratio = 0.07

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Roof Framing - H3-4 - Header



Uniform 1 = 0.09 klf (0.0'-4.0')

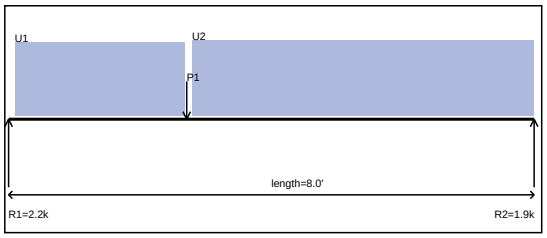
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.17k	Vall = 3.50k	Ratio = 0.05
M = 0.17k-ft	Mall = 3.44k-ft	Ratio = 0.05

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Roof Framing - H3-5 - Header



Uniform 1 = 0.36 klf (0.1'-2.7') P1 = 1.08 K (2.7')

Uniform 2 = 0.37 klf (2.8'-8.0')

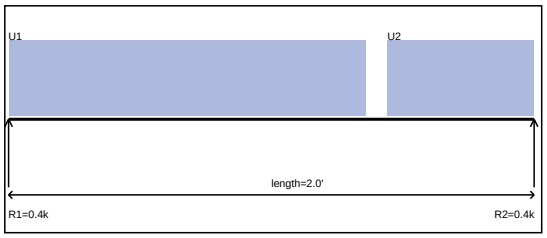
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 2.12k	Vall = 4.47k	Ratio = 0.48
M = 4.54k-ft	Mall = 5.17k-ft	Ratio = 0.88

Deflection
TL = 0.14" L/678 > L/240 min
DL = 0.06"
L = 0.00" L/999+ > L/360 min

4x10 DF #2

Description - Roof Framing - H3-6 - Header



Uniform 1 = 0.37 klf (0.0'-1.4')

Uniform 2 = 0.37 klf (1.4'-2.0')

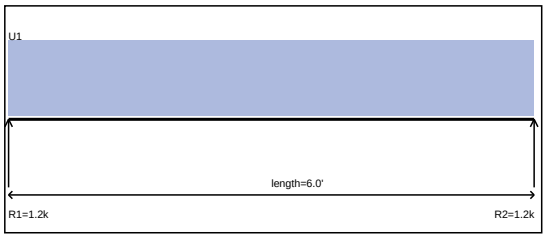
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.36k	Vall = 3.50k	Ratio = 0.10
M = 0.18k-ft	Mall = 3.44k-ft	Ratio = 0.05

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Roof Framing - H3-7 - Header



Uniform 1 = 0.37 klf (0.0'-6.0')

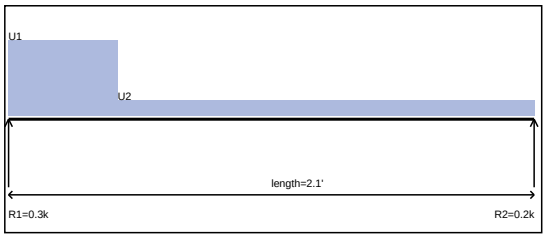
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.10k	Vall = 3.50k	Ratio = 0.32
M = 1.65k-ft	Mall = 3.44k-ft	Ratio = 0.48

Deflection
TL = 0.06" L/999+ > L/240 min
DL = 0.02"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Roof Framing - H3-8 - Header



Uniform 1 = 0.45 klf (0.0'-0.4')

Uniform 2 = 0.09 klf (0.4'-2.1')

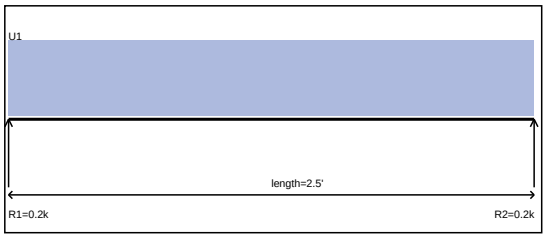
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.23k	Vall = 3.50k	Ratio = 0.07
M = 0.06k-ft	Mall = 3.44k-ft	Ratio = 0.02

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Roof Framing - H3-9 - Header



Uniform 1 = 0.12 klf (0.0'-2.5')

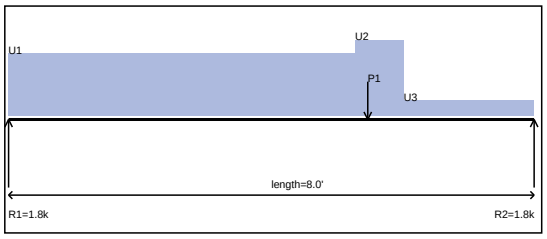
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.15k	Vall = 3.50k	Ratio = 0.04
M = 0.10k-ft	Mall = 3.44k-ft	Ratio = 0.03

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Roof Framing - H3-10 - Header



Uniform 1 = 0.37 klf (0.0'-5.3')

P1 = 1.05 K (5.5')

Uniform 2 = 0.45 klf (5.3'-6.0')

Uniform 3 = 0.09 klf (6.0'-8.0')

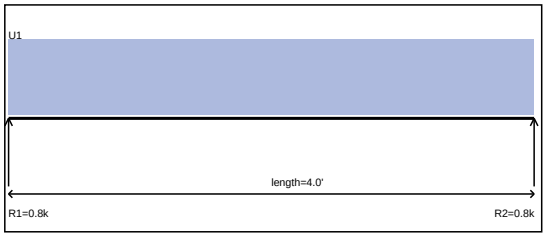
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.75k	Vall = 4.47k	Ratio = 0.39
M = 4.17k-ft	Mall = 5.17k-ft	Ratio = 0.81

Deflection
TL = 0.13" L/738 > L/240 min
DL = 0.05"
L = 0.00" L/999+ > L/360 min

4x10 DF #2

Description - Roof Framing - H3-11 - Header



Uniform 1 = 0.37 klf (0.0'-4.0')

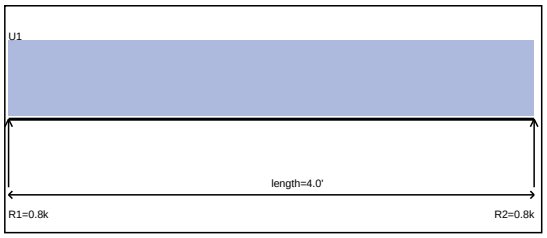
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.74k	Vall = 3.50k	Ratio = 0.21
M = 0.74k-ft	Mall = 3.44k-ft	Ratio = 0.21

Deflection
TL = 0.01" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Roof Framing - H3-12 - Header



Uniform 1 = 0.37 klf (0.0'-4.0')

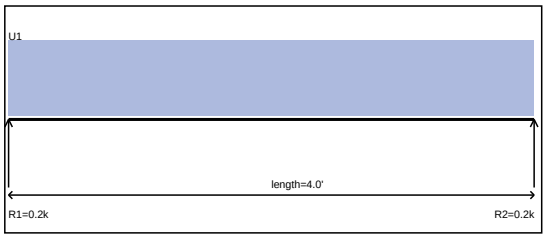
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.74k	Vall = 3.50k	Ratio = 0.21
M = 0.74k-ft	Mall = 3.44k-ft	Ratio = 0.21

Deflection
TL = 0.01" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Roof Framing - H3-13 - Header



Uniform 1 = 0.09 klf (0.0'-4.0')

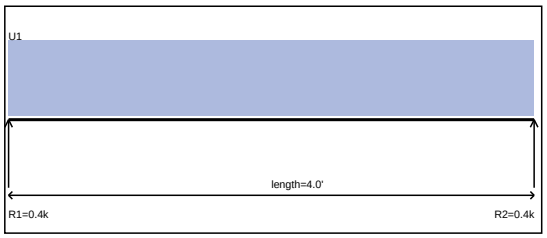
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.18k	Vall = 3.50k	Ratio = 0.05
M = 0.18k-ft	Mall = 3.44k-ft	Ratio = 0.05

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Roof Framing - H3-14 - Header



Uniform 1 = 0.15 klf (0.0'-4.0')

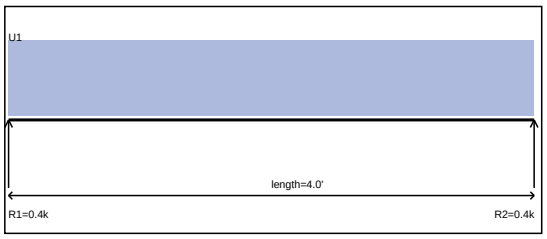
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.31k	Vall = 3.50k	Ratio = 0.09
M = 0.31k-ft	Mall = 3.44k-ft	Ratio = 0.09

Deflection
TL = 0.01" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Roof Framing - H3-15 - Header



Uniform 1 = 0.15 klf (0.0'-4.0')

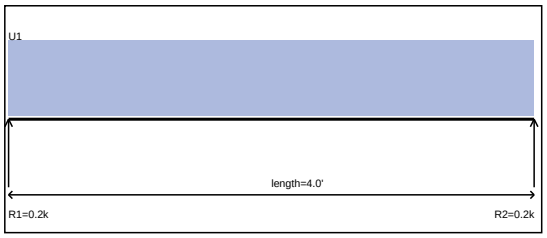
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.31k	Vall = 3.50k	Ratio = 0.09
M = 0.31k-ft	Mall = 3.44k-ft	Ratio = 0.09

Deflection
TL = 0.01" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Roof Framing - H3-16 - Header



Uniform 1 = 0.09 klf (0.0'-4.0')

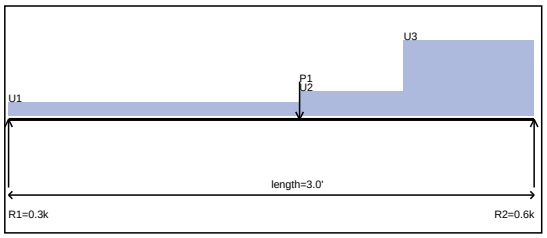
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.17k	Vall = 3.50k	Ratio = 0.05
M = 0.17k-ft	Mall = 3.44k-ft	Ratio = 0.05

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Upper Floor Framing - H2-1 - Header



Uniform 1 = 0.10 klf (0.0'-1.7')

P1 = 0.17 K (1.7')

Uniform 2 = 0.18 klf (1.7'-2.3')

Uniform 3 = 0.55 klf (2.3'-3.0')

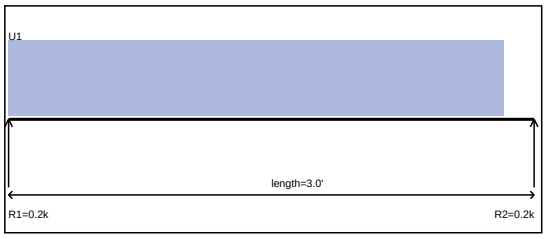
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.57k	Vall = 3.50k	Ratio = 0.16
M = 0.34k-ft	Mall = 3.44k-ft	Ratio = 0.10

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Upper Floor Framing - H2-2 - Header



Uniform 1 = 0.10 klf (0.0'-2.8')

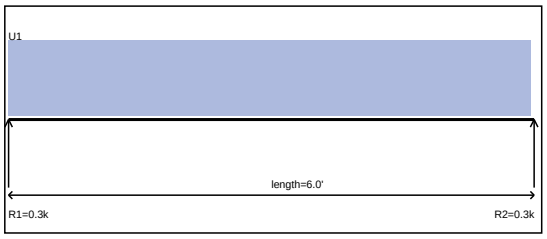
Controlling Load Combination/ Cd
V = D Cd=0.9
M = D Cd=0.9
△ = D

V = 0.15k	Vall = 2.74k	Ratio = 0.05
M = 0.11k-ft	Mall = 2.69k-ft	Ratio = 0.04

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Upper Floor Framing - H2-3 - Header



Uniform 1 = 0.10 klf (0.0'-6.0')

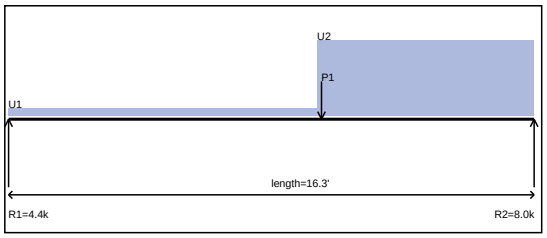
Controlling Load Combination/ Cd
V = D Cd=0.9
M = D Cd=0.9
△ = D

V = 0.30k	Vall = 2.74k	Ratio = 0.11
M = 0.45k-ft	Mall = 2.69k-ft	Ratio = 0.17

Deflection
TL = 0.02" L/999+ > L/240 min
DL = 0.02"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Upper Floor Framing - H2-4 - Header



Uniform 1 = 0.06 klf (0.0'-9.5') P1 = 7.93 K (9.7')

Uniform 2 = 0.58 klf (9.5'-16.3')

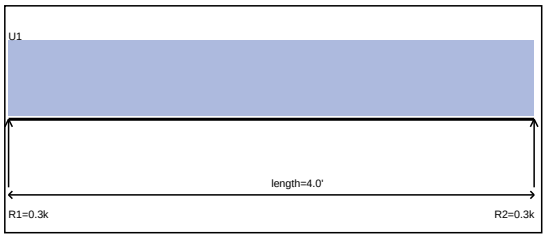
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + 0.75 * (L + S))

V = 7.07k	Vall = 17.49k	Ratio = 0.40
M = 33.94k-ft	Mall = 58.11k-ft	Ratio = 0.58

Deflection
TL = 0.34" L/582 > L/240 min
DL = 0.16"
L = 0.17" L/999+ > L/360 min

5-1/2x18 GLB

Description - Upper Floor Framing - H2-5 - Header



Uniform 1 = 0.12 klf (0.0'-4.0')

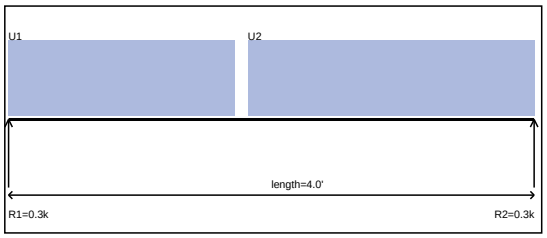
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.25k	Vall = 3.04k	Ratio = 0.08
M = 0.25k-ft	Mall = 2.99k-ft	Ratio = 0.08

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Upper Floor Framing - H2-6 - Header



Uniform 1 = 0.12 klf (0.0'-1.7')

Uniform 2 = 0.12 klf (1.8'-4.0')

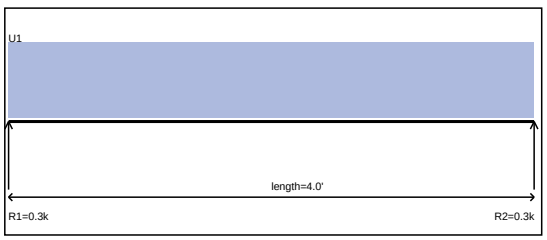
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.24k	Vall = 3.04k	Ratio = 0.08
M = 0.24k-ft	Mall = 2.99k-ft	Ratio = 0.08

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Upper Floor Framing - H2-7 - Header



Uniform 1 = 0.12 klf (0.0'-4.0')

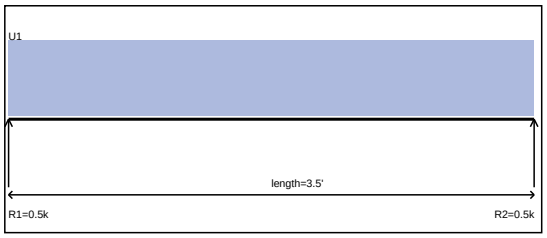
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.25k	Vall = 3.04k	Ratio = 0.08
M = 0.25k-ft	Mall = 2.99k-ft	Ratio = 0.08

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Upper Floor Framing - H2-8 - Header



Uniform 1 = 0.26 klf (0.0'-3.5')

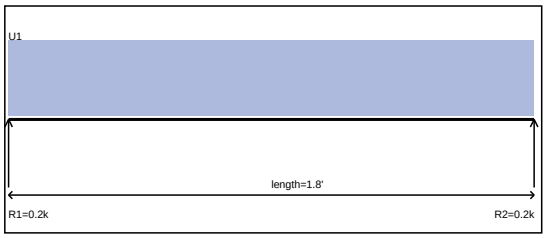
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.46k	Vall = 3.50k	Ratio = 0.13
M = 0.40k-ft	Mall = 3.44k-ft	Ratio = 0.12

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Upper Floor Framing - H2-9 - Header



Uniform 1 = 0.12 klf (0.0'-1.8')

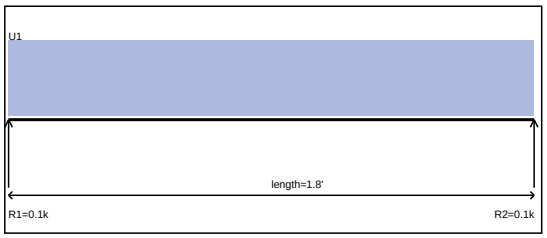
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.11k	Vall = 3.50k	Ratio = 0.03
M = 0.05k-ft	Mall = 3.44k-ft	Ratio = 0.01

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Upper Floor Framing - H2-10 - Header



Uniform 1 = 0.07 klf (0.0'-1.8')

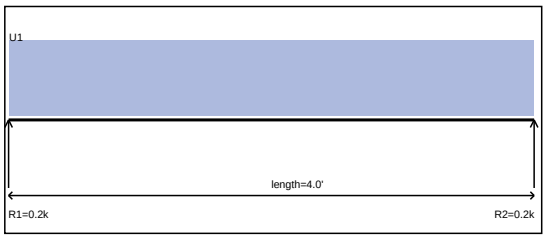
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.06k	Vall = 3.50k	Ratio = 0.02
M = 0.03k-ft	Mall = 3.44k-ft	Ratio = 0.01

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Upper Floor Framing - H2-11 - Header



Uniform 1 = 0.10 klf (0.0'-4.0')

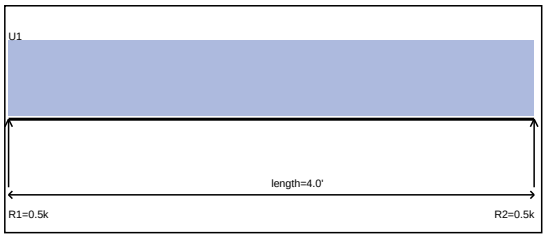
Controlling Load Combination/ Cd
V = D Cd=0.9
M = D Cd=0.9
△ = D

V = 0.20k	Vall = 2.74k	Ratio = 0.07
M = 0.20k-ft	Mall = 2.69k-ft	Ratio = 0.07

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Upper Floor Framing - H2-12 - Header



Uniform 1 = 0.21 klf (0.0'-4.0')

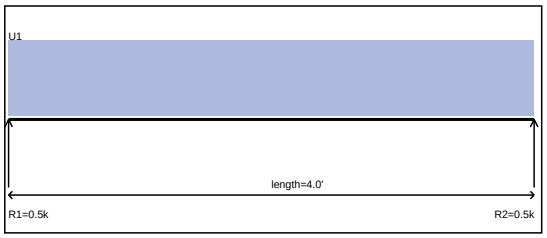
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.42k	Vall = 3.04k	Ratio = 0.14
M = 0.42k-ft	Mall = 2.99k-ft	Ratio = 0.14

Deflection
TL = 0.01" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Upper Floor Framing - H2-13 - Header



Uniform 1 = 0.21 klf (0.0'-4.0')

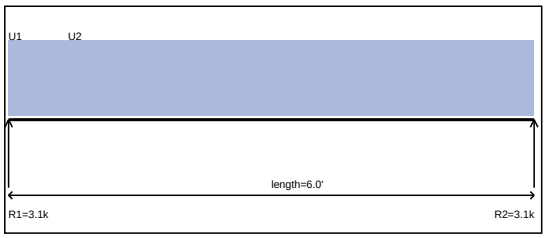
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.42k	Vall = 3.04k	Ratio = 0.14
M = 0.42k-ft	Mall = 2.99k-ft	Ratio = 0.14

Deflection
TL = 0.01" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Upper Floor Framing - H2-14 - Header



Uniform 1 = 1.03 klf (0.0'-0.7')

Uniform 2 = 1.03 klf (0.7'-6.0')

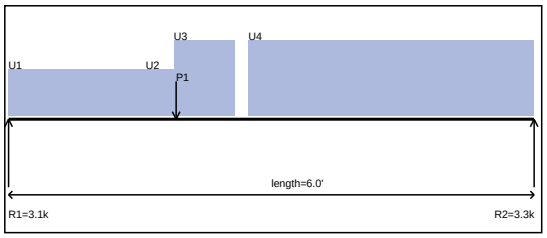
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + 0.75 * (L + S))

V = 2.37k	Vall = 3.88k	Ratio = 0.61
M = 3.55k-ft	Mall = 4.49k-ft	Ratio = 0.79

Deflection
TL = 0.07" L/999+ > L/240 min
DL = 0.03"
L = 0.03" L/999+ > L/360 min

4x10 DF #2

Description - Upper Floor Framing - H2-15 - Header



Uniform 1 = 0.63 klf (0.0'-1.6')

P1 = 1.01 K (1.9')

Uniform 2 = 0.63 klf (1.6'-1.9')

Uniform 3 = 1.03 klf (1.9'-2.6')

Uniform 4 = 1.03 klf (2.7'-6.0')

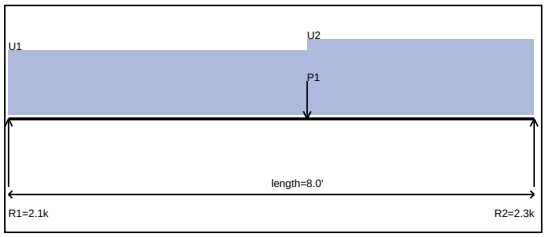
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 2.40k	Vall = 3.88k	Ratio = 0.62
M = 4.27k-ft	Mall = 5.17k-ft	Ratio = 0.83

Deflection
TL = 0.07" L/962 > L/240 min
DL = 0.03"
L = 0.03" L/999+ > L/360 min

4x10 DF #2

Description - Upper Floor Framing - H2-16 - Header



Uniform 1 = 0.47 klf (0.0'-4.5')

P1 = 0.25 K (4.5')

Uniform 2 = 0.55 klf (4.5'-8.0')

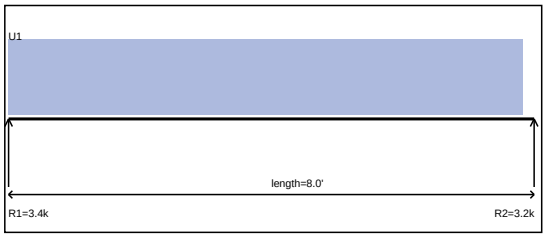
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 2.22k	Vall = 4.47k	Ratio = 0.50
M = 4.42k-ft	Mall = 5.17k-ft	Ratio = 0.86

Deflection
TL = 0.14" L/696 > L/240 min
DL = 0.07"
L = 0.00" L/999+ > L/360 min

4x10 DF #2

Description - Upper Floor Framing - H2-17 - Header



Uniform 1 = 0.83 klf (0.0'-7.8')

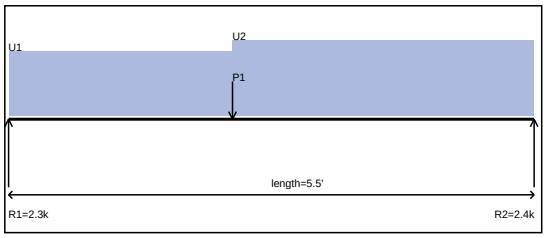
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 3.05k	Vall = 4.72k	Ratio = 0.64
M = 6.09k-ft	Mall = 6.09k-ft	Ratio = 1.00

Deflection
TL = 0.11" L/910 > L/240 min
DL = 0.04"
L = 0.06" L/999+ > L/360 min

4x12 DF #2

Description - Upper Floor Framing - H2-18 - Header



Uniform 1 = 0.71 klf (0.0'-2.3')

P1 = 0.24 K (2.3')

Uniform 2 = 0.83 klf (2.3'-5.5')

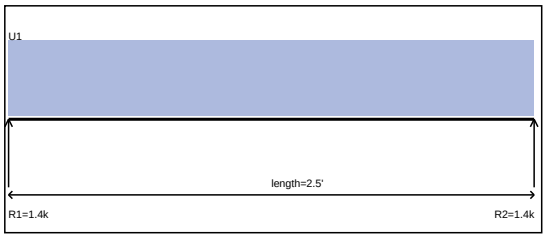
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 2.11k	Vall = 3.04k	Ratio = 0.69
M = 2.93k-ft	Mall = 2.99k-ft	Ratio = 0.98

Deflection
TL = 0.09" L/737 > L/240 min
DL = 0.04"
L = 0.05" L/999+ > L/360 min

4x8 DF #2

Description - Upper Floor Framing - H2-19 - Header



Uniform 1 = 1.07 klf (0.0'-2.5')

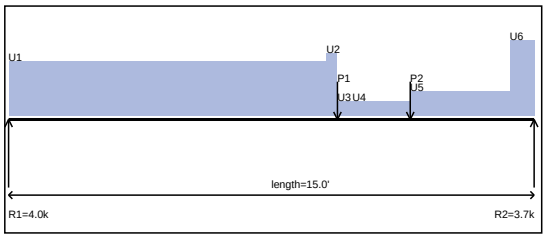
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.34k	Vall = 3.04k	Ratio = 0.44
M = 0.84k-ft	Mall = 2.99k-ft	Ratio = 0.28

Deflection
TL = 0.01" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Upper Floor Framing - B2-2 - Flush Bottom



Uniform 1 = 0.51 klf (0.0'-9.1')

P1 = 1.28 K (9.4')

Uniform 2 = 0.59 klf (9.1'-9.4')

P2 = 0.10 K (11.5')

Uniform 3 = 0.14 klf (9.4'-9.8')

Uniform 4 = 0.14 klf (9.8'-11.5')

Uniform 5 = 0.23 klf (11.5'-14.3')

Uniform 6 = 0.71 klf (14.3'-15.0')

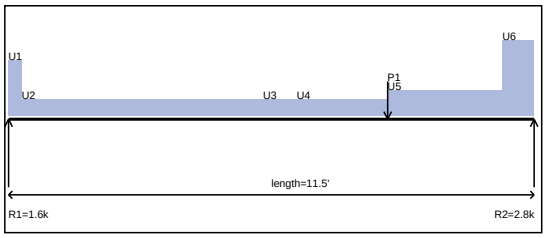
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 3.76k	Vall = 18.35k	Ratio = 0.21
M = 14.77k-ft	Mall = 54.23k-ft	Ratio = 0.27

Deflection
TL = 0.18" L/999+ > L/240 min
DL = 0.09"
L = 0.01" L/999+ > L/360 min

(3)1-3/4x16 LVL

Description - Upper Floor Framing - B2-3 - Flush Bottom



Uniform 1 = 0.53 klf (0.0'-0.3')

P1 = 1.74 K (8.3')

Uniform 2 = 0.16 klf (0.3'-5.6')

Uniform 3 = 0.16 klf (5.6'-6.3')

Uniform 4 = 0.16 klf (6.3'-8.3')

Uniform 5 = 0.24 klf (8.3'-10.8')

Uniform 6 = 0.72 klf (10.8'-11.5')

Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 2.38k	Vall = 18.35k	Ratio = 0.13
M = 5.90k-ft	Mall = 54.23k-ft	Ratio = 0.11

Deflection
TL = 0.04" L/999+ > L/240 min
DL = 0.02"
L = 0.01" L/999+ > L/360 min

(3)1-3/4x16 LVL

Description - Upper Floor Framing - B2-4 - Flush

Uniform 1 = 0.22 klf (0.0'-2.1')

P1 = 0.74 K (2.1')

Uniform 2 = 0.59 klf (2.1'-10.2')

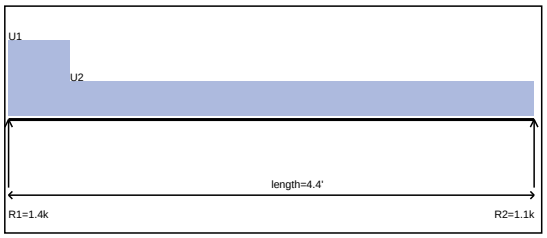
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 2.69k	Vall = 6.12k	Ratio = 0.44
M = 7.05k-ft	Mall = 18.08k-ft	Ratio = 0.39

Deflection
TL = 0.12" L/999+ > L/240 min
DL = 0.06"
L = 0.02" L/999+ > L/360 min

1-3/4x16 LVL

Description - Upper Floor Framing - B2-5 - Flush



Uniform 1 = 1.04 klf (0.0'-0.5')

Uniform 2 = 0.48 klf (0.5'-4.4')

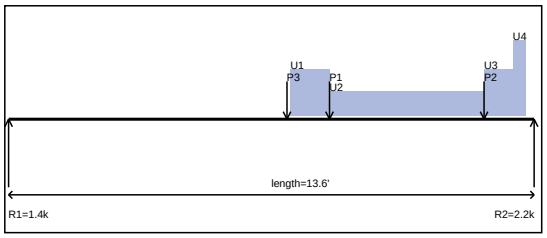
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.33k	Vall = 10.64k	Ratio = 0.13
M = 1.21k-ft	Mall = 31.44k-ft	Ratio = 0.04

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

(2)1-3/4x16 LVL

Description - Upper Floor Framing - B2-6 - Flush



Uniform 1 = 0.19 klf (7.3'-8.3')
Uniform 2 = 0.10 klf (8.3'-12.3')
Uniform 3 = 0.19 klf (12.3'-13.1')
Uniform 4 = 0.31 klf (13.1'-13.4')

P1 = 0.18 K (8.3')
P2 = 0.18 K (12.3')
P3 = 2.28 K (7.2')

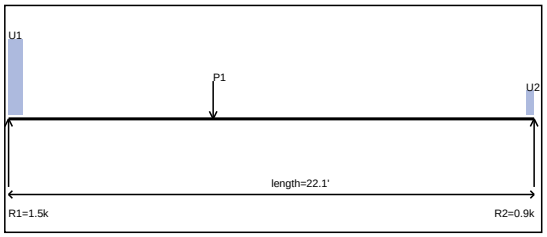
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.98k	Vall = 6.12k	Ratio = 0.32
M = 8.99k-ft	Mall = 18.08k-ft	Ratio = 0.50

Deflection
TL = 0.26" L/619 > L/240 min
DL = 0.15"
L = 0.02" L/999+ > L/360 min

1-3/4x16 LVL

Description - Upper Floor Framing - B2-7 - Flush



Uniform 1 = 0.37 klf (0.0'-0.6')
Uniform 2 = 0.12 klf (21.7'-22.1')

P1 = 2.01 K (8.6')

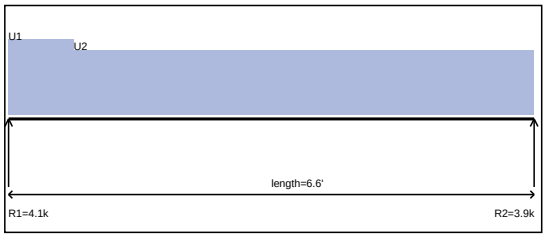
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.31k	Vall = 10.64k	Ratio = 0.12
M = 10.54k-ft	Mall = 31.44k-ft	Ratio = 0.34

Deflection
TL = 0.41" L/651 > L/240 min
DL = 0.11"
L = 0.30" L/897 > L/360 min

(2)1-3/4x16 LVL

Description - Upper Floor Framing - B2-8 - Flush



Uniform 1 = 1.38 klf (0.0'-0.8')
Uniform 2 = 1.18 klf (0.8'-6.6')

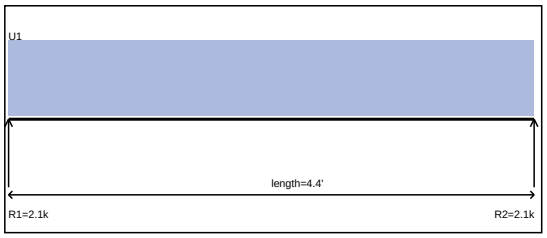
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 3.43k	Vall = 12.24k	Ratio = 0.28
M = 5.45k-ft	Mall = 36.15k-ft	Ratio = 0.15

Deflection
TL = 0.02" L/999+ > L/240 min
DL = 0.01"
L = 0.01" L/999+ > L/360 min

(2)1-3/4x16 LVL

Description - Upper Floor Framing - B2-9 - Flush



Uniform 1 = 0.91 klf (0.0'-4.4')

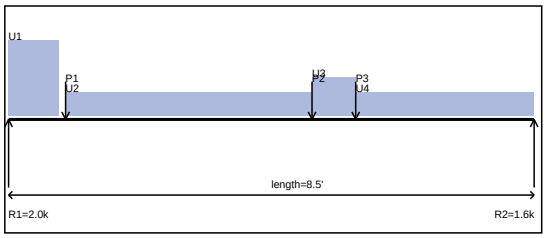
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 2.01k	Vall = 10.64k	Ratio = 0.19
M = 2.22k-ft	Mall = 31.44k-ft	Ratio = 0.07

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

(2)1-3/4x16 LVL

Description - Upper Floor Framing - B2-10 - Flush



Uniform 1 = 0.77 klf (0.0'-0.8')
Uniform 2 = 0.24 klf (0.9'-4.9')
Uniform 3 = 0.39 klf (4.9'-5.6')
Uniform 4 = 0.24 klf (5.6'-8.5')

P1 = 0.31 K (0.9')
P2 = 0.31 K (4.9')
P3 = 0.31 K (5.6')

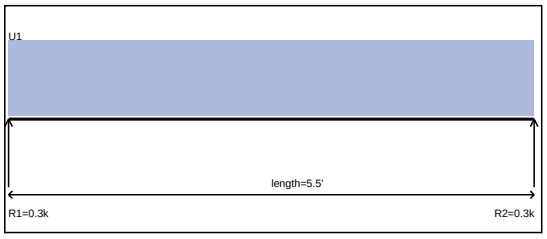
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.74k	Vall = 12.24k	Ratio = 0.14
M = 3.61k-ft	Mall = 36.15k-ft	Ratio = 0.10

Deflection
TL = 0.02" L/999+ > L/240 min
DL = 0.01"
L = 0.00" L/999+ > L/360 min

(2)1-3/4x16 LVL

Description - Upper Floor Framing - B2-11 - Dropped



Uniform 1 = 0.09 klf (0.0'-5.5')

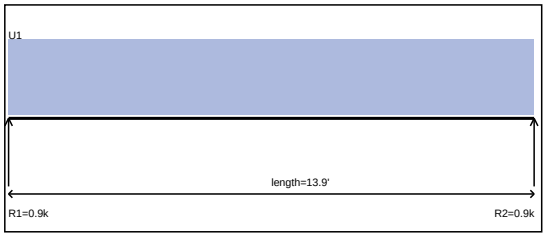
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.23k	Vall = 4.47k	Ratio = 0.05
M = 0.32k-ft	Mall = 5.17k-ft	Ratio = 0.06

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x10 DF #2

Description - Upper Floor Framing - B2-12 - Dropped



Uniform 1 = 0.12 klf (0.0'-13.9')

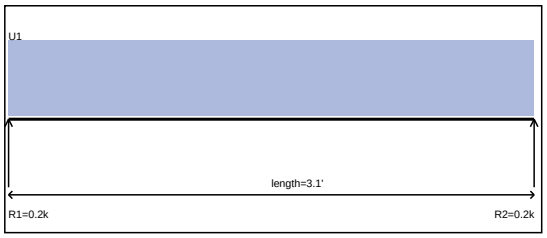
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.86k	Vall = 4.47k	Ratio = 0.19
M = 2.99k-ft	Mall = 5.17k-ft	Ratio = 0.58

Deflection
TL = 0.28" L/594 > L/240 min
DL = 0.11"
L = 0.00" L/999+ > L/360 min

4x10 DF #2

Description - Upper Floor Framing - B2-13 - Dropped



Uniform 1 = 0.09 klf (0.0'-3.1')

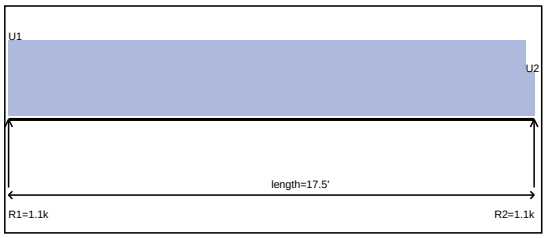
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.13k	Vall = 8.24k	Ratio = 0.02
M = 0.11k-ft	Mall = 10.17k-ft	Ratio = 0.01

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

6x12 DF #2

Description - Upper Floor Framing - B2-14 - Dropped



Uniform 1 = 0.12 klf (0.0'-17.2')

Uniform 2 = 0.07 klf (17.2'-17.5')

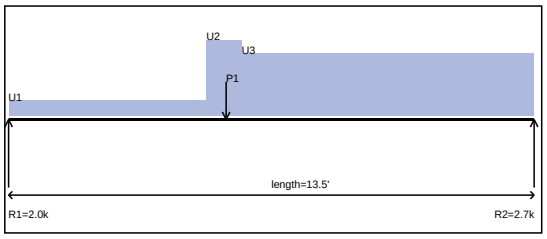
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.07k	Vall = 8.24k	Ratio = 0.13
M = 4.67k-ft	Mall = 10.17k-ft	Ratio = 0.46

Deflection
TL = 0.28" L/740 > L/240 min
DL = 0.11"
L = 0.00" L/999+ > L/360 min

6x12 DF #2

Description - Upper Floor Framing - B2-15 - Dropped



Uniform 1 = 0.09 klf (0.0'-5.1')

P1 = 1.04 K (5.6')

Uniform 2 = 0.45 klf (5.1'-6.0')

Uniform 3 = 0.37 klf (6.0'-13.5')

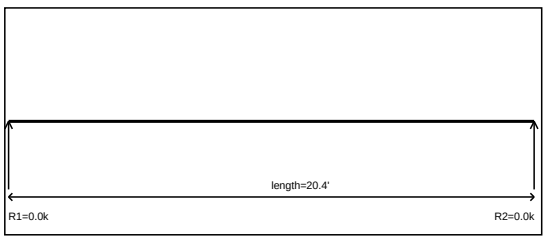
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 2.66k	Vall = 8.24k	Ratio = 0.32
M = 9.70k-ft	Mall = 10.17k-ft	Ratio = 0.95

Deflection
TL = 0.35" L/461 > L/240 min
DL = 0.14"
L = 0.00" L/999+ > L/360 min

6x12 DF #2

Description - Upper Floor Framing - B2-16 - Flush



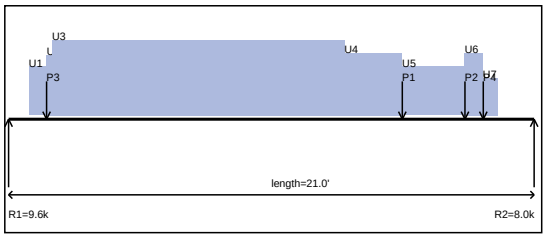
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

V = 0.00k	Vall = 5.32k	Ratio = 0
M = 0.00k-ft	Mall = 15.72k-ft	Ratio = 0

Deflection
TL = 0 " L/ NA > L/240 min
DL = 0 "
L = 0 " L/ NA > L/360 min

1-3/4x16 LVL

Description - Upper Floor Framing - B2-17 - Flush Bottom



Uniform 1 = 0.42 klf (0.8'-1.5')
Uniform 2 = 0.52 klf (1.5'-1.7')
Uniform 3 = 0.65 klf (1.7'-13.4')
Uniform 4 = 0.54 klf (13.4'-15.7')
Uniform 5 = 0.42 klf (15.7'-18.2')
Uniform 6 = 0.54 klf (18.2'-18.9')
Uniform 7 = 0.32 klf (18.9'-19.5')

P1 = 0.15 K (15.7')
P2 = 0.15 K (18.2')
P3 = 3.64 K (1.5')
P4 = 2.72 K (18.9')

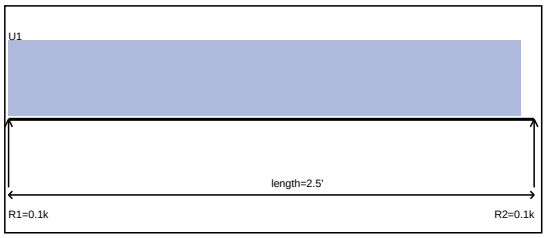
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + 0.75 * (L + S))

V = 7.58k	Vall = 21.28k	Ratio = 0.36
M = 33.14k-ft	Mall = 62.88k-ft	Ratio = 0.53

Deflection
TL = 0.58" L/433 > L/240 min
DL = 0.29"
L = 0.29" L/874 > L/360 min

(4)1-3/4x16 LVL

Description - Main Floor Framing - H1-1 - Header



Uniform 1 = 0.07 klf (0.0'-2.4')

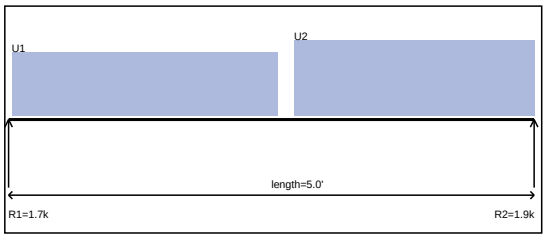
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.08k	Vall = 3.04k	Ratio = 0.03
M = 0.05k-ft	Mall = 2.99k-ft	Ratio = 0.02

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Main Floor Framing - H1-2 - Header



Uniform 1 = 0.68 klf (0.0'-2.6')
Uniform 2 = 0.81 klf (2.7'-5.0')

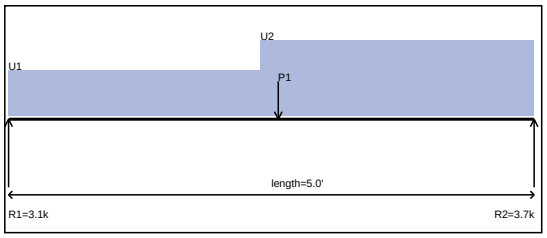
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.87k	Vall = 3.88k	Ratio = 0.48
M = 2.17k-ft	Mall = 4.49k-ft	Ratio = 0.48

Deflection
TL = 0.03" L/999+ > L/240 min
DL = 0.01"
L = 0.01" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing - H1-3 - Header



Uniform 1 = 0.71 klf (0.0'-2.4') P1 = 1.98 K (2.6')

Uniform 2 = 1.18 klf (2.4'-5.0')

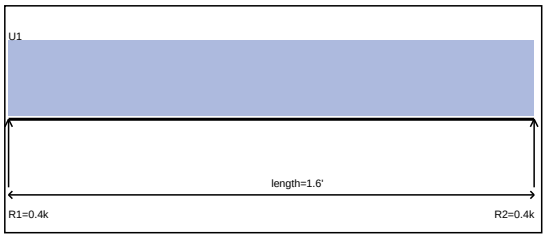
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 3.18k	Vall = 4.47k	Ratio = 0.71
M = 4.72k-ft	Mall = 5.17k-ft	Ratio = 0.91

Deflection
TL = 0.06" L/999+ > L/240 min
DL = 0.03"
L = 0.02" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing - B1-1 - Dropped



Uniform 1 = 0.48 klf (0.0'-1.6')

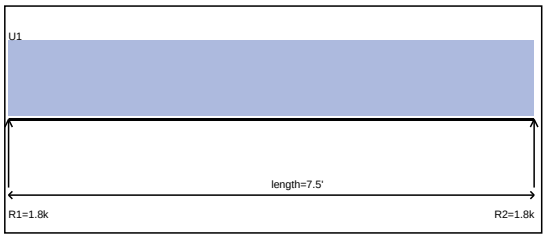
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.39k	Vall = 3.88k	Ratio = 0.10
M = 0.16k-ft	Mall = 4.49k-ft	Ratio = 0.03

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing - B1-2 - Dropped



Uniform 1 = 0.48 klf (0.0'-7.5')

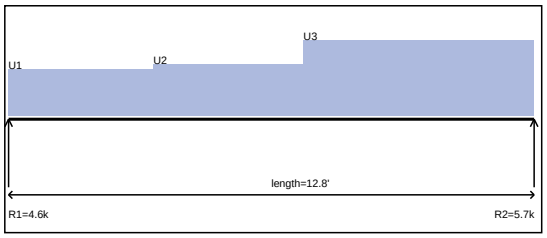
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.79k	Vall = 3.88k	Ratio = 0.46
M = 3.36k-ft	Mall = 4.49k-ft	Ratio = 0.75

Deflection
TL = 0.09" L/977 > L/240 min
DL = 0.02"
L = 0.07" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing - B1-3 - Flush



Uniform 1 = 0.61 klf (0.0'-3.5')

Uniform 2 = 0.67 klf (3.5'-7.2')

Uniform 3 = 0.99 klf (7.2'-12.8')

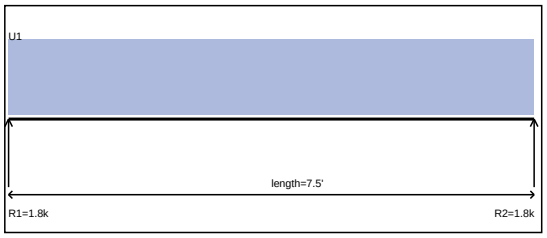
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 5.69k	Vall = 10.64k	Ratio = 0.53
M = 16.29k-ft	Mall = 31.44k-ft	Ratio = 0.52

Deflection
TL = 0.21" L/725 > L/240 min
DL = 0.06"
L = 0.15" L/997 > L/360 min

(2)1-3/4x16 LVL

Description - Main Floor Framing - B1-4 - Dropped



Uniform 1 = 0.48 klf (0.0'-7.5')

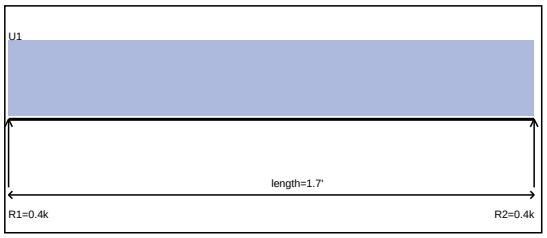
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.79k	Vall = 3.88k	Ratio = 0.46
M = 3.36k-ft	Mall = 4.49k-ft	Ratio = 0.75

Deflection
TL = 0.09" L/977 > L/240 min
DL = 0.02"
L = 0.07" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing - B1-5 - Dropped



Uniform 1 = 0.48 klf (0.0'-1.7')

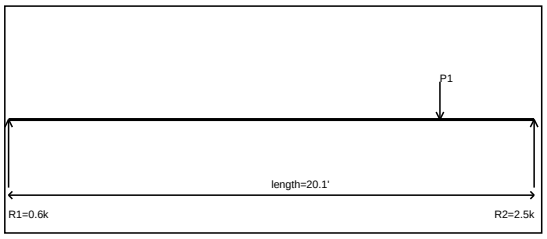
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.40k	Vall = 3.88k	Ratio = 0.10
M = 0.16k-ft	Mall = 4.49k-ft	Ratio = 0.04

Deflection
TL = 0.00" L/999+ > L/240 min
DL = 0.00"
L = 0.00" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing - B1-7 - Flush



P1 = 2.93 K (16.5')

Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 2.09k	Vall = 18.35k	Ratio = 0.11
M = 7.56k-ft	Mall = 54.23k-ft	Ratio = 0.14

Deflection
TL = 0.16" L/999+ > L/240 min
DL = 0.09"
L = 0.03" L/999+ > L/360 min

(3)1-3/4x16 LVL

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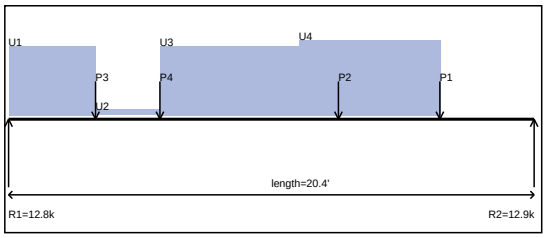
Description - Main Floor Framing - B1-8 - Flush Bottom



Uniform 1 = 1.17 klf (0.0'-3.4')

Uniform 2 = 0.10 klf (3.4'-5.9')

Uniform 3 = 1.17 klf (5.9'-11.3')

Uniform 4 = 1.28 klf (11.3'-16.8')

P1 = 5.31 K (16.8')

P2 = 0.00 K (12.8')

P3 = 1.34 K (3.4')

P4 = 1.34 K (5.9')

Controlling Load Combination/ Cd
V = (D + L) Cd= NA
M = (D + L) Cd= NA
△ = (D + L)

V = 12.37k	Vall = 74.50k	Ratio = 0.17
M = 65.33k-ft	Mall = 118.00k-ft	Ratio = 0.55

Deflection
TL = 0.58" L/422 > L/240 min
DL = 0.21"
L = 0.37" L/658 > L/360 min

W14x30 Steel

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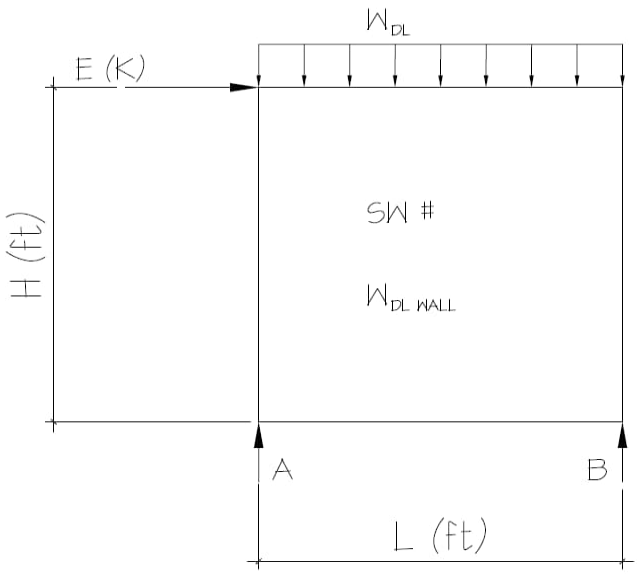
Project Name: Milestone NW Lot 3
M&K Project #: 203-24024
Engineer: RSC
Date: 12-Dec-24

Overstrength Calculations

Wall Description/SW #: 202

Parameters:

L =	26.2	ft
H =	9.1	ft
E =	2.90	k
W_{DLwall} =	0.14	klf
W_{DL} =	0.034	klf
Ω_0 =	2.5	(ASCE table 12.2.1 footnote
SDS =	1.108	



Analysis:

E (unfactored) = 4.14

$E_{MH} = \Omega_0 * E$ = 10.36 k

$E_V = 0.2*SDS*DL$ = 0.999 k

$E_M = E_{MH} + E_V$

$E_M = E_{MH} - E_V$

$E_M = E_{MH} + E_V$ = 11.356 k

$E_M = E_{MH} - E_V$ = 9.359 k

E_M (max) $= \sum M_A = 0$ = 11.36(9.1) - R_B(26.2)

R_B = 3.9E

R_A = - 3.9E

E_M (min) $= \sum M_A = 0$ = 9.36(9.1) - R_B(26.2)

R_B = 3.2E

R_A = - 3.2E

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

ALLOWABLE STESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM CALCS FOR LOAD APPLICATION

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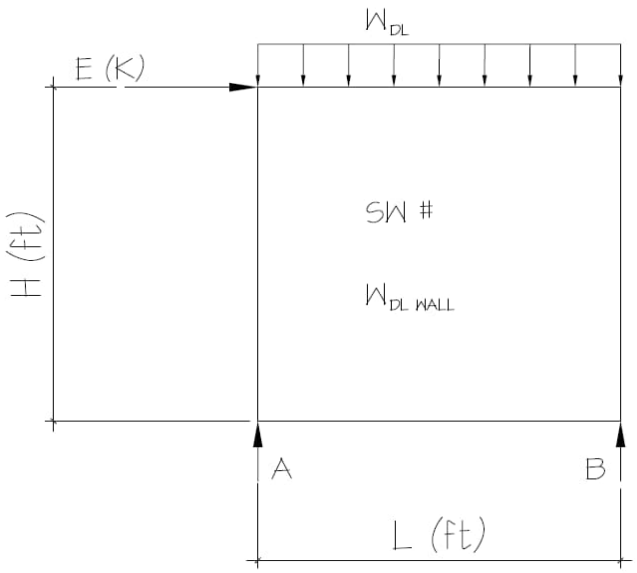
Project Name: Milestone NW Lot 3
M&K Project #: 203-24024
Engineer: RSC
Date: 12-Dec-24

Overstrength Calculations

Wall Description/SW #: 203

Parameters:

L =	40.8	ft
H =	9.1	ft
E =	1.60	k
W_{DLwall} =	0.10	klf
W_{DL} =	0.149	klf
Ω_0 =	2.5	(ASCE table 12.2.1 footnote
SDS =	1.108	



Analysis:

E (unfactored) = 2.29

$E_{MH} = \Omega_0 * E$ = 5.71 k

$E_V = 0.2*SDS*DL$ = 2.251 k

$E_M = E_{MH} + E_V$

$E_M = E_{MH} - E_V$

$E_M = E_{MH} + E_V$ = 7.966 k

$E_M = E_{MH} - E_V$ = 3.463 k

E_M (max) = $\sum M_A = 0$ =	7.97(9.1) - R_B(40.8)	R_B =	1.8E
		R_A =	- 1.8E
E_M (min) = $\sum M_A = 0$ =	3.46(9.1) - R_B(40.8)	R_B =	0.8E
		R_A =	- 0.8E

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

ALLOWABLE STESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM CALCS FOR LOAD APPLICATION

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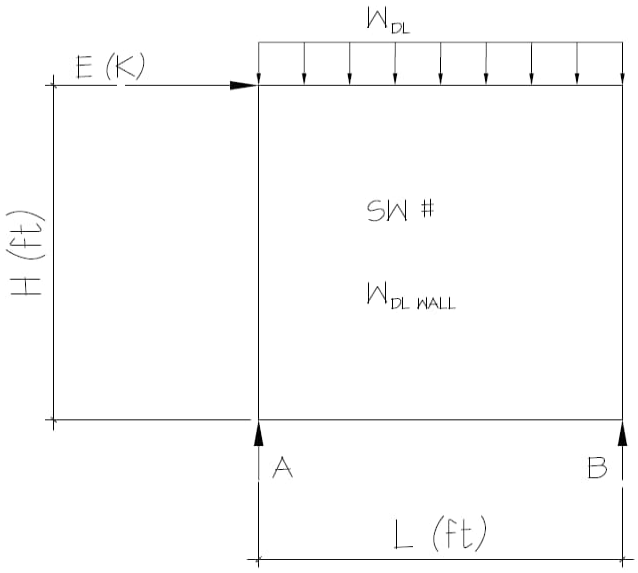
Project Name: Milestone NW Lot 3
M&K Project #: 203-24024
Engineer: RSC
Date: 12-Dec-24

Overstrength Calculations

Wall Description/SW #: 206

Parameters:

L =	14.5	ft
H =	9.1	ft
E =	1.40	k
W_{DLwall} =	0.10	klf
W_{DL} =	0.048	klf
Ω_0 =	2.5	(ASCE table 12.2.1 footnote
SDS =	1.108	



Analysis:

E (unfactored) = 2.00

$E_{MH} = \Omega_0 * E$ = 5.00 k

$E_V = 0.2*SDS*DL$ = 0.476 k

$E_M = E_{MH} + E_V$

$E_M = E_{MH} - E_V$

$E_M = E_{MH} + E_V$ = 5.476 k

$E_M = E_{MH} - E_V$ = 4.524 k

E_M (max) $= \sum M_A = 0$ =	5.48(9.1) - RB(14.5)	RB=	3.4E
		RA=	- 3.4E
E_M (min) $= \sum M_A = 0$ =	4.52(9.1) - RB(14.5)	RB=	2.8E
		RA=	- 2.8E

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

ALLOWABLE STESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM CALCS FOR LOAD APPLICATION

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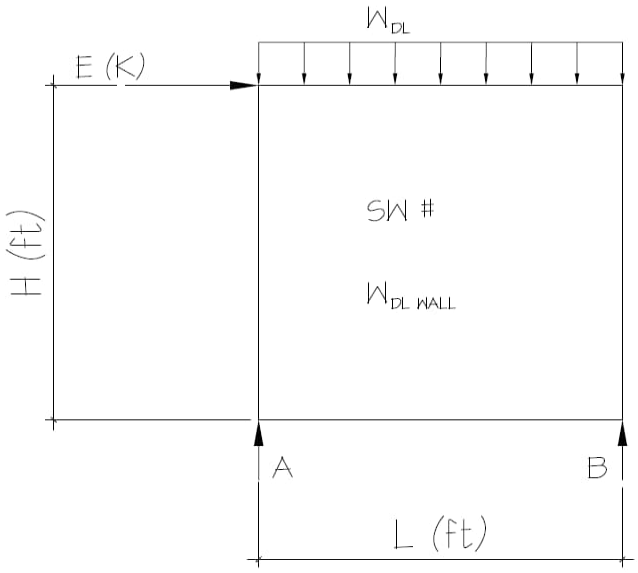
Project Name: Milestone NW Lot 3
M&K Project #: 203-24024
Engineer: RSC
Date: 12-Dec-24

Overstrength Calculations

Wall Description/SW #: 207

Parameters:

L =	13.5	ft
H =	9.1	ft
E =	1.10	k
W_{DLwall} =	0.10	klf
W_{DL} =	0.000	klf
Ω_0 =	2.5	(ASCE table 12.2.1 footnote
SDS =	1.108	



Analysis:

E (unfactored) = 1.57

$E_{MH} = \Omega_0 * E$ = 3.93 k

$E_V = 0.2*SDS*DL$ = 0.299 k

$E_M = E_{MH} + E_V$

$E_M = E_{MH} - E_V$

$E_M = E_{MH} + E_V$ = 4.228 k

$E_M = E_{MH} - E_V$ = 3.629 k

E_M (max) = $\sum M_A = 0$ =	4.23(9.1) - RB(13.5)	RB=	2.8E
		RA=	- 2.8E
E_M (min) = $\sum M_A = 0$ =	3.63(9.1) - RB(13.5)	RB=	2.4E
		RA=	- 2.4E

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

ALLOWABLE STESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM CALCS FOR LOAD APPLICATION

Wood Beam

Project File: beam calcs with overstrength.ec

DESCRIPTION: B2-16 OS 207

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-16

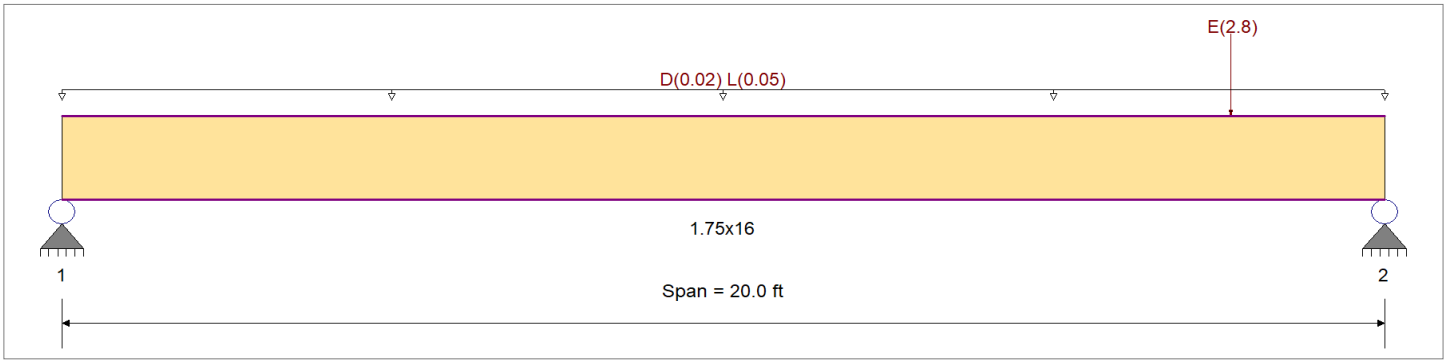
Wood Species : LVL OS
Wood Grade : Manufactured

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

Fb +	3,120.0 psi
Fb -	3,120.0 psi
Fc - Prll	3,012.0 psi
Fc - Perp	900.0 psi
Fv	342.0 psi
Ft	1,866.0 psi

E : Modulus of Elasticity

Ebend- xx	1,900.0 ksi
Eminbend - xx	101,654 ksi
Density	35.0 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, L = 0.050 , Tributary Width = 1.0 ft
Point Load : E = 2.80 k @ 17.670 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.206 : 1	Maximum Shear Stress Ratio	=	0.196 : 1
Section used for this span		1.75x16	Section used for this span		1.75x16
fb: Actual	=	617.19 psi	fv: Actual	=	106.99 psi
F'b	=	3,000.29 psi	F'v	=	547.20 psi
Load Combination		+D+L+H	Load Combination		+1.140D+0.70E
Location of maximum on span	=	10.000 ft	Location of maximum on span	=	18.686 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.251 in	Ratio =	956 >=360	Span: 1 : E Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.335 in	Ratio =	716 >=300	Span: 1 : +D+0.750L+0.750S+0.5250E+H
Max Upward Total Deflection	0 in	Ratio =	0 <300	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H														0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.080	0.041	0.90	1.00	1.00	1.00	0.962	1.00	1.00	1.00	1.34	215.4	2,700.3	0.23	12.5	307.8
+D+L+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.206	0.105	1.00	1.00	1.00	1.00	0.962	1.00	1.00	1.00	3.84	617.2	3,000.3	0.67	35.7	342.0
+D+Lr+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.057	0.029	1.25	1.00	1.00	1.00	0.962	1.00	1.00	1.00	1.34	215.4	3,750.4	0.23	12.5	427.5
+D+S+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.062	0.032	1.15	1.00	1.00	1.00	0.962	1.00	1.00	1.00	1.34	215.4	3,450.3	0.23	12.5	393.3
+D+0.750Lr+0.750L+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Wood Beam

Project File: beam calcs with overstrength.ec

DESCRIPTION: B2-16 OS 207

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 20.0 ft	1	0.138	0.070	1.25	1.00	1.00	1.00	0.962	1.00	1.00	1.00	3.22	516.7	3,750.4	0.56	29.9	427.5
+D+0.750L+0.750S+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.150	0.076	1.15	1.00	1.00	1.00	0.962	1.00	1.00	1.00	3.22	516.7	3,450.3	0.56	29.9	393.3
+D+0.60W+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.045	0.023	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	1.34	215.4	4,800.5	0.23	12.5	547.2
+D+0.750Lr+0.750L+0.450W+					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.108	0.055	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	3.22	516.7	4,800.5	0.56	29.9	547.2
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.108	0.055	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	3.22	516.7	4,800.5	0.56	29.9	547.2
+0.60D+0.60W+0.60H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.027	0.014	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	0.80	129.2	4,800.5	0.14	7.5	547.2
+D+0.70E+0.60H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.154	0.192	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	4.59	737.1	4,800.5	1.96	105.2	547.2
+D-0.70E+0.60H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.117	0.149	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	3.48	559.4	4,800.5	1.52	81.7	547.2
+D+0.750L+0.750S+0.5250E+					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.173	0.182	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	5.16	828.6	4,800.5	1.86	99.5	547.2
+D+0.750L+0.750S-0.5250E+					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.058	0.078	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	1.73	278.2	4,800.5	0.80	42.9	547.2
+0.60D+0.70E+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.146	0.183	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	4.37	701.6	4,800.5	1.87	100.3	547.2
+0.60D-0.70E+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.124	0.157	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	3.70	594.9	4,800.5	1.61	86.1	547.2
+1.140D+0.70E					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.156	0.196	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	4.66	749.6	4,800.5	2.00	107.0	547.2
+1.140D-0.70E					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.114	0.146	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	3.40	546.9	4,800.5	1.50	80.1	547.2
+1.105D+0.750L+0.750S+0.5					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.177	0.184	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	5.29	849.7	4,800.5	1.88	100.8	547.2
+1.105D+0.750L+0.750S-0.52					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.062	0.076	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	1.86	299.2	4,800.5	0.78	41.8	547.2
+0.460D+0.70E					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.144	0.180	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	4.29	689.1	4,800.5	1.84	98.5	547.2
+0.460D-0.70E					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.127	0.160	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	3.78	607.4	4,800.5	1.64	87.7	547.2

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.5250E+H	1	0.3349	10.584		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	0.814	2.474
Max Upward from Load Combinations	0.814	2.000
Max Upward from Load Cases	0.500	2.474
Max Downward from all Load Conditio	-0.326	-2.474
Max Downward from Load Combinations	-0.068	-1.571
Max Downward from Load Cases (Resis	-0.326	-2.474
+D+H	0.268	0.268
+D+L+H	0.768	0.768
+D+Lr+H	0.268	0.268

DESCRIPTION: B2-16 OS 207

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
+D+S+H	0.268	0.268
+D+0.750Lr+0.750L+H	0.643	0.643
+D+0.750L+0.750S+H	0.643	0.643
+D+0.60W+H	0.268	0.268
+D+0.750Lr+0.750L+0.450W+H	0.643	0.643
+D+0.750L+0.750S+0.450W+H	0.643	0.643
+0.60D+0.60W+0.60H	0.161	0.161
+D+0.70E+0.60H	0.496	2.000
+D-0.70E+0.60H	0.040	-1.464
+D+0.750L+0.750S+0.5250E+H	0.814	1.942
+D+0.750L+0.750S-0.5250E+H	0.472	-0.656
+0.60D+0.70E+H	0.389	1.892
+0.60D-0.70E+H	-0.068	-1.571
D Only	0.268	0.268
L Only	0.500	0.500
E Only	0.326	2.474
E Only * -1.0	-0.326	-2.474
H Only		

Wood Beam

Project File: beam calcs with overstrength.ec

DESCRIPTION: B2-17 OS 203

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-16

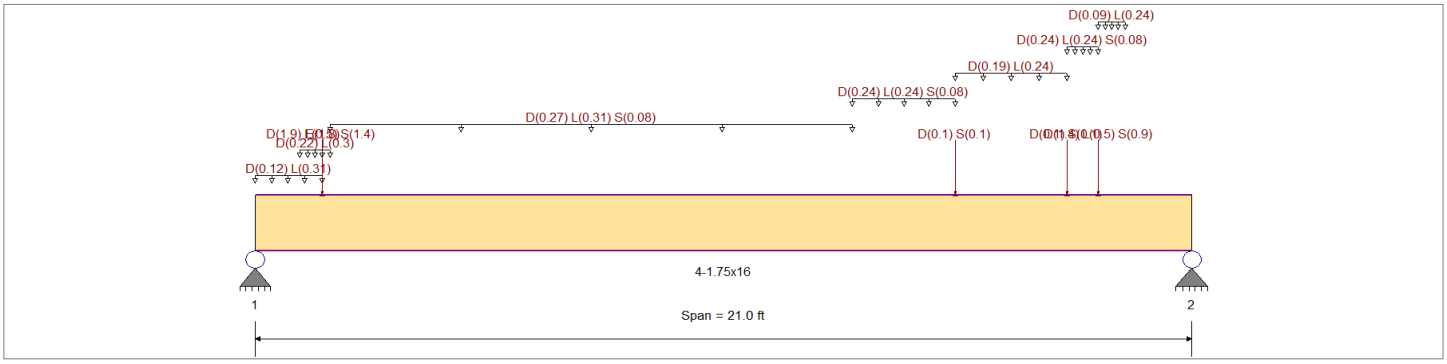
Wood Species : LVL OS
Wood Grade : Manufactured

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

Fb +	3120 psi
Fb -	3120 psi
Fc - Prll	3012 psi
Fc - Perp	900 psi
Fv	342 psi
Ft	1866 psi

E : Modulus of Elasticity

Ebend- xx	1900 ksi
Eminbend - xx	101654 ksi
Density	35 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.120, L = 0.310 k/ft, Extent = 0.0 -->> 1.50 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.220, L = 0.30 k/ft, Extent = 1.0 -->> 1.70 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.270, L = 0.310, S = 0.080 k/ft, Extent = 1.70 -->> 13.40 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.240, L = 0.240, S = 0.080 k/ft, Extent = 13.40 -->> 15.70 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.190, L = 0.240 k/ft, Extent = 15.70 -->> 18.20 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.240, L = 0.240, S = 0.080 k/ft, Extent = 18.20 -->> 18.90 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.090, L = 0.240 k/ft, Extent = 18.90 -->> 19.50 ft, Tributary Width = 1.0 ft
Point Load : D = 1.90, L = 0.50, S = 1.40 k @ 1.50 ft
Point Load : D = 0.10, S = 0.10 k @ 15.70 ft
Point Load : D = 0.10, S = 0.10 k @ 18.20 ft
Point Load : D = 1.40, L = 0.50, S = 0.90 k @ 18.90 ft
Point Load : E = 1.80 k @ 1.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.478 : 1	Maximum Shear Stress Ratio	=	0.309 : 1
Section used for this span		4-1.75x16	Section used for this span		4-1.75x16
fb: Actual	=	1,434.80 psi	fv: Actual	=	105.82 psi
F'b	=	3,000.29 psi	F'v	=	342.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	10.270 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.299 in	Ratio =	842 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.665 in	Ratio =	379 >=300	Span: 1 : +D+0.750L+0.750S+0.5250E+H
Max Upward Total Deflection	0 in	Ratio =	0 <300	n/a

DESCRIPTION: B2-17 OS 203

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H														0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.279	0.200	0.90	1.00	1.00	1.00	0.962	1.00	1.00	1.00	18.76	753.8	2,700.3	4.60	61.6	307.8
+D+L+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.478	0.309	1.00	1.00	1.00	1.00	0.962	1.00	1.00	1.00	35.71	1,434.8	3,000.3	7.90	105.8	342.0
+D+Lr+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.201	0.144	1.25	1.00	1.00	1.00	0.962	1.00	1.00	1.00	18.76	753.8	3,750.4	4.60	61.6	427.5
+D+S+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.291	0.228	1.15	1.00	1.00	1.00	0.962	1.00	1.00	1.00	25.02	1,005.3	3,450.3	6.69	89.6	393.3
+D+0.750Lr+0.750L+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.337	0.222	1.25	1.00	1.00	1.00	0.962	1.00	1.00	1.00	31.47	1,264.5	3,750.4	7.07	94.8	427.5
+D+0.750L+0.750S+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.421	0.294	1.15	1.00	1.00	1.00	0.962	1.00	1.00	1.00	36.17	1,453.2	3,450.3	8.64	115.8	393.3
+D+0.60W+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.157	0.113	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	18.76	753.8	4,800.5	4.60	61.6	547.2
+D+0.750Lr+0.750L+0.450W+					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.263	0.173	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	31.47	1,264.5	4,800.5	7.07	94.8	547.2
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.303	0.212	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	36.17	1,453.2	4,800.5	8.64	115.8	547.2
+0.60D+0.60W+0.60H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.094	0.068	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	11.26	452.3	4,800.5	2.76	36.9	547.2
+D+0.70E+0.60H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.165	0.141	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	19.73	792.8	4,800.5	5.77	77.2	547.2
+D-0.70E+0.60H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.149	0.094	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	17.82	715.9	4,800.5	3.83	51.3	547.2
+D+0.750L+0.750S+0.5250E+					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.309	0.233	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	36.90	1,482.4	4,800.5	9.52	127.5	547.2
+D+0.750L+0.750S-0.5250E+					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.297	0.190	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	35.45	1,424.3	4,800.5	7.77	104.0	547.2
+0.60D+0.70E+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.102	0.096	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	12.24	491.7	4,800.5	3.93	52.6	547.2
+0.60D-0.70E+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.086	0.055	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	10.32	414.7	4,800.5	2.26	30.3	547.2
+1.140D+0.70E					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.187	0.157	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	22.36	898.3	4,800.5	6.41	85.8	547.2
+1.140D-0.70E					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.171	0.107	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	20.44	821.3	4,800.5	4.38	58.7	547.2
+1.105D+0.750L+0.750S+0.5					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.325	0.245	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	38.86	1,561.5	4,800.5	10.00	134.0	547.2
+1.105D+0.750L+0.750S-0.52					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.313	0.202	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	37.42	1,503.4	4,800.5	8.25	110.5	547.2
+0.460D+0.70E					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.080	0.080	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	9.62	386.4	4,800.5	3.28	44.0	547.2
+0.460D-0.70E					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.064	0.042	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	7.70	309.5	4,800.5	1.71	23.0	547.2

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.5250E+H	1	0.6646	10.423		0.0000	0.000

DESCRIPTION: B2-17 OS 203

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	10.150	7.440
Max Upward from Load Combinations	10.150	7.440
Max Upward from Load Cases	4.855	3.959
Max Downward from all Load Conditio	-1.671	-0.129
Max Downward from Load Cases (Resis	-1.671	-0.129
+D+H	4.855	3.959
+D+L+H	8.654	6.925
+D+Lr+H	4.855	3.959
+D+S+H	6.946	5.544
+D+0.750Lr+0.750L+H	7.705	6.184
+D+0.750L+0.750S+H	9.273	7.372
+D+0.60W+H	4.855	3.959
+D+0.750Lr+0.750L+0.450W+H	7.705	6.184
+D+0.750L+0.750S+0.450W+H	9.273	7.372
+0.60D+0.60W+0.60H	2.913	2.375
+D+0.70E+0.60H	6.025	4.049
+D-0.70E+0.60H	3.685	3.869
+D+0.750L+0.750S+0.5250E+H	10.150	7.440
+D+0.750L+0.750S-0.5250E+H	8.395	7.305
+0.60D+0.70E+H	4.083	2.465
+0.60D-0.70E+H	1.743	2.285
D Only	4.855	3.959
L Only	3.799	2.967
S Only	2.091	1.585
E Only	1.671	0.129
E Only * -1.0	-1.671	-0.129
H Only		

Wood Beam

Project File: beam calcs with overstrength.ec

DESCRIPTION: B2-17 OS 206

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-16

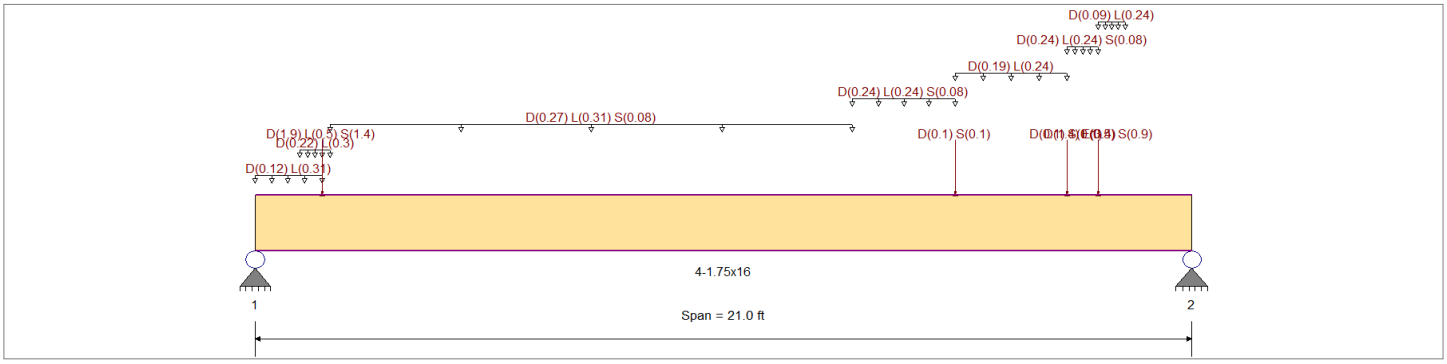
Wood Species : LVL OS
Wood Grade : Manufactured

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

Fb +	3,120.0 psi
Fb -	3,120.0 psi
Fc - Prll	3,012.0 psi
Fc - Perp	900.0 psi
Fv	342.0 psi
Ft	1,866.0 psi

E : Modulus of Elasticity

Ebend- xx	1,900.0 ksi
Eminbend - xx	101,654 ksi
Density	35.0 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.120, L = 0.310 k/ft, Extent = 0.0 -->> 1.50 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.220, L = 0.30 k/ft, Extent = 1.0 -->> 1.70 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.270, L = 0.310, S = 0.080 k/ft, Extent = 1.70 -->> 13.40 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.240, L = 0.240, S = 0.080 k/ft, Extent = 13.40 -->> 15.70 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.190, L = 0.240 k/ft, Extent = 15.70 -->> 18.20 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.240, L = 0.240, S = 0.080 k/ft, Extent = 18.20 -->> 18.90 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.090, L = 0.240 k/ft, Extent = 18.90 -->> 19.50 ft, Tributary Width = 1.0 ft
Point Load : D = 1.90, L = 0.50, S = 1.40 k @ 1.50 ft
Point Load : D = 0.10, S = 0.10 k @ 15.70 ft
Point Load : D = 0.10, S = 0.10 k @ 18.20 ft
Point Load : D = 1.40, L = 0.50, S = 0.90 k @ 18.90 ft
Point Load : E = 3.40 k @ 18.90 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.478 : 1	Maximum Shear Stress Ratio	=	0.309 : 1
Section used for this span		4-1.75x16	Section used for this span		4-1.75x16
fb: Actual	=	1,434.80 psi	fv: Actual	=	105.82 psi
F'b	=	3,000.29 psi	F'v	=	342.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	10.270 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.299 in	Ratio =	842 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.689 in	Ratio =	365 >=300	Span: 1 : +D+0.750L+0.750S+0.5250E+H
Max Upward Total Deflection	0 in	Ratio =	0 <300	n/a

DESCRIPTION: B2-17 OS 206

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H														0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.279	0.200	0.90	1.00	1.00	1.00	0.962	1.00	1.00	1.00	18.76	753.8	2,700.3	4.60	61.6	307.8
+D+L+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.478	0.309	1.00	1.00	1.00	1.00	0.962	1.00	1.00	1.00	35.71	1,434.8	3,000.3	7.90	105.8	342.0
+D+Lr+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.201	0.144	1.25	1.00	1.00	1.00	0.962	1.00	1.00	1.00	18.76	753.8	3,750.4	4.60	61.6	427.5
+D+S+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.291	0.228	1.15	1.00	1.00	1.00	0.962	1.00	1.00	1.00	25.02	1,005.3	3,450.3	6.69	89.6	393.3
+D+0.750Lr+0.750L+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.337	0.222	1.25	1.00	1.00	1.00	0.962	1.00	1.00	1.00	31.47	1,264.5	3,750.4	7.07	94.8	427.5
+D+0.750L+0.750S+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.421	0.294	1.15	1.00	1.00	1.00	0.962	1.00	1.00	1.00	36.17	1,453.2	3,450.3	8.64	115.8	393.3
+D+0.60W+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.157	0.113	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	18.76	753.8	4,800.5	4.60	61.6	547.2
+D+0.750Lr+0.750L+0.450W+					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.263	0.173	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	31.47	1,264.5	4,800.5	7.07	94.8	547.2
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.303	0.212	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	36.17	1,453.2	4,800.5	8.64	115.8	547.2
+0.60D+0.60W+0.60H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.094	0.068	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	11.26	452.3	4,800.5	2.76	36.9	547.2
+D+0.70E+0.60H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.178	0.148	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	21.32	856.7	4,800.5	6.07	81.2	547.2
+D-0.70E+0.60H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.137	0.107	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	16.39	658.5	4,800.5	4.36	58.4	547.2
+D+0.750L+0.750S+0.5250E+					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.318	0.219	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	38.03	1,528.0	4,800.5	8.94	119.8	547.2
+D+0.750L+0.750S-0.5250E+					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.288	0.207	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	34.36	1,380.5	4,800.5	8.46	113.4	547.2
+0.60D+0.70E+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.116	0.110	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	13.88	557.8	4,800.5	4.50	60.2	547.2
+0.60D-0.70E+H					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.075	0.062	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	8.95	359.6	4,800.5	2.52	33.7	547.2
+1.140D+0.70E					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.200	0.162	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	23.94	961.8	4,800.5	6.61	88.6	547.2
+1.140D-0.70E					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.159	0.122	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	19.01	763.6	4,800.5	5.00	67.0	547.2
+1.105D+0.750L+0.750S+0.5					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.335	0.229	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	40.00	1,607.1	4,800.5	9.36	125.3	547.2
+1.105D+0.750L+0.750S-0.52					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.304	0.219	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	36.33	1,459.6	4,800.5	8.95	119.8	547.2
+0.460D+0.70E					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.095	0.097	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	11.30	454.2	4,800.5	3.95	52.9	547.2
+0.460D-0.70E					1.00	1.00	1.00	0.962	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 21.0 ft	1	0.053	0.046	1.60	1.00	1.00	1.00	0.962	1.00	1.00	1.00	6.37	256.0	4,800.5	1.88	25.1	547.2

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.5250E+H	1	0.6887	10.577		0.0000	0.000

DESCRIPTION: B2-17 OS 206

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	9.451	8.979
Max Upward from Load Combinations	9.451	8.979
Max Upward from Load Cases	4.855	3.959
Max Downward from all Load Conditio	-0.340	-3.060
Max Downward from Load Cases (Resis	-0.340	-3.060
+D+H	4.855	3.959
+D+L+H	8.654	6.925
+D+Lr+H	4.855	3.959
+D+S+H	6.946	5.544
+D+0.750Lr+0.750L+H	7.705	6.184
+D+0.750L+0.750S+H	9.273	7.372
+D+0.60W+H	4.855	3.959
+D+0.750Lr+0.750L+0.450W+H	7.705	6.184
+D+0.750L+0.750S+0.450W+H	9.273	7.372
+0.60D+0.60W+0.60H	2.913	2.375
+D+0.70E+0.60H	5.093	6.101
+D-0.70E+0.60H	4.617	1.817
+D+0.750L+0.750S+0.5250E+H	9.451	8.979
+D+0.750L+0.750S-0.5250E+H	9.094	5.766
+0.60D+0.70E+H	3.151	4.517
+0.60D-0.70E+H	2.675	0.233
D Only	4.855	3.959
L Only	3.799	2.967
S Only	2.091	1.585
E Only	0.340	3.060
E Only * -1.0	-0.340	-3.060
H Only		

Cantilevered Retaining Wall

Project File: Foundation Retaining.ec6

DESCRIPTION: Typical Basement Wall

Code Reference

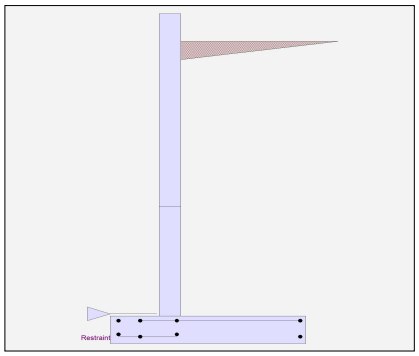
Calculations per IBC 2021 1807.3, ASCE 7-16

Criteria

Retained Height	=	10.00 ft
Wall height above soil	=	1.00 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 (Multiplier used on soil density)	=	7.000

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 (Strength Level)	=	0.0 psf
Uniform Seismic Force	=	77.000
Total Seismic Force	=	847.000

Adjacent Footing Load

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

Cantilevered Retaining Wall

Project File: Foundation Retaining.ec6

DESCRIPTION: Typical Basement Wall

Design Summary

Wall Stability Ratios

Overturning	=	2.50	OK
Slab Resists All Sliding !			
Global Stability	=	1.75	

Total Bearing Load	=	7,151	lbs
...resultant ecc.	=	8.28	in
Eccentricity within middle third			
Soil Pressure @ Toe	=	2,015	psf NG
Soil Pressure @ Heel	=	369	psf OK
Allowable	=	1,500	psf
Soil Pressure Exceeds Allowable!			
ACI Factored @ Toe	=	2,452	psf
ACI Factored @ Heel	=	449	psf
Footing Shear @ Toe	=	16.6	psi OK
Footing Shear @ Heel	=	26.9	psi OK
Allowable	=	75.0	psi

Sliding Calcs

Lateral Sliding Force	=	2,710.4	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

		2nd	Bottom		
		Stem OK	Ratio > 1.0		
Design Height Above Ftg	ft =	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	=	**0.522**	**1.058**		
Total Force @ Section					
Service Level	lbs =				
Strength Level	lbs =	1,470.0	3,570.0		
Moment....Actual					
Service Level	ft-# =				
Strength Level	ft-# =	3,402.0	13,183.3		
Moment.....Allowable	ft-# =	6,513.6	12,453.1		
Shear.....Actual					
Service Level	psi =				
Strength Level	psi =	18.8	45.8		
Shear.....Allowable	psi =	43.2	54.4		
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

DESCRIPTION: Typical Basement Wall

Concrete Stem Rebar Area Details

2nd Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1223 in2/ft		
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.1728 in2/ft	#4@ 13.89 in	#4@ 27.78 in
Provided Area :	0.2325 in2/ft	#5@ 21.53 in	#5@ 43.06 in
Maximum Area :	0.8805 in2/ft	#6@ 30.56 in	#6@ 61.11 in

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.474 in2/ft		
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.474 in2/ft	#4@ 13.89 in	#4@ 27.78 in
Provided Area :	0.465 in2/ft	#5@ 21.53 in	#5@ 43.06 in
Maximum Area :	0.8805 in2/ft	#6@ 30.56 in	#6@ 61.11 in

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	4.50
Total Footing Width	=	6.00
Footing Thickness	=	12.00 in

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	2,452	449	psf
Mu' : Upward	=	2,571	6,434	ft-#
Mu' : Downward	=	203	16,754	ft-#
Mu: Design	=	2,368	10,319	ft-#
φ Mn	=	17,034	19,126	ft-#
Actual 1-Way Shear	=	16.61	26.94	psi
Allow 1-Way Shear	=	49.38	47.62	psi

Toe Reinforcing = # 5 @ 8.00 in
Heel Reinforcing = # 5 @ 8.00 in
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, φ Tn = 0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

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

Heel: #4@ 7.20 in, #5@ 11.17 in, #6@ 15.85 in, #7@ 21.62 in, #8@ 28.46 in, #9@ 36.03 in, #10@ 45.76 in

Key: No key defined

Min footing T&S reinf Area 1.56 in2
Min footing T&S reinf Area per foot 0.26 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

DESCRIPTION: Typical Basement Wall

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... 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)	4,216.7	4.08	17,218.1
HL Act Pres (be water tbl)					Soil Over HL (bel. water tbl)		4.08	17,218.1
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	=	592.9	5.50	3,261.0	Surcharge Over Toe	=		
	=				Stem Weight(s)	=	1,100.0	1.83	2,016.7
					Earth @ Stem Transitions	=			
Total	=	2,710.4	**O.T.M.** =	11,025.1	Footing Weight	=	900.0	3.00	2,700.0
					Key Weight	=			
					Vert. Component	=	934.7	6.00	5,608.2
					Total =		7,151.4 lbs	**R.M.=**	27,542.9

Resisting/Overturning Ratio = **2.50**

Vertical Loads used for Soil Pressure = 7,151.4 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)	0.103	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.

DESCRIPTION: Typical Basement Wall

Rebar Lap & Embedment Lengths Information

Stem Design Segment: 2nd
Stem Design Height: 4.00 ft above top of footing

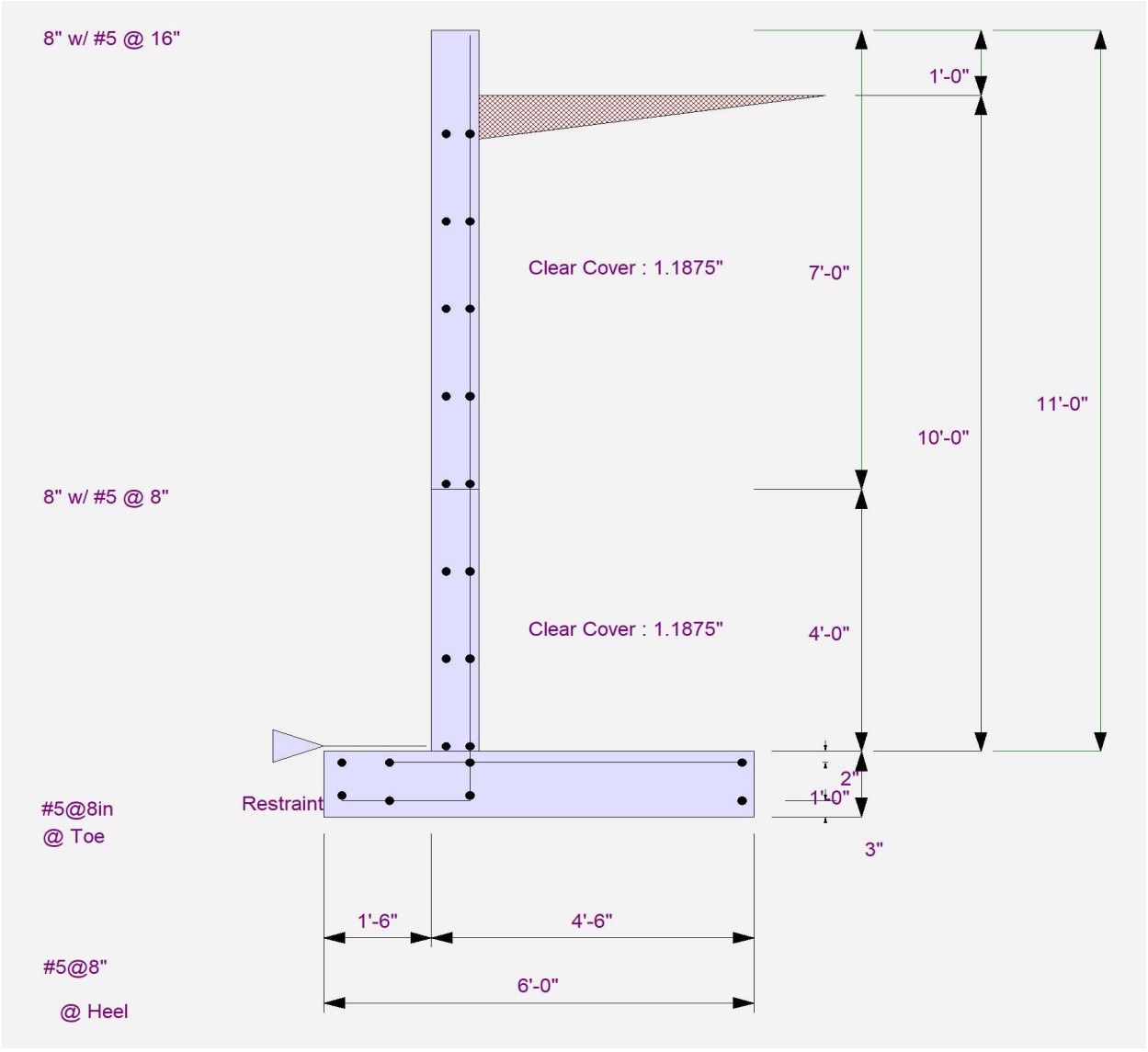
Lap Splice length for #5 bar specified in this stem design segment (25.4.2.4a) =	23.40 in
Development length for #5 bar specified in this stem design segment =	18.00 in

---

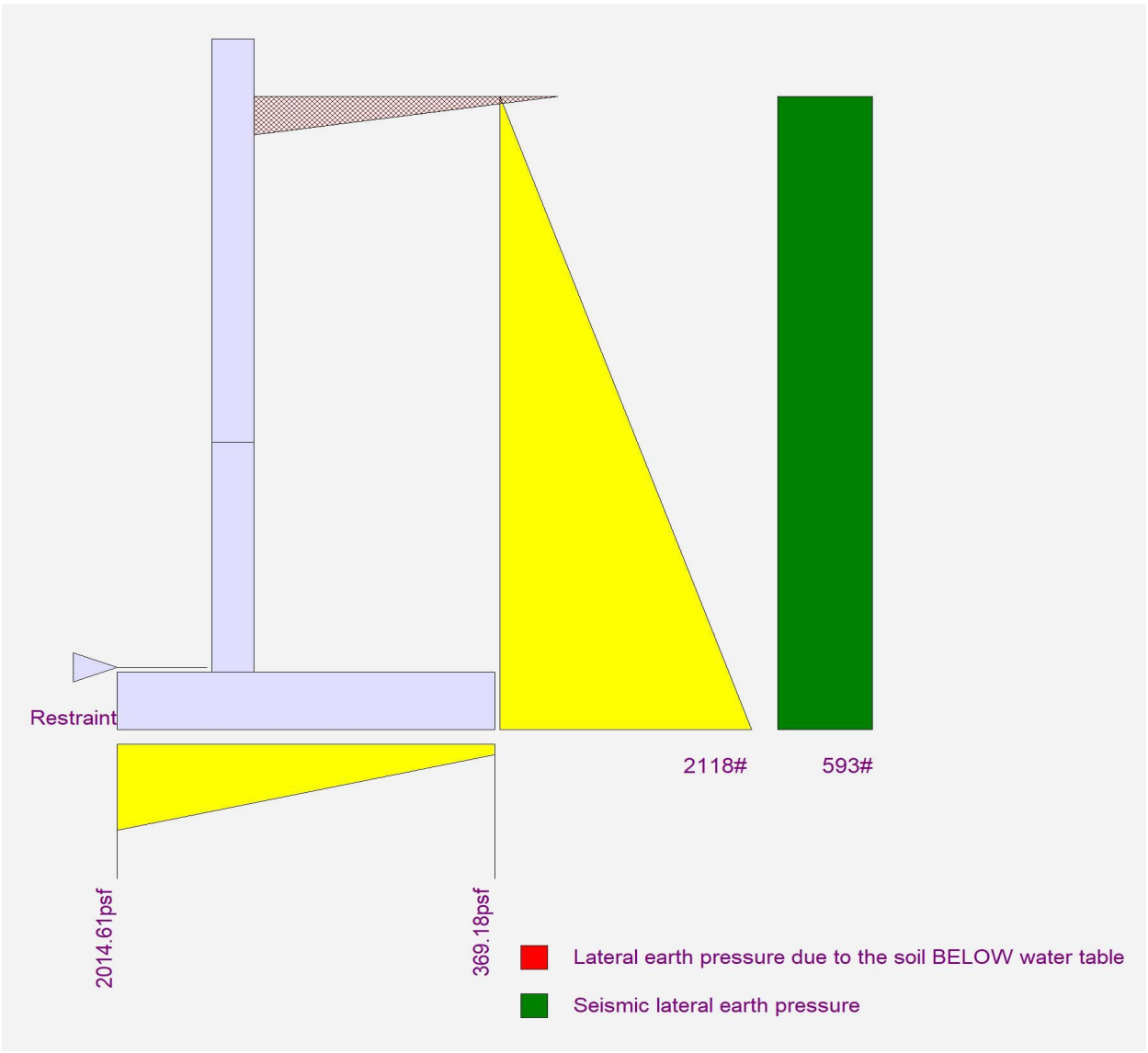
Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.4a) =	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 in2/ft
As Required =	0.4740 in2/ft

DESCRIPTION: Typical Basement Wall



DESCRIPTION: Typical Basement Wall



Cantilevered Retaining Wall

Project File: Foundation Retaining.ec6

DESCRIPTION: Typical Basement/Crawl Wall

Code Reference

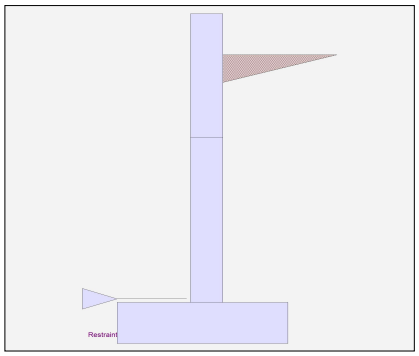
Calculations per IBC 2021 1807.3, ASCE 7-16

Criteria

Retained Height	=	6.00 ft
Wall height above soil	=	1.00 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 (Multiplier used on soil density)	=	7.000

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 (Strength Level)	=	0.0 psf
Uniform Seismic Force	=	49.000
Total Seismic Force	=	343.000

Adjacent Footing Load

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

Cantilevered Retaining Wall

Project File: Foundation Retaining.ec6

DESCRIPTION: Typical Basement/Crawl Wall

Design Summary

Wall Stability Ratios

Overturning	=	2.12	OK
Slab Resists All Sliding !			
Global Stability	=	1.77	
Total Bearing Load	=	2,484 lbs	
...resultant ecc.	=	5.64 in	
Eccentricity within middle third			
Soil Pressure @ Toe	=	1,281 psf	OK
Soil Pressure @ Heel	=	138 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,520 psf	
ACI Factored @ Heel	=	164 psf	
Footing Shear @ Toe	=	7.8 psi	OK
Footing Shear @ Heel	=	11.2 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	1,097.6 lbs

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

Load Factors

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

Stem Construction

		2nd	Bottom		
		Stem OK	Stem OK		
Design Height Above Ftg	ft =	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	16.00		
Rebar Placed at	=	6.5 in	6.5 in		
Design Data					
fb/FB + fa/Fa	=	**0.026**	**0.444**		
Total Force @ Section					
Service Level	lbs =				
Strength Level	lbs =	210.0	1,302.0		
Moment....Actual					
Service Level	ft-# =				
Strength Level	ft-# =	172.7	2,898.0		
Moment.....Allowable	ft-# =	6,513.6	6,513.6		
Shear.....Actual					
Service Level	psi =				
Strength Level	psi =	2.7	16.7		
Shear.....Allowable	psi =	43.2	43.2		
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

DESCRIPTION: Typical Basement/Crawl Wall

Concrete Stem Rebar Area Details

2nd Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0062 in2/ft		
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.1728 in2/ft	#4@ 13.89 in	#4@ 27.78 in
Provided Area :	0.2325 in2/ft	#5@ 21.53 in	#5@ 43.06 in
Maximum Area :	0.8805 in2/ft	#6@ 30.56 in	#6@ 61.11 in

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1042 in2/ft		
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.1728 in2/ft	#4@ 13.89 in	#4@ 27.78 in
Provided Area :	0.2325 in2/ft	#5@ 21.53 in	#5@ 43.06 in
Maximum Area :	0.8805 in2/ft	#6@ 30.56 in	#6@ 61.11 in

Footing Data

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

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	1,520	164	psf
Mu' : Upward	=	1,492	299	ft-#
Mu' : Downward	=	203	1,672	ft-#
Mu: Design	=	1,290	1,373	ft-#
φ Mn	=	2,500	2,500	ft-#
Actual 1-Way Shear	=	7.83	11.16	psi
Allow 1-Way Shear	=	40.00	40.00	psi

Toe Reinforcing = None Spec'd
Heel Reinforcing = None Spec'd
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, φ Tn = 0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

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

Heel: phiMn = phi*5*lambda*sqrt(fc)*Sm

Key: No key defined

Min footing T&S reinf Area 0.91 in2
Min footing T&S reinf Area per foot 0.26 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

DESCRIPTION: Typical Basement/Crawl Wall

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		857.5	2.33	2,000.8	Soil Over HL (ab. water tbl)	880.0	2.83	2,493.3
HL Act Pres (be water tbl)					Soil Over HL (bel. water tbl)		2.83	2,493.3
Hydrostatic Force					Water Table			
Buoyant Force	=				Sloped Soil Over Heel	=		
Surcharge over Heel	=				Surcharge Over Heel	=		
Surcharge Over Toe	=				Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	=		
Added Lateral Load	=				* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=				Soil Over Toe	=		
Seismic Earth Load	=	240.1	3.50	840.4	Surcharge Over Toe	=		
	=				Stem Weight(s)	=	700.0	1.83	1,283.3
					Earth @ Stem Transitions	=		
Total	=	1,097.6	**O.T.M.** =	2,841.2	Footing Weight	=	525.0	1.75	918.8
					Key Weight	=			
					Vert. Component	=	378.5	3.50	1,324.8
					Total =		2,483.5 lbs	**R.M.=**	6,020.2

Resisting/Overturning Ratio = **2.12**

Vertical Loads used for Soil Pressure = 2,483.5 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)	0.071	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.

DESCRIPTION: Typical Basement/Crawl Wall

Rebar Lap & Embedment Lengths Information

Stem Design Segment: 2nd
Stem Design Height: 4.00 ft above top of footing

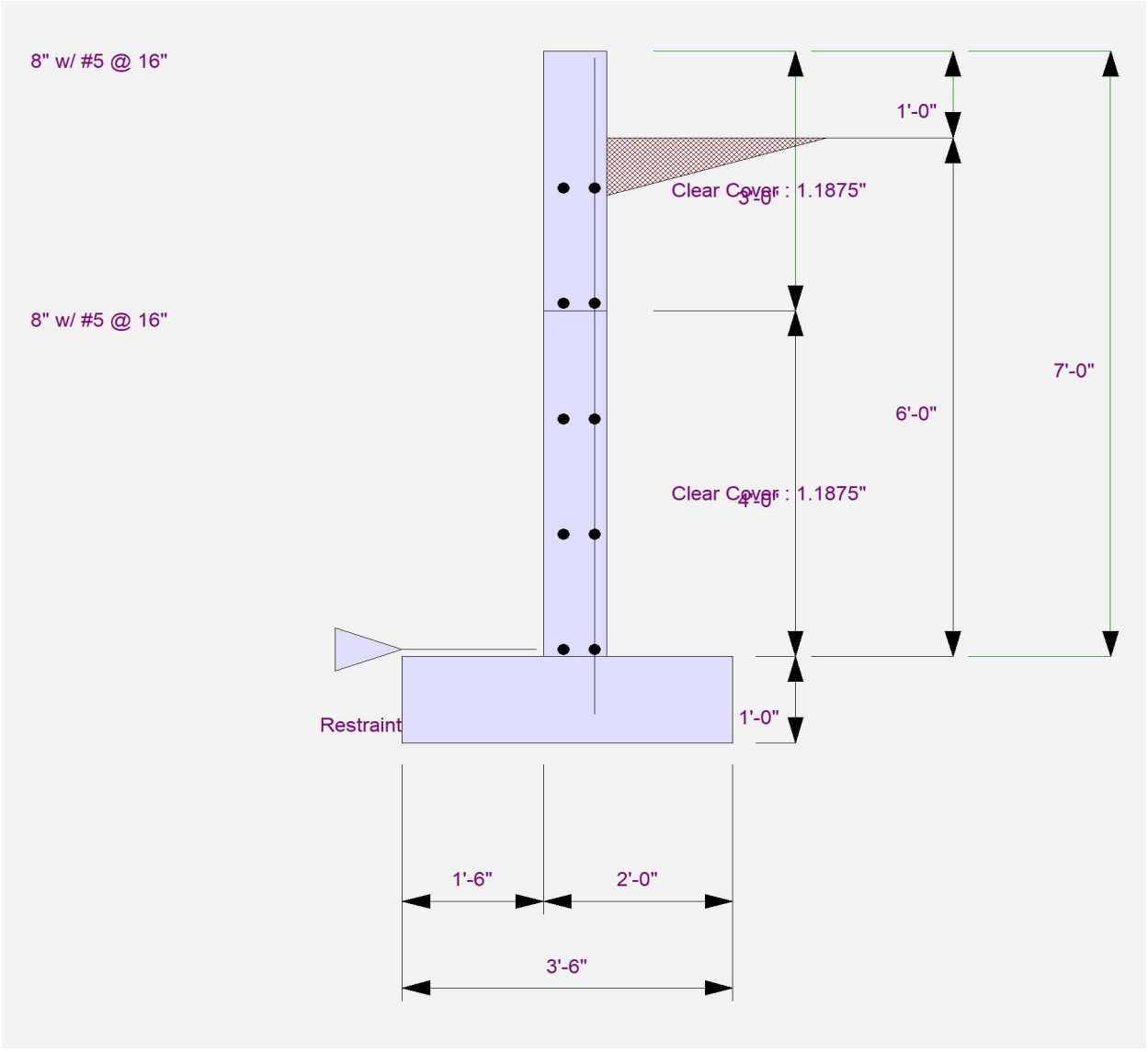
Lap Splice length for #5 bar specified in this stem design segment (25.4.2.4a) =	23.40 in
Development length for #5 bar specified in this stem design segment =	18.00 in

---

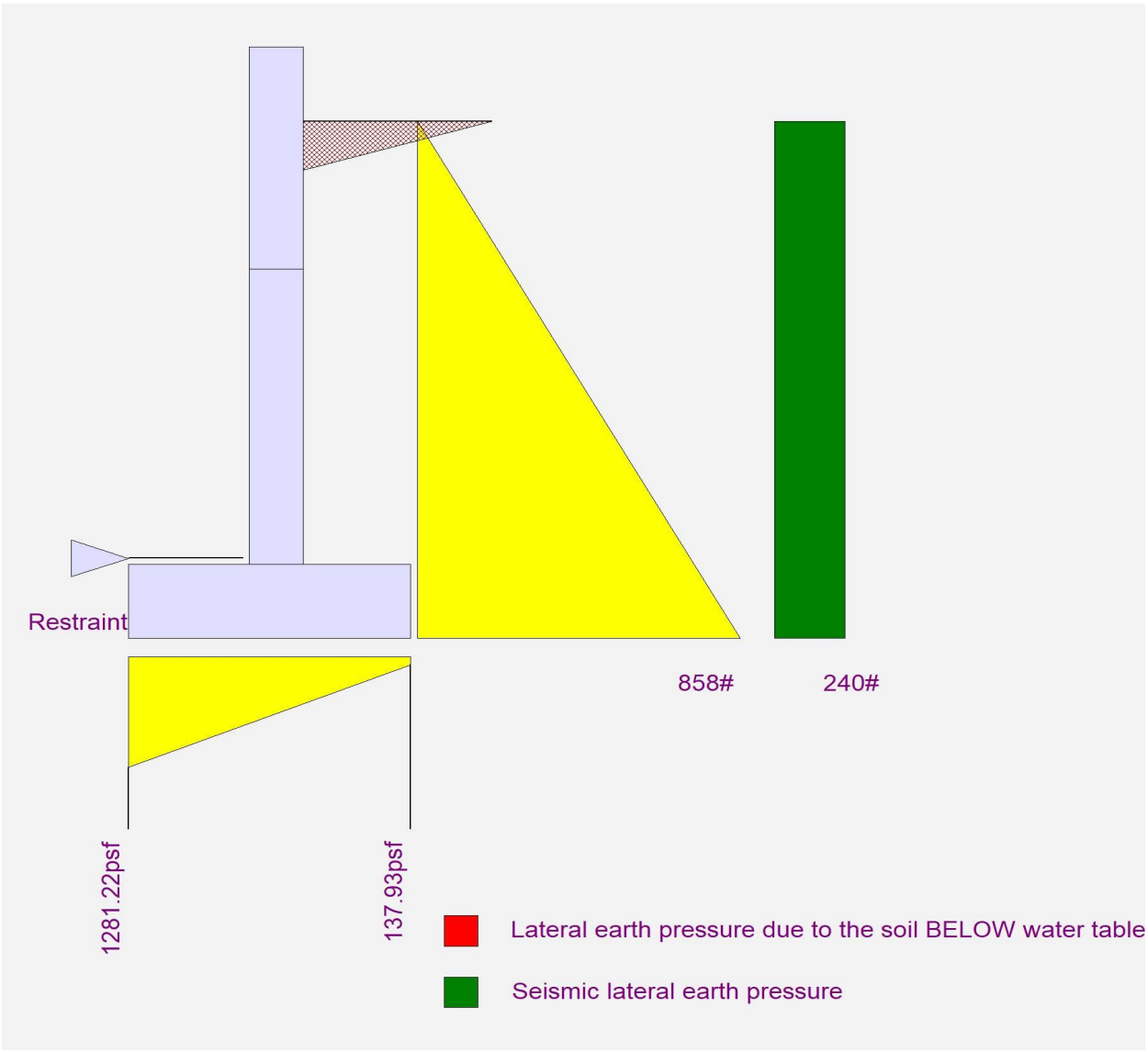
Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.4a) =	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 =	0.2325 in2/ft
As Required =	0.1728 in2/ft

DESCRIPTION: Typical Basement/Crawl Wall



DESCRIPTION: Typical Basement/Crawl Wall



MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shear Wall Calculations Wind

Milestone NW

Mercer Island - Lot 3

Mercer Island

Parameters:

Single Family Home

Design Wind Speed: 100 MPH

Wind Exposure Category: C

Seismic Design Category: D

Code & Design Standard: 2021 IBC Ch. 1609, ASCE 7-16 Ch. 26-30

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

Nicholas Martignetti, P.E., Project Manager

Ryan Chan, E.I.T., Staff Engineer

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

WIND DESIGN SUMMARY PER ASCE 7-16

M+K PROJECT #: 203-24024
ENGINEER: RSC

PARAMETERS:

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

0.60

ROOF GEOMETRY:

TRANS. ROOF PITCH	6.0	:12
LONG. ROOF PITCH	6.0	:12
MEAN ROOF HEIGHT, H	22.93	FT

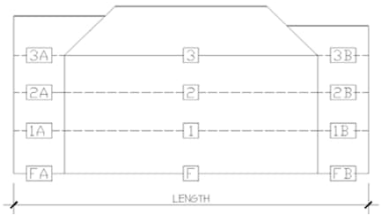
BUILDING GEOMETRY:

LENGTH	74	FT
WIDTH	37	FT
NUMBER OF STORIES	2	

TRANSVERSE DIRECTION (PERPENDICULAR TO MAIN RIDGE LINE)

TRIBUTARY DESIGN AREAS:

DIAPHRAGM LEVEL	FLOOR-TO-FLOOR HEIGHT		SECTION A	SECTION O	SECTION B	
2	9.08 FT	ROOF SURFACE	0	221	0	SQ FT
		WALL SURFACE	0	330	0	SQ FT
1	11.4 FT	ROOF SURFACE	0	60	0	SQ FT
		WALL SURFACE	0	692	0	SQ FT
FND		ROOF SURFACE	0	0	0	SQ FT
		WALL SURFACE	0	0	0	SQ FT



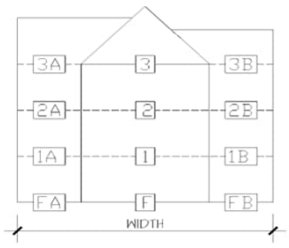
TRIBUTARY DESIGN LOADS: (0.6W)

	SECTION A	SECTION O	SECTION B	
STORY SHEAR	0.00	6.11	0.00	KIPS
TOTAL SHEAR	0.00	6.11	0.00	KIPS
		6.11		KIPS
STORY SHEAR	0.00	9.25	0.00	KIPS
TOTAL SHEAR	0.00	15.36	0.00	KIPS
		15.36		KIPS
STORY SHEAR	0.00	0.00	0.00	KIPS
TOTAL SHEAR	0.00	15.36	0.00	KIPS
		15.36		KIPS

LONGITUDINAL DIRECTION (PARALLEL TO MAIN RIDGE LINE)

TRIBUTARY DESIGN AREAS:

DIAPHRAGM LEVEL	FLOOR-TO-FLOOR HEIGHT		SECTION A	SECTION O	SECTION B	
2	9.08 FT	ROOF SURFACE	0	138	0	SQ FT
		WALL SURFACE	0	161	0	SQ FT
1	11.4 FT	ROOF SURFACE	0	0	0	SQ FT
		WALL SURFACE	0	380	0	SQ FT
FND		ROOF SURFACE	0	0	0	SQ FT
		WALL SURFACE	0	0	0	SQ FT



TRIBUTARY DESIGN LOADS: (0.6W)

	SECTION A	SECTION O	SECTION B	
STORY SHEAR	0.00	3.04	0.00	KIPS
TOTAL SHEAR	0.00	3.04	0.00	KIPS
		3.04		KIPS
STORY SHEAR	0.00	4.04	0.00	KIPS
TOTAL SHEAR	0.00	7.07	0.00	KIPS
		7.07		KIPS
STORY SHEAR	0.00	0.00	0.00	KIPS
TOTAL SHEAR	0.00	7.07	0.00	KIPS
		7.07		KIPS

SYMBOLS AND LEGEND

F FAN- DIRECT VENT TO OUTSIDE
-BATHROOMS/LAUNDRY 50 CFM MIN.
-KITCHEN EXHAUST HOOD TO BE MIN. OF 100CFM. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR MUST BE PROVIDED PER SECTION M1503.6.

WF WHOLE-HOUSE FAN TO RUN CONTINUOUS & CONFORM TO IRC, M1508.4. FAN SIZE PER PLAN. FAN RATE TO BE ADJUSTED BY A FACTOR OF 1.5 FOR A NON BALANCED NON DISTRIBUTED SYSTEM. FRESH AIR TO BE PROVIDED BY THE FORCED AIR SYSTEM DUCTS PER SECTION M1505.4.1. FAN TO HAVE A SONE RATING OF 1.0 OR LESS MEASURED AT 0.1 INCHES WATER GAUGE

T THERMOSTAT @ 50" ABOVE FLOOR

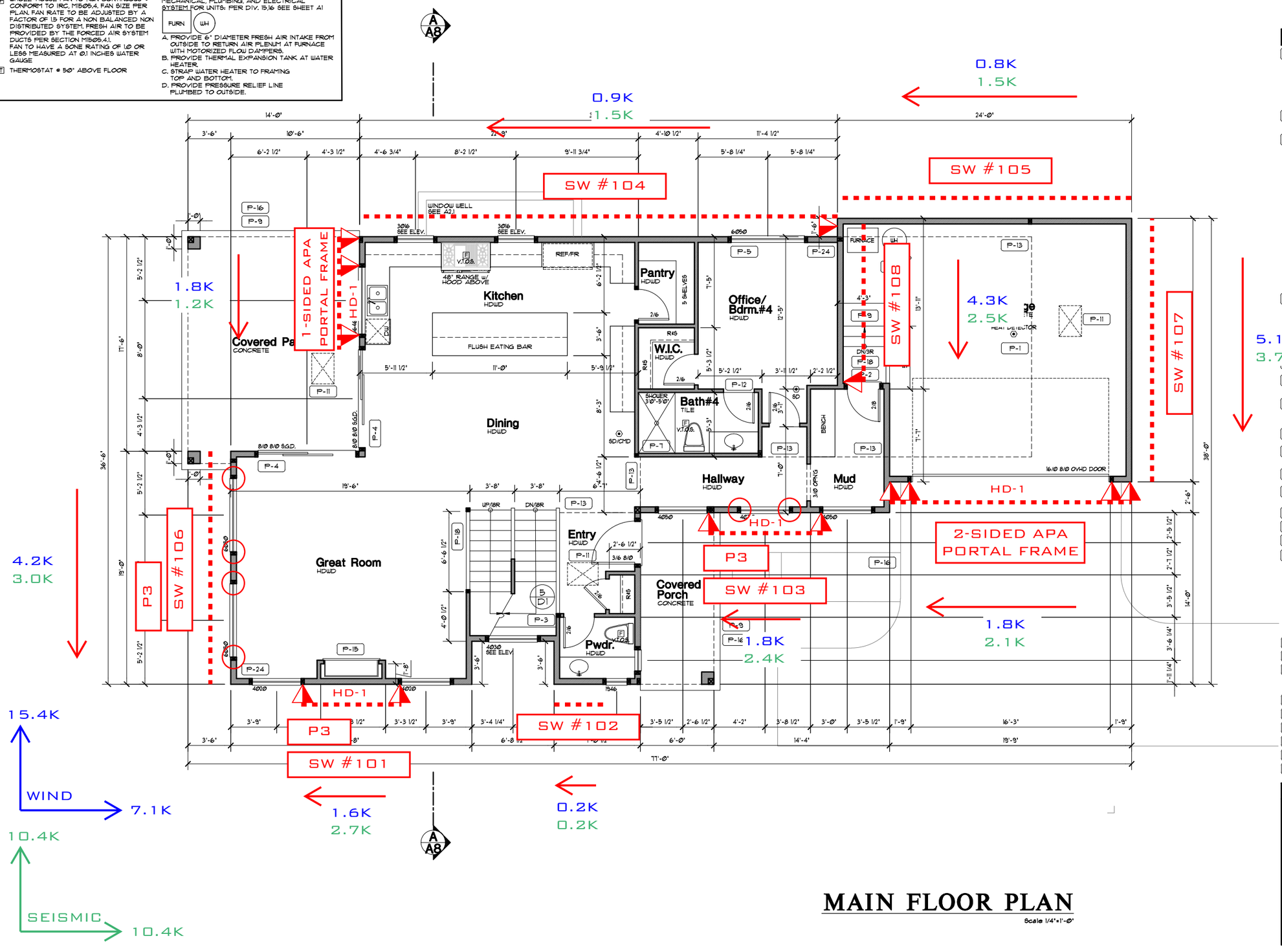
SD/CMD 110v SMOKE ALARM PER I.R.C. R314 WITH BATTERY BACKUP INTERCONNECTED PER R314.4 & R315.5. USE A COMBINATION SMOKE/CARBON MONOXIDE ALARM WHEN NOTED

HD-1 HEAT DETECTOR OR HEAT ALARM RATED FOR THE AMBIENT OUTDOOR TEMPERATURES & HUMIDITY PER I.R.C. R314.

MECHANICAL, PLUMBING, AND ELECTRICAL SYSTEM FOR UNITS: PER DIV. 15,16 SEE SHEET A1

FURN WH

A. PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR PLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.
B. PROVIDE THERMAL EXPANSION TANK AT WATER HEATER.
C. STRAP WATER HEATER TO FRAMING TOP AND BOTTOM.
D. PROVIDE PRESSURE RELIEF LINE PLUMBED TO OUTSIDE.



GENERAL PLAN NOTES

1. SEE SHEET A-1 FOR ALL GENERAL NOTES AND REQUIREMENTS.
2. ENERGY AND AIR QUALITY INFORMATION SEE DIV. 17 SHEET A-1
3. SEE BUILDING ELEVATION FOR WINDOW OPERATION SEE DIV. 8 SHEET A-1
4. SEE TYP. MATERIALS LIST ON SECTION SHEET
5. SEE SHEET A-1 FOR ALL NOTES AND REQUIREMENTS CONCERNING MECHANICAL, PLUMBING, AND ELECTRICAL.

FLOOR PLAN KEY NOTES

P-1 OCCUPANCY SEPARATION:
APPLY (1) LAYER OF ½" GWB. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY. APPLY (1) LAYER OF ⅝" TYPE 'X' GWB. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS. DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL
SEE DIV. 01002.6.A SHEET A-1.

P-2 1⅜" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR
SEE DIV. 01002.6.B. SHEET A-1

P-3 STAIR ASSEMBLY NOTES: PER I.R.C. SECTION R311.5
A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".
B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT. RISERS 7¾" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1 1/4" ON STAIRS WITH SOLID RISERS.
C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE 1 CIRCULAR TO HAVE 1¼" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL. RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER I.R.C. TABLE R301.5
D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER I.R.C. SECTION R302.11.
E. COVER USABLE SPACE UNDER STAIR W/ ½" G.W.B. PER I.R.C. SECTION R302.7.
F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
G. PROVIDE STAIRWAY ILLUMINATION PER I.R.C. SECTION R303.7.
SEE DIV. 01002.1 SHEET A-1.

P-4 SAFETY GLAZING PER I.R.C., SECTION R308
A. WINDOWS WITHIN 18" OF FLOOR
B. LANDS WITHIN A 24" ARC OF DOORS
C. WINDOWS AT TUBS AND SHOWERS
D. GLAZING IN DOORS
E. LESS THAN 60" HORIZ. FROM THE BOT. STAIR TREAD NOSING, & BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE
SEE DIV. 08800 SHEET A-1

EGRESS WINDOW PER I.R.C., SECTION R310
SEE DIV. 08600 SHEET A-1

P-6 IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB.
SEE DIV. 15 SHEET A-1

P-7 COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 72" ABOVE DRAIN INLETS, PER I.R.C. SECTION 307.2.
SEE DIV. 09250 SHEET A-1

P-8 (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.

P-9 7¾" MAX. RISER WITH 10" MIN. RUN. IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER I.R.C. SECTION R311.7.8. SEE DIV. 01002.1 SHEET A-1

P-10 18"x24" CRAWL SPACE ACCESS. INSULATE AND WEATHER STRIP. SEE DIV. 01002.1 SHEET A-1

P-11 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE. INSULATE AND WEATHER STRIP.
SEE DIV. 01002.2 SHEET A-1

P-12 FLOOR MATERIAL BREAK LINE

P-13 WALL LINE ABOVE

P-14 WALL LINE BELOW

P-15 FIREPLACE ASSEMBLY NOTES:
A. DIRECT VENT GAS FIREPLACES, MUST BE LISTED, LABELED &INSTALLED PER MFG. SPECIFICATIONS, &HALL CONFORM TO I.R.C.REQUIREMENTS.
SEE DIV. 01002.12 SHEET A-1
B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO I.R.C. REQUIREMENTS. SEE DIV. 01002.12 SHT A-1
C. HEARTH SHALL CONFORM TO I.R.C REQUIREMENT SEE DIV. 01002.12
D. FIREBLOCK OPENINGS AROUND PENETRATIONS @ EACH FLOOR PER I.R.C. SECTION R1003.19.
E. FIREPLACE MUST COMPLY WITH UL 127 TESTING

P-16 SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS

P-17 3" DIAMETER STEEL POST

P-18 36" GUARDRAIL PER I.R.C. SECTION R312 & TABLE R301.5 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 200lb LOAD ON TOP RAIL ACTING IN ANY DIRECTION.

P-19 15" VENT FOR MECHANICAL 1" CLEARANCE ALL SIDES PER I.R.C., SECTION R302.11. SEE DIV. 15 SHEET A-1

P-20 PLANT SHELF

P-21 UPPER AND LOWER LINEN CABINETS

P-22 SOFFIT AREA

P-23 INTEGRATED MAKE UP AIR

P-24 2x6 STUDS W/ R-21 INSULATION MIN.

SQUARE FOOTAGE

MAIN FLOOR	1425 SF
UPPER FLOOR	1415 SF
LOWER	983 SF
TOTAL	3823 SF
GARAGE	476 SF
COV'D PORCH	84 SF
COV'D PATIO	249 SF

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

MAIN FLOOR PLAN

Scale 1/4"=1'-0"

Date	By	Description
03/23/21	SM	FLOOR PLAN DESIGN
10/30/23	AG	FLOOR PLAN DESIGN
5/03/24	AG	ELEVATION DESIGN
10/31/24	AG	STRUCTURAL SET

Milestone NW

Mercer Island Lot 3

7621 SE 22nd ST. Mercer Island, WA 98040

ARCHITECTURAL INNOVATIONS, P.S.
Forward Thinking Design Solutions For Your Environment
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Bellevue, WA 98007
1-800-888-4517
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TITLE

JOB NO. : 21024.05
STARTING NO. : 21024.03

SHEET

A3

SYMBOLS AND LEGEND

F FAN- DIRECT VENT TO OUTSIDE
-BATHROOMS/LAUNDRY 50 CFM MIN.
-KITCHEN EXHAUST HOOD TO BE MIN. OF 100CFM. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR MUST BE PROVIDED PER SECTION M1503.6.

WF WHOLE-HOUSE FAN TO RUN CONTINUOUS & CONFORM TO IRC, M1508.4. FAN SIZE PER PLAN. FAN RATE TO BE ADJUSTED BY A FACTOR OF 1.5 FOR A NON BALANCED NON DISTRIBUTED SYSTEM. FRESH AIR TO BE PROVIDED BY THE FORCED AIR SYSTEM DUCTS PER SECTION M1505.4.1. FAN TO HAVE A SONE RATING OF 1.0 OR LESS MEASURED AT 0.1 INCHES WATER GAUGE

T THERMOSTAT @ 50" ABOVE FLOOR

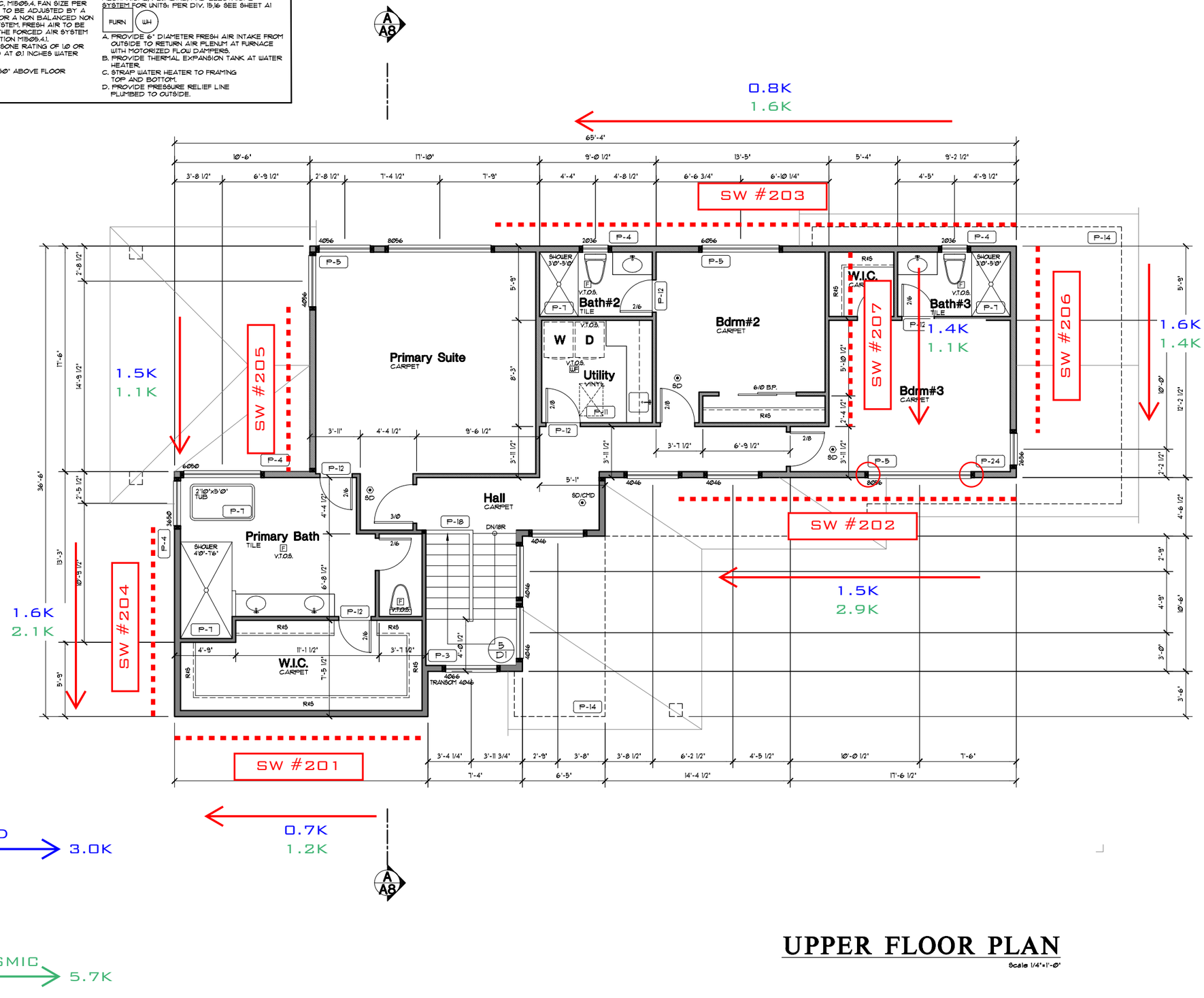
SD/CMD 110v SMOKE ALARM PER I.R.C. R314 WITH BATTERY BACKUP INTERCONNECTED PER R314.4 & R315.5. USE A COMBINATION SMOKE/CARBON MONOXIDE ALARM WHEN NOTED

HD HEAT DETECTOR OR HEAT ALARM RATED FOR THE AMBIENT OUTDOOR TEMPERATURES & HUMIDITY PER I.R.C. R314.

MECHANICAL, PLUMBING, AND ELECTRICAL
SYSTEM FOR UNITS: PER DIV. 15,16 SEE SHEET A1

FURN WH

A. PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR PLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.
B. PROVIDE THERMAL EXPANSION TANK AT WATER HEATER.
C. STRAP WATER HEATER TO FRAMING TOP AND BOTTOM.
D. PROVIDE PRESSURE RELIEF LINE PLUMBED TO OUTSIDE.



UPPER FLOOR PLAN

Scale 1/4"=1'-0"

GENERAL PLAN NOTES

1. SEE SHEET A-1 FOR ALL GENERAL NOTES AND REQUIREMENTS.
2. ENERGY AND AIR QUALITY INFORMATION SEE DIV. 17 SHEET A-1
3. SEE BUILDING ELEVATION FOR WINDOW OPERATION SEE DIV. 8 SHEET A-1
4. SEE TYP. MATERIALS LIST ON SECTION SHEET
5. SEE SHEET A-1 FOR ALL NOTES AND REQUIREMENTS CONCERNING MECHANICAL, PLUMBING, AND ELECTRICAL.

FLOOR PLAN KEY NOTES

P-1 OCCUPANCY SEPARATION:
APPLY (1) LAYER OF ½" GWB. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY.
APPLY (1) LAYER OF ⅝" TYPE 'X' GWB. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS.
DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL
SEE DIV. 01.00 2.6.A SHEET A-1.

P-2 1⅜" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR.
SEE DIV. 01.00 2.6.B. SHEET A-1

P-3 STAIR ASSEMBLY NOTES: PER I.R.C. SECTION R311.5
A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".
B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT. RISERS 7¾" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1 1/4" ON STAIRS WITH SOLID RISERS.
C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE 1 CIRCULAR TO HAVE 1¼" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL. RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER I.R.C. TABLE R301.5
D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER I.R.C. SECTION R302.11.
E. COVER USABLE SPACE UNDER STAIR W/ ½" G.W.B. PER I.R.C. SECTION R302.7.
F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
G. PROVIDE STAIRWAY ILLUMINATION PER I.R.C. SECTION R303.7.
SEE DIV. 01.00 2.7 SHEET A-1.

P-4 SAFETY GLAZING PER I.R.C., SECTION R308
A. WINDOWS WITHIN 18" OF FLOOR
B. WINDOWS WITHIN A 24" ARC OF DOORS
C. WINDOWS AT TUBS AND SHOWERS
D. GLAZING IN DOORS
E. LESS THAN 60" HORIZ. FROM THE BOT. STAIR TREAD NOSING, 4 BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE
SEE DIV. 08.80 0 SHEET A-1

P-5 EGRESS WINDOW PER I.R.C., SECTION R310
SEE DIV. 08.60 0 SHEET A-1

P-6 IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB.
SEE DIV. 15 SHEET A-1

P-7 COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 72" ABOVE DRAIN INLETS, PER I.R.C. SECTION 307.2.
SEE DIV. 09.25 0 SHEET A-1

P-8 (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.

P-9 7¾" MAX. RISER WITH 10" MIN. RUN. IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER I.R.C. SECTION R311.7.8. SEE DIV. 01.00 2.7 SHEET A-1

P-10 18"x24" CRAWL SPACE ACCESS. INSULATE AND WEATHER STRIP. SEE DIV. 01.00 2.1 SHEET A-1

P-11 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE. INSULATE AND WEATHER STRIP.
SEE DIV. 01.00 2.2 SHEET A-1

P-12 FLOOR MATERIAL BREAK LINE

P-13 WALL LINE ABOVE

P-14 WALL LINE BELOW

P-15 FIREPLACE ASSEMBLY NOTES:
A. DIRECT VENT GAS FIREPLACES, MUST BE LISTED, LABELED &INSTALLED PER MFG. SPECIFICATIONS, SHALL CONFORM TO I.R.C.REQUIREMENTS.
SEE DIV. 01.00 2.12 SHEET A-1
B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO I.R.C. REQUIREMENTS. SEE DIV. 01.00 2.12 SHT A-1
C. HEARTH SHALL CONFORM TO I.R.C REQUIREMENT SEE DIV. 01.00 2.12
D. FIREBLOCK OPENINGS AROUND PENETRATIONS @ EACH FLOOR PER I.R.C. SECTION R1003.19.
E. FIREPLACE MUST COMPLY WITH UL 127 TESTING

P-16 SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS

P-17 3" DIAMETER STEEL POST

P-18 36" GUARDRAIL PER I.R.C. SECTION R312 & TABLE R301.5 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 200lb LOAD ON TOP RAIL ACTING IN ANY DIRECTION.

P-19 "B" VENT FOR MECHANICAL. 1" CLEARANCE ALL SIDES PER I.R.C. SECTION R302.11. SEE DIV. 15 SHEET A-1

P-20 PLANT SHELF

P-21 UPPER AND LOWER LINEN CABINETS

P-22 SOFFIT AREA

P-23 INTEGRATED MAKE UP AIR

P-24 2x6 STUDS W/ R-21 INSULATION MIN.

Date	By	Description
03/23/21	SM	FLOOR PLAN DESIGN
10/30/23	AG	FLOOR PLAN DESIGN
5/3/24	AG	ELEVATION DESIGN
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TITLE

JOB NO.: 21024.05
STARTING NO.: 21024.03

SHEET
A5

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 203-24024
Engineer: RSC

Shearwall 201: 2nd - Front Ext. Wall @ W.I.C.

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, H_o	0.0	ft.		
Wall Length, L	19.7	ft.	Qualifying Wall Length, L	19.7	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
700 lbs	<	6605 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	134	plf	Overturning Moment	6.4	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	30.4	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 202: 2nd - Front Ext. Wall @ Hall - Bed 3

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, Hc	5.5	ft.		
Wall Length, L	26.2	ft.	Qualifying Wall Length, L	14.2	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1500 lbs	<	4726 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	238	plf	Overturning Moment	13.6	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	83.0	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24024
ENGINEER: RSC

SHEARWALL 203: 2ND - REAR EXT. WALL @ PRIMAR SUITE - BATH 3

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H_c	5.5	FT.		
WALL LENGTH, L	40.8	FT.	QUALIFYING WALL LENGTH, L	30.8	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
800 LBS	<	10326 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	249	PLF	OVERTURNING MOMENT	7.3	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	200.7	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 204: 2ND - SIDE EXT. WALL @ W.I.C. - PRIMARY BATH

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	14.8	FT.	QUALIFYING WALL LENGTH, L	14.8	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1600 LBS	<	4970 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	278	PLF	OVERTURNING MOMENT	14.5	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	200	LBS	RESISTIVE MOMENT	30.1	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24024
ENGINEER: RSC

SHEARWALL 205: 2ND - SIDE EXT. WALL @ PRIMARY SUITE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	12.8	FT.	QUALIFYING WALL LENGTH, L	12.8	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1500 LBS	<	4295 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	164	PLF	OVERTURNING MOMENT	13.6	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	200	LBS	RESISTIVE MOMENT	14.4	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 206: 2ND - SIDE EXT. WALL @ BED 3 - BATH 3

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	14.5	FT.	QUALIFYING WALL LENGTH, L	14.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1600 LBS	<	4872 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	148	PLF	OVERTURNING MOMENT	14.5	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	250	LBS	RESISTIVE MOMENT	17.3	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24024
ENGINEER: RSC

SHEARWALL 207: 2ND - SIDE INT. WALL @ W.I.C. - BED 3

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	13.5	FT.	QUALIFYING WALL LENGTH, L	13.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1400 LBS	<	4543 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	100	PLF	OVERTURNING MOMENT	12.7	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	431	LBS	RESISTIVE MOMENT	13.5	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL : BASEMENT - NOT USED

SHEARWALL PROPERTIES:

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

CAPACITY EVALUATION:

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

SHEARWALL ASSEMBLY SPECIFICATION

P0 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - UNBLOCKED
#DIV/0!

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24024
ENGINEER: RSC

SHEARWALL 101: 1ST - FRONT EXT. WALL @ GREAT RM

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_o	0.0	FT.		
WALL LENGTH, L	8.2	FT.	QUALIFYING WALL LENGTH, L	8.2	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1600 LBS	<	5149 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	254	PLF	OVERTURNING MOMENT	16.0	K-FT	HOLD DOWN DESIGN LOAD	302	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	13.5	K-FT	HOLDOWN CAPACITY	4935	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	4.2	FT.	QUALIFYING WALL LENGTH, L	4.2	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
200 LBS	<	1356 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	159	PLF	OVERTURNING MOMENT	2.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	2.8	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24024
ENGINEER: RSC

SHEARWALL 103: 1ST - FRONT EXT. WALL @ HALLWAY

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_o	5.0	FT.		
WALL LENGTH, L	9.4	FT.	QUALIFYING WALL LENGTH, L	5.4	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1800 LBS	<	3422 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	147	PLF	OVERTURNING MOMENT	18.0	K-FT	HOLD DOWN DESIGN LOAD	745	LBS
DL AT ENDS OF WALL	600	LBS	RESISTIVE MOMENT	11.0	K-FT	HOLDOWN CAPACITY	4935	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

SHEARWALL 104: 1ST - REAR EXT. WALL @ KITCHEN - OFFICE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	5.0	FT.		
WALL LENGTH, L	39.0	FT.	QUALIFYING WALL LENGTH, L	27.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
900 LBS	<	9060 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	369	PLF	OVERTURNING MOMENT	9.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	280.5	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24024
ENGINEER: RSC

SHEARWALL 105: 1ST - REAR EXT. WALL @ GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	24.0	FT.	QUALIFYING WALL LENGTH, L	24.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
800 LBS	<	8059 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	182	PLF	OVERTURNING MOMENT	8.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	64.5	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 106: 1ST - SIDE EXT. WALL @ GREAT ROOM

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	5.0	FT.		
WALL LENGTH, L	19.0	FT.	QUALIFYING WALL LENGTH, L	7.0	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
4200 LBS	<	4317 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	522	PLF	OVERTURNING MOMENT	60.7	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	98.5	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24024
ENGINEER: RSC

SHEARWALL 107: 1ST - SIDE EXT. WALL @ GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_o	0.0	FT.		
WALL LENGTH, L	21.5	FT.	QUALIFYING WALL LENGTH, L	21.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
5100 LBS	<	7220 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	134	PLF	OVERTURNING MOMENT	51.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	1210	LBS	RESISTIVE MOMENT	51.3	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	13.0	FT.	QUALIFYING WALL LENGTH, L	13.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
4300 LBS	<	4365 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	342	PLF	OVERTURNING MOMENT	43.0	K-FT	HOLD DOWN DESIGN LOAD	947	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	30.7	K-FT	HOLDOWN CAPACITY	4935	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shear Wall Calculations Seismic

Milestone NW

Mercer Island - Lot 3

Mercer Island

Parameters:

Single Family Home

Design Wind Speed: 100 MPH

Wind Exposure Category: C

Seismic Design Category: D

Code & Design Standard: 2021 IBC Ch. 1609, ASCE 7-16 Ch. 26-30

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

Nicholas Martignetti, P.E., Project Manager

Ryan Chan, E.I.T., Staff Engineer

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SEISMIC CALCULATION - ASCE 7-16

M+K PROJECT #: 203-24024
ENGINEER: RSC

SEISMIC DESIGN CATEGORY:

USER INPUTS:

SITE CLASS	D
SPECTRAL RESPONSE ACCELERATION 0.2 SEC, S_S	1.385
SPECTRAL RESPONSE ACCELERATION 1.0 SEC, S_1	0.483
OCCUPANCY CATEGORY	II

VARIABLES:

SITE COEFFICIENT, FA	1.20
SITE COEFFICIENT, FV	1.82

CALCULATED VALUES:

MAXIMUM SPECTRAL RESPONSE ACCELERATION, S_{MS}	1.662
MAXIMUM SPECTRAL RESPONSE ACCELERATION, S_{M1}	0.878
DESIGN SPECTRAL RESPONSE ACCELERATION, S_{DS}	1.108
DESIGN SPECTRAL RESPONSE ACCELERATION, S_{D1}	0.585
SEISMIC DESIGN CATEGORY (SHORT TERM)	D
SEISMIC DESIGN CATEGORY (1.0 SECOND TERM)	D

BUILDING PERIOD DETERMINATION:

USER INPUTS:

BUILDING PERIOD COEFFICIENT, C_T	0.020
LONG-PERIOD TRANS PERIOD, T_L (SEC)	6
HT. ABV BASE TO HIGHEST LEVEL, h_N	20

CALCULATED VALUES:

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

SITE CLASS ASSUMPTION

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

EQUIVALENT LATERAL FORCE PROCEDURE

DEAD LOAD CALCULATION:

LEVEL	STORY HT. (FT.)	AREA (FT^2)	DEAD LOAD (PSF)	DL OF EXT WALL TRIB. TO LEVEL (KIPS)	TOTAL LEVEL DL
1	11.4	2353	16	14.3	51 K
2	9.1	1732	17	5.9	35 K
3	0.0	0	0	0.0	0 K
4	0.0	0	0	0.0	0 K
5	0.0	0	0	0.0	0 K
6	0.0	0	0	0.0	0 K
7	0.0	0	0	0.0	0 K
8	0.0	0	0	0.0	0 K
9	0.0	0	0	0.0	0 K
10	0.0	0	0	0.0	0 K
11	0.0	0	0	0.0	0 K
12	0.0	0	0	0.0	0 K
13	0.0	0	0	0.0	0 K
14	0.0	0	0	0.0	0 K
15	0.0	0	0	0.0	0 K

TOTAL DEAD LOAD OF STRUCTURE 87 KIPS

SEISMIC RESPONSE COEFFICIENT:

	TRANSVERSE	LONGITUDINAL
RESPONSE MODIFICATION FACTOR, R	6.5	6.5
OCCUPANCY IMPORTANCE FACTOR, I_E	1.00	1.00
SEISMIC RESPONSE COEFFICIENT, C_s	0.170	0.170

BASE SHEARS:

ULTIMATE LOADS				x 0.7 =	ALLOWABLE LOADS			
TRANSVERSE		LONGITUDINAL			TRANSVERSE		LONGITUDINAL	
15	K	15	K		10.4	K	10.4	K

STORY SHEAR CALCULATION:

DISTRIBUTION EXPONENT, k: 1.00

		ULTIMATE LOADS				x 0.7 =	ALLOWABLE LOADS					
		TRANSVERSE		LONGITUDINAL			TRANSVERSE			LONGITUDINAL		
LEVEL	VERT. DIST. FACTOR, C_{VX}	STORY SHEAR, F_x		STORY SHEAR, F_x			STORY SHEAR, F_x		Σ STORY SHEAR	STORY SHEAR, F_x		Σ STORY SHEAR
1	0.447	6.6	K	6.6	K		4.6	K	10.4 K	4.6	K	10.4 K
2	0.553	8.2	K	8.2	K		5.7	K	5.7 K	5.7	K	5.7 K
3	0.000	0.0	K	0.0	K		0.0	K	0.0 K	0.0	K	0.0 K
4	0.000	0.0	K	0.0	K		0.0	K	0.0 K	0.0	K	0.0 K
5	0.00	0.0	K	0.0	K		0.0	K	0.0 K	0.0	K	0.0 K
6	0.00	0.0	K	0.0	K		0.0	K	0.0 K	0.0	K	0.0 K
7	0.00	0.0	K	0.0	K		0.0	K	0.0 K	0.0	K	0.0 K
8	0.00	0.0	K	0.0	K		0.0	K	0.0 K	0.0	K	0.0 K
9	0.00	0.0	K	0.0	K		0.0	K	0.0 K	0.0	K	0.0 K
10	0.00	0.0	K	0.0	K		0.0	K	0.0 K	0.0	K	0.0 K
11	0.00	0.0	K	0.0	K		0.0	K	0.0 K	0.0	K	0.0 K
12	0.00	0.0	K	0.0	K		0.0	K	0.0 K	0.0	K	0.0 K
13	0.00	0.0	K	0.0	K		0.0	K	0.0 K	0.0	K	0.0 K
14	0.00	0.0	K	0.0	K		0.0	K	0.0 K	0.0	K	0.0 K
15	0.00	0.0	K	0.0	K		0.0	K	0.0 K	0.0	K	0.0 K

SYMBOLS AND LEGEND

F FAN- DIRECT VENT TO OUTSIDE
-BATHROOMS/LAUNDRY 50 CFM MIN.
-KITCHEN EXHAUST HOOD TO BE MIN. OF 100CFM. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR MUST BE PROVIDED PER SECTION M1503.6.

WF WHOLE-HOUSE FAN TO RUN CONTINUOUS & CONFORM TO IRC, M1508.4. FAN SIZE PER PLAN. FAN RATE TO BE ADJUSTED BY A FACTOR OF 1.5 FOR A NON BALANCED NON DISTRIBUTED SYSTEM. FRESH AIR TO BE PROVIDED BY THE FORCED AIR SYSTEM DUCTS PER SECTION M1505.4.1. FAN TO HAVE A SONE RATING OF 1.0 OR LESS MEASURED AT 0.1 INCHES WATER GAUGE

T THERMOSTAT @ 50" ABOVE FLOOR

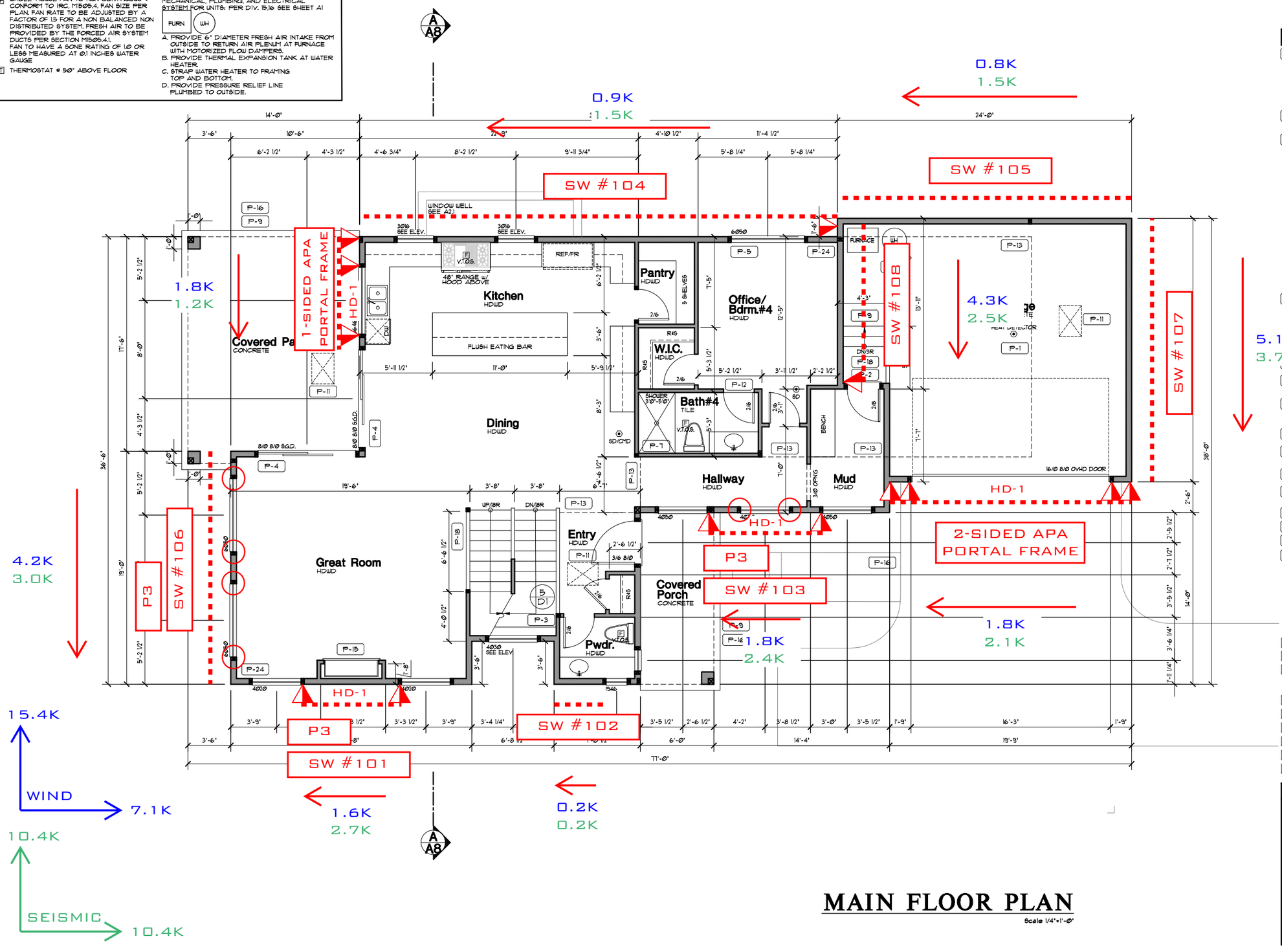
SD/CMD 110v SMOKE ALARM PER I.R.C. R314 WITH BATTERY BACKUP INTERCONNECTED PER R314.4 & R315.5. USE A COMBINATION SMOKE/CARBON MONOXIDE ALARM WHEN NOTED

HD-1 HEAT DETECTOR OR HEAT ALARM RATED FOR THE AMBIENT OUTDOOR TEMPERATURES & HUMIDITY PER I.R.C. R314.

MECHANICAL, PLUMBING, AND ELECTRICAL SYSTEM FOR UNITS: PER DIV. 15,16 SEE SHEET A1

FURN WH

A. PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR PLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.
B. PROVIDE THERMAL EXPANSION TANK AT WATER HEATER.
C. STRAP WATER HEATER TO FRAMING TOP AND BOTTOM.
D. PROVIDE PRESSURE RELIEF LINE PLUMBED TO OUTSIDE.



GENERAL PLAN NOTES

1. SEE SHEET A-1 FOR ALL GENERAL NOTES AND REQUIREMENTS.
2. ENERGY AND AIR QUALITY INFORMATION SEE DIV. 17 SHEET A-1
3. SEE BUILDING ELEVATION FOR WINDOW OPERATION SEE DIV. 8 SHEET A-1
4. SEE TYP. MATERIALS LIST ON SECTION SHEET
5. SEE SHEET A-1 FOR ALL NOTES AND REQUIREMENTS CONCERNING MECHANICAL, PLUMBING, AND ELECTRICAL.

FLOOR PLAN KEY NOTES

P-1 OCCUPANCY SEPARATION:
APPLY (1) LAYER OF ½" GWB. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY. APPLY (1) LAYER OF ⅝" TYPE 'X' GWB. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS. DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL
SEE DIV. 01002.6.A SHEET A-1.

P-2 1⅜" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR
SEE DIV. 01002.6.B. SHEET A-1

P-3 STAIR ASSEMBLY NOTES: PER I.R.C. SECTION R311.5
A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".
B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT. RISERS 7¾" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1 1/4" ON STAIRS WITH SOLID RISERS.
C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE 1 CIRCULAR TO HAVE 1¼" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL. RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER I.R.C. TABLE R301.5
D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER I.R.C. SECTION R302.11.
E. COVER USABLE SPACE UNDER STAIR W/ ½" G.W.B. PER I.R.C. SECTION R302.7.
F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
G. PROVIDE STAIRWAY ILLUMINATION PER I.R.C. SECTION R303.7.
SEE DIV. 01002.1 SHEET A-1.

P-4 SAFETY GLAZING PER I.R.C., SECTION R308
A. WINDOWS WITHIN 18" OF FLOOR
B. LANDS WITHIN A 24" ARC OF DOORS
C. WINDOWS AT TUBS AND SHOWERS
D. GLAZING IN DOORS
E. LESS THAN 60" HORIZ. FROM THE BOT. STAIR TREAD NOSING, & BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE
SEE DIV. 08800 SHEET A-1

EGRESS WINDOW PER I.R.C., SECTION R310
SEE DIV. 08600 SHEET A-1

P-6 IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB.
SEE DIV. 15 SHEET A-1

P-7 COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 72" ABOVE DRAIN INLETS, PER I.R.C. SECTION 307.2.
SEE DIV. 09250 SHEET A-1

P-8 (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.

P-9 7¾" MAX. RISER WITH 10" MIN. RUN. IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER I.R.C. SECTION R311.7.8. SEE DIV. 01002.1 SHEET A-1

P-10 18"x24" CRAWL SPACE ACCESS. INSULATE AND WEATHER STRIP. SEE DIV. 01002.1 SHEET A-1

P-11 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE. INSULATE AND WEATHER STRIP.
SEE DIV. 01002.2 SHEET A-1

P-12 FLOOR MATERIAL BREAK LINE

P-13 WALL LINE ABOVE

P-14 WALL LINE BELOW

P-15 FIREPLACE ASSEMBLY NOTES:
A. DIRECT VENT GAS FIREPLACES, MUST BE LISTED, LABELED &INSTALLED PER MFG. SPECIFICATIONS, &HALL CONFORM TO I.R.C.REQUIREMENTS.
SEE DIV. 01002.12 SHEET A-1
B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO I.R.C. REQUIREMENTS. SEE DIV. 01002.12 SHT A-1
C. HEARTH SHALL CONFORM TO I.R.C REQUIREMENT SEE DIV. 01002.12
D. FIREBLOCK OPENINGS AROUND PENETRATIONS @ EACH FLOOR PER I.R.C. SECTION R1003.19.
E. FIREPLACE MUST COMPLY WITH UL 127 TESTING

P-16 SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS

P-17 3" DIAMETER STEEL POST

P-18 36" GUARDRAIL PER I.R.C. SECTION R312 & TABLE R301.5 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 200lb LOAD ON TOP RAIL ACTING IN ANY DIRECTION.

P-19 15" VENT FOR MECHANICAL 1" CLEARANCE ALL SIDES PER I.R.C., SECTION R302.11. SEE DIV. 15 SHEET A-1

P-20 PLANT SHELF

P-21 UPPER AND LOWER LINEN CABINETS

P-22 SOFFIT AREA

P-23 INTEGRATED MAKE UP AIR

P-24 2x6 STUDS W/ R-21 INSULATION MIN.

SQUARE FOOTAGE

MAIN FLOOR	1425 SF
UPPER FLOOR	1415 SF
LOWER	983 SF
TOTAL	3823 SF
GARAGE	476 SF
COV'D PORCH	84 SF
COV'D PATIO	249 SF

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

MAIN FLOOR PLAN

Scale 1/4"=1'-0"

Date	By	Description
03/23/21	SM	FLOOR PLAN DESIGN
10/30/23	AG	FLOOR PLAN DESIGN
5/03/24	AG	ELEVATION DESIGN
10/31/24	AG	STRUCTURAL SET

Milestone NW

Mercer Island Lot 3

7621 SE 22nd ST. Mercer Island, WA 98040

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TITLE

JOB NO. : 21024.05
STARTING NO. : 21024.03

SHEET

A3

SYMBOLS AND LEGEND

F FAN- DIRECT VENT TO OUTSIDE
-BATHROOMS/LAUNDRY 50 CFM MIN.
-KITCHEN EXHAUST HOOD TO BE MIN. OF 100CFM. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR MUST BE PROVIDED PER SECTION M1503.6.

WF WHOLE-HOUSE FAN TO RUN CONTINUOUS & CONFORM TO IRC, M1508.4. FAN SIZE PER PLAN. FAN RATE TO BE ADJUSTED BY A FACTOR OF 1.5 FOR A NON BALANCED NON DISTRIBUTED SYSTEM. FRESH AIR TO BE PROVIDED BY THE FORCED AIR SYSTEM DUCTS PER SECTION M1505.4.1. FAN TO HAVE A SONE RATING OF 1.0 OR LESS MEASURED AT 0.1 INCHES WATER GAUGE

T THERMOSTAT @ 50" ABOVE FLOOR

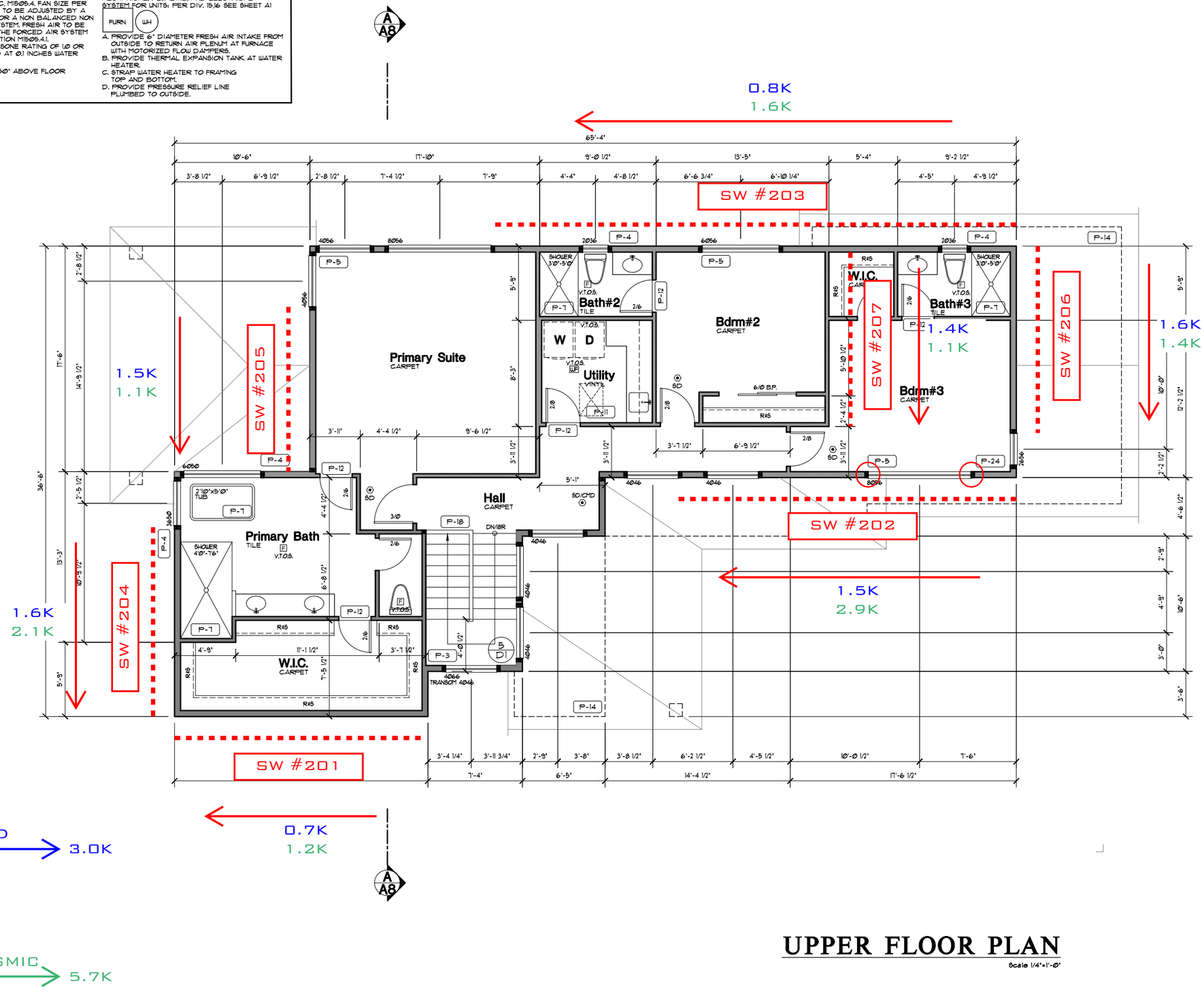
SD/CMD 110v SMOKE ALARM PER I.R.C. R314 WITH BATTERY BACKUP INTERCONNECTED PER R314.4 & R315.5. USE A COMBINATION SMOKE/CARBON MONOXIDE ALARM WHEN NOTED

HD HEAT DETECTOR OR HEAT ALARM RATED FOR THE AMBIENT OUTDOOR TEMPERATURES & HUMIDITY PER I.R.C. R314.

MECHANICAL, PLUMBING, AND ELECTRICAL
SYSTEM FOR UNITS: PER DIV. 15,16 SEE SHEET A1

FURN WH

A. PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR PLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.
B. PROVIDE THERMAL EXPANSION TANK AT WATER HEATER.
C. STRAP WATER HEATER TO FRAMING TOP AND BOTTOM.
D. PROVIDE PRESSURE RELIEF LINE PLUMBED TO OUTSIDE.



UPPER FLOOR PLAN

Scale 1/4"=1'-0"

GENERAL PLAN NOTES

1. SEE SHEET A-1 FOR ALL GENERAL NOTES AND REQUIREMENTS.
2. ENERGY AND AIR QUALITY INFORMATION SEE DIV. 17 SHEET A-1
3. SEE BUILDING ELEVATION FOR WINDOW OPERATION SEE DIV. 8 SHEET A-1
4. SEE TYP. MATERIALS LIST ON SECTION SHEET
5. SEE SHEET A-1 FOR ALL NOTES AND REQUIREMENTS CONCERNING MECHANICAL, PLUMBING, AND ELECTRICAL.

FLOOR PLAN KEY NOTES

P-1 OCCUPANCY SEPARATION:
APPLY (1) LAYER OF ½" GWB. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY.
APPLY (1) LAYER OF ⅝" TYPE 'X' GWB. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS.
DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL
SEE DIV. 01.00 2.6.A SHEET A-1.

P-2 1⅜" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR.
SEE DIV. 01.00 2.6.B. SHEET A-1

P-3 STAIR ASSEMBLY NOTES: PER I.R.C. SECTION R311.5
A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".
B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT. RISERS 7¾" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1 1/4" ON STAIRS WITH SOLID RISERS.
C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE 1 CIRCULAR TO HAVE 1¼" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL. RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER I.R.C. TABLE R301.5
D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER I.R.C. SECTION R302.11.
E. COVER USABLE SPACE UNDER STAIR W/ ½" G.W.B. PER I.R.C. SECTION R302.7.
F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
G. PROVIDE STAIRWAY ILLUMINATION PER I.R.C. SECTION R303.7.
SEE DIV. 01.00 2.7 SHEET A-1.

P-4 SAFETY GLAZING PER I.R.C., SECTION R308
A. WINDOWS WITHIN 18" OF FLOOR
B. WINDOWS WITHIN A 24" ARC OF DOORS
C. WINDOWS AT TUBS AND SHOWERS
D. GLAZING IN DOORS
E. LESS THAN 60" HORIZ. FROM THE BOT. STAIR TREAD NOSING, 4 BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE
SEE DIV. 08.80 0 SHEET A-1

P-5 EGRESS WINDOW PER I.R.C., SECTION R310
SEE DIV. 08.60 0 SHEET A-1

P-6 IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB.
SEE DIV. 15 SHEET A-1

P-7 COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 72" ABOVE DRAIN INLETS, PER I.R.C. SECTION 307.2.
SEE DIV. 09.25 0 SHEET A-1

P-8 (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.

P-9 7¾" MAX. RISER WITH 10" MIN. RUN. IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER I.R.C. SECTION R311.7.8. SEE DIV. 01.00 2.7 SHEET A-1

P-10 18"x24" CRAWL SPACE ACCESS. INSULATE AND WEATHER STRIP. SEE DIV. 01.00 2.1 SHEET A-1

P-11 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE. INSULATE AND WEATHER STRIP.
SEE DIV. 01.00 2.2 SHEET A-1

P-12 FLOOR MATERIAL BREAK LINE

P-13 WALL LINE ABOVE

P-14 WALL LINE BELOW

P-15 FIREPLACE ASSEMBLY NOTES:
A. DIRECT VENT GAS FIREPLACES, MUST BE LISTED, LABELED &INSTALLED PER MFG. SPECIFICATIONS, SHALL CONFORM TO I.R.C.REQUIREMENTS.
SEE DIV. 01.00 2.12 SHEET A-1
B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO I.R.C. REQUIREMENTS. SEE DIV. 01.00 2.12 SHT A-1
C. HEARTH SHALL CONFORM TO I.R.C REQUIREMENT SEE DIV. 01.00 2.12
D. FIREBLOCK OPENINGS AROUND PENETRATIONS @ EACH FLOOR PER I.R.C. SECTION R1003.19.
E. FIREPLACE MUST COMPLY WITH UL 127 TESTING

P-16 SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS

P-17 3" DIAMETER STEEL POST

P-18 36" GUARDRAIL PER I.R.C. SECTION R312 & TABLE R301.5 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 200lb LOAD ON TOP RAIL ACTING IN ANY DIRECTION.

P-19 "B" VENT FOR MECHANICAL. 1" CLEARANCE ALL SIDES PER I.R.C. SECTION R302.11. SEE DIV. 15 SHEET A-1

P-20 PLANT SHELF

P-21 UPPER AND LOWER LINEN CABINETS

P-22 SOFFIT AREA

P-23 INTEGRATED MAKE UP AIR

P-24 2x6 STUDS W/ R-21 INSULATION MIN.

Date	By	Description
03/23/21	SM	FLOOR PLAN DESIGN
10/30/23	AG	FLOOR PLAN DESIGN
5/3/24	AG	ELEVATION DESIGN
10/31/24	AG	STRUCTURAL SET

Milestone NW

Mercer Island Lot 3

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TITLE

JOB NO.: 21024.05
STARTING NO.: 21024.03

SHEET
A5

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 203-24024
Engineer: RSC

Shearwall 201: 2nd - Front Ext. Wall @ W.I.C.

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, H_o	0.0	ft.		
Wall Length, L	19.7	ft.	Qualifying Wall Length, L	19.7	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1200 lbs	<	4718 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	134	plf	Overturning Moment	10.9	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	22.5	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 202: 2nd - Front Ext. Wall @ Hall - Bed 3

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, Hc	5.5	ft.		
Wall Length, L	26.2	ft.	Qualifying Wall Length, L	14.2	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2900 lbs	<	3376 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	238	plf	Overturning Moment	26.4	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	61.5	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24024
ENGINEER: RSC

SHEARWALL 203: 2ND - REAR EXT. WALL @ PRIMAR SUITE - BATH 3

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H_c	5.5	FT.		
WALL LENGTH, L	40.8	FT.	QUALIFYING WALL LENGTH, L	30.8	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1600 LBS	<	7376 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	249	PLF	OVERTURNING MOMENT	14.5	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	148.8	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 204: 2ND - SIDE EXT. WALL @ W.I.C. - PRIMARY BATH

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	14.8	FT.	QUALIFYING WALL LENGTH, L	14.8	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
2100 LBS	<	3550 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	278	PLF	OVERTURNING MOMENT	19.1	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	200	LBS	RESISTIVE MOMENT	22.3	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24024
ENGINEER: RSC

SHEARWALL 205: 2ND - SIDE EXT. WALL @ PRIMARY SUITE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	12.8	FT.	QUALIFYING WALL LENGTH, L	12.8	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1100 LBS	<	3068 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	164	PLF	OVERTURNING MOMENT	10.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	200	LBS	RESISTIVE MOMENT	10.7	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 206: 2ND - SIDE EXT. WALL @ BED 3 - BATH 3

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.1	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	14.5	FT.	QUALIFYING WALL LENGTH, L	14.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1400 LBS	<	3480 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	148	PLF	OVERTURNING MOMENT	12.7	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	250	LBS	RESISTIVE MOMENT	12.8	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 203-24024
Engineer: RSC

Shearwall 207: 2nd - Side Int. Wall @ W.I.C. - Bed 3

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, H_o	0.0	ft.		
Wall Length, L	13.5	ft.	Qualifying Wall Length, L	13.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1100 lbs	<	3245 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	100	plf	Overturning Moment	10.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	431	lbs	Resistive Moment	10.0	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall : Basement - Not Used

Shearwall Properties:

Wall height, H	0.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	0.0	ft.	Qualifying Wall Length, L	0.0	ft.	Shearwall Assembly	P0

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
0 lbs	####	#DIV/0! lbs

Shearwall Assembly Specification

P0 - 1-side 7/16" OSB
fastened w/ 8d nails at 6"o.c. panel edges & 12"o.c. panel field - UNBLOCKED
#DIV/0!

Overturning Evaluation:

Resistive DL	0	plf	Overturning Moment	0.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	0	lbs	Resistive Moment	0.0	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24024
ENGINEER: RSC

SHEARWALL 101: 1ST - FRONT EXT. WALL @ GREAT RM

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	8.2	FT.	QUALIFYING WALL LENGTH, L	8.2	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
2700 LBS	<	3678 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	254	PLF	OVERTURNING MOMENT	27.0	K-FT	HOLD DOWN DESIGN LOAD	2075	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	10.0	K-FT	HOLDOWN CAPACITY	3695	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	4.2	FT.	QUALIFYING WALL LENGTH, L	4.2	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
200 LBS	<	968 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	159	PLF	OVERTURNING MOMENT	2.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	2.1	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24024
ENGINEER: RSC

SHEARWALL 103: 1ST - FRONT EXT. WALL @ HALLWAY

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_o	5.0	FT.		
WALL LENGTH, L	9.4	FT.	QUALIFYING WALL LENGTH, L	5.4	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
2400 LBS	<	2444 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	147	PLF	OVERTURNING MOMENT	24.0	K-FT	HOLD DOWN DESIGN LOAD	1682	LBS
DL AT ENDS OF WALL	600	LBS	RESISTIVE MOMENT	8.1	K-FT	HOLDOWN CAPACITY	3695	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

SHEARWALL 104: 1ST - REAR EXT. WALL @ KITCHEN - OFFICE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	5.0	FT.		
WALL LENGTH, L	39.0	FT.	QUALIFYING WALL LENGTH, L	27.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1500 LBS	<	6471 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	369	PLF	OVERTURNING MOMENT	15.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	208.0	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24024
ENGINEER: RSC

SHEARWALL 105: 1ST - REAR EXT. WALL @ GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	24.0	FT.	QUALIFYING WALL LENGTH, L	24.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1500 LBS	<	5757 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	182	PLF	OVERTURNING MOMENT	15.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	47.8	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 106: 1ST - SIDE EXT. WALL @ GREAT ROOM

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	5.0	FT.		
WALL LENGTH, L	19.0	FT.	QUALIFYING WALL LENGTH, L	7.0	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
3000 LBS	<	3083 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	522	PLF	OVERTURNING MOMENT	54.5	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	73.0	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 203-24024
ENGINEER: RSC

SHEARWALL 107: 1ST - SIDE EXT. WALL @ GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	21.5	FT.	QUALIFYING WALL LENGTH, L	21.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
3700 LBS	<	5157 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	134	PLF	OVERTURNING MOMENT	37.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	1200	LBS	RESISTIVE MOMENT	37.9	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	13.0	FT.	QUALIFYING WALL LENGTH, L	13.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
2500 LBS	<	3118 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	342	PLF	OVERTURNING MOMENT	25.0	K-FT	HOLD DOWN DESIGN LOAD	153	LBS
DL AT ENDS OF WALL	430	LBS	RESISTIVE MOMENT	23.0	K-FT	HOLDOWN CAPACITY	3695	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN