MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

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

CALCULATION PACKAGE

October 23, 2025

McCullough Architects

Sears Plat – Lot 1
7414 78th Ave SE
Mercer Island, Washington

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

Prepared By:

Matthew Mills, E.I.T. *Project Engineer*

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

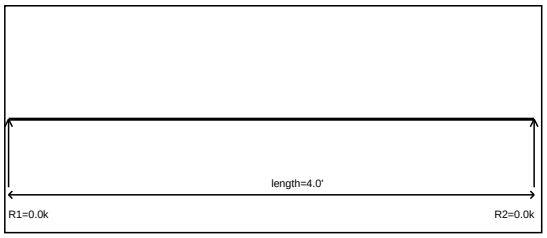
Signature, Seal & Date

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

BEAM & HEADER CALCULATIONS

M+K PROJECT #: 244-25018 - T01 - Sears Plat - Lot 1
ENGINEER: Matthew Mills
Date: 11/17/2025

Description - Roof Framing - H3-1 - Header



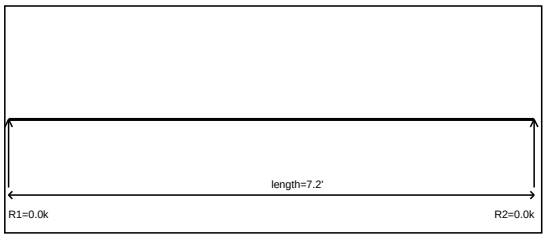
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

V = 0.00k	Vall = 3.04k	Ratio = 0
M = 0.00k-ft	Mall = 2.99k-ft	Ratio = 0

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

4x8 DF #2

Description - Roof Framing - H3-2 - Header



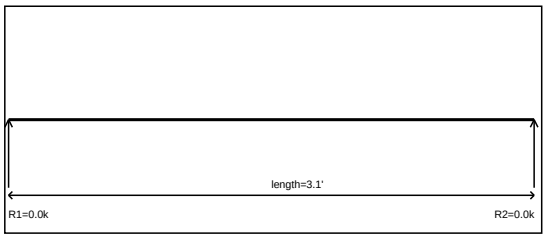
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

V = 0.00k	Vall = 3.04k	Ratio = 0
M = 0.00k-ft	Mall = 2.99k-ft	Ratio = 0

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

4x8 DF #2

Description - Roof Framing - H3-3 - Header



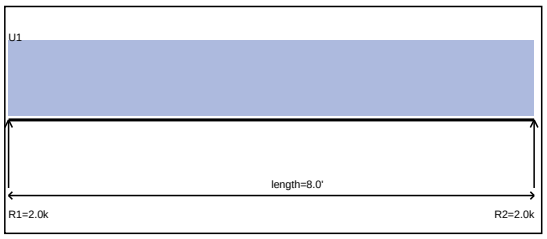
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

V = 0.00k	Vall = 3.04k	Ratio = 0
M = 0.00k-ft	Mall = 2.99k-ft	Ratio = 0

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

4x8 DF #2

Description - Roof Framing - H3-4 - Header



Uniform 1 = 0.49 klf (0.0'-8.0')

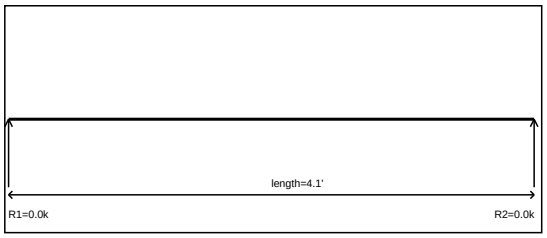
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.96k	Vall = 4.47k	Ratio = 0.44
M = 3.93k-ft	Mall = 5.17k-ft	Ratio = 0.76

Deflection
TL = 0.12" L/784 > L/240 min
DL = 0.05"
L = 0.00" L/999+ > L/360 min

4x10 DF #2

Description - Roof Framing - H3-5 - Header



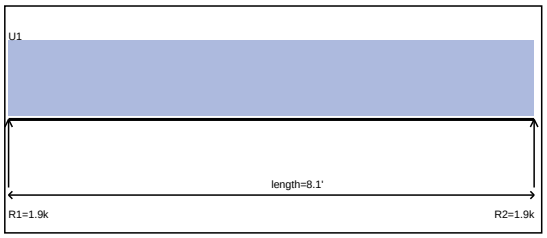
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

V = 0.00k	Vall = 3.04k	Ratio = 0
M = 0.00k-ft	Mall = 2.99k-ft	Ratio = 0

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

4x8 DF #2

Description - Roof Framing - H3-6 - Header



Uniform 1 = 0.45 klf (0.0'-8.1')

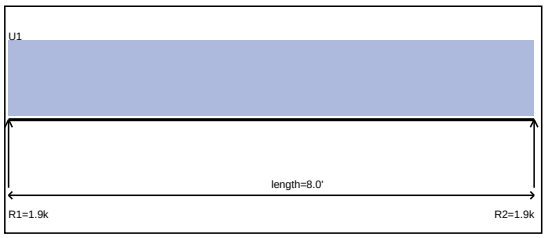
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.82k	Vall = 4.47k	Ratio = 0.41
M = 3.68k-ft	Mall = 5.17k-ft	Ratio = 0.71

Deflection
TL = 0.12" L/829 > L/240 min
DL = 0.05"
L = 0.00" L/999+ > L/360 min

4x10 DF #2

Description - Roof Framing - H3-7 - Header



Uniform 1 = 0.45 klf (0.0'-8.0')

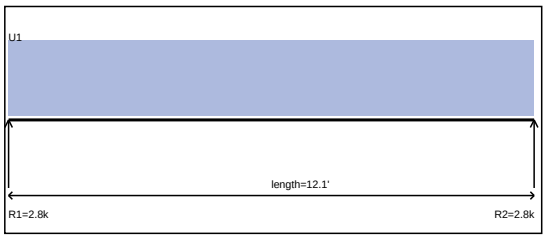
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.80k	Vall = 4.47k	Ratio = 0.40
M = 3.61k-ft	Mall = 5.17k-ft	Ratio = 0.70

Deflection
TL = 0.11" L/854 > L/240 min
DL = 0.05"
L = 0.00" L/999+ > L/360 min

4x10 DF #2

Description - Roof Framing - H3-8 - Header



Uniform 1 = 0.45 klf (0.0'-12.1')

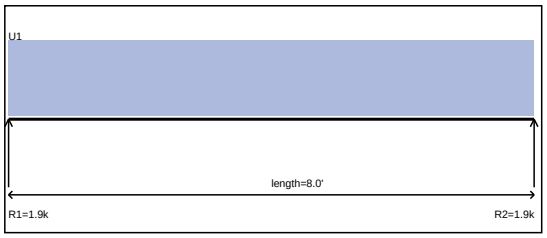
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 2.72k	Vall = 6.40k	Ratio = 0.43
M = 8.22k-ft	Mall = 10.87k-ft	Ratio = 0.76

Deflection
TL = 0.56" L/257 > L/240 min
DL = 0.23"
L = 0.00" L/999+ > L/360 min

3-1/2x9 GLB

Description - Roof Framing - H3-9 - Header



Uniform 1 = 0.45 klf (0.0'-8.0')

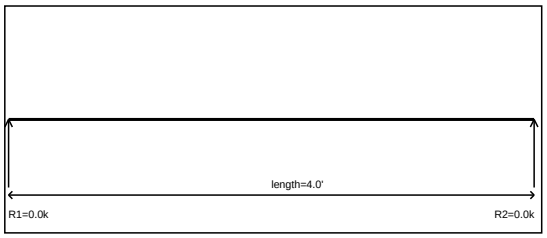
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.80k	Vall = 4.47k	Ratio = 0.40
M = 3.61k-ft	Mall = 5.17k-ft	Ratio = 0.70

Deflection
TL = 0.11" L/854 > L/240 min
DL = 0.05"
L = 0.00" L/999+ > L/360 min

4x10 DF #2

Description - Roof Framing - H3-10 - Header



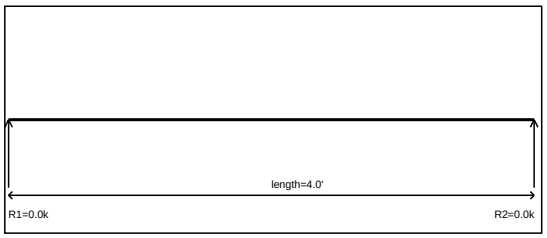
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

V = 0.00k	Vall = 3.04k	Ratio = 0
M = 0.00k-ft	Mall = 2.99k-ft	Ratio = 0

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

4x8 DF #2

Description - Roof Framing - H3-11 - Header



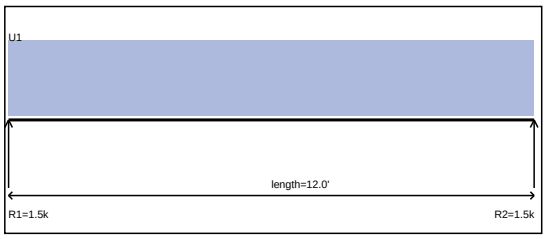
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

V = 0.00k	Vall = 3.04k	Ratio = 0
M = 0.00k-ft	Mall = 2.99k-ft	Ratio = 0

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

4x8 DF #2

Description - Roof Framing - H3-12 - Header



Uniform 1 = 0.25 klf (0.0'-12.0')

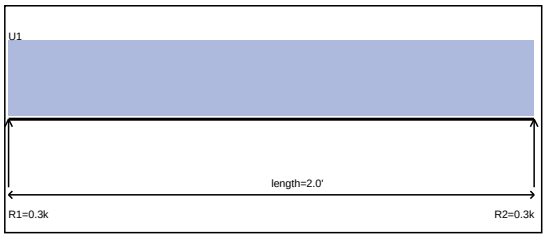
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.47k	Vall = 4.47k	Ratio = 0.33
M = 4.41k-ft	Mall = 5.17k-ft	Ratio = 0.85

Deflection
TL = 0.31" L/465 > L/240 min
DL = 0.13"
L = 0.00" L/999+ > L/360 min

4x10 DF #2

Description - Roof Framing - H3-13 - Header



Uniform 1 = 0.25 klf (0.0'-2.0')

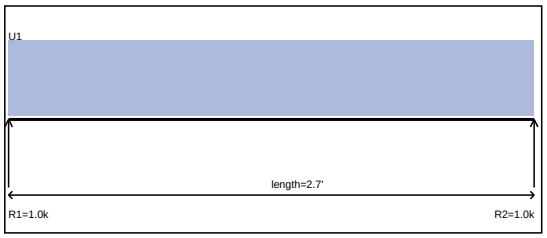
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.25k	Vall = 3.50k	Ratio = 0.07
M = 0.12k-ft	Mall = 3.44k-ft	Ratio = 0.04

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

4x8 DF #2

Description - Roof Framing - H3-14 - Header



Uniform 1 = 0.74 klf (0.0'-2.7')

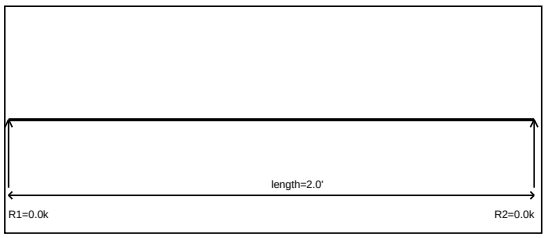
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.98k	Vall = 3.50k	Ratio = 0.28
M = 0.65k-ft	Mall = 3.44k-ft	Ratio = 0.19

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 - H3-15 - Header



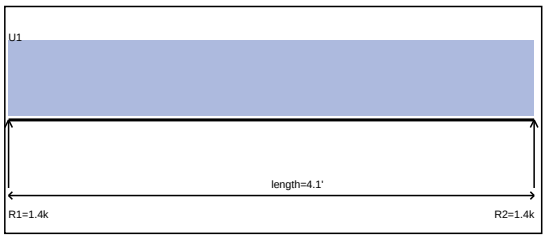
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

V = 0.00k	Vall = 3.04k	Ratio = 0
M = 0.00k-ft	Mall = 2.99k-ft	Ratio = 0

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

4x8 DF #2

Description - Roof Framing - H3-16 - Header



Uniform 1 = 0.65 klf (0.0'-4.1')

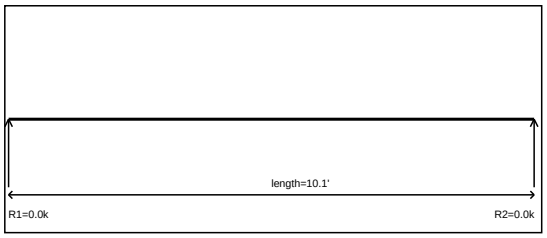
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.32k	Vall = 3.50k	Ratio = 0.38
M = 1.34k-ft	Mall = 3.44k-ft	Ratio = 0.39

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

4x8 DF #2

Description - Roof Framing - H3-17 - Header



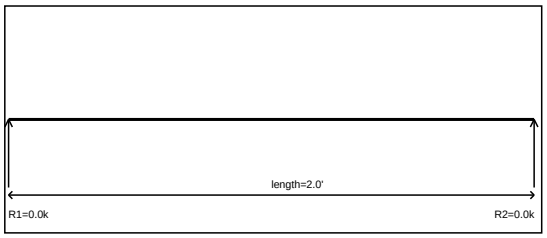
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

V = 0.00k	Vall = 3.04k	Ratio = 0
M = 0.00k-ft	Mall = 2.99k-ft	Ratio = 0

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

4x8 DF #2

Description - Roof Framing - H3-18 - Header



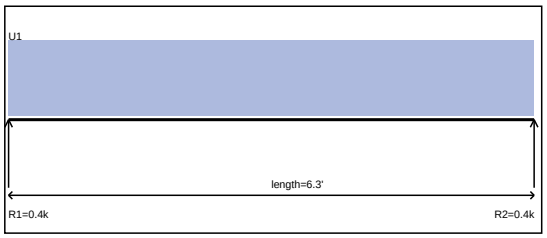
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

V = 0.00k	Vall = 3.04k	Ratio = 0
M = 0.00k-ft	Mall = 2.99k-ft	Ratio = 0

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

4x8 DF #2

Description - Roof Framing - H3-19 - Header



Uniform 1 = 0.10 klf (0.0'-6.3')

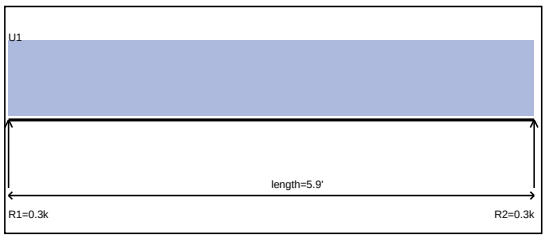
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.31k	Vall = 3.50k	Ratio = 0.09
M = 0.48k-ft	Mall = 3.44k-ft	Ratio = 0.14

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

4x8 DF #2

Description - Roof Framing - H3-20 - Header



Uniform 1 = 0.10 klf (0.0'-5.9')

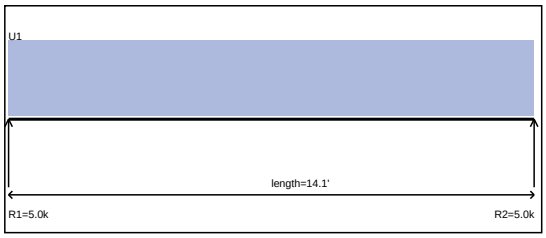
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.29k	Vall = 3.50k	Ratio = 0.08
M = 0.43k-ft	Mall = 3.44k-ft	Ratio = 0.13

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

4x8 DF #2

Description - Roof Framing - H3-21 - Header



Uniform 1 = 0.70 klf (0.0'-14.1')

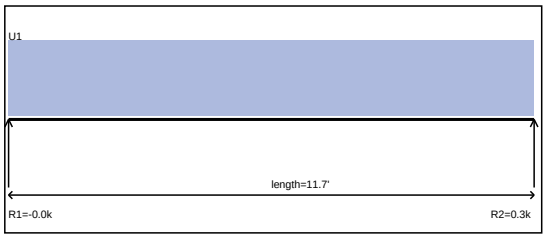
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 4.93k	Vall = 13.41k	Ratio = 0.37
M = 17.37k-ft	Mall = 30.36k-ft	Ratio = 0.57

Deflection
TL = 0.43" L/389 > L/240 min
DL = 0.18"
L = 0.00" L/999+ > L/360 min

5-1/2x12 GLB

Description - Roof Framing - B3-1 - Refer to External Design



Uniform 1 = 0.04 klf (0.0'-11.7')

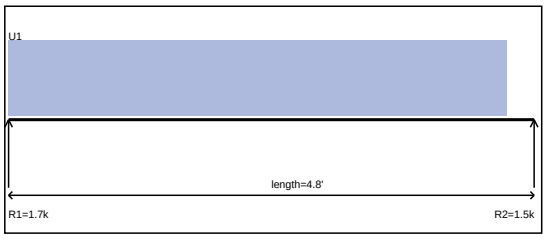
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = D Cd=0.9
△ = NA

V = 0.24k	Vall = 0 k	Ratio = 0
M = 1.57k-ft	Mall = 0 k-ft	Ratio = 0

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

Refer to External Design

Description - Upper Floor Framing - H2-2 - Header



Uniform 1 = 0.69 klf (0.0'-4.5')

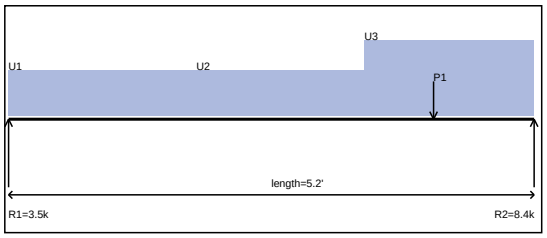
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.63k	Vall = 3.88k	Ratio = 0.42
M = 1.93k-ft	Mall = 4.49k-ft	Ratio = 0.43

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

4x10 DF #2

Description - Upper Floor Framing - H2-3 - Header



Uniform 1 = 0.74 klf (0.0'-1.8') P1 = 7.11 K (4.2')

Uniform 2 = 0.74 klf (1.8'-3.5')

Uniform 3 = 1.23 klf (3.5'-5.2')

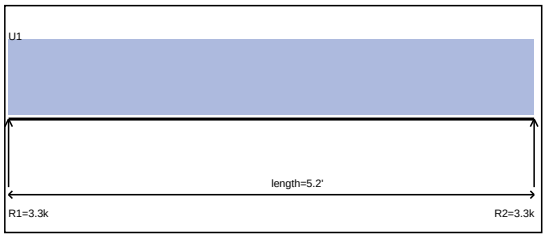
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 7.15k	Vall = 8.24k	Ratio = 0.87
M = 6.70k-ft	Mall = 10.17k-ft	Ratio = 0.66

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

6x12 DF #2

Description - Upper Floor Framing - H2-4 - Header



Uniform 1 = 1.23 klf (0.0'-5.2')

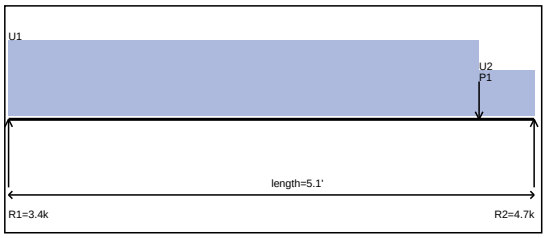
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + 0.75 * (L + S))

V = 2.47k	Vall = 7.17k	Ratio = 0.34
M = 3.24k-ft	Mall = 8.84k-ft	Ratio = 0.37

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

6x12 DF #2

Description - Upper Floor Framing - H2-5 - Header



Uniform 1 = 1.23 klf (0.0'-4.5') P1 = 1.96 K (4.5')

Uniform 2 = 0.74 klf (4.5'-5.1')

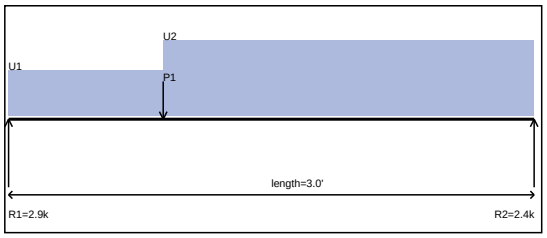
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 3.94k	Vall = 8.24k	Ratio = 0.48
M = 3.80k-ft	Mall = 10.17k-ft	Ratio = 0.37

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

6x12 DF #2

Description - Upper Floor Framing - H2-6 - Header



Uniform 1 = 0.74 klf (0.0'-0.9') P1 = 1.96 K (0.9')

Uniform 2 = 1.23 klf (0.9'-3.0')

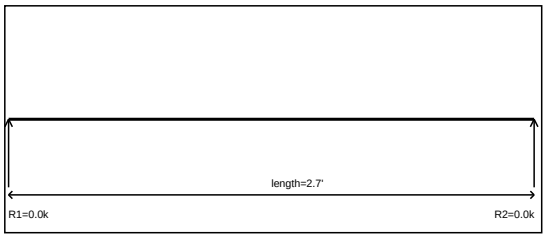
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 2.43k	Vall = 4.47k	Ratio = 0.54
M = 1.92k-ft	Mall = 5.17k-ft	Ratio = 0.37

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

4x10 DF #2

Description - Upper Floor Framing - H2-7 - Header



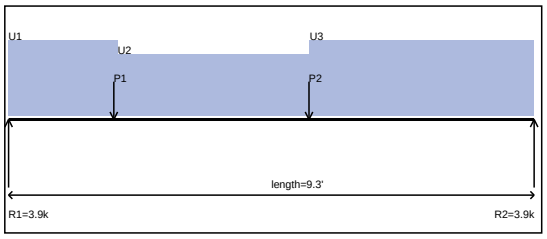
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

V = 0.00k	Vall = 3.04k	Ratio = 0
M = 0.00k-ft	Mall = 2.99k-ft	Ratio = 0

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

4x8 DF #2

Description - Upper Floor Framing - H2-9 - Header



Uniform 1 = 0.83 klf (0.0'-1.9') P1 = 0.25 K (1.9')

Uniform 2 = 0.68 klf (1.9'-5.3') P2 = 0.25 K (5.3')

Uniform 3 = 0.83 klf (5.3'-9.3')

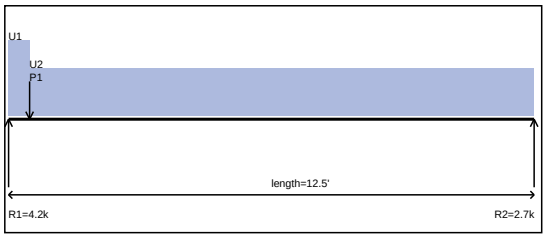
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 3.48k	Vall = 7.42k	Ratio = 0.47
M = 7.99k-ft	Mall = 16.80k-ft	Ratio = 0.48

Deflection
TL = 0.14" L/812 > L/240 min
DL = 0.06"
L = 0.08" L/999+ > L/360 min

3-1/2x12 GLB

Description - Upper Floor Framing - H2-14 - Header



Uniform 1 = 0.67 klf (0.0'-0.5')

P1 = 1.47 K (0.5')

Uniform 2 = 0.42 klf (0.5'-12.5')

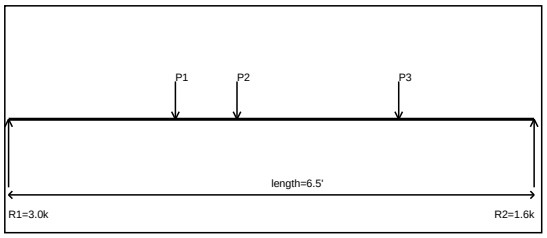
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 3.25k	Vall = 6.49k	Ratio = 0.50
M = 8.38k-ft	Mall = 12.86k-ft	Ratio = 0.65

Deflection
TL = 0.39" L/387 > L/240 min
DL = 0.18"
L = 0.21" L/711 > L/360 min

3-1/2x10-1/2 GLB

Description - Upper Floor Framing - H2-15 - Header



P1 = 4.01 K (2.1')

P2 = 0.25 K (2.8')

P3 = 0.25 K (4.8')

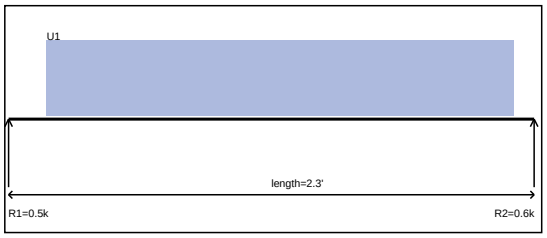
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 2.94k	Vall = 5.43k	Ratio = 0.54
M = 6.06k-ft	Mall = 7.00k-ft	Ratio = 0.87

Deflection
TL = 0.07" L/999+ > L/240 min
DL = 0.04"
L = 0.00" L/999+ > L/360 min

4x12 DF #2

Description - Upper Floor Framing - H2-21 - Header



Uniform 1 = 0.50 klf (0.2'-2.2')

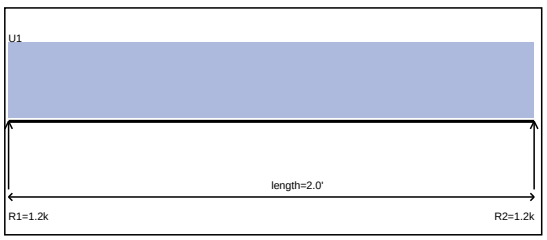
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.52k	Vall = 3.88k	Ratio = 0.13
M = 0.31k-ft	Mall = 4.49k-ft	Ratio = 0.07

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 - H2-23 - Header



Uniform 1 = 1.14 klf (0.0'-2.0')

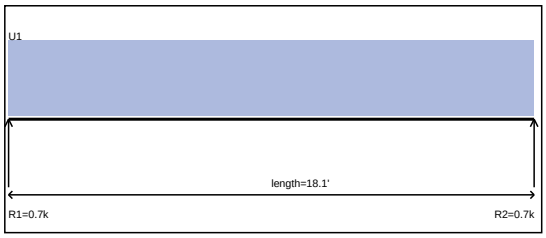
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.14k	Vall = 3.88k	Ratio = 0.29
M = 0.57k-ft	Mall = 4.49k-ft	Ratio = 0.13

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 - H2-24 - Header



Uniform 1 = 0.07 klf (0.0'-18.1')

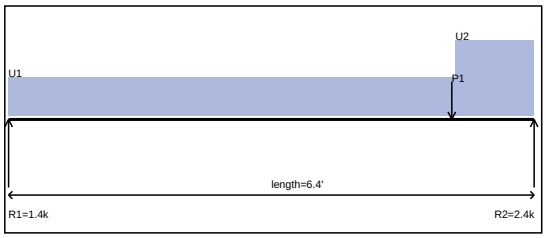
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.66k	Vall = 11.13k	Ratio = 0.06
M = 2.98k-ft	Mall = 37.80k-ft	Ratio = 0.08

Deflection
TL = 0.06" L/999+ > L/240 min
DL = 0.02"
L = 0.04" L/999+ > L/360 min

3-1/2x18 GLB

Description - Upper Floor Framing - B2-1 - Dropped



Uniform 1 = 0.35 klf (0.0'-5.4')

P1 = 1.09 K (5.4')

Uniform 2 = 0.69 klf (5.4'-6.4')

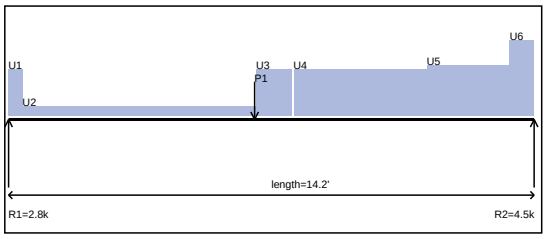
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 2.33k	Vall = 3.88k	Ratio = 0.60
M = 2.46k-ft	Mall = 4.49k-ft	Ratio = 0.55

Deflection
TL = 0.05" L/999+ > L/240 min
DL = 0.02"
L = 0.03" L/999+ > L/360 min

4x10 DF #2

Description - Upper Floor Framing - B2-2 - Flush



Uniform 1 = 0.59 klf (0.0'-0.4')

P1 = 1.48 K (6.7')

Uniform 2 = 0.12 klf (0.4'-6.7')

Uniform 3 = 0.59 klf (6.7'-7.7')

Uniform 4 = 0.59 klf (7.7'-11.3')

Uniform 5 = 0.64 klf (11.3'-13.6')

Uniform 6 = 0.96 klf (13.6'-14.2')

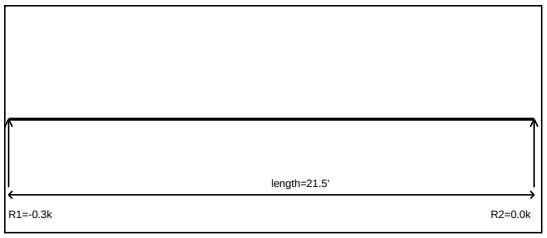
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 4.48k	Vall = 11.13k	Ratio = 0.40
M = 14.66k-ft	Mall = 37.80k-ft	Ratio = 0.39

Deflection
TL = 0.17" L/978 > L/240 min
DL = 0.05"
L = 0.13" L/999+ > L/360 min

3-1/2x18 GLB

Description - Upper Floor Framing - B2-3 - Refer to External Design



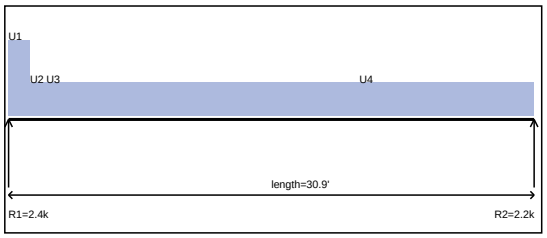
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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

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

Refer to External Design

Description - Upper Floor Framing - B2-6 - Flush



Uniform 1 = 0.32 klf (0.0'-1.3')

Uniform 2 = 0.14 klf (1.3'-2.2')

Uniform 3 = 0.14 klf (2.2'-20.6')

Uniform 4 = 0.14 klf (20.6'-30.9')

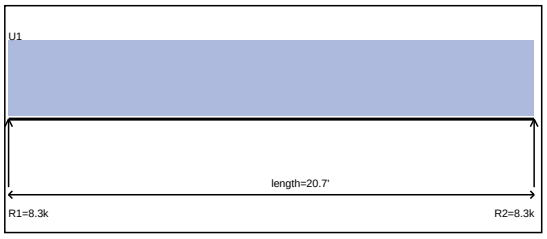
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 2.17k	Vall = 20.11k	Ratio = 0.11
M = 16.31k-ft	Mall = 62.66k-ft	Ratio = 0.26

Deflection
TL = 0.58" L/636 > L/240 min
DL = 0.24"
L = 0.00" L/999+ > L/360 min

5-1/2x18 GLB

Description - Upper Floor Framing - B2-7 - Flush



Uniform 1 = 0.80 klf (0.0'-20.7')

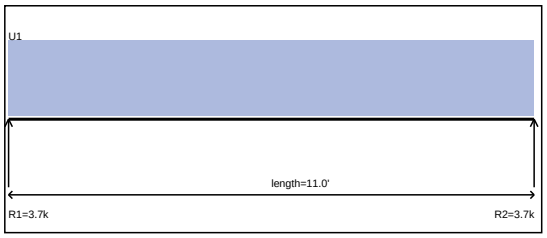
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 8.27k	Vall = 20.11k	Ratio = 0.41
M = 42.71k-ft	Mall = 65.24k-ft	Ratio = 0.65

Deflection
TL = 0.68" L/364 > L/240 min
DL = 0.33"
L = 0.00" L/999+ > L/360 min

5-1/2x18 GLB

Description - Upper Floor Framing - B2-8 - Flush



Uniform 1 = 0.67 klf (0.0'-11.0')

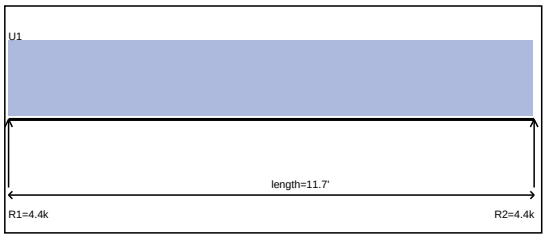
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 3.69k	Vall = 11.13k	Ratio = 0.33
M = 10.18k-ft	Mall = 37.80k-ft	Ratio = 0.27

Deflection
TL = 0.07" L/999+ > L/240 min
DL = 0.03"
L = 0.05" L/999+ > L/360 min

3-1/2x18 GLB

Description - Upper Floor Framing - B2-10 - Flush



Uniform 1 = 0.75 klf (0.0'-11.7')

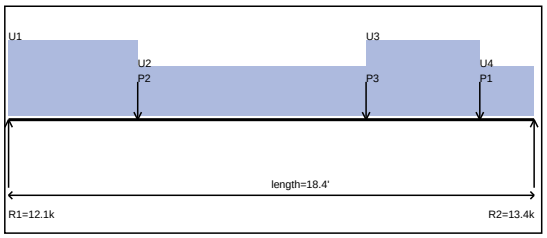
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 4.36k	Vall = 12.80k	Ratio = 0.34
M = 12.77k-ft	Mall = 43.47k-ft	Ratio = 0.29

Deflection
TL = 0.10" L/999+ > L/240 min
DL = 0.05"
L = 0.00" L/999+ > L/360 min

3-1/2x18 GLB

Description - Upper Floor Framing - B2-11 - Flush Bottom



Uniform 1 = 1.28 klf (0.0'-4.5')
Uniform 2 = 0.83 klf (4.5'-12.5')
Uniform 3 = 1.28 klf (12.5'-16.5')
Uniform 4 = 0.83 klf (16.5'-18.4')

P1 = 2.72 K (16.5')
P2 = 1.80 K (4.5')
P3 = 1.80 K (12.5')

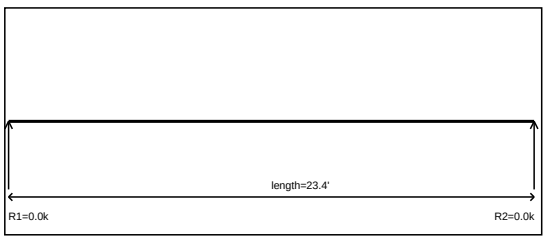
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 11.36k	Vall = 23.47k	Ratio = 0.48
M = 44.93k-ft	Mall = 88.46k-ft	Ratio = 0.51

Deflection
TL = 0.36" L/616 > L/240 min
DL = 0.17"
L = 0.15" L/999+ > L/360 min

5-1/2x21 GLB

Description - Upper Floor Framing - B2-12 - Refer to External Design



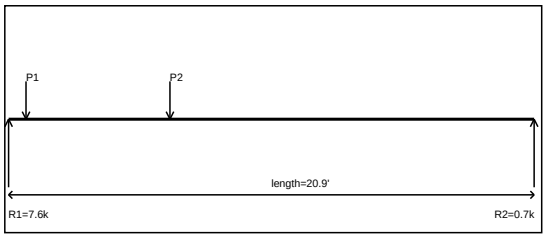
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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

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

Refer to External Design

Description - Upper Floor Framing - B2-13 - Flush



P1 = 6.81 K (0.7')

P2 = 1.35 K (6.4')

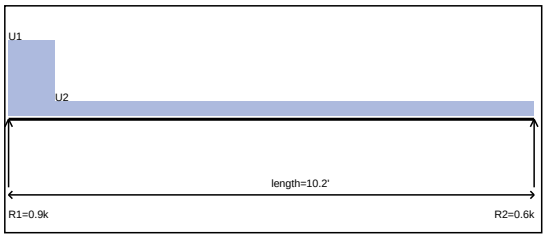
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + L) Cd=1
△ = (D + 0.75 * (L + S))

V = 6.84k	Vall = 12.80k	Ratio = 0.53
M = 7.34k-ft	Mall = 37.72k-ft	Ratio = 0.19

Deflection
TL = 0.20" L/999+ > L/240 min
DL = 0.08"
L = 0.11" L/999+ > L/360 min

3-1/2x18 GLB

Description - Upper Floor Framing - B2-14 - Flush



Uniform 1 = 0.53 klf (0.0'-0.9')

Uniform 2 = 0.10 klf (0.9'-10.2')

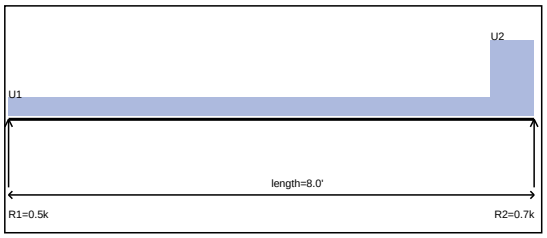
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = D Cd=0.9
△ = (D + L)

V = 0.88k	Vall = 17.49k	Ratio = 0.05
M = 1.33k-ft	Mall = 53.46k-ft	Ratio = 0.02

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

5-1/2x18 GLB

Description - Upper Floor Framing - B2-17 - Flush



Uniform 1 = 0.10 klf (0.0'-7.3')

Uniform 2 = 0.42 klf (7.3'-8.0')

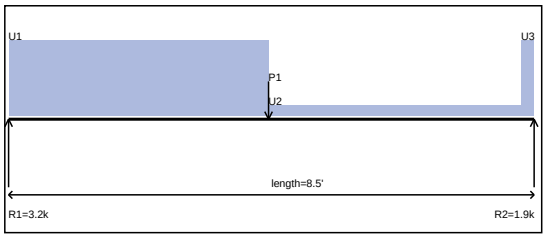
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = D Cd=0.9
△ = (D + L)

V = 0.60k	Vall = 17.49k	Ratio = 0.03
M = 0.81k-ft	Mall = 53.46k-ft	Ratio = 0.02

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

5-1/2x18 GLB

Description - Upper Floor Framing - B2-18 - Flush



Uniform 1 = 0.75 klf (0.0'-4.2')

P1 = 1.32 K (4.2')

Uniform 2 = 0.10 klf (4.2'-8.3')

Uniform 3 = 0.75 klf (8.3'-8.5')

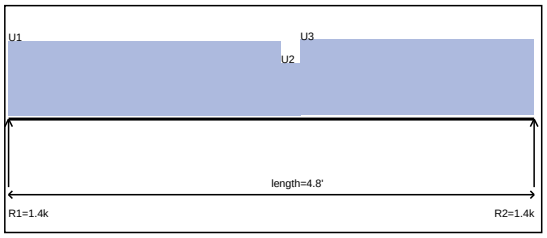
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 3.13k	Vall = 12.80k	Ratio = 0.24
M = 6.58k-ft	Mall = 43.47k-ft	Ratio = 0.15

Deflection
TL = 0.03" L/999+ > L/240 min
DL = 0.01"
L = 0.00" L/999+ > L/360 min

3-1/2x18 GLB

Description - Upper Floor Framing - B2-19 - Flush



Uniform 1 = 0.57 klf (0.0'-2.5')

Uniform 2 = 0.40 klf (2.5'-2.6')

Uniform 3 = 0.58 klf (2.6'-4.8')

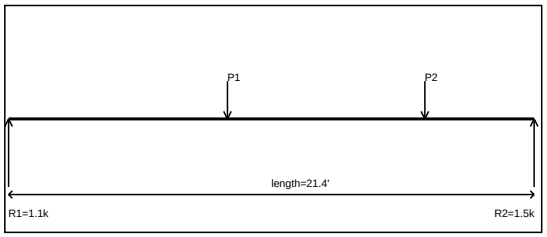
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.35k	Vall = 11.13k	Ratio = 0.12
M = 1.59k-ft	Mall = 37.80k-ft	Ratio = 0.04

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

3-1/2x18 GLB

Description - Upper Floor Framing - B2-20 - Flush



P1 = 1.48 K (8.9')

P2 = 1.09 K (17.0')

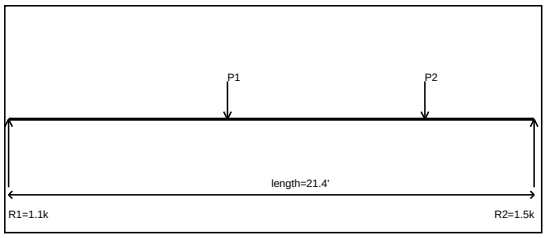
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.48k	Vall = 11.13k	Ratio = 0.13
M = 9.72k-ft	Mall = 37.63k-ft	Ratio = 0.26

Deflection
TL = 0.26" L/980 > L/240 min
DL = 0.07"
L = 0.19" L/999+ > L/360 min

3-1/2x18 GLB

Description - Upper Floor Framing - B2-21 - Flush



P1 = 1.48 K (8.9')

P2 = 1.09 K (17.0')

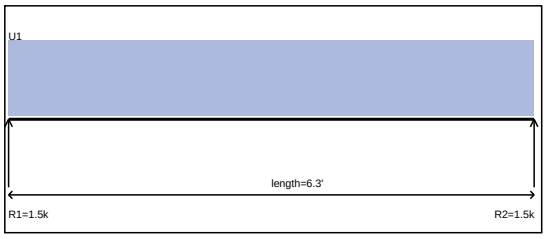
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.48k	Vall = 11.13k	Ratio = 0.13
M = 9.72k-ft	Mall = 37.63k-ft	Ratio = 0.26

Deflection
TL = 0.26" L/980 > L/240 min
DL = 0.07"
L = 0.19" L/999+ > L/360 min

3-1/2x18 GLB

Description - Upper Floor Framing - B2-22 - Flush



Uniform 1 = 0.47 klf (0.0'-6.3')

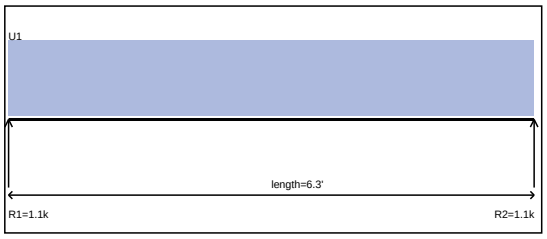
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.48k	Vall = 11.13k	Ratio = 0.13
M = 2.34k-ft	Mall = 37.80k-ft	Ratio = 0.06

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

3-1/2x18 GLB

Description - Upper Floor Framing - B2-23 - Flush



Uniform 1 = 0.34 klf (0.0'-6.3')

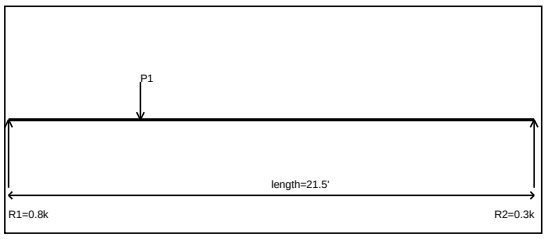
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.09k	Vall = 11.13k	Ratio = 0.10
M = 1.72k-ft	Mall = 37.80k-ft	Ratio = 0.05

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

3-1/2x18 GLB

Description - Upper Floor Framing - B2-24 - Flush



P1 = 1.01 K (5.4')

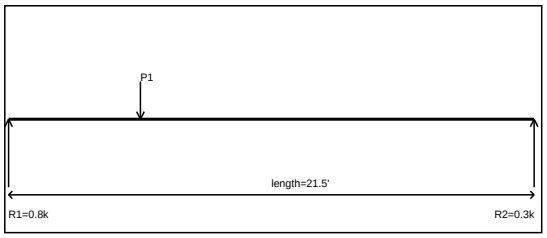
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.75k	Vall = 11.13k	Ratio = 0.07
M = 4.07k-ft	Mall = 37.62k-ft	Ratio = 0.11

Deflection
TL = 0.11" L/999+ > L/240 min
DL = 0.03"
L = 0.08" L/999+ > L/360 min

3-1/2x18 GLB

Description - Upper Floor Framing - B2-25 - Flush



P1 = 1.01 K (5.4')

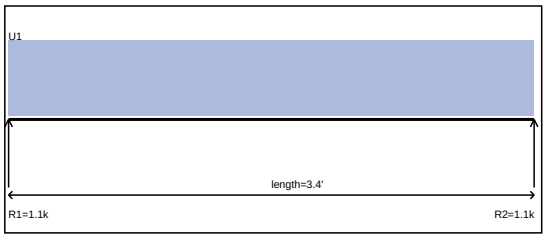
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.75k	Vall = 11.13k	Ratio = 0.07
M = 4.07k-ft	Mall = 37.62k-ft	Ratio = 0.11

Deflection
TL = 0.11" L/999+ > L/240 min
DL = 0.03"
L = 0.08" L/999+ > L/360 min

3-1/2x18 GLB

Description - Upper Floor Framing - B2-26 - Flush



Uniform 1 = 0.59 klf (0.0'-3.4')

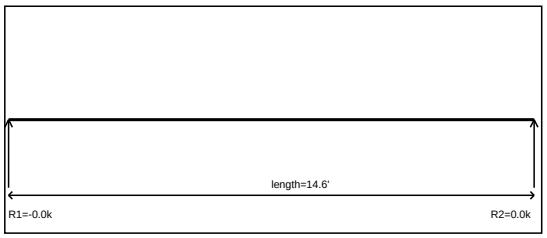
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.01k	Vall = 11.13k	Ratio = 0.09
M = 0.86k-ft	Mall = 37.80k-ft	Ratio = 0.02

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

3-1/2x18 GLB

Description - Upper Floor Framing - B2-27 - Refer to External Design



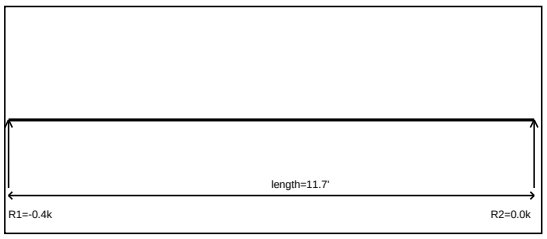
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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

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

Refer to External Design

Description - Upper Floor Framing - B2-28 - Refer to External Design



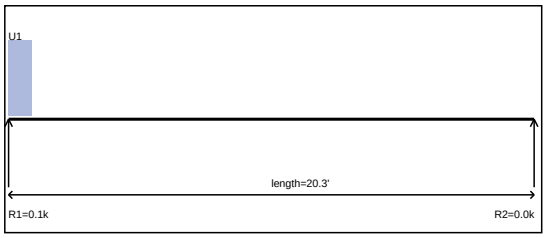
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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

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

Refer to External Design

Description - Upper Floor Framing - B2-29 - Flush



Uniform 1 = 0.03 klf (0.0'-0.9')

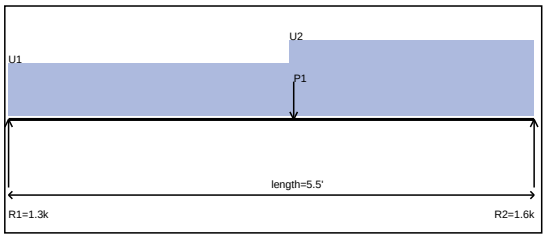
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.03k	Vall = 11.13k	Ratio = 0.00
M = 0.01k-ft	Mall = 37.80k-ft	Ratio = 0.00

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

3-1/2x18 GLB

Description - Main Floor Framing - B1-1 - Dropped



Uniform 1 = 0.36 klf (0.0'-2.9')

P1 = 0.38 K (3.0')

Uniform 2 = 0.52 klf (2.9'-5.5')

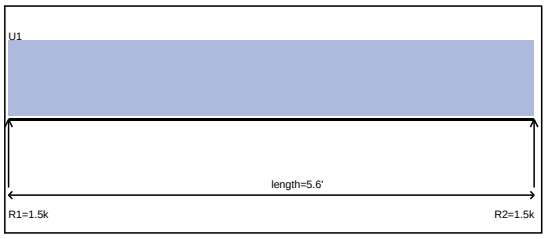
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.51k	Vall = 3.88k	Ratio = 0.39
M = 2.17k-ft	Mall = 4.49k-ft	Ratio = 0.48

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

4x10 DF #2

Description - Main Floor Framing - B1-2 - Dropped



Uniform 1 = 0.52 klf (0.0'-5.6')

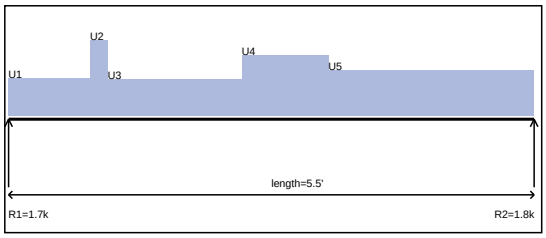
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.46k	Vall = 3.88k	Ratio = 0.38
M = 2.03k-ft	Mall = 4.49k-ft	Ratio = 0.45

Deflection
TL = 0.03" L/999+ > L/240 min
DL = 0.01"
L = 0.02" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing - B1-3 - Dropped



Uniform 1 = 0.52 klf (0.0'-0.9')

Uniform 2 = 1.04 klf (0.9'-1.0')

Uniform 3 = 0.50 klf (1.0'-2.4')

Uniform 4 = 0.83 klf (2.4'-3.3')

Uniform 5 = 0.63 klf (3.3'-5.5')

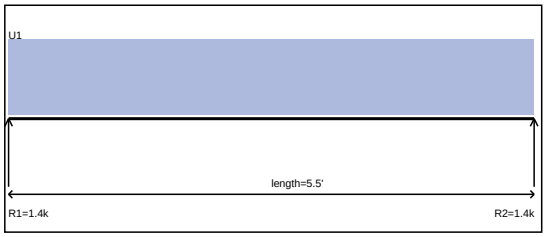
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.78k	Vall = 3.88k	Ratio = 0.46
M = 2.47k-ft	Mall = 4.49k-ft	Ratio = 0.55

Deflection
TL = 0.04" L/999+ > L/240 min
DL = 0.01"
L = 0.03" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing - B1-4 - Dropped



Uniform 1 = 0.50 klf (0.0'-5.5')

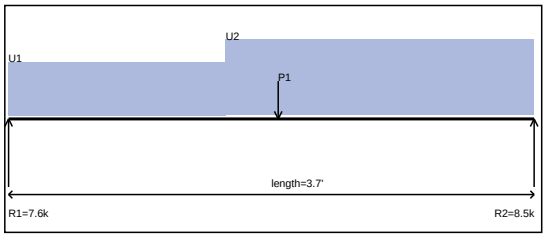
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.39k	Vall = 3.88k	Ratio = 0.36
M = 1.86k-ft	Mall = 4.49k-ft	Ratio = 0.41

Deflection
TL = 0.03" L/999+ > L/240 min
DL = 0.00"
L = 0.02" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing - B1-9 - Dropped



Uniform 1 = 1.74 klf (0.0'-1.5')

P1 = 7.82 K (1.9')

Uniform 2 = 2.48 klf (1.5'-3.7')

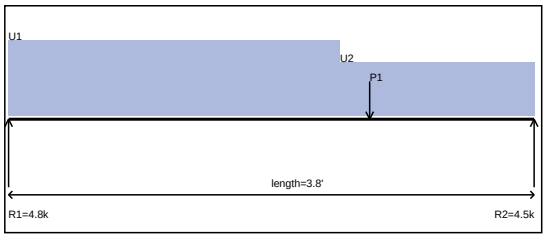
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 7.04k	Vall = 4.47k	Ratio = 1.58
M = 9.37k-ft	Mall = 5.17k-ft	Ratio = 1.81

Deflection
TL = 0.06" L/705 > L/240 min
DL = 0.03"
L = 0.01" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing - B1-10 - Dropped



Uniform 1 = 2.48 klf (0.0'-2.4') P1 = 0.98 K (2.6')

Uniform 2 = 1.74 klf (2.4'-3.8')

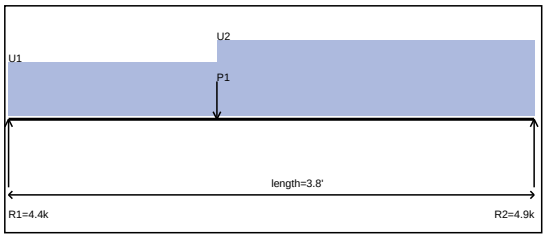
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + 0.75 * (L + S))

V = 3.87k	Vall = 3.88k	Ratio = 1.00
M = 3.68k-ft	Mall = 4.49k-ft	Ratio = 0.82

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 - B1-11 - Dropped



Uniform 1 = 1.74 klf (0.0'-1.5') P1 = 0.98 K (1.5')

Uniform 2 = 2.48 klf (1.5'-3.8')

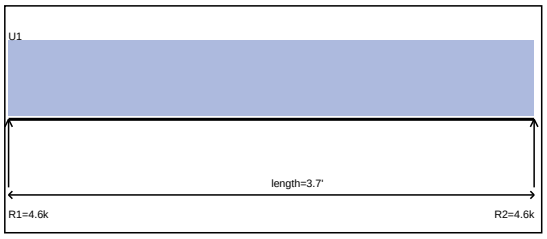
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + 0.75 * (L + S))

V = 3.90k	Vall = 3.88k	Ratio = 1.00
M = 3.72k-ft	Mall = 4.49k-ft	Ratio = 0.83

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 - B1-12 - Dropped



Uniform 1 = 2.48 klf (0.0'-3.7')

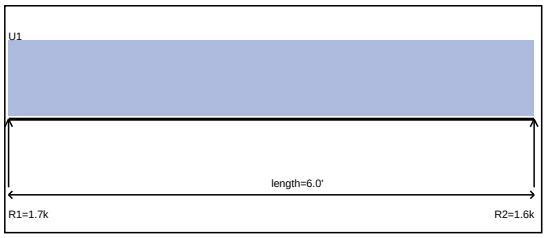
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + 0.75 * (L + S))

V = 3.74k	Vall = 3.88k	Ratio = 0.96
M = 3.42k-ft	Mall = 4.49k-ft	Ratio = 0.76

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

4x10 DF #2

Description - Main Floor Framing - B1-15 - Dropped



Uniform 1 = 0.54 klf (0.0'-6.0')

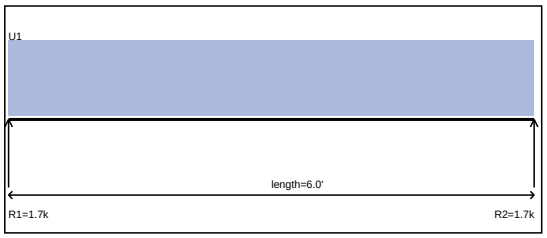
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.61k	Vall = 3.88k	Ratio = 0.41
M = 2.41k-ft	Mall = 4.49k-ft	Ratio = 0.54

Deflection
TL = 0.04" L/999+ > L/240 min
DL = 0.01"
L = 0.03" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing - B1-16 - Dropped



Uniform 1 = 0.54 klf (0.0'-6.0')

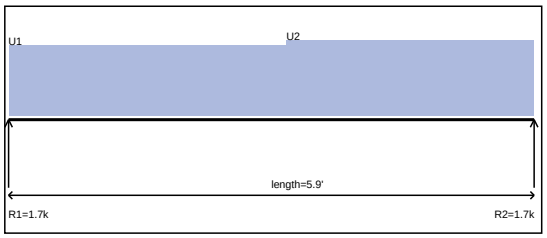
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.61k	Vall = 3.88k	Ratio = 0.41
M = 2.41k-ft	Mall = 4.49k-ft	Ratio = 0.54

Deflection
TL = 0.04" L/999+ > L/240 min
DL = 0.01"
L = 0.03" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing - B1-17 - Dropped



Uniform 1 = 0.54 klf (0.0'-3.1')

Uniform 2 = 0.58 klf (3.1'-5.9')

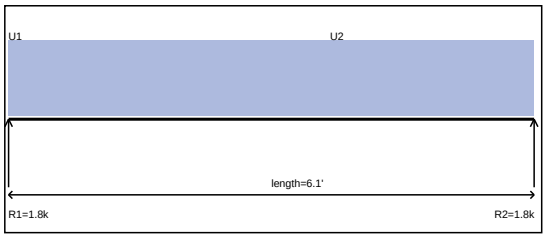
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.69k	Vall = 3.88k	Ratio = 0.44
M = 2.45k-ft	Mall = 4.49k-ft	Ratio = 0.55

Deflection
TL = 0.04" L/999+ > L/240 min
DL = 0.01"
L = 0.03" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing - B1-18 - Dropped



Uniform 1 = 0.58 klf (0.0'-3.7')

Uniform 2 = 0.58 klf (3.7'-6.1')

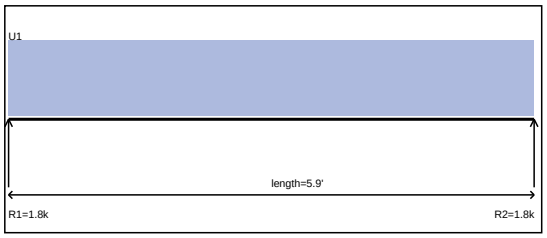
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.78k	Vall = 3.88k	Ratio = 0.46
M = 2.72k-ft	Mall = 4.49k-ft	Ratio = 0.60

Deflection
TL = 0.05" L/999+ > L/240 min
DL = 0.01"
L = 0.04" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing - B1-19 - Dropped



Uniform 1 = 0.58 klf (0.0'-5.9')

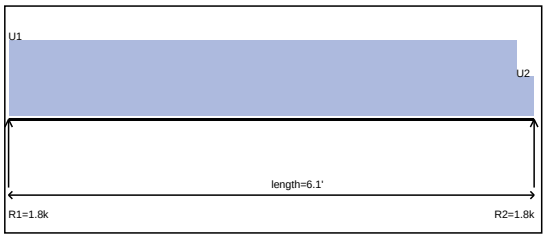
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.73k	Vall = 3.88k	Ratio = 0.45
M = 2.56k-ft	Mall = 4.49k-ft	Ratio = 0.57

Deflection
TL = 0.04" L/999+ > L/240 min
DL = 0.01"
L = 0.03" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing - B1-20 - Dropped



Uniform 1 = 0.58 klf (0.0'-5.9')

Uniform 2 = 0.30 klf (5.9'-6.1')

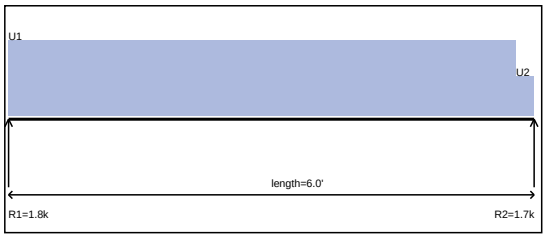
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.78k	Vall = 3.88k	Ratio = 0.46
M = 2.70k-ft	Mall = 4.49k-ft	Ratio = 0.60

Deflection
TL = 0.05" L/999+ > L/240 min
DL = 0.01"
L = 0.04" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing - B1-21 - Dropped



Uniform 1 = 0.58 klf (0.0'-5.8')

Uniform 2 = 0.30 klf (5.8'-6.0')

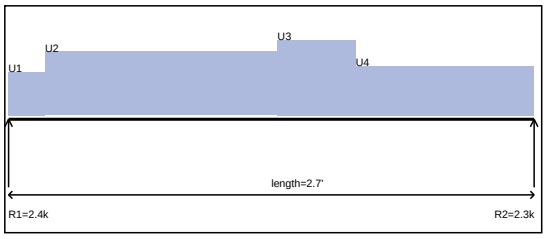
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.73k	Vall = 3.88k	Ratio = 0.45
M = 2.56k-ft	Mall = 4.49k-ft	Ratio = 0.57

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

4x10 DF #2

Description - Main Floor Framing - B1-27 - Dropped



Uniform 1 = 1.22 klf (0.0'-0.2')

Uniform 2 = 1.81 klf (0.2'-1.4')

Uniform 3 = 2.14 klf (1.4'-1.8')

Uniform 4 = 1.41 klf (1.8'-2.7')

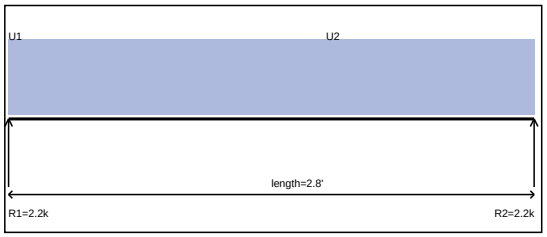
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 2.37k	Vall = 3.88k	Ratio = 0.61
M = 1.69k-ft	Mall = 4.49k-ft	Ratio = 0.38

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

4x10 DF #2

Description - Main Floor Framing - B1-28 - Dropped



Uniform 1 = 1.54 klf (0.0'-1.7')

Uniform 2 = 1.54 klf (1.7'-2.8')

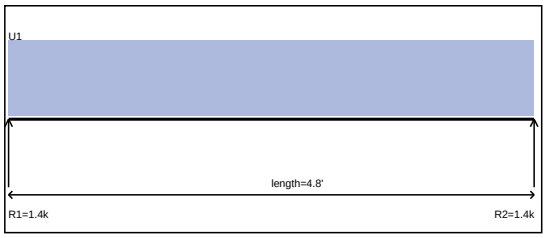
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 2.12k	Vall = 3.88k	Ratio = 0.55
M = 1.46k-ft	Mall = 4.49k-ft	Ratio = 0.32

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

4x10 DF #2

Description - Main Floor Framing - B1-29 - Dropped



Uniform 1 = 0.57 klf (0.0'-4.8')

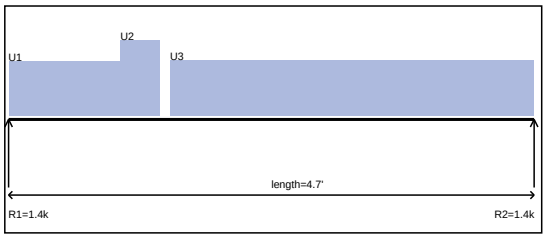
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.35k	Vall = 3.88k	Ratio = 0.35
M = 1.61k-ft	Mall = 4.49k-ft	Ratio = 0.36

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

4x10 DF #2

Description - Main Floor Framing - B1-30 - Dropped



Uniform 1 = 0.57 klf (0.0'-1.0')

Uniform 2 = 0.79 klf (1.0'-1.3')

Uniform 3 = 0.58 klf (1.4'-4.7')

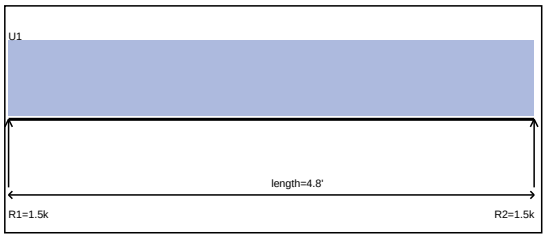
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.36k	Vall = 3.88k	Ratio = 0.35
M = 1.58k-ft	Mall = 4.49k-ft	Ratio = 0.35

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

4x10 DF #2

Description - Main Floor Framing - B1-31 - Dropped



Uniform 1 = 0.58 klf (0.0'-4.8')

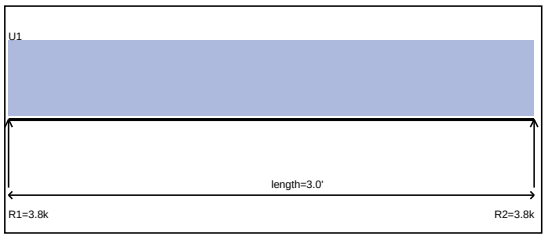
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.40k	Vall = 3.88k	Ratio = 0.36
M = 1.70k-ft	Mall = 4.49k-ft	Ratio = 0.38

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

4x10 DF #2

Description - Main Floor Framing - B1-32 - Dropped



Uniform 1 = 2.48 klf (0.0'-3.0')

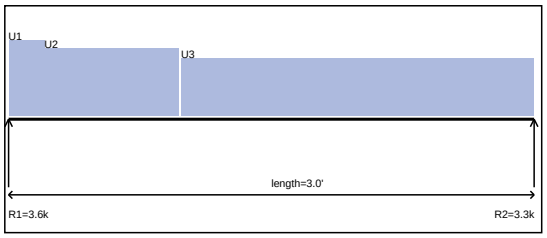
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + 0.75 * (L + S))

V = 3.06k	Vall = 3.88k	Ratio = 0.79
M = 2.30k-ft	Mall = 4.49k-ft	Ratio = 0.51

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

4x10 DF #2

Description - Main Floor Framing - B1-33 - Dropped



Uniform 1 = 2.78 klf (0.0'-0.2')

Uniform 2 = 2.48 klf (0.2'-1.0')

Uniform 3 = 2.11 klf (1.0'-3.0')

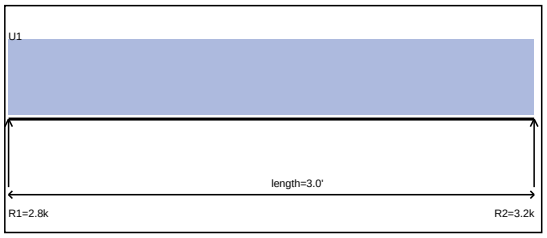
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + 0.75 * (L + S))

V = 2.89k	Vall = 3.88k	Ratio = 0.74
M = 2.01k-ft	Mall = 4.49k-ft	Ratio = 0.45

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

4x10 DF #2

Description - Main Floor Framing - B1-34 - Dropped



Uniform 1 = 2.11 klf (0.0'-3.0')

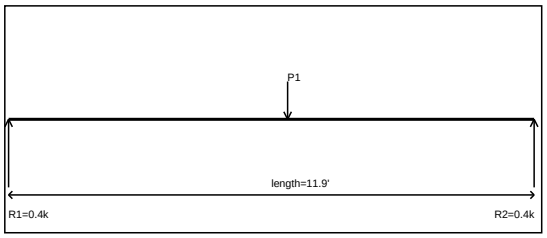
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + 0.75 * (L + S))

V = 2.60k	Vall = 3.88k	Ratio = 0.67
M = 1.40k-ft	Mall = 4.49k-ft	Ratio = 0.31

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

4x10 DF #2

Description - Main Floor Framing - B1-35 - Flush



P1 = 0.72 K (6.3')

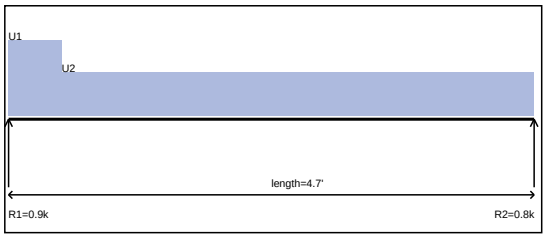
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.38k	Vall = 3.16k	Ratio = 0.12
M = 2.13k-ft	Mall = 5.70k-ft	Ratio = 0.37

Deflection
TL = 0.23" L/626 > L/240 min
DL = 0.05"
L = 0.18" L/782 > L/360 min

1-3/4x9-1/2 LVL

Description - Main Floor Framing - B1-36 - Flush



Uniform 1 = 0.52 klf (0.0'-0.5')

Uniform 2 = 0.30 klf (0.5'-4.7')

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

V = 0.82k	Vall = 3.16k	Ratio = 0.26
M = 0.86k-ft	Mall = 5.70k-ft	Ratio = 0.15

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

1-3/4x9-1/2 LVL

Wood Beam

Project File: Calcs.ec6

DESCRIPTION: B3-1

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

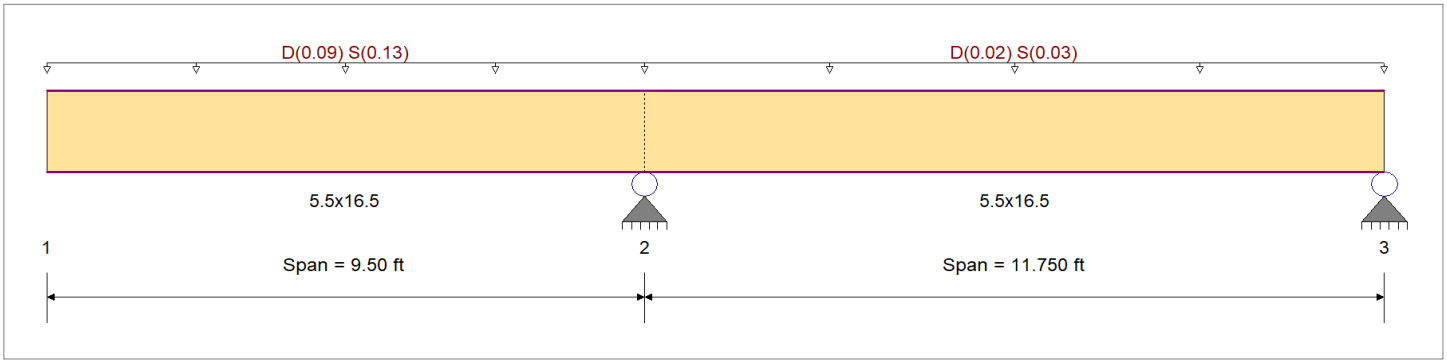
Wood Species : DF/DF
Wood Grade : 24F-V4

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

Fb +	2400 psi
Fb -	1850 psi
Fc - Prll	1650 psi
Fc - Perp	650 psi
Fv	265 psi
Ft	1100 psi

E : Modulus of Elasticity

Ebend- xx	1800 ksi
Eminbend - xx	950 ksi
Ebend- yy	1600 ksi
Eminbend - yy	850 ksi
Density	31.21 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Load for Span Number 1
Uniform Load : D = 0.090, S = 0.130 , Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.020, S = 0.030 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.224 : 1	Maximum Shear Stress Ratio	=	0.098 : 1
Section used for this span		5.5x16.5	Section used for this span		5.5x16.5
fb: Actual	=	477.36 psi	fv: Actual	=	29.72 psi
F'b	=	2,127.50 psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	9.500 ft	Location of maximum on span	=	8.173 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.155 in	Ratio =	6653	>=360	Span: 1 : S Only
Max Upward Transient Deflection	-0.021 in	Ratio =	1472	>=360	Span: 2 : S Only
Max Downward Total Deflection	0.262 in	Ratio =	868	>=240	Span: 1 : +D+S
Max Upward Total Deflection	-0.036 in	Ratio =	3922	>=240	Span: 2 : +D+S

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 9.50 ft	1	0.117	0.051	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.06	195.3	1,665.0	0.74	12.2	238.5
Length = 11.750 ft	2	0.117	0.051	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.06	195.3	1,665.0	0.44	12.2	238.5
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.50 ft	1	0.224	0.098	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	9.93	477.4	2,127.5	1.80	29.7	304.8
Length = 11.750 ft	2	0.224	0.098	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	9.93	477.4	2,127.5	1.07	29.7	304.8
+D+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Wood Beam

Project File: Calcs.ec6

DESCRIPTION: B2-3

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16
Load Combination Set : IBC 2021

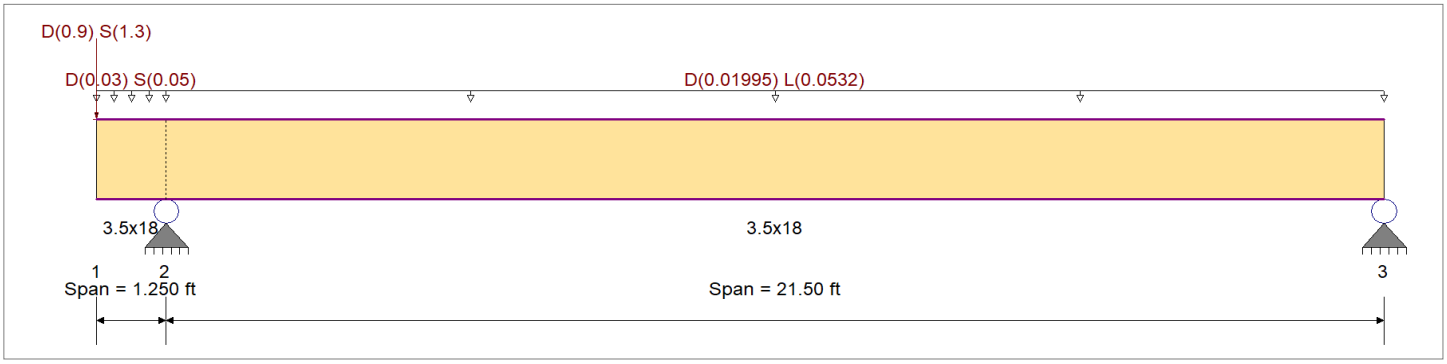
Material Properties

Analysis Method :	Allowable Stress Design
Load Combination :	IBC 2021
Wood Species :	DF/DF
Wood Grade :	24F-V4
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi
Fb -	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight NOT internally calculated and added
Load for Span Number 1
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 2.0 ft
Point Load : D = 0.90, S = 1.30 k @ 0.0 ft
Load for Span Number 2
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 1.330 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.098 : 1	Maximum Shear Stress Ratio	=	0.180 : 1
Section used for this span		3.5x18	Section used for this span		3.5x18
fb: Actual	=	233.14 psi	fv: Actual	=	54.76 psi
F'b	=	2,388.60 psi	F'v	=	304.75 psi
Load Combination		+D+L	Load Combination		+D+S
Location of maximum on span	=	11.531 ft	Location of maximum on span	=	1.250 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.084 in	Ratio =	1930 >=360	Span: 2 : L Only
Max Upward Transient Deflection	-0.016 in	Ratio =	3061 >=360	Span: 1 : L Only
Max Downward Total Deflection	0.097 in	Ratio =	2660 >=240	Span: 2 : +D+L
Max Upward Total Deflection	-0.015 in	Ratio =	1970 >=240	Span: 1 : +D+L

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 1.250 ft	1	0.044	0.094	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.15	72.9	1,665.0	0.94	22.3	238.5
Length = 21.50 ft	2	0.044	0.094	0.90	1.00	1.00	1.00	0.995	1.00	1.00	1.00	1.15	72.9	1,657.1	0.24	22.3	238.5
+D+L					1.00	1.00	1.00	0.995	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.250 ft	1	0.039	0.084	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.15	72.9	1,850.0	0.94	22.3	265.0
Length = 21.50 ft	2	0.098	0.084	1.00	1.00	1.00	1.00	0.995	1.00	1.00	1.00	3.67	233.1	2,388.6	0.73	22.3	265.0

Wood Beam

Project File: Calcs.ec6

DESCRIPTION: B2-4

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

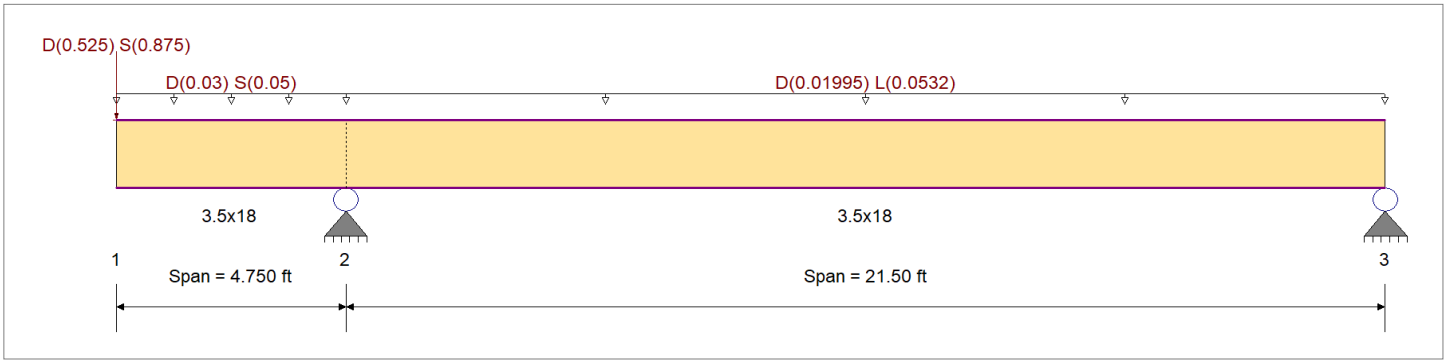
Wood Species : DF/DF
Wood Grade : 24F-V4

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

Fb +	2,400.0 psi
Fb -	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight NOT internally calculated and added
Load for Span Number 1
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 2.0 ft
Point Load : D = 0.5250, S = 0.8750 k @ 0.0 ft
Load for Span Number 2
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 1.330 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.226 : 1	Maximum Shear Stress Ratio	=	0.130 : 1
Section used for this span		3.5x18	Section used for this span		3.5x18
fb: Actual	=	479.52 psi	fv: Actual	=	39.55 psi
F'b	=	2,117.39 psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	0.000 ft	Location of maximum on span	=	3.264 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.110 in	Ratio =	1930 >=360	Span: 1 : S Only
Max Upward Transient Deflection	-0.059 in	Ratio =	1034 >=360	Span: 1 : L Only
Max Downward Total Deflection	0.154 in	Ratio =	738 >=240	Span: 1 : +D+S
Max Upward Total Deflection	-0.098 in	Ratio =	2637 >=240	Span: 2 : +D+S

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 4.750 ft	1	0.108	0.062	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.83	179.8	1,665.0	0.62	14.8	238.5
Length = 21.50 ft	2	0.109	0.062	0.90	1.00	1.00	1.00	0.995	1.00	1.00	1.00	2.83	179.8	1,657.1	0.32	14.8	238.5
+D+L					1.00	1.00	1.00	0.995	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 4.750 ft	1	0.097	0.073	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.83	179.8	1,850.0	0.81	19.3	265.0
Length = 21.50 ft	2	0.078	0.073	1.00	1.00	1.00	1.00	0.995	1.00	1.00	1.00	2.93	186.0	2,388.6	0.81	19.3	265.0

Wood Beam

Project File: Calcs.ec6

DESCRIPTION: B2-7 (overstrength)

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

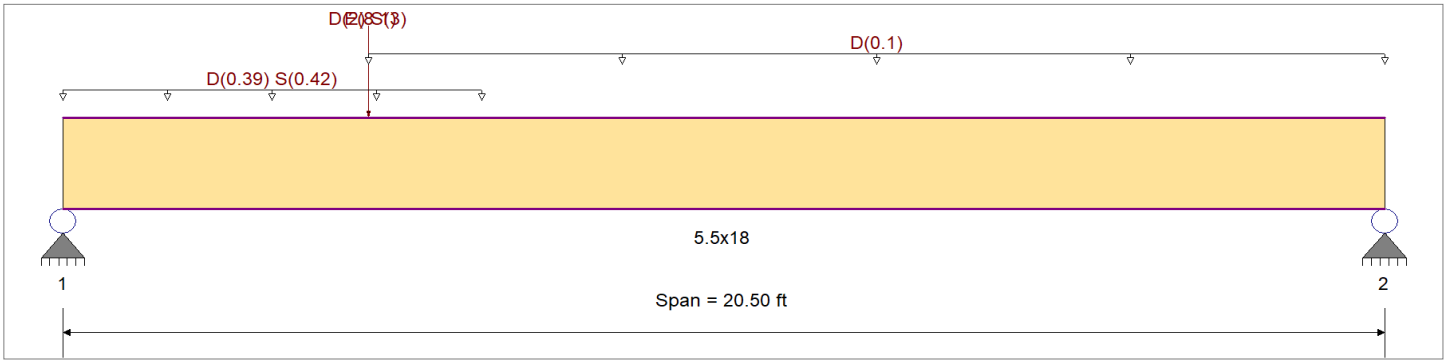
Wood Species : DF/DF
Wood Grade : 24F-V4

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

Fb +	2,400.0 psi
Fb -	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.390, S = 0.420 k/ft, Extent = 0.0 -->> 6.50 ft, Tributary Width = 1.0 ft
Point Load : E = 8.10 k @ 4.750 ft
Point Load : D = 2.0, S = 3.0 k @ 4.750 ft
Uniform Load : D = 0.10 k/ft, Extent = 4.750 -->> 20.50 ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.518 : 1	Maximum Shear Stress Ratio	=	0.390 : 1
Section used for this span		5.5x18	Section used for this span		5.5x18
fb: Actual	=	1,367.31 psi	fv: Actual	=	118.98 psi
F'b	=	2,638.03 psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.938 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	0.345 in	Ratio =	0 >=0	Span: 1 : E Only
Max Upward Transient Deflection	0 in	Ratio =	712 >=0	n/a
Max Downward Total Deflection	0.586 in	Ratio =	419 >=240	Span: 1 : +D+0.750S+0.5250E
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 20.50 ft	1	0.333	0.246	0.90	1.00	1.00	1.00	0.956	1.00	1.00	1.00	16.99	686.6	2,064.5	3.88	58.8	238.5
+D+S					1.00	1.00	1.00	0.956	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.50 ft	1	0.518	0.390	1.15	1.00	1.00	1.00	0.956	1.00	1.00	1.00	33.84	1,367.3	2,638.0	7.85	119.0	304.8
+D+0.750S					1.00	1.00	1.00	0.956	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.50 ft	1	0.453	0.341	1.15	1.00	1.00	1.00	0.956	1.00	1.00	1.00	29.59	1,195.4	2,638.0	6.86	103.9	304.8

Wood Beam

Project File: Calcs.ec6

DESCRIPTION: B2-8 (overstrength)

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

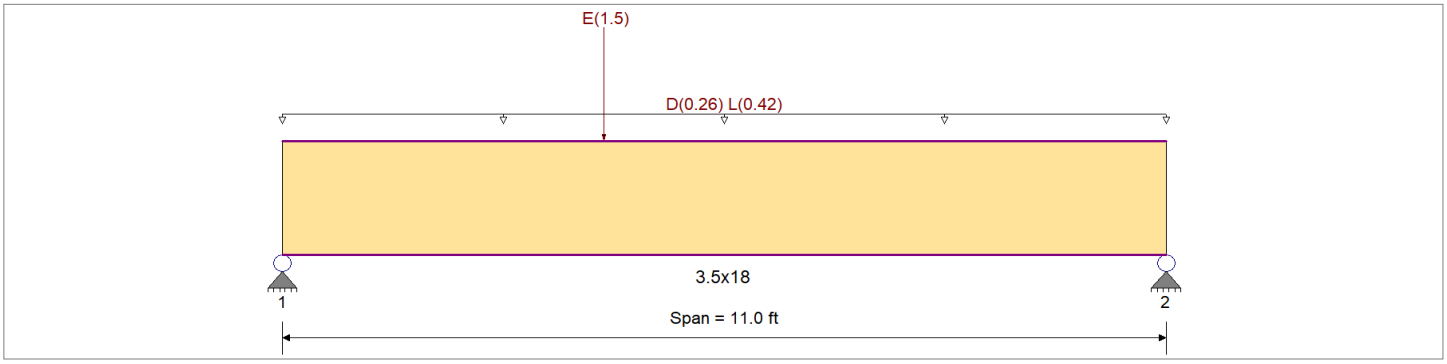
Wood Species : DF/DF
Wood Grade : 24F-V4

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

Fb +	2,400.0 psi
Fb -	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.260, L = 0.420 , Tributary Width = 1.0 ft
Point Load : E = 1.50 k @ 4.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.278 : 1	Maximum Shear Stress Ratio	=	0.250 : 1
Section used for this span		3.5x18	Section used for this span		3.5x18
fb: Actual	=	666.13 psi	fv: Actual	=	66.30 psi
F'b	=	2,400.00 psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	5.500 ft	Location of maximum on span	=	9.515 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.045 in	Ratio =	0 >=0	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	2904 >=0	n/a
Max Downward Total Deflection	0.075 in	Ratio =	1758 >=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.122	0.110	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.14	262.8	2,160.0	1.10	26.2	238.5
+D+L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.278	0.250	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	10.49	666.1	2,400.0	2.78	66.3	265.0
+D+0.750L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.188	0.170	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	8.90	565.3	3,000.0	2.36	56.3	331.3
+D+0.70E					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.108	0.099	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.51	413.0	3,840.0	1.77	42.1	424.0
+D-0.70E					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Wood Beam

Project File: Calcs.ec6

LIC# : KW-06017913, Build:20.24.05.02 MULHERN & KULP STRUCTURAL ENGINEERING INC

DESCRIPTION: B2-12 (overstrength)

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

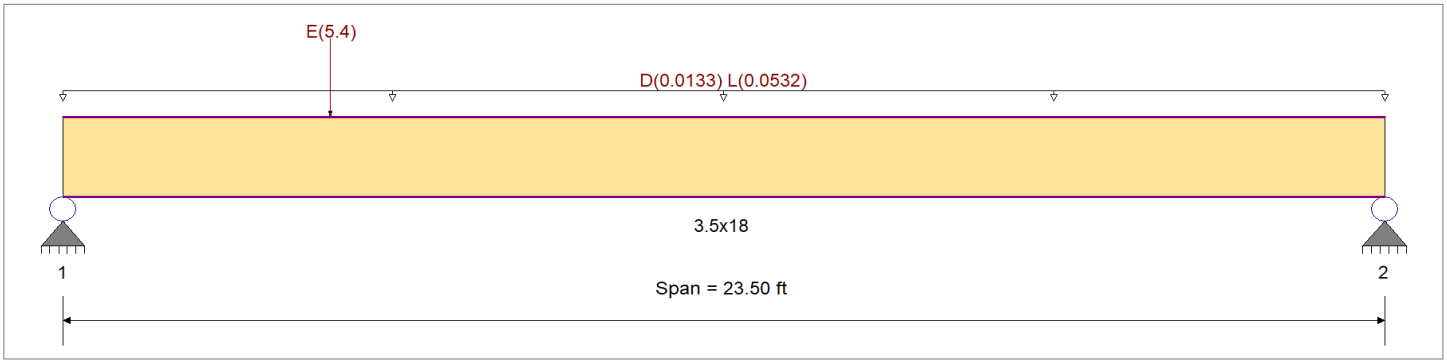
Wood Species : DF/DF
Wood Grade : 24F-V4

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

Fb +	2,400.0 psi
Fb -	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.330 ft
Point Load : E = 5.40 k @ 4.750 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.295 : 1	Maximum Shear Stress Ratio	=	0.185 : 1
Section used for this span		3.5x18	Section used for this span		3.5x18
fb: Actual	=	860.90 psi	fv: Actual	=	78.41 psi
F'b	=	2,919.85 psi	F'v	=	424.00 psi
Load Combination		+0.60D-0.70E	Load Combination		+D+0.70E
Location of maximum on span	=	4.803 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	0.485 in	Ratio =	0 >=0	Span: 1 : E Only
Max Upward Transient Deflection	0 in	Ratio =	581 >=0	n/a
Max Downward Total Deflection	0.404 in	Ratio =	698 >=240	Span: 1 : +D+0.750L+0.5250E
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 23.50 ft	1	0.055	0.028	0.90	1.00	1.00	1.00	0.986	1.00	1.00	1.00	1.86	118.1	2,130.7	0.28	6.6	238.5
+D+L					1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 23.50 ft	1	0.148	0.074	1.00	1.00	1.00	1.00	0.986	1.00	1.00	1.00	5.53	351.3	2,367.4	0.82	19.6	265.0
+D+0.750L					1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 23.50 ft	1	0.099	0.049	1.25	1.00	1.00	1.00	0.986	1.00	1.00	1.00	4.62	293.0	2,959.3	0.69	16.4	331.3
+D+0.70E					1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 23.50 ft	1	0.260	0.185	1.60	1.00	1.00	1.00	0.986	1.00	1.00	1.00	15.50	983.8	3,787.9	3.29	78.4	424.0
+D-0.70E					1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Wood Beam

Project File: Calcs.ec6

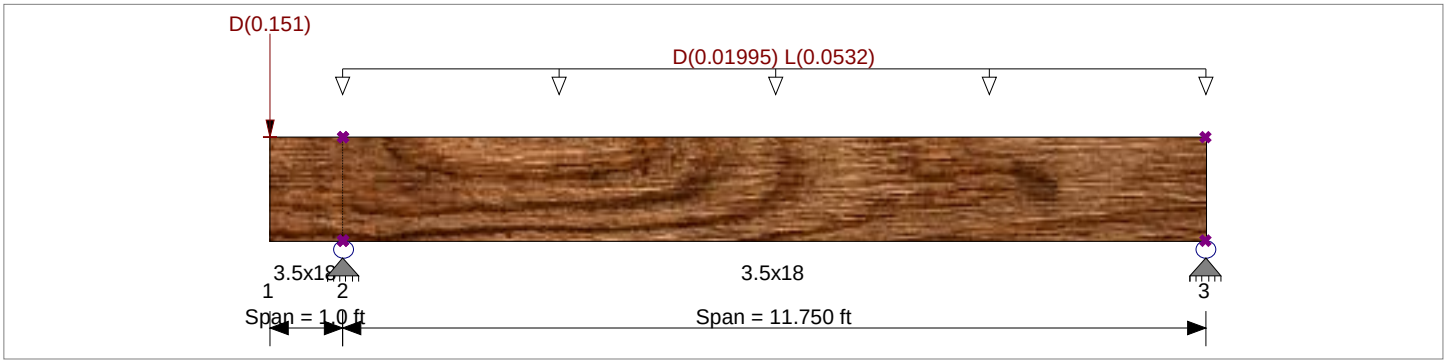
DESCRIPTION: B2-27

CODE REFERENCES

Calculations per NDS 2018, IBC 2021
Load Combination Set : ASCE 7-22 / IBC 2024 (L<=100psf)

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,400.0 psi	*E : Modulus of Elasticity*	
Load Combination :	ASCE 7-22 / IBC 2024 (L<=100psf)	Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
		Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Wood Species :	DF/DF	Fc - Perp	650.0 psi		
Wood Grade :	24F - V4	Fv	265.0 psi		
		Ft	1,100.0 psi	Density	31.210 pcf
Beam Bracing :	Completely Unbraced				



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
Point Load : D = 0.1510 k @ 0.0 ft
Load for Span Number 2
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 1.330 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.041 : 1	Maximum Shear Stress Ratio	=	0.036 : 1
Section used for this span		3.5x18	Section used for this span		3.5x18
fb: Actual	=	90.17 psi	fv: Actual	=	9.48 psi
F'b	=	2,215.54 psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	6.039 ft	Location of maximum on span	=	1.000 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.008 in	Ratio = 18752	>=360	Span: 2 : L Only
Max Upward Transient Deflection	-0.002 in	Ratio = 11824	>=360	Span: 1 : L Only
Max Downward Total Deflection	0.011 in	Ratio = 12272	>=240	Span: 2 : +D+L
Max Upward Total Deflection	-0.003 in	Ratio = 8182	>=240	Span: 1 : +D+L

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 1.0 ft	1	0.006	0.016	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.16	10.0	1,660.4	0.16	3.9	238.5
Length = 11.750 ft	2	0.016	0.016	0.90	1.00	1.00	0.94	1.000	1.00	1.00	1.00	0.50	32.0	2,025.2	0.16	3.9	238.5
+D+L					1.00	1.00	0.94	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	1	0.005	0.036	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.16	10.0	1,844.2	0.40	9.5	265.0
Length = 11.750 ft	2	0.041	0.036	1.00	1.00	1.00	0.92	1.000	1.00	1.00	1.00	1.42	90.2	2,215.5	0.40	9.5	265.0

Wood Beam

Project File: Calcs.ec6

LIC# : KW-06017913, Build:20.25.06.05 MULHERN & KULP STRUCTURAL ENGINEERING INC (c) ENERCALC, LLC 1982-2025

DESCRIPTION: B2-28

CODE REFERENCES

Calculations per NDS 2018, IBC 2021
Load Combination Set : ASCE 7-22 / IBC 2024 (L<=100psf)

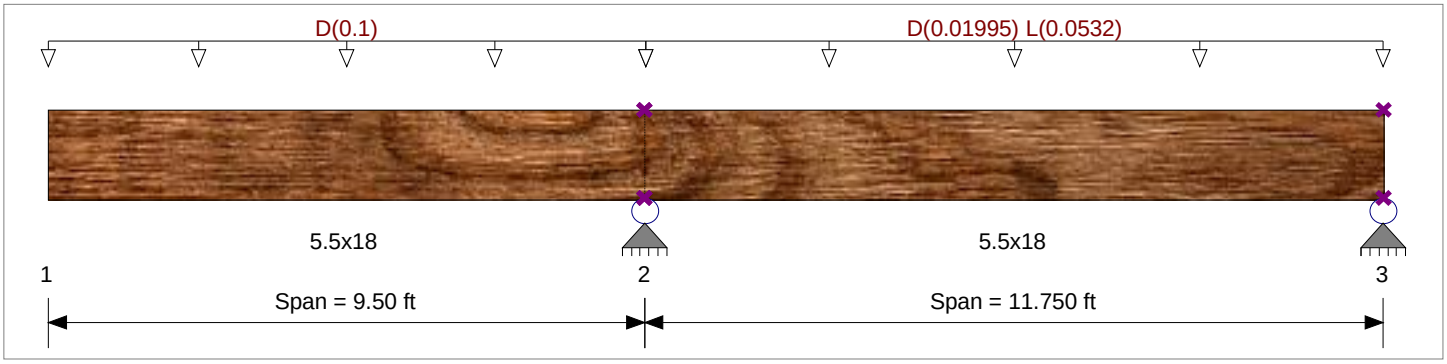
Material Properties

Analysis Method :	Allowable Stress Design
Load Combination :	ASCE 7-22 / IBC 2024 (L<=100psf)
Wood Species :	DF/DF
Wood Grade :	24F - V4
Beam Bracing :	Completely Unbraced

Fb +	2,400.0 psi
Fb -	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.10 , Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 1.330 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.135 : 1	Maximum Shear Stress Ratio	=	0.062 : 1
Section used for this span		5.5x18	Section used for this span		5.5x18
fb: Actual	=	221.44 psi	fv: Actual	=	14.75 psi
F'b	=	1,638.73 psi	F'v	=	238.50 psi
Load Combination		D Only	Load Combination		D Only
Location of maximum on span	=	0.000 ft	Location of maximum on span	=	8.014 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.005 in	Ratio = 29468	>=360	Span: 2 : L Only
Max Upward Transient Deflection	-0.012 in	Ratio = 18582	>=360	Span: 1 : L Only
Max Downward Total Deflection	0.108 in	Ratio = 2104	>=240	Span: 1 : D Only
Max Upward Total Deflection	-0.014 in	Ratio = 10001	>=240	Span: 2 : D Only

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 9.50 ft	1	0.135	0.062	0.90	1.00	1.00	0.99	1.000	1.00	1.00	1.00	5.48	221.4	1,644.2	0.97	14.7	238.5
Length = 11.750 ft	2	0.135	0.041	0.90	1.00	1.00	0.98	1.000	1.00	1.00	1.00	5.48	221.4	1,638.7	0.65	9.8	238.5
+D+L					1.00	1.00	0.98	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.50 ft	1	0.121	0.056	1.00	1.00	1.00	0.99	1.000	1.00	1.00	1.00	5.48	221.4	1,823.7	0.97	14.7	265.0
Length = 11.750 ft	2	0.122	0.051	1.00	1.00	1.00	0.98	1.000	1.00	1.00	1.00	5.48	221.4	1,816.6	0.89	13.4	265.0

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

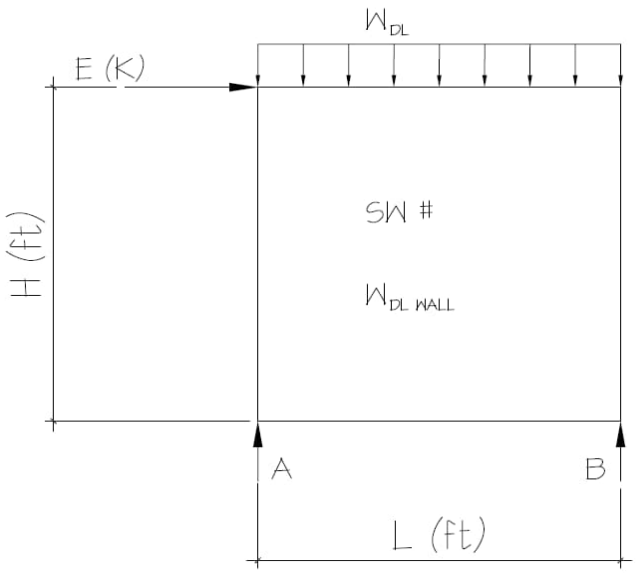
PROJECT NAME: SEARS PLAT - LO
MCCULLOUGH
M&K PROJECT #: 244-25018
ENGINEER: MPM
DATE: 14-OCT-25

OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #: 201

PARAMETERS:

L =	12.5	FT
H =	9.0	FT
E =	0.50	K
W_{DLWALL} =	0.10	KLF
W_{DL} =	0.000	KLF
Ω_0 =	2.5	(ASCE TABLE 12.2.1 FOOTNOTE
SDS =	1.177	



ANALYSIS:

E (UNFACTORED) = 0.71

$E_{MH} = \Omega_0 * E$ = 1.79 K

$E_V = 0.2*SDS*DL$ = 0.294 K

$E_M = E_{MH} + E_V$

$E_M = E_{MH} - E_V$

$E_M = E_{MH} + E_V$ = 2.080 K

$E_M = E_{MH} - E_V$ = 1.491 K

E_M (MAX) $= \sum M_A = 0$ = 2.08(9.0) - R_B(12.5)

R_B = 1.5E

R_A = - 1.5E

E_M (MIN) $= \sum M_A = 0$ = 1.49(9.0) - R_B(12.5)

R_B = 1.1E

R_A = - 1.1E

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

ALLOWABLE STESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM CALCS FOR LOAD APPLICATION

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

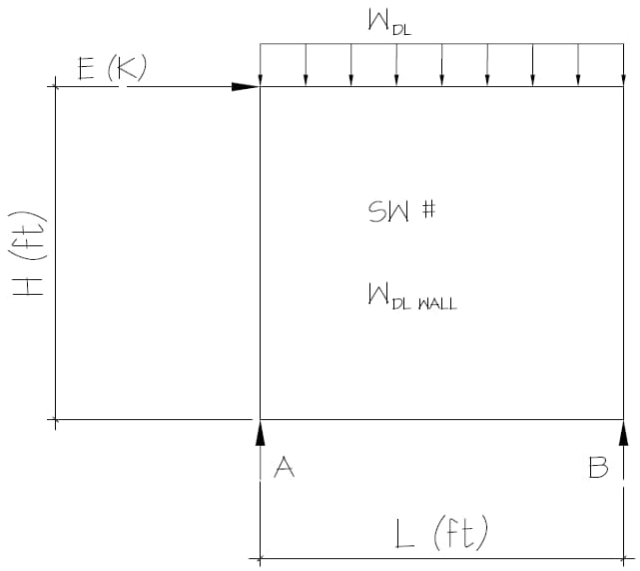
PROJECT NAME: SEARS PLAT - LO
MCCULLOUGH
M&K PROJECT #: 244-25018
ENGINEER: MPM
DATE: 14-OCT-25

OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #: 208

PARAMETERS:

L =	6.2	FT
H =	9.0	FT
E =	1.40	K
W_{DLWALL} =	0.10	KLF
W_{DL} =	0.290	KLF
Ω_0 =	2.5	(ASCE TABLE 12.2.1 FOOTNOTE
SDS =	1.177	



ANALYSIS:

E (UNFACTORED) = 2.00

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

$E_V = 0.2*SDS*DL$ = 0.569 K

$E_M = E_{MH} + E_V$

$E_M = E_{MH} - E_V$

$E_M = E_{MH} + E_V$ = 5.569 K

$E_M = E_{MH} - E_V$ = 4.431 K

E_M (MAX) = $\sum M_A = 0$ =	5.57(9.0) - R_B(6.2)	R_B =	8.1E
		R_A =	- 8.1E
E_M (MIN) = $\sum M_A = 0$ =	4.43(9.0) - R_B(6.2)	R_B =	6.4E
		R_A =	- 6.4E

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

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

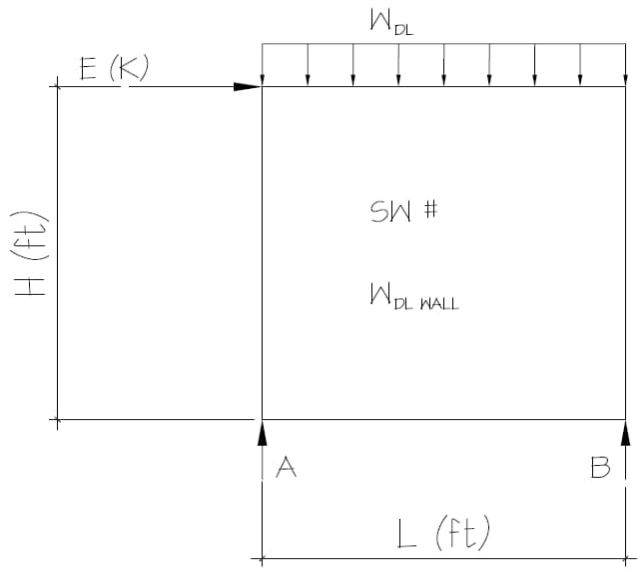
PROJECT NAME: SEARS PLAT - LO
MCCULLOUGH
M&K PROJECT #: 244-25018
ENGINEER: MPM
DATE: 14-OCT-25

OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #: 209

PARAMETERS:

L =	18.7	FT
H =	9.0	FT
E =	3.00	K
W_{DLWALL} =	0.10	KLF
W_{DL} =	0.034	KLF
Ω_0 =	2.5	(ASCE TABLE 12.2.1 FOOTNOTE
SDS =	1.177	



ANALYSIS:

E (UNFACTORED) = 4.29

$E_{MH} = \Omega_0 * E$ = 10.71 K

$E_V = 0.2*SDS*DL$ = 0.590 K

$E_M = E_{MH} + E_V$

$E_M = E_{MH} + E_V$ = 11.304 K

$E_M = E_{MH} - E_V$

$E_M = E_{MH} - E_V$ = 10.124 K

E_M (MAX) $= \sum M_A = 0 =$ 11.30(9.0) - R_B(18.7)

R_B = 5.4E

R_A = - 5.4E

E_M (MIN) $= \sum M_A = 0 =$ 10.12(9.0) - R_B(18.7)

R_B = 4.9E

R_A = - 4.9E

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

ALLOWABLE STESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM CALCS FOR LOAD APPLICATION

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shear Wall Calculations - Seismic

McCullough Architects

7414 78th Ave SE

Mercer Island, WA

Parameters:

Single Family Home

Design Wind Speed: 100 MPH

Wind Exposure Category: B

Seismic Design Category: D

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

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

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

Matthew Mills, Staff Engineer

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: 7414 78TH AVE SE
M&K PROJECT #: MCCULLOUGH
ENGINEER: MPM
DATE: 07-OCT-25

WIND DESIGN SUMMARY PER ASCE 7-16

PARAMETERS:

WIND SPEED	100
EXPOSURE CATEGORY	B
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	0.5	:12
LONG. ROOF PITCH	0.0	:12
MEAN ROOF HEIGHT, H	25.25	FT

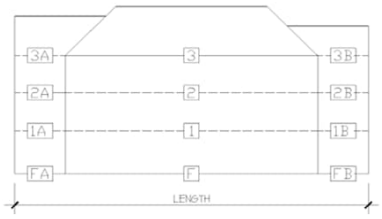
BUILDING GEOMETRY:

LENGTH	94	FT
WIDTH	53	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 FT	Roof Surface	0	360	0	sq ft
		Wall surface	0	626	0	sq ft
1	12.5 FT	Roof Surface	0	0	0	sq ft
		Wall surface	0	1050	0	sq ft
FND		Roof Surface	0	0	0	sq ft
		Wall surface	0	0	0	sq ft



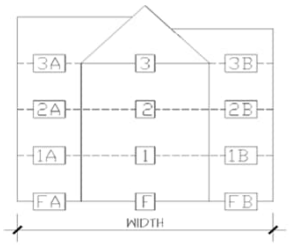
TRIBUTARY DESIGN LOADS: (0.6W)

	SECTION A	SECTION O	SECTION B	
Story Shear	0.00	7.74	0.00	kips
Total Shear	0.00	7.74	0.00	kips
		7.74		kips
Story Shear	0.00	10.08	0.00	kips
Total Shear	0.00	17.82	0.00	kips
		17.82		kips
Story Shear	0.00	0.00	0.00	kips
Total Shear	0.00	17.82	0.00	kips
		17.82		kips

LONGITUDINAL DIRECTION (PARALLEL TO MAIN RIDGE LINE)

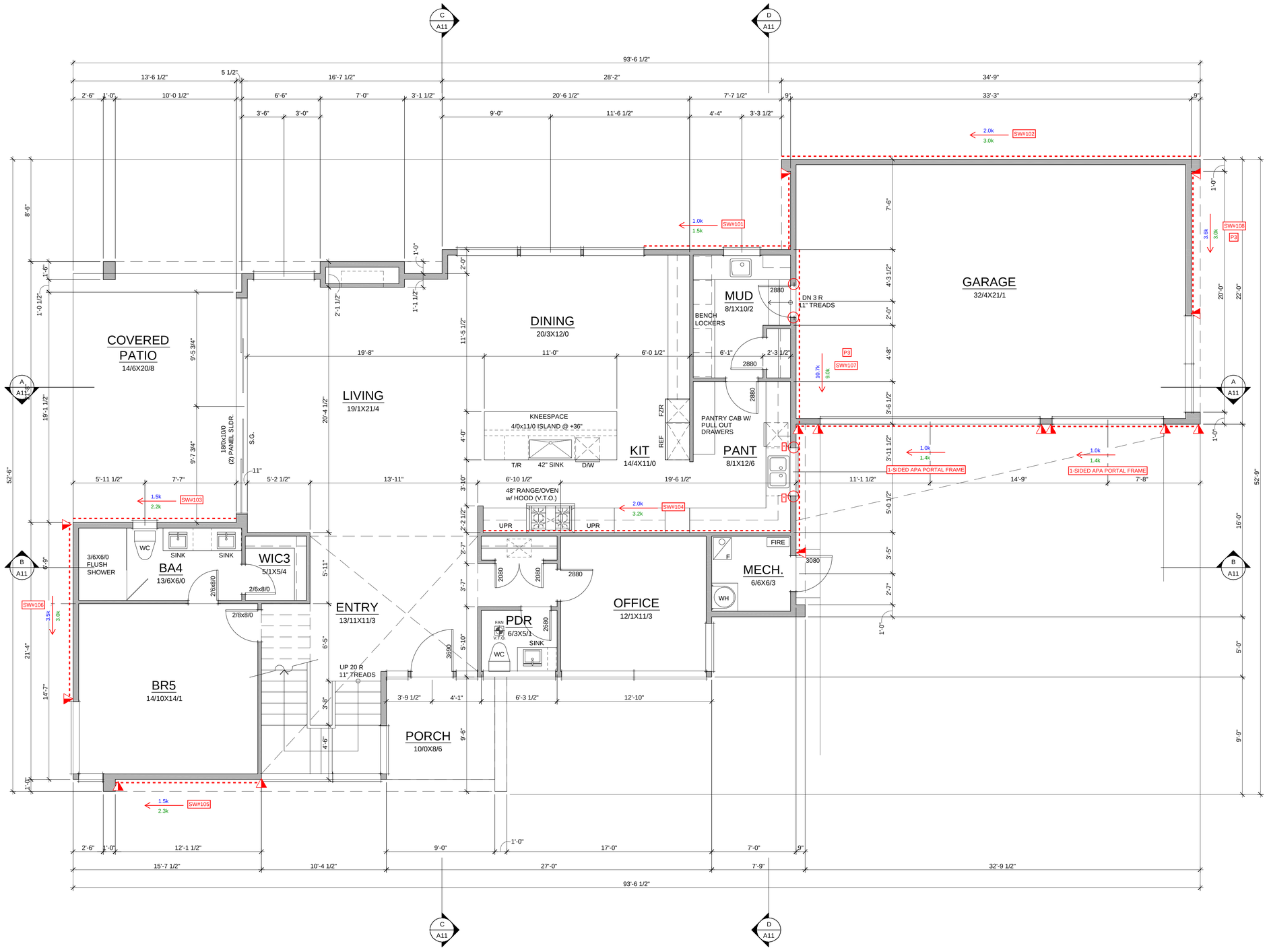
TRIBUTARY DESIGN AREAS:

DIAPHRAGM LEVEL	FLOOR-TO-FLOOR HEIGHT		SECTION A	SECTION O	SECTION B	
2	9 FT	Roof Surface	0	308	0	sq ft
		Wall surface	0	295	0	sq ft
1	12.5 FT	Roof Surface	0	0	0	sq ft
		Wall surface	0	596	0	sq ft
FND		Roof Surface	0	0	0	sq ft
		Wall surface	0	0	0	sq ft



TRIBUTARY DESIGN LOADS: (0.6W)

	SECTION A	SECTION O	SECTION B	
Story Shear	0.00	4.31	0.00	kips
Total Shear	0.00	4.31	0.00	kips
		4.31		kips
Story Shear	0.00	5.72	0.00	kips
Total Shear	0.00	10.03	0.00	kips
		10.03		kips
Story Shear	0.00	0.00	0.00	kips
Total Shear	0.00	10.03	0.00	kips
		10.03		kips



MAIN FLOOR PLAN

SCALE 1/4" = 1'-0"

1,972 SF

TOTAL = 4,647 SF

GENERAL NOTES:

1. PLATE HEIGHT @ MAIN FLOOR IS 11'-1", U.N.O.
   PLATE HEIGHT @ UPPER FLOOR IS 9'-1" U.N.P.
2. DIMENSION LINES ARE TO FACE OF STUD U.N.O.
3. WINDOW SIZES & ROUGH OPENINGS TO BE VERIFIED BY CONTRACTOR.
4. WINDOW HEAD HEIGHT AT MAIN FLOOR IS 8'-0" ABOVE SUBFLOOR, U.N.O. IF NOMINAL DOOR AND WINDOW HEIGHTS ARE SIMILAR, COORDINATE WITH DOOR AND WINDOW SPEC'S TO LOCATE FINAL ELEVATION OF THE HEAD HEIGHTS SO THAT ALL DOOR AND WINDOW TRIM ALIGN.
5. WINDOW AND DOOR SIZES ARE DIMENSIONED IN FEET AND INCHES (E.G. 2828= 2'-8"W X 2'-8"H)
6. EXTERIOR WALLS TO BE 2X6 STUDS AT 16" O.C., INTERIOR WALLS TO BE 2X4 STUDS AT 16" O.C., U.N.O.
7. FIREBLOCK ALL PLUMBING PENETRATIONS AND STAIR RUNS PER IRC SEC. R302.11.
8. SAFETY GLAZING PER IRC SEC. R308.4.
9. ALL WOOD IN CONTACT WITH CONCRETE TO BE PRESSURE TREATED PER IRC SEC. R317.1.
10. PROVIDE UNDER-STAIR PROTECTION (1/2" GWB) PER IRC SEC R302.7.
11. PROVIDE (1) LAYER OF 1/2" GWB AT THE GARAGE SIDE OF ALL WALLS SEPARATING THE GARAGE FROM THE RESIDENCE, ALL WALLS SUPPORTING A FLOOR CEILING ASSEMBLY BETWEEN THE GARAGE AND RESIDENCE, AND BETWEEN THE GARAGE AND ITS ATTIC. PROVIDE (1) LAYER 5/8" TYPE X GWB TO GARAGE CEILING IF BELOW HABITABLE ROOMS.
12. HOUSE/GARAGE DOOR SHALL BE 1-⅜" THICK WOOD SOLID CORE, OR 1-¾" THICK SOLID OR HONEYCOMB CORE STEEL DOOR, OR 20-MINUTE RATED FIRE DOOR W/ SELF CLOSING DEVICE.
13. DUCTS IN THE GARAGE AND DUCTS PENETRATING THE WALLS AND CEILINGS SEPARATING THE DWELLING FROM THE GARAGE SHALL BE MIN. 26 GUAGE GALVANIZED STEEL.
14. PER IRC SEC R311.7.5. MAX. RISER HEIGHT SHALL BE 7-3/4". MIN. TREAD DEPTH SHALL BE 10". STAIR NOSINGS: 3/4" MIN., 1-1/4" MAX. RADIUS @ LEADING EDGE OF TREAD: 9/16" MAX.
15. PROVIDE HANDRAILS PER IRC SEC. R311.7.8. TOP OF HANDRAIL SHALL BE NOT LASS THAN 34" OR MORE THAN 38" ABOVE THE TREAD NOSINGS. HANDRAILS SHALL BE CONTINUOUS THE FULL LENGTH OF THE FLIGHT PER R311.7.7.2. THE HANDRAIL GRIP-SIZE SHALL BE PROVIDED PER R311.7.7.3.
16. PROVIDE GUARDS (MIN. 36" HEIGHT) IN LOCATIONS PER IRC SEC. R312.
17. FACTORY BUILT FIREPLACES & CHIMNEYS SHALL BE LISTED & LABELED AND SHALL BE INSTALLED & TERMINATED IN ACCORDANCE TO THE CONDITIONS OF THE LISTINGS. FACTORY BUILT FIREPLACES SHALL MEET EMISSION STANDARDS PER CH. 51-51 WAC.
18. PROVIDE EXTERIOR AIR SUPPLY TO ANY FACTORY-BUILT FIREPLACE PER IRC SEC R1006.

MCCULLOUGH ARCHITECTS
5601 6th Ave South
Suite 371
Seattle, WA. 98108
206.443.1181
mccullougharchitects.com

Revisions	Comment
-	-
-	-

Date: 2025.10.02
Job No.: 24-008
Project No:
Drawn:
Approved:

Owner
SAINTFIELD2 LLC

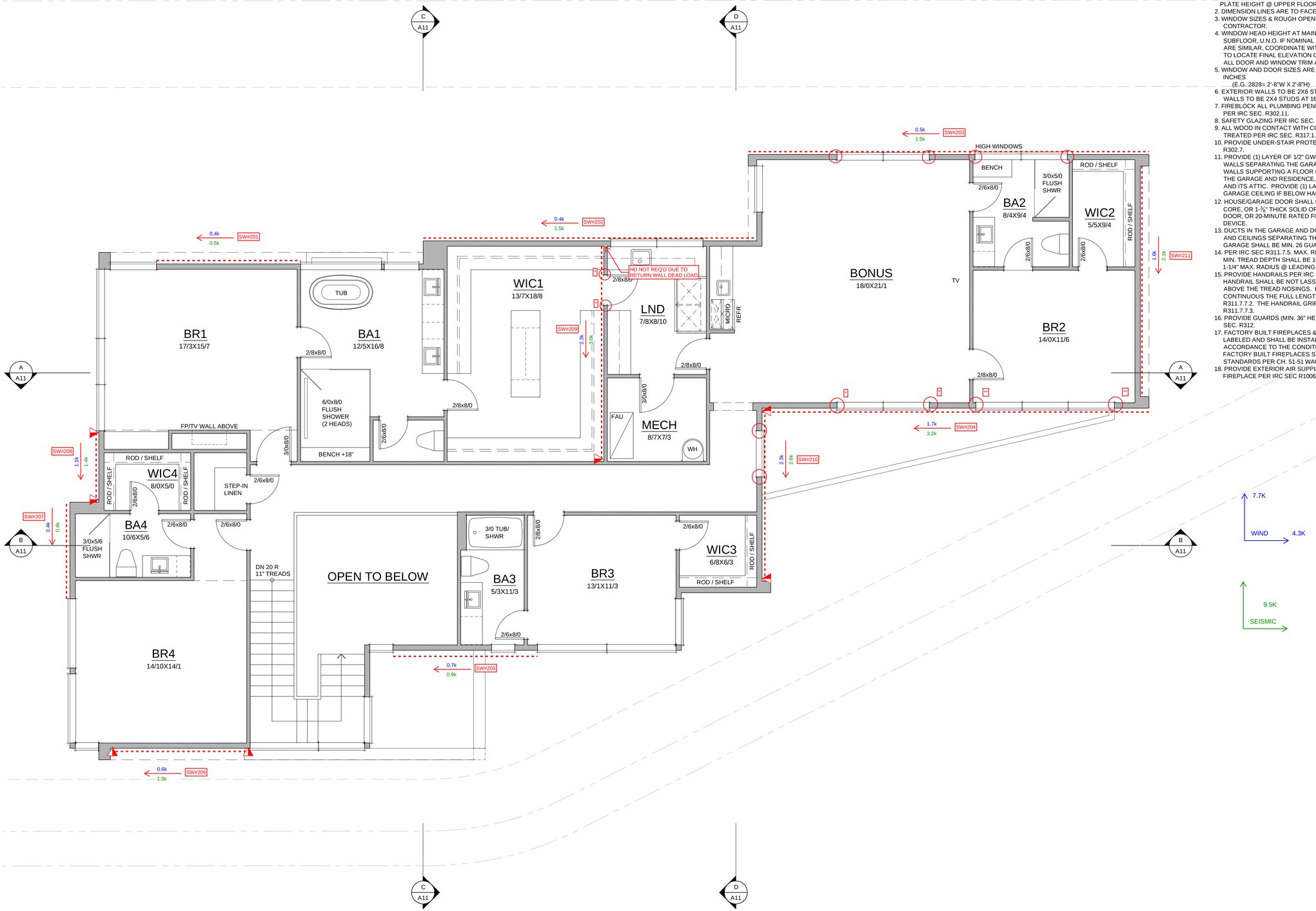
REGISTERED ARCHITECT 7806 PHILIP McCULLOUGH STATE OF WASHINGTON

SEARS PLAT - LOT 1
Mercer Island
Washington
98040

Preliminary

Main Floor Plan

A5



UPPER FLOOR PLAN

SCALE 1/4" = 1'-0" 2,675 SF

GENERAL NOTES:

1. PLATE HEIGHT @ MAIN FLOOR IS 11'-1", U.N.O.
   PLATE HEIGHT @ UPPER FLOOR IS 9'-1" U.N.O.
2. DIMENSION LINES ARE TO FACE OF STUD U.N.O.
3. WINDOW SIZES & ROUGH OPENINGS TO BE VERIFIED BY CONTRACTOR.
4. WINDOW HEAD HEIGHT AT MAIN FLOOR IS 8'-0" ABOVE SUBFLOOR, U.N.O. IF NOMINAL DOOR AND WINDOW HEIGHTS ARE SIMILAR, COORDINATE WITH DOOR AND WINDOW SPEC'S TO LOCATE FINAL ELEVATION OF THE HEAD HEIGHTS SO THAT ALL DOOR AND WINDOW TRIM ALIGN.
5. WINDOW AND DOOR SIZES ARE DIMENSIONED IN FEET AND INCHES
   (E.G. 2828= 2'-8"W X 2'-8"H)
6. EXTERIOR WALLS TO BE 2X6 STUDS AT 16" O.C., INTERIOR WALLS TO BE 2X4 STUDS AT 16" O.C., U.N.O.
7. FIREBLOCK ALL PLUMBING PENETRATIONS AND STAIR RUNS PER IRC SEC. R302.11.
8. SAFETY GLAZING PER IRC SEC. R308.4.
9. ALL WOOD IN CONTACT WITH CONCRETE TO BE PRESSURE TREATED PER IRC SEC. R317.1.
10. PROVIDE UNDER-STAIR PROTECTION (1/2" GWB) PER IRC SEC R302.7.
11. PROVIDE (1) LAYER OF 1/2" GWB AT THE GARAGE SIDE OF ALL WALLS SEPARATING THE GARAGE FROM THE RESIDENCE, ALL WALLS SUPPORTING A FLOOR CEILING ASSEMBLY BETWEEN THE GARAGE AND RESIDENCE, AND BETWEEN THE GARAGE AND ITS ATTIC. PROVIDE (1) LAYER 5/8" TYPE X GWB TO GARAGE CEILING IF BELOW HABITABLE ROOMS.
12. HOUSE/GARAGE DOOR SHALL BE 1-⅜" THICK WOOD SOLID CORE, OR 1-¾" THICK SOLID OR HONEYCOMB CORE STEEL DOOR, OR 20-MINUTE RATED FIRE DOOR W/ SELF CLOSING DEVICE.
13. DUCTS IN THE GARAGE AND DUCTS PENETRATING THE WALLS AND CEILINGS SEPARATING THE DWELLING FROM THE GARAGE SHALL BE MIN. 26 GUAGE GALVANIZED STEEL.
14. PER IRC SEC R311.7.5. MAX. RISER HEIGHT SHALL BE 7-3/4". MIN. TREAD DEPTH SHALL BE 10". STAIR NOSINGS: 3/4" MIN., 1-1/4" MAX. RADIUS @ LEADING EDGE OF TREAD: 9/16" MAX.
15. PROVIDE HANDRAILS PER IRC SEC. R311.7.8. TOP OF HANDRAIL SHALL BE NOT LASS THAN 34" OR MORE THAN 38" ABOVE THE TREAD NOSINGS. HANDRAILS SHALL BE CONTINUOUS THE FULL LENGTH OF THE FLIGHT PER R311.7.7.2. THE HANDRAIL GRIP-SIZE SHALL BE PROVIDED PER R311.7.7.3.
16. PROVIDE GUARDS (MIN. 36" HEIGHT) IN LOCATIONS PER IRC SEC. R312.
17. FACTORY BUILT FIREPLACES & CHIMNEYS SHALL BE LISTED & LABELED AND SHALL BE INSTALLED & TERMINATED IN ACCORDANCE TO THE CONDITIONS OF THE LISTINGS. FACTORY BUILT FIREPLACES SHALL MEET EMISSION STANDARDS PER CH. 51-51 WAC.
18. PROVIDE EXTERIOR AIR SUPPLY TO ANY FACTORY-BUILT FIREPLACE PER IRC SEC R1006.

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Revisions
- -
- -

Comment

Date: 2025.10.21
Job No.: 24-008
Project No:
Drawn:
Approved:

Owner
SAINTFIELD2 LLC

REGISTERED ARCHITECT
PHILIP MCCULLOUGH
STATE OF WASHINGTON
7806

SEARS PLAT - LOT 1
Mercer Island
Washington
98040

Preliminary

Upper Floor Plan
A7

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 244-25018
Engineer: MPM

Shearwall 201: 2nd - BR1 Rear Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_o	0.0	ft.		
Wall Length, L	12.5	ft.	Qualifying Wall Length, L	12.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
400 lbs	<	4198 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	3.6	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	0	lbs	Resistive Moment	7.0	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 202: 2nd - WIC Rear Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	5.0	ft.		
Wall Length, L	28.9	ft.	Qualifying Wall Length, L	20.9	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
400 lbs	<	7018 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	300	plf	Overturning Moment	3.6	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	123.2	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 244-25018
Engineer: MPM

Shearwall 203: 2nd - Bonus Room Rear Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_c	7.0	ft.		
Wall Length, L	34.8	ft.	Qualifying Wall Length, L	18.8	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
500 lbs	<	6296 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	290	plf	Overturning Moment	4.5	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	170.1	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 204: 2nd - Bonus Room Front Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	7.0	ft.		
Wall Length, L	33.5	ft.	Qualifying Wall Length, L	13.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1700 lbs	<	4491 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	290	plf	Overturning Moment	15.3	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	158.5	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 244-25018
Engineer: MPM

Shearwall 205: 2nd - BR3 Front Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_c	2.0	ft.		
Wall Length, L	12.5	ft.	Qualifying Wall Length, L	10.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
700 lbs	<	3526 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	200	plf	Overturning Moment	6.3	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	0	lbs	Resistive Moment	14.1	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 206: 2nd - BR4 Front Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	12.1	ft.	Qualifying Wall Length, L	12.1	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
600 lbs	<	4063 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	5.4	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	0	lbs	Resistive Moment	6.6	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 244-25018
Engineer: MPM

Shearwall 207: 2nd - BA4 Side Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	8.4	ft.	Qualifying Wall Length, L	8.4	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
400 lbs	<	2821 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	140	plf	Overturning Moment	3.6	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	200	lbs	Resistive Moment	6.0	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 208: 2nd - WIC4 Side Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	6.2	ft.	Qualifying Wall Length, L	6.2	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1100 lbs	<	2082 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	390	plf	Overturning Moment	9.9	k-ft	Hold Down Design Load	329	lbs
DL at ends of wall	200	lbs	Resistive Moment	7.9	k-ft	Holdown Capacity	1705	lbs

Hold-down Specification

SIMPSON CS16 STRAP TIE (14" END LENGTH)

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 244-25018
Engineer: MPM

Shearwall 209: 2nd - WIC1 Interior Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_c	8.0	ft.		
Wall Length, L	18.7	ft.	Qualifying Wall Length, L	16.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2300 lbs	<	5247 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	20.7	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	27.7	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 210: 2nd - WIC3 Side Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	5.0	ft.		
Wall Length, L	15.0	ft.	Qualifying Wall Length, L	11.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2300 lbs	<	3652 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	20.7	k-ft	Hold Down Design Load	129	lbs
DL at ends of wall	640	lbs	Resistive Moment	18.8	k-ft	Holdown Capacity	1705	lbs

Hold-down Specification

SIMPSON CS16 STRAP TIE (14" END LENGTH)

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 244-25018
Engineer: MPM

Shearwall 211: 2nd - BR2 Side Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	20.0	ft.	Qualifying Wall Length, L	20.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1600 lbs	<	6716 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	14.4	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	1160	lbs	Resistive Moment	38.9	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall : Basement -

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	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
0 lbs	####	#DIV/0! 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
#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 #: 244-25018
Engineer: MPM

Shearwall : Basement -

Shearwall Properties:

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

Capacity Evaluation:

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

Shearwall 101: 1st - Mud Room Rear Wall

Shearwall Properties:

Wall height, H	11.0	ft.	Max wall opening ht, Hc	7.0	ft.		
Wall Length, L	12.2	ft.	Qualifying Wall Length, L	9.1	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity	
1000 lbs	<	2972	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	480	plf	Overturning Moment	11.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	800	lbs	Resistive Moment	40.9	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 244-25018
Engineer: MPM

Shearwall 102: 1st - Garage Rear Wall

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	34.8	ft.	Qualifying Wall Length, L	34.8	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2000 lbs	<	11669 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	550	plf	Overturning Moment	22.7	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	800	lbs	Resistive Moment	323.9	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 103: 1st - BA4 Rear Wall

Shearwall Properties:

Wall height, H	11.0	ft.	Max wall opening ht, Hc	2.0	ft.		
Wall Length, L	13.5	ft.	Qualifying Wall Length, L	11.6	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1500 lbs	<	3895 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	400	plf	Overturning Moment	16.5	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	37.7	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 244-25018
Engineer: MPM

Shearwall 104: 1st - Kitchen Interior Wall

Shearwall Properties:

Wall height, H	11.0	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	25.5	ft.	Qualifying Wall Length, L	25.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2000 lbs	<	8563 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	500	plf	Overturning Moment	22.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	800	lbs	Resistive Moment	164.7	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 105: 1st - BR5 Front Wall

Shearwall Properties:

Wall height, H	11.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	12.1	ft.	Qualifying Wall Length, L	12.1	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1500 lbs	<	4063 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	360	plf	Overturning Moment	21.9	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	300	lbs	Resistive Moment	27.0	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 244-25018
Engineer: MPM

Shearwall 106: 1st - BR5 Side Wall

Shearwall Properties:

Wall height, H	11.0	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	14.9	ft.	Qualifying Wall Length, L	14.9	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
3500 lbs	<	5003 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	240	plf	Overturning Moment	38.5	k-ft	Hold Down Design Load	525	lbs
DL at ends of wall	500	lbs	Resistive Moment	30.7	k-ft	Holdown Capacity	4935	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

Shearwall 107: 1st - Interior Garage Wall

Shearwall Properties:

Wall height, H	11.0	ft.	Max wall opening ht, Hc	8.0	ft.		
Wall Length, L	31.9	ft.	Qualifying Wall Length, L	25.3	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
10700 lbs	<	15944 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	150	plf	Overturning Moment	117.7	k-ft	Hold Down Design Load	456	lbs
DL at ends of wall	1200	lbs	Resistive Moment	103.1	k-ft	Holdown Capacity	4935	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 244-25018
Engineer: MPM

Shearwall 108: 1st - Garage Side Wall

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	12.0	ft.	Qualifying Wall Length, L	12.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
3600 lbs	<	4030 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	200	plf	Overturning Moment	32.8	k-ft	Hold Down Design Load	570	lbs
DL at ends of wall	1200	lbs	Resistive Moment	25.9	k-ft	Holdown Capacity	4935	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

Shearwall : Basement -

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	P1

Capacity Evaluation:

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

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shear Wall Calculations - Seismic

McCullough Architects

7414 78th Ave SE

Mercer Island, WA

Parameters:

Single Family Home

Design Wind Speed: 100 MPH

Wind Exposure Category: B

Seismic Design Category: D

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

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

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

Matthew Mills, Staff Engineer

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Project Name: 7414 78th Ave SE
McCullough
M&K Project #: 244-25018
Engineer: MPM
Date: 07-Oct-25

SEISMIC CALCULATION - ASCE 7-16

Seismic Design Category:

User Inputs:

Site Class	D
Spectral Response Acceleration 0.2 sec, **Ss**	1.471
Spectral Response Acceleration 1.0 sec, **S1**	0.508
Occupancy Category	II

Variables:

Site coefficient, Fa	1.20
Site coefficient, Fv	1.79

Calculated Values:

Maximum spectral response acceleration, S_{MS}	1.765
Maximum spectral response acceleration, S_{M1}	0.910
Design spectral response acceleration, S_{DS}	1.177
Design spectral response acceleration, S_{D1}	0.607
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	22

Calculated Values:

Approximate Fundamental Period, T_A	0.200
T_0	0.103
T_S	0.516
Spectral Response Acc., S_A (g)	1.177

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	12.5	2900	15	15.9	59 K
2	9.0	3150	17	5.6	59 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
16	0.0	0	0	0.0	0 K
17	0.0	0	0	0.0	0 K
18	0.0	0	0	0.0	0 K
19	0.0	0	0	0.0	0 K
20	0.0	0	0	0.0	0 K

Total Dead Load Of Structure 119 Kips

Seismic Response Coefficient:

	Transverse	Longitudinal
Response modification factor, **R**	6.5	6.5
Occupancy Importance Factor, I_E	1.00	1.00
Seismic Response Coefficient, C_s	0.181	0.181

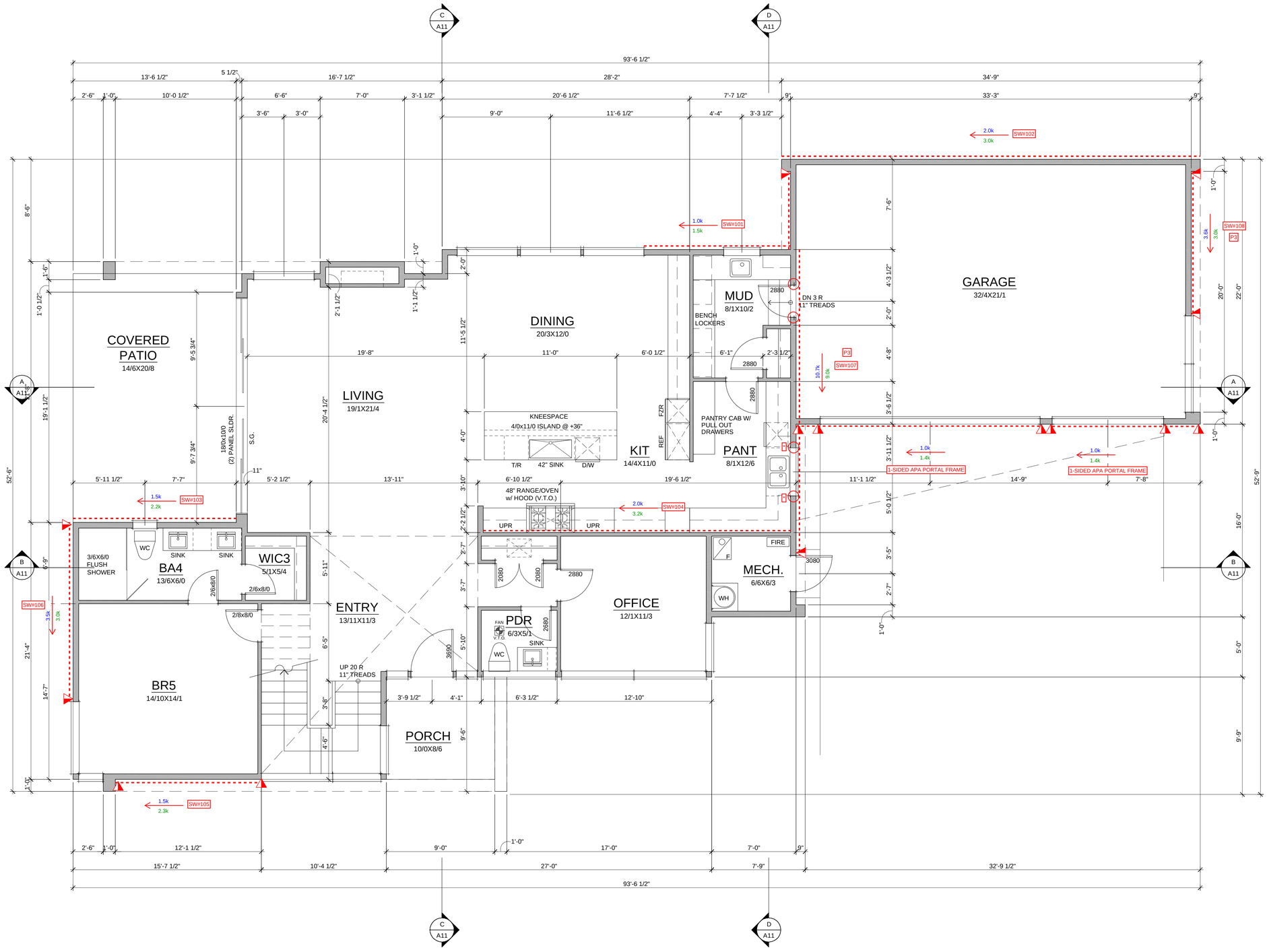
Base Shears:

Ultimate Loads				x 0.7 =	Allowable Loads			
Transverse		Longitudinal			Transverse		Longitudinal	
21	K	21	K		15.0	K	15.0	K

Story Shear Calculation:

Distribution exponent, k = 1.00

Level	Vert. Dist. Factor, C_{vx}	Ultimate Loads: Transverse Story Shear, F_x		Ultimate Loads: Longitudinal Story Shear, F_x		x 0.7 =	Allowable Loads: Transverse Story Shear, F_x		Σ Story Shear		Allowable Loads: Longitudinal Story Shear, F_x		Σ Story Shear	
1	0.369	7.9	K	7.9	K		5.5	K	15.0	K	5.5	K	15.0	K
2	0.631	13.6	K	13.6	K		9.5	K	9.5	K	9.5	K	9.5	K
3	0.000	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K
4	0.000	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K
5	0.00	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K
6	0.00	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K
7	0.00	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K
8	0.00	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K
9	0.00	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K
10	0.00	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K
11	0.00	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K
12	0.00	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K
13	0.00	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K
14	0.00	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K
15	0.00	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K
16	0.00	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K
17	0.00	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K
18	0.00	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K
19	0.00	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K
20	0.00	0.0	K	0.0	K		0.0	K	0.0	K	0.0	K	0.0	K



MAIN FLOOR PLAN

SCALE 1/4" = 1'-0"

1,972 SF

TOTAL = 4,647 SF

GENERAL NOTES:

1. PLATE HEIGHT @ MAIN FLOOR IS 11'-1", U.N.O.
   PLATE HEIGHT @ UPPER FLOOR IS 9'-1" U.N.P.
2. DIMENSION LINES ARE TO FACE OF STUD U.N.O.
3. WINDOW SIZES & ROUGH OPENINGS TO BE VERIFIED BY CONTRACTOR.
4. WINDOW HEAD HEIGHT AT MAIN FLOOR IS 8'-0" ABOVE SUBFLOOR, U.N.O. IF NOMINAL DOOR AND WINDOW HEIGHTS ARE SIMILAR, COORDINATE WITH DOOR AND WINDOW SPEC'S TO LOCATE FINAL ELEVATION OF THE HEAD HEIGHTS SO THAT ALL DOOR AND WINDOW TRIM ALIGN.
5. WINDOW AND DOOR SIZES ARE DIMENSIONED IN FEET AND INCHES (E.G. 2828= 2'-8"W X 2'-8"H)
6. EXTERIOR WALLS TO BE 2X6 STUDS AT 16" O.C., INTERIOR WALLS TO BE 2X4 STUDS AT 16" O.C., U.N.O.
7. FIREBLOCK ALL PLUMBING PENETRATIONS AND STAIR RUNS PER IRC SEC. R302.11.
8. SAFETY GLAZING PER IRC SEC. R308.4.
9. ALL WOOD IN CONTACT WITH CONCRETE TO BE PRESSURE TREATED PER IRC SEC. R317.1.
10. PROVIDE UNDER-STAIR PROTECTION (1/2" GWB) PER IRC SEC R302.7.
11. PROVIDE (1) LAYER OF 1/2" GWB AT THE GARAGE SIDE OF ALL WALLS SEPARATING THE GARAGE FROM THE RESIDENCE, ALL WALLS SUPPORTING A FLOOR CEILING ASSEMBLY BETWEEN THE GARAGE AND RESIDENCE, AND BETWEEN THE GARAGE AND ITS ATTIC. PROVIDE (1) LAYER 5/8" TYPE X GWB TO GARAGE CEILING IF BELOW HABITABLE ROOMS.
12. HOUSE/GARAGE DOOR SHALL BE 1-⅜" THICK WOOD SOLID CORE, OR 1-¾" THICK SOLID OR HONEYCOMB CORE STEEL DOOR, OR 20-MINUTE RATED FIRE DOOR W/ SELF CLOSING DEVICE.
13. DUCTS IN THE GARAGE AND DUCTS PENETRATING THE WALLS AND CEILINGS SEPARATING THE DWELLING FROM THE GARAGE SHALL BE MIN. 26 GUAGE GALVANIZED STEEL.
14. PER IRC SEC R311.7.5. MAX. RISER HEIGHT SHALL BE 7-3/4". MIN. TREAD DEPTH SHALL BE 10". STAIR NOSINGS: 3/4" MIN., 1-1/4" MAX. RADIUS @ LEADING EDGE OF TREAD: 9/16" MAX.
15. PROVIDE HANDRAILS PER IRC SEC. R311.7.8. TOP OF HANDRAIL SHALL BE NOT LASS THAN 34" OR MORE THAN 38" ABOVE THE TREAD NOSINGS. HANDRAILS SHALL BE CONTINUOUS THE FULL LENGTH OF THE FLIGHT PER R311.7.7.2. THE HANDRAIL GRIP-SIZE SHALL BE PROVIDED PER R311.7.7.3.
16. PROVIDE GUARDS (MIN. 36" HEIGHT) IN LOCATIONS PER IRC SEC. R312.
17. FACTORY BUILT FIREPLACES & CHIMNEYS SHALL BE LISTED & LABELED AND SHALL BE INSTALLED & TERMINATED IN ACCORDANCE TO THE CONDITIONS OF THE LISTINGS. FACTORY BUILT FIREPLACES SHALL MEET EMISSION STANDARDS PER CH. 51-51 WAC.
18. PROVIDE EXTERIOR AIR SUPPLY TO ANY FACTORY-BUILT FIREPLACE PER IRC SEC R1006.

MCCULLOUGH ARCHITECTS
5601 6th Ave South
Suite 371
Seattle, WA. 98108
206.443.1181
mccullougharchitects.com

Revisions	Comment
-	-
-	-

Date: 2025.10.02
Job No.: 24-008
Project No:
Drawn:
Approved:

Owner
SAINTFIELD2 LLC

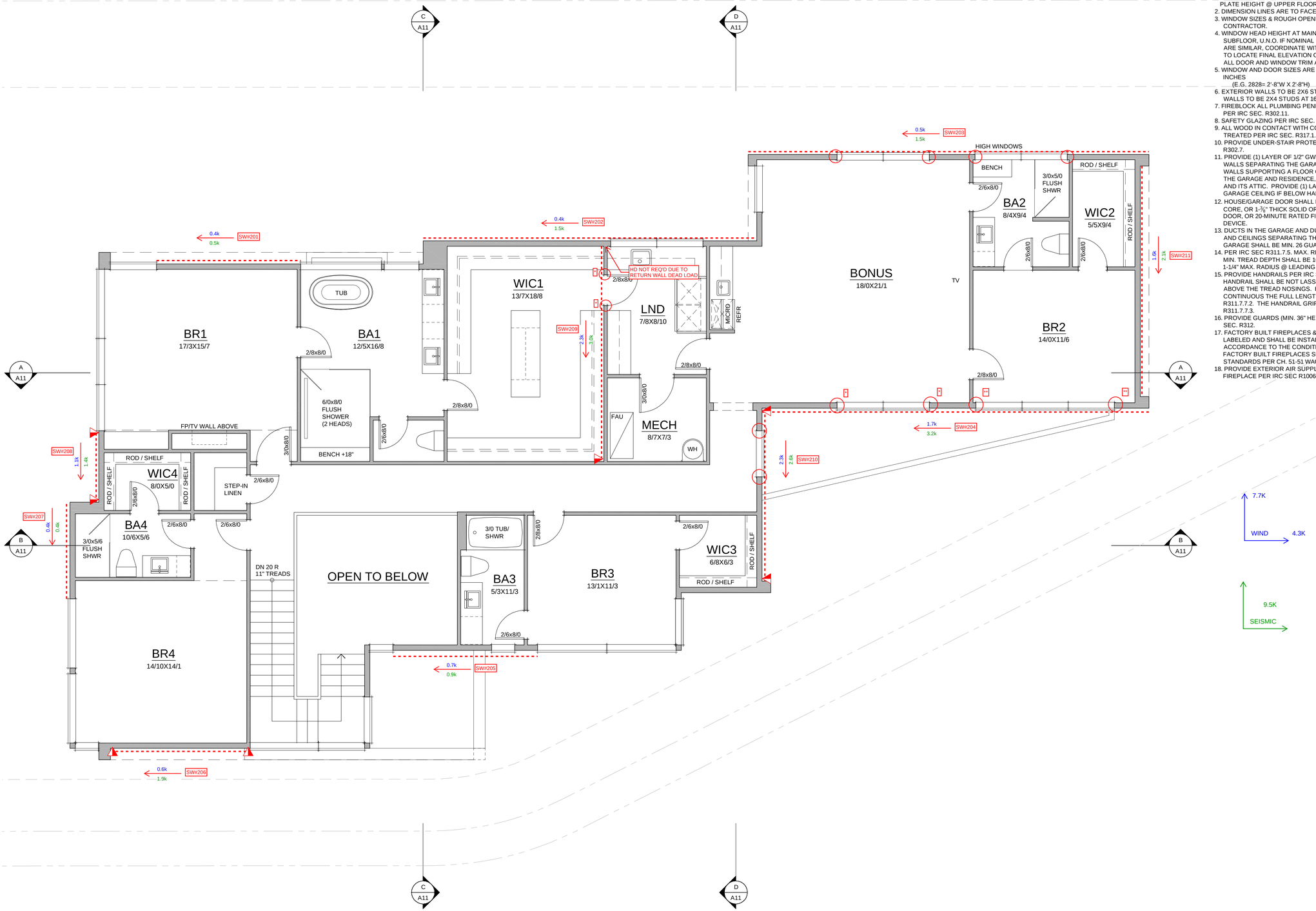
REGISTERED ARCHITECT 7806 PHILIP McCULLOUGH STATE OF WASHINGTON

SEARS PLAT - LOT 1
Mercer Island
Washington
98040

Preliminary

Main Floor Plan

A5



UPPER FLOOR PLAN

SCALE 1/4" = 1'-0" 2,675 SF

GENERAL NOTES:

1. PLATE HEIGHT @ MAIN FLOOR IS 11'-1", U.N.O.
   PLATE HEIGHT @ UPPER FLOOR IS 9'-1" U.N.O.
2. DIMENSION LINES ARE TO FACE OF STUD U.N.O.
3. WINDOW SIZES & ROUGH OPENINGS TO BE VERIFIED BY CONTRACTOR.
4. WINDOW HEAD HEIGHT AT MAIN FLOOR IS 8'-0" ABOVE SUBFLOOR, U.N.O. IF NOMINAL DOOR AND WINDOW HEIGHTS ARE SIMILAR, COORDINATE WITH DOOR AND WINDOW SPEC'S TO LOCATE FINAL ELEVATION OF THE HEAD HEIGHTS SO THAT ALL DOOR AND WINDOW TRIM ALIGN.
5. WINDOW AND DOOR SIZES ARE DIMENSIONED IN FEET AND INCHES
   (E.G. 2828= 2'-8"W X 2'-8"H)
6. EXTERIOR WALLS TO BE 2X6 STUDS AT 16" O.C., INTERIOR WALLS TO BE 2X4 STUDS AT 16" O.C., U.N.O.
7. FIREBLOCK ALL PLUMBING PENETRATIONS AND STAIR RUNS PER IRC SEC. R302.11.
8. SAFETY GLAZING PER IRC SEC. R308.4.
9. ALL WOOD IN CONTACT WITH CONCRETE TO BE PRESSURE TREATED PER IRC SEC. R317.1.
10. PROVIDE UNDER-STAIR PROTECTION (1/2" GWB) PER IRC SEC R302.7.
11. PROVIDE (1) LAYER OF 1/2" GWB AT THE GARAGE SIDE OF ALL WALLS SEPARATING THE GARAGE FROM THE RESIDENCE, ALL WALLS SUPPORTING A FLOOR CEILING ASSEMBLY BETWEEN THE GARAGE AND RESIDENCE, AND BETWEEN THE GARAGE AND ITS ATTIC. PROVIDE (1) LAYER 5/8" TYPE X GWB TO GARAGE CEILING IF BELOW HABITABLE ROOMS.
12. HOUSE/GARAGE DOOR SHALL BE 1-⅜" THICK WOOD SOLID CORE, OR 1-¾" THICK SOLID OR HONEYCOMB CORE STEEL DOOR, OR 20-MINUTE RATED FIRE DOOR W/ SELF CLOSING DEVICE.
13. DUCTS IN THE GARAGE AND DUCTS PENETRATING THE WALLS AND CEILINGS SEPARATING THE DWELLING FROM THE GARAGE SHALL BE MIN. 26 GUAGE GALVANIZED STEEL.
14. PER IRC SEC R311.7.5. MAX. RISER HEIGHT SHALL BE 7-3/4". MIN. TREAD DEPTH SHALL BE 10". STAIR NOSINGS: 3/4" MIN., 1-1/4" MAX. RADIUS @ LEADING EDGE OF TREAD: 9/16" MAX.
15. PROVIDE HANDRAILS PER IRC SEC. R311.7.8. TOP OF HANDRAIL SHALL BE NOT LASS THAN 34" OR MORE THAN 38" ABOVE THE TREAD NOSINGS. HANDRAILS SHALL BE CONTINUOUS THE FULL LENGTH OF THE FLIGHT PER R311.7.7.2. THE HANDRAIL GRIP-SIZE SHALL BE PROVIDED PER R311.7.7.3.
16. PROVIDE GUARDS (MIN. 36" HEIGHT) IN LOCATIONS PER IRC SEC. R312.
17. FACTORY BUILT FIREPLACES & CHIMNEYS SHALL BE LISTED & LABELED AND SHALL BE INSTALLED & TERMINATED IN ACCORDANCE TO THE CONDITIONS OF THE LISTINGS. FACTORY BUILT FIREPLACES SHALL MEET EMISSION STANDARDS PER CH. 51-51 WAC.
18. PROVIDE EXTERIOR AIR SUPPLY TO ANY FACTORY-BUILT FIREPLACE PER IRC SEC R1006.

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Revisions
- -
- -

Comment

Date: 2025.10.21
Job No.: 24-008
Project No:
Drawn:
Approved:

Owner
SAINTFIELD2 LLC

REGISTERED ARCHITECT
PHILIP MCCULLOUGH
STATE OF WASHINGTON
7806

SEARS PLAT - LOT 1
Mercer Island
Washington
98040

Preliminary

Upper Floor Plan
A7

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 244-25018
Engineer: MPM

Shearwall 201: 2nd - BR1 Rear Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_o	0.0	ft.		
Wall Length, L	12.5	ft.	Qualifying Wall Length, L	12.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
500 lbs	<	2998 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	4.5	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	0	lbs	Resistive Moment	5.1	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 202: 2nd - WIC Rear Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	5.0	ft.		
Wall Length, L	28.9	ft.	Qualifying Wall Length, L	20.9	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1500 lbs	<	5013 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	300	plf	Overturning Moment	13.5	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	89.3	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 244-25018
Engineer: MPM

Shearwall 203: 2nd - Bonus Room Rear Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_c	7.0	ft.		
Wall Length, L	34.8	ft.	Qualifying Wall Length, L	18.8	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1500 lbs	<	4497 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	290	plf	Overturning Moment	13.5	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	123.4	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 204: 2nd - Bonus Room Front Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	7.0	ft.		
Wall Length, L	33.5	ft.	Qualifying Wall Length, L	13.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
3200 lbs	<	3208 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	290	plf	Overturning Moment	28.8	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	115.0	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 244-25018
Engineer: MPM

Shearwall 205: 2nd - BR3 Front Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_c	2.0	ft.		
Wall Length, L	12.5	ft.	Qualifying Wall Length, L	10.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

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

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL	175	plf	Overturning Moment	8.1	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	0	lbs	Resistive Moment	8.9	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 206: 2nd - BR4 Front Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	12.1	ft.	Qualifying Wall Length, L	12.1	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1900 lbs	<	2902 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	17.1	k-ft	Hold Down Design Load	1018	lbs
DL at ends of wall	0	lbs	Resistive Moment	4.8	k-ft	Holdown Capacity	1705	lbs

Hold-down Specification

SIMPSON CS16 STRAP TIE (14" END LENGTH)

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 244-25018
Engineer: MPM

Shearwall 207: 2nd - BA4 Side Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	8.4	ft.	Qualifying Wall Length, L	8.4	ft.	Shearwall Assembly	P1

Capacity Evaluation:

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

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL	140	plf	Overturning Moment	3.6	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	200	lbs	Resistive Moment	4.3	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 208: 2nd - WIC4 Side Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	6.2	ft.	Qualifying Wall Length, L	6.2	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1400 lbs	<	1487 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	390	plf	Overturning Moment	12.6	k-ft	Hold Down Design Load	1112	lbs
DL at ends of wall	200	lbs	Resistive Moment	5.7	k-ft	Holdown Capacity	1705	lbs

Hold-down Specification

SIMPSON CS16 STRAP TIE (14" END LENGTH)

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 244-25018
ENGINEER: MPM

SHEARWALL 209: 2ND - WIC1 INTERIOR WALL

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, H_c	8.0	FT.		
WALL LENGTH, L	18.7	FT.	QUALIFYING WALL LENGTH, L	16.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
3000 LBS	<	3748 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	27.0	K-FT	HOLD DOWN DESIGN LOAD	368	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	20.1	K-FT	HOLDOWN CAPACITY	1705	LBS

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

SHEARWALL 210: 2ND - WIC3 SIDE WALL

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, Hc	5.0	FT.		
WALL LENGTH, L	15.0	FT.	QUALIFYING WALL LENGTH, L	11.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
2600 LBS	<	2608 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	23.4	K-FT	HOLD DOWN DESIGN LOAD	653	LBS
DL AT ENDS OF WALL	640	LBS	RESISTIVE MOMENT	13.6	K-FT	HOLDOWN CAPACITY	1705	LBS

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 244-25018
Engineer: MPM

Shearwall 211: 2nd - BR2 Side Wall

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	20.0	ft.	Qualifying Wall Length, L	20.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2100 lbs	<	4797 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	18.9	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	1160	lbs	Resistive Moment	28.2	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall : Basement -

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	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
0 lbs	####	#DIV/0! 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
#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 #: 244-25018
Engineer: MPM

Shearwall : Basement -

Shearwall Properties:

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

Capacity Evaluation:

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

Shearwall 101: 1st - Mud Room Rear Wall

Shearwall Properties:

Wall height, H	11.0	ft.	Max wall opening ht, Hc	7.0	ft.		
Wall Length, L	12.2	ft.	Qualifying Wall Length, L	9.1	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1500 lbs	<	2123 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	480	plf	Overturning Moment	16.5	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	800	lbs	Resistive Moment	29.7	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 244-25018
Engineer: MPM

Shearwall 102: 1st - Garage Rear Wall

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	34.8	ft.	Qualifying Wall Length, L	34.8	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2000 lbs	<	8335 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	550	plf	Overturning Moment	31.7	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	800	lbs	Resistive Moment	234.9	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 103: 1st - BA4 Rear Wall

Shearwall Properties:

Wall height, H	11.0	ft.	Max wall opening ht, Hc	2.0	ft.		
Wall Length, L	13.5	ft.	Qualifying Wall Length, L	11.6	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2200 lbs	<	2782 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	400	plf	Overturning Moment	24.2	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	27.3	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 244-25018
ENGINEER: MPM

SHEARWALL 104: 1ST - KITCHEN INTERIOR WALL

SHEARWALL PROPERTIES:

WALL HEIGHT, H	11.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	25.5	FT.	QUALIFYING WALL LENGTH, L	25.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
3200 LBS	<	6116 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	500	PLF	OVERTURNING MOMENT	35.2	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	119.4	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 105: 1ST - BR5 FRONT WALL

SHEARWALL PROPERTIES:

WALL HEIGHT, H	11.0	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	12.1	FT.	QUALIFYING WALL LENGTH, L	12.1	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
2300 LBS	<	2902 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	360	PLF	OVERTURNING MOMENT	42.4	K-FT	HOLD DOWN DESIGN LOAD	1886	LBS
DL AT ENDS OF WALL	300	LBS	RESISTIVE MOMENT	19.6	K-FT	HOLDOWN CAPACITY	3695	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 244-25018
ENGINEER: MPM

SHEARWALL 106: 1ST - BR5 SIDE WALL

SHEARWALL PROPERTIES:

WALL HEIGHT, H	11.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	14.9	FT.	QUALIFYING WALL LENGTH, L	14.9	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
3000 LBS	<	3574 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	240	PLF	OVERTURNING MOMENT	33.0	K-FT	HOLD DOWN DESIGN LOAD	721	LBS
DL AT ENDS OF WALL	500	LBS	RESISTIVE MOMENT	22.3	K-FT	HOLDOWN CAPACITY	3695	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

SHEARWALL 107: 1ST - INTERIOR GARAGE WALL

SHEARWALL PROPERTIES:

WALL HEIGHT, H	11.0	FT.	MAX WALL OPENING HT, Hc	8.0	FT.		
WALL LENGTH, L	31.9	FT.	QUALIFYING WALL LENGTH, L	25.3	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
9000 LBS	<	11389 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	150	PLF	OVERTURNING MOMENT	99.0	K-FT	HOLD DOWN DESIGN LOAD	758	LBS
DL AT ENDS OF WALL	1200	LBS	RESISTIVE MOMENT	74.8	K-FT	HOLDOWN CAPACITY	3695	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 244-25018
Engineer: MPM

Shearwall 108: 1st - Garage Side Wall

Shearwall Properties:

Wall height, H	9.1	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	12.0	ft.	Qualifying Wall Length, L	12.0	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
3000 lbs	<	5402 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	200	plf	Overturning Moment	27.3	k-ft	Hold Down Design Load	708	lbs
DL at ends of wall	1200	lbs	Resistive Moment	18.8	k-ft	Holdown Capacity	3695	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

Shearwall : Basement -

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	0.0

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
0 lbs	#N/A	#N/A lbs

Shearwall Assembly Specification

#N/A
#N/A
#N/A

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	#N/A	lbs

Hold-down Specification

No Holdown Required

Cantilevered Retaining Wall

Project File: Calcs.ec6

DESCRIPTION: 5'-0" Max Unbalanced Fill

Code Reference

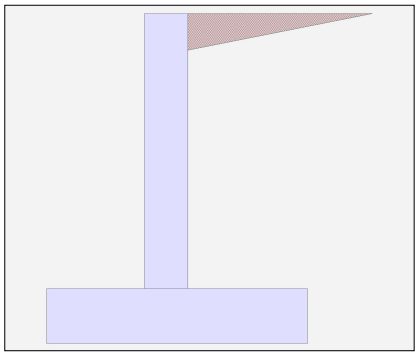
Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	5.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	0.0 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
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

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

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		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: Calcs.ec6

DESCRIPTION: 5'-0" Max Unbalanced Fill

Design Summary

Wall Stability Ratios

Overturning	=	5.03	OK
Sliding	=	1.52	OK
Global Stability	=	2.15	

Total Bearing Load	=	2,386	lbs
...resultant ecc.	=	1.53	in

Eccentricity within middle third

Soil Pressure @ Toe	=	482 psf	OK
Soil Pressure @ Heel	=	711 psf	OK
Allowable	=	1,500 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	596 psf	
ACI Factored @ Heel	=	879 psf	
Footing Shear @ Toe	=	2.9 psi	OK
Footing Shear @ Heel	=	4.1 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	630.0 lbs

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

Load Factors

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

Stem Construction

		Bottom		
		Stem OK		
Design Height Above Ftg	ft =	0.00		
Wall Material Above "Ht"	=	Concrete		
Design Method	=	SD	SD	SD
Thickness	=	8.00		
Rebar Size	=	# 4		
Rebar Spacing	=	12.00		
Rebar Placed at	=	Edge		
Design Data				
fb/FB + fa/Fa	=	**0.215**		
Total Force @ Section				
Service Level	lbs =			
Strength Level	lbs =	700.0		
Moment....Actual				
Service Level	ft-# =			
Strength Level	ft-# =	1,166.7		
Moment.....Allowable	=	5,412.6		
Shear.....Actual				
Service Level	psi =			
Strength Level	psi =	9.3		
Shear.....Allowable	psi =	41.6		
Anet (Masonry)	in2 =			
Wall Weight	psf =	100.0		
Rebar Depth 'd'	in =	6.25		

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
Fy	psi =	60,000.0

Summary of Sliding Forces

	FS = 1.0	FS = 1.5
Lateral Force @ Base of Footing	630.00 lbs	945.00 lbs
less 100% Passive Force	- 0.0 lbs	- 0.0 lbs
less 100% Friction Force	- 954.57 lbs	- 954.57 lbs
Added Resisting Force Required	0.0 lbs	
Added Resisting Force Required for 1.5 Factor of Safety		0.00 lbs

Sliding Factor of Safety = 1.515: 1.00

DESCRIPTION: 5'-0" Max Unbalanced Fill

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0437 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 :	0.2 in2/ft	#5@ 21.53 in	#5@ 43.06 in
Maximum Area :	0.8467 in2/ft	#6@ 30.56 in	#6@ 61.11 in

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	2.50
Total Footing Width	=	4.00
Footing Thickness	=	12.00 in

f'c = 2,500 psi Fy = 75,000 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	=	596	879	psf
Mu' : Upward	=	711	1,379	ft-#
Mu' : Downward	=	203	2,227	ft-#
Mu: Design	=	508	849	ft-#
φ Mn	=	2,500	2,500	ft-#
Actual 1-Way Shear	=	2.93	4.10	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 1.04 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