MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

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

CALCULATION PACKAGE

March 27, 2025

MacPherson Construction & Design

5320 Butterworth Rd – North Lot
Mercer Island, WA

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

Prepared By:

Blake F. Durham, E.I.T. *Staff Engineer*

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

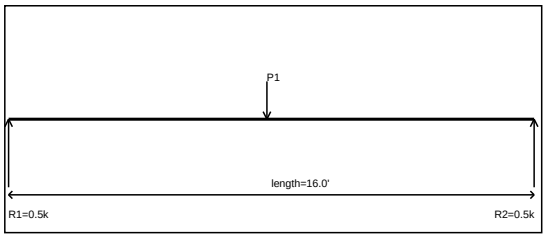
Signature, Seal & Date

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

BEAM & HEADER CALCULATIONS

M+K PROJECT #: 306-25001-T02 - 5320 Butterworth Rd - Nor...
ENGINEER: Blake Durham
Date: 07/30/2025

Description - Low Roof Framing Plan - H10-1 - Header



P1 = 0.98 K (7.9')

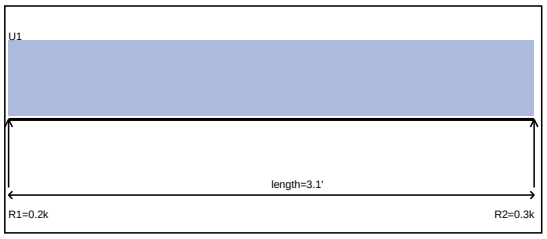
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.50k	Vall = 13.41k	Ratio = 0.04
M = 3.91k-ft	Mall = 30.36k-ft	Ratio = 0.13

Deflection
TL = 0.13" L/999+ > L/240 min
DL = 0.04"
L = 0.00" L/999+ > L/360 min

5-1/2x12 GLB

Description - Low Roof Framing Plan - B10-1 - Flush



Uniform 1 = 0.19 klf (0.0'-3.1')

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

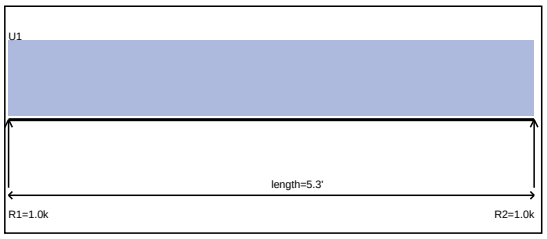
V = 0.29k	Vall = 0 k	Ratio = 0
M = 0.06k-ft	Mall = 0 k-ft	Ratio = 0

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

SEE ENERCALC OUTPUT

Refer to External Design

Description - Low Roof Framing Plan - B10-2 - Flush



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

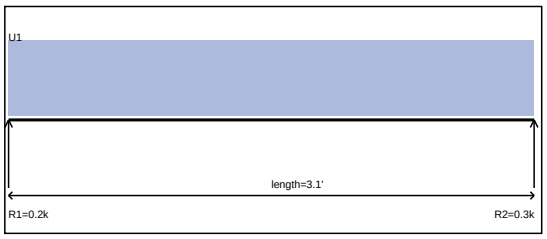
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.98k	Vall = 2.50k	Ratio = 0.39
M = 1.30k-ft	Mall = 2.57k-ft	Ratio = 0.51

Deflection
TL = 0.05" L/999+ > L/240 min
DL = 0.02"
L = 0.00" L/999+ > L/360 min

(2)2x8 HF #2

Description - Low Roof Framing Plan - B10-3 - Flush



Uniform 1 = 0.18 klf (0.0'-3.1')

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

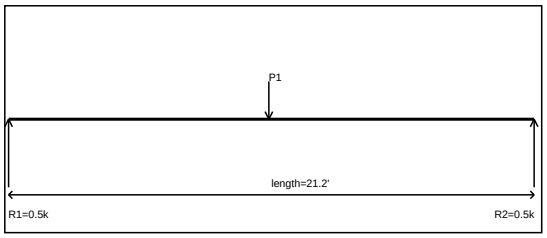
V = 0.28k	Vall = 0 k	Ratio = 0
M = 0.07k-ft	Mall = 0 k-ft	Ratio = 0

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

SEE ENERCALC OUTPUT

Refer to External Design

Description - Low Roof Framing Plan - B10-4 - Flush



P1 = 0.98 K (10.5')

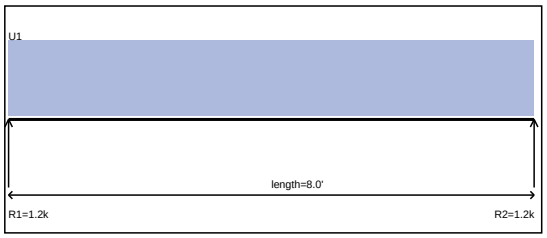
Controlling Load Combination/ Cd
V = (D + S) Cd= NA
M = (D + S) Cd= NA
△ = (D + S)

V = 0.49k	Vall = 26.80k	Ratio = 0.02
M = 5.19k-ft	Mall = 21.90k-ft	Ratio = 0.24

Deflection
TL = 0.47" L/541 > L/240 min
DL = 0.13"
L = 0.00" L/999+ > L/360 min

W8x10 Steel

Description - Angled Roof Framing Plan - H8-1 - Header



Uniform 1 = 0.29 klf (0.0'-8.0')

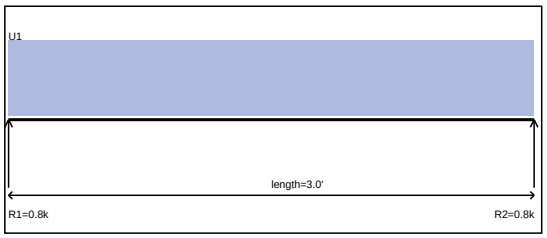
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.16k	Vall = 3.50k	Ratio = 0.33
M = 2.33k-ft	Mall = 3.44k-ft	Ratio = 0.68

Deflection
TL = 0.15" L/637 > L/240 min
DL = 0.04"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Angled Roof Framing Plan - H8-2 - Header



Uniform 1 = 0.49 klf (0.0'-3.0')

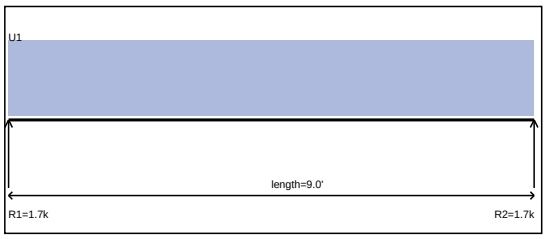
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.74k	Vall = 3.50k	Ratio = 0.21
M = 0.55k-ft	Mall = 3.44k-ft	Ratio = 0.16

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

4x8 DF #2

Description - Angled Roof Framing Plan - H8-3 - Header



Uniform 1 = 0.37 klf (0.0'-9.0')

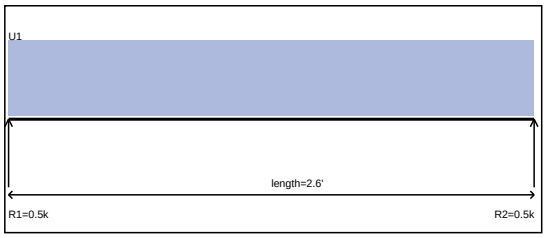
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.69k	Vall = 5.33k	Ratio = 0.32
M = 3.79k-ft	Mall = 7.55k-ft	Ratio = 0.50

Deflection
TL = 0.25" L/433 > L/240 min
DL = 0.07"
L = 0.00" L/999+ > L/360 min

3-1/2x7-1/2 GLB

Description - Angled Roof Framing Plan - H8-4 - Header



Uniform 1 = 0.33 klf (0.0'-2.6')

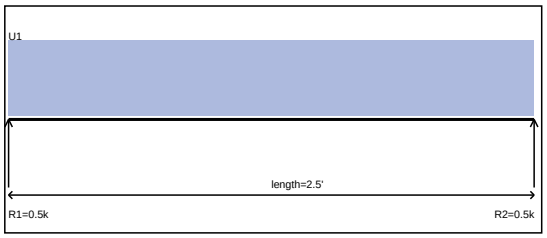
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.43k	Vall = 3.50k	Ratio = 0.12
M = 0.28k-ft	Mall = 3.44k-ft	Ratio = 0.08

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

4x8 DF #2

Description - Angled Roof Framing Plan - H8-5 - Header



Uniform 1 = 0.33 klf (0.0'-2.5')

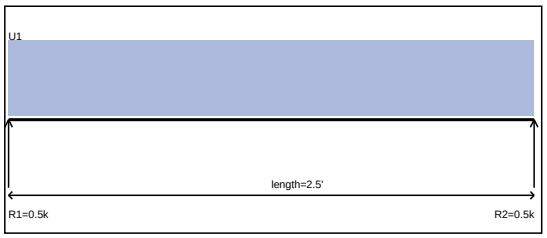
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.42k	Vall = 3.50k	Ratio = 0.12
M = 0.26k-ft	Mall = 3.44k-ft	Ratio = 0.08

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

4x8 DF #2

Description - Angled Roof Framing Plan - H8-6 - Header



Uniform 1 = 0.33 klf (0.0'-2.5')

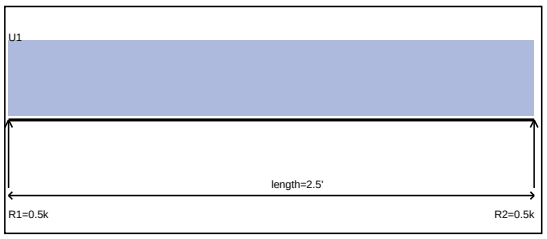
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.42k	Vall = 3.50k	Ratio = 0.12
M = 0.26k-ft	Mall = 3.44k-ft	Ratio = 0.08

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

4x8 DF #2

Description - Angled Roof Framing Plan - H8-7 - Header



Uniform 1 = 0.33 klf (0.0'-2.5')

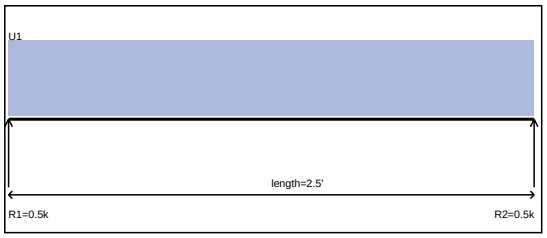
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.42k	Vall = 3.50k	Ratio = 0.12
M = 0.26k-ft	Mall = 3.44k-ft	Ratio = 0.08

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

4x8 DF #2

Description - Angled Roof Framing Plan - H8-8 - Header



Uniform 1 = 0.38 klf (0.0'-2.5')

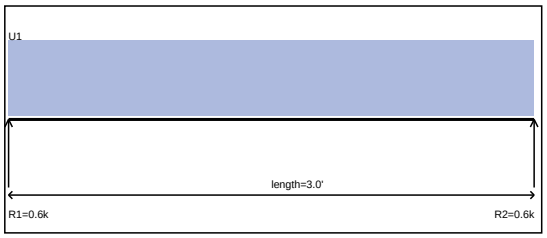
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.47k	Vall = 3.50k	Ratio = 0.13
M = 0.29k-ft	Mall = 3.44k-ft	Ratio = 0.09

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

4x8 DF #2

Description - Angled Roof Framing Plan - H8-9 - Header



Uniform 1 = 0.37 klf (0.0'-3.0')

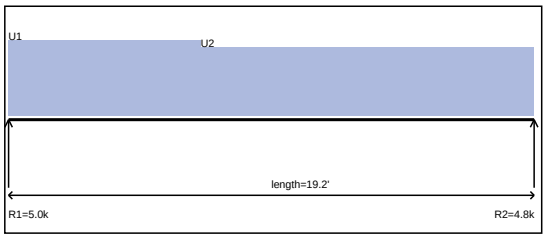
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.56k	Vall = 3.50k	Ratio = 0.16
M = 0.42k-ft	Mall = 3.44k-ft	Ratio = 0.12

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

4x8 DF #2

Description - Angled Roof Framing Plan - B8-1 - Flush



Uniform 1 = 0.54 klf (0.0'-7.0')

Uniform 2 = 0.49 klf (7.0'-19.2')

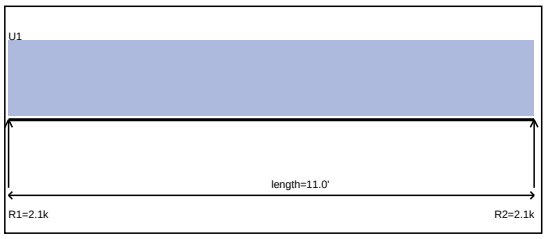
Controlling Load Combination/ Cd
V = (D + S) Cd= NA
M = (D + S) Cd= NA
△ = (D + S)

V = 4.98k	Vall = 49.00k	Ratio = 0.10
M = 23.25k-ft	Mall = 64.90k-ft	Ratio = 0.36

Deflection
TL = 0.45" L/512 > L/240 min
DL = 0.13"
L = 0.00" L/999+ > L/360 min

W10x22 Steel

Description - Angled Roof Framing Plan - B8-2 - Flush



Uniform 1 = 0.38 klf (0.0'-11.0')

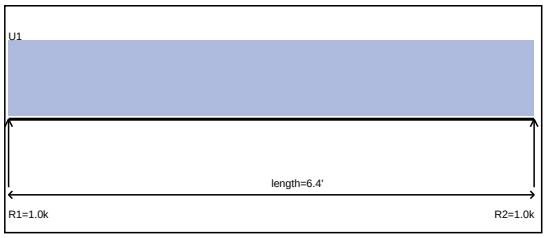
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 2.07k	Vall = 9.08k	Ratio = 0.23
M = 5.69k-ft	Mall = 20.50k-ft	Ratio = 0.28

Deflection
TL = 0.13" L/989 > L/240 min
DL = 0.04"
L = 0.00" L/999+ > L/360 min

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

Description - Angled Roof Framing Plan - B8-3 - Flush



Uniform 1 = 0.31 klf (0.0'-6.4')

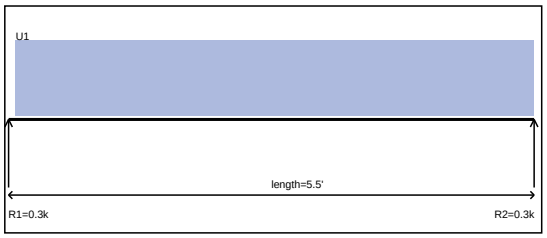
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.99k	Vall = 4.54k	Ratio = 0.22
M = 1.59k-ft	Mall = 10.25k-ft	Ratio = 0.16

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

1-3/4x11-7/8 LVL

Description - Angled Upper Floor Framing Plan - H7-1 - Header



Uniform 1 = 0.10 klf (0.1'-5.5')

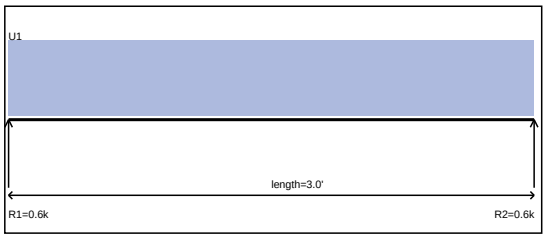
Controlling Load Combination/ Cd
V = D Cd=0.9
M = D Cd=0.9
△ = D

V = 0.27k	Vall = 2.74k	Ratio = 0.10
M = 0.38k-ft	Mall = 2.69k-ft	Ratio = 0.14

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

4x8 DF #2

Description - Angled Upper Floor Framing Plan - H7-2 - Header



Uniform 1 = 0.35 klf (0.0'-3.0')

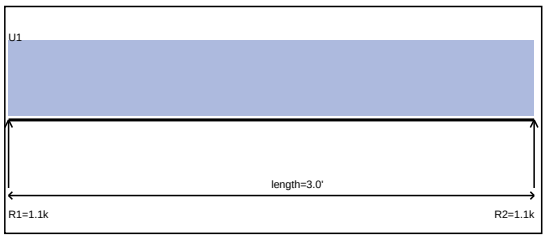
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.52k	Vall = 3.04k	Ratio = 0.17
M = 0.39k-ft	Mall = 2.99k-ft	Ratio = 0.13

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

4x8 DF #2

Description - Angled Upper Floor Framing Plan - H7-4 - Header



Uniform 1 = 0.69 klf (0.0'-3.0')

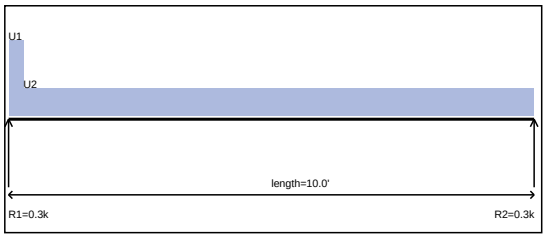
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.04k	Vall = 3.04k	Ratio = 0.34
M = 0.78k-ft	Mall = 2.99k-ft	Ratio = 0.26

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

4x8 DF #2

Description - Angled Upper Floor Framing Plan - H7-5 - Header



Uniform 1 = 0.11 klf (0.0'-0.3')

Uniform 2 = 0.04 klf (0.3'-10.0')

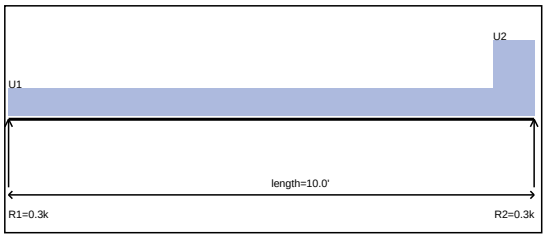
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.21k	Vall = 4.47k	Ratio = 0.05
M = 0.52k-ft	Mall = 5.17k-ft	Ratio = 0.10

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

4x10 DF #2

Description - Angled Upper Floor Framing Plan - H7-6 - Header



Uniform 1 = 0.04 klf (0.0'-9.2')

Uniform 2 = 0.11 klf (9.2'-10.0')

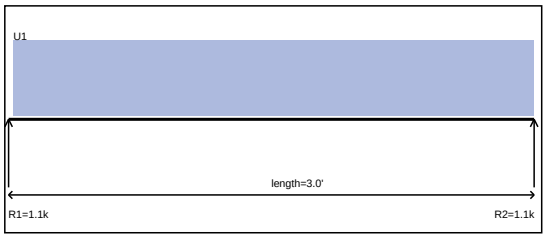
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.22k	Vall = 4.47k	Ratio = 0.05
M = 0.52k-ft	Mall = 5.17k-ft	Ratio = 0.10

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

4x10 DF #2

Description - Angled Upper Floor Framing Plan - H7-7 - Header



Uniform 1 = 0.69 klf (0.0'-3.0')

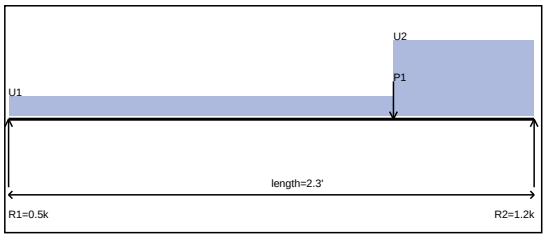
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.04k	Vall = 3.04k	Ratio = 0.34
M = 0.78k-ft	Mall = 2.99k-ft	Ratio = 0.26

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

4x8 DF #2

Description - Angled Upper Floor Framing Plan - B7-1 - Flush



Uniform 1 = 0.10 klf (0.0'-1.6')

Uniform 2 = 0.39 klf (1.6'-2.3')

P1 = 1.16 K (1.6')

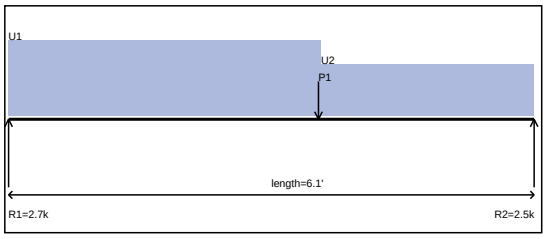
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.12k	Vall = 12.80k	Ratio = 0.09
M = 0.60k-ft	Mall = 43.47k-ft	Ratio = 0.01

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 - Angled Upper Floor Framing Plan - B7-2 - Flush



Uniform 1 = 0.75 klf (0.0'-3.6')

Uniform 2 = 0.51 klf (3.6'-6.1')

P1 = 1.12 K (3.6')

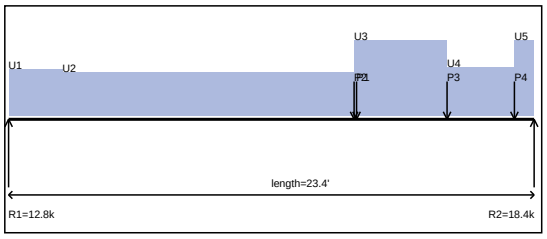
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + 0.75 * (L + S))

V = 2.35k	Vall = 11.13k	Ratio = 0.21
M = 3.67k-ft	Mall = 37.80k-ft	Ratio = 0.10

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

3-1/2x18 GLB

Description - Angled Upper Floor Framing Plan - B7-3 - Flush



Uniform 1 = 0.84 klf (0.0'-2.4')

Uniform 2 = 0.78 klf (2.4'-15.4')

Uniform 3 = 1.37 klf (15.4'-19.5')

Uniform 4 = 0.88 klf (19.5'-22.5')

Uniform 5 = 1.37 klf (22.5'-23.4')

P1 = 3.21 K (15.5')

P2 = 4.79 K (15.4')

P3 = 0.74 K (19.5')

P4 = 0.74 K (22.5')

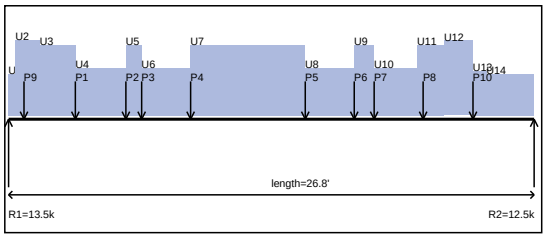
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd= NA
M = (D + 0.75 * (L + S)) Cd= NA
△ = (D + 0.75 * (L + S))

V = 15.17k	Vall = 111.00k	Ratio = 0.14
M = 84.67k-ft	Mall = 205.00k-ft	Ratio = 0.41

Deflection
TL = 0.49" L/572 > L/240 min
DL = 0.18"
L = 0.28" L/999+ > L/360 min

W16x45 Steel

Description - Angled Upper Floor Framing Plan - B7-4 - Flush



Uniform 1 = 0.59 klf (0.0'-0.3')
Uniform 2 = 1.07 klf (0.3'-1.6')
Uniform 3 = 1.00 klf (1.6'-3.4')
Uniform 4 = 0.67 klf (3.4'-6.0')
Uniform 5 = 1.00 klf (6.0'-6.8')
Uniform 6 = 0.67 klf (6.8'-9.3')
Uniform 7 = 1.00 klf (9.3'-15.1')
Uniform 8 = 0.67 klf (15.1'-17.6')
Uniform 9 = 1.00 klf (17.6'-18.7')
Uniform 10 = 0.67 klf (18.7'-20.9')
Uniform 11 = 1.00 klf (20.9'-22.2')
Uniform 12 = 1.06 klf (22.2'-23.7')
Uniform 13 = 0.63 klf (23.7'-24.4')
Uniform 14 = 0.59 klf (24.4'-26.8')

P1 = 0.43 K (3.4')
P2 = 0.43 K (6.0')
P3 = 0.42 K (6.8')
P4 = 0.42 K (9.3')
P5 = 0.42 K (15.1')
P6 = 0.42 K (17.6')
P7 = 0.42 K (18.7')
P8 = 0.42 K (21.2')
P9 = 0.11 K (0.8')
P10 = 0.11 K (23.7')

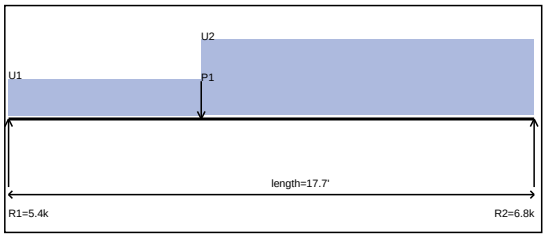
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd= NA
M = (D + 0.75 * (L + S)) Cd= NA
△ = (D + 0.75 * (L + S))

V = 11.26k	Vall = 111.00k	Ratio = 0.10
M = 75.15k-ft	Mall = 205.00k-ft	Ratio = 0.37

Deflection
TL = 0.57" L/562 > L/240 min
DL = 0.24"
L = 0.26" L/999+ > L/360 min

W16x45 Steel

Description - Angled Upper Floor Framing Plan - B7-5 - Flush



Uniform 1 = 0.37 klf (0.0'-6.5')
Uniform 2 = 0.77 klf (6.5'-17.7')

P1 = 0.99 K (6.5')

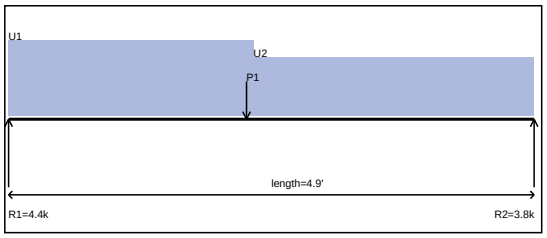
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 5.65k	Vall = 12.80k	Ratio = 0.44
M = 24.46k-ft	Mall = 43.47k-ft	Ratio = 0.56

Deflection
TL = 0.45" L/472 > L/240 min
DL = 0.19"
L = 0.19" L/999+ > L/360 min

3-1/2x18 GLB

Description - Angled Main Floor Framing Plan - B6-1 - Dropped



Uniform 1 = 1.38 klf (0.0'-2.3') P1 = 2.07 K (2.2')

Uniform 2 = 1.07 klf (2.3'-4.9')

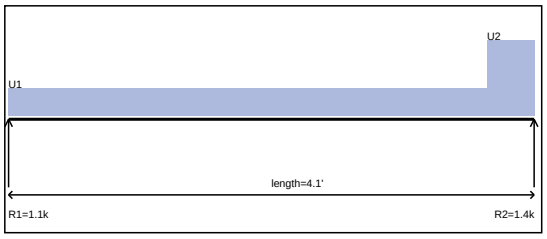
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 3.60k	Vall = 4.47k	Ratio = 0.81
M = 5.16k-ft	Mall = 5.17k-ft	Ratio = 1.00

Deflection
TL = 0.06" L/971 > L/240 min
DL = 0.02"
L = 0.02" L/999+ > L/360 min

4x10 DF #2

Description - Angled Main Floor Framing Plan - B6-2 - Dropped



Uniform 1 = 0.51 klf (0.0'-3.7')

Uniform 2 = 1.38 klf (3.7'-4.1')

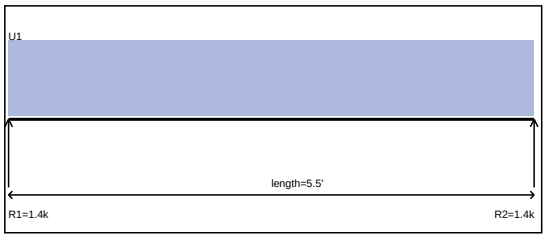
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.26k	Vall = 3.88k	Ratio = 0.33
M = 1.08k-ft	Mall = 4.49k-ft	Ratio = 0.24

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

4x10 DF #2

Description - Angled Main Floor Framing Plan - B6-3 - Dropped



Uniform 1 = 0.51 klf (0.0'-5.5')

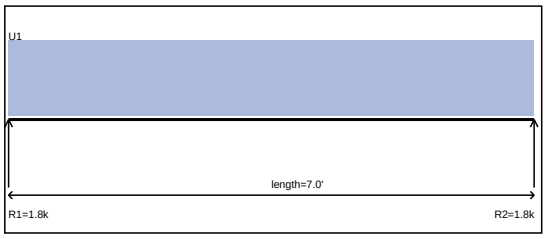
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.40k	Vall = 3.88k	Ratio = 0.36
M = 1.92k-ft	Mall = 4.49k-ft	Ratio = 0.43

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

4x10 DF #2

Description - Angled Main Floor Framing Plan - B6-4 - Dropped



Uniform 1 = 0.51 klf (0.0'-7.0')

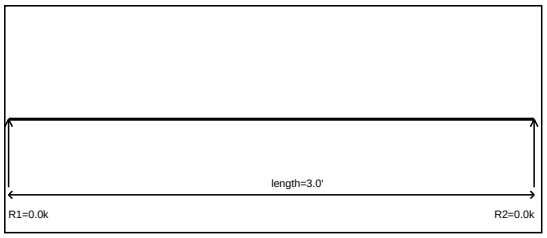
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.78k	Vall = 3.88k	Ratio = 0.46
M = 3.11k-ft	Mall = 4.49k-ft	Ratio = 0.69

Deflection
TL = 0.07" L/999+ > L/240 min
DL = 0.01"
L = 0.06" L/999+ > L/360 min

4x10 DF #2

Description - Roof Framing Plan - H3-1 - Header



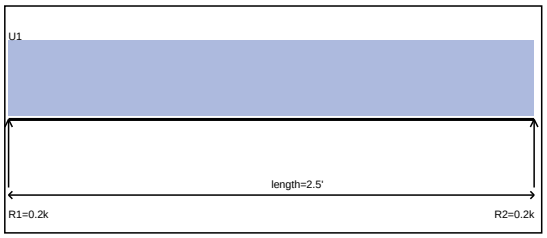
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H3-2 - Header



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

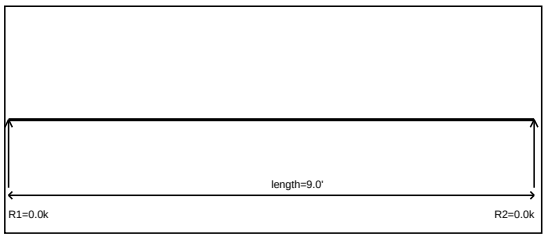
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.15k	Vall = 3.50k	Ratio = 0.04
M = 0.09k-ft	Mall = 3.44k-ft	Ratio = 0.03

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

4x8 DF #2

Description - Roof Framing Plan - H3-3 - Header



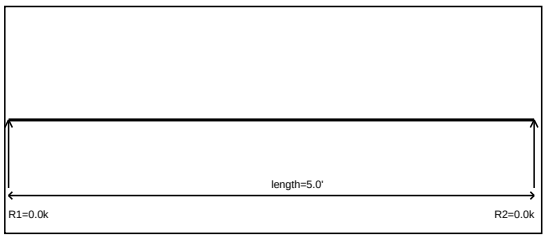
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H3-4 - Header



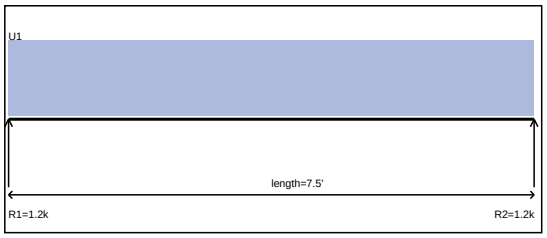
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H3-5 - Header



Uniform 1 = 0.31 klf (0.0'-7.5')

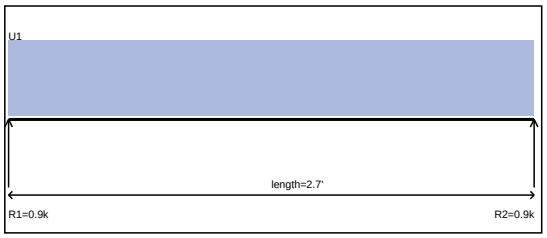
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.16k	Vall = 3.50k	Ratio = 0.33
M = 2.17k-ft	Mall = 3.44k-ft	Ratio = 0.63

Deflection
TL = 0.12" L/730 > L/240 min
DL = 0.04"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Roof Framing Plan - H3-6 - Header



Uniform 1 = 0.61 klf (0.0'-2.7')

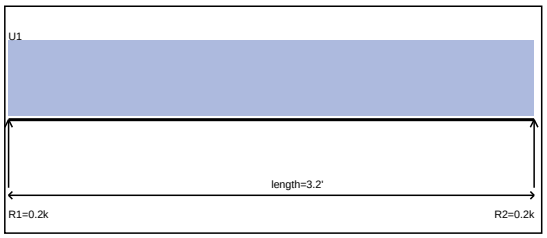
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.80k	Vall = 3.50k	Ratio = 0.23
M = 0.54k-ft	Mall = 3.44k-ft	Ratio = 0.16

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 Plan - H3-7 - Header



Uniform 1 = 0.07 klf (0.0'-3.2')

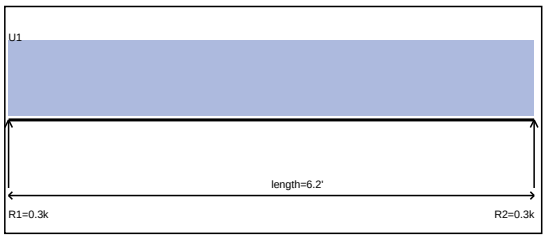
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.11k	Vall = 3.50k	Ratio = 0.03
M = 0.09k-ft	Mall = 3.44k-ft	Ratio = 0.03

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

4x8 DF #2

Description - Roof Framing Plan - H3-8 - Header



Uniform 1 = 0.07 klf (0.0'-6.2')

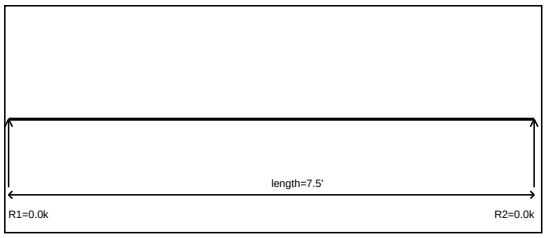
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.22k	Vall = 3.50k	Ratio = 0.06
M = 0.34k-ft	Mall = 3.44k-ft	Ratio = 0.10

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

4x8 DF #2

Description - Roof Framing Plan - H3-9 - Header



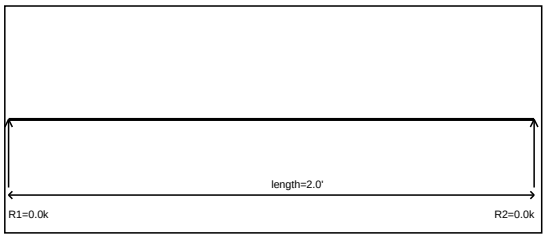
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H3-10 - Header



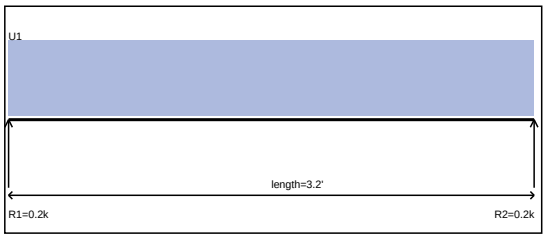
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H3-11 - Header



Uniform 1 = 0.07 klf (0.0'-3.2')

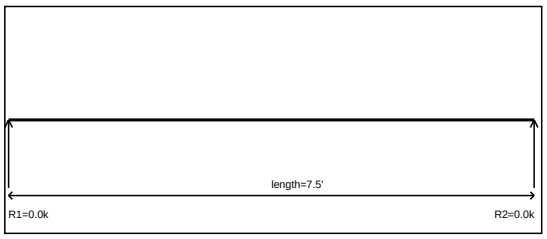
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.11k	Vall = 3.50k	Ratio = 0.03
M = 0.09k-ft	Mall = 3.44k-ft	Ratio = 0.03

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

4x8 DF #2

Description - Roof Framing Plan - H3-12 - Header



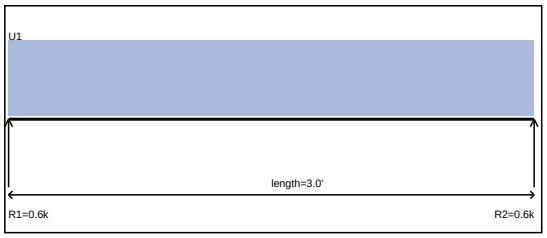
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H3-13 - Header



Uniform 1 = 0.34 klf (0.0'-3.0')

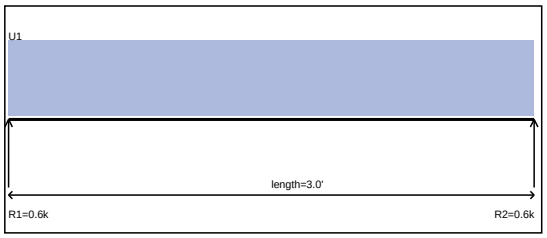
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.51k	Vall = 3.50k	Ratio = 0.15
M = 0.38k-ft	Mall = 3.44k-ft	Ratio = 0.11

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 Plan - H3-14 - Header



Uniform 1 = 0.34 klf (0.0'-3.0')

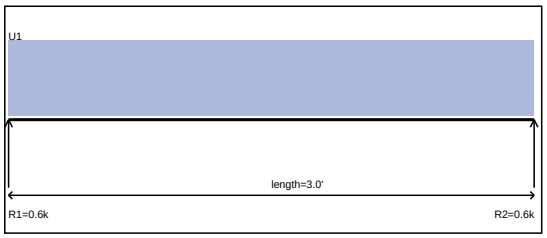
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.51k	Vall = 3.50k	Ratio = 0.15
M = 0.38k-ft	Mall = 3.44k-ft	Ratio = 0.11

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 Plan - H3-15 - Header



Uniform 1 = 0.34 klf (0.0'-3.0')

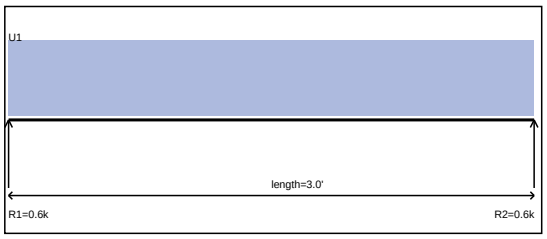
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.51k	Vall = 3.50k	Ratio = 0.15
M = 0.38k-ft	Mall = 3.44k-ft	Ratio = 0.11

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 Plan - H3-16 - Header



Uniform 1 = 0.34 klf (0.0'-3.0')

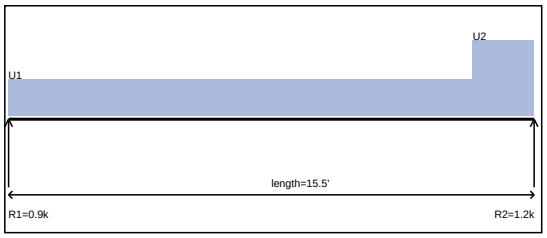
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.51k	Vall = 3.50k	Ratio = 0.15
M = 0.38k-ft	Mall = 3.44k-ft	Ratio = 0.11

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 Plan - B3-1 - Flush



Uniform 1 = 0.12 klf (0.0'-13.6')

Uniform 2 = 0.25 klf (13.7'-15.5')

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

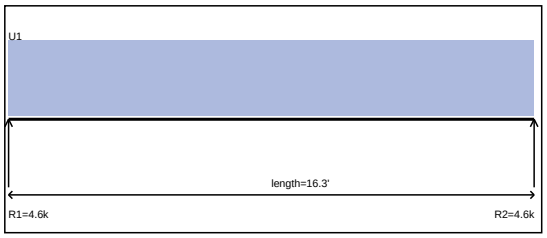
V = 1.15k	Vall = 0 k	Ratio = 0
M = 2.78k-ft	Mall = 0 k-ft	Ratio = 0

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

SEE ENERCALC OUTPUT

Refer to External Design

Description - Roof Framing Plan - B3-2 - Flush



Uniform 1 = 0.56 klf (0.0'-16.3')

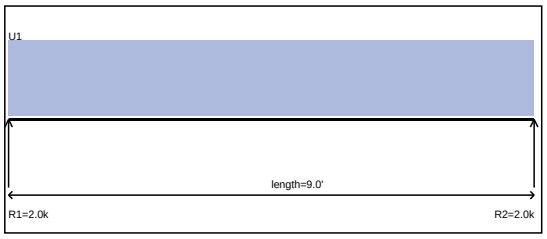
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 4.54k	Vall = 13.62k	Ratio = 0.33
M = 18.46k-ft	Mall = 30.74k-ft	Ratio = 0.60

Deflection
TL = 0.63" L/309 > L/240 min
DL = 0.18"
L = 0.00" L/999+ > L/360 min

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

Description - Upper Floor Framing Plan - H2-3 - Header



Uniform 1 = 0.43 klf (0.0'-9.0')

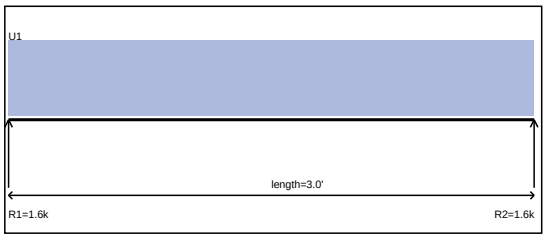
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.92k	Vall = 4.64k	Ratio = 0.41
M = 4.32k-ft	Mall = 6.56k-ft	Ratio = 0.66

Deflection
TL = 0.28" L/380 > L/240 min
DL = 0.04"
L = 0.24" L/444 > L/360 min

3-1/2x7-1/2 GLB

Description - Upper Floor Framing Plan - H2-5 - Header



Uniform 1 = 1.06 klf (0.0'-3.0')

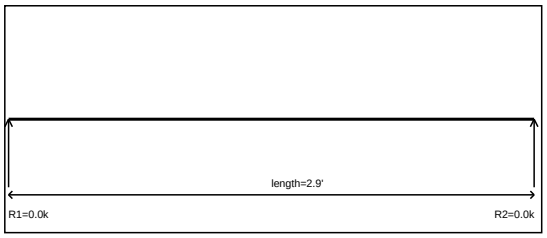
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 1.32k	Vall = 3.50k	Ratio = 0.38
M = 0.99k-ft	Mall = 3.44k-ft	Ratio = 0.29

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

4x8 DF #2

Description - Upper Floor Framing Plan - H2-6 - Header



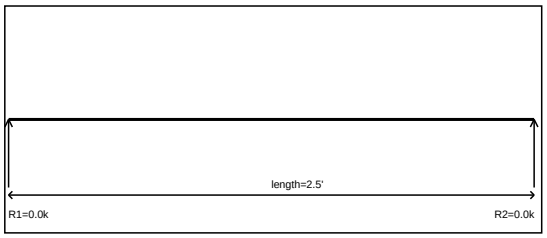
Controlling Load Combination/ Cd
V = NA Cd= NA
M = NA Cd= NA
△ = NA

V = 0 k	Vall = 0 k	Ratio = 0
M = 0 k-ft	Mall = 0 k-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 Plan - H2-7 - Header



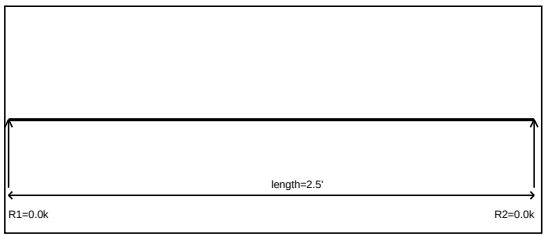
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H2-8 - Header



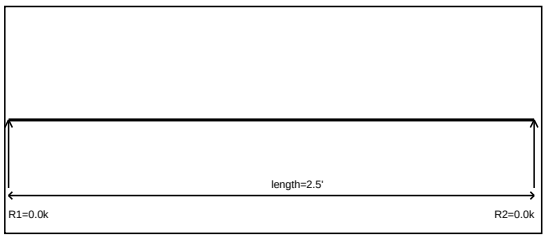
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H2-9 - Header



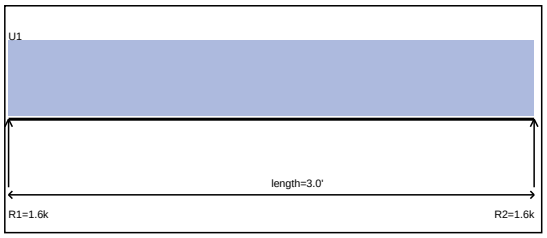
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H2-10 - Header



Uniform 1 = 1.06 klf (0.0'-3.0')

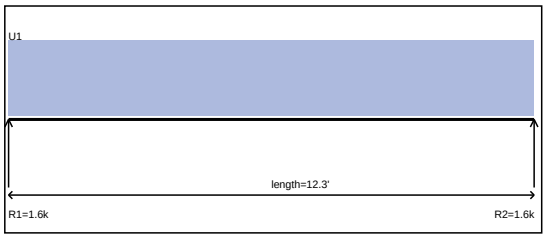
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 1.32k	Vall = 3.50k	Ratio = 0.38
M = 0.99k-ft	Mall = 3.44k-ft	Ratio = 0.29

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

4x8 DF #2

Description - Upper Floor Framing Plan - H2-11 - Header



Uniform 1 = 0.26 klf (0.0'-12.3')

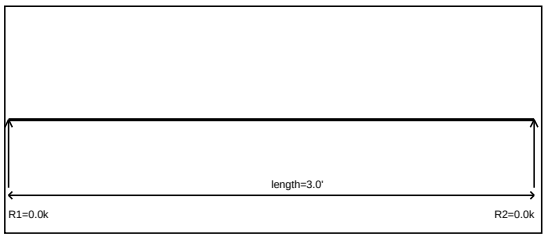
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.57k	Vall = 5.43k	Ratio = 0.29
M = 4.81k-ft	Mall = 7.00k-ft	Ratio = 0.69

Deflection
TL = 0.20" L/752 > L/240 min
DL = 0.06"
L = 0.00" L/999+ > L/360 min

4x12 DF #2

Description - Upper Floor Framing Plan - H2-12 - Header



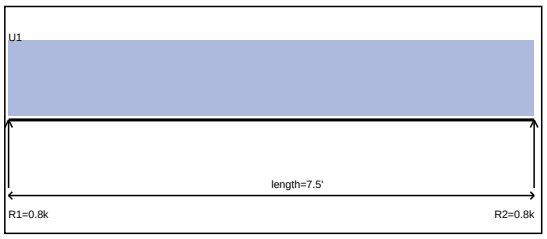
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H2-13 - Header



Uniform 1 = 0.20 klf (0.0'-7.5')

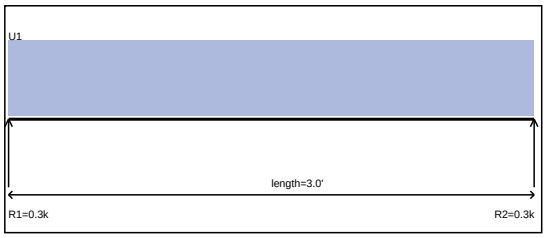
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.74k	Vall = 3.50k	Ratio = 0.21
M = 1.38k-ft	Mall = 3.44k-ft	Ratio = 0.40

Deflection
TL = 0.08" L/999+ > L/240 min
DL = 0.02"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Upper Floor Framing Plan - H2-14 - Header



Uniform 1 = 0.20 klf (0.0'-3.0')

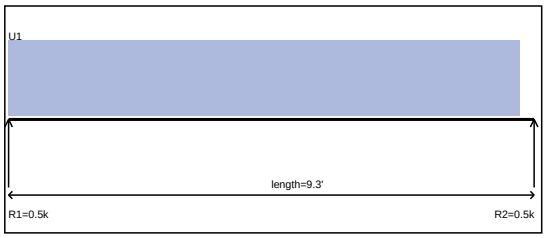
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 0.29k	Vall = 3.50k	Ratio = 0.08
M = 0.22k-ft	Mall = 3.44k-ft	Ratio = 0.06

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

4x8 DF #2

Description - Upper Floor Framing Plan - H2-15 - Header



Uniform 1 = 0.10 klf (0.0'-9.0')

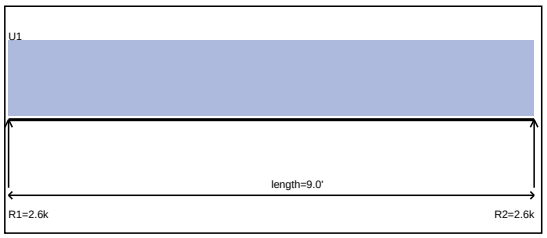
Controlling Load Combination/ Cd
V = D Cd=0.9
M = D Cd=0.9
△ = D

V = 0.46k	Vall = 3.50k	Ratio = 0.13
M = 1.07k-ft	Mall = 4.04k-ft	Ratio = 0.26

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

4x10 DF #2

Description - Upper Floor Framing Plan - H2-16 - Header



Uniform 1 = 0.57 klf (0.0'-9.0')

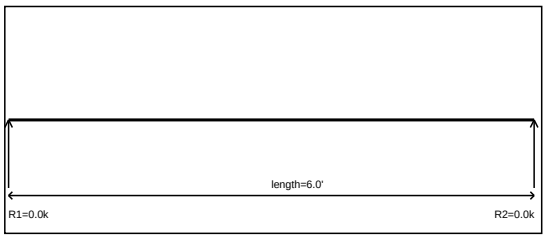
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 2.56k	Vall = 4.72k	Ratio = 0.54
M = 5.76k-ft	Mall = 6.09k-ft	Ratio = 0.95

Deflection
TL = 0.13" L/855 > L/240 min
DL = 0.02"
L = 0.11" L/997 > L/360 min

4x12 DF #2

Description - Upper Floor Framing Plan - H2-20 - Header



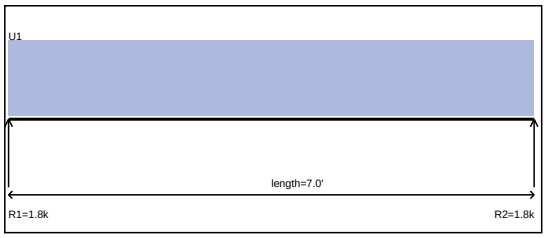
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H2-21 - Header



Uniform 1 = 0.50 klf (0.0'-7.0')

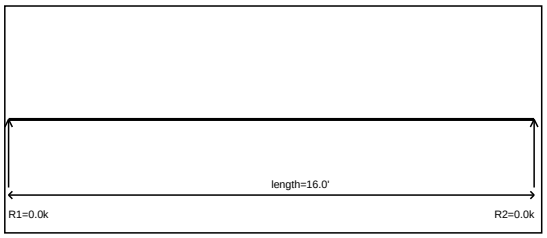
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.75k	Vall = 3.50k	Ratio = 0.50
M = 3.06k-ft	Mall = 3.44k-ft	Ratio = 0.89

Deflection
TL = 0.15" L/554 > L/240 min
DL = 0.04"
L = 0.00" L/999+ > L/360 min

4x8 DF #2

Description - Upper Floor Framing Plan - H2-22 - Header



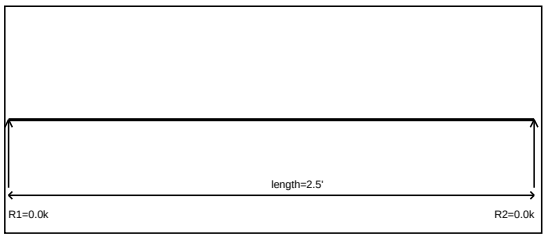
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

V = 0.00k	Vall = 1.71k	Ratio = 0
M = 0.00k-ft	Mall = 6.18k-ft	Ratio = 0

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

11-7/8" TJI 360 I-Joists

Description - Upper Floor Framing Plan - H2-23 - Header



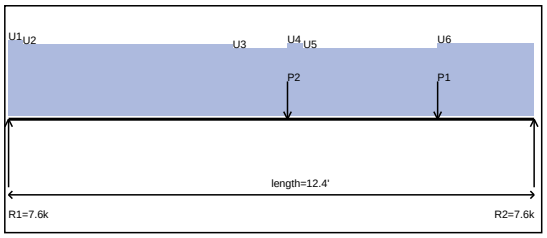
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H2-24 - Header



Uniform 1 = 1.26 klf (0.0'-0.3')

Uniform 2 = 1.19 klf (0.3'-5.3')

Uniform 3 = 1.13 klf (5.3'-6.6')

Uniform 4 = 1.20 klf (6.6'-7.0')

Uniform 5 = 1.13 klf (7.0'-10.1')

Uniform 6 = 1.20 klf (10.1'-12.4')

P1 = 0.11 K (10.1')

P2 = 0.33 K (6.6')

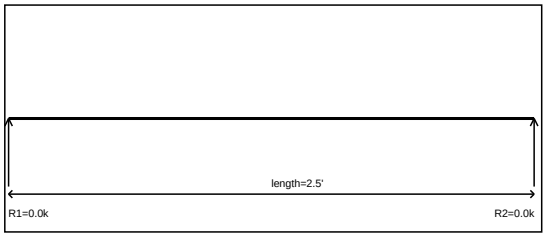
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 7.35k	Vall = 11.66k	Ratio = 0.63
M = 22.61k-ft	Mall = 26.40k-ft	Ratio = 0.86

Deflection
TL = 0.44" L/339 > L/240 min
DL = 0.12"
L = 0.32" L/473 > L/360 min

5-1/2x12 GLB

Description - Upper Floor Framing Plan - H2-25 - Header



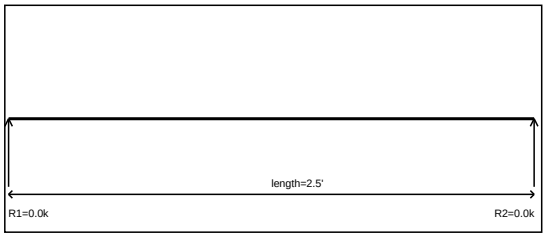
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H2-26 - Header



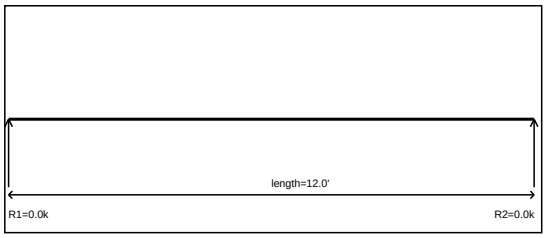
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H2-27 - Header



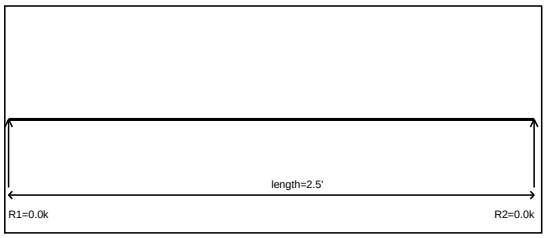
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H2-28 - Header



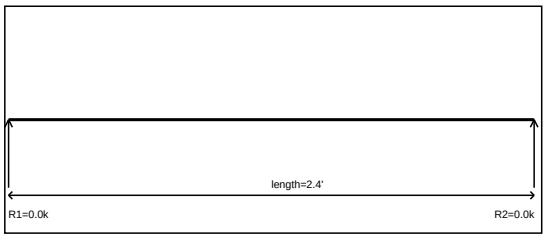
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H2-30 - Header



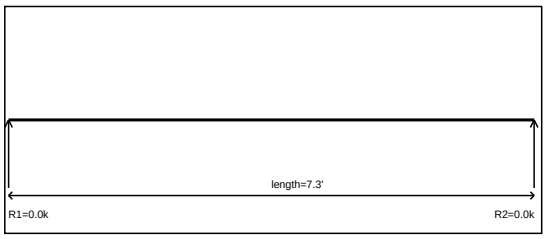
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H2-31 - Header



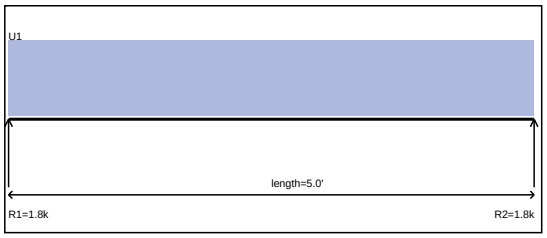
Controlling Load Combination/ Cd
V = NA Cd=1
M = NA Cd=1
△ = NA

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 Plan - H2-32 - Header



Uniform 1 = 0.71 klf (0.0'-5.0')

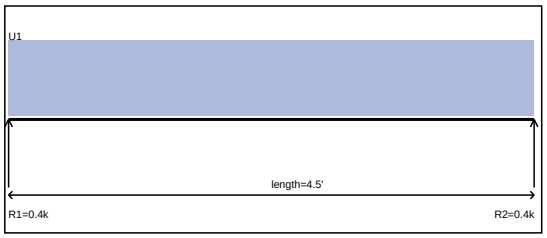
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.78k	Vall = 3.50k	Ratio = 0.51
M = 2.23k-ft	Mall = 3.44k-ft	Ratio = 0.65

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

4x8 DF #2

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



Uniform 1 = 0.13 klf (0.0'-4.5')

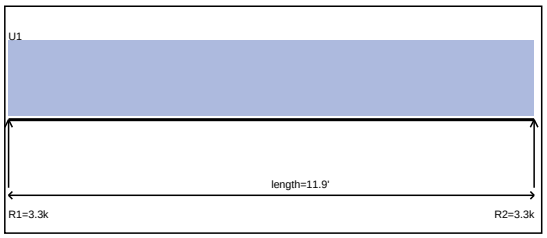
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.30k	Vall = 3.95k	Ratio = 0.08
M = 0.34k-ft	Mall = 8.91k-ft	Ratio = 0.04

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

1-3/4x11-7/8 LVL

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



Uniform 1 = 0.54 klf (0.0'-11.9')

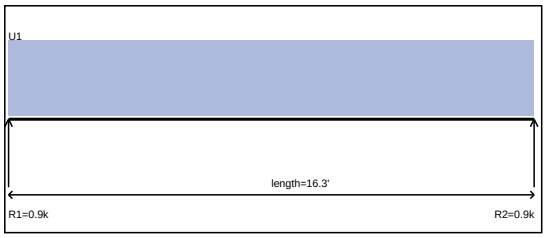
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 3.21k	Vall = 11.13k	Ratio = 0.29
M = 9.56k-ft	Mall = 37.80k-ft	Ratio = 0.25

Deflection
TL = 0.08" L/999+ > L/240 min
DL = 0.03"
L = 0.05" L/999+ > L/360 min

3-1/2x18 GLB

Description - Upper Floor Framing Plan - B2-4 - Flush



Uniform 1 = 0.10 klf (0.0'-16.3')

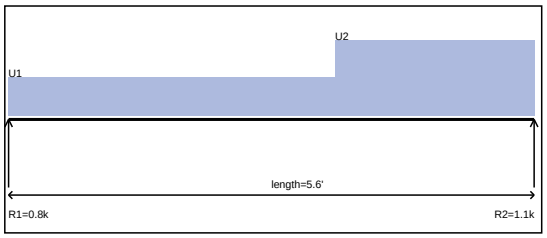
Controlling Load Combination/ Cd
V = D Cd=0.9
M = D Cd=0.9
△ = D

V = 0.82k	Vall = 7.11k	Ratio = 0.11
M = 3.34k-ft	Mall = 16.04k-ft	Ratio = 0.21

Deflection
TL = 0.17" L/999+ > L/240 min
DL = 0.17"
L = 0.00" L/999+ > L/360 min

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

Description - Upper Floor Framing Plan - B2-5 - Flush



Uniform 1 = 0.23 klf (0.0'-3.5')

Uniform 2 = 0.45 klf (3.5'-5.6')

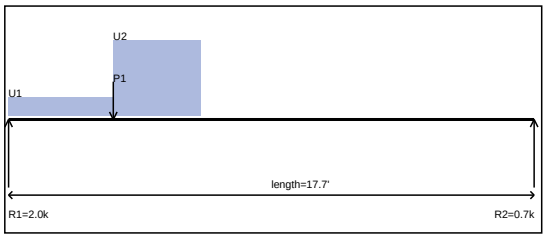
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.02k	Vall = 11.13k	Ratio = 0.09
M = 1.17k-ft	Mall = 37.80k-ft	Ratio = 0.03

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 Plan - B2-6 - Flush



Uniform 1 = 0.10 klf (0.0'-3.5') P1 = 1.16 K (3.5')

Uniform 2 = 0.41 klf (3.5'-6.5')

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

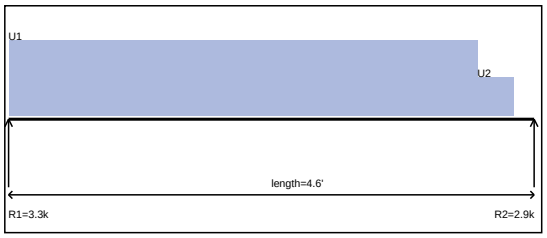
V = 1.95k	Vall = 0 k	Ratio = 0
M = 6.51k-ft	Mall = 0 k-ft	Ratio = 0

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

SEE ENERCALC OUTPUT

Refer to External Design

Description - Upper Floor Framing Plan - B2-7 - Flush



Uniform 1 = 1.44 klf (0.0'-4.1')

Uniform 2 = 0.73 klf (4.1'-4.4')

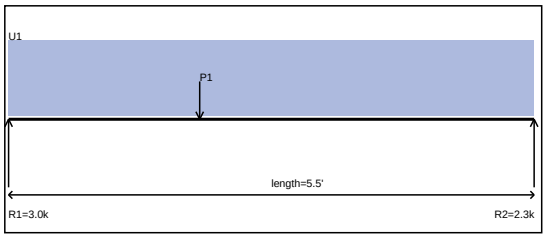
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 2.69k	Vall = 4.21k	Ratio = 0.64
M = 3.06k-ft	Mall = 4.40k-ft	Ratio = 0.70

Deflection
TL = 0.13" L/439 > L/240 min
DL = 0.04"
L = 0.06" L/877 > L/360 min

(2)1-3/4x5-1/2 LVL

Description - Upper Floor Framing Plan - B2-8 - Dropped



Uniform 1 = 0.46 klf (0.0'-5.5')

P1 = 2.65 K (2')

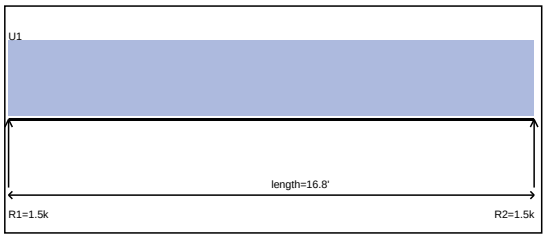
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 2.78k	Vall = 4.72k	Ratio = 0.59
M = 4.62k-ft	Mall = 6.09k-ft	Ratio = 0.76

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

4x12 DF #2

Description - Upper Floor Framing Plan - B2-10 - Flush



Uniform 1 = 0.17 klf (0.0'-16.8')

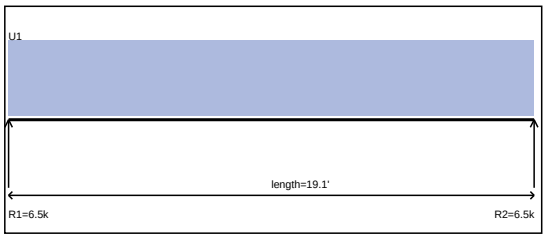
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.43k	Vall = 9.08k	Ratio = 0.16
M = 6.00k-ft	Mall = 20.50k-ft	Ratio = 0.29

Deflection
TL = 0.33" L/616 > L/240 min
DL = 0.23"
L = 0.00" L/999+ > L/360 min

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

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



Uniform 1 = 0.68 klf (0.0'-19.1')

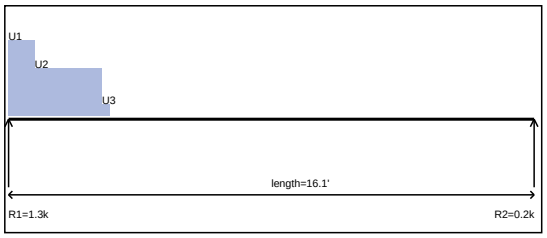
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 6.45k	Vall = 20.11k	Ratio = 0.32
M = 30.82k-ft	Mall = 65.75k-ft	Ratio = 0.47

Deflection
TL = 0.42" L/545 > L/240 min
DL = 0.16"
L = 0.00" L/999+ > L/360 min

5-1/2x18 GLB

Description - Upper Floor Framing Plan - B2-12 - Flush



Uniform 1 = 0.65 klf (0.0'-0.8')

Uniform 2 = 0.41 klf (0.8'-2.9')

Uniform 3 = 0.10 klf (2.9'-3.1')

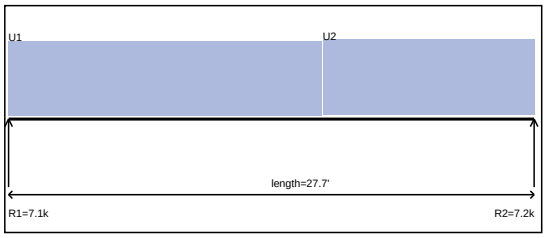
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.27k	Vall = 1.90k	Ratio = 0.67
M = 1.49k-ft	Mall = 4.36k-ft	Ratio = 0.34

Deflection
TL = 0.22" L/877 > L/240 min
DL = 0.10"
L = 0.00" L/999+ > L/360 min

11-7/8" TJI 210 I-Joists

Description - Upper Floor Framing Plan - B2-13 - Flush Top



Uniform 1 = 0.51 klf (0.0'-16.5')

Uniform 2 = 0.52 klf (16.5'-27.7')

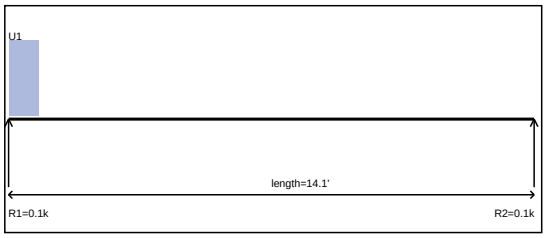
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 7.11k	Vall = 26.82k	Ratio = 0.27
M = 48.85k-ft	Mall = 109.46k-ft	Ratio = 0.45

Deflection
TL = 0.59" L/563 > L/240 min
DL = 0.17"
L = 0.00" L/999+ > L/360 min

5-1/2x24 GLB

Description - Upper Floor Framing Plan - B2-14 - Flush



Uniform 1 = 0.27 klf (0.0'-0.8')

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

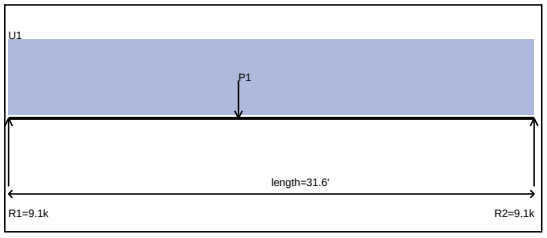
V = 0.01k	Vall = 0 k	Ratio = 0
M = 0.25k-ft	Mall = 0 k-ft	Ratio = 0

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

SEE ENERCALC OUTPUT

Refer to External Design

Description - Upper Floor Framing Plan - B2-15 - Refer to External Design



Uniform 1 = 0.57 klf (0.0'-31.6') P1 = 0.11 K (13.8')

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

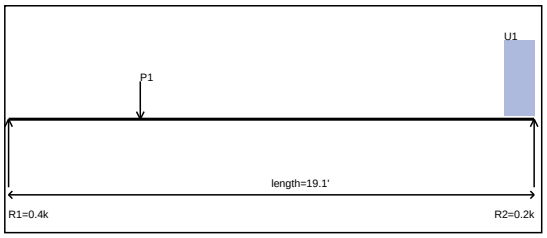
V = 9.02k	Vall = 0 k	Ratio = 0
M = 71.35k-ft	Mall = 0 k-ft	Ratio = 0

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

SEE ENERCALC OUTPUT

Refer to External Design

Description - Upper Floor Framing Plan - B2-16 - Flush



Uniform 1 = 0.03 klf (18.0'-19.1') P1 = 0.41 K (4.8')

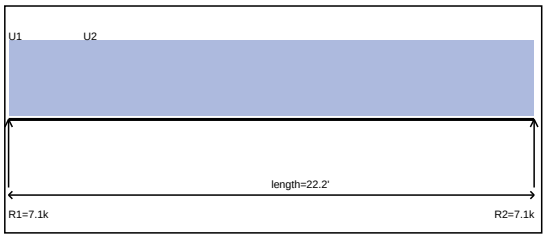
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.31k	Vall = 11.13k	Ratio = 0.03
M = 1.49k-ft	Mall = 37.80k-ft	Ratio = 0.04

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

3-1/2x18 GLB

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



Uniform 1 = 0.64 klf (0.0'-3.1')

Uniform 2 = 0.64 klf (3.2'-22.2')

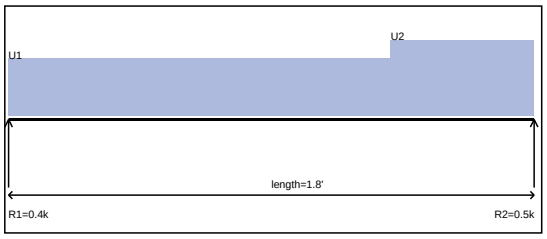
Controlling Load Combination/ Cd
V = (D + S) Cd= NA
M = (D + S) Cd= NA
△ = (D + S)

V = 7.09k	Vall = 70.70k	Ratio = 0.10
M = 39.37k-ft	Mall = 137.00k-ft	Ratio = 0.29

Deflection
TL = 0.49" L/548 > L/240 min
DL = 0.14"
L = 0.00" L/999+ > L/360 min

W10x45 Steel

Description - Upper Floor Framing Plan - B2-18 - Flush



Uniform 1 = 0.40 klf (0.0'-1.3')

Uniform 2 = 0.53 klf (1.3'-1.8')

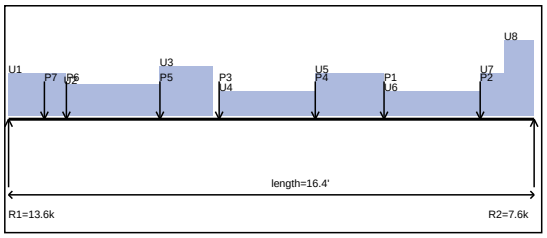
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.41k	Vall = 11.13k	Ratio = 0.04
M = 0.17k-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 - Upper Floor Framing Plan - B2-19 - Flush



Uniform 1 = 0.79 klf (0.0'-1.8')
Uniform 2 = 0.58 klf (1.7'-4.7')
Uniform 3 = 0.92 klf (4.7'-6.4')
Uniform 4 = 0.45 klf (6.6'-9.6')
Uniform 5 = 0.79 klf (9.6'-11.7')
Uniform 6 = 0.45 klf (11.7'-14.7')
Uniform 7 = 0.79 klf (14.7'-15.5')
Uniform 8 = 1.40 klf (15.5'-16.4')

P1 = 0.51 K (11.7')
P2 = 0.51 K (14.7')
P3 = 0.51 K (6.6')
P4 = 0.51 K (9.6')
P5 = 0.51 K (4.7')
P6 = 0.65 K (1.8')
P7 = 7.07 K (1.1')

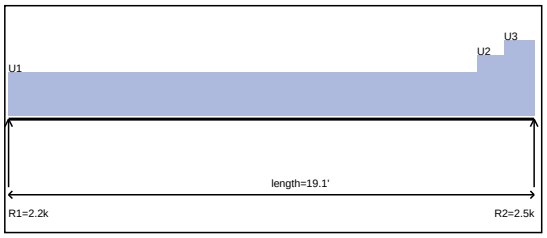
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 11.22k	Vall = 20.11k	Ratio = 0.56
M = 26.01k-ft	Mall = 66.76k-ft	Ratio = 0.39

Deflection
TL = 0.26" L/752 > L/240 min
DL = 0.10"
L = 0.11" L/999+ > L/360 min

5-1/2x18 GLB

Description - Upper Floor Framing Plan - B2-20 - Flush



Uniform 1 = 0.23 klf (0.0'-17.1')
Uniform 2 = 0.32 klf (17.1'-18.0')
Uniform 3 = 0.40 klf (18.0'-19.1')

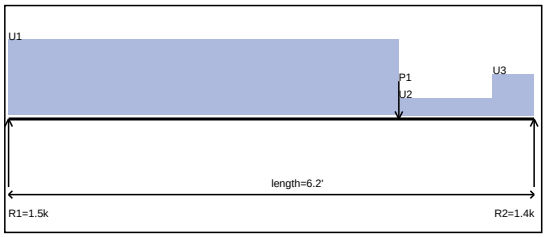
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 2.43k	Vall = 13.62k	Ratio = 0.18
M = 10.47k-ft	Mall = 30.74k-ft	Ratio = 0.34

Deflection
TL = 0.50" L/464 > L/240 min
DL = 0.22"
L = 0.00" L/999+ > L/360 min

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

Description - Upper Floor Framing Plan - B2-21 - Flush



Uniform 1 = 0.44 klf (0.0'-4.6')
Uniform 2 = 0.10 klf (4.6'-5.8')
Uniform 3 = 0.24 klf (5.8'-6.2')

P1 = 0.51 K (4.6')

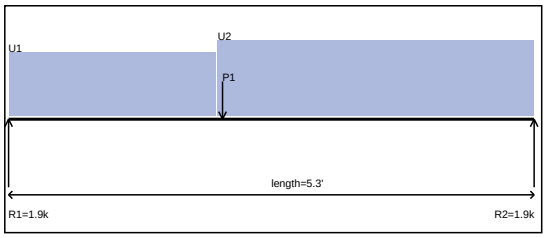
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.43k	Vall = 20.11k	Ratio = 0.07
M = 2.34k-ft	Mall = 68.31k-ft	Ratio = 0.03

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 Plan - B2-22 - Flush



Uniform 1 = 0.50 klf (0.0'-2.1') P1 = 0.74 K (2.1')

Uniform 2 = 0.60 klf (2.1'-5.3')

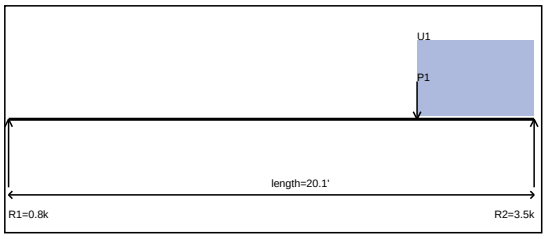
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.84k	Vall = 9.08k	Ratio = 0.20
M = 2.79k-ft	Mall = 20.50k-ft	Ratio = 0.14

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

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

Description - Upper Floor Framing Plan - B2-23 - Flush



Uniform 1 = 0.39 klf (15.7'-20.1') P1 = 2.43 K (15.7')

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

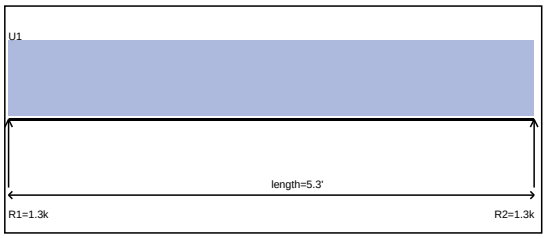
V = 3.43k	Vall = 13.62k	Ratio = 0.25
M = 11.53k-ft	Mall = 30.74k-ft	Ratio = 0.38

Deflection
TL = 0.60" L/400 > L/240 min
DL = 0.25"
L = 0.00" L/999+ > L/360 min

SEE ENERCALC OUTPUT

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

Description - Upper Floor Framing Plan - B2-24 - Flush



Uniform 1 = 0.48 klf (0.0'-5.3')

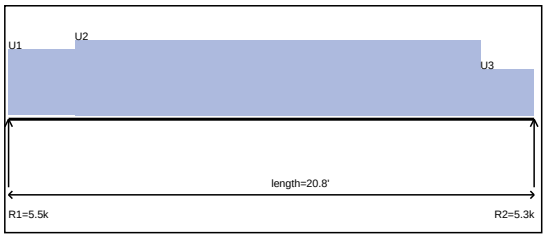
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.27k	Vall = 9.08k	Ratio = 0.14
M = 1.67k-ft	Mall = 20.50k-ft	Ratio = 0.08

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

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

Description - Upper Floor Framing Plan - B2-25 - Flush



Uniform 1 = 0.48 klf (0.0'-2.6')

Uniform 2 = 0.55 klf (2.6'-18.6')

Uniform 3 = 0.34 klf (18.6'-20.8')

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

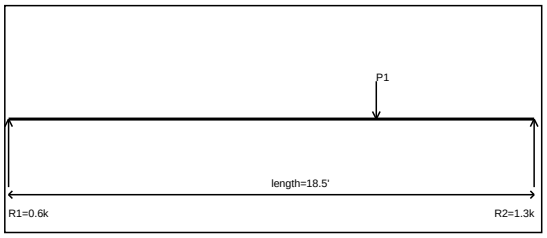
V = 5.47k	Vall = 0 k	Ratio = 0
M = 28.75k-ft	Mall = 0 k-ft	Ratio = 0

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

SEE ENERCALC OUTPUT

Refer to External Design

Description - Upper Floor Framing Plan - B2-26 - Flush



P1 = 1.84 K (13.0')

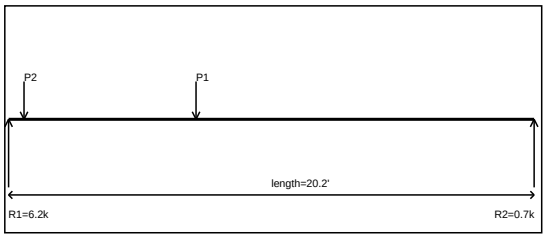
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 1.29k	Vall = 9.08k	Ratio = 0.14
M = 7.17k-ft	Mall = 20.50k-ft	Ratio = 0.35

Deflection
TL = 0.48" L/466 > L/240 min
DL = 0.15"
L = 0.00" L/999+ > L/360 min

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

Description - Upper Floor Framing Plan - B2-27 - Flush



P1 = 1.27 K (7.2')

P2 = 5.54 K (0.6')

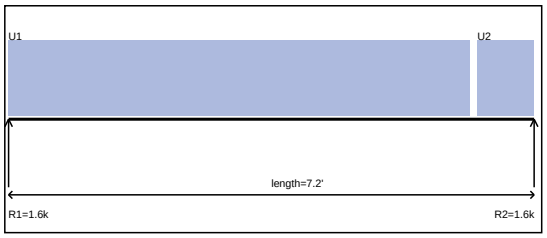
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 6.13k	Vall = 9.08k	Ratio = 0.67
M = 7.95k-ft	Mall = 20.50k-ft	Ratio = 0.39

Deflection
TL = 0.63" L/386 > L/240 min
DL = 0.18"
L = 0.00" L/999+ > L/360 min

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

Description - Main Floor Framing Plan - B1-1 - Dropped



Uniform 1 = 0.44 klf (0.0'-6.3')

Uniform 2 = 0.44 klf (6.4'-7.2')

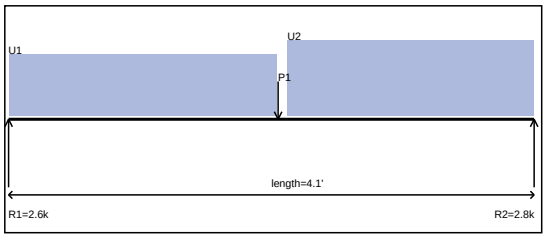
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.59k	Vall = 3.88k	Ratio = 0.41
M = 2.84k-ft	Mall = 4.49k-ft	Ratio = 0.63

Deflection
TL = 0.07" L/999+ > L/240 min
DL = 0.01"
L = 0.06" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing Plan - B1-2 - Dropped



Uniform 1 = 0.44 klf (0.0'-2.1') P1 = 3.31 K (2.1')

Uniform 2 = 0.54 klf (2.2'-4.1')

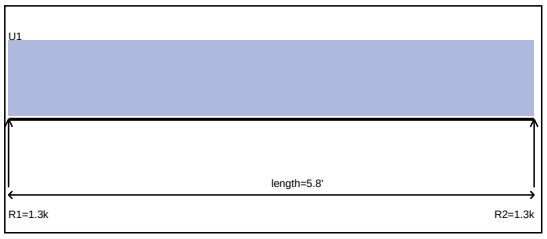
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 2.73k	Vall = 3.88k	Ratio = 0.70
M = 4.35k-ft	Mall = 4.49k-ft	Ratio = 0.97

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

4x10 DF #2

Description - Main Floor Framing Plan - B1-3 - Dropped



Uniform 1 = 0.44 klf (0.0'-5.8')

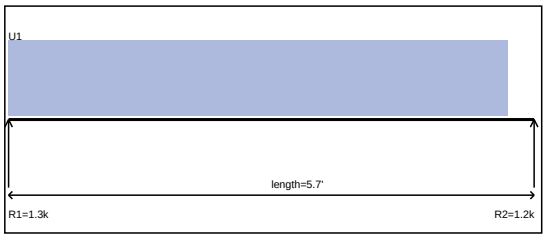
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.28k	Vall = 3.88k	Ratio = 0.33
M = 1.85k-ft	Mall = 4.49k-ft	Ratio = 0.41

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 Plan - B1-4 - Dropped



Uniform 1 = 0.44 klf (0.0'-5.5')

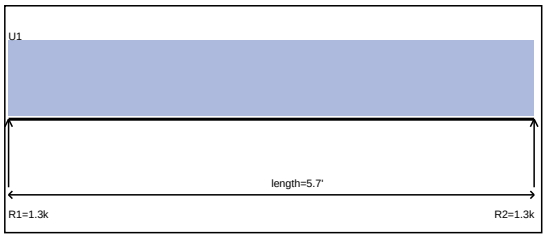
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.27k	Vall = 3.88k	Ratio = 0.33
M = 1.82k-ft	Mall = 4.49k-ft	Ratio = 0.41

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 Plan - B1-5 - Dropped



Uniform 1 = 0.44 klf (0.0'-5.7')

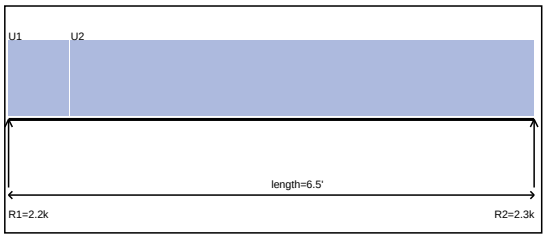
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.27k	Vall = 3.88k	Ratio = 0.33
M = 1.81k-ft	Mall = 4.49k-ft	Ratio = 0.40

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 Plan - B1-6 - Dropped



Uniform 1 = 0.68 klf (0.0'-0.7')

Uniform 2 = 0.68 klf (0.8'-6.5')

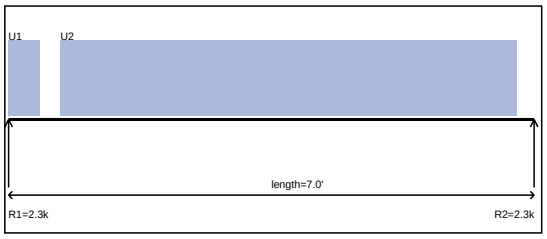
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 2.20k	Vall = 3.88k	Ratio = 0.57
M = 3.58k-ft	Mall = 4.49k-ft	Ratio = 0.80

Deflection
TL = 0.07" L/999+ > L/240 min
DL = 0.01"
L = 0.06" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing Plan - B1-7 - Dropped



Uniform 1 = 0.68 klf (0.0'-0.4')

Uniform 2 = 0.68 klf (0.7'-6.8')

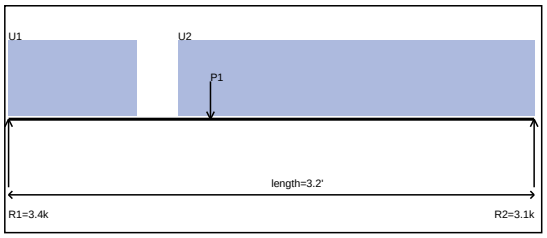
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 2.21k	Vall = 3.88k	Ratio = 0.57
M = 4.09k-ft	Mall = 4.49k-ft	Ratio = 0.91

Deflection
TL = 0.10" L/860 > L/240 min
DL = 0.02"
L = 0.08" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing Plan - B1-8 - Dropped



Uniform 1 = 1.45 klf (0.0'-0.8') P1 = 2.07 K (1.2')

Uniform 2 = 1.45 klf (1.0'-3.2')

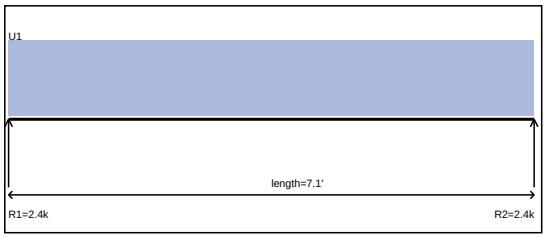
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 2.76k	Vall = 4.47k	Ratio = 0.62
M = 2.57k-ft	Mall = 5.17k-ft	Ratio = 0.50

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 Plan - B1-9 - Dropped



Uniform 1 = 0.65 klf (0.0'-7.1')

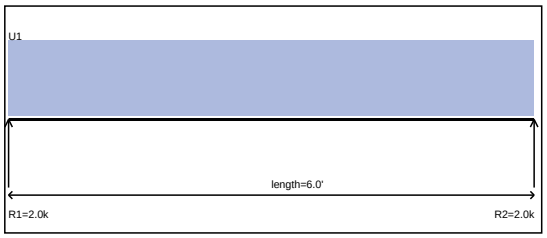
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 2.31k	Vall = 3.88k	Ratio = 0.60
M = 4.12k-ft	Mall = 4.49k-ft	Ratio = 0.92

Deflection
TL = 0.10" L/840 > L/240 min
DL = 0.02"
L = 0.08" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing Plan - B1-10 - Dropped



Uniform 1 = 0.65 klf (0.0'-6.0')

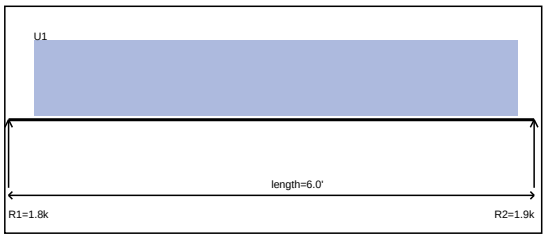
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.95k	Vall = 3.88k	Ratio = 0.50
M = 2.92k-ft	Mall = 4.49k-ft	Ratio = 0.65

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 Plan - B1-11 - Dropped



Uniform 1 = 0.65 klf (0.3'-5.8')

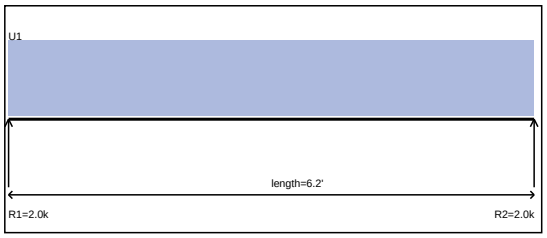
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.82k	Vall = 3.88k	Ratio = 0.47
M = 2.90k-ft	Mall = 4.49k-ft	Ratio = 0.65

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 Plan - B1-12 - Dropped



Uniform 1 = 0.64 klf (0.0'-6.2')

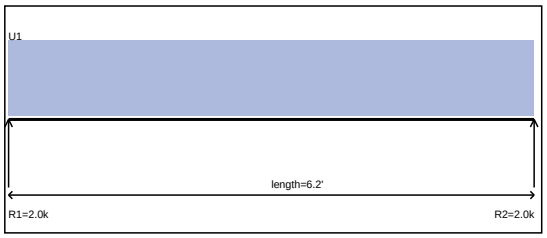
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.98k	Vall = 3.88k	Ratio = 0.51
M = 3.07k-ft	Mall = 4.49k-ft	Ratio = 0.68

Deflection
TL = 0.06" L/999+ > L/240 min
DL = 0.01"
L = 0.05" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing Plan - B1-13 - Dropped



Uniform 1 = 0.64 klf (0.0'-6.2')

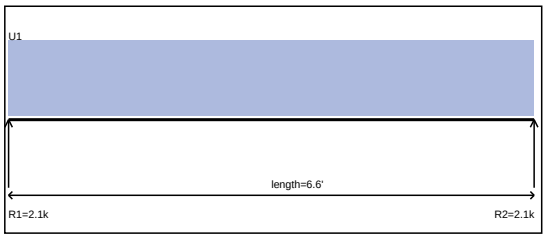
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.96k	Vall = 3.88k	Ratio = 0.50
M = 3.01k-ft	Mall = 4.49k-ft	Ratio = 0.67

Deflection
TL = 0.06" L/999+ > L/240 min
DL = 0.01"
L = 0.04" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing Plan - B1-14 - Dropped



Uniform 1 = 0.64 klf (0.0'-6.6')

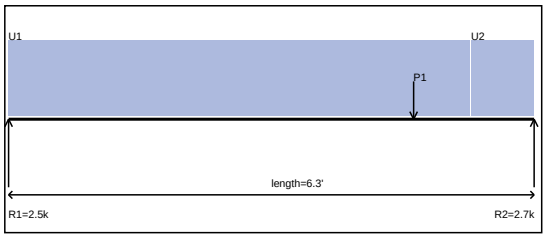
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 2.10k	Vall = 3.88k	Ratio = 0.54
M = 3.46k-ft	Mall = 4.49k-ft	Ratio = 0.77

Deflection
TL = 0.07" L/999+ > L/240 min
DL = 0.01"
L = 0.06" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing Plan - B1-15 - Dropped



Uniform 1 = 0.77 klf (0.0'-5.5') P1 = 0.37 K (4.8')

Uniform 2 = 0.77 klf (5.5'-6.3')

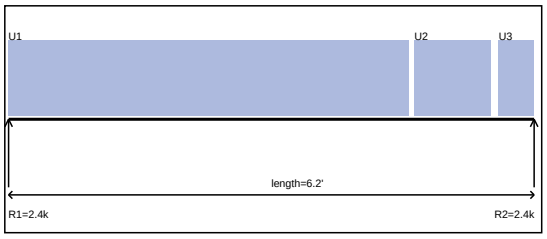
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 2.69k	Vall = 3.88k	Ratio = 0.69
M = 4.03k-ft	Mall = 4.49k-ft	Ratio = 0.90

Deflection
TL = 0.08" L/977 > L/240 min
DL = 0.02"
L = 0.06" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing Plan - B1-16 - Dropped



Uniform 1 = 0.77 klf (0.0'-4.8')

Uniform 2 = 0.77 klf (4.8'-5.7')

Uniform 3 = 0.77 klf (5.8'-6.2')

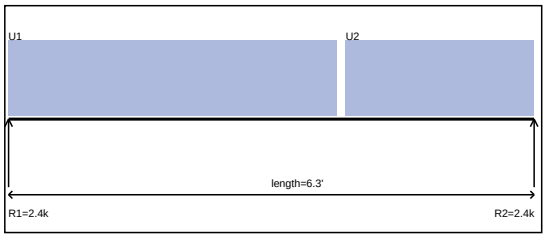
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 2.40k	Vall = 3.88k	Ratio = 0.62
M = 3.72k-ft	Mall = 4.49k-ft	Ratio = 0.83

Deflection
TL = 0.07" L/999+ > L/240 min
DL = 0.01"
L = 0.06" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing Plan - B1-17 - Dropped



Uniform 1 = 0.77 klf (0.0'-3.9')

Uniform 2 = 0.77 klf (4.0'-6.3')

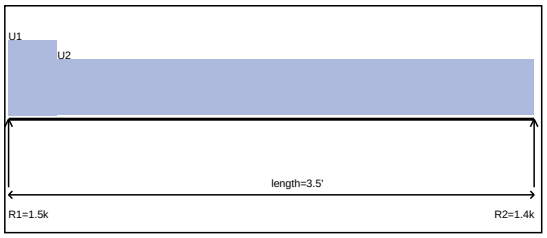
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 2.38k	Vall = 3.88k	Ratio = 0.61
M = 3.68k-ft	Mall = 4.49k-ft	Ratio = 0.82

Deflection
TL = 0.07" L/999+ > L/240 min
DL = 0.01"
L = 0.06" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing Plan - B1-18 - Dropped



Uniform 1 = 1.04 klf (0.0'-0.3')

Uniform 2 = 0.77 klf (0.3'-3.5')

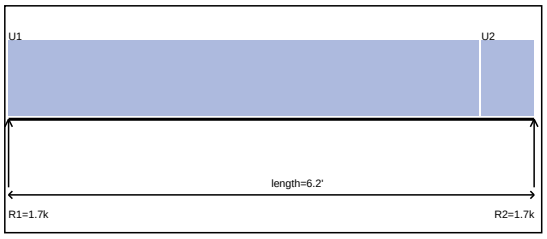
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.44k	Vall = 3.88k	Ratio = 0.37
M = 1.19k-ft	Mall = 4.49k-ft	Ratio = 0.27

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 Plan - B1-19 - Dropped



Uniform 1 = 0.53 klf (0.0'-5.6')

Uniform 2 = 0.53 klf (5.6'-6.2')

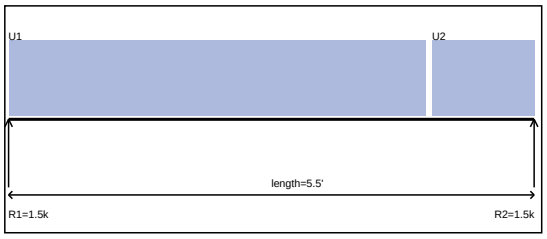
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.64k	Vall = 3.88k	Ratio = 0.42
M = 2.55k-ft	Mall = 4.49k-ft	Ratio = 0.57

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 Plan - B1-20 - Dropped



Uniform 1 = 0.53 klf (0.0'-4.4')

Uniform 2 = 0.53 klf (4.4'-5.5')

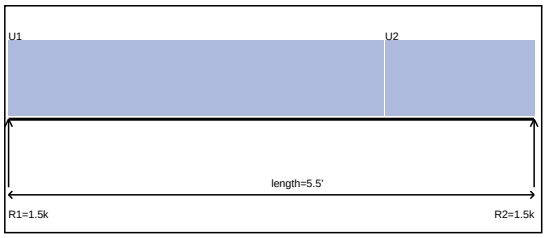
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.45k	Vall = 3.88k	Ratio = 0.37
M = 1.99k-ft	Mall = 4.49k-ft	Ratio = 0.44

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 Plan - B1-21 - Dropped



Uniform 1 = 0.53 klf (0.0'-3.9')

Uniform 2 = 0.53 klf (3.9'-5.5')

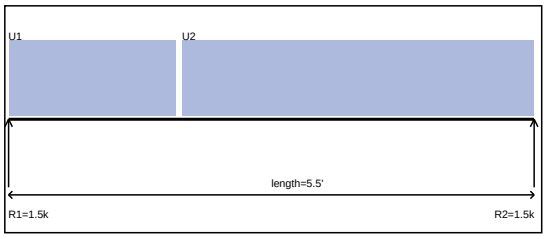
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.45k	Vall = 3.88k	Ratio = 0.37
M = 2.00k-ft	Mall = 4.49k-ft	Ratio = 0.44

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 Plan - B1-22 - Dropped



Uniform 1 = 0.53 klf (0.0'-1.7')

Uniform 2 = 0.53 klf (1.8'-5.5')

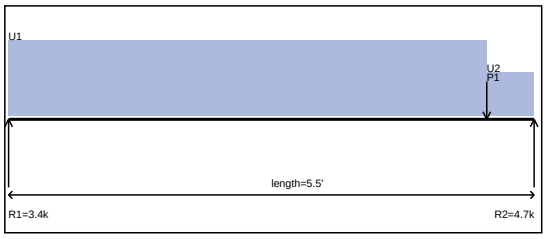
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.43k	Vall = 3.88k	Ratio = 0.37
M = 1.94k-ft	Mall = 4.49k-ft	Ratio = 0.43

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 Plan - B1-23 - Dropped



Uniform 1 = 1.18 klf (0.0'-5.0') P1 = 1.75 K (5.0')

Uniform 2 = 0.68 klf (5.0'-5.5')

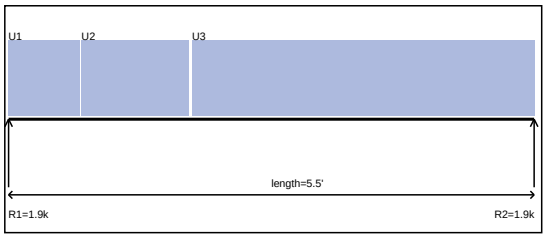
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 3.79k	Vall = 4.47k	Ratio = 0.85
M = 4.01k-ft	Mall = 5.17k-ft	Ratio = 0.78

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

4x10 DF #2

Description - Main Floor Framing Plan - B1-24 - Dropped



Uniform 1 = 0.68 klf (0.0'-0.7')

Uniform 2 = 0.68 klf (0.8'-1.9')

Uniform 3 = 0.68 klf (1.9'-5.5')

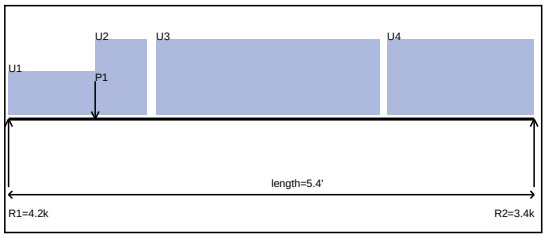
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.88k	Vall = 3.88k	Ratio = 0.48
M = 2.58k-ft	Mall = 4.49k-ft	Ratio = 0.58

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 Plan - B1-25 - Dropped



Uniform 1 = 0.68 klf (0.0'-0.9')

P1 = 1.75 K (0.9')

Uniform 2 = 1.18 klf (0.9'-1.4')

Uniform 3 = 1.18 klf (1.5'-3.8')

Uniform 4 = 1.18 klf (3.9'-5.4')

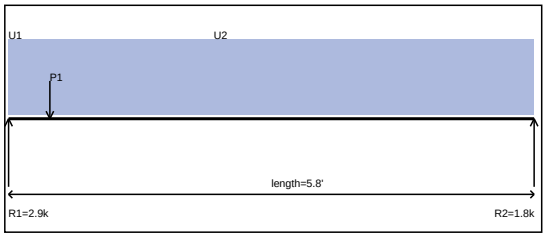
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 3.42k	Vall = 4.47k	Ratio = 0.77
M = 4.05k-ft	Mall = 5.17k-ft	Ratio = 0.78

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

4x10 DF #2

Description - Main Floor Framing Plan - B1-26 - Dropped



Uniform 1 = 0.58 klf (0.0'-2.2')

P1 = 1.29 K (0.5')

Uniform 2 = 0.58 klf (2.2'-5.8')

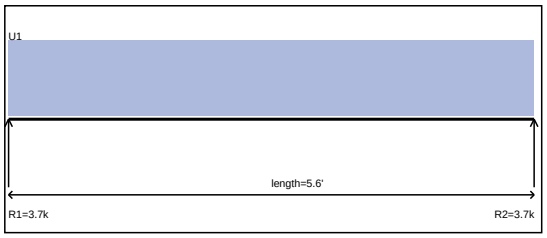
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 2.05k	Vall = 3.88k	Ratio = 0.53
M = 2.50k-ft	Mall = 4.49k-ft	Ratio = 0.56

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 Plan - B1-27 - Dropped



Uniform 1 = 1.32 klf (0.0'-5.6')

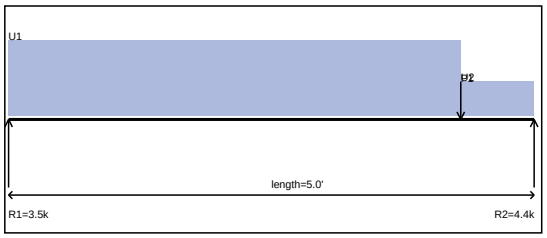
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 3.03k	Vall = 4.47k	Ratio = 0.68
M = 4.21k-ft	Mall = 5.17k-ft	Ratio = 0.81

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

4x10 DF #2

Description - Main Floor Framing Plan - B1-28 - Dropped



Uniform 1 = 1.32 klf (0.0'-4.3')

P1 = 1.78 K (4.3')

Uniform 2 = 0.61 klf (4.3'-5.0')

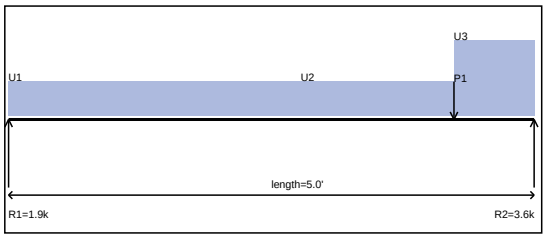
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 3.59k	Vall = 4.47k	Ratio = 0.80
M = 3.83k-ft	Mall = 5.17k-ft	Ratio = 0.74

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

4x10 DF #2

Description - Main Floor Framing Plan - B1-29 - Dropped



Uniform 1 = 0.61 klf (0.0'-2.8')

P1 = 1.78 K (4.2')

Uniform 2 = 0.61 klf (2.8'-4.2')

Uniform 3 = 1.32 klf (4.2'-5.0')

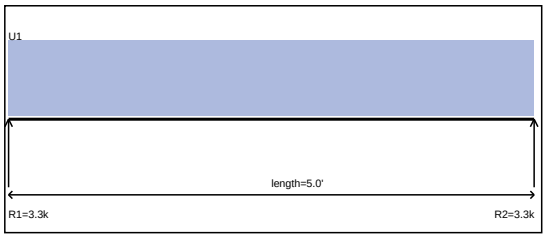
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + L) Cd=1
△ = (D + 0.75 * (L + S))

V = 2.92k	Vall = 4.47k	Ratio = 0.65
M = 2.13k-ft	Mall = 4.49k-ft	Ratio = 0.47

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 Plan - B1-30 - Dropped



Uniform 1 = 1.32 klf (0.0'-5.0')

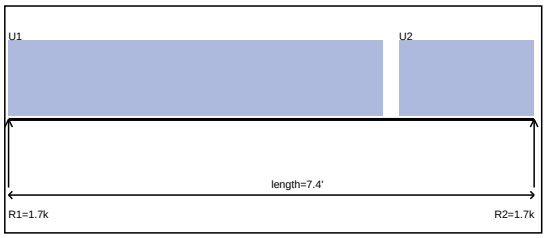
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 2.73k	Vall = 4.47k	Ratio = 0.61
M = 3.41k-ft	Mall = 5.17k-ft	Ratio = 0.66

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

4x10 DF #2

Description - Main Floor Framing Plan - B1-31 - Dropped



Uniform 1 = 0.46 klf (0.0'-5.3')

Uniform 2 = 0.46 klf (5.5'-7.4')

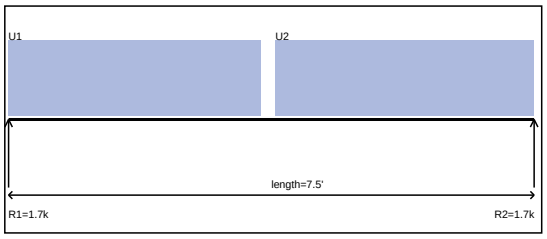
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.69k	Vall = 3.88k	Ratio = 0.43
M = 3.07k-ft	Mall = 4.49k-ft	Ratio = 0.68

Deflection
TL = 0.08" L/999+ > L/240 min
DL = 0.02"
L = 0.07" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing Plan - B1-32 - Dropped



Uniform 1 = 0.46 klf (0.0'-3.6')

Uniform 2 = 0.46 klf (3.8'-7.5')

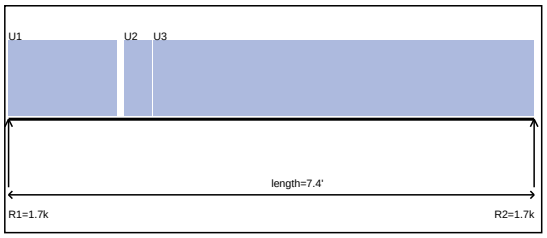
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.69k	Vall = 3.88k	Ratio = 0.43
M = 3.07k-ft	Mall = 4.49k-ft	Ratio = 0.68

Deflection
TL = 0.08" L/999+ > L/240 min
DL = 0.02"
L = 0.07" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing Plan - B1-33 - Dropped



Uniform 1 = 0.46 klf (0.0'-1.5')

Uniform 2 = 0.46 klf (1.6'-2.0')

Uniform 3 = 0.46 klf (2.0'-7.4')

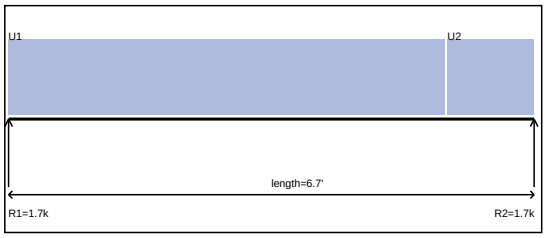
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.69k	Vall = 3.88k	Ratio = 0.44
M = 3.10k-ft	Mall = 4.49k-ft	Ratio = 0.69

Deflection
TL = 0.08" L/999+ > L/240 min
DL = 0.02"
L = 0.07" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing Plan - B1-34 - Dropped



Uniform 1 = 0.49 klf (0.0'-5.6')

Uniform 2 = 0.49 klf (5.6'-6.7')

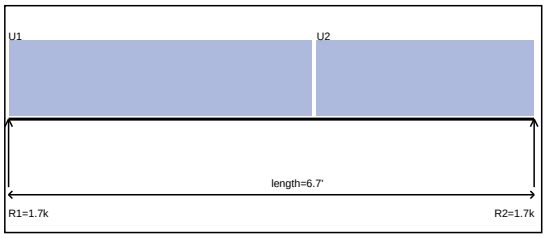
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.63k	Vall = 3.88k	Ratio = 0.42
M = 2.72k-ft	Mall = 4.49k-ft	Ratio = 0.61

Deflection
TL = 0.06" L/999+ > L/240 min
DL = 0.01"
L = 0.05" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing Plan - B1-35 - Dropped



Uniform 1 = 0.49 klf (0.0'-3.9')

Uniform 2 = 0.49 klf (3.9'-6.7')

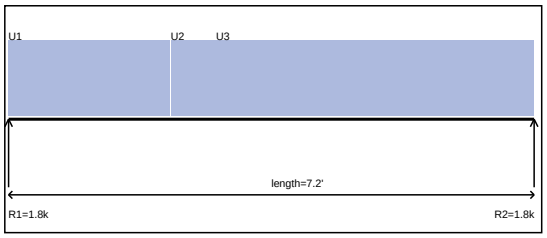
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.63k	Vall = 3.88k	Ratio = 0.42
M = 2.71k-ft	Mall = 4.49k-ft	Ratio = 0.60

Deflection
TL = 0.06" L/999+ > L/240 min
DL = 0.01"
L = 0.05" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing Plan - B1-36 - Dropped



Uniform 1 = 0.49 klf (0.0'-2.2')

Uniform 2 = 0.49 klf (2.2'-2.9')

Uniform 3 = 0.49 klf (2.9'-7.2')

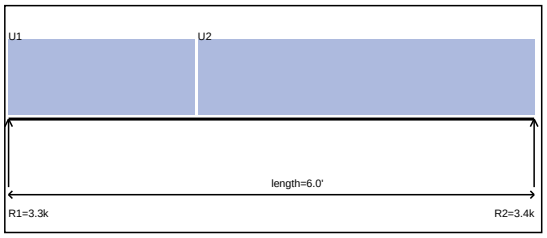
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.76k	Vall = 3.88k	Ratio = 0.45
M = 3.18k-ft	Mall = 4.49k-ft	Ratio = 0.71

Deflection
TL = 0.08" L/999+ > L/240 min
DL = 0.02"
L = 0.06" L/999+ > L/360 min

4x10 DF #2

Description - Main Floor Framing Plan - B1-37 - Dropped



Uniform 1 = 1.11 klf (0.0'-2.1')

Uniform 2 = 1.11 klf (2.1'-6.0')

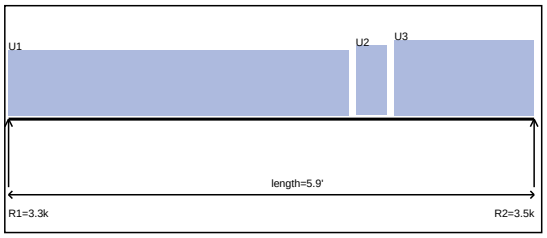
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 2.74k	Vall = 4.47k	Ratio = 0.61
M = 4.06k-ft	Mall = 5.17k-ft	Ratio = 0.79

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

4x10 DF #2

Description - Main Floor Framing Plan - B1-38 - Dropped



Uniform 1 = 1.11 klf (0.0'-3.8')

Uniform 2 = 1.18 klf (3.9'-4.3')

Uniform 3 = 1.28 klf (4.3'-5.9')

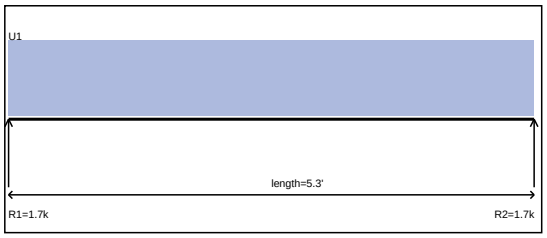
Controlling Load Combination/ Cd
V = (D + 0.75 * (L + S)) Cd=1.15
M = (D + 0.75 * (L + S)) Cd=1.15
△ = (D + 0.75 * (L + S))

V = 2.83k	Vall = 4.47k	Ratio = 0.63
M = 4.01k-ft	Mall = 5.17k-ft	Ratio = 0.78

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

4x10 DF #2

Description - Main Floor Framing Plan - B1-39 - Dropped



Uniform 1 = 0.61 klf (0.0'-5.3')

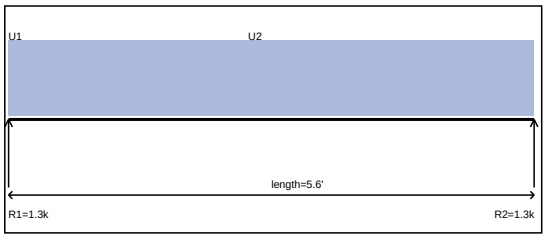
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.62k	Vall = 3.88k	Ratio = 0.42
M = 2.16k-ft	Mall = 4.49k-ft	Ratio = 0.48

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 Plan - B1-40 - Dropped



Uniform 1 = 0.46 klf (0.0'-2.5')

Uniform 2 = 0.46 klf (2.5'-5.6')

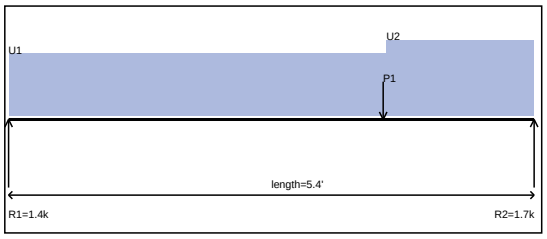
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.27k	Vall = 3.88k	Ratio = 0.33
M = 1.76k-ft	Mall = 4.49k-ft	Ratio = 0.39

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 Plan - B1-41 - Dropped



Uniform 1 = 0.46 klf (0.0'-3.9')

P1 = 0.37 K (3.8')

Uniform 2 = 0.56 klf (3.9'-5.4')

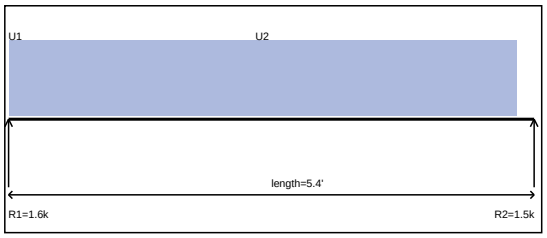
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.62k	Vall = 3.88k	Ratio = 0.42
M = 2.01k-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 Plan - B1-42 - Dropped



Uniform 1 = 0.56 klf (0.0'-2.5')

Uniform 2 = 0.56 klf (2.5'-5.2')

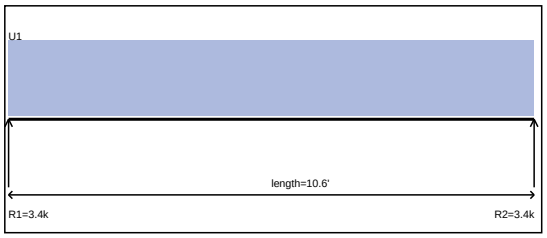
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 1.50k	Vall = 3.88k	Ratio = 0.39
M = 2.02k-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 Plan - B1-43 - Flush



Uniform 1 = 0.63 klf (0.0'-10.6')

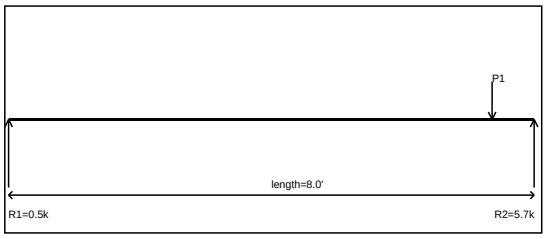
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 3.31k	Vall = 3.95k	Ratio = 0.84
M = 8.75k-ft	Mall = 8.91k-ft	Ratio = 0.98

Deflection
TL = 0.38" L/335 > L/240 min
DL = 0.15"
L = 0.23" L/547 > L/360 min

1-3/4x11-7/8 LVL

Description - Main Floor Framing Plan - B1-44 - Flush



P1 = 6.13 K (7.3')

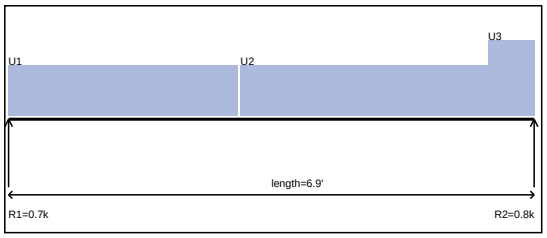
Controlling Load Combination/ Cd
V = (D + S) Cd=1.15
M = (D + S) Cd=1.15
△ = (D + S)

V = 5.64k	Vall = 9.08k	Ratio = 0.62
M = 3.59k-ft	Mall = 20.50k-ft	Ratio = 0.18

Deflection
TL = 0.04" L/999+ > L/240 min
DL = 0.01"
L = 0.00" L/999+ > L/360 min

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

Description - Main Floor Framing Plan - B1-47 - Flush



Uniform 1 = 0.20 klf (0.0'-3.0')

Uniform 2 = 0.20 klf (3.1'-6.3')

Uniform 3 = 0.30 klf (6.3'-6.9')

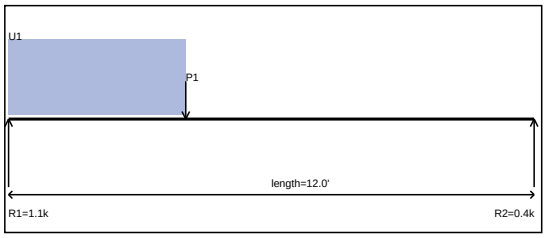
Controlling Load Combination/ Cd
V = (D + L) Cd=1
M = (D + L) Cd=1
△ = (D + L)

V = 0.75k	Vall = 3.95k	Ratio = 0.19
M = 1.19k-ft	Mall = 8.91k-ft	Ratio = 0.13

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

1-3/4x11-7/8 LVL

Description - Main Floor Framing Plan - B1-48 - Flush



Uniform 1 = 0.17 klf (0.0'-4.1')

P1 = 0.75 K (4.1')

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

V = 1.07k	Vall = 3.95k	Ratio = 0.27
M = 2.94k-ft	Mall = 8.91k-ft	Ratio = 0.33

Deflection
TL = 0.17" L/875 > L/240 min
DL = 0.03"
L = 0.13" L/999+ > L/360 min

1-3/4x11-7/8 LVL

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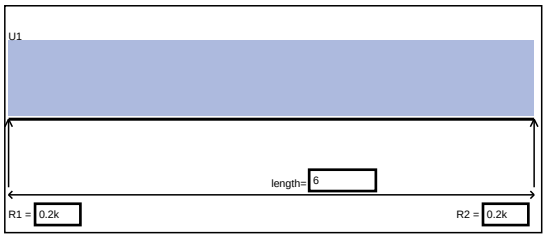
Description - Main Floor Framing - F1-1 - Flush Bottom



Uniform 1 = 0.067 klf P1 =
Uniform 2 = P2 =

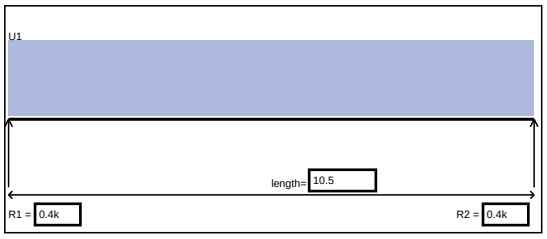
Controlling Load Combination/ Cd
V = (D + L) Cd = 1
M = (D + L) Cd = 1
△ = (D + L)

V =	0.2k	Vall =	1.09k	Ratio =	0.18
M =	0.3k-ft	Mall =	1.28k-ft	Ratio =	0.23

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

2x8 HF #2 @ 16" o.c.

Description - Low Roof Framing - F10-1 - Flush



Uniform 1 = 0.07 klf P1 =
Uniform 2 = P2 =

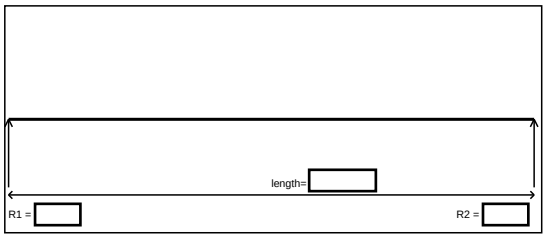
Controlling Load Combination/ Cd
V = (D + S) Cd = 1.15
M = (D + S) Cd = 1.15
△ = (D + S)

V =	0.4k	Vall =	1.25k	Ratio =	0.32
M =	1.0k-ft	Mall =	1.48k-ft	Ratio =	0.68

Deflection
TL = 0.31" L/999+ > L/240 min
DL = 0.09"
L = 0.00" L/999+ > L/360 min

2x8 HF #2 @ 24" o.c.

Description -



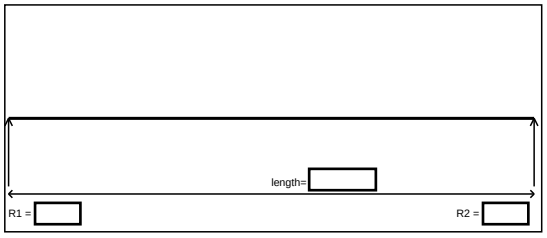
Uniform 1 = P1 =
Uniform 2 = P2 =

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

V =		Vall =		Ratio =	
M =		Mall =		Ratio =	

Deflection
TL =
DL =
L =

Description -



Uniform 1 = P1 =
Uniform 2 = P2 =

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

V =		Vall =		Ratio =	
M =		Mall =		Ratio =	

Deflection
TL =
DL =
L =

Wood Beam

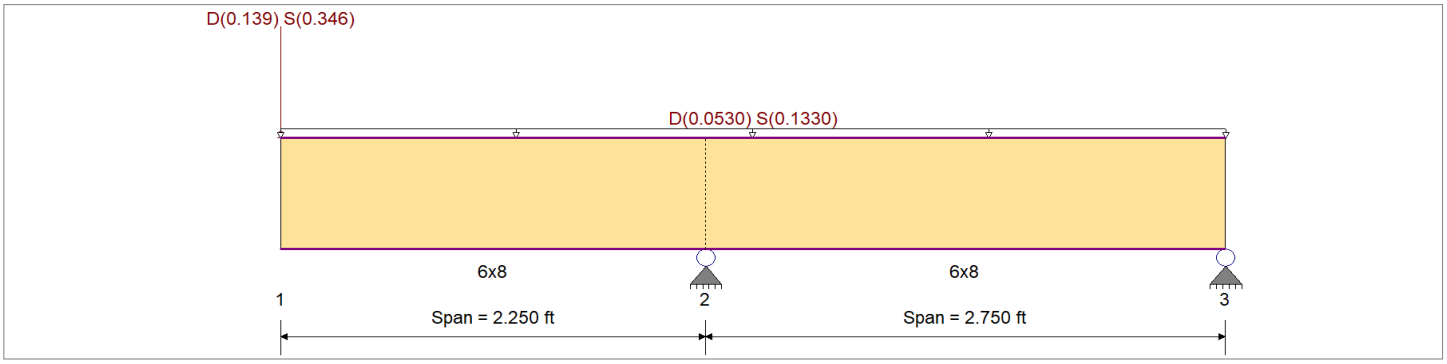
DESCRIPTION: B10-1/3

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	875 psi	*E : Modulus of Elasticity*	
Load Combination :	ASCE 7-16	Fb -	875 psi	Ebend- xx	1300 ksi
		Fc - Prll	600 psi	Eminbend - xx	470 ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625 psi		
Wood Grade :	No.2	Fv	170 psi		
		Ft	425 psi	Density	31.21 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added
Loads on all spans...
Uniform Load on ALL spans : D = 0.0530, S = 0.1330 k/ft
Load for Span Number 1
Point Load : D = 0.1390, S = 0.3460 k @ 0.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.361 : 1	Maximum Shear Stress Ratio	=	0.147 : 1
Section used for this span		6x8	Section used for this span		6x8
fb: Actual	=	363.53 psi	fv: Actual	=	28.69 psi
F'b	=	1,006.25 psi	F'v	=	195.50 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	2.250 ft	Location of maximum on span	=	1.634 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.026 in	Ratio = 2072	>=360	Span: 1 : S Only
Max Upward Transient Deflection	-0.003 in	Ratio = 10609	>=360	Span: 2 : S Only
Max Downward Total Deflection	0.036 in	Ratio = 1480	>=180	Span: 1 : +D+S+H
Max Upward Total Deflection	-0.004 in	Ratio = 7571	>=180	Span: 2 : +D+S+H

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
+D+H														0.0	0.00	0.0	0.0
Length = 2.250 ft	1	0.132	0.054	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	787.5	0.23	8.2	153.0
Length = 2.750 ft	2	0.132	0.054	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	787.5	0.20	8.2	153.0
+D+L+H, LL Comb Run (*L)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	1	0.119	0.048	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	875.0	0.23	8.2	170.0
Length = 2.750 ft	2	0.119	0.048	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	875.0	0.20	8.2	170.0
+D+L+H, LL Comb Run (L*)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0

DESCRIPTION: B10-1/3

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 2.250 ft	**1**	0.119	0.048	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	875.0	0.23	8.2	170.0
Length = 2.750 ft	**2**	0.119	0.048	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	875.0	0.20	8.2	170.0
+D+L+H, LL Comb Run (LL)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.119	0.048	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	875.0	0.23	8.2	170.0
Length = 2.750 ft	**2**	0.119	0.048	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	875.0	0.20	8.2	170.0
+D+Lr+H, LL Comb Run (*L)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.095	0.039	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,093.8	0.23	8.2	212.5
Length = 2.750 ft	**2**	0.095	0.039	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,093.8	0.20	8.2	212.5
+D+Lr+H, LL Comb Run (L*)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.095	0.039	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,093.8	0.23	8.2	212.5
Length = 2.750 ft	**2**	0.095	0.039	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,093.8	0.20	8.2	212.5
+D+Lr+H, LL Comb Run (LL)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.095	0.039	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,093.8	0.23	8.2	212.5
Length = 2.750 ft	**2**	0.095	0.039	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,093.8	0.20	8.2	212.5
+D+S+H					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.361	0.147	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.56	363.5	1,006.3	0.79	28.7	195.5
Length = 2.750 ft	**2**	0.361	0.147	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.56	363.5	1,006.3	0.71	28.7	195.5
+D+0.750Lr+0.750L+H, LL Co					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.095	0.039	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,093.8	0.23	8.2	212.5
Length = 2.750 ft	**2**	0.095	0.039	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,093.8	0.20	8.2	212.5
+D+0.750Lr+0.750L+H, LL Co					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.095	0.039	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,093.8	0.23	8.2	212.5
Length = 2.750 ft	**2**	0.095	0.039	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,093.8	0.20	8.2	212.5
+D+0.750Lr+0.750L+H, LL Co					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.095	0.039	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,093.8	0.23	8.2	212.5
Length = 2.750 ft	**2**	0.095	0.039	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,093.8	0.20	8.2	212.5
+D+0.750L+0.750S+H, LL Cor					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.297	0.121	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,006.3	0.65	23.6	195.5
Length = 2.750 ft	**2**	0.297	0.121	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,006.3	0.58	23.6	195.5
+D+0.750L+0.750S+H, LL Cor					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.297	0.121	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,006.3	0.65	23.6	195.5
Length = 2.750 ft	**2**	0.297	0.121	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,006.3	0.58	23.6	195.5
+D+0.750L+0.750S+H, LL Cor					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.297	0.121	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,006.3	0.65	23.6	195.5
Length = 2.750 ft	**2**	0.297	0.121	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,006.3	0.58	23.6	195.5
+D+0.60W+H					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.074	0.030	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,400.0	0.23	8.2	272.0
Length = 2.750 ft	**2**	0.074	0.030	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,400.0	0.20	8.2	272.0
+D+0.750Lr+0.750L+0.450W+					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.074	0.030	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,400.0	0.23	8.2	272.0
Length = 2.750 ft	**2**	0.074	0.030	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,400.0	0.20	8.2	272.0
+D+0.750Lr+0.750L+0.450W+					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.074	0.030	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,400.0	0.23	8.2	272.0
Length = 2.750 ft	**2**	0.074	0.030	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,400.0	0.20	8.2	272.0
+D+0.750Lr+0.750L+0.450W+					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.074	0.030	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,400.0	0.23	8.2	272.0
Length = 2.750 ft	**2**	0.074	0.030	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,400.0	0.20	8.2	272.0

Wood Beam

DESCRIPTION: B10-1/3

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
+D+0.750L+0.750S+0.450W+H					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.213	0.087	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,400.0	0.65	23.6	272.0
Length = 2.750 ft	**2**	0.213	0.087	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,400.0	0.58	23.6	272.0
+D+0.750L+0.750S+0.450W+H					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.213	0.087	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,400.0	0.65	23.6	272.0
Length = 2.750 ft	**2**	0.213	0.087	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,400.0	0.58	23.6	272.0
+D+0.750L+0.750S+0.450W+H					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.213	0.087	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,400.0	0.65	23.6	272.0
Length = 2.750 ft	**2**	0.213	0.087	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,400.0	0.58	23.6	272.0
+0.60D+0.60W+0.60H					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.045	0.018	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.27	62.4	1,400.0	0.14	4.9	272.0
Length = 2.750 ft	**2**	0.045	0.018	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.27	62.4	1,400.0	0.12	4.9	272.0
+D+0.70E+H					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.074	0.030	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,400.0	0.23	8.2	272.0
Length = 2.750 ft	**2**	0.074	0.030	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.45	104.0	1,400.0	0.20	8.2	272.0
+D+0.750L+0.750S+0.5250E+					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.213	0.087	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,400.0	0.65	23.6	272.0
Length = 2.750 ft	**2**	0.213	0.087	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,400.0	0.58	23.6	272.0
+D+0.750L+0.750S+0.5250E+					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.213	0.087	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,400.0	0.65	23.6	272.0
Length = 2.750 ft	**2**	0.213	0.087	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,400.0	0.58	23.6	272.0
+D+0.750L+0.750S+0.5250E+					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.213	0.087	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,400.0	0.65	23.6	272.0
Length = 2.750 ft	**2**	0.213	0.087	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	298.7	1,400.0	0.58	23.6	272.0
+0.60D+0.70E+0.60H					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.250 ft	**1**	0.045	0.018	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.27	62.4	1,400.0	0.14	4.9	272.0
Length = 2.750 ft	**2**	0.045	0.018	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.27	62.4	1,400.0	0.12	4.9	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.0365	0.000		0.0000	0.000
	2	0.0000	0.000	+D+S+H	-0.0044	1.122

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions		1.727	
Max Upward from Load Combinations		1.727	
Max Upward from Load Cases		1.234	
Max Downward from all Load Conditio			-0.312
Max Downward from Load Combinations			-0.312
Max Downward from Load Cases (Resis			-0.223
+D+H		0.494	-0.090
+D+L+H, LL Comb Run (*L)		0.494	-0.090
+D+L+H, LL Comb Run (L*)		0.494	-0.090
+D+L+H, LL Comb Run (LL)		0.494	-0.090
+D+Lr+H, LL Comb Run (*L)		0.494	-0.090
+D+Lr+H, LL Comb Run (L*)		0.494	-0.090
+D+Lr+H, LL Comb Run (LL)		0.494	-0.090
+D+S+H		1.727	-0.312
+D+0.750Lr+0.750L+H, LL Comb Run (*		0.494	-0.090
+D+0.750Lr+0.750L+H, LL Comb Run (L		0.494	-0.090
+D+0.750Lr+0.750L+H, LL Comb Run (L		0.494	-0.090

Wood Beam

DESCRIPTION: B10-1/3

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+0.750L+0.750S+H, LL Comb Run (*L		1.419	-0.257
+D+0.750L+0.750S+H, LL Comb Run (L*		1.419	-0.257
+D+0.750L+0.750S+H, LL Comb Run (LL		1.419	-0.257
+D+0.60W+H		0.494	-0.090
+D+0.750Lr+0.750L+0.450W+H, LL Comb		0.494	-0.090
+D+0.750Lr+0.750L+0.450W+H, LL Comb		0.494	-0.090
+D+0.750Lr+0.750L+0.450W+H, LL Comb		0.494	-0.090
+D+0.750L+0.750S+0.450W+H, LL Comb		1.419	-0.257
+D+0.750L+0.750S+0.450W+H, LL Comb		1.419	-0.257
+D+0.750L+0.750S+0.450W+H, LL Comb		1.419	-0.257
+0.60D+0.60W+0.60H		0.296	-0.054
+D+0.70E+H		0.494	-0.090
+D+0.750L+0.750S+0.5250E+H, LL Comb		1.419	-0.257
+D+0.750L+0.750S+0.5250E+H, LL Comb		1.419	-0.257
+D+0.750L+0.750S+0.5250E+H, LL Comb		1.419	-0.257
+0.60D+0.70E+0.60H		0.296	-0.054
D Only		0.494	-0.090
S Only		1.234	-0.223
H Only			

Wood Beam

LIC# : KW-06017913, Build:20.24.08.01 MULHERN & KULP STRUCTURAL ENGINEERING INC (c) ENERCALC INC 1983-2023

DESCRIPTION: B3-1

CODE REFERENCES

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

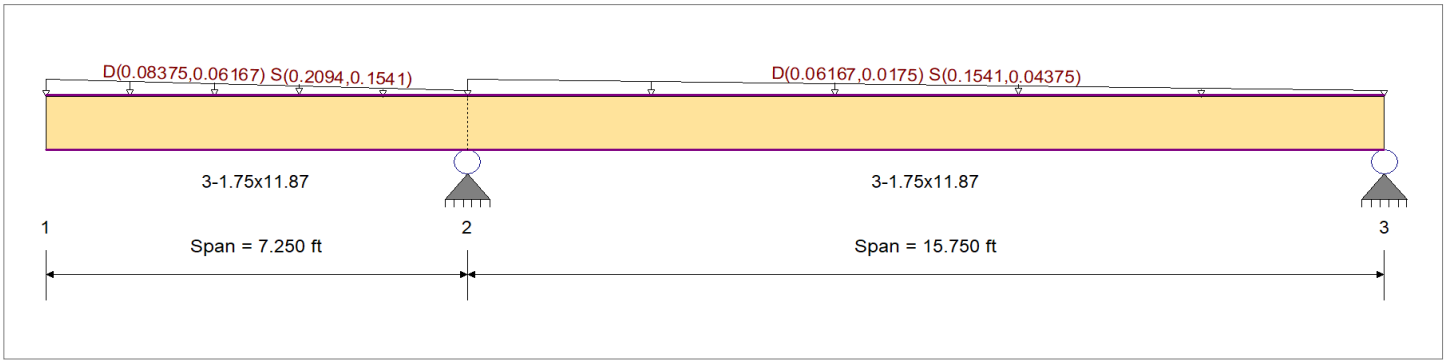
Material Properties

Analysis Method :	Allowable Stress Design
Load Combination :	ASCE 7-16
Wood Species :	iLevel Truss Joist
Wood Grade :	MicroLam LVL 1.9 E
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling

Fb +	2,600.0 psi
Fb -	2,600.0 psi
Fc - Prll	2,510.0 psi
Fc - Perp	750.0 psi
Fv	285.0 psi
Ft	1,555.0 psi

E : Modulus of Elasticity

Ebend- xx	1,900.0 ksi
Eminbend - xx	965.71 ksi
Density	42.010 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
Varying Uniform Load : D= 0.08375->0.06167, S= 0.2094->0.1541 k/ft, Extent = 0.0 -->> 7.250 ft, Trib Width = 1.0 ft

Load for Span Number 2
Varying Uniform Load : D= 0.06167->0.01750, S= 0.1541->0.04375 k/ft, Extent = 0.0 -->> 15.750 ft, Trib Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.228 : 1	Maximum Shear Stress Ratio	=	0.135 : 1
Section used for this span		3-1.75x11.87	Section used for this span		3-1.75x11.87
fb: Actual	=	683.35 psi	fv: Actual	=	44.39 psi
F'b	=	2,994.26 psi	F'v	=	327.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	7.250 ft	Location of maximum on span	=	7.250 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.171 in	Ratio =	1020 >=360	Span: 1 : S Only
Max Upward Transient Deflection	-0.015 in	Ratio =	12766 >=360	Span: 2 : S Only
Max Downward Total Deflection	0.239 in	Ratio =	728 >=180	Span: 1 : +D+S
Max Upward Total Deflection	-0.021 in	Ratio =	9121 >=180	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_F	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 = 7.250 ft	1	0.083	0.049	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	2.01	195.2	2,343.3	0.53	12.7	256.5
Length = 15.750 ft	2	0.083	0.049	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	2.01	195.2	2,343.3	0.50	12.7	256.5
+D+S					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 7.250 ft	1	0.228	0.135	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	7.03	683.3	2,994.3	1.84	44.4	327.8

Wood Beam

DESCRIPTION: B3-1

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 15.750 ft	**2**	0.228	0.135	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	7.03	683.3	2,994.3	1.74	44.4	327.8
+D+0.750S					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 7.250 ft	**1**	0.187	0.111	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	5.77	561.3	2,994.3	1.52	36.5	327.8
Length = 15.750 ft	**2**	0.187	0.111	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	5.77	561.3	2,994.3	1.43	36.5	327.8
+0.60D					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 7.250 ft	**1**	0.028	0.017	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	1.20	117.1	4,165.9	0.32	7.6	456.0
Length = 15.750 ft	**2**	0.028	0.017	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	1.20	117.1	4,165.9	0.30	7.6	456.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2388	0.000		0.0000	0.000
+D+S	2	0.0107	11.351	+D+S	-0.0207	2.816

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions		3.585	0.442
Max Upward from Load Combinations		3.585	0.442
Max Upward from Load Cases		2.560	0.316
D Only		1.024	0.126
+D+S		3.585	0.442
+D+0.750S		2.944	0.363
+0.60D		0.615	0.076
S Only		2.560	0.316

Steel Beam

DESCRIPTION: B2-6

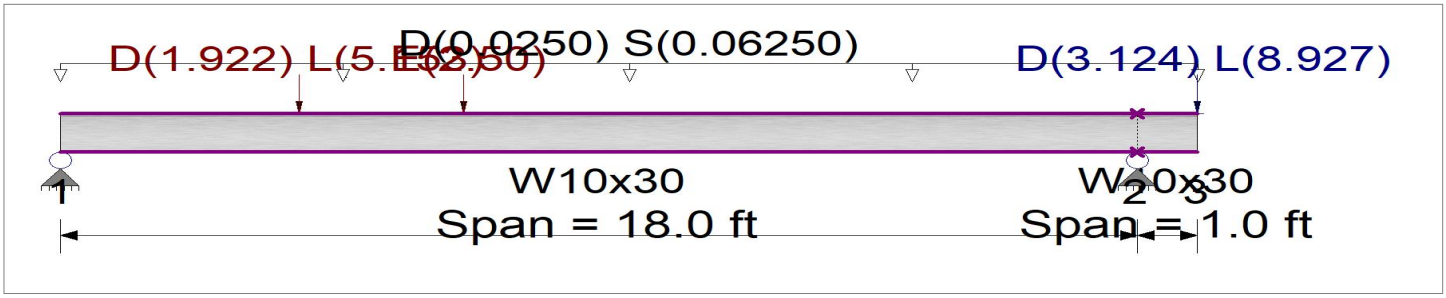
CODE REFERENCES

Calculations per AISC 360-16, IBC 2021, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

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

Beam self weight calculated and added to loading
Loads on all spans...
Uniform Load on ALL spans : D = 0.010, S = 0.0250 ksf, Tributary Width = 2.50 ft
Load(s) for Span Number 1
Point Load : E = 2.50 k @ 6.750 ft, (OS)
Point Load : D = 1.922, L = 5.153 k @ 4.0 ft, (H2-24)
Linked Load(s)
Beam B2-15, Support 2: D = 3.124, L = 8.927 k @ 19 ft from left end of beam

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.257 : 1	Maximum Shear Stress Ratio =	0.192 : 1
Section used for this span	W10x30	Section used for this span	W10x30
Ma : Applied	23.427 k-ft	Va : Applied	12.106 k
Mn / Omega : Allowable	91.317 k-ft	Vn/Omega : Allowable	63.0 k
Load Combination	+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	Load Combination	+D+L+H, LL Comb Run (*L)
		Location of maximum on span	18.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.020 in	Ratio =	1,211	>=360	Span: 2 : L Only, LL Comb Run (*L)
Max Upward Transient Deflection	-0.021 in	Ratio =	1,164	>=360	Span: 2 : L Only, LL Comb Run (L*)
Max Downward Total Deflection	0.236 in	Ratio =	915	>=180	Span: 2 : +D+0.750L+0.750S+0.5250E+H, LL Comb Run
Max Upward Total Deflection	-0.033 in	Ratio =	732	>=180	Span: 2 : +D+0.750L+0.750S+0.5250E+H, LL Comb Run

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 18.00 ft	1	0.075	0.050	6.81	-3.15	6.81	152.50	91.32	1.00	1.00	3.18	94.50	63.00
Dsgn. L = 1.00 ft	2	0.035	0.050		-3.15	3.15	152.50	91.32	1.00	1.00	3.18	94.50	63.00
+D+L+H, LL Comb Run (*L)													
Dsgn. L = 18.00 ft	1	0.132	0.192	4.81	-12.08	12.08	152.50	91.32	1.00	1.00	12.11	94.50	63.00
Dsgn. L = 1.00 ft	2	0.132	0.192		-12.08	12.08	152.50	91.32	1.00	1.00	12.11	94.50	63.00
+D+L+H, LL Comb Run (L*)													
Dsgn. L = 18.00 ft	1	0.250	0.092	22.80	-3.15	22.80	152.50	91.32	1.00	1.00	5.82	94.50	63.00
Dsgn. L = 1.00 ft	2	0.035	0.050		-3.15	3.15	152.50	91.32	1.00	1.00	3.18	94.50	63.00
+D+L+H, LL Comb Run (LL)													
Dsgn. L = 18.00 ft	1	0.228	0.192	20.80	-12.08	20.80	152.50	91.32	1.00	1.00	12.11	94.50	63.00
Dsgn. L = 1.00 ft	2	0.132	0.192		-12.08	12.08	152.50	91.32	1.00	1.00	12.11	94.50	63.00
+D+Lr+H, LL Comb Run (*L)													
Dsgn. L = 18.00 ft	1	0.075	0.050	6.81	-3.15	6.81	152.50	91.32	1.00	1.00	3.18	94.50	63.00
Dsgn. L = 1.00 ft	2	0.035	0.050		-3.15	3.15	152.50	91.32	1.00	1.00	3.18	94.50	63.00
+D+Lr+H, LL Comb Run (L*)													
Dsgn. L = 18.00 ft	1	0.075	0.050	6.81	-3.15	6.81	152.50	91.32	1.00	1.00	3.18	94.50	63.00
Dsgn. L = 1.00 ft	2	0.035	0.050		-3.15	3.15	152.50	91.32	1.00	1.00	3.18	94.50	63.00

Steel Beam

DESCRIPTION: B2-6

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+Lr+H, LL Comb Run (LL)													
Dsgn. L = 18.00 ft	1	0.075	0.050	6.81	-3.15	6.81	152.50	91.32	1.00	1.00	3.18	94.50	63.00
Dsgn. L = 1.00 ft	2	0.035	0.050		-3.15	3.15	152.50	91.32	1.00	1.00	3.18	94.50	63.00
+D+S+H													
Dsgn. L = 18.00 ft	1	0.094	0.051	8.56	-3.18	8.56	152.50	91.32	1.00	1.00	3.24	94.50	63.00
Dsgn. L = 1.00 ft	2	0.035	0.051		-3.18	3.18	152.50	91.32	1.00	1.00	3.24	94.50	63.00
+D+0.750Lr+0.750L+H, LL Comb F													
Dsgn. L = 18.00 ft	1	0.108	0.157	5.31	-9.85	9.85	152.50	91.32	1.00	1.00	9.87	94.50	63.00
Dsgn. L = 1.00 ft	2	0.108	0.157		-9.85	9.85	152.50	91.32	1.00	1.00	9.87	94.50	63.00
+D+0.750Lr+0.750L+H, LL Comb F													
Dsgn. L = 18.00 ft	1	0.206	0.077	18.80	-3.15	18.80	152.50	91.32	1.00	1.00	4.82	94.50	63.00
Dsgn. L = 1.00 ft	2	0.035	0.050		-3.15	3.15	152.50	91.32	1.00	1.00	3.18	94.50	63.00
+D+0.750Lr+0.750L+H, LL Comb F													
Dsgn. L = 18.00 ft	1	0.190	0.157	17.31	-9.85	17.31	152.50	91.32	1.00	1.00	9.87	94.50	63.00
Dsgn. L = 1.00 ft	2	0.108	0.157		-9.85	9.85	152.50	91.32	1.00	1.00	9.87	94.50	63.00
+D+0.750L+0.750S+H, LL Comb R													
Dsgn. L = 18.00 ft	1	0.108	0.157	6.62	-9.87	9.87	152.50	91.32	1.00	1.00	9.92	94.50	63.00
Dsgn. L = 1.00 ft	2	0.108	0.157		-9.87	9.87	152.50	91.32	1.00	1.00	9.92	94.50	63.00
+D+0.750L+0.750S+H, LL Comb R													
Dsgn. L = 18.00 ft	1	0.220	0.083	20.12	-3.18	20.12	152.50	91.32	1.00	1.00	5.24	94.50	63.00
Dsgn. L = 1.00 ft	2	0.035	0.051		-3.18	3.18	152.50	91.32	1.00	1.00	3.23	94.50	63.00
+D+0.750L+0.750S+H, LL Comb R													
Dsgn. L = 18.00 ft	1	0.204	0.157	18.62	-9.87	18.62	152.50	91.32	1.00	1.00	9.92	94.50	63.00
Dsgn. L = 1.00 ft	2	0.108	0.157		-9.87	9.87	152.50	91.32	1.00	1.00	9.92	94.50	63.00
+D+0.60W+H													
Dsgn. L = 18.00 ft	1	0.075	0.050	6.81	-3.15	6.81	152.50	91.32	1.00	1.00	3.18	94.50	63.00
Dsgn. L = 1.00 ft	2	0.035	0.050		-3.15	3.15	152.50	91.32	1.00	1.00	3.18	94.50	63.00
+D+0.750Lr+0.750L+0.450W+H, L													
Dsgn. L = 18.00 ft	1	0.108	0.157	5.31	-9.85	9.85	152.50	91.32	1.00	1.00	9.87	94.50	63.00
Dsgn. L = 1.00 ft	2	0.108	0.157		-9.85	9.85	152.50	91.32	1.00	1.00	9.87	94.50	63.00
+D+0.750Lr+0.750L+0.450W+H, L													
Dsgn. L = 18.00 ft	1	0.206	0.077	18.80	-3.15	18.80	152.50	91.32	1.00	1.00	4.82	94.50	63.00
Dsgn. L = 1.00 ft	2	0.035	0.050		-3.15	3.15	152.50	91.32	1.00	1.00	3.18	94.50	63.00
+D+0.750Lr+0.750L+0.450W+H, L													
Dsgn. L = 18.00 ft	1	0.190	0.157	17.31	-9.85	17.31	152.50	91.32	1.00	1.00	9.87	94.50	63.00
Dsgn. L = 1.00 ft	2	0.108	0.157		-9.85	9.85	152.50	91.32	1.00	1.00	9.87	94.50	63.00
+D+0.750L+0.750S+0.450W+H, LI													
Dsgn. L = 18.00 ft	1	0.108	0.157	6.62	-9.87	9.87	152.50	91.32	1.00	1.00	9.92	94.50	63.00
Dsgn. L = 1.00 ft	2	0.108	0.157		-9.87	9.87	152.50	91.32	1.00	1.00	9.92	94.50	63.00
+D+0.750L+0.750S+0.450W+H, LI													
Dsgn. L = 18.00 ft	1	0.220	0.083	20.12	-3.18	20.12	152.50	91.32	1.00	1.00	5.24	94.50	63.00
Dsgn. L = 1.00 ft	2	0.035	0.051		-3.18	3.18	152.50	91.32	1.00	1.00	3.23	94.50	63.00
+D+0.750L+0.750S+0.450W+H, LI													
Dsgn. L = 18.00 ft	1	0.204	0.157	18.62	-9.87	18.62	152.50	91.32	1.00	1.00	9.92	94.50	63.00
Dsgn. L = 1.00 ft	2	0.108	0.157		-9.87	9.87	152.50	91.32	1.00	1.00	9.92	94.50	63.00
+0.60D+0.60W+0.60H													
Dsgn. L = 18.00 ft	1	0.045	0.030	4.09	-1.89	4.09	152.50	91.32	1.00	1.00	1.91	94.50	63.00
Dsgn. L = 1.00 ft	2	0.021	0.030		-1.89	1.89	152.50	91.32	1.00	1.00	1.91	94.50	63.00
+D+0.70E+H													
Dsgn. L = 18.00 ft	1	0.143	0.050	13.07	-3.15	13.07	152.50	91.32	1.00	1.00	3.18	94.50	63.00
Dsgn. L = 1.00 ft	2	0.035	0.050		-3.15	3.15	152.50	91.32	1.00	1.00	3.18	94.50	63.00
+D+0.750L+0.750S+0.5250E+H, L													
Dsgn. L = 18.00 ft	1	0.115	0.157	10.50	-9.87	10.50	152.50	91.32	1.00	1.00	9.92	94.50	63.00
Dsgn. L = 1.00 ft	2	0.108	0.157		-9.87	9.87	152.50	91.32	1.00	1.00	9.92	94.50	63.00
+D+0.750L+0.750S+0.5250E+H, L													
Dsgn. L = 18.00 ft	1	0.257	0.096	23.43	-3.18	23.43	152.50	91.32	1.00	1.00	6.06	94.50	63.00
Dsgn. L = 1.00 ft	2	0.035	0.051		-3.18	3.18	152.50	91.32	1.00	1.00	3.23	94.50	63.00
+D+0.750L+0.750S+0.5250E+H, L													
Dsgn. L = 18.00 ft	1	0.240	0.157	21.93	-9.87	21.93	152.50	91.32	1.00	1.00	9.92	94.50	63.00
Dsgn. L = 1.00 ft	2	0.108	0.157		-9.87	9.87	152.50	91.32	1.00	1.00	9.92	94.50	63.00
+0.60D+0.70E+0.60H													
Dsgn. L = 18.00 ft	1	0.118	0.035	10.79	-1.89	10.79	152.50	91.32	1.00	1.00	2.18	94.50	63.00

Steel Beam

DESCRIPTION: B2-6

Maximum Forces & Stresses for Load Combinations

Load Combination			Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length		Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L =	1.00 ft	2	0.021	0.030		-1.89	1.89	152.50	91.32	1.00	1.00	1.91	94.50	63.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.5250E+H	1	0.2360	8.064		0.0000	0.000
	2	0.0000	8.064	+D+0.750L+0.750S+0.5250E+H	-0.0328	1.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	6.062	14.845	
Max Upward from Load Combinations	6.062	14.845	
Max Upward from Load Cases	4.008	10.568	
Max Downward from all Load Conditions (Resisti	-0.496		
Max Downward from Load Cases (Resisting Upli	-0.496		
+D+H	1.815	4.277	
+D+L+H, LL Comb Run (*L)	1.319	13.699	
+D+L+H, LL Comb Run (L*)	5.823	5.422	
+D+L+H, LL Comb Run (LL)	5.327	14.845	
+D+Lr+H, LL Comb Run (*L)	1.815	4.277	
+D+Lr+H, LL Comb Run (L*)	1.815	4.277	
+D+Lr+H, LL Comb Run (LL)	1.815	4.277	
+D+S+H	2.376	4.903	
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	1.443	11.344	
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	4.821	5.135	
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	4.449	12.203	
+D+0.750L+0.750S+H, LL Comb Run (*L)	1.863	11.814	
+D+0.750L+0.750S+H, LL Comb Run (L*)	5.241	5.606	
+D+0.750L+0.750S+H, LL Comb Run (LL)	4.869	12.673	
+D+0.60W+H	1.815	4.277	
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run	1.443	11.344	
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run	4.821	5.135	
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run	4.449	12.203	
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	1.863	11.814	
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	5.241	5.606	
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	4.869	12.673	
+0.60D+0.60W+0.60H	1.089	2.566	
+D+0.70E+H	2.909	4.933	
+D+0.750L+0.750S+0.5250E+H, LL Comb Run	2.684	12.306	
+D+0.750L+0.750S+0.5250E+H, LL Comb Run	6.062	6.098	
+D+0.750L+0.750S+0.5250E+H, LL Comb Run	5.690	13.165	
+0.60D+0.70E+0.60H	2.183	3.222	
D Only	1.815	4.277	
L Only, LL Comb Run (*L)	-0.496	9.423	
L Only, LL Comb Run (L*)	4.008	1.145	
L Only, LL Comb Run (LL)	3.512	10.568	
S Only	0.561	0.627	
E Only	1.563	0.937	
H Only			

Steel Beam

LIC# : KW-06017913, Build:20.24.08.01 MULHERN & KULP STRUCTURAL ENGINEERING INC (c) ENERCALC INC 1983-2023

DESCRIPTION: B2-14

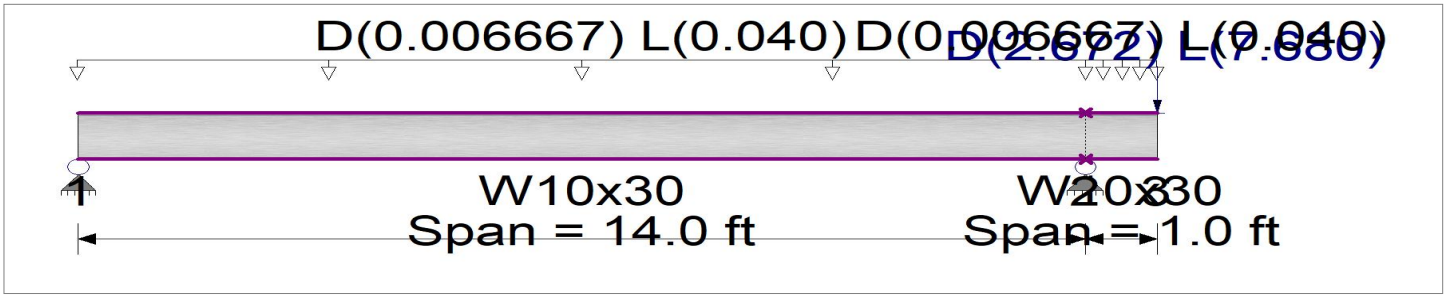
CODE REFERENCES

Calculations per AISC 360-16, IBC 2021, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



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 = 0.010, L = 0.060 ksf, Tributary Width = 0.6667 ft
Load for Span Number 2
Uniform Load : D = 0.010, L = 0.060 ksf, Tributary Width = 0.6667 ft
Linked Load(s)
Beam B2-15, Support 1: D = 2.672, L = 7.680 k @ 15 ft from left end of beam

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.114** : 1	Maximum Shear Stress Ratio =	**0.166** : 1
Section used for this span	**W10x30**	Section used for this span	**W10x30**
Ma : Applied	10.390 k-ft	Va : Applied	10.428 k
Mn / Omega : Allowable	91.317 k-ft	Vn/Omega : Allowable	63.0 k
Load Combination	+D+L+H, LL Comb Run (LL)	Load Combination	+D+L+H, LL Comb Run (LL)
		Location of maximum on span	14.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.013 in	Ratio =	1,778	>=360	Span: 2 : L Only, LL Comb Run (*L)
Max Upward Transient Deflection	-0.034 in	Ratio =	4,925	>=360	Span: 2 : L Only, LL Comb Run (*L)
Max Downward Total Deflection	0.017 in	Ratio =	1434	>=180	Span: 2 : +D+L+H, LL Comb Run (*L)
Max Upward Total Deflection	-0.040 in	Ratio =	4224	>=180	Span: 2 : +D+L+H, LL Comb Run (*L)

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 14.00 ft	1	0.029	0.043	0.06	-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
Dsgn. L = 1.00 ft	2	0.029	0.043		-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
+D+L+H, LL Comb Run (*L)													
Dsgn. L = 14.00 ft	1	0.114	0.166		-10.39	10.39	152.50	91.32	1.00	1.00	10.43	94.50	63.00
Dsgn. L = 1.00 ft	2	0.114	0.166		-10.39	10.39	152.50	91.32	1.00	1.00	10.43	94.50	63.00
+D+L+H, LL Comb Run (L*)													
Dsgn. L = 14.00 ft	1	0.029	0.043	0.77	-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
Dsgn. L = 1.00 ft	2	0.029	0.043		-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
+D+L+H, LL Comb Run (LL)													
Dsgn. L = 14.00 ft	1	0.114	0.166		-10.39	10.39	152.50	91.32	1.00	1.00	10.43	94.50	63.00
Dsgn. L = 1.00 ft	2	0.114	0.166		-10.39	10.39	152.50	91.32	1.00	1.00	10.43	94.50	63.00
+D+Lr+H, LL Comb Run (*L)													
Dsgn. L = 14.00 ft	1	0.029	0.043	0.06	-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
Dsgn. L = 1.00 ft	2	0.029	0.043		-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
+D+Lr+H, LL Comb Run (L*)													
Dsgn. L = 14.00 ft	1	0.029	0.043	0.06	-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
Dsgn. L = 1.00 ft	2	0.029	0.043		-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
+D+Lr+H, LL Comb Run (LL)													

Steel Beam

DESCRIPTION: B2-14

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 14.00 ft	1	0.029	0.043	0.06	-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
Dsgn. L = 1.00 ft	2	0.029	0.043		-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
+D+S+H													
Dsgn. L = 14.00 ft	1	0.029	0.043	0.06	-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
Dsgn. L = 1.00 ft	2	0.029	0.043		-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
+D+0.750Lr+0.750L+H, LL Comb F													
Dsgn. L = 14.00 ft	1	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
Dsgn. L = 1.00 ft	2	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
+D+0.750Lr+0.750L+H, LL Comb F													
Dsgn. L = 14.00 ft	1	0.029	0.043	0.57	-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
Dsgn. L = 1.00 ft	2	0.029	0.043		-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
+D+0.750Lr+0.750L+H, LL Comb F													
Dsgn. L = 14.00 ft	1	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
Dsgn. L = 1.00 ft	2	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
+D+0.750L+0.750S+H, LL Comb R													
Dsgn. L = 14.00 ft	1	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
Dsgn. L = 1.00 ft	2	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
+D+0.750L+0.750S+H, LL Comb R													
Dsgn. L = 14.00 ft	1	0.029	0.043	0.57	-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
Dsgn. L = 1.00 ft	2	0.029	0.043		-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
+D+0.750L+0.750S+H, LL Comb R													
Dsgn. L = 14.00 ft	1	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
Dsgn. L = 1.00 ft	2	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
+D+0.60W+H													
Dsgn. L = 14.00 ft	1	0.029	0.043	0.06	-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
Dsgn. L = 1.00 ft	2	0.029	0.043		-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
+D+0.750Lr+0.750L+0.450W+H, L													
Dsgn. L = 14.00 ft	1	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
Dsgn. L = 1.00 ft	2	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
+D+0.750Lr+0.750L+0.450W+H, L													
Dsgn. L = 14.00 ft	1	0.029	0.043	0.57	-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
Dsgn. L = 1.00 ft	2	0.029	0.043		-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
+D+0.750Lr+0.750L+0.450W+H, L													
Dsgn. L = 14.00 ft	1	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
Dsgn. L = 1.00 ft	2	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
+D+0.750L+0.750S+0.450W+H, LI													
Dsgn. L = 14.00 ft	1	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
Dsgn. L = 1.00 ft	2	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
+D+0.750L+0.750S+0.450W+H, LI													
Dsgn. L = 14.00 ft	1	0.029	0.043	0.57	-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
Dsgn. L = 1.00 ft	2	0.029	0.043		-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
+D+0.750L+0.750S+0.450W+H, LI													
Dsgn. L = 14.00 ft	1	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
Dsgn. L = 1.00 ft	2	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
+0.60D+0.60W+0.60H													
Dsgn. L = 14.00 ft	1	0.018	0.026	0.03	-1.61	1.61	152.50	91.32	1.00	1.00	1.62	94.50	63.00
Dsgn. L = 1.00 ft	2	0.018	0.026		-1.61	1.61	152.50	91.32	1.00	1.00	1.62	94.50	63.00
+D+0.70E+H													
Dsgn. L = 14.00 ft	1	0.029	0.043	0.06	-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
Dsgn. L = 1.00 ft	2	0.029	0.043		-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
+D+0.750L+0.750S+0.5250E+H, L													
Dsgn. L = 14.00 ft	1	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
Dsgn. L = 1.00 ft	2	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
+D+0.750L+0.750S+0.5250E+H, L													
Dsgn. L = 14.00 ft	1	0.029	0.043	0.57	-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
Dsgn. L = 1.00 ft	2	0.029	0.043		-2.69	2.69	152.50	91.32	1.00	1.00	2.71	94.50	63.00
+D+0.750L+0.750S+0.5250E+H, L													
Dsgn. L = 14.00 ft	1	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
Dsgn. L = 1.00 ft	2	0.093	0.135		-8.46	8.46	152.50	91.32	1.00	1.00	8.50	94.50	63.00
+0.60D+0.70E+0.60H													
Dsgn. L = 14.00 ft	1	0.018	0.026	0.03	-1.61	1.61	152.50	91.32	1.00	1.00	1.62	94.50	63.00
Dsgn. L = 1.00 ft	2	0.018	0.026		-1.61	1.61	152.50	91.32	1.00	1.00	1.62	94.50	63.00

Steel Beam

DESCRIPTION: B2-14

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+L+H	-0.0398	8.288
+D+L+H	2	0.0167	1.000		0.0000	8.288

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.345	11.707	
Max Upward from Load Combinations	0.345	11.707	
Max Upward from Load Cases	0.280	8.550	
Max Downward from all Load Conditions (Resisti	-0.550		
Max Downward from Load Combinations (Resisti	-0.485		
Max Downward from Load Cases (Resisting Upli	-0.550		
+D+H	0.065	3.157	
+D+L+H, LL Comb Run (*L)	-0.485	11.427	
+D+L+H, LL Comb Run (L*)	0.345	3.437	
+D+L+H, LL Comb Run (LL)	-0.205	11.707	
+D+Lr+H, LL Comb Run (*L)	0.065	3.157	
+D+Lr+H, LL Comb Run (L*)	0.065	3.157	
+D+Lr+H, LL Comb Run (LL)	0.065	3.157	
+D+S+H	0.065	3.157	
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	-0.348	9.360	
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	0.275	3.367	
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	-0.138	9.570	
+D+0.750L+0.750S+H, LL Comb Run (*L)	-0.348	9.360	
+D+0.750L+0.750S+H, LL Comb Run (L*)	0.275	3.367	
+D+0.750L+0.750S+H, LL Comb Run (LL)	-0.138	9.570	
+D+0.60W+H	0.065	3.157	
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run	-0.348	9.360	
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run	0.275	3.367	
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run	-0.138	9.570	
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	-0.348	9.360	
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	0.275	3.367	
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	-0.138	9.570	
+0.60D+0.60W+0.60H	0.039	1.894	
+D+0.70E+H	0.065	3.157	
+D+0.750L+0.750S+0.5250E+H, LL Comb Run	-0.348	9.360	
+D+0.750L+0.750S+0.5250E+H, LL Comb Run	0.275	3.367	
+D+0.750L+0.750S+0.5250E+H, LL Comb Run	-0.138	9.570	
+0.60D+0.70E+0.60H	0.039	1.894	
D Only	0.065	3.157	
L Only, LL Comb Run (*L)	-0.550	8.270	
L Only, LL Comb Run (L*)	0.280	0.280	
L Only, LL Comb Run (LL)	-0.270	8.550	
H Only			

Steel Beam

DESCRIPTION: B2-15

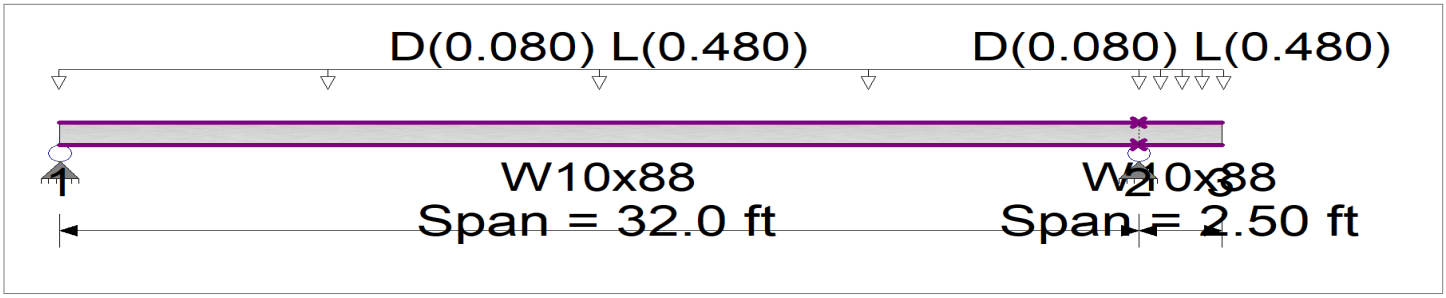
CODE REFERENCES

Calculations per AISC 360-16, IBC 2021, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



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 = 0.010, L = 0.060 ksf, Tributary Width = 8.0 ft
Load for Span Number 2
Uniform Load : D = 0.010, L = 0.060 ksf, Tributary Width = 8.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.293 : 1	Maximum Shear Stress Ratio =	0.080 : 1
Section used for this span	W10x88	Section used for this span	W10x88
Ma : Applied	82.681 k-ft	Va : Applied	10.431 k
Mn / Omega : Allowable	281.936 k-ft	Vn/Omega : Allowable	130.680 k
Load Combination	+D+L+H, LL Comb Run (L*)	Load Combination	+D+L+H, LL Comb Run (LL)
		Location of maximum on span	32.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.990 in	Ratio =	388	>=180	Span: 2 : +D+L+H, LL Comb Run (L*)
Max Upward Total Deflection	-0.245 in	Ratio =	245	>=180	Span: 2 : +D+L+H, LL Comb Run (L*)

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 32.00 ft	1	0.075	0.021	21.24	-0.53	21.24	470.83	281.94	1.00	1.00	2.70	196.02	130.68
Dsgn. L = 2.50 ft	2	0.002	0.003		-0.53	0.53	470.83	281.94	1.00	1.00	0.42	196.02	130.68
+D+L+H, LL Comb Run (*L)													
Dsgn. L = 32.00 ft	1	0.073	0.021	20.50	-2.03	20.50	470.83	281.94	1.00	1.00	2.75	196.02	130.68
Dsgn. L = 2.50 ft	2	0.007	0.012		-2.02	2.02	470.83	281.94	1.00	1.00	1.62	196.02	130.68
+D+L+H, LL Comb Run (L*)													
Dsgn. L = 32.00 ft	1	0.293	0.079	82.68	-0.53	82.68	470.83	281.94	1.00	1.00	10.38	196.02	130.68
Dsgn. L = 2.50 ft	2	0.002	0.003		-0.53	0.53	470.83	281.94	1.00	1.00	0.42	196.02	130.68
+D+L+H, LL Comb Run (LL)													
Dsgn. L = 32.00 ft	1	0.291	0.080	81.93	-2.03	81.93	470.83	281.94	1.00	1.00	10.43	196.02	130.68
Dsgn. L = 2.50 ft	2	0.007	0.012		-2.03	2.03	470.83	281.94	1.00	1.00	1.62	196.02	130.68
+D+Lr+H, LL Comb Run (*L)													
Dsgn. L = 32.00 ft	1	0.075	0.021	21.24	-0.53	21.24	470.83	281.94	1.00	1.00	2.70	196.02	130.68
Dsgn. L = 2.50 ft	2	0.002	0.003		-0.53	0.53	470.83	281.94	1.00	1.00	0.42	196.02	130.68
+D+Lr+H, LL Comb Run (L*)													
Dsgn. L = 32.00 ft	1	0.075	0.021	21.24	-0.53	21.24	470.83	281.94	1.00	1.00	2.70	196.02	130.68
Dsgn. L = 2.50 ft	2	0.002	0.003		-0.53	0.53	470.83	281.94	1.00	1.00	0.42	196.02	130.68
+D+Lr+H, LL Comb Run (LL)													
Dsgn. L = 32.00 ft	1	0.075	0.021	21.24	-0.53	21.24	470.83	281.94	1.00	1.00	2.70	196.02	130.68
Dsgn. L = 2.50 ft	2	0.002	0.003		-0.53	0.53	470.83	281.94	1.00	1.00	0.42	196.02	130.68

Steel Beam

DESCRIPTION: B2-15

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+S+H													
Dsgn. L = 32.00 ft	1	0.075	0.021	21.24	-0.53	21.24	470.83	281.94	1.00	1.00	2.70	196.02	130.68
Dsgn. L = 2.50 ft	2	0.002	0.003		-0.53	0.53	470.83	281.94	1.00	1.00	0.42	196.02	130.68
+D+0.750Lr+0.750L+H, LL Comb F													
Dsgn. L = 32.00 ft	1	0.073	0.021	20.69	-1.65	20.69	470.83	281.94	1.00	1.00	2.74	196.02	130.68
Dsgn. L = 2.50 ft	2	0.006	0.010		-1.65	1.65	470.83	281.94	1.00	1.00	1.32	196.02	130.68
+D+0.750Lr+0.750L+H, LL Comb F													
Dsgn. L = 32.00 ft	1	0.239	0.065	67.32	-0.53	67.32	470.83	281.94	1.00	1.00	8.46	196.02	130.68
Dsgn. L = 2.50 ft	2	0.002	0.003		-0.53	0.53	470.83	281.94	1.00	1.00	0.42	196.02	130.68
+D+0.750Lr+0.750L+H, LL Comb F													
Dsgn. L = 32.00 ft	1	0.237	0.065	66.76	-1.65	66.76	470.83	281.94	1.00	1.00	8.50	196.02	130.68
Dsgn. L = 2.50 ft	2	0.006	0.010		-1.65	1.65	470.83	281.94	1.00	1.00	1.32	196.02	130.68
+D+0.750L+0.750S+H, LL Comb R													
Dsgn. L = 32.00 ft	1	0.073	0.021	20.69	-1.65	20.69	470.83	281.94	1.00	1.00	2.74	196.02	130.68
Dsgn. L = 2.50 ft	2	0.006	0.010		-1.65	1.65	470.83	281.94	1.00	1.00	1.32	196.02	130.68
+D+0.750L+0.750S+H, LL Comb R													
Dsgn. L = 32.00 ft	1	0.239	0.065	67.32	-0.53	67.32	470.83	281.94	1.00	1.00	8.46	196.02	130.68
Dsgn. L = 2.50 ft	2	0.002	0.003		-0.53	0.53	470.83	281.94	1.00	1.00	0.42	196.02	130.68
+D+0.750L+0.750S+H, LL Comb R													
Dsgn. L = 32.00 ft	1	0.237	0.065	66.76	-1.65	66.76	470.83	281.94	1.00	1.00	8.50	196.02	130.68
Dsgn. L = 2.50 ft	2	0.006	0.010		-1.65	1.65	470.83	281.94	1.00	1.00	1.32	196.02	130.68
+D+0.60W+H													
Dsgn. L = 32.00 ft	1	0.075	0.021	21.24	-0.53	21.24	470.83	281.94	1.00	1.00	2.70	196.02	130.68
Dsgn. L = 2.50 ft	2	0.002	0.003		-0.53	0.53	470.83	281.94	1.00	1.00	0.42	196.02	130.68
+D+0.750Lr+0.750L+0.450W+H, L													
Dsgn. L = 32.00 ft	1	0.073	0.021	20.69	-1.65	20.69	470.83	281.94	1.00	1.00	2.74	196.02	130.68
Dsgn. L = 2.50 ft	2	0.006	0.010		-1.65	1.65	470.83	281.94	1.00	1.00	1.32	196.02	130.68
+D+0.750Lr+0.750L+0.450W+H, L													
Dsgn. L = 32.00 ft	1	0.239	0.065	67.32	-0.53	67.32	470.83	281.94	1.00	1.00	8.46	196.02	130.68
Dsgn. L = 2.50 ft	2	0.002	0.003		-0.53	0.53	470.83	281.94	1.00	1.00	0.42	196.02	130.68
+D+0.750Lr+0.750L+0.450W+H, L													
Dsgn. L = 32.00 ft	1	0.237	0.065	66.76	-1.65	66.76	470.83	281.94	1.00	1.00	8.50	196.02	130.68
Dsgn. L = 2.50 ft	2	0.006	0.010		-1.65	1.65	470.83	281.94	1.00	1.00	1.32	196.02	130.68
+D+0.750L+0.750S+0.450W+H, LI													
Dsgn. L = 32.00 ft	1	0.073	0.021	20.69	-1.65	20.69	470.83	281.94	1.00	1.00	2.74	196.02	130.68
Dsgn. L = 2.50 ft	2	0.006	0.010		-1.65	1.65	470.83	281.94	1.00	1.00	1.32	196.02	130.68
+D+0.750L+0.750S+0.450W+H, LI													
Dsgn. L = 32.00 ft	1	0.239	0.065	67.32	-0.53	67.32	470.83	281.94	1.00	1.00	8.46	196.02	130.68
Dsgn. L = 2.50 ft	2	0.002	0.003		-0.53	0.53	470.83	281.94	1.00	1.00	0.42	196.02	130.68
+D+0.750L+0.750S+0.450W+H, LI													
Dsgn. L = 32.00 ft	1	0.237	0.065	66.76	-1.65	66.76	470.83	281.94	1.00	1.00	8.50	196.02	130.68
Dsgn. L = 2.50 ft	2	0.006	0.010		-1.65	1.65	470.83	281.94	1.00	1.00	1.32	196.02	130.68
+0.60D+0.60W+0.60H													
Dsgn. L = 32.00 ft	1	0.045	0.012	12.75	-0.32	12.75	470.83	281.94	1.00	1.00	1.62	196.02	130.68
Dsgn. L = 2.50 ft	2	0.001	0.002		-0.32	0.32	470.83	281.94	1.00	1.00	0.25	196.02	130.68
+D+0.70E+H													
Dsgn. L = 32.00 ft	1	0.075	0.021	21.24	-0.53	21.24	470.83	281.94	1.00	1.00	2.70	196.02	130.68
Dsgn. L = 2.50 ft	2	0.002	0.003		-0.53	0.53	470.83	281.94	1.00	1.00	0.42	196.02	130.68
+D+0.750L+0.750S+0.5250E+H, L													
Dsgn. L = 32.00 ft	1	0.073	0.021	20.69	-1.65	20.69	470.83	281.94	1.00	1.00	2.74	196.02	130.68
Dsgn. L = 2.50 ft	2	0.006	0.010		-1.65	1.65	470.83	281.94	1.00	1.00	1.32	196.02	130.68
+D+0.750L+0.750S+0.5250E+H, L													
Dsgn. L = 32.00 ft	1	0.239	0.065	67.32	-0.53	67.32	470.83	281.94	1.00	1.00	8.46	196.02	130.68
Dsgn. L = 2.50 ft	2	0.002	0.003		-0.53	0.53	470.83	281.94	1.00	1.00	0.42	196.02	130.68
+D+0.750L+0.750S+0.5250E+H, L													
Dsgn. L = 32.00 ft	1	0.237	0.065	66.76	-1.65	66.76	470.83	281.94	1.00	1.00	8.50	196.02	130.68
Dsgn. L = 2.50 ft	2	0.006	0.010		-1.65	1.65	470.83	281.94	1.00	1.00	1.32	196.02	130.68
+0.60D+0.70E+0.60H													
Dsgn. L = 32.00 ft	1	0.045	0.012	12.75	-0.32	12.75	470.83	281.94	1.00	1.00	1.62	196.02	130.68
Dsgn. L = 2.50 ft	2	0.001	0.002		-0.32	0.32	470.83	281.94	1.00	1.00	0.25	196.02	130.68

Steel Beam

DESCRIPTION: B2-15

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.9898	16.000		0.0000	0.000
	2	0.0000	16.000	+D+L+H	-0.2452	2.500

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	10.352	12.051	
Max Upward from Load Combinations	10.352	12.051	
Max Upward from Load Cases	7.680	8.927	
Max Downward from all Load Conditions (Resisti	-0.047		
Max Downward from Load Cases (Resisting Upli	-0.047		
+D+H	2.672	3.124	
+D+L+H, LL Comb Run (*L)	2.625	4.371	
+D+L+H, LL Comb Run (L*)	10.352	10.804	
+D+L+H, LL Comb Run (LL)	10.305	12.051	
+D+Lr+H, LL Comb Run (*L)	2.672	3.124	
+D+Lr+H, LL Comb Run (L*)	2.672	3.124	
+D+Lr+H, LL Comb Run (LL)	2.672	3.124	
+D+S+H	2.672	3.124	
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	2.636	4.060	
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	8.432	8.884	
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	8.396	9.820	
+D+0.750L+0.750S+H, LL Comb Run (*L)	2.636	4.060	
+D+0.750L+0.750S+H, LL Comb Run (L*)	8.432	8.884	
+D+0.750L+0.750S+H, LL Comb Run (LL)	8.396	9.820	
+D+0.60W+H	2.672	3.124	
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run	2.636	4.060	
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run	8.432	8.884	
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run	8.396	9.820	
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	2.636	4.060	
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	8.432	8.884	
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	8.396	9.820	
+0.60D+0.60W+0.60H	1.603	1.875	
+D+0.70E+H	2.672	3.124	
+D+0.750L+0.750S+0.5250E+H, LL Comb Run	2.636	4.060	
+D+0.750L+0.750S+0.5250E+H, LL Comb Run	8.432	8.884	
+D+0.750L+0.750S+0.5250E+H, LL Comb Run	8.396	9.820	
+0.60D+0.70E+0.60H	1.603	1.875	
D Only	2.672	3.124	
L Only, LL Comb Run (*L)	-0.047	1.247	
L Only, LL Comb Run (L*)	7.680	7.680	
L Only, LL Comb Run (LL)	7.633	8.927	
H Only			

Wood Beam

LIC# : KW-06017913, Build:20.24.08.01 MULHERN & KULP STRUCTURAL ENGINEERING INC (c) ENERCALC INC 1983-2023

DESCRIPTION: B2-23 (SW #208)

CODE REFERENCES

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

Material Properties

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

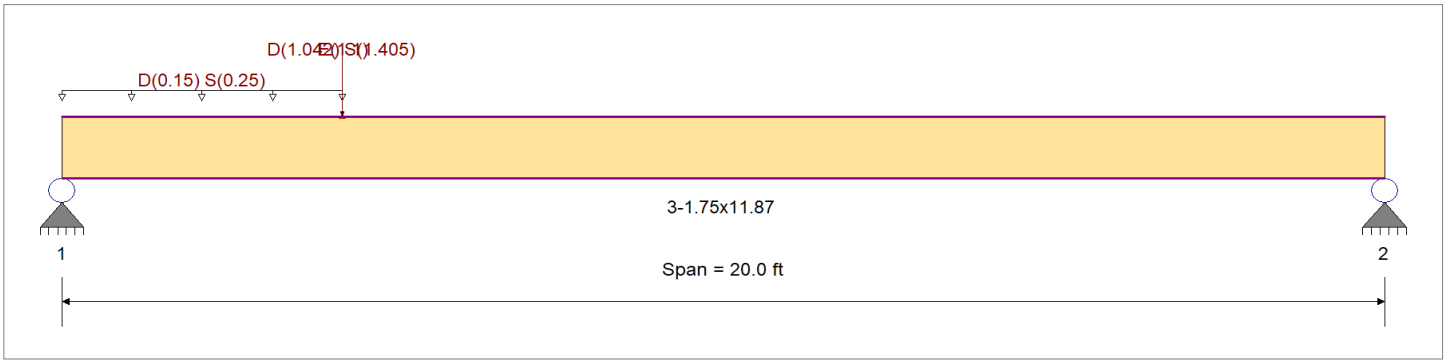
Wood Species : LVL OS
Wood Grade : Manufactured

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

Fb +	3,120.0 psi
Fb -	3,120.0 psi
Fc - Prll	600.0 psi
Fc - Perp	900.0 psi
Fv	342.0 psi
Ft	3,012.0 psi

E : Modulus of Elasticity

Ebend- xx	2,000.0 ksi
Eminbend - xx	101,654 ksi
Density	35.0 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Point Load : D = 1.042, S = 1.405 k @ 4.250 ft
Uniform Load : D = 0.150, S = 0.250 k/ft, Extent = 0.0 -->> 4.250 ft, Tributary Width = 1.0 ft
Point Load : E = 1.10 k @ 4.250 ft, (OS)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.298 : 1	Maximum Shear Stress Ratio	=	0.188 : 1
Section used for this span		3-1.75x11.87	Section used for this span		3-1.75x11.87
fb: Actual	=	1,070.37 psi	fv: Actual	=	73.79 psi
F'b	=	3,593.11 psi	F'v	=	393.30 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.234 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	0.236 in	Ratio =	1015 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.413 in	Ratio =	581 >=180	Span: 1 : +D+0.750S+0.5250E
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.157	0.098	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	4.54	441.7	2,812.0	1.25	30.0	307.8
+D+S					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.298	0.188	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	11.01	1,070.4	3,593.1	3.07	73.8	393.3
+D+0.750S					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.254	0.160	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	9.39	913.2	3,593.1	2.61	62.8	393.3
+0.60D					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.053	0.033	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	2.73	265.0	4,999.1	0.75	18.0	547.2

Wood Beam

DESCRIPTION: B2-23 (SW #208)

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.70E					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	**1**	0.138	0.082	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	7.11	691.4	4,999.1	1.85	44.6	547.2
+D+0.750S+0.5250E					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	**1**	0.220	0.135	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	11.32	1,100.4	4,999.1	3.07	73.8	547.2
+0.60D+0.70E					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	**1**	0.103	0.060	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	5.29	514.7	4,999.1	1.36	32.6	547.2

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750S+0.5250E	1	0.4129	8.759		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	3.446	0.720
Max Upward from Load Combinations	3.446	0.720
Max Upward from Load Cases	2.056	0.411
D Only	1.390	0.289
+D+S	3.446	0.701
+D+0.750S	2.932	0.598
+0.60D	0.834	0.173
+D+0.70E	1.997	0.453
+D+0.750S+0.5250E	3.387	0.720
+0.60D+0.70E	1.441	0.337
S Only	2.056	0.411
E Only	0.866	0.234

Wood Beam

LIC# : KW-06017913, Build:20.24.08.01 MULHERN & KULP STRUCTURAL ENGINEERING INC (c) ENERCALC INC 1983-2023

DESCRIPTION: B2-23 (SW #213)

CODE REFERENCES

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

Material Properties

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

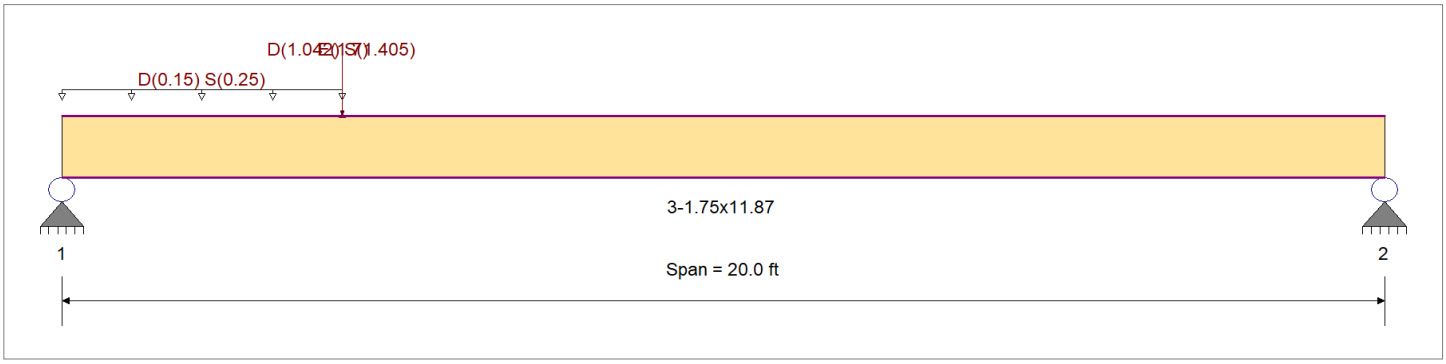
Wood Species : LVL OS
Wood Grade : Manufactured

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

Fb +	3,120.0 psi
Fb -	3,120.0 psi
Fc - Prll	600.0 psi
Fc - Perp	900.0 psi
Fv	342.0 psi
Ft	3,012.0 psi

E : Modulus of Elasticity

Ebend- xx	2,000.0 ksi
Eminbend - xx	101,654 ksi
Density	35.0 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Point Load : D = 1.042, S = 1.405 k @ 4.250 ft
Uniform Load : D = 0.150, S = 0.250 k/ft, Extent = 0.0 -->> 4.250 ft, Tributary Width = 1.0 ft
Point Load : E = 1.70 k @ 4.250 ft, (OS)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.298 : 1	Maximum Shear Stress Ratio	=	0.188 : 1
Section used for this span		3-1.75x11.87	Section used for this span		3-1.75x11.87
fb: Actual	=	1,070.37 psi	fv: Actual	=	73.79 psi
F'b	=	3,593.11 psi	F'v	=	393.30 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.234 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	0.236 in	Ratio =	1015 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.451 in	Ratio =	532 >=180	Span: 1 : +D+0.750S+0.5250E
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.157	0.098	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	4.54	441.7	2,812.0	1.25	30.0	307.8
+D+S					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.298	0.188	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	11.01	1,070.4	3,593.1	3.07	73.8	393.3
+D+0.750S					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.254	0.160	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	9.39	913.2	3,593.1	2.61	62.8	393.3
+0.60D					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	1	0.053	0.033	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	2.73	265.0	4,999.1	0.75	18.0	547.2

Wood Beam

DESCRIPTION: B2-23 (SW #213)

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.70E					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	**1**	0.166	0.096	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	8.51	827.6	4,999.1	2.19	52.6	547.2
+D+0.750S+0.5250E					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	**1**	0.241	0.146	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	12.37	1,202.6	4,999.1	3.31	79.8	547.2
+0.60D+0.70E					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 20.0 ft	**1**	0.130	0.074	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	6.69	650.9	4,999.1	1.69	40.6	547.2

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750S+0.5250E	1	0.4510	8.759		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	3.635	0.787
Max Upward from Load Combinations	3.635	0.787
Max Upward from Load Cases	2.056	0.411
D Only	1.390	0.289
+D+S	3.446	0.701
+D+0.750S	2.932	0.598
+0.60D	0.834	0.173
+D+0.70E	2.327	0.542
+D+0.750S+0.5250E	3.635	0.787
+0.60D+0.70E	1.771	0.426
S Only	2.056	0.411
E Only	1.339	0.361

Wood Beam

DESCRIPTION: B2-25

CODE REFERENCES

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

Material Properties

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

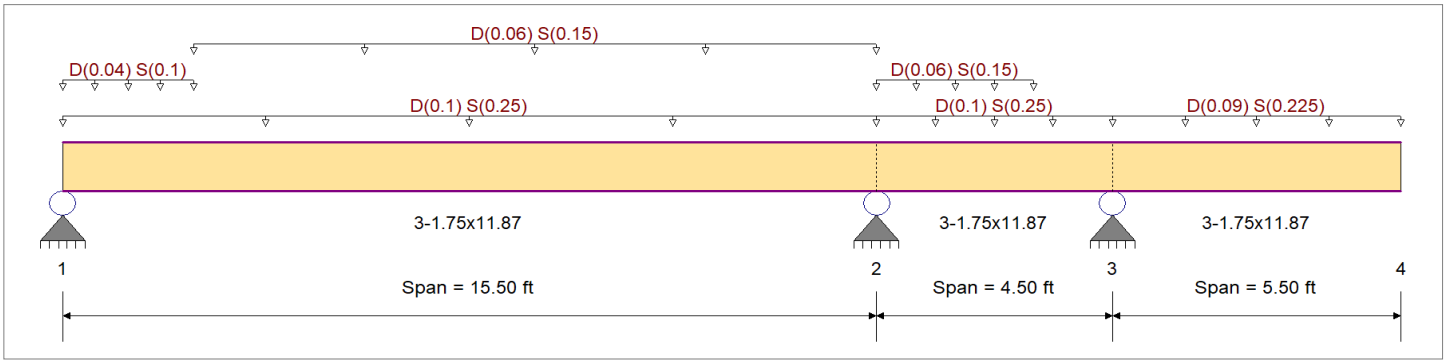
Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

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

Fb +	2,600.0 psi
Fb -	2,600.0 psi
Fc - Prll	2,510.0 psi
Fc - Perp	750.0 psi
Fv	285.0 psi
Ft	1,555.0 psi

E : Modulus of Elasticity

Ebend- xx	1,900.0 ksi
Eminbend - xx	965.71 ksi
Density	42.010 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 = 0.010, S = 0.0250 ksf, Tributary Width = 10.0 ft
Uniform Load : D = 0.010, S = 0.0250 ksf, Extent = 0.0 -->> 2.50 ft, Tributary Width = 4.0 ft
Uniform Load : D = 0.010, S = 0.0250 ksf, Extent = 2.50 -->> 15.50 ft, Tributary Width = 6.0 ft
Load for Span Number 2
Uniform Load : D = 0.010, S = 0.0250 ksf, Tributary Width = 10.0 ft
Uniform Load : D = 0.010, S = 0.0250 ksf, Extent = 0.0 -->> 3.0 ft, Tributary Width = 6.0 ft
Load for Span Number 3
Uniform Load : D = 0.010, S = 0.0250 ksf, Tributary Width = 9.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.413 : 1	Maximum Shear Stress Ratio	=	0.340 : 1
Section used for this span		3-1.75x11.87	Section used for this span		3-1.75x11.87
fb: Actual	=	1,235.87 psi	fv: Actual	=	111.52 psi
F'b	=	2,994.26 psi	F'v	=	327.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	15.500 ft	Location of maximum on span	=	14.588 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.207 in	Ratio =	898 >=360	Span: 1 : S Only
Max Upward Transient Deflection	-0.018 in	Ratio =	3055 >=360	Span: 2 : S Only
Max Downward Total Deflection	0.290 in	Ratio =	641 >=180	Span: 1 : +D+S
Max Upward Total Deflection	-0.025 in	Ratio =	2182 >=180	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_F	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 = 15.50 ft	1	0.151	0.124	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	3.63	353.1	2,343.3	1.32	31.9	256.5
Length = 4.50 ft	2	0.151	0.124	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	3.63	353.1	2,343.3	0.69	31.9	256.5

Wood Beam

DESCRIPTION: B2-25

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 5.50 ft	**3**	0.056	0.124	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	1.36	132.4	2,343.3	0.41	31.9	256.5
+D+S					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.50 ft	**1**	0.413	0.340	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	12.71	1,235.9	2,994.3	4.64	111.5	327.8
Length = 4.50 ft	**2**	0.413	0.340	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	12.71	1,235.9	2,994.3	2.42	111.5	327.8
Length = 5.50 ft	**3**	0.155	0.340	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	4.76	463.4	2,994.3	1.43	111.5	327.8
+D+0.750S					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.50 ft	**1**	0.339	0.280	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	10.44	1,015.2	2,994.3	3.81	91.6	327.8
Length = 4.50 ft	**2**	0.339	0.280	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	10.44	1,015.2	2,994.3	1.99	91.6	327.8
Length = 5.50 ft	**3**	0.127	0.280	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	3.91	380.6	2,994.3	1.17	91.6	327.8
+0.60D					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.50 ft	**1**	0.051	0.042	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	2.18	211.9	4,165.9	0.79	19.1	456.0
Length = 4.50 ft	**2**	0.051	0.042	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	2.18	211.9	4,165.9	0.42	19.1	456.0
Length = 5.50 ft	**3**	0.019	0.042	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.82	79.4	4,165.9	0.24	19.1	456.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2898	7.034		0.0000	0.000
	2	0.0000	7.034	+D+S	-0.0247	2.080
+D+S	3	0.1455	5.500		0.0000	2.080

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Max Upward from all Load Conditions	3.359	8.118	0.965	
Max Upward from Load Combinations	3.359	8.118	0.965	
Max Upward from Load Cases	2.399	5.799	0.689	
D Only	0.960	2.320	0.276	
+D+S	3.359	8.118	0.965	
+D+0.750S	2.759	6.669	0.793	
+0.60D	0.576	1.392	0.165	
S Only	2.399	5.799	0.689	

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

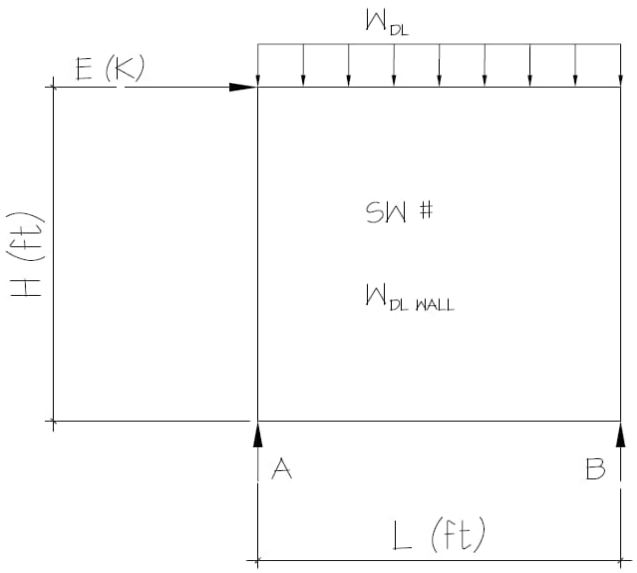
Project Name: MacPherson Co
5320 Butterwort
M&K Project #: 306-25001
Engineer: BFD
Date: 04-Mar-25

Overstrength Calculations

Wall Description/SW #: 208

Parameters:

L =	19.8	ft
H =	5.0	ft
E =	1.10	k
W_{DLwall} =	0.05	klf
W_{DL} =	0.020	klf
Ω_0 =	2.5	(ASCE table 12.2.1 footnote
SDS =	1.293	



Analysis:

E (unfactored) = 1.57

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

$E_V = 0.2*SDS*DL$ = 0.359 k

$E_M = E_{MH} + E_V$

$E_M = E_{MH} - E_V$

$E_M = E_{MH} + E_V$ = 4.288 k

$E_M = E_{MH} - E_V$ = 3.569 k

E_M (max) $= \sum M_A = 0$ = 4.29(5.0) - R_B(19.84)

R_B = 1.1E

R_A = - 1.1E

E_M (min) $= \sum M_A = 0$ = 3.57(5.0) - R_B(19.84)

R_B = 0.9E

R_A = - 0.9E

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

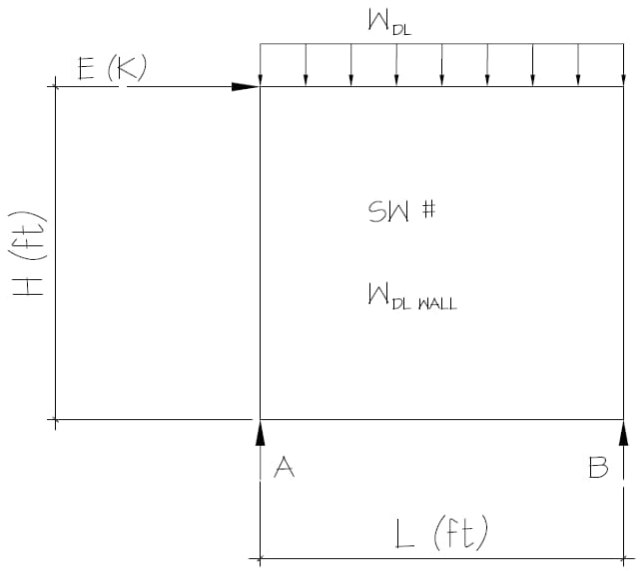
Project Name: MacPherson Ci
5320 Butterwort
M&K Project #: 306-25001
Engineer: BFD
Date: 04-Mar-25

Overstrength Calculations

Wall Description/SW #: 212

Parameters:

L =	17.5	ft
H =	9.0	ft
E =	1.10	k
W_{DLwall} =	0.10	klf
W_{DL} =	0.090	klf
Ω_0 =	2.5	(ASCE table 12.2.1 footnote
SDS =	1.293	



Analysis:

E (unfactored) = 1.57

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

$E_V = 0.2*SDS*DL$ = 0.860 k

$E_M = E_{MH} + E_V$

$E_M = E_{MH} - E_V$

$E_M = E_{MH} + E_V$ = 4.788 k

$E_M = E_{MH} - E_V$ = 3.069 k

E_M (max) $= \sum M_A = 0 =$ 4.79(9.0) - R_B(17.5)

R_B = 2.5E

R_A = - 2.5E

E_M (min) $= \sum M_A = 0 =$ 3.07(9.0) - R_B(17.5)

R_B = 1.6E

R_A = - 1.6E

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*

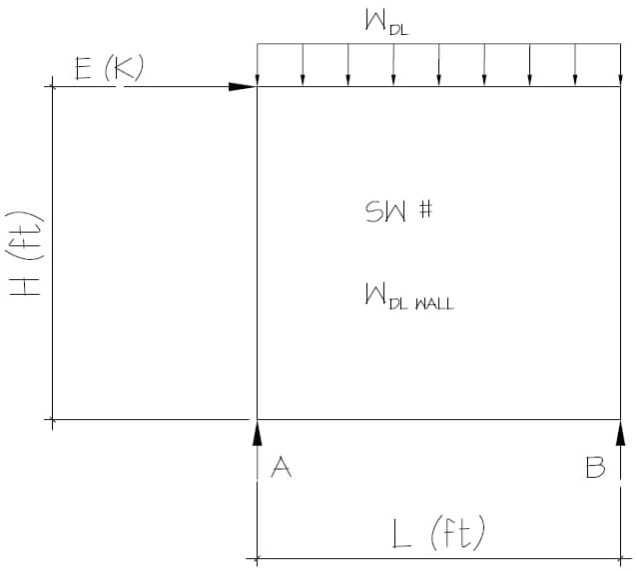
Project Name: MacPherson Ci
5330 Butterwort
M&K Project #: 306-25001
Engineer: BFD
Date: 04-Mar-25

Overstrength Calculations

Wall Description/SW #: 213

Parameters:

L =	4.7	ft
H =	5.0	ft
E =	0.40	k
W_{DLwall} =	0.05	klf
W_{DL} =	0.100	klf
Ω_0 =	2.5	(ASCE table 12.2.1 footnote
SDS =	1.293	



Analysis:

E (unfactored) = 0.57

$E_{MH} = \Omega_0 * E$ = 1.43 k

$E_V = 0.2*SDS*DL$ = 0.183 k

$E_M = E_{MH} + E_V$

$E_M = E_{MH} - E_V$

$E_M = E_{MH} + E_V$ = 1.612 k

$E_M = E_{MH} - E_V$ = 1.245 k

E_M (max) $= \sum M_A = 0$ = 1.61(5.0) - R_B(4.73)

R_B = 1.7E

R_A = - 1.7E

E_M (min) $= \sum M_A = 0$ = 1.25(5.0) - R_B(4.73)

R_B = 1.3E

R_A = - 1.3E

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 - Wind

MacPherson Construction & Design

5320 Butterworth Rd - North Lot

Mercer Island , WA

Parameters:

Single Family Home

Design Wind Speed: 100 MPH

wind Exposure Category: C

Seismic Design Category: D

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

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

Nicholas J. Martignetti, P.E., Project Manager

Blake F. Durham, Staff Engineer

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

WIND DESIGN SUMMARY PER ASCE 7-16

M+K PROJECT #: 306-25001
ENGINEER: BFD

PARAMETERS:

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

0.60

ROOF GEOMETRY:

TRANS. ROOF PITCH	0.3	:12
LONG. ROOF PITCH	0.3	:12
MEAN ROOF HEIGHT, H	20.55	FT

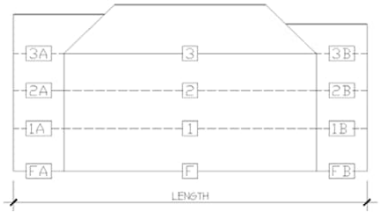
BUILDING GEOMETRY:

LENGTH	148	FT
WIDTH	100	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	0	0	SQ FT
		WALL SURFACE	0	552.1	0	SQ FT
1	11.65 FT	ROOF SURFACE	0	0	0	SQ FT
		WALL SURFACE	0	1528	0	SQ FT
FND		ROOF SURFACE	0	0	0	SQ FT
		WALL SURFACE	0	0	0	SQ FT



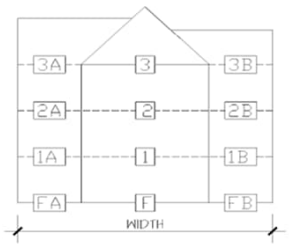
TRIBUTARY DESIGN LOADS: (0.6W)

	SECTION A	SECTION O	SECTION B	
STORY SHEAR	0.00	7.23	0.00	KIPS
TOTAL SHEAR	0.00	7.23	0.00	KIPS
	7.23			KIPS
STORY SHEAR	0.00	19.21	0.00	KIPS
TOTAL SHEAR	0.00	26.44	0.00	KIPS
	26.44			KIPS
STORY SHEAR	0.00	0.00	0.00	KIPS
TOTAL SHEAR	0.00	26.44	0.00	KIPS
	26.44			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	0	0	SQ FT
		WALL SURFACE	0	346.9	0	SQ FT
1	11.65 FT	ROOF SURFACE	0	0	0	SQ FT
		WALL SURFACE	0	1022	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	4.21	0.00	KIPS
TOTAL SHEAR	0.00	4.21	0.00	KIPS
	4.21			KIPS
STORY SHEAR	0.00	11.86	0.00	KIPS
TOTAL SHEAR	0.00	16.07	0.00	KIPS
	16.07			KIPS
STORY SHEAR	0.00	0.00	0.00	KIPS
TOTAL SHEAR	0.00	16.07	0.00	KIPS
	16.07			KIPS

MECHANICAL NOTES:

- PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR PLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.
- PROVIDE DUCTED COMBUSTION AIR FOR GAS BURNERS AS REQ'D.
- PROVIDE THERMAL EXPANSION TANK AT WATER HEATER, IF REQ'D.
- STRAP WATER HEATER TO FRAMING TOP & BOTTOM PER UPC.
- PROVIDE PRESSURE RELIEF LINE PLUMBED DIRECT TO OUTSIDE OR APPROVED DRAIN LOCATION.
- IF RANGE HOOD IS GREATER THAN 400 CFM, AN AUTOMATIC MECHANICAL DAMPER SHALL BE INTEGRATED INTO THE WHOLE HOUSE FAN SYSTEM TO PROVIDE MAKEUP AIR AT THE SAME RATE AS THE EXHAUST FAN.

ENERGY CODE REQUIREMENTS:
MAXIMUM HEATING OUTPUT = XX,XXX BTU/HR
PROVIDE AIR SOURCE HEAT PUMP WITH MIN. HPSF = 11
PROVIDE HIGH EFFICIENCY GAS HOT WATER HEATER WITH MIN. UEF = .91

WINDOW & DOOR LEGEND

AWN: AWNING
CSMT: CASEMENT
FG: FULL GLASS
OBS: OBSCURE GLAZING
OVHD: OVERHEAD GARAGE DOOR
OXXO: FUNCTION ON SLIDERS (X=OPERABLE)
PICT: PICTURE
PKT: POCKET
PVT: PIVOT SWING
SDLT: DOOR SIDELIGHT
SG: SAFETY GLAZING
SLD: HORIZONTAL SLIDER
TRANS: TRANSOM ABOVE
20 MIN: 20 MIN. FIRE RATING

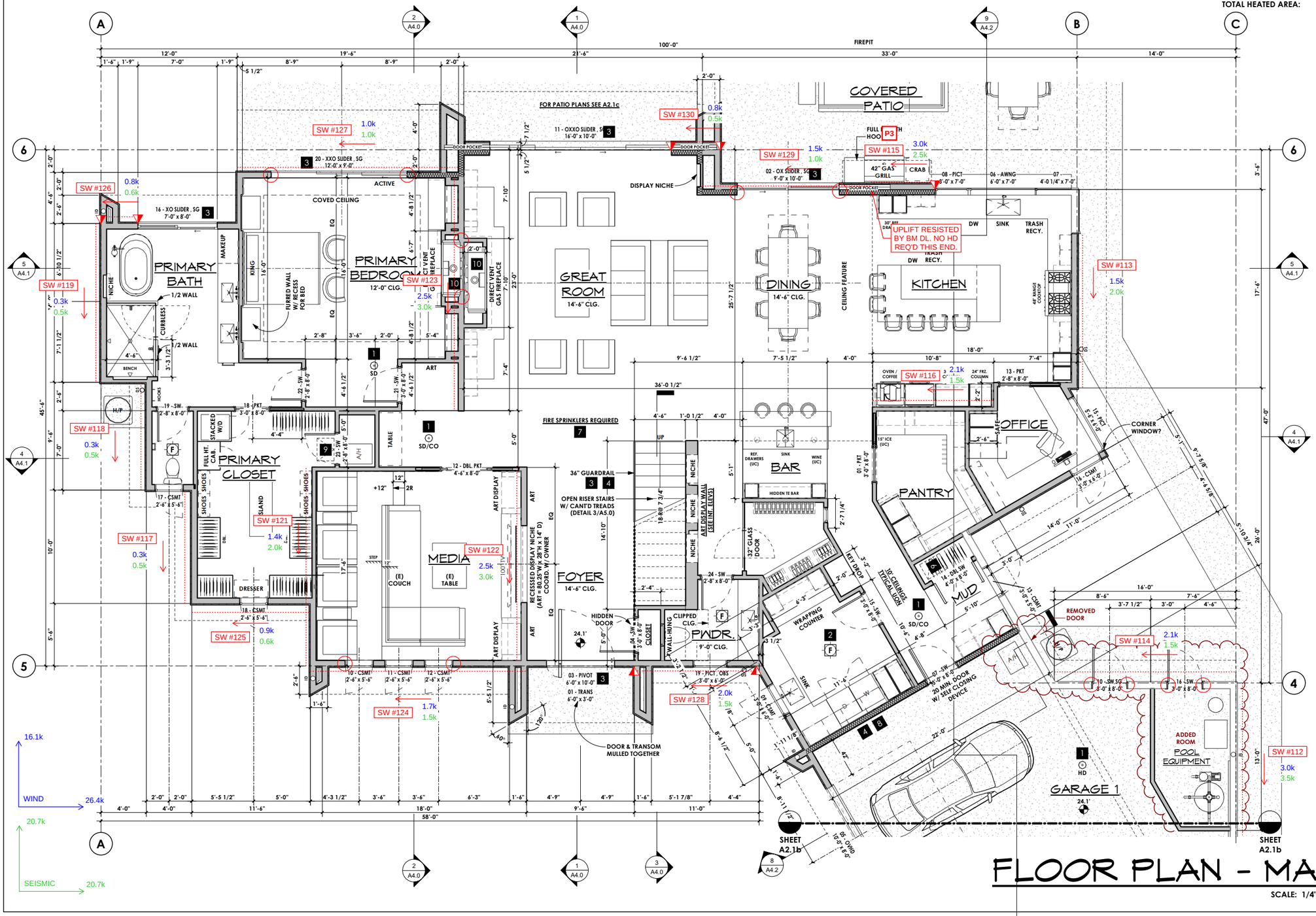
NOTES:
1. U-VALUE: REFER TO GENERAL NOTES ENERGY SECTION FOR MIN. VALUES, AND COVER SHEET ENERGY NOTES FOR CREDIT OPTIONS.
2. WINDOWS ARE TYPICALLY CENTERED IN EXT. WALL UNLESS DIMENSIONED OTHERWISE.
3. DOOR HINGE JAMB TO BE 4 1/2" FROM ADJACENT WALL UNLESS NOTED OTHERWISE.
4. SET EXTERIOR DOORS PRIOR TO SETTING WINDOWS. ALIGN INSIDE LINERS TO MATCH FINISH CASING. WINDOW R.O. SHOULD BE 3/4" LOWER THAN DOOR R.O. (VERIFY W/ MANUFACTURER)
5. PROVIDE SAFETY GLAZING AT ALL LOCATIONS REQUIRED BY CODE (IRC R308.4)
6. PROVIDE SAFETY GLASS SHOWER ENCLOSURE & DOORS, TYP.

KEY NOTES: NOTE: ALL KEY NOTES MAY NOT APPLY

1. INSTALL HEAT, SMOKE AND CARBON MONOXIDE DETECTORS. PER GENERAL NOTES, FIRE PROTECTION.
2. INSTALL WHOLE HOUSE FAN PER GENERAL NOTES, VENTILATION & LIGHTING.
3. PROVIDE SAFETY GLAZING PER GENERAL NOTES, GLAZING.
4. INSTALL GUARDRAILS & HANDRAIL PER GENERAL NOTES, STAIRS.
5. PROVIDE FIRE SEPARATION BETWEEN HOUSE & GARAGE. PER GENERAL NOTES, GARAGES.
6. INSTALL DECKS & STAIRS PER GENERAL NOTES DECKS & STAIRWAYS.
7. INSTALL RESIDENTIAL FIRE SPRINKLER SYSTEM PER GENERAL NOTES, FIRE PROTECTION.
8. PROVIDE INSULATION IN WALLS BETWEEN HEATED & UN-HEATED AREAS, PER GENERAL NOTES, ENERGY.
9. CRAWL SPACE ACCESS: 18"x24" PER GENERAL NOTES, CRAWL SPACES.
10. ZERO CLEARANCE DIRECT VENT GAS FIREPLACE PER GENERAL NOTES, FIREPLACES.

FLOOR AREAS

LEVEL	DESCRIPTION	AREA	HEATED
MAIN FLOOR	FLOOR AREA	3,428 SF	YES
MAIN FLOOR	GUEST STAIRS	124 SF	YES
MAIN FLOOR	SHOP	1,112 SF	
MAIN FLOOR	GARAGE 1	1,068 SF	
MAIN FLOOR	GARAGE 2	293 SF	
UPPER FLOOR	FLOOR AREA	2,571 SF	YES
GROSS BUILDING AREA		8,596 SF	
TOTAL HEATED AREA:		6,180 SF	



FLOOR PLAN - MAIN

SCALE: 1/4" = 1'-0"

2" @ FULL SCALE

DATE	REV.	BY	DESCRIPTION
4/1/25		DAN	PERMIT SUBMITTAL
7/24/25		DAN	PERMIT SUBMITTAL 2

MACPHERSON RESIDENCE
5320 BUTTERWORTH RD.
MERCER ISLAND, WA 98040
PARCEL #: 8661400040
FLOOR PLAN - MAIN

MacPherson Construction & Design
22605 SE 56th St Suite 140, Issaquah, WA 98029
PH. 425.391.3333 FAX 425.557.2841

SHEET NUMBER
A2.1a

7/24/2025 2:47:07 PM

MECHANICAL NOTES:

- PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR PLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.
- PROVIDE DUCTED COMBUSTION AIR FOR GAS BURNERS AS REQ'D.
- PROVIDE THERMAL EXPANSION TANK AT WATER HEATER, IF REQ'D.
- STRAP WATER HEATER TO FRAMING TOP & BOTTOM PER UPC.
- PROVIDE PRESSURE RELIEF LINE PLUMBED DIRECT TO OUTSIDE OR APPROVED DRAIN LOCATION.
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ENERGY CODE REQUIREMENTS:
MAXIMUM HEATING OUTPUT = XX,XXX BTU/HR
PROVIDE AIR SOURCE HEAT PUMP WITH MIN. HPSF = 11
PROVIDE HIGH EFFICIENCY GAS HOT WATER HEATER WITH MIN. UEF = .91

WINDOW & DOOR LEGEND

AWN:	AWNING
CSMT:	CASEMENT
FG:	FULL GLASS
OBS:	OBSCURE GLAZING
OVHD:	OVERHEAD GARAGE DOOR
OXXO:	FUNCTION ON SLIDERS (X=OPERABLE)
PICT:	PICTURE
PKT:	POCKET
PVT:	PIVOT SWING
SDLT:	DOOR SIDELIGHT
SG:	SAFETY GLAZING
SLD:	HORIZONTAL SLIDER
TRANS:	TRANSOM ABOVE
20 MIN:	20 MIN. FIRE RATING

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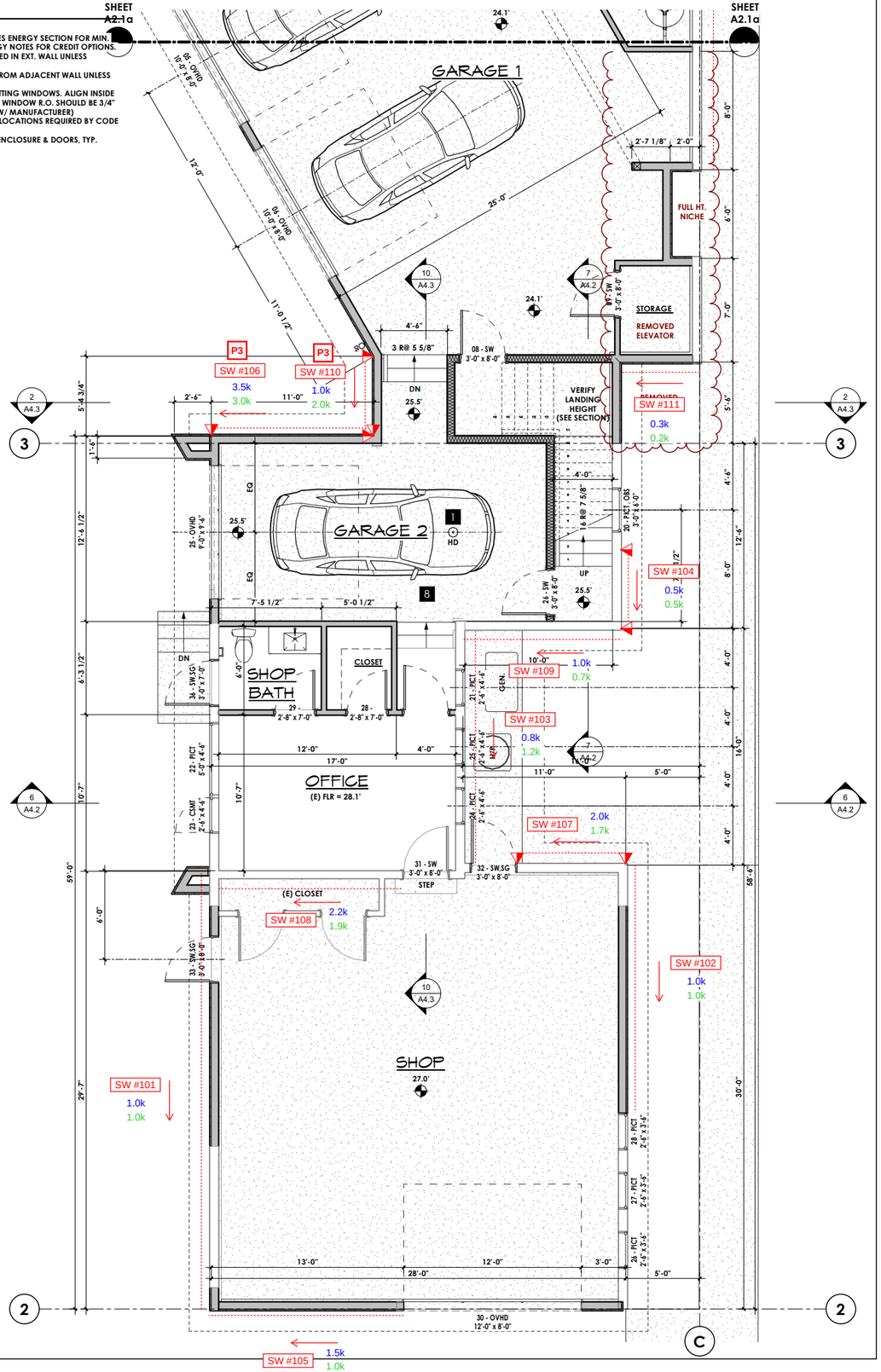
1. INSTALL HEAT, SMOKE AND CARBON MONOXIDE DETECTORS. PER GENERAL NOTES, FIRE PROTECTION.
2. INSTALL WHOLE HOUSE FAN PER GENERAL NOTES, VENTILATION & LIGHTING.
3. PROVIDE SAFETY GLAZING PER GENERAL NOTES, GLAZING.
4. INSTALL GUARDRAILS & HANDRAIL PER GENERAL NOTES, STAIRS.
5. PROVIDE FIRE SEPARATION BETWEEN HOUSE & GARAGE. PER GENERAL NOTES, GARAGES.
6. INSTALL DECKS & STAIRS PER GENERAL NOTES DECKS & STAIRWAYS.
7. INSTALL RESIDENTIAL FIRE SPRINKLER SYSTEM PER GENERAL NOTES, FIRE PROTECTION.
8. PROVIDE INSULATION IN WALLS BETWEEN HEATED & UN-HEATED AREAS, PER GENERAL NOTES, ENERGY.
9. CRAWL SPACE ACCESS: 18"x24" PER GENERAL NOTES, CRAWL SPACES.
10. ZERO CLEARANCE DIRECT VENT GAS FIREPLACE PER GENERAL NOTES, FIREPLACES.

FLOOR AREAS

LEVEL	DESCRIPTION	AREA	HEATED
MAIN FLOOR	FLOOR AREA	3,428 SF	YES
MAIN FLOOR	GUEST STAIRS	124 SF	YES
MAIN FLOOR	SHOP	1,112 SF	
MAIN FLOOR	GARAGE 1	1,068 SF	
MAIN FLOOR	GARAGE 2	293 SF	
UPPER FLOOR	FLOOR AREA	2,571 SF	YES
GROSS BUILDING AREA		8,596 SF	
TOTAL HEATED AREA:		6,180 SF	



2" @ FULL SCALE

DATE	REV.	BY	DESCRIPTION
4/1/25		DAN	PERMIT SUBMITTAL
7/24/25		DAN	PERMIT SUBMITTAL 2

MACPHERSON RESIDENCE

5320 BUTTERWORTH RD.
MERCER ISLAND, WA 98040
PARCEL #: 866140-0040

FLOOR PLAN - MAIN

SCALE THIS DRAWING, IN FEET
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

16.1k
WIND 26.4k
20.7k
SEISMIC 20.7k

FLOOR PLAN - MAIN

SCALE: 1/4" = 1'-0"

NORTH

MacPherson
Construction & Design
22605 SE 56th St Suite 140, Issaquah, WA 98029
PH. 425.391.3333 FAX 425.557.2841

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SCALE THIS DRAWING, IN FEET

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

KEY NOTES:

1. INSTALL HEAT, SMOKE AND CARBON MONOXIDE DETECTORS. PER GENERAL NOTES, FIRE PROTECTION.
2. INSTALL WHOLE HOUSE FAN. PER GENERAL NOTES, VENTILATION & LIGHTING.
3. PROVIDE SAFETY GLAZING PER GENERAL NOTES, GLAZING.
4. INSTALL GUARDRAILS & HANDRAIL PER GENERAL NOTES, STAIRS.
5. PROVIDE FIRE SEPARATION BETWEEN HOUSE & GARAGE. PER GENERAL NOTES, GARAGES.
6. INSTALL DECKS & STAIRS. PER GENERAL NOTES DECKS & EXTERIOR STAIRWAYS.
7. INSTALL RESIDENTIAL FIRE SPRINKLER SYSTEM. PER GENERAL NOTES, FIRE PROTECTION.
8. PROVIDE INSULATION IN WALLS BETWEEN HEATED & UN-HEATED AREAS. PER GENERAL NOTES, ENERGY.
9. CRAWL SPACE ACCESS: 18"x24" PER GENERAL NOTES, CRAWL SPACES.
10. ZERO CLEARANCE DIRECT VENT GAS FIREPLACE. PER GENERAL NOTES, FIREPLACES.

MECHANICAL NOTES:

- PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR PLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.
- PROVIDE DUCTED COMBUSTION AIR FOR GAS BURNERS AS REQ'D.
- PROVIDE THERMAL EXPANSION TANK AT WATER HEATER, IF REQ'D.
- STRAP WATER HEATER TO FRAMING TOP & BOTTOM PER UPC.
- PROVIDE PRESSURE RELIEF LINE PLUMBED DIRECT TO OUTSIDE OR APPROVED DRAIN LOCATION. (E) ROOF DEMOLISHED
- IF RANGE HOOD IS GREATER THAN 400 CFM AN AUTOMATIC MECHANICAL DAMPER SHALL BE INTEGRATED INTO THE WHOLE HOUSE FAN SYSTEM TO PROVIDE MAKEUP AIR AT THE SAME RATE AS THE EXHAUST FAN.

ENERGY CODE REQUIREMENTS:
MAXIMUM HEATING OUTPUT = XX,XXX BTU/HR
PROVIDE AIR SOURCE HEAT PUMP WITH MIN. HPSF = 11
PROVIDE HIGH EFFICIENCY GAS HOT WATER HEATER WITH MIN. UEF = .91

4.2k WIND 7.2k
8.9k
SEISMIC 8.9k

FLOOR AREAS

LEVEL	DESCRIPTION	AREA	HEATED
MAIN FLOOR	FLOOR AREA	3,428 SF	YES
MAIN FLOOR	GUEST STAIRS	124 SF	YES
MAIN FLOOR	SHOP	1,112 SF	
MAIN FLOOR	GARAGE 1	1,068 SF	
MAIN FLOOR	GARAGE 2	293 SF	
UPPER FLOOR	FLOOR AREA	2,571 SF	YES
GROSS BUILDING AREA		8,596 SF	
TOTAL HEATED AREA:		6,180 SF	

FLOOR PLAN - UPPER

SCALE: 1/4" = 1'-0"

NORTH

2" @ FULL SCALE

DATE	REV.	BY	DESCRIPTION
4/1/25		DAN	PERMIT SUBMITTAL
7/24/25		DAN	PERMIT SUBMITTAL 2

MACPHERSON RESIDENCE
5320 BUTTERWORTH RD.
MERCER ISLAND, WA 98040
PARCEL #: 866140-0040
FLOOR PLAN - UPPER

MacPherson Construction & Design
22605 SE 56th St Suite 140, Issaquah, WA 98029
PH. 425.391.3333 FAX 425.557.2841

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MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 201: 2nd - North Ext. Wall @ Guest Bed

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_o	5.5	ft.		
Wall Length, L	16.5	ft.	Qualifying Wall Length, L	9.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
400 lbs	<	3000 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	120	plf	Overturning Moment	3.6	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	20.6	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 202: 2nd - North Ext. Wall @ Guest Lounge

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	5.5	ft.		
Wall Length, L	13.0	ft.	Qualifying Wall Length, L	5.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
300 lbs	<	1784 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	120	plf	Overturning Moment	2.7	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	13.8	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 203: 2nd - South Ext. Wall @ Guest Bed

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_o	5.0	ft.		
Wall Length, L	16.5	ft.	Qualifying Wall Length, L	11.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
300 lbs	<	3862 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	120	plf	Overturning Moment	2.7	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	20.6	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 204: 2nd - South Ext. Wall @ Pantry

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	5.6	ft.	Qualifying Wall Length, L	5.6	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
200 lbs	<	1891 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	120	plf	Overturning Moment	1.8	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	3.7	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 205: 2nd - West Ext. Wall @ Guest Bed

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_o	0.0	ft.		
Wall Length, L	17.0	ft.	Qualifying Wall Length, L	17.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1700 lbs	<	5722 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	185	plf	Overturning Moment	15.3	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	30.3	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 206: 2nd - East Ext. Wall @ Guest Lounge

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	11.0	ft.	Qualifying Wall Length, L	11.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1800 lbs	<	3707 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	165	plf	Overturning Moment	16.2	k-ft	Hold Down Design Load	288	lbs
DL at ends of wall	400	lbs	Resistive Moment	13.0	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 #: 306-25001
Engineer: BFD

Shearwall 207: 2nd - North Ext. Wall @ Guest Stairs

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_o	0.0	ft.		
Wall Length, L	5.4	ft.	Qualifying Wall Length, L	5.4	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
300 lbs	<	1807 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	120	plf	Overturning Moment	2.7	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	3.5	k-ft	Holdown Capacity	1705	lbs

Hold-down Specification

No Holdown Required

Shearwall 208: 2nd - North Ext. Wall @ Stairs/Foyer

Shearwall Properties:

Wall height, H	5.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	19.8	ft.	Qualifying Wall Length, L	19.8	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1000 lbs	<	6662 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	70	plf	Overturning Moment	5.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	19.5	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 306-25001
ENGINEER: BFD

SHEARWALL 209: 2ND - NORTH EXT. WALL @ JORDAN'S ROOM/LOUNGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, H_o	0.0	FT.		
WALL LENGTH, L	22.2	FT.	QUALIFYING WALL LENGTH, L	22.2	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1100 LBS	<	7441 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	190	PLF	OVERTURNING MOMENT	9.9	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	50.0	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 210: 2ND - WEST EXT. WALL @ STAIRS

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, Hc	6.0	FT.		
WALL LENGTH, L	10.6	FT.	QUALIFYING WALL LENGTH, L	7.6	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1700 LBS	<	4815 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	15.3	K-FT	HOLD DOWN DESIGN LOAD	120	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	14.0	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 #: 306-25001
ENGINEER: BFD

SHEARWALL 211: 2ND - SOUTH EXT. WALL @ CHRIS' ROOM/DECK

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, H_o	6.0	FT.		
WALL LENGTH, L	16.0	FT.	QUALIFYING WALL LENGTH, L	8.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
300 LBS	<	2812 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	130	PLF	OVERTURNING MOMENT	2.7	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	20.7	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 212: 2ND - SOUTH EXT. WALL @ JORDAN'S ROOM

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, Hc	6.0	FT.		
WALL LENGTH, L	17.5	FT.	QUALIFYING WALL LENGTH, L	10.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
300 LBS	<	3358 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	190	PLF	OVERTURNING MOMENT	2.7	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	32.5	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 306-25001
ENGINEER: BFD

SHEARWALL 213: 2ND - EAST EXT. WALL @ STAIRS/ GREAT ROOM

SHEARWALL PROPERTIES:

WALL HEIGHT, H	5.0	FT.	MAX WALL OPENING HT, H_o	0.0	FT.		
WALL LENGTH, L	4.7	FT.	QUALIFYING WALL LENGTH, L	4.7	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
300 LBS	<	1588 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	150	PLF	OVERTURNING MOMENT	1.5	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	600	LBS	RESISTIVE MOMENT	4.1	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 214: 2ND - EAST EXT. WALL @ JORDAN'S ROOM/DECK

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, Hc	8.0	FT.		
WALL LENGTH, L	18.0	FT.	QUALIFYING WALL LENGTH, L	4.6	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1700 LBS	<	2350 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	120	PLF	OVERTURNING MOMENT	15.3	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	24.0	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 101: 1st - North Ext. Wall @ Shop

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_c	8.0	ft.		
Wall Length, L	29.1	ft.	Qualifying Wall Length, L	25.9	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1000 lbs	<	8682 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	120	plf	Overturning Moment	10.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	56.3	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 102: 1st - South Ext. Wall @ Shop

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	16.8	ft.	Qualifying Wall Length, L	16.8	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1000 lbs	<	5625 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	120	plf	Overturning Moment	10.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	21.2	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 306-25001
ENGINEER: BFD

SHEARWALL 103: 1ST - SOUTH EXT. WALL @ OFFICE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_o	3.5	FT.		
WALL LENGTH, L	16.0	FT.	QUALIFYING WALL LENGTH, L	5.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
800 LBS	<	1847 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	120	PLF	OVERTURNING MOMENT	8.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	19.6	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 104: 1ST - SOUTH EXT. WALL @ GUEST STAIRS

SHEARWALL PROPERTIES:

WALL HEIGHT, H	11.5	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	5.6	FT.	QUALIFYING WALL LENGTH, L	5.6	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
500 LBS	<	1885 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	7.6	K-FT	HOLD DOWN DESIGN LOAD	10	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	7.5	K-FT	HOLDOWN CAPACITY	4935	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 306-25001
ENGINEER: BFD

SHEARWALL 105: 1ST - WEST EXT. WALL @ SHOP

SHEARWALL PROPERTIES:

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

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1500 LBS	<	4365 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	175	PLF	OVERTURNING MOMENT	15.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	18.0	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 106: 1ST - EAST EXT. WALL @ GARAGE 2

SHEARWALL PROPERTIES:

WALL HEIGHT, H	11.5	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	11.0	FT.	QUALIFYING WALL LENGTH, L	11.0	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
3500 LBS	<	6932 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	330	PLF	OVERTURNING MOMENT	56.4	K-FT	HOLD DOWN DESIGN LOAD	2773	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	25.9	K-FT	HOLDOWN CAPACITY	4935	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 107: 1st - East Ext. Wall @ Shop

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_o	0.0	ft.		
Wall Length, L	7.3	ft.	Qualifying Wall Length, L	7.3	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2000 lbs	<	2451 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	20.0	k-ft	Hold Down Design Load	1805	lbs
DL at ends of wall	400	lbs	Resistive Moment	6.8	k-ft	Holdown Capacity	4935	lbs

Hold-down Specification

Simpson STHD14RJ Holdown

Shearwall 108: 1st - West Int. Wall @ Shop/Office

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	12.4	ft.	Qualifying Wall Length, L	12.4	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2200 lbs	<	4171 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	445	plf	Overturning Moment	19.8	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	800	lbs	Resistive Moment	39.8	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 306-25001
ENGINEER: BFD

SHEARWALL 109: 1ST - WEST EXT. WALL @ STAIRS/GARAGE 2

SHEARWALL PROPERTIES:

WALL HEIGHT, H	11.5	FT.	MAX WALL OPENING HT, H_o	0.0	FT.		
WALL LENGTH, L	10.6	FT.	QUALIFYING WALL LENGTH, L	10.6	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1000 LBS	<	3549 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	143	PLF	OVERTURNING MOMENT	11.5	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	14.8	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 110: 1ST - NORTH EXT. WALL @ GARAGE 1

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	5.4	FT.	QUALIFYING WALL LENGTH, L	5.4	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1000 LBS	<	3397 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	280	PLF	OVERTURNING MOMENT	12.7	K-FT	HOLD DOWN DESIGN LOAD	958	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	7.5	K-FT	HOLDOWN CAPACITY	4935	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 306-25001
ENGINEER: BFD

SHEARWALL 111: 1ST - WEST EXT. WALL @ GARAGE STORAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_o	0.0	FT.		
WALL LENGTH, L	5.3	FT.	QUALIFYING WALL LENGTH, L	5.3	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
300 LBS	<	1783 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	220	PLF	OVERTURNING MOMENT	3.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	6.6	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 112: 1ST - SOUTH EXT. WALL @ GARAGE 1

SHEARWALL PROPERTIES:

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

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
3000 LBS	<	7052 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	270	PLF	OVERTURNING MOMENT	30.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	61.1	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 113: 1st - South Ext. Wall @ Kitchen

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	13.5	ft.	Qualifying Wall Length, L	13.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1500 lbs	<	4533 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	320	plf	Overturning Moment	15.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	31.1	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 114: 1st - East Ext. Wall @ Garage 1

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	8.0	ft.		
Wall Length, L	16.0	ft.	Qualifying Wall Length, L	9.7	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2100 lbs	<	2945 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	21.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	21.9	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 115: 1st - East Ext. Wall @ Kitchen/Patio

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_o	0.0	ft.		
Wall Length, L	5.6	ft.	Qualifying Wall Length, L	5.6	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
3000 lbs	<	3504 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	443	plf	Overturning Moment	30.0	k-ft	Hold Down Design Load	2489	lbs
DL at ends of wall	2000	lbs	Resistive Moment	16.2	k-ft	Holdown Capacity	4935	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

Shearwall 116: 1st - East Int. Wall @ Kitchen/Pantry

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	10.7	ft.	Qualifying Wall Length, L	10.7	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2100 lbs	<	3583 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	325	plf	Overturning Moment	21.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	600	lbs	Resistive Moment	22.4	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 117: 1st - North Ext. Wall @ Primary Closet

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	10.0	ft.	Qualifying Wall Length, L	10.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
300 lbs	<	3358 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	155	plf	Overturning Moment	3.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	10.6	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 118: 1st - North Ext. Wall @ Primary Bath

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	9.5	ft.	Qualifying Wall Length, L	9.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
300 lbs	<	3190 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	3.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	10.5	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 119: 1st - North Ext. Wall @ Primary Bath

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	14.0	ft.	Qualifying Wall Length, L	14.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
300 lbs	<	4701 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	160	plf	Overturning Moment	3.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	19.2	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 120: 1st - North Int./Ext. Wall @ Primary Bath/Bed

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	16.8	ft.	Qualifying Wall Length, L	16.8	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
0 lbs	<	5641 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	255	plf	Overturning Moment	0.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	38.4	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 306-25001
ENGINEER: BFD

SHEARWALL 121: 1ST - NORTH INT./EXT. WALL @ PRIMARY CLOSET/MEDIA

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_o	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
1400 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	245	PLF	OVERTURNING MOMENT	14.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	51.3	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 122: 1ST - NORTH INT. WALL @ MEDIA/FOYER

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	2.5	FT.		
WALL LENGTH, L	21.6	FT.	QUALIFYING WALL LENGTH, L	14.6	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
2500 LBS	<	4909 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	25.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	58.3	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 306-25001
ENGINEER: BFD

SHEARWALL 123: 1ST - NORTH INT. WALL @ GREAT ROOM/PRIMARY BED

SHEARWALL PROPERTIES:

WALL HEIGHT, H	12.0	FT.	MAX WALL OPENING HT, H_o	8.0	FT.		
WALL LENGTH, L	20.5	FT.	QUALIFYING WALL LENGTH, L	15.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
2500 LBS	=	5205 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	30.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	64.1	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 124: 1ST - WEST EXT. WALL @ MEDIA

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	5.5	FT.		
WALL LENGTH, L	19.0	FT.	QUALIFYING WALL LENGTH, L	9.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1700 LBS	<	3190 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	120	PLF	OVERTURNING MOMENT	17.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	26.3	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 306-25001
ENGINEER: BFD

SHEARWALL 125: 1ST - WEST EXT. WALL @ PRIMARY CLOSET

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_c	5.5	FT.		
WALL LENGTH, L	10.5	FT.	QUALIFYING WALL LENGTH, L	8.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
900 LBS	<	2686 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	120	PLF	OVERTURNING MOMENT	9.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	9.7	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 126: 1ST - EAST EXT. WALL @ PRIMARY BATH

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	3.1	FT.	QUALIFYING WALL LENGTH, L	3.1	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
800 LBS	<	869 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	120	PLF	OVERTURNING MOMENT	8.0	K-FT	HOLD DOWN DESIGN LOAD	2080	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	1.6	K-FT	HOLDOWN CAPACITY	4935	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 306-25001
ENGINEER: BFD

SHEARWALL 127: 1ST - EAST EXT. WALL @ PRIMARY BED

SHEARWALL PROPERTIES:

WALL HEIGHT, H	12.0	FT.	MAX WALL OPENING HT, H_o	9.0	FT.		
WALL LENGTH, L	19.5	FT.	QUALIFYING WALL LENGTH, L	7.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1000 LBS	<	2393 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	120	PLF	OVERTURNING MOMENT	12.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	27.6	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 128: 1ST - WEST EXT. WALL @ POWDER

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	6.0	FT.		
WALL LENGTH, L	10.7	FT.	QUALIFYING WALL LENGTH, L	7.7	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
2000 LBS	<	2576 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	320	PLF	OVERTURNING MOMENT	35.3	K-FT	HOLD DOWN DESIGN LOAD	1056	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	24.1	K-FT	HOLDOWN CAPACITY	4935	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 306-25001
ENGINEER: BFD

SHEARWALL 129: 1ST - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H	14.5	FT.	MAX WALL OPENING HT, H_o	10.0	FT.		
WALL LENGTH, L	15.5	FT.	QUALIFYING WALL LENGTH, L	6.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1500 LBS	<	1788 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	230	PLF	OVERTURNING MOMENT	21.8	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	30.4	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 130: 1ST - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H	14.5	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	4.3	FT.	QUALIFYING WALL LENGTH, L	4.3	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
800 LBS	<	1192 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	170	PLF	OVERTURNING MOMENT	11.6	K-FT	HOLD DOWN DESIGN LOAD	2016	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	3.0	K-FT	HOLDOWN CAPACITY	4935	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shear Wall Calculations - Seismic

MacPherson Construction & Design

5320 Butterworth Rd - North Lot

Mercer Island , WA

Parameters:

Single Family Home

Design Wind Speed: 100 MPH

wind Exposure Category: C

Seismic Design Category: D

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

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

Nicholas J. Martignetti, P.E., Project Manager

Blake F. Durham, Staff Engineer

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SEISMIC CALCULATION - ASCE 7-16

M+K PROJECT #: 306-25001
ENGINEER: BFD

SEISMIC DESIGN CATEGORY:

USER INPUTS:

SITE CLASS	F
SPECTRAL RESPONSE ACCELERATION 0.2 SEC, S_S	1.437
SPECTRAL RESPONSE ACCELERATION 1.0 SEC, S_1	0.499
OCCUPANCY CATEGORY	II

VARIABLES:

SITE COEFFICIENT, FA	x
SITE COEFFICIENT, FV	x

CALCULATED VALUES:

MAXIMUM SPECTRAL RESPONSE ACCELERATION, S_{MS}	1.940
MAXIMUM SPECTRAL RESPONSE ACCELERATION, S_{M1}	0.674
DESIGN SPECTRAL RESPONSE ACCELERATION, S_{DS}	1.293
DESIGN SPECTRAL RESPONSE ACCELERATION, S_{D1}	0.499
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)	8
HT. ABV BASE TO HIGHEST LEVEL, h_N	21

CALCULATED VALUES:

APPROXIMATE FUNDAMENTAL PERIOD, T_A	0.193
T_O	0.077
T_S	0.386
SPECTRAL RESPONSE ACC., S_A (G)	1.293

SITE CLASS ASSUMPTION

No — PER ASCE 7-16 SECTION 11.4.3 THE SITE CLASS MAY BE ASSUMED TO BE D

EQUIVALENT LATERAL FORCE PROCEDURE

DEAD LOAD CALCULATION:

LEVEL	STORY HT. (FT.)	AREA (FT^2)	DEAD LOAD (PSF)	DL OF EXT WALL TRIB. TO LEVEL (KIPS)	TOTAL LEVEL DL
1	11.6	5129	15	26.8	104 K
2	9.0	3454	10	10.0	45 K
3	0.0	0	0	0.0	0 K
4	0.0	0	0	0.0	0 K
5	0.0	0	0	0.0	0 K
6	0.0	0	0	0.0	0 K
7	0.0	0	0	0.0	0 K
8	0.0	0	0	0.0	0 K
9	0.0	0	0	0.0	0 K
10	0.0	0	0	0.0	0 K
11	0.0	0	0	0.0	0 K
12	0.0	0	0	0.0	0 K
13	0.0	0	0	0.0	0 K
14	0.0	0	0	0.0	0 K
15	0.0	0	0	0.0	0 K

TOTAL DEAD LOAD OF STRUCTURE 148 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	0.199	0.199

BASE SHEARS:

ULTIMATE LOADS				x 0.7 =	ALLOWABLE LOADS			
TRANSVERSE		LONGITUDINAL			TRANSVERSE		LONGITUDINAL	
30	K	30	K		20.7	K	20.7	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	ALLOWABLE LOADS: TRANSVERSE Σ STORY SHEAR	ALLOWABLE LOADS: LONGITUDINAL STORY SHEAR, F_x	ALLOWABLE LOADS: LONGITUDINAL Σ STORY SHEAR
1	0.567	16.7 K	16.7 K	11.7 K	20.7 K	11.7 K	20.7 K
2	0.433	12.8 K	12.8 K	8.9 K	8.9 K	8.9 K	8.9 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

MECHANICAL NOTES:

- PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR PLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.
- PROVIDE DUCTED COMBUSTION AIR FOR GAS BURNERS AS REQ'D.
- PROVIDE THERMAL EXPANSION TANK AT WATER HEATER, IF REQ'D.
- STRAP WATER HEATER TO FRAMING TOP & BOTTOM PER UPC.
- PROVIDE PRESSURE RELIEF LINE PLUMBED DIRECT TO OUTSIDE OR APPROVED DRAIN LOCATION.
- IF RANGE HOOD IS GREATER THAN 400 CFM, AN AUTOMATIC MECHANICAL DAMPER SHALL BE INTEGRATED INTO THE WHOLE HOUSE FAN SYSTEM TO PROVIDE MAKEUP AIR AT THE SAME RATE AS THE EXHAUST FAN.

ENERGY CODE REQUIREMENTS:
MAXIMUM HEATING OUTPUT = XX,XXX BTU/HR
PROVIDE AIR SOURCE HEAT PUMP WITH MIN. HPSF = 11
PROVIDE HIGH EFFICIENCY GAS HOT WATER HEATER WITH MIN. UEF = .91

WINDOW & DOOR LEGEND

AWN: AWNING
CSMT: CASEMENT
FG: FULL GLASS
OBS: OBSCURE GLAZING
OVHD: OVERHEAD GARAGE DOOR
OXXO: FUNCTION ON SLIDERS (X=OPERABLE)
PICT: PICTURE
PKT: POCKET
PVT: PIVOT SWING
SDLT: DOOR SIDELIGHT
SG: SAFETY GLAZING
SLD: HORIZONTAL SLIDER
TRANS: TRANSOM ABOVE
20 MIN: 20 MIN. FIRE RATING

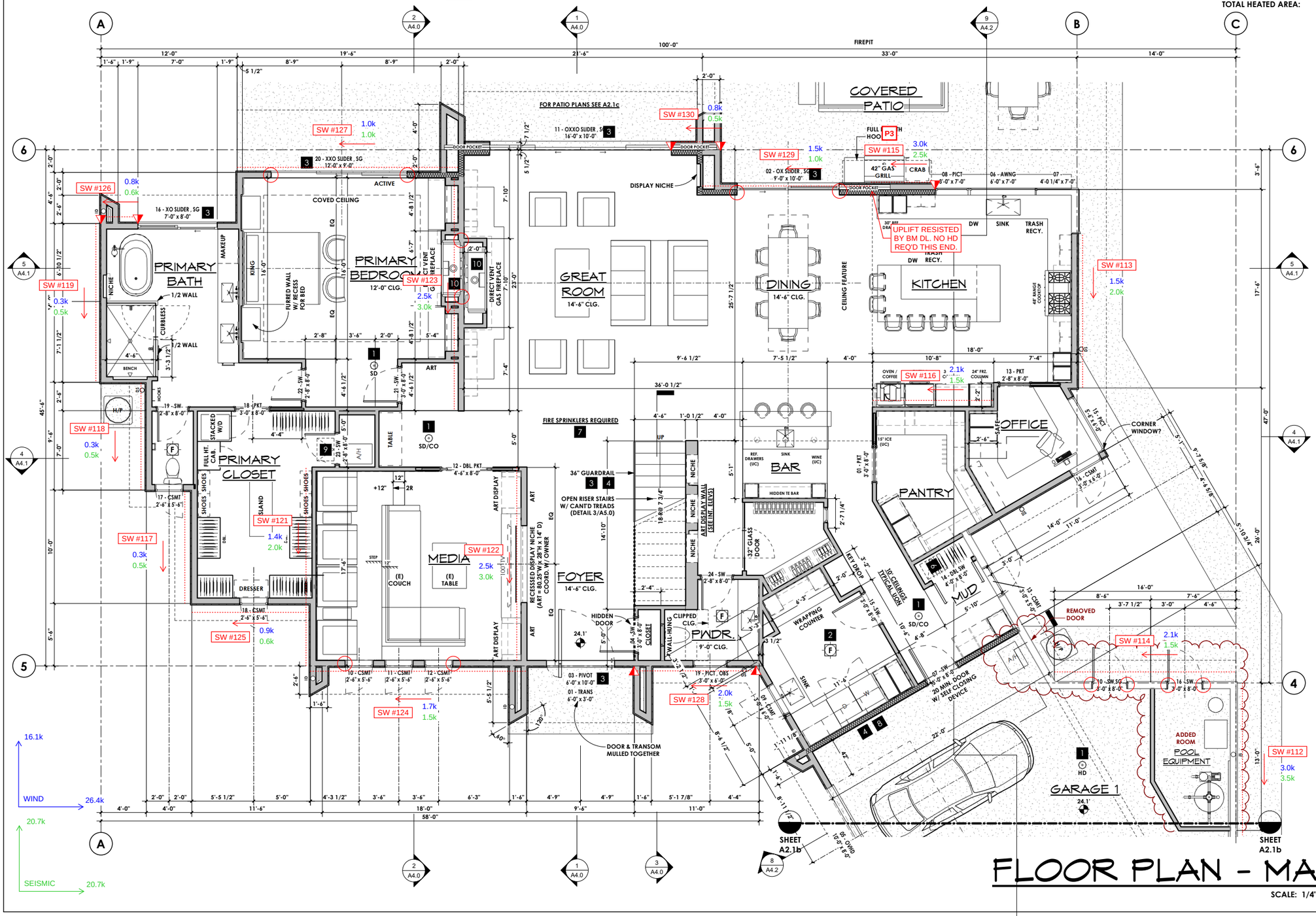
NOTES:
1. U-VALUE: REFER TO GENERAL NOTES ENERGY SECTION FOR MIN. VALUES, AND COVER SHEET ENERGY NOTES FOR CREDIT OPTIONS.
2. WINDOWS ARE TYPICALLY CENTERED IN EXT. WALL UNLESS DIMENSIONED OTHERWISE.
3. DOOR HINGE JAMB TO BE 4 1/2" FROM ADJACENT WALL UNLESS NOTED OTHERWISE.
4. SET EXTERIOR DOORS PRIOR TO SETTING WINDOWS. ALIGN INSIDE LINERS TO MATCH FINISH CASING. WINDOW R.O. SHOULD BE 3/4" LOWER THAN DOOR R.O. (VERIFY W/ MANUFACTURER)
5. PROVIDE SAFETY GLAZING AT ALL LOCATIONS REQUIRED BY CODE (IRC R308.4)
6. PROVIDE SAFETY GLASS SHOWER ENCLOSURE & DOORS, TYP.

KEY NOTES: NOTE: ALL KEY NOTES MAY NOT APPLY

1. INSTALL HEAT, SMOKE AND CARBON MONOXIDE DETECTORS. PER GENERAL NOTES, FIRE PROTECTION.
2. INSTALL WHOLE HOUSE FAN PER GENERAL NOTES, VENTILATION & LIGHTING.
3. PROVIDE SAFETY GLAZING PER GENERAL NOTES, GLAZING.
4. INSTALL GUARDRAILS & HANDRAIL PER GENERAL NOTES, STAIRS.
5. PROVIDE FIRE SEPARATION BETWEEN HOUSE & GARAGE. PER GENERAL NOTES, GARAGES.
6. INSTALL DECKS & STAIRS PER GENERAL NOTES DECKS & STAIRWAYS.
7. INSTALL RESIDENTIAL FIRE SPRINKLER SYSTEM PER GENERAL NOTES, FIRE PROTECTION.
8. PROVIDE INSULATION IN WALLS BETWEEN HEATED & UN-HEATED AREAS, PER GENERAL NOTES, ENERGY.
9. CRAWL SPACE ACCESS: 18"x24" PER GENERAL NOTES, CRAWL SPACES.
10. ZERO CLEARANCE DIRECT VENT GAS FIREPLACE PER GENERAL NOTES, FIREPLACES.

FLOOR AREAS

LEVEL	DESCRIPTION	AREA	HEATED
MAIN FLOOR	FLOOR AREA	3,428 SF	YES
MAIN FLOOR	GUEST STAIRS	124 SF	YES
MAIN FLOOR	SHOP	1,112 SF	
MAIN FLOOR	GARAGE 1	1,068 SF	
MAIN FLOOR	GARAGE 2	293 SF	
UPPER FLOOR	FLOOR AREA	2,571 SF	YES
GROSS BUILDING AREA		8,596 SF	
TOTAL HEATED AREA:		6,180 SF	



FLOOR PLAN - MAIN

SCALE: 1/4" = 1'-0"

2" @ FULL SCALE

DATE	REV.	BY	DESCRIPTION
4/1/25		DAN	PERMIT SUBMITTAL
7/24/25		DAN	PERMIT SUBMITTAL 2

MACPHERSON RESIDENCE
5320 BUTTERWORTH RD.
MERCER ISLAND, WA 98040
PARCEL #: 8661400040
FLOOR PLAN - MAIN

MacPherson Construction & Design
22605 SE 56th St Suite 140, Issaquah, WA 98029
PH. 425.391.3333 FAX 425.557.2841

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MECHANICAL NOTES:

- PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR PLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.
- PROVIDE DUCTED COMBUSTION AIR FOR GAS BURNERS AS REQ'D.
- PROVIDE THERMAL EXPANSION TANK AT WATER HEATER, IF REQ'D.
- STRAP WATER HEATER TO FRAMING TOP & BOTTOM PER UPC.
- PROVIDE PRESSURE RELIEF LINE PLUMBED DIRECT TO OUTSIDE OR APPROVED DRAIN LOCATION.
- IF RANGE HOOD IS GREATER THAN 400 CFM AN AUTOMATIC MECHANICAL DAMPER SHALL BE INTEGRATED INTO THE WHOLE HOUSE FAN SYSTEM TO PROVIDE MAKEUP AIR AT THE SAME RATE AS THE EXHAUST FAN.

ENERGY CODE REQUIREMENTS:
MAXIMUM HEATING OUTPUT = XX,XXX BTU/HR
PROVIDE AIR SOURCE HEAT PUMP WITH MIN. HPSF = 11
PROVIDE HIGH EFFICIENCY GAS HOT WATER HEATER WITH MIN. UEF = .91

WINDOW & DOOR LEGEND

AWN:	AWNING
CSMT:	CASEMENT
FG:	FULL GLASS
OBS:	OBSCURE GLAZING
OVHD:	OVERHEAD GARAGE DOOR
OXXO:	FUNCTION ON SLIDERS (X=OPERABLE)
PICT:	PICTURE
PKT:	POCKET
PVT:	PIVOT SWING
SDLT:	DOOR SIDELIGHT
SG:	SAFETY GLAZING
SLD:	HORIZONTAL SLIDER
TRANS:	TRANSOM ABOVE
20 MIN:	20 MIN. FIRE RATING

NOTES:
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5. PROVIDE SAFETY GLAZING AT ALL LOCATIONS REQUIRED BY CODE (IRC R308.4)
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KEY NOTES: NOTE: ALL KEY NOTES MAY NOT APPLY

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2. INSTALL WHOLE HOUSE FAN PER GENERAL NOTES, VENTILATION & LIGHTING.
3. PROVIDE SAFETY GLAZING PER GENERAL NOTES, GLAZING.
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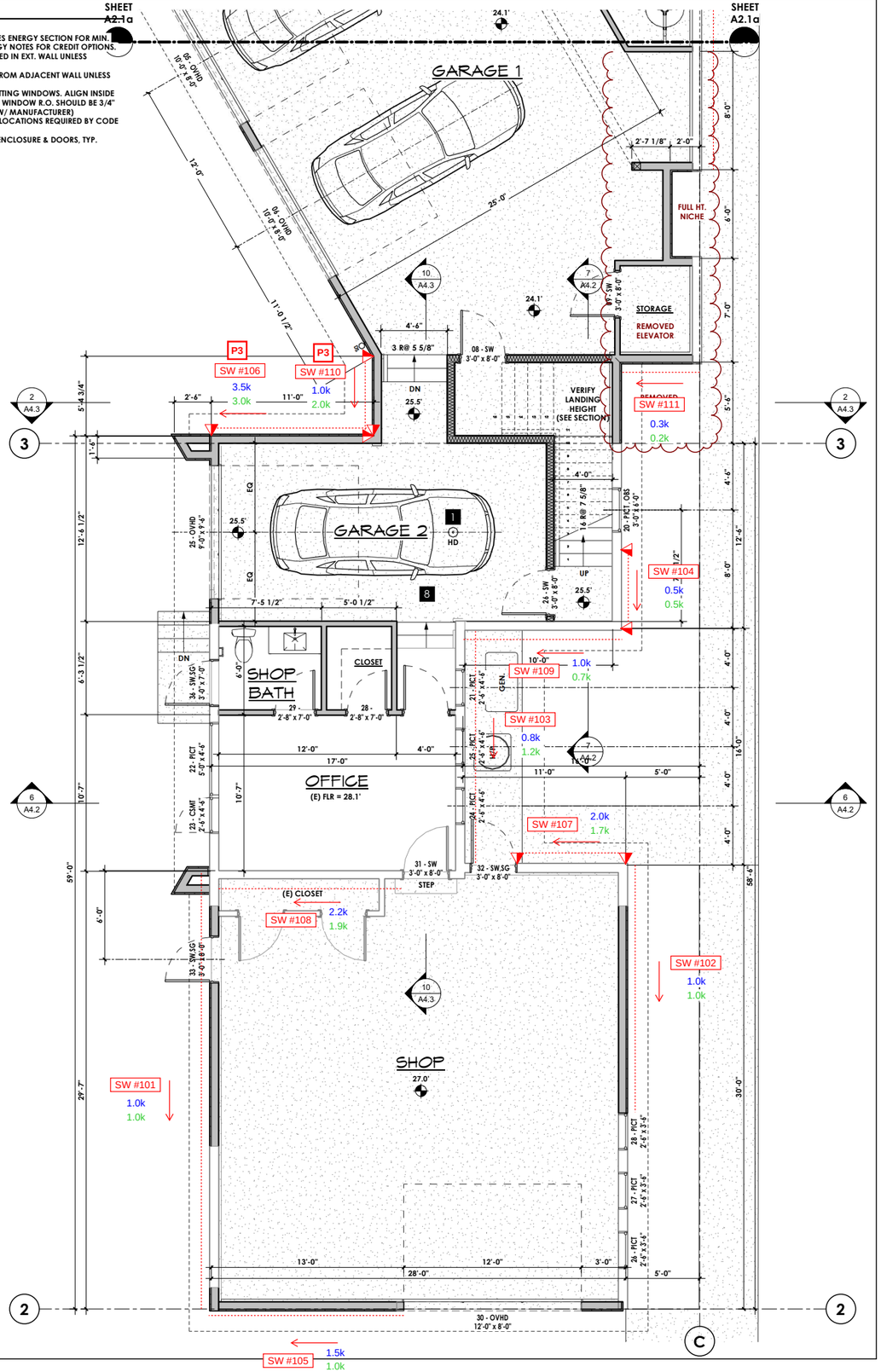
8. PROVIDE INSULATION IN WALLS BETWEEN HEATED & UN-HEATED AREAS, PER GENERAL NOTES, ENERGY.
9. CRAWL SPACE ACCESS: 18"x24" PER GENERAL NOTES, CRAWL SPACES.
10. ZERO CLEARANCE DIRECT VENT GAS FIREPLACE PER GENERAL NOTES, FIREPLACES.

FLOOR AREAS

LEVEL	DESCRIPTION	AREA	HEATED
MAIN FLOOR	FLOOR AREA	3,428 SF	YES
MAIN FLOOR	GUEST STAIRS	124 SF	YES
MAIN FLOOR	SHOP	1,112 SF	
MAIN FLOOR	GARAGE 1	1,068 SF	
MAIN FLOOR	GARAGE 2	293 SF	
UPPER FLOOR	FLOOR AREA	2,571 SF	YES
GROSS BUILDING AREA		8,596 SF	
TOTAL HEATED AREA:		6,180 SF	



2" @ FULL SCALE

DATE	REV.	BY	DESCRIPTION
4/1/25		DAN	PERMIT SUBMITTAL
7/24/25		DAN	PERMIT SUBMITTAL 2

MACPHERSON RESIDENCE

5320 BUTTERWORTH RD.
MERCER ISLAND, WA 98040
PARCEL #: 866140-0040

FLOOR PLAN - MAIN

SCALE THIS DRAWING, IN FEET
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

16.1k
WIND 26.4k
20.7k
SEISMIC 20.7k

FLOOR PLAN - MAIN

SCALE: 1/4" = 1'-0"

NORTH

MacPherson
Construction & Design
22605 SE 56th St Suite 140, Issaquah, WA 98029
PH. 425.391.3333 FAX 425.557.2841

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SCALE THIS DRAWING, IN FEET

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

KEY NOTES:

1. INSTALL HEAT, SMOKE AND CARBON MONOXIDE DETECTORS. PER GENERAL NOTES, FIRE PROTECTION.
2. INSTALL WHOLE HOUSE FAN. PER GENERAL NOTES, VENTILATION & LIGHTING.
3. PROVIDE SAFETY GLAZING PER GENERAL NOTES, GLAZING.
4. INSTALL GUARDRAILS & HANDRAIL PER GENERAL NOTES, STAIRS.
5. PROVIDE FIRE SEPARATION BETWEEN HOUSE & GARAGE. PER GENERAL NOTES, GARAGES.
6. INSTALL DECKS & STAIRS. PER GENERAL NOTES DECKS & EXTERIOR STAIRWAYS.
7. INSTALL RESIDENTIAL FIRE SPRINKLER SYSTEM. PER GENERAL NOTES, FIRE PROTECTION.
8. PROVIDE INSULATION IN WALLS BETWEEN HEATED & UN-HEATED AREAS. PER GENERAL NOTES, ENERGY.
9. CRAWL SPACE ACCESS: 18"x24" PER GENERAL NOTES, CRAWL SPACES.
10. ZERO CLEARANCE DIRECT VENT GAS FIREPLACE. PER GENERAL NOTES, FIREPLACES.

MECHANICAL NOTES:

- PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR PLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.
- PROVIDE DUCTED COMBUSTION AIR FOR GAS BURNERS AS REQ'D.
- PROVIDE THERMAL EXPANSION TANK AT WATER HEATER, IF REQ'D.
- STRAP WATER HEATER TO FRAMING TOP & BOTTOM PER UPC.
- PROVIDE PRESSURE RELIEF LINE PLUMBED DIRECT TO OUTSIDE OR APPROVED DRAIN LOCATION. (E) ROOF DEMOLISHED
- IF RANGE HOOD IS GREATER THAN 400 CFM AN AUTOMATIC MECHANICAL DAMPER SHALL BE INTEGRATED INTO THE WHOLE HOUSE FAN SYSTEM TO PROVIDE MAKEUP AIR AT THE SAME RATE AS THE EXHAUST FAN.

ENERGY CODE REQUIREMENTS:
MAXIMUM HEATING OUTPUT = XX,XXX BTU/HR
PROVIDE AIR SOURCE HEAT PUMP WITH MIN. HPSF = 11
PROVIDE HIGH EFFICIENCY GAS HOT WATER HEATER WITH MIN. UEF = .91

4.2k WIND 7.2k
8.9k
SEISMIC 8.9k

FLOOR AREAS

LEVEL	DESCRIPTION	AREA	HEATED
MAIN FLOOR	FLOOR AREA	3,428 SF	YES
MAIN FLOOR	GUEST STAIRS	124 SF	YES
MAIN FLOOR	SHOP	1,112 SF	
MAIN FLOOR	GARAGE 1	1,068 SF	
MAIN FLOOR	GARAGE 2	293 SF	
UPPER FLOOR	FLOOR AREA	2,571 SF	YES
GROSS BUILDING AREA		8,596 SF	
TOTAL HEATED AREA:		6,180 SF	

FLOOR PLAN - UPPER

SCALE: 1/4" = 1'-0"

NORTH

2" @ FULL SCALE

DATE	REV.	BY	DESCRIPTION
4/1/25		DAN	PERMIT SUBMITTAL
7/24/25		DAN	PERMIT SUBMITTAL 2

MACPHERSON RESIDENCE
5320 BUTTERWORTH RD.
MERCER ISLAND, WA 98040
PARCEL #: 866140-0040
FLOOR PLAN - UPPER

MacPherson Construction & Design
22605 SE 56th St Suite 140, Issaquah, WA 98029
PH. 425.391.3333 FAX 425.557.2841

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MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 201: 2nd - North Ext. Wall @ Guest Bed

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_o	5.5	ft.		
Wall Length, L	16.5	ft.	Qualifying Wall Length, L	9.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
900 lbs	<	2143 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	120	plf	Overturning Moment	8.1	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	14.4	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 202: 2nd - North Ext. Wall @ Guest Lounge

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	5.5	ft.		
Wall Length, L	13.0	ft.	Qualifying Wall Length, L	5.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
800 lbs	<	1274 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	120	plf	Overturning Moment	7.2	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	9.6	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 203: 2nd - South Ext. Wall @ Guest Bed

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_c	5.0	ft.		
Wall Length, L	16.5	ft.	Qualifying Wall Length, L	11.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1100 lbs	<	2758 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	120	plf	Overturning Moment	9.9	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	14.4	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 204: 2nd - South Ext. Wall @ Pantry

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	5.6	ft.	Qualifying Wall Length, L	5.6	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
200 lbs	<	1350 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	120	plf	Overturning Moment	1.8	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	2.6	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 205: 2nd - West Ext. Wall @ Guest Bed

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_o	0.0	ft.		
Wall Length, L	17.0	ft.	Qualifying Wall Length, L	17.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2200 lbs	<	4087 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	185	plf	Overturning Moment	19.8	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	21.2	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 206: 2nd - East Ext. Wall @ Guest Lounge

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	11.0	ft.	Qualifying Wall Length, L	11.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2300 lbs	<	2648 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	165	plf	Overturning Moment	20.7	k-ft	Hold Down Design Load	1051	lbs
DL at ends of wall	400	lbs	Resistive Moment	9.1	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 #: 306-25001
Engineer: BFD

Shearwall 207: 2nd - North Ext. Wall @ Guest Stairs

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_o	0.0	ft.		
Wall Length, L	5.4	ft.	Qualifying Wall Length, L	5.4	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
500 lbs	<	1290 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	120	plf	Overturning Moment	4.5	k-ft	Hold Down Design Load	382	lbs
DL at ends of wall	400	lbs	Resistive Moment	2.4	k-ft	Holdown Capacity	1705	lbs

Hold-down Specification

SIMPSON CS16 STRAP TIE (14" END LENGTH)

Shearwall 208: 2nd - North Ext. Wall @ Stairs/Foyer

Shearwall Properties:

Wall height, H	5.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	19.8	ft.	Qualifying Wall Length, L	19.8	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1100 lbs	<	4759 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	70	plf	Overturning Moment	5.5	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	13.6	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 306-25001
ENGINEER: BFD

SHEARWALL 209: 2ND - NORTH EXT. WALL @ JORDAN'S ROOM/LOUNGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, H_o	0.0	FT.		
WALL LENGTH, L	22.2	FT.	QUALIFYING WALL LENGTH, L	22.2	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
2200 LBS	<	5315 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	190	PLF	OVERTURNING MOMENT	19.8	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	34.9	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 210: 2ND - WEST EXT. WALL @ STAIRS

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, Hc	6.0	FT.		
WALL LENGTH, L	10.6	FT.	QUALIFYING WALL LENGTH, L	7.6	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
2200 LBS	<	3439 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	19.8	K-FT	HOLD DOWN DESIGN LOAD	941	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	9.8	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 #: 306-25001
Engineer: BFD

Shearwall 211: 2nd - South Ext. Wall @ Chris' Room/Deck

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, H_c	6.0	ft.		
Wall Length, L	16.0	ft.	Qualifying Wall Length, L	8.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1000 lbs	<	2009 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	130	plf	Overturning Moment	9.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	14.5	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 212: 2nd - South Ext. Wall @ Jordan's Room

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	6.0	ft.		
Wall Length, L	17.5	ft.	Qualifying Wall Length, L	10.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1100 lbs	<	2399 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	190	plf	Overturning Moment	9.9	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	22.7	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 213: 2nd - East Ext. Wall @ Stairs/ Great Room

Shearwall Properties:

Wall height, H	5.0	ft.	Max wall opening ht, H_o	0.0	ft.		
Wall Length, L	4.7	ft.	Qualifying Wall Length, L	4.7	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
550 lbs	<	1135 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	150	plf	Overturning Moment	2.8	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	600	lbs	Resistive Moment	2.8	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 214: 2nd - East Ext. Wall @ Jordan's Room/Deck

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	8.0	ft.		
Wall Length, L	18.0	ft.	Qualifying Wall Length, L	4.6	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1650 lbs	<	1679 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	120	plf	Overturning Moment	14.9	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	16.7	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 101: 1st - North Ext. Wall @ Shop

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_c	8.0	ft.		
Wall Length, L	29.1	ft.	Qualifying Wall Length, L	25.9	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1000 lbs	<	6201 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	120	plf	Overturning Moment	10.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	39.3	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 102: 1st - South Ext. Wall @ Shop

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	16.8	ft.	Qualifying Wall Length, L	16.8	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1000 lbs	<	4018 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	120	plf	Overturning Moment	10.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	14.8	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 306-25001
ENGINEER: BFD

SHEARWALL 103: 1ST - SOUTH EXT. WALL @ OFFICE

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_c	3.5	FT.		
WALL LENGTH, L	16.0	FT.	QUALIFYING WALL LENGTH, L	5.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1200 LBS	<	1319 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	120	PLF	OVERTURNING MOMENT	12.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	13.7	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 104: 1ST - SOUTH EXT. WALL @ GUEST STAIRS

SHEARWALL PROPERTIES:

WALL HEIGHT, H	11.5	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	5.6	FT.	QUALIFYING WALL LENGTH, L	5.6	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
500 LBS	<	1346 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	7.6	K-FT	HOLD DOWN DESIGN LOAD	411	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	5.2	K-FT	HOLDOWN CAPACITY	3695	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 306-25001
ENGINEER: BFD

SHEARWALL 105: 1ST - WEST EXT. WALL @ SHOP

SHEARWALL PROPERTIES:

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

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1000 LBS	<	3118 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	175	PLF	OVERTURNING MOMENT	10.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	12.6	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 106: 1ST - EAST EXT. WALL @ GARAGE 2

SHEARWALL PROPERTIES:

WALL HEIGHT, H	11.5	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	11.0	FT.	QUALIFYING WALL LENGTH, L	11.0	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
3000 LBS	<	4952 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	330	PLF	OVERTURNING MOMENT	55.1	K-FT	HOLD DOWN DESIGN LOAD	3368	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	18.1	K-FT	HOLDOWN CAPACITY	3740	LBS

HOLD-DOWN SPECIFICATION

SIMPSON HTT5 HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 107: 1st - East Ext. Wall @ Shop

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_o	0.0	ft.		
Wall Length, L	7.3	ft.	Qualifying Wall Length, L	7.3	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1700 lbs	<	1751 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	17.0	k-ft	Hold Down Design Load	1676	lbs
DL at ends of wall	400	lbs	Resistive Moment	4.8	k-ft	Holdown Capacity	3695	lbs

Hold-down Specification

Simpson STHD14RJ Holdown

Shearwall 108: 1st - West Int. Wall @ Shop/Office

Shearwall Properties:

Wall height, H	9.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	12.4	ft.	Qualifying Wall Length, L	12.4	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1900 lbs	<	2979 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	445	plf	Overturning Moment	17.1	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	800	lbs	Resistive Moment	27.8	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 109: 1st - West Ext. Wall @ Stairs/Garage 2

Shearwall Properties:

Wall height, H	11.5	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	10.6	ft.	Qualifying Wall Length, L	10.6	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
700 lbs	<	2535 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	143	plf	Overturning Moment	8.1	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	800	lbs	Resistive Moment	10.3	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 110: 1st - North Ext. Wall @ Garage 1

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	5.4	ft.	Qualifying Wall Length, L	5.4	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2000 lbs	<	2426 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	280	plf	Overturning Moment	24.5	k-ft	Hold Down Design Load	3570	lbs
DL at ends of wall	800	lbs	Resistive Moment	5.3	k-ft	Holdown Capacity	3740	lbs

Hold-down Specification

SIMPSON HTT5 HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 111: 1st - West Ext. Wall @ Garage Storage

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	5.3	ft.	Qualifying Wall Length, L	5.3	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
200 lbs	<	1274 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	220	plf	Overturning Moment	2.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	800	lbs	Resistive Moment	4.6	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 112: 1st - South Ext. Wall @ Garage 1

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	21.0	ft.	Qualifying Wall Length, L	21.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
3500 lbs	<	5037 lbs

Shearwall Assembly Specification

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

Overturning Evaluation:

Resistive DL	270	plf	Overturning Moment	35.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	42.7	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 113: 1st - South Ext. Wall @ Kitchen

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	13.5	ft.	Qualifying Wall Length, L	13.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2000 lbs	<	3238 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	320	plf	Overturning Moment	20.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	21.7	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 114: 1st - East Ext. Wall @ Garage 1

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	8.0	ft.		
Wall Length, L	16.0	ft.	Qualifying Wall Length, L	9.7	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1500 lbs	<	2103 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	15.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	15.3	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 115: 1st - East Ext. Wall @ Kitchen/Patio

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_o	0.0	ft.		
Wall Length, L	5.6	ft.	Qualifying Wall Length, L	5.6	ft.	Shearwall Assembly	P3

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
2500 lbs	<	2503 lbs

Shearwall Assembly Specification

P3 - 1-side 7/16" OSB
fastened w/ 8d nails at 3"o.c. panel edges & 12"o.c. panel field - edges blocked
ADEQUATE

Overturning Evaluation:

Resistive DL	443	plf	Overturning Moment	25.0	k-ft	Hold Down Design Load	2466	lbs
DL at ends of wall	2000	lbs	Resistive Moment	11.3	k-ft	Holdown Capacity	3695	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

Shearwall 116: 1st - East Int. Wall @ Kitchen/Pantry

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	10.7	ft.	Qualifying Wall Length, L	10.7	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1500 lbs	<	2559 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	325	plf	Overturning Moment	15.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	600	lbs	Resistive Moment	15.7	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 117: 1st - North Ext. Wall @ Primary Closet

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_c	0.0	ft.		
Wall Length, L	10.0	ft.	Qualifying Wall Length, L	10.0	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
500 lbs	<	2399 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	155	plf	Overturning Moment	5.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	7.4	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 118: 1st - North Ext. Wall @ Primary Bath

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	9.5	ft.	Qualifying Wall Length, L	9.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
500 lbs	<	2279 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	5.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	7.4	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 306-25001
ENGINEER: BFD

SHEARWALL 119: 1ST - NORTH EXT. WALL @ PRIMARY BATH

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	14.0	FT.	QUALIFYING WALL LENGTH, L	14.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
500 LBS	<	3358 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	160	PLF	OVERTURNING MOMENT	5.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	13.4	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 120: 1ST - NORTH INT./EXT. WALL @ PRIMARY BATH/BED

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	16.8	FT.	QUALIFYING WALL LENGTH, L	16.8	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
0 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	255	PLF	OVERTURNING MOMENT	0.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	26.8	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 121: 1st - North Int./Ext. Wall @ Primary Closet/Media

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, H_o	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
2000 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	245	plf	Overturning Moment	20.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	35.8	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 122: 1st - North Int. Wall @ Media/Foyer

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	2.5	ft.		
Wall Length, L	21.6	ft.	Qualifying Wall Length, L	14.6	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
3000 lbs	<	3507 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	30.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	40.7	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 123: 1st - North Int. Wall @ Great Room/Primary Bed

Shearwall Properties:

Wall height, H	12.0	ft.	Max wall opening ht, H_o	8.0	ft.		
Wall Length, L	20.5	ft.	Qualifying Wall Length, L	15.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
3000 lbs	=	3718 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	36.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	44.8	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 124: 1st - West Ext. Wall @ Media

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	5.5	ft.		
Wall Length, L	19.0	ft.	Qualifying Wall Length, L	9.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1500 lbs	<	2279 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	120	plf	Overturning Moment	15.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	18.4	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SHEARWALL DESIGN SUMMARY

M+K PROJECT #: 306-25001
ENGINEER: BFD

SHEARWALL 125: 1ST - WEST EXT. WALL @ PRIMARY CLOSET

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_c	5.5	FT.		
WALL LENGTH, L	10.5	FT.	QUALIFYING WALL LENGTH, L	8.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
600 LBS	<	1919 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	120	PLF	OVERTURNING MOMENT	6.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	6.8	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 126: 1ST - EAST EXT. WALL @ PRIMARY BATH

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	3.1	FT.	QUALIFYING WALL LENGTH, L	3.1	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
600 LBS	<	621 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	120	PLF	OVERTURNING MOMENT	6.0	K-FT	HOLD DOWN DESIGN LOAD	1587	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	1.1	K-FT	HOLDOWN CAPACITY	3695	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 127: 1st - East Ext. Wall @ Primary Bed

Shearwall Properties:

Wall height, H	12.0	ft.	Max wall opening ht, H_c	9.0	ft.		
Wall Length, L	19.5	ft.	Qualifying Wall Length, L	7.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1000 lbs	<	1709 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	120	plf	Overturning Moment	12.0	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	19.2	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 128: 1st - West Ext. Wall @ Powder

Shearwall Properties:

Wall height, H	10.0	ft.	Max wall opening ht, Hc	6.0	ft.		
Wall Length, L	10.7	ft.	Qualifying Wall Length, L	7.7	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1500 lbs	<	1840 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	320	plf	Overturning Moment	34.9	k-ft	Hold Down Design Load	1691	lbs
DL at ends of wall	800	lbs	Resistive Moment	16.8	k-ft	Holdown Capacity	3695	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Shearwall Design Summary

M+K Project #: 306-25001
Engineer: BFD

Shearwall 129: 1st - East Ext. Wall @ Dining

Shearwall Properties:

Wall height, H	14.5	ft.	Max wall opening ht, H_o	10.0	ft.		
Wall Length, L	15.5	ft.	Qualifying Wall Length, L	6.5	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
1000 lbs	<	1277 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	230	plf	Overturning Moment	14.5	k-ft	Hold Down Design Load	0	lbs
DL at ends of wall	400	lbs	Resistive Moment	21.3	k-ft	Holdown Capacity	0	lbs

Hold-down Specification

No Holdown Required

Shearwall 130: 1st - East Ext. Wall @ Great Room

Shearwall Properties:

Wall height, H	14.5	ft.	Max wall opening ht, Hc	0.0	ft.		
Wall Length, L	4.3	ft.	Qualifying Wall Length, L	4.3	ft.	Shearwall Assembly	P1

Capacity Evaluation:

Total Shear load on Wall		Allowable Shearwall Capacity
500 lbs	<	851 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	170	plf	Overturning Moment	7.3	k-ft	Hold Down Design Load	1209	lbs
DL at ends of wall	400	lbs	Resistive Moment	2.1	k-ft	Holdown Capacity	3695	lbs

Hold-down Specification

SIMPSON STHD14RJ HOLDOWN

Concrete Beam

DESCRIPTION: TYP. GRADE BM (WORST CASE LOAD)

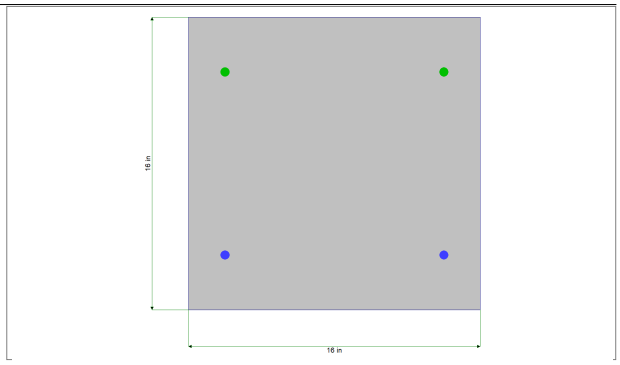
CODE REFERENCES

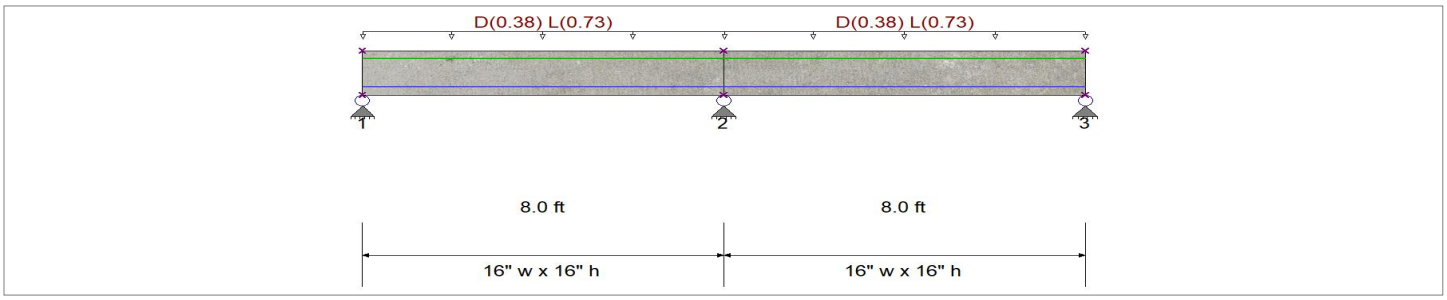
Calculations per ACI 318-19, IBC 2021, ASCE 7-16
Load Combination Set : ASCE 7-16

General Information

f'c	=	3.0 ksi	ϕ Phi Values	Flexure :	0.90
fr = f'c$^{1/2}$ *7.50	=	410.792 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #		3
			Number of Resisting Legs Per Stirrup	=	2

Seismic Design Category = A





Cross Section & Reinforcing Details

Rectangular Section, Width = 16.0 in, Height = 16.0 in
Span #1 Reinforcing....
2-#4 at 3.0 in from Bottom, from 0.0 to 8.0 ft in this span
2-#4 at 3.0 in from Top, from 0.0 to 8.0 ft in this span
Span #2 Reinforcing....
2-#4 at 3.0 in from Bottom, from 0.0 to 8.0 ft in this span
2-#4 at 3.0 in from Top, from 0.0 to 8.0 ft in this span

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.380, L = 0.730 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.380, L = 0.730 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio =	**0.580**	: 1
Section used for this span	**Typical Section**	
Mu : Applied	-15.467	k-ft
Mn * Phi : Allowable	26.682	k-ft
Location of maximum on span	0.000	ft
Span # where maximum occurs	Span # 2	

Maximum Deflection

Max Downward Transient Deflection	0.002 in	Ratio =	58587	>=360.0	L Only
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360.0	L Only
Max Downward Total Deflection	0.003 in	Ratio =	31268	>=180.0	Span: 2 : +D+L
Max Upward Total Deflection	0.000 in	Ratio =	0	<180.0	Span: 2 : +D+L

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	4.103	13.678	4.103
Max Upward from Load Combinations	4.103	13.678	4.103
Max Upward from Load Cases	2.190	7.300	2.190

Concrete Beam

DESCRIPTION: TYP. GRADE BM (WORST CASE LOAD)

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
D Only	1.913	6.378	1.913
+D+L	4.103	13.678	4.103
+D+0.750L	3.556	11.853	3.556
+0.60D	1.148	3.827	1.148
L Only	2.190	7.300	2.190

Shear Stirrup Requirements

Between 0.00 to 7.09 ft, Ties Not Req'd, Stirrups are not required.
Between 7.12 to 8.88 ft, Max spacing per T9.7.6.2.2, use #3 stirrups spaced at 6 in
Between 8.91 to 15.97 ft, Ties Not Req'd, Stirrups are not required.

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k)	Av, min Req'd?	Spacing Req'd (in)	Φ Vc (k)	Φ Vs (k)	Φ Vn (k)	Vu / Φ Vn	Vc Eqn (T22.5.5.1)	Spacing Provision
+1.20D+1.60L	1	0.00	13.00	5.80	No	N/A	7.93	0.00	7.93	0.732	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	0.20	13.00	5.42	No	N/A	7.93	0.00	7.93	0.684	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	0.39	13.00	5.04	No	N/A	7.93	0.00	7.93	0.636	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	0.59	13.00	4.66	No	N/A	7.93	0.00	7.93	0.588	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	0.78	13.00	4.28	No	N/A	7.93	0.00	7.93	0.541	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	0.98	13.00	3.91	No	N/A	7.93	0.00	7.93	0.493	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	1.18	13.00	3.53	No	N/A	7.93	0.00	7.93	0.445	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	1.37	13.00	3.15	No	N/A	7.93	0.00	7.93	0.397	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	1.57	13.00	2.77	No	N/A	7.93	0.00	7.93	0.349	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	1.76	13.00	2.39	No	N/A	7.93	0.00	7.93	0.302	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	1.96	13.00	2.01	No	N/A	7.93	0.00	7.93	0.254	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	2.16	13.00	1.63	No	N/A	7.93	0.00	7.93	0.206	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	2.35	13.00	1.25	No	N/A	7.93	0.00	7.93	0.158	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	2.55	13.00	0.88	No	N/A	7.93	0.00	7.93	0.111	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	2.74	13.00	0.50	No	N/A	7.93	0.00	7.93	0.063	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	2.94	13.00	0.12	No	N/A	7.93	0.00	7.93	0.015	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	3.13	13.00	-0.26	No	N/A	7.93	0.00	7.93	0.033	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	3.33	13.00	-0.64	No	N/A	7.93	0.00	7.93	0.081	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	3.53	13.00	-1.02	No	N/A	7.93	0.00	7.93	0.128	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	3.72	13.00	-1.40	No	N/A	7.93	0.00	7.93	0.176	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	3.92	13.00	-1.78	No	N/A	7.93	0.00	7.93	0.224	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	4.11	13.00	-2.15	No	N/A	7.93	0.00	7.93	0.272	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	4.31	13.00	-2.53	No	N/A	7.93	0.00	7.93	0.320	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	4.51	13.00	-2.91	No	N/A	7.93	0.00	7.93	0.367	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	4.70	13.00	-3.29	No	N/A	7.93	0.00	7.93	0.415	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	4.90	13.00	-3.67	No	N/A	7.93	0.00	7.93	0.463	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	5.09	13.00	-4.05	No	N/A	7.93	0.00	7.93	0.511	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	5.29	13.00	-4.43	No	N/A	7.93	0.00	7.93	0.558	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	5.49	13.00	-4.81	No	N/A	7.93	0.00	7.93	0.606	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	5.68	13.00	-5.18	No	N/A	7.93	0.00	7.93	0.654	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	5.88	13.00	-5.56	No	N/A	7.93	0.00	7.93	0.702	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	6.07	13.00	-5.94	No	N/A	7.93	0.00	7.93	0.750	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	6.27	13.00	-6.32	No	N/A	7.93	0.00	7.93	0.797	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	6.47	13.00	-6.70	No	N/A	7.93	0.00	7.93	0.845	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	6.66	13.00	-7.08	No	N/A	7.93	0.00	7.93	0.893	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	6.86	13.00	-7.46	No	N/A	7.93	0.00	7.93	0.941	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	7.05	13.00	-7.84	No	N/A	7.93	0.00	7.93	0.989	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	7.25	13.00	-8.21	No	6.50	17.09	13.20	30.29	0.271	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	7.44	13.00	-8.59	Yes	6.50	17.09	13.20	30.29	0.284	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	7.64	13.00	-8.97	Yes	6.50	17.09	13.20	30.29	0.296	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	7.84	13.00	-9.35	Yes	6.50	17.09	13.20	30.29	0.309	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	2	8.03	13.00	9.60	Yes	6.50	17.09	13.20	30.29	0.317	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	2	8.23	13.00	9.22	Yes	6.50	17.09	13.20	30.29	0.305	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	2	8.42	13.00	8.85	Yes	6.50	17.09	13.20	30.29	0.292	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	2	8.62	13.00	8.47	No	6.50	17.09	13.20	30.29	0.280	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	2	8.82	13.00	8.09	No	6.50	17.09	13.20	30.29	0.267	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	2	9.01	13.00	7.71	No	N/A	7.93	0.00	7.93	0.973	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	9.21	13.00	7.33	No	N/A	7.93	0.00	7.93	0.925	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	9.40	13.00	6.95	No	N/A	7.93	0.00	7.93	0.877	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	9.60	13.00	6.57	No	N/A	7.93	0.00	7.93	0.829	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	9.80	13.00	6.19	No	N/A	7.93	0.00	7.93	0.781	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	9.99	13.00	5.82	No	N/A	7.93	0.00	7.93	0.734	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	10.19	13.00	5.44	No	N/A	7.93	0.00	7.93	0.686	Eqn (c)	Ties Not Req'd

Concrete Beam

DESCRIPTION: TYP. GRADE BM (WORST CASE LOAD)

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k)	Av, min Req'd?	Spacing Req'd (in)	Φ Vc (k)	Φ Vs (k)	Φ Vn (k)	Vu / Φ Vn	Vc Eqn (T22.5.5.1)	Spacing Provision
+1.20D+1.60L	2	10.38	13.00	5.06	No	N/A	7.93	0.00	7.93	0.638	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	10.58	13.00	4.68	No	N/A	7.93	0.00	7.93	0.590	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	10.78	13.00	4.30	No	N/A	7.93	0.00	7.93	0.543	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	10.97	13.00	3.92	No	N/A	7.93	0.00	7.93	0.495	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	11.17	13.00	3.54	No	N/A	7.93	0.00	7.93	0.447	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	11.36	13.00	3.16	No	N/A	7.93	0.00	7.93	0.399	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	11.56	13.00	2.79	No	N/A	7.93	0.00	7.93	0.351	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	11.76	13.00	2.41	No	N/A	7.93	0.00	7.93	0.304	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	11.95	13.00	2.03	No	N/A	7.93	0.00	7.93	0.256	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	12.15	13.00	1.65	No	N/A	7.93	0.00	7.93	0.208	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	12.34	13.00	1.27	No	N/A	7.93	0.00	7.93	0.160	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	12.54	13.00	0.89	No	N/A	7.93	0.00	7.93	0.112	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	12.73	13.00	0.51	No	N/A	7.93	0.00	7.93	0.065	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	12.93	13.00	0.13	No	N/A	7.93	0.00	7.93	0.017	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	13.13	13.00	-0.24	No	N/A	7.93	0.00	7.93	0.031	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	13.32	13.00	-0.62	No	N/A	7.93	0.00	7.93	0.079	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	13.52	13.00	-1.00	No	N/A	7.93	0.00	7.93	0.126	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	13.71	13.00	-1.38	No	N/A	7.93	0.00	7.93	0.174	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	13.91	13.00	-1.76	No	N/A	7.93	0.00	7.93	0.222	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	14.11	13.00	-2.14	No	N/A	7.93	0.00	7.93	0.270	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	14.30	13.00	-2.52	No	N/A	7.93	0.00	7.93	0.318	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	14.50	13.00	-2.90	No	N/A	7.93	0.00	7.93	0.365	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	14.69	13.00	-3.27	No	N/A	7.93	0.00	7.93	0.413	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	14.89	13.00	-3.65	No	N/A	7.93	0.00	7.93	0.461	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	15.09	13.00	-4.03	No	N/A	7.93	0.00	7.93	0.509	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	15.28	13.00	-4.41	No	N/A	7.93	0.00	7.93	0.556	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	15.48	13.00	-4.79	No	N/A	7.93	0.00	7.93	0.604	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	15.67	13.00	-5.17	No	N/A	7.93	0.00	7.93	0.652	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	2	15.87	13.00	-5.55	No	N/A	7.93	0.00	7.93	0.700	Eqn (c)	Ties Not Req'd

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	8.000	-15.15	26.68	0.57
Span # 2	2	8.000	-15.47	26.68	0.58
+1.40D					
Span # 1	1	8.000	-7.00	26.68	0.26
Span # 2	2	8.000	-7.14	26.68	0.27
+1.20D+1.60L					
Span # 1	1	8.000	-15.15	26.68	0.57
Span # 2	2	8.000	-15.47	26.68	0.58
+1.20D+L					
Span # 1	1	8.000	-11.72	26.68	0.44
Span # 2	2	8.000	-11.96	26.68	0.45
+1.20D					
Span # 1	1	8.000	-6.00	26.68	0.22
Span # 2	2	8.000	-6.12	26.68	0.23
+0.90D					
Span # 1	1	8.000	-4.50	26.68	0.17
Span # 2	2	8.000	-4.59	26.68	0.17

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L	1	0.0031	3.314		0.0000	0.000
+D+L	2	0.0031	4.686		0.0000	0.000

Concrete Beam

LIC# : KW-06017913, Build:20.24.08.01 MULHERN & KULP STRUCTURAL ENGINEERING INC (c) ENERCALC INC 1983-2023

DESCRIPTION: TYP. GRADE BM (WORST CASE LENGTH)

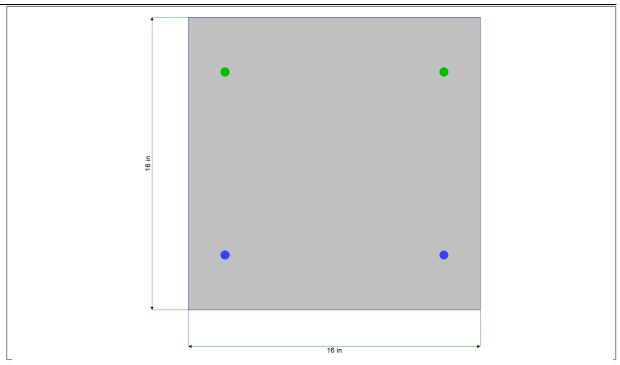
CODE REFERENCES

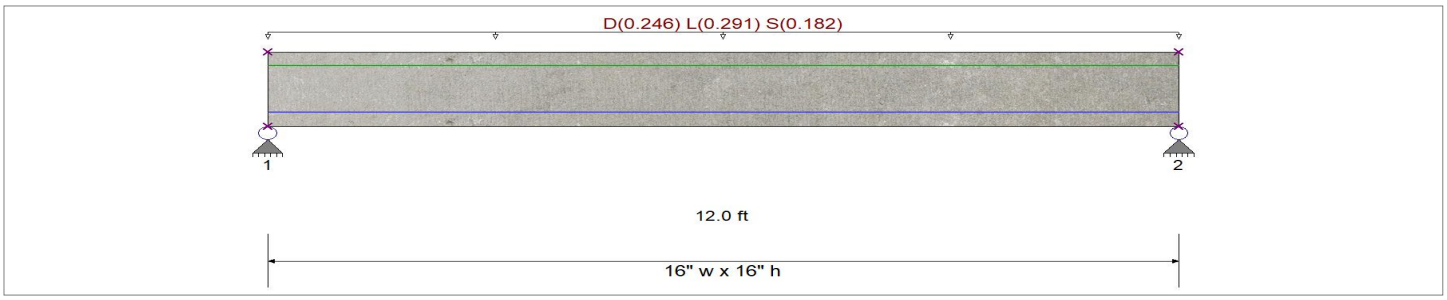
Calculations per ACI 318-19, IBC 2021, ASCE 7-16
Load Combination Set : IBC 2021

General Information

f'c	= 3.0 ksi	ϕ Phi Values	Flexure :	0.90	
fr = f'c$^{1/2}$ *7.50	= 410.792 psi		Shear :	0.750	
ψ Density	= 145.0 pcf	β_1	=	0.850	
λ LtWt Factor	= 1.0				
Elastic Modulus	= 3,122.0 ksi	Fy - Stirrups		40.0 ksi	
fy - Main Rebar	= 60.0 ksi	E - Stirrups	=	29,000.0 ksi	
E - Main Rebar	= 29,000.0 ksi	Stirrup Bar Size #		3	
		Number of Resisting Legs Per Stirrup =		2	

Seismic Design Category = A





Cross Section & Reinforcing Details

Rectangular Section, Width = 16.0 in, Height = 16.0 in
Span #1 Reinforcing....
2-#4 at 3.0 in from Bottom, from 0.0 to 12.0 ft in this span 2-#4 at 3.0 in from Top, from 0.0 to 12.0 ft in this span

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.2460, L = 0.2910, S = 0.1820 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio =	**0.783** : 1	
Section used for this span	**Typical Section**	
Mu : Applied	20.90	k-ft
Mn * Phi : Allowable	26.682	k-ft
Location of maximum on span	6.011	ft
Span # where maximum occurs	Span # 1	

Maximum Deflection

Max Downward Transient Deflection	0.008 in	Ratio =	18089	>=360.0	S Only
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360.0	L Only
Max Downward Total Deflection	0.023 in	Ratio =	6131	>=180.0	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0.000 in	Ratio =	0	<180.0	Span: 1 : +D+0.750L+0.750S

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	5.151	5.151
Max Upward from Load Combinations	5.151	5.151
Max Upward from Load Cases	3.023	3.023
D Only	3.023	3.023
+D+L	4.769	4.769
+D+S	4.115	4.115
+D+0.750L	4.332	4.332

Concrete Beam

DESCRIPTION: TYP. GRADE BM (WORST CASE LENGTH)

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
+D+0.750L+0.750S	5.151	5.151
+0.60D	1.814	1.814
L Only	1.746	1.746
S Only	1.092	1.092

Shear Stirrup Requirements

Entire Beam Span Length : Ties Not Req'd, Stirrups are not required.

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k)	Av, min Req'd?	Spacing Req'd (in)	Φ Vc (k)	Φ Vs (k)	Φ Vn (k)	Vu / Φ Vn	Vc Eqn (T22.5.5.1)	Spacing Provision
+1.20D+1.60L+0.50S	1	0.00	13.00	6.97	No	N/A	7.93	0.00	7.93	0.879	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	0.13	13.00	6.81	No	N/A	7.93	0.00	7.93	0.860	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	0.26	13.00	6.66	No	N/A	7.93	0.00	7.93	0.840	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	0.39	13.00	6.51	No	N/A	7.93	0.00	7.93	0.821	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	0.52	13.00	6.36	No	N/A	7.93	0.00	7.93	0.802	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	0.66	13.00	6.21	No	N/A	7.93	0.00	7.93	0.783	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	0.79	13.00	6.05	No	N/A	7.93	0.00	7.93	0.764	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	0.92	13.00	5.90	No	N/A	7.93	0.00	7.93	0.744	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	1.05	13.00	5.75	No	N/A	7.93	0.00	7.93	0.725	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	1.18	13.00	5.60	No	N/A	7.93	0.00	7.93	0.706	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	1.31	13.00	5.44	No	N/A	7.93	0.00	7.93	0.687	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	1.44	13.00	5.29	No	N/A	7.93	0.00	7.93	0.668	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	1.57	13.00	5.14	No	N/A	7.93	0.00	7.93	0.648	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	1.70	13.00	4.99	No	N/A	7.93	0.00	7.93	0.629	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	1.84	13.00	4.83	No	N/A	7.93	0.00	7.93	0.610	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	1.97	13.00	4.68	No	N/A	7.93	0.00	7.93	0.591	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	2.10	13.00	4.53	No	N/A	7.93	0.00	7.93	0.572	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	2.23	13.00	4.38	No	N/A	7.93	0.00	7.93	0.552	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	2.36	13.00	4.23	No	N/A	7.93	0.00	7.93	0.533	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	2.49	13.00	4.07	No	N/A	7.93	0.00	7.93	0.514	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	2.62	13.00	3.92	No	N/A	7.93	0.00	7.93	0.495	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	2.75	13.00	3.77	No	N/A	7.93	0.00	7.93	0.475	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	2.89	13.00	3.62	No	N/A	7.93	0.00	7.93	0.456	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	3.02	13.00	3.46	No	N/A	7.93	0.00	7.93	0.437	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	3.15	13.00	3.31	No	N/A	7.93	0.00	7.93	0.418	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	3.28	13.00	3.16	No	N/A	7.93	0.00	7.93	0.399	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	3.41	13.00	3.01	No	N/A	7.93	0.00	7.93	0.379	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	3.54	13.00	2.86	No	N/A	7.93	0.00	7.93	0.360	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	3.67	13.00	2.70	No	N/A	7.93	0.00	7.93	0.341	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	3.80	13.00	2.55	No	N/A	7.93	0.00	7.93	0.322	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	3.93	13.00	2.40	No	N/A	7.93	0.00	7.93	0.303	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	4.07	13.00	2.25	No	N/A	7.93	0.00	7.93	0.283	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	4.20	13.00	2.09	No	N/A	7.93	0.00	7.93	0.264	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	4.33	13.00	1.94	No	N/A	7.93	0.00	7.93	0.245	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	4.46	13.00	1.79	No	N/A	7.93	0.00	7.93	0.226	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	4.59	13.00	1.64	No	N/A	7.93	0.00	7.93	0.207	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	4.72	13.00	1.48	No	N/A	7.93	0.00	7.93	0.187	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	4.85	13.00	1.33	No	N/A	7.93	0.00	7.93	0.168	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	4.98	13.00	1.18	No	N/A	7.93	0.00	7.93	0.149	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	5.11	13.00	1.03	No	N/A	7.93	0.00	7.93	0.130	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	5.25	13.00	0.88	No	N/A	7.93	0.00	7.93	0.110	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	5.38	13.00	0.72	No	N/A	7.93	0.00	7.93	0.091	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	5.51	13.00	0.57	No	N/A	7.93	0.00	7.93	0.072	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	5.64	13.00	0.42	No	N/A	7.93	0.00	7.93	0.053	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	5.77	13.00	0.27	No	N/A	7.93	0.00	7.93	0.034	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	5.90	13.00	0.11	No	N/A	7.93	0.00	7.93	0.014	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	6.03	13.00	-0.04	No	N/A	7.93	0.00	7.93	0.005	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	6.16	13.00	-0.19	No	N/A	7.93	0.00	7.93	0.024	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	6.30	13.00	-0.34	No	N/A	7.93	0.00	7.93	0.043	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	6.43	13.00	-0.49	No	N/A	7.93	0.00	7.93	0.062	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	6.56	13.00	-0.65	No	N/A	7.93	0.00	7.93	0.082	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	6.69	13.00	-0.80	No	N/A	7.93	0.00	7.93	0.101	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	6.82	13.00	-0.95	No	N/A	7.93	0.00	7.93	0.120	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	6.95	13.00	-1.10	No	N/A	7.93	0.00	7.93	0.139	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	7.08	13.00	-1.26	No	N/A	7.93	0.00	7.93	0.158	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	7.21	13.00	-1.41	No	N/A	7.93	0.00	7.93	0.178	Eqn (c)	Ties Not Req'd

Concrete Beam

DESCRIPTION: TYP. GRADE BM (WORST CASE LENGTH)

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k)	Av, min Req'd?	Spacing Req'd (in)	Φ Vc (k)	Φ Vs (k)	Φ Vn (k)	Vu / Φ Vn	Vc Eqn (T22.5.5.1)	Spacing Provision
+1.20D+1.60L+0.50S	1	7.34	13.00	-1.56	No	N/A	7.93	0.00	7.93	0.197	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	7.48	13.00	-1.71	No	N/A	7.93	0.00	7.93	0.216	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	7.61	13.00	-1.87	No	N/A	7.93	0.00	7.93	0.235	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	7.74	13.00	-2.02	No	N/A	7.93	0.00	7.93	0.255	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	7.87	13.00	-2.17	No	N/A	7.93	0.00	7.93	0.274	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	8.00	13.00	-2.32	No	N/A	7.93	0.00	7.93	0.293	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	8.13	13.00	-2.47	No	N/A	7.93	0.00	7.93	0.312	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	8.26	13.00	-2.63	No	N/A	7.93	0.00	7.93	0.331	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	8.39	13.00	-2.78	No	N/A	7.93	0.00	7.93	0.351	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	8.52	13.00	-2.93	No	N/A	7.93	0.00	7.93	0.370	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	8.66	13.00	-3.08	No	N/A	7.93	0.00	7.93	0.389	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	8.79	13.00	-3.24	No	N/A	7.93	0.00	7.93	0.408	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	8.92	13.00	-3.39	No	N/A	7.93	0.00	7.93	0.427	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	9.05	13.00	-3.54	No	N/A	7.93	0.00	7.93	0.447	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	9.18	13.00	-3.69	No	N/A	7.93	0.00	7.93	0.466	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	9.31	13.00	-3.85	No	N/A	7.93	0.00	7.93	0.485	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	9.44	13.00	-4.00	No	N/A	7.93	0.00	7.93	0.504	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	9.57	13.00	-4.15	No	N/A	7.93	0.00	7.93	0.524	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	9.70	13.00	-4.30	No	N/A	7.93	0.00	7.93	0.543	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	9.84	13.00	-4.45	No	N/A	7.93	0.00	7.93	0.562	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	9.97	13.00	-4.61	No	N/A	7.93	0.00	7.93	0.581	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	10.10	13.00	-4.76	No	N/A	7.93	0.00	7.93	0.600	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	10.23	13.00	-4.91	No	N/A	7.93	0.00	7.93	0.620	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	10.36	13.00	-5.06	No	N/A	7.93	0.00	7.93	0.639	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	10.49	13.00	-5.22	No	N/A	7.93	0.00	7.93	0.658	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	10.62	13.00	-5.37	No	N/A	7.93	0.00	7.93	0.677	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	10.75	13.00	-5.52	No	N/A	7.93	0.00	7.93	0.696	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	10.89	13.00	-5.67	No	N/A	7.93	0.00	7.93	0.716	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	11.02	13.00	-5.82	No	N/A	7.93	0.00	7.93	0.735	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	11.15	13.00	-5.98	No	N/A	7.93	0.00	7.93	0.754	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	11.28	13.00	-6.13	No	N/A	7.93	0.00	7.93	0.773	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	11.41	13.00	-6.28	No	N/A	7.93	0.00	7.93	0.792	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	11.54	13.00	-6.43	No	N/A	7.93	0.00	7.93	0.812	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	11.67	13.00	-6.59	No	N/A	7.93	0.00	7.93	0.831	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	11.80	13.00	-6.74	No	N/A	7.93	0.00	7.93	0.850	Eqn (c)	Ties Not Req'd
+1.20D+1.60L+0.50S	1	11.93	13.00	-6.89	No	N/A	7.93	0.00	7.93	0.869	Eqn (c)	Ties Not Req'd

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	12.000	20.90	26.68	0.78
+1.40D					
Span # 1	1	12.000	12.70	26.68	0.48
+1.20D+1.60L					
Span # 1	1	12.000	19.26	26.68	0.72
+1.20D+1.60L+0.50S					
Span # 1	1	12.000	20.90	26.68	0.78
+1.20D+0.50L					
Span # 1	1	12.000	13.50	26.68	0.51
+1.20D					
Span # 1	1	12.000	10.88	26.68	0.41
+1.20D+0.50L+1.60S					
Span # 1	1	12.000	18.74	26.68	0.70
+1.20D+1.60S					
Span # 1	1	12.000	16.12	26.68	0.60
+1.20D+0.50L+0.50S					
Span # 1	1	12.000	15.14	26.68	0.57
+1.20D+0.50L+0.70S					
Span # 1	1	12.000	15.79	26.68	0.59
+0.90D					
Span # 1	1	12.000	8.16	26.68	0.31

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+0.750L+0.750S	1	0.0235	6.000		0.0000	0.000

Concrete Beam

DESCRIPTION: TYP. GRADE BM @ CRAWL

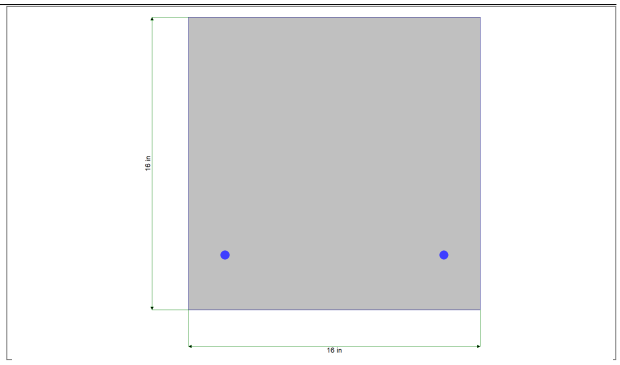
CODE REFERENCES

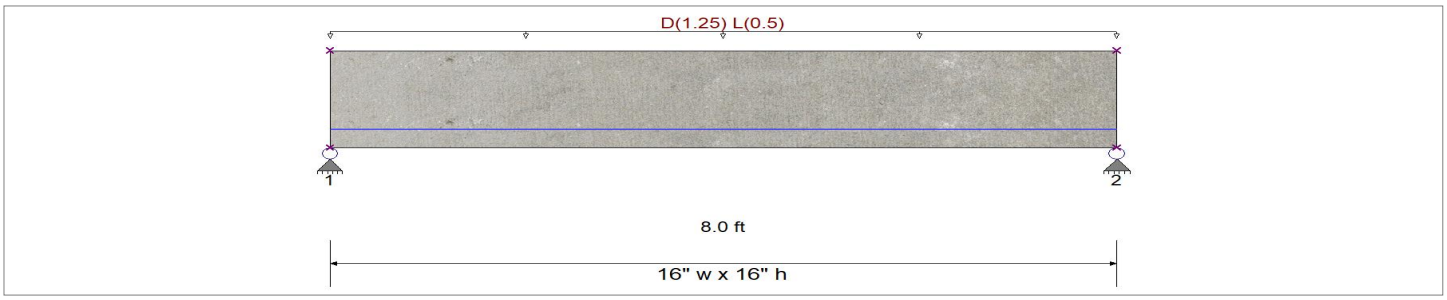
Calculations per ACI 318-19, IBC 2021, ASCE 7-16
Load Combination Set : ASCE 7-16

General Information

f'c	=	3.0 ksi	ϕ Phi Values	Flexure :	0.90
fr = f'c$^{1/2}$ *7.50	=	410.792 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #		3
			Number of Resisting Legs Per Stirrup	=	2

Seismic Design Category = A





Cross Section & Reinforcing Details

Rectangular Section, Width = 16.0 in, Height = 16.0 in
Span #1 Reinforcing....
2-#4 at 3.0 in from Bottom, from 0.0 to 8.0 ft in this span

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.10, L = 0.040 ksf, Tributary Width = 12.50 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio =	**0.913** : 1	
Section used for this span	**Typical Section**	
Mu : Applied	20.875	k-ft
Mn * Phi : Allowable	22.871	k-ft
Location of maximum on span	3.993	ft
Span # where maximum occurs	Span # 1	

Maximum Deflection

Max Downward Transient Deflection	0.003 in	Ratio =	35532	>=360.0	L Only
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360.0	L Only
Max Downward Total Deflection	0.011 in	Ratio =	8848	>=180.0	Span: 1 : +D+L
Max Upward Total Deflection	0.000 in	Ratio =	0	<180.0	Span: 1 : +D+L

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	8.031	8.031
Max Upward from Load Combinations	8.031	8.031
Max Upward from Load Cases	6.031	6.031
D Only	6.031	6.031
+D+L	8.031	8.031
+D+0.750L	7.531	7.531
+0.60D	3.619	3.619

Concrete Beam

LIC# : KW-06017913, Build:20.24.08.01 MULHERN & KULP STRUCTURAL ENGINEERING INC (c) ENERCALC INC 1983-2023

DESCRIPTION: TYP. GRADE BM @ CRAWL

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
L Only	2.000	2.000

Shear Stirrup Requirements

Between 0.00 to 0.96 ft, Max spacing per T9.7.6.2.2, use #3 stirrups spaced at 6 in
Between 0.98 to 7.02 ft, Ties Not Req'd, Stirrups are not required.
Between 7.04 to 7.99 ft, Max spacing per T9.7.6.2.2, use #3 stirrups spaced at 6 in

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k)	Av, min Req'd?	Spacing Req'd (in)	Φ Vc (k)	Φ Vs (k)	Φ Vn (k)	Vu / Φ Vn	Vc Eqn (T22.5.5.1)	Spacing Provision
+1.20D+1.60L	1	0.00	13.00	10.44	Yes	6.50	17.09	13.20	30.29	0.345	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	0.09	13.00	10.21	Yes	6.50	17.09	13.20	30.29	0.337	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	0.17	13.00	9.98	Yes	6.50	17.09	13.20	30.29	0.330	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	0.26	13.00	9.75	Yes	6.50	17.09	13.20	30.29	0.322	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	0.35	13.00	9.52	Yes	6.50	17.09	13.20	30.29	0.314	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	0.44	13.00	9.30	Yes	6.50	17.09	13.20	30.29	0.307	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	0.52	13.00	9.07	Yes	6.50	17.09	13.20	30.29	0.299	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	0.61	13.00	8.84	Yes	6.50	17.09	13.20	30.29	0.292	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	0.70	13.00	8.61	Yes	6.50	17.09	13.20	30.29	0.284	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	0.79	13.00	8.38	No	6.50	17.09	13.20	30.29	0.277	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	0.87	13.00	8.16	No	6.50	17.09	13.20	30.29	0.269	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	0.96	13.00	7.93	No	6.50	17.09	13.20	30.29	0.262	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	1.05	13.00	7.70	No	N/A	7.93	0.00	7.93	0.971	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	1.14	13.00	7.47	No	N/A	7.93	0.00	7.93	0.943	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	1.22	13.00	7.24	No	N/A	7.93	0.00	7.93	0.914	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	1.31	13.00	7.02	No	N/A	7.93	0.00	7.93	0.885	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	1.40	13.00	6.79	No	N/A	7.93	0.00	7.93	0.856	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	1.49	13.00	6.56	No	N/A	7.93	0.00	7.93	0.827	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	1.57	13.00	6.33	No	N/A	7.93	0.00	7.93	0.799	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	1.66	13.00	6.10	No	N/A	7.93	0.00	7.93	0.770	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	1.75	13.00	5.87	No	N/A	7.93	0.00	7.93	0.741	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	1.84	13.00	5.65	No	N/A	7.93	0.00	7.93	0.712	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	1.92	13.00	5.42	No	N/A	7.93	0.00	7.93	0.684	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	2.01	13.00	5.19	No	N/A	7.93	0.00	7.93	0.655	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	2.10	13.00	4.96	No	N/A	7.93	0.00	7.93	0.626	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	2.19	13.00	4.73	No	N/A	7.93	0.00	7.93	0.597	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	2.27	13.00	4.51	No	N/A	7.93	0.00	7.93	0.568	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	2.36	13.00	4.28	No	N/A	7.93	0.00	7.93	0.540	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	2.45	13.00	4.05	No	N/A	7.93	0.00	7.93	0.511	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	2.54	13.00	3.82	No	N/A	7.93	0.00	7.93	0.482	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	2.62	13.00	3.59	No	N/A	7.93	0.00	7.93	0.453	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	2.71	13.00	3.37	No	N/A	7.93	0.00	7.93	0.425	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	2.80	13.00	3.14	No	N/A	7.93	0.00	7.93	0.396	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	2.89	13.00	2.91	No	N/A	7.93	0.00	7.93	0.367	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	2.97	13.00	2.68	No	N/A	7.93	0.00	7.93	0.338	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	3.06	13.00	2.45	No	N/A	7.93	0.00	7.93	0.309	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	3.15	13.00	2.22	No	N/A	7.93	0.00	7.93	0.281	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	3.23	13.00	2.00	No	N/A	7.93	0.00	7.93	0.252	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	3.32	13.00	1.77	No	N/A	7.93	0.00	7.93	0.223	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	3.41	13.00	1.54	No	N/A	7.93	0.00	7.93	0.194	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	3.50	13.00	1.31	No	N/A	7.93	0.00	7.93	0.165	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	3.58	13.00	1.08	No	N/A	7.93	0.00	7.93	0.137	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	3.67	13.00	0.86	No	N/A	7.93	0.00	7.93	0.108	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	3.76	13.00	0.63	No	N/A	7.93	0.00	7.93	0.079	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	3.85	13.00	0.40	No	N/A	7.93	0.00	7.93	0.050	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	3.93	13.00	0.17	No	N/A	7.93	0.00	7.93	0.022	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	4.02	13.00	-0.06	No	N/A	7.93	0.00	7.93	0.007	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	4.11	13.00	-0.29	No	N/A	7.93	0.00	7.93	0.036	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	4.20	13.00	-0.51	No	N/A	7.93	0.00	7.93	0.065	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	4.28	13.00	-0.74	No	N/A	7.93	0.00	7.93	0.094	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	4.37	13.00	-0.97	No	N/A	7.93	0.00	7.93	0.122	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	4.46	13.00	-1.20	No	N/A	7.93	0.00	7.93	0.151	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	4.55	13.00	-1.43	No	N/A	7.93	0.00	7.93	0.180	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	4.63	13.00	-1.65	No	N/A	7.93	0.00	7.93	0.209	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	4.72	13.00	-1.88	No	N/A	7.93	0.00	7.93	0.237	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	4.81	13.00	-2.11	No	N/A	7.93	0.00	7.93	0.266	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	4.90	13.00	-2.34	No	N/A	7.93	0.00	7.93	0.295	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	4.98	13.00	-2.57	No	N/A	7.93	0.00	7.93	0.324	Eqn (c)	Ties Not Req'd

Concrete Beam

DESCRIPTION: TYP. GRADE BM @ CRAWL

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k)	Av, min Req'd?	Spacing Req'd (in)	Φ Vc (k)	Φ Vs (k)	Φ Vn (k)	Vu / Φ Vn	Vc Eqn (T22.5.5.1)	Spacing Provision
+1.20D+1.60L	1	5.07	13.00	-2.79	No	N/A	7.93	0.00	7.93	0.353	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	5.16	13.00	-3.02	No	N/A	7.93	0.00	7.93	0.381	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	5.25	13.00	-3.25	No	N/A	7.93	0.00	7.93	0.410	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	5.33	13.00	-3.48	No	N/A	7.93	0.00	7.93	0.439	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	5.42	13.00	-3.71	No	N/A	7.93	0.00	7.93	0.468	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	5.51	13.00	-3.94	No	N/A	7.93	0.00	7.93	0.496	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	5.60	13.00	-4.16	No	N/A	7.93	0.00	7.93	0.525	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	5.68	13.00	-4.39	No	N/A	7.93	0.00	7.93	0.554	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	5.77	13.00	-4.62	No	N/A	7.93	0.00	7.93	0.583	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	5.86	13.00	-4.85	No	N/A	7.93	0.00	7.93	0.612	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	5.95	13.00	-5.08	No	N/A	7.93	0.00	7.93	0.640	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	6.03	13.00	-5.30	No	N/A	7.93	0.00	7.93	0.669	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	6.12	13.00	-5.53	No	N/A	7.93	0.00	7.93	0.698	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	6.21	13.00	-5.76	No	N/A	7.93	0.00	7.93	0.727	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	6.30	13.00	-5.99	No	N/A	7.93	0.00	7.93	0.756	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	6.38	13.00	-6.22	No	N/A	7.93	0.00	7.93	0.784	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	6.47	13.00	-6.44	No	N/A	7.93	0.00	7.93	0.813	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	6.56	13.00	-6.67	No	N/A	7.93	0.00	7.93	0.842	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	6.64	13.00	-6.90	No	N/A	7.93	0.00	7.93	0.871	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	6.73	13.00	-7.13	No	N/A	7.93	0.00	7.93	0.899	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	6.82	13.00	-7.36	No	N/A	7.93	0.00	7.93	0.928	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	6.91	13.00	-7.59	No	N/A	7.93	0.00	7.93	0.957	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	6.99	13.00	-7.81	No	N/A	7.93	0.00	7.93	0.986	Eqn (c)	Ties Not Req'd
+1.20D+1.60L	1	7.08	13.00	-8.04	No	6.50	17.09	13.20	30.29	0.266	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	7.17	13.00	-8.27	No	6.50	17.09	13.20	30.29	0.273	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	7.26	13.00	-8.50	No	6.50	17.09	13.20	30.29	0.281	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	7.34	13.00	-8.73	Yes	6.50	17.09	13.20	30.29	0.288	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	7.43	13.00	-8.95	Yes	6.50	17.09	13.20	30.29	0.296	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	7.52	13.00	-9.18	Yes	6.50	17.09	13.20	30.29	0.303	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	7.61	13.00	-9.41	Yes	6.50	17.09	13.20	30.29	0.311	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	7.69	13.00	-9.64	Yes	6.50	17.09	13.20	30.29	0.318	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	7.78	13.00	-9.87	Yes	6.50	17.09	13.20	30.29	0.326	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	7.87	13.00	-10.10	Yes	6.50	17.09	13.20	30.29	0.333	Eqn (a)	Max spacing per T9.7.6.2
+1.20D+1.60L	1	7.96	13.00	-10.32	Yes	6.50	17.09	13.20	30.29	0.341	Eqn (a)	Max spacing per T9.7.6.2

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	8.000	20.87	22.87	0.91
+1.40D					
Span # 1	1	8.000	16.89	22.87	0.74
+1.20D+1.60L					
Span # 1	1	8.000	20.87	22.87	0.91
+1.20D+L					
Span # 1	1	8.000	18.47	22.87	0.81
+1.20D					
Span # 1	1	8.000	14.47	22.87	0.63
+0.90D					
Span # 1	1	8.000	10.86	22.87	0.47

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L	1	0.0108	4.000		0.0000	0.000

Cantilevered Retaining Wall

DESCRIPTION: Pool Retaining Wall (Empty)

Code Reference

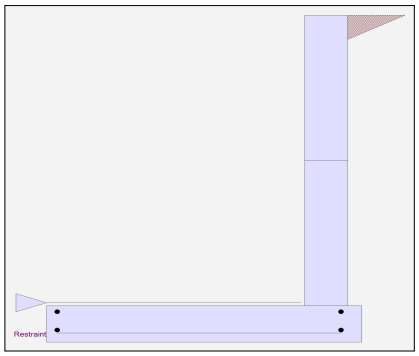
Calculations per IBC 2021 1807.3, ASCE 7-16

Criteria

Retained Height	=	8.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

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

Axial Load Applied to Stem

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

Earth Pressure Seismic Load

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

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Strength Level)	=	0.0 psf
Uniform Seismic Force	=	63.000
Total Seismic Force	=	567.000

Adjacent Footing Load

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

Cantilevered Retaining Wall

DESCRIPTION: Pool Retaining Wall (Empty)

Design Summary

Wall Stability Ratios

Overturning	=	2.31	OK
Slab Resists All Sliding !			
Global Stability	=	1.21	

Total Bearing Load	=	3,219	lbs
...resultant ecc.	=	7.46	in
Eccentricity within middle third			
Soil Pressure @ Toe	=	534	psf OK
Soil Pressure @ Heel	=	174	psf OK
Allowable	=	1,500	psf
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	747	psf
ACI Factored @ Heel	=	243	psf
Footing Shear @ Toe	=	20.0	psi OK
Footing Shear @ Heel	=	2.7	psi OK
Allowable	=	75.0	psi

Sliding Calcs

Lateral Sliding Force	=	1,814.4	lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing pressures.

Load Factors

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

Stem Construction

		2nd	Bottom		
		Stem OK	Stem OK		
Design Height Above Ftg	ft =	4.00	0.00		
Wall Material Above "Ht"	=	Concrete	Concrete		
Design Method	=	SD	SD	SD	SD
Thickness	=	12.00	12.00		
Rebar Size	=	# 5	# 5		
Rebar Spacing	=	12.00	12.00		
Rebar Placed at	=	Edge	Edge		
Design Data					
fb/FB + fa/Fa	=	**0.080**	**0.495**		
Total Force @ Section					
Service Level	lbs =				
Strength Level	lbs =	700.0	2,296.0		
Moment....Actual					
Service Level	ft-# =				
Strength Level	ft-# =	1,101.3	6,794.7		
Moment.....Allowable	ft-# =	13,701.3	13,701.3		
Shear.....Actual					
Service Level	psi =				
Strength Level	psi =	5.7	18.8		
Shear.....Allowable	psi =	40.7	40.7		
Anet (Masonry)	in2 =				
Wall Weight	psf =	150.0	150.0		
Rebar Depth 'd'	in =	10.19	10.19		

Masonry Data

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

Concrete Data

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

Cantilevered Retaining Wall

DESCRIPTION: Pool Retaining Wall (Empty)

Concrete Stem Rebar Area Details

2nd Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0248 in2/ft		
0.0018bh : 0.0018(12)(12) :	0.2592 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.2592 in2/ft	#4@ 9.26 in	#4@ 18.52 in
Provided Area :	0.31 in2/ft	#5@ 14.35 in	#5@ 28.70 in
Maximum Area :	1.3801 in2/ft	#6@ 20.37 in	#6@ 40.74 in

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.153 in2/ft		
0.0018bh : 0.0018(12)(12) :	0.2592 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.2592 in2/ft	#4@ 9.26 in	#4@ 18.52 in
Provided Area :	0.31 in2/ft	#5@ 14.35 in	#5@ 28.70 in
Maximum Area :	1.3801 in2/ft	#6@ 20.37 in	#6@ 40.74 in

Footing Data

Toe Width	=	6.00 ft
Heel Width	=	1.33
Total Footing Width	=	7.33
Footing Thickness	=	12.00 in

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

Footing Design Results

		Toe	Heel	
Factored Pressure	=	747	243	psf
Mu' : Upward	=	10,972	14	ft-#
Mu' : Downward	=	3,240	69	ft-#
Mu: Design	=	7,732	55	ft-#
φ Mn	=	11,610	2,500	ft-#
Actual 1-Way Shear	=	19.98	2.72	psi
Allow 1-Way Shear	=	43.14	40.00	psi

Toe Reinforcing = # 5 @ 12.00 in
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: #4@ 8.57 in, #5@ 13.28 in, #6@ 18.85 in, #7@ 25.71 in, #8@ 33.85 in, #9@ 42.85 in, #10@ 54.42 in

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

Key: No key defined

Min footing T&S reinf Area 1.90 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

Cantilevered Retaining Wall

DESCRIPTION: Pool Retaining Wall (Empty)

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		1,417.5	3.00	4,252.5		Soil Over HL (ab. water tbl) 293.0	7.17	2,100.1
HL Act Pres (be water tbl)						Soil Over HL (bel. water tbl)	7.17	2,100.1
Hydrostatic Force						Water Table		
Buoyant Force	=					Sloped Soil Over Heel =		
Surcharge over Heel	=					Surcharge Over Heel =		
Surcharge Over Toe	=					Adjacent Footing Load =		
Adjacent Footing Load	=					Axial Dead Load on Stem =		
Added Lateral Load	=				*	Axial Live Load on Stem =		
Load @ Stem Above Soil	=					Soil Over Toe =		
Seismic Earth Load	=	396.9	4.50	1,786.1		Surcharge Over Toe =		
	=					Stem Weight(s) = 1,200.0	6.50	7,800.0
						Earth @ Stem Transitions =		
Total	=	1,814.4	**O.T.M.** =	6,038.6		Footing Weight = 1,100.0	3.67	4,033.0
						Key Weight =		
						Vert. Component =		
						Total = 2,593.0 lbs	**R.M.=**	13,933.0

Resisting/Overturning Ratio = **2.31**

Vertical Loads used for Soil Pressure = 3,218.7 lbs

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

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

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.016	in

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

Cantilevered Retaining Wall

DESCRIPTION: Pool Retaining Wall (Empty)

Rebar Lap & Embedment Lengths Information

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

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

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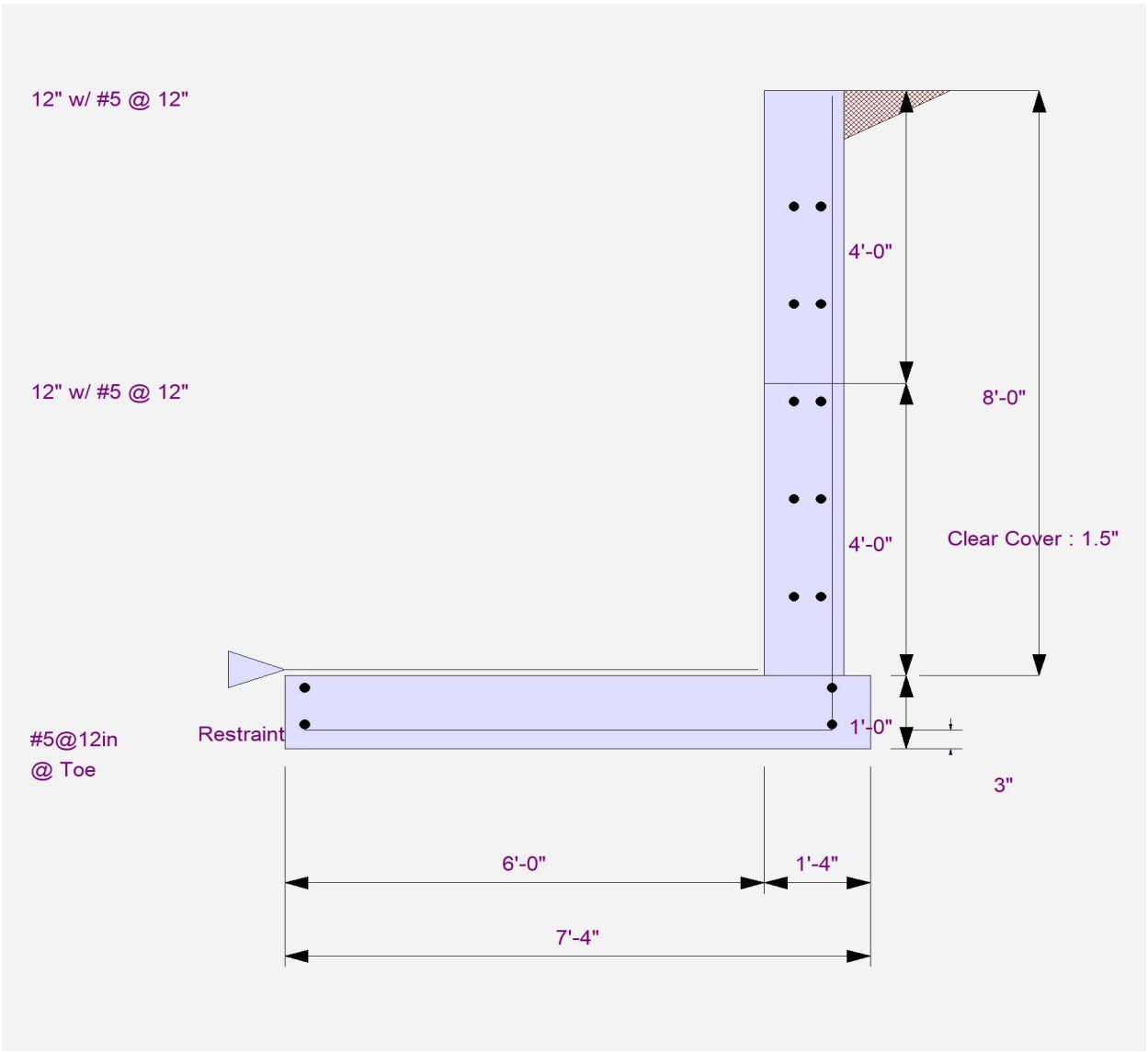
Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.4a) =	23.40 in
Development length for #5 bar specified in this stem design segment =	18.00 in
Hooked embedment length into footing for #5 bar specified in this stem design segment =	8.27 in
As Provided =	0.3100 in2/ft
As Required =	0.2592 in2/ft

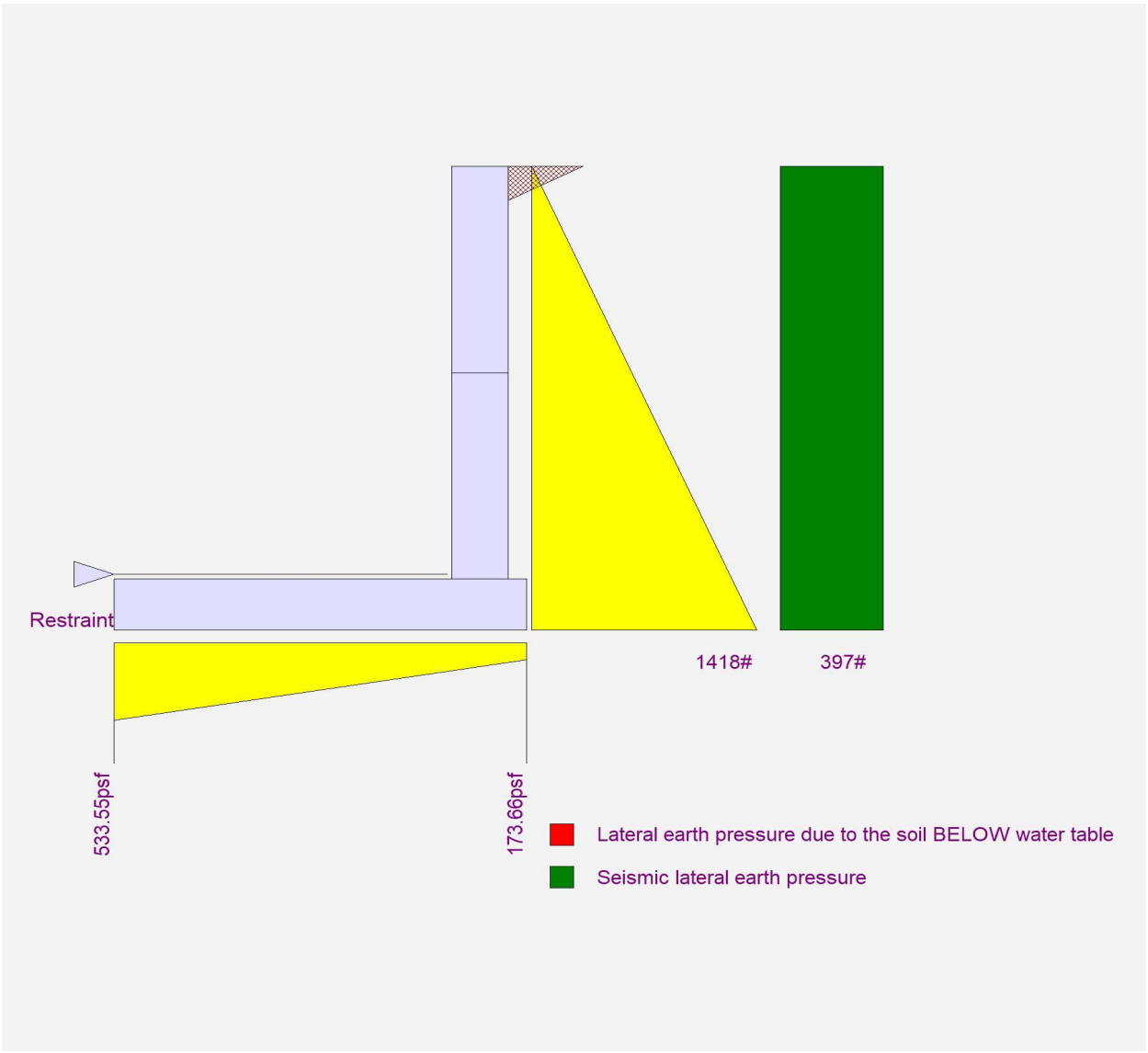
Cantilevered Retaining Wall

DESCRIPTION: Pool Retaining Wall (Empty)



Cantilevered Retaining Wall

DESCRIPTION: Pool Retaining Wall (Empty)



Cantilevered Retaining Wall

DESCRIPTION: Pool Retaining Wall (Filled)

Code Reference

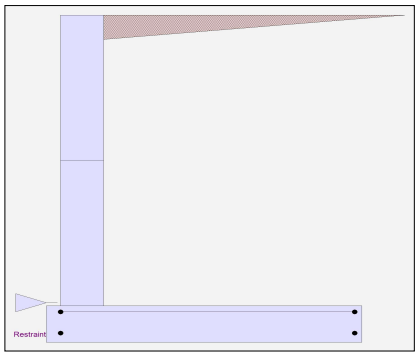
Calculations per IBC 2021 1807.3, ASCE 7-16

Criteria

Retained Height	=	8.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	27.4 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

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

Axial Load Applied to Stem

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

Earth Pressure Seismic Load

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

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Strength Level)	=	0.0 psf
Uniform Seismic Force	=	63.000
Total Seismic Force	=	567.000

Adjacent Footing Load

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

1/3 INCREASE PERMITTED FOR SOIL BEARING CAPACITY WHEN SUPPORTING TRANSIENT SEISMIC LOAD

Cantilevered Retaining Wall

DESCRIPTION: Pool Retaining Wall (Filled)

Design Summary

Wall Stability Ratios

Overturning	=	5.46	OK
Slab Resists All Sliding !			
Global Stability	=	3.16	
Total Bearing Load	=	8,137 lbs	
...resultant ecc.	=	7.91 in	
Eccentricity within middle third			
Soil Pressure @ Toe	=	1,591 psf	NG
Soil Pressure @ Heel	=	476 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Exceeds Allowable!			
ACI Factored @ Toe	=	2,227 psf	
ACI Factored @ Heel	=	667 psf	
Footing Shear @ Toe	=	0.6 psi	OK
Footing Shear @ Heel	=	3.6 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	1,506.6 lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing pressures.

Load Factors

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

Stem Construction

		2nd	Bottom		
		Stem OK	Stem OK		
Design Height Above Ftg	ft =	4.00	0.00		
Wall Material Above "Ht"	=	Concrete	Concrete		
Design Method	=	SD	SD	SD	SD
Thickness	=	12.00	12.00		
Rebar Size	=	# 5	# 5		
Rebar Spacing	=	12.00	12.00		
Rebar Placed at	=	Edge	Edge		
Design Data					
fb/FB + fa/Fa	=	**0.070**	**0.420**		
Total Force @ Section					
Service Level	lbs =				
Strength Level	lbs =	602.7	1,906.9		
Moment....Actual					
Service Level	ft-# =				
Strength Level	ft-# =	971.6	5,757.0		
Moment.....Allowable	ft-# =	13,701.3	13,701.3		
Shear.....Actual					
Service Level	psi =				
Strength Level	psi =	4.9	15.6		
Shear.....Allowable	psi =	40.7	40.7		
Anet (Masonry)	in2 =				
Wall Weight	psf =	150.0	150.0		
Rebar Depth 'd'	in =	10.19	10.19		

Masonry Data

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

Concrete Data

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

Cantilevered Retaining Wall

DESCRIPTION: Pool Retaining Wall (Filled)

Concrete Stem Rebar Area Details

2nd Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0219 in2/ft		
0.0018bh : 0.0018(12)(12) :	0.2592 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.2592 in2/ft	#4@ 9.26 in	#4@ 18.52 in
Provided Area :	0.31 in2/ft	#5@ 14.35 in	#5@ 28.70 in
Maximum Area :	1.3801 in2/ft	#6@ 20.37 in	#6@ 40.74 in

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1296 in2/ft		
0.0018bh : 0.0018(12)(12) :	0.2592 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.2592 in2/ft	#4@ 9.26 in	#4@ 18.52 in
Provided Area :	0.31 in2/ft	#5@ 14.35 in	#5@ 28.70 in
Maximum Area :	1.3801 in2/ft	#6@ 20.37 in	#6@ 40.74 in

Footing Data

Toe Width	=	0.33 ft
Heel Width	=	7.00
Total Footing Width	=	7.33
Footing Thickness	=	12.00 in

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

Footing Design Results

		Toe	Heel	
Factored Pressure	=	2,227	667	psf
Mu' : Upward	=	122	19,664	ft-#
Mu' : Downward	=	10	22,248	ft-#
Mu: Design	=	112	2,584	ft-#
φ Mn	=	2,500	13,005	ft-#
Actual 1-Way Shear	=	0.56	3.64	psi
Allow 1-Way Shear	=	40.00	41.60	psi

Toe Reinforcing = None Spec'd
Heel Reinforcing = # 5 @ 12.00 in
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, 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: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46.29 in, #10@ 58.79 in

Key: No key defined

Min footing T&S reinf Area 1.90 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

Cantilevered Retaining Wall

DESCRIPTION: Pool Retaining Wall (Filled)

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		1,109.7	3.00	3,329.1	Soil Over HL (ab. water tbl)	5,280.0	4.33	22,879.8
HL Act Pres (be water tbl)					Soil Over HL (bel. water tbl)		4.33	22,879.8
Hydrostatic Force					Water Table			
Buoyant Force	=				Sloped Soil Over Heel	=		
Surcharge over Heel	=				Surcharge Over Heel	=		
Surcharge Over Toe	=				Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	=		
Added Lateral Load	=				* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=				Soil Over Toe	=		
Seismic Earth Load	=	396.9	4.50	1,786.1	Surcharge Over Toe	=		
	=				Stem Weight(s)	=	1,200.0	0.83	1,000.0
					Earth @ Stem Transitions	=		
					Footing Weight	=	1,100.0	3.67	4,033.3
					Key Weight	=			
					Vert. Component	=			
Total	=	1,506.6	**O.T.M.** =	5,115.2	**Total =**		7,580.0 lbs	**R.M.=**	27,913.1

Resisting/Overturning Ratio = **5.46**

Vertical Loads used for Soil Pressure = 8,136.9 lbs

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

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

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.048	in

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

Cantilevered Retaining Wall

DESCRIPTION: Pool Retaining Wall (Filled)

Rebar Lap & Embedment Lengths Information

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

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

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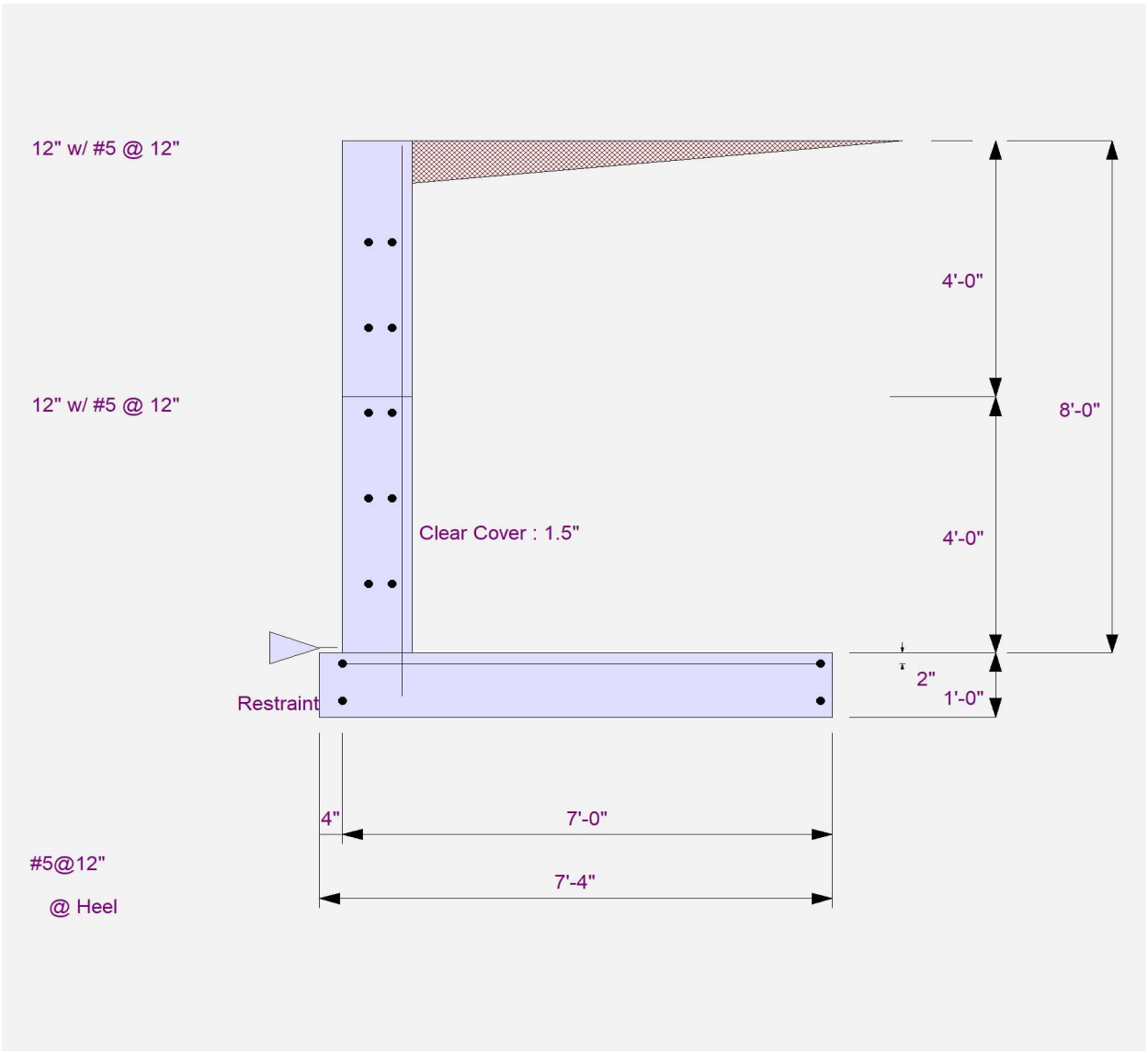
Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.4a) =	23.40 in
Development length for #5 bar specified in this stem design segment =	18.00 in
Hooked embedment length into footing for #5 bar specified in this stem design segment =	8.27 in
As Provided =	0.3100 in2/ft
As Required =	0.2592 in2/ft

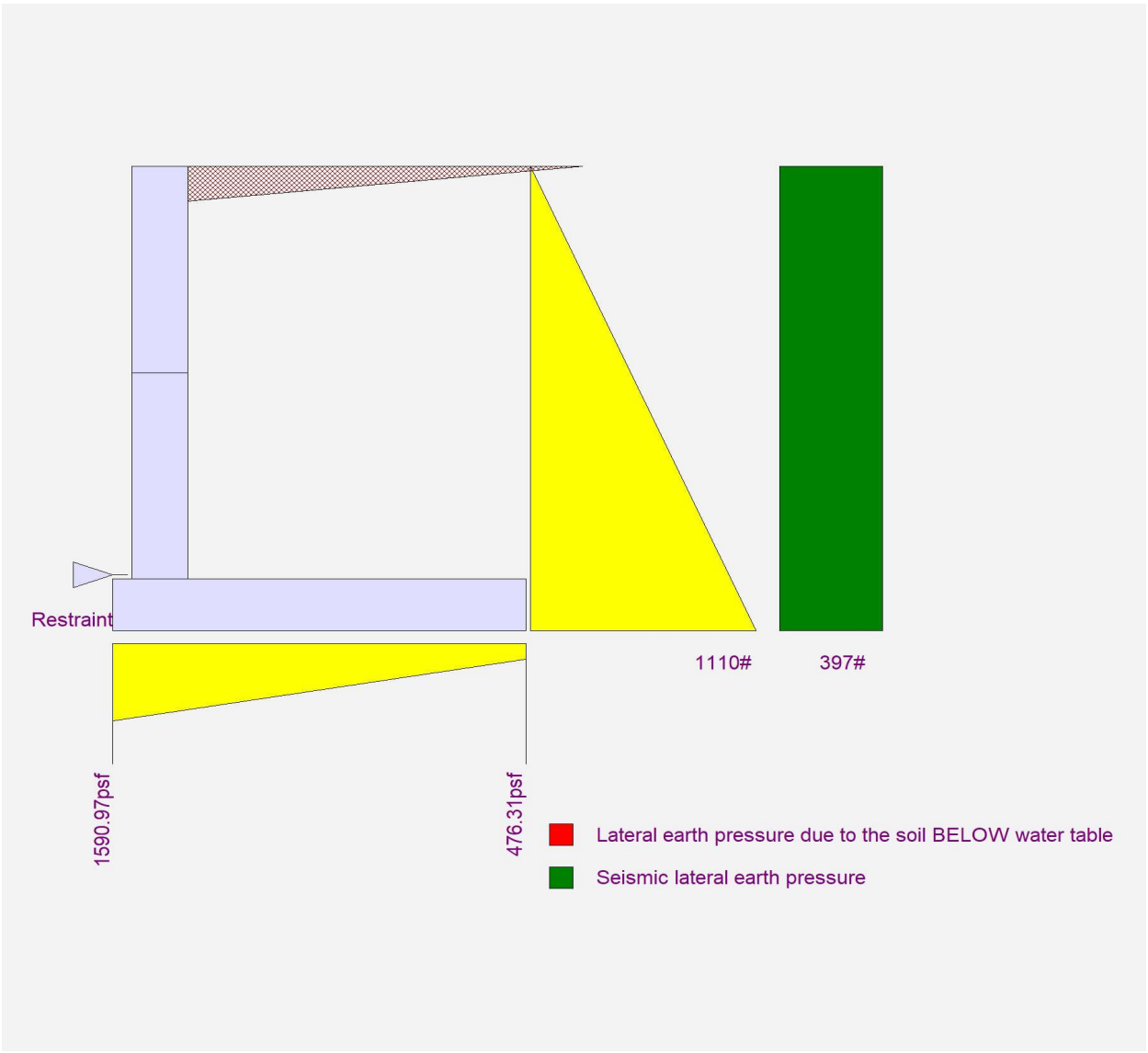
Cantilevered Retaining Wall

DESCRIPTION: Pool Retaining Wall (Filled)



Cantilevered Retaining Wall

DESCRIPTION: Pool Retaining Wall (Filled)



BATTERED PILE DESIGN

GIVEN: 4" DIAMETER SCHEDULE 40 PIPE PILE W/ 20K ALLOWABLE AXIAL COMPRESSION

ALLOWABLE LATERAL LOAD: 20K * (1/4) =
→ 5K/BATTERED PILE

BASE SHEAR: 11.8K WIND (N-S DIRECTION)
→ 3 BATTERED PILES (15K CAPACITY)
23.7K WIND (E-W DIRECTION)
→ 5 BATTERED PILES (25K CAPACITY)

15.3K SEISMIC (N-S DIRECTION)
→ 4 BATTERED PILES (20K CAPACITY)
15.3K SEISMIC (E-W DIRECTION)
→ 4 BATTERED PILES (20K CAPACITY)

4 BATTERED PILES IN THE N-S DIRECTION & 5 BATTERED PILES IN THE E-W DIRECTION ARE ADEQUATE TO RESIST THE LATERAL LOAD

PROJECT NAME: _____ PROJECT NUMBER: _____
DATE: _____ SHEET: _____ DRAWN BY: _____

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