



MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

300 Brookside Avenue, Building 4, Ambler, PA 19002 ▶ p 215-646-8001 ▶ mulhernkulp.com

CALCULATION PACKAGE

April 3, 2020

ARCHITECTURAL INNOVATIONS

Pratt Plot – Lot 4

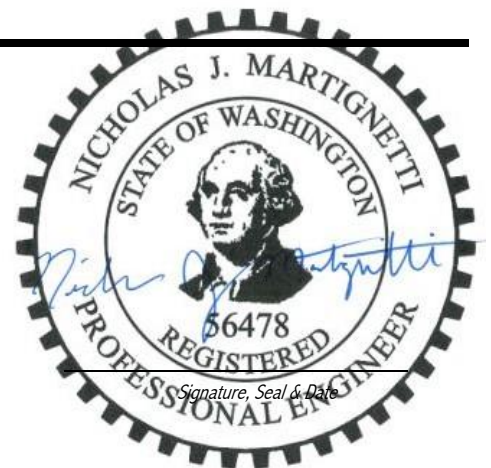
Mercer Island, WA

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

Prepared By:

Richard J. Zabel, P.E. *Project Engineer*

Nicholas J. Martignetti, P.E. *Project Manager*



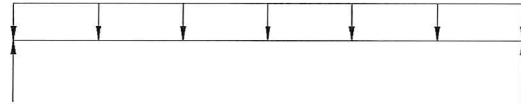


BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: 4x10 HDR - WORST CASE LOAD B1

PARAMETERS:

L = FT
W = KLF
P = K



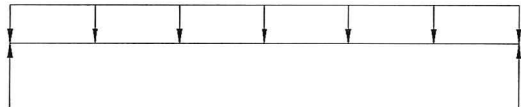
ANALYSIS:

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

BEAM DESCRIPTION: 4x10 HDR - WORST CASE LENGTH B1

PARAMETERS:

L = FT
W = KLF
P = K



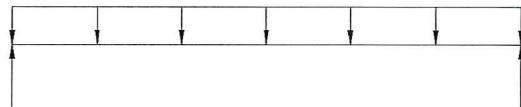
ANALYSIS:

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

BEAM DESCRIPTION: ROOF FRAMING - FLUSH BOTTOM BEAM @ OPEN TO BELOW B2

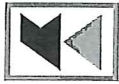
PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

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

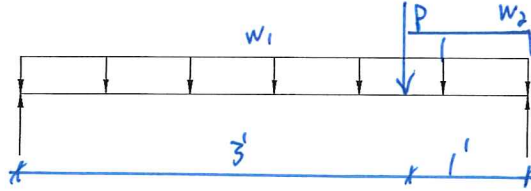


BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: ROOF FRAMING - HEADER @ REAR UTILITY WINDOW 133

PARAMETERS:

L = FT
W₁ = KLF W₂ = 0.57
P = K



ANALYSIS:

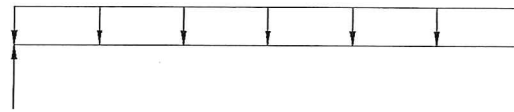
R_{MAX} = K V_D = K < V_{ALL} = K ADEQUATE
M_{MAX} = K-FT < M_{ALL} = K-FT ADEQUATE
Δ_{TL} = IN. L/ < L/240 ADEQUATE

4x10

BEAM DESCRIPTION: UPPER FLOOR FRAMING - 9' GARAGE DOOR 134

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

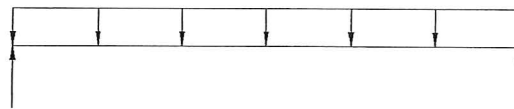
R_{MAX} = K V_D = K < V_{ALL} = K ADEQUATE
M_{MAX} = K-FT < M_{ALL} = K-FT ADEQUATE
Δ_{TL} = IN. L/ < L/240 ADEQUATE

4x12

BEAM DESCRIPTION: UPPER FLOOR FRAMING - FLUSH BOTTOM BEAM @ FRONT OF GARAGE 135

PARAMETERS:

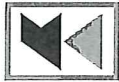
L = FT
W = KLF
P = K



ANALYSIS:

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

5 1/2 x 15" GLB



BEAM & HEADER CALCULATIONS

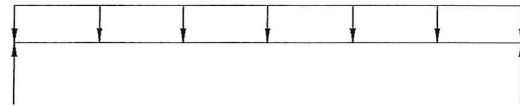
BEAM DESCRIPTION: UPPER FLOOR FRAMING - FLUSH BOT BEAM @ REAR OF GARAGE B36

PARAMETERS:

L = FT

W = KLF

P = K



ANALYSIS:

R_{MAX} = K V_D = K < V_{ALL} = K ADEQUATE

M_{MAX} = K-FT < M_{ALL} = K-FT ADEQUATE

Δ_{TL} = IN. L/ < L/240 ADEQUATE

5 1/2" x 15" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING - FRONT TO BACK BEAM @ GARAGE B37

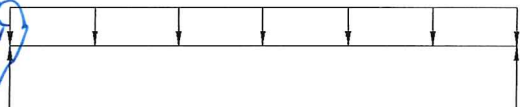
PARAMETERS:

L = FT

W = KLF

P = K

(SEE ENERCALL OUTPUT FOR OVERSTRENGTH CALC)



ANALYSIS:

R_{MAX} = K V_D = K < V_{ALL} = K ADEQUATE

M_{MAX} = K-FT < M_{ALL} = K-FT ADEQUATE

Δ_{TL} = IN. L/ < L/240 ADEQUATE

7" x 18" LVL

BEAM DESCRIPTION: UPPER FLOOR FRAMING - 17' GARAGE DOOR HEADER B38

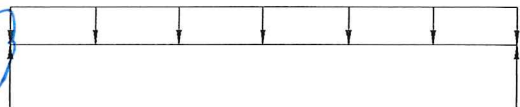
PARAMETERS:

L = FT

W = KLF

P = K

(SEE ENERCALL OUTPUT FOR OVERSTRENGTH CALC)



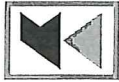
ANALYSIS:

R_{MAX} = K V_D = K < V_{ALL} = K ADEQUATE

M_{MAX} = K-FT < M_{ALL} = K-FT ADEQUATE

Δ_{TL} = IN. L/ < L/240 ADEQUATE

5 1/2" x 15" GLB



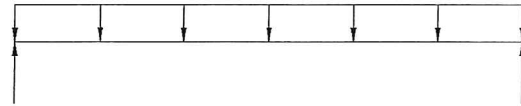
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLOOR FRAMING - FLUSH BOTTOM BEAM @ PANTRY

B9

PARAMETERS:

L = 9 FT
W = 0.92 KLF
P = - K



ANALYSIS:

$R_{MAX} = 4.14$ K $V_D =$ [] K $< V_{ALL} = 7.42$ K ADEQUATE
 $M_{MAX} = 9.32$ K-FT $< M_{ALL} = 16.8$ K-FT ADEQUATE
 $\Delta_{TL} = 0.15$ IN. $L/720 < L/240$ ADEQUATE

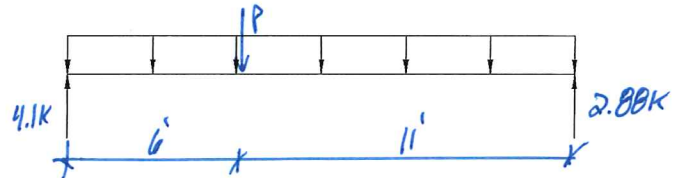
3 1/2" x 12" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING - FLUSH BEAM @ KITCHEN

B10

PARAMETERS:

L = 17 FT
W = 0.167 KLF
P = 4.14 K



ANALYSIS:

$R_{MAX} = 4.1$ K $V_D =$ [] K $< V_{ALL} = 11.13$ K ADEQUATE
 $M_{MAX} = 21.6$ K-FT $< M_{ALL} = 37.8$ K-FT ADEQUATE
 $\Delta_{TL} = 0.37$ IN. $L/550 < L/240$ ADEQUATE

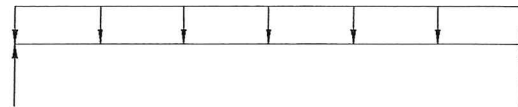
3 1/2" x 18" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING - HEADERS @ REAR OF KITCHEN (WORST CASE)

B11

PARAMETERS:

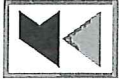
L = 7 FT
W = 1.14 KLF
P = - K



ANALYSIS:

$R_{MAX} = 3.99$ K $V_D =$ [] K $< V_{ALL} = 5.56$ K ADEQUATE
 $M_{MAX} = 6.98$ K-FT $< M_{ALL} = 9.45$ K-FT ADEQUATE
 $\Delta_{TL} = 0.16$ IN. $L/525 < L/240$ ADEQUATE

3 1/2" x 9" GLB



BEAM & HEADER CALCULATIONS

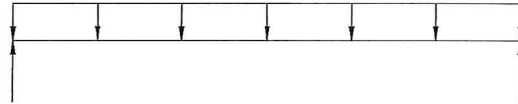
BEAM DESCRIPTION: UPPER FLOOR FRAMING - FLUSH BOTTOM BEAM @ FOYER 1B12

PARAMETERS:

L = 15.5 FT

W = 0.57 KLF

P = - K



ANALYSIS:

R_{MAX} = 4.41 K V_D = [] K < V_{ALL} = 11.13 K ADEQUATE

M_{MAX} = 17.12 K-FT < M_{ALL} = 37.8 K-FT ADEQUATE

Δ_{TL} = 0.24 IN. L/775 < L/240 ADEQUATE

3 1/2"x18" GLB

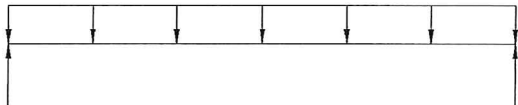
BEAM DESCRIPTION: UPPER FLOOR FRAMING - DROPPED BEAM @ FRONT PORCH 1B13

PARAMETERS:

L = 16 FT

W = 0.2 KLF

P = - K



ANALYSIS:

R_{MAX} = 1.6 K V_D = [] K < V_{ALL} = 7.168 K ADEQUATE

M_{MAX} = 6.4 K-FT < M_{ALL} = 8.84 K-FT ADEQUATE

Δ_{TL} = 0.33 IN. L/581 < L/240 ADEQUATE

6x12

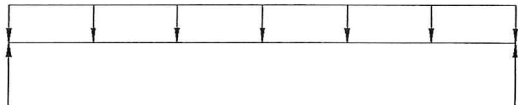
BEAM DESCRIPTION: UPPER FLOOR FRAMING - GREAT ROOM FRONT WINDOW HDR 1B14

PARAMETERS:

L = 8 FT

W = 0.69 KLF

P = - K



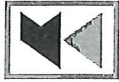
ANALYSIS:

R_{MAX} = 2.76 K V_D = [] K < V_{ALL} = 5.922 K ADEQUATE

M_{MAX} = 5.52 K-FT < M_{ALL} = 6.032 K-FT ADEQUATE

Δ_{TL} = 0.125 IN. L/770 < L/240 ADEQUATE

6x10

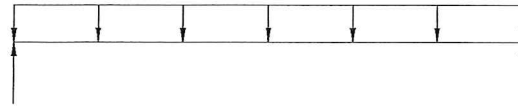


BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLOOR FRAMING- GREAT ROOM SGD HDR B15

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

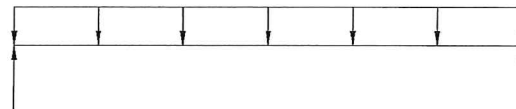
$R_{MAX} =$ K $V_D =$ K $< V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT $< M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $L/$ $< L/240$ ADEQUATE

5 1/2" x 13 1/2" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING- FLUSH BEAM @ SIDE OF REAR PORCH B16

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

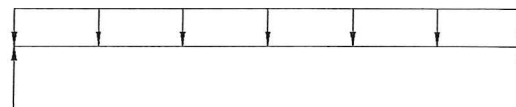
$R_{MAX} =$ K $V_D =$ K $< V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT $< M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $L/$ $< L/240$ ADEQUATE

3 1/2" x 18" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING- FLUSH BEAM @ REAR OF REAR PORCH B17

PARAMETERS:

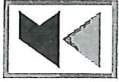
L = FT
W = KLF
P = K



ANALYSIS:

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

3 1/2" x 18" GLB

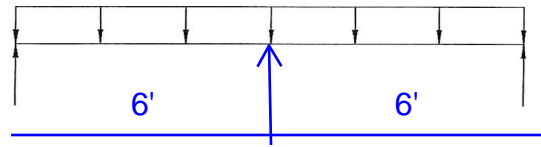


BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: MAIN FLOOR FRAMING - Dropped BEAM @ REAR OF CRAWL B19

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

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

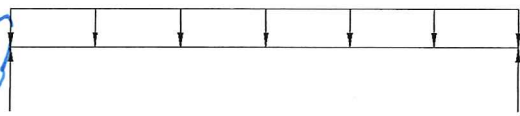
6x10 dropped

BEAM DESCRIPTION: MAIN FLOOR FRAMING - Dropped BEAM @ FRONT OF CRAWL B19

PARAMETERS:

L = FT
W = KLF
P = K

SEE ENER CALC
OUTPUT FOR
OVERSTRENGTH
CALCS



ANALYSIS:

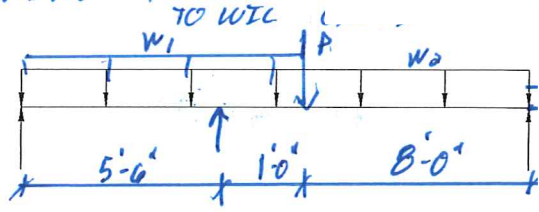
$R_{MAX} =$ K $V_D =$ K < $V_{ALL} =$ K ADEQUATE
 $M_{MAX} =$ K-FT < $M_{ALL} =$ K-FT ADEQUATE
 $\Delta_{TL} =$ IN. $L/$ < $L/240$ ADEQUATE

6x10 dropped

BEAM DESCRIPTION: MAIN FLOOR FRAMING - FLUSH BOTTOM BEAM @ MECH B20

PARAMETERS:

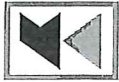
L = FT
W = KLF $w_2 = 0.77$
P = K



ANALYSIS:

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

3 1/2" x 12" GLB



BEAM & HEADER CALCULATIONS

VOID

1302

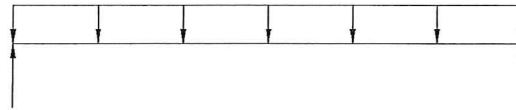
BEAM DESCRIPTION: MAIN FLOOR FRAMING - FLUSH BEAM @ BED 5 W/ DECK ADV. 1302

PARAMETERS:

L = 11 FT

W = 0.74 KLF

P = - K



ANALYSIS:

R_{MAX} = 4.07 K

V_D = [] K

< V_{ALL} = 11.13 K

ADEQUATE

M_{MAX} = 11.19 K-FT

< M_{ALL} = 378 K-FT

ADEQUATE

Δ_{TL} = 0.08 IN.

L/ 9994 < L/240

ADEQUATE

3 1/2" x 18" GLB

VOID

1303



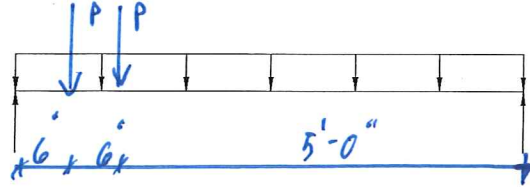
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: MAIN FLOOR FRAMING - FLUSH BOT HOR @ BED 6

B24

PARAMETERS:

L = FT
W = KLF
P = K



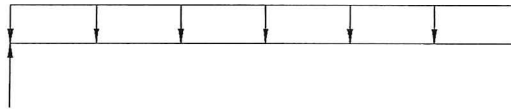
ANALYSIS:

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

BEAM DESCRIPTION:

PARAMETERS:

L = FT
W = KLF
P = K



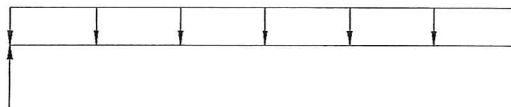
ANALYSIS:

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

BEAM DESCRIPTION:

PARAMETERS:

L = FT
W = KLF
P = K



ANALYSIS:

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

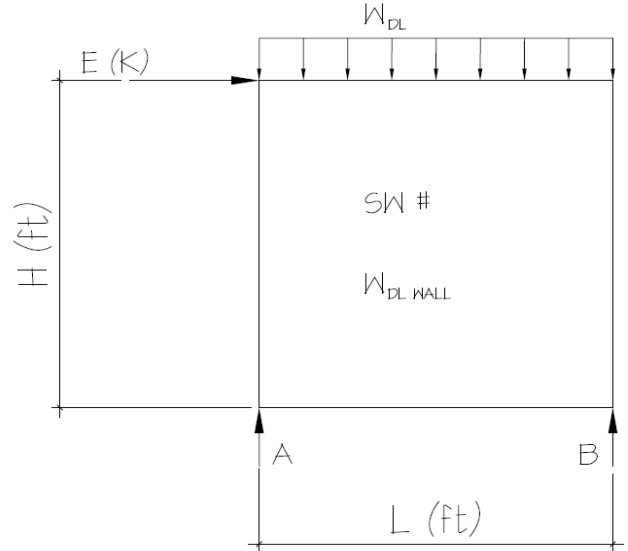
OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #:

201

PARAMETERS:

L = 7.0 FT
 H = 9.0 FT
 E = 0.70 K
 W_{DLWALL} = 0.10 KLF
 W_{DL} = 0.034 KLF
 Ω₀ = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE G)
 SDS = 0.976



ANALYSIS:

$E_{MH} = \Omega_0 * E = 1.75$ K $E_v = 0.2 * SDS * DL = 0.183$ K
 $E_M = E_{MH} + E_v = 1.933$ K
 $E_M = E_{MH} - E_v = 1.567$ K

$E_M (MAX) = \sum M_A = 0 = 1.93(9.0) + 0.134(7)(3.5) - R_B(7)$ $R_B = 0.5DL + 2.5E$
 $R_A = 0.5DL - 2.5E$
 $E_M (MIN) = \sum M_A = 0 = 1.57(9.0) + 0.134(7)(3.5) - R_B(7)$ $R_B = 0.5DL + 2.0E$
 $R_A = 0.5DL - 2.0E$

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

ALLOWABLE STRESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM
CALCS FOR LOAD
APPLICATION

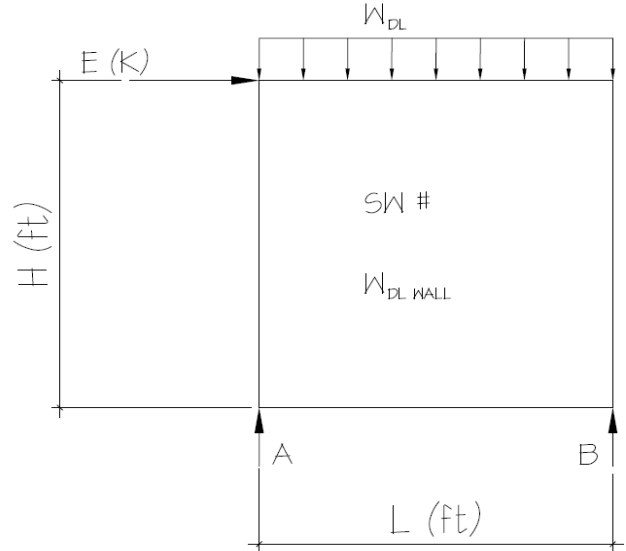
OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #:

205

PARAMETERS:

L = 13.5 FT
 H = 9.0 FT
 E = 1.55 K
 W_{DLWALL} = 0.10 KLF
 W_{DL} = 0.000 KLF
 Ω₀ = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE G)
 SDS = 0.976



ANALYSIS:

$E_{MH} = \Omega_0 * E = 3.88$ K $E_v = 0.2 * SDS * DL = 0.264$ K
 $E_M = E_{MH} + E_v = 4.139$ K
 $E_M = E_{MH} - E_v = 3.611$ K

$E_M (MAX) = \sum M_A = 0 = 4.14(9.0) + 0.1(13.5)(6.75) - R_B(13.5)$ $R_B = 0.7DL + 2.8E$
 $R_A = 0.7DL - 2.8E$

$E_M (MIN) = \sum M_A = 0 = 3.61(9.0) + 0.1(13.5)(6.75) - R_B(13.5)$ $R_B = 0.7DL + 2.4E$
 $R_A = 0.7DL - 2.4E$

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

ALLOWABLE STRESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM
CALCS FOR LOAD
APPLICATION

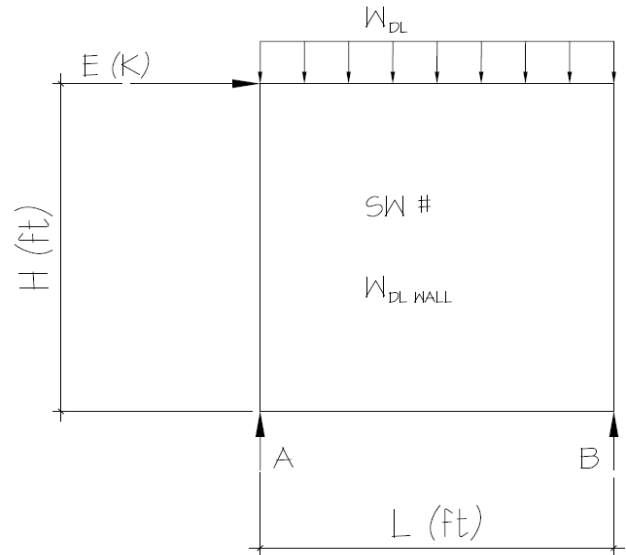
OVERSTRENGTH CALCULATIONS

WALL DESCRIPTION/SW #:

104

PARAMETERS:

- L = 13.5 FT
- H = 10.0 FT
- E = 1.65 K
- W_{DLWALL} = 0.20 KLF
- W_{DL} = 0.000 KLF
- Ω_0 = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE G)
- SDS = 0.976



ANALYSIS:

$$E_{MH} = \Omega_0 * E = 4.13 \text{ K} \quad E_v = 0.2 * SDS * DL = 0.527 \text{ K}$$

$$E_M = E_{MH} + E_v = 4.652 \text{ K}$$

$$E_M = E_{MH} - E_v = 3.598 \text{ K}$$

$$E_M (MAX) = \sum M_A = 0 = 4.65(10.0) + 0.2(13.5)(6.75) - R_B(13.5) \quad R_B = 1.4DL + 3.4E$$

$$R_A = 1.4DL - 3.4E$$

$$E_M (MIN) = \sum M_A = 0 = 3.60(10.0) + 0.2(13.5)(6.75) - R_B(13.5) \quad R_B = 1.4DL + 2.7E$$

$$R_A = 1.4DL - 2.7E$$

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

ALLOWABLE STRESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM
CALCS FOR LOAD
APPLICATION

Mulhern & Kulp
 Structural Engineering Inc
 20 S. Maple St
 Ambler, PA 19002
 215-646-8001
 Title Block Line 6

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Printed: 31 MAR 2020, 1:35PM

Wood Beam

File = P:\CYJ7GB-P\27VIUR-8\2020\2POAWE-4\Design\Gravity\beam calcs with overstrength.ec6 .
 Software copyright ENERCALC, INC. 1983-2018, Build:10.18.12.13 .

Lic. #: KW-06004787

Licensee: MULHERN & KULP STRUCTURAL ENGINEERING INC

Description: B7 - Front to back Garage Beam

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values		
			M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv
Length = 21.50 ft	1	0.228	0.157	1.25	0.946	1.00	1.00	1.00	1.00	1.00	26.52	841.95	3690.76	5.63	66.97	427.50
+D+S					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.361	0.236	1.15	0.946	1.00	1.00	1.00	1.00	1.00	38.64	1,226.71	3395.50	7.81	92.98	393.30
+D+0.750Lr+0.750L					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.286	0.201	1.25	0.946	1.00	1.00	1.00	1.00	1.00	33.30	1,057.20	3690.76	7.21	85.80	427.50
+D+0.750L+0.750S					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.396	0.268	1.15	0.946	1.00	1.00	1.00	1.00	1.00	42.39	1,345.77	3395.50	8.85	105.31	393.30
+D+0.60W					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.178	0.122	1.60	0.946	1.00	1.00	1.00	1.00	1.00	26.52	841.95	4724.18	5.63	66.97	547.20
+1.126D+0.70E					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.232	0.125	1.60	0.946	1.00	1.00	1.00	1.00	1.00	34.55	1,096.82	4724.18	5.75	68.43	547.20
+1.126D-0.70E					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.169	0.151	1.60	0.946	1.00	1.00	1.00	1.00	1.00	25.18	799.25	4724.18	6.92	82.38	547.20
+D+0.750Lr+0.750L+0.450W					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.224	0.157	1.60	0.946	1.00	1.00	1.00	1.00	1.00	33.30	1,057.20	4724.18	7.21	85.80	547.20
+D+0.750L+0.750S+0.450W					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.285	0.192	1.60	0.946	1.00	1.00	1.00	1.00	1.00	42.39	1,345.77	4724.18	8.85	105.31	547.20
+1.090D+0.750L+0.750S+0.5250E					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.325	0.194	1.60	0.946	1.00	1.00	1.00	1.00	1.00	48.29	1,533.14	4724.18	8.91	106.11	547.20
+1.090D+0.750L+0.750S-0.5250E					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.277	0.213	1.60	0.946	1.00	1.00	1.00	1.00	1.00	41.26	1,309.96	4724.18	9.79	116.57	547.20
+0.60D+0.60W					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.107	0.073	1.60	0.946	1.00	1.00	1.00	1.00	1.00	15.91	505.17	4724.18	3.38	40.18	547.20
+0.470D+0.70E					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.115	0.048	1.60	0.946	1.00	1.00	1.00	1.00	1.00	17.15	544.50	4724.18	2.21	26.28	547.20
+0.470D-0.70E					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.054	0.070	1.60	0.946	1.00	1.00	1.00	1.00	1.00	8.03	254.97	4724.18	3.23	38.45	547.20

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	6.347	9.028
Overall MINimum	0.837	-0.837
D Only	3.530	5.705
+D+L	4.661	7.815
+D+Lr	3.530	5.705
+D+S	5.146	7.928
+D+0.750Lr+0.750L	4.378	7.288
+D+0.750L+0.750S	5.590	8.954
+D+0.60W	3.530	5.705
+1.126D+0.70E	4.561	5.838
+D+0.750Lr+0.750L+0.450W	4.378	7.288
+D+0.750L+0.750S+0.450W	5.590	8.954
+1.090D+0.750L+0.750S+0.5250E	6.347	9.028
+0.60D+0.60W	2.118	3.423
+0.470D+0.70E	2.245	2.095
D Only	3.530	5.705
Lr Only		
L Only	1.130	2.110
S Only	1.615	2.222
W Only		
E Only	0.837	-0.837
H Only		

Wood Beam

File = P:\CYJ7GB-P\27VIUR-8\2020\2POAWE-4\Design\Gravity\beam calcs with overstrength.ec6 .
Software copyright ENERCALC, INC. 1983-2018, Build:10.18.12.13 .

Lic. #: KW-06004787

Licensee: MULHERN & KULP STRUCTURAL ENGINEERING INC

Description: B8 - 17' Garage Door Header

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

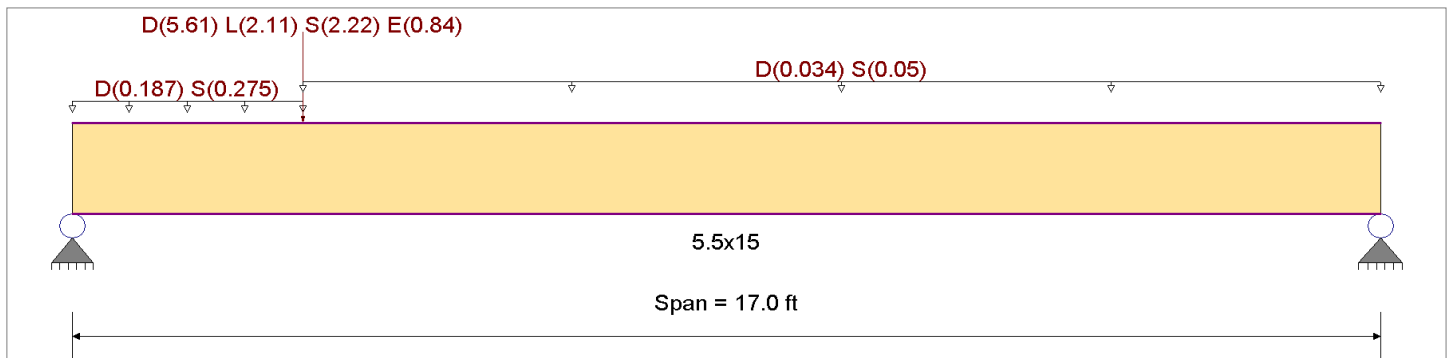
Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10

Fb +	2,880.0 psi	E : Modulus of Elasticity	
Fb -	2,880.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,980.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	780.0 psi	Ebend- yy	1,600.0 ksi
Fv	318.0 psi	Eminbend - yy	850.0 ksi
Ft	1,320.0 psi	Density	31.210 pcf

Wood Species : DF/DF
Wood Grade : 24F - V8

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 calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.1870, S = 0.2750 k/ft, Extent = 0.0 -->> 3.0 ft, Tributary Width = 1.0 ft

Point Load : D = 5.610, L = 2.110, S = 2.220, E = 0.840 k @ 3.0 ft

Uniform Load : D = 0.0340, S = 0.0500 k/ft, Extent = 3.0 -->> 17.0 ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.441 : 1	Maximum Shear Stress Ratio	=	0.419 : 1
Section used for this span		5.5x15	Section used for this span		5.5x15
fb : Actual	=	1,449.08 psi	fv : Actual	=	153.16 psi
FB : Allowable	=	3,284.80 psi	Fv : Allowable	=	365.70 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	3.040 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		0.118 in	Ratio =		1721 >= 360
Max Upward Transient Deflection		0.000 in	Ratio =		0 < 360
Max Downward Total Deflection		0.405 in	Ratio =		503 >= 300
Max Upward Total Deflection		0.000 in	Ratio =		0 < 300

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values					
			M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v		
D Only	Length = 17.0 ft	1	0.350	0.332	0.90	0.992	1.00	1.00	1.00	1.00	1.00	1.00	15.49	901.03	2570.72	0.00	0.00	0.00	0.00
+D+L	Length = 17.0 ft	1	0.421	0.398	1.00	0.992	1.00	1.00	1.00	1.00	1.00	1.00	20.68	1,203.46	2856.35	0.00	0.00	0.00	0.00
+D+Lr	Length = 17.0 ft	1	0.252	0.239	1.25	0.992	1.00	1.00	1.00	1.00	1.00	1.00	15.49	901.03	3570.44	0.00	0.00	0.00	0.00
+D+S	Length = 17.0 ft	1				0.992	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	0.00

Mulhern & Kulp
 Structural Engineering Inc
 20 S. Maple St
 Ambler, PA 19002
 215-646-8001
 Title Block Line 6

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Printed: 31 MAR 2020, 1:36PM

Wood Beam

File = P:\CYJ7GB-P\27VIUR-8\2020\2POAWE-4\Design\Gravity\beam calcs with overstrength.ec6 .
 Software copyright ENERCALC, INC. 1983-2018, Build:10.18.12.13 .

Lic. #: KW-06004787

Licensee: MULHERN & KULP STRUCTURAL ENGINEERING INC

Description: B8 - 17' Garage Door Header

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values		
			M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv
Length = 17.0 ft	1	0.405	0.385	1.15	0.992	1.00	1.00	1.00	1.00	1.00	22.85	1,329.34	3284.80	7.75	140.96	365.70
+D+0.750Lr+0.750L					0.992	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.316	0.299	1.25	0.992	1.00	1.00	1.00	1.00	1.00	19.39	1,127.86	3570.44	6.53	118.70	397.50
+D+0.750L+0.750S					0.992	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.441	0.419	1.15	0.992	1.00	1.00	1.00	1.00	1.00	24.91	1,449.08	3284.80	8.42	153.16	365.70
+D+0.60W					0.992	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.197	0.187	1.60	0.992	1.00	1.00	1.00	1.00	1.00	15.49	901.03	4570.16	5.23	95.00	508.80
+1.126D+0.70E					0.992	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.240	0.228	1.60	0.992	1.00	1.00	1.00	1.00	1.00	18.89	1,098.84	4570.16	6.37	115.78	508.80
+1.126D-0.70E					0.992	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.204	0.193	1.60	0.992	1.00	1.00	1.00	1.00	1.00	15.99	930.29	4570.16	5.40	98.17	508.80
+D+0.750Lr+0.750L+0.450W					0.992	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.247	0.233	1.60	0.992	1.00	1.00	1.00	1.00	1.00	19.39	1,127.86	4570.16	6.53	118.70	508.80
+D+0.750L+0.750S+0.450W					0.992	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.317	0.301	1.60	0.992	1.00	1.00	1.00	1.00	1.00	24.91	1,449.08	4570.16	8.42	153.16	508.80
+1.090D+0.750L+0.750S+0.5250E					0.992	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.349	0.331	1.60	0.992	1.00	1.00	1.00	1.00	1.00	27.39	1,593.38	4570.16	9.26	168.32	508.80
+1.090D+0.750L+0.750S-0.5250E					0.992	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.321	0.305	1.60	0.992	1.00	1.00	1.00	1.00	1.00	25.21	1,466.97	4570.16	8.53	155.11	508.80
+0.60D+0.60W					0.992	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.118	0.112	1.60	0.992	1.00	1.00	1.00	1.00	1.00	9.29	540.62	4570.16	3.14	57.00	508.80
+0.470D+0.70E					0.992	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.111	0.105	1.60	0.992	1.00	1.00	1.00	1.00	1.00	8.73	507.77	4570.16	2.94	53.46	508.80
+0.470D-0.70E					0.992	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.074	0.070	1.60	0.992	1.00	1.00	1.00	1.00	1.00	5.83	339.21	4570.16	1.97	35.85	508.80

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	9.791	2.618
Overall MINimum	0.692	0.148
D Only	5.479	1.471
+D+L	7.217	1.844
+D+Lr	5.479	1.471
+D+S	8.348	2.348
+D+0.750Lr+0.750L	6.783	1.751
+D+0.750L+0.750S	8.934	2.408
+D+0.60W	5.479	1.471
+1.126D+0.70E	6.654	1.761
+D+0.750Lr+0.750L+0.450W	6.783	1.751
+D+0.750L+0.750S+0.450W	8.934	2.408
+1.090D+0.750L+0.750S+0.5250E	9.791	2.618
+0.60D+0.60W	3.288	0.883
+0.470D+0.70E	3.060	0.795
D Only	5.479	1.471
Lr Only		
L Only	1.738	0.372
S Only	2.869	0.876
W Only		
E Only	0.692	0.148
H Only		

Title Block Line 1
 You can change this area
 using the "Settings" menu item
 and then using the "Printing &
 Title Block" selection.
 Title Block Line 6

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Printed: 24 AUG 2020, 2:48PM

Wood Beam

File: beam calcs with overstrength.ec6
 Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.17
 MULHERN & KULP STRUCTURAL ENGINEERING INC

Lic. #: KW-06004787

DESCRIPTION: B19 -Flush Bottom Beam @ Crawl

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
 Load Combination Set : ASCE 7-10

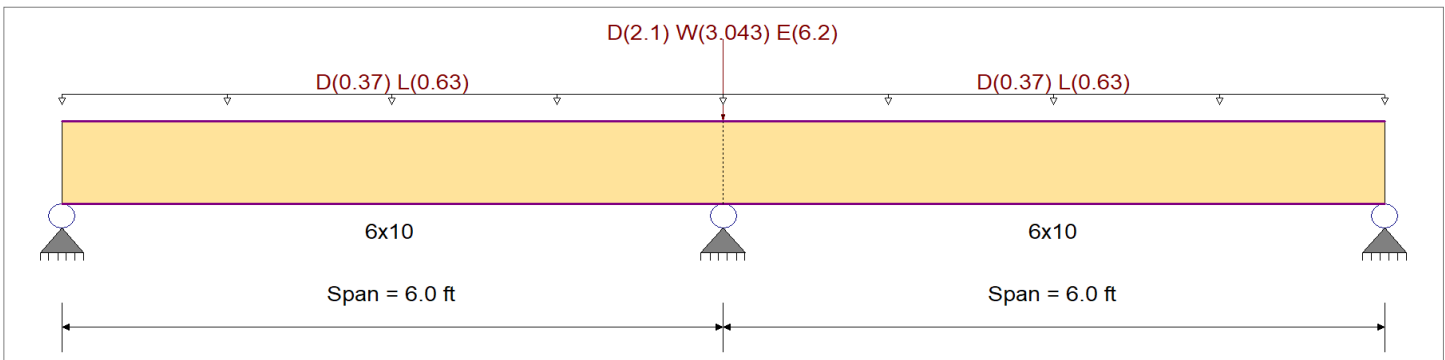
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination : ASCE 7-10

Wood Species : Douglas Fir-Larch
 Wood Grade : No.2

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

Fb +	900.0 psi	E : Modulus of Elasticity	
Fb -	900.0 psi	Ebend- xx	1,600.0ksi
Fc - Prll	1,350.0 psi	Eminbend - xx	580.0ksi
Fc - Perp	625.0 psi		
Fv	180.0 psi		
Ft	575.0 psi	Density	31.210pcf



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.370, L = 0.630, Tributary Width = 1.0 ft

Point Load : D = 2.10, W = 3.043, E = 6.20 k @ 6.0 ft

Load for Span Number 2

Uniform Load : D = 0.370, L = 0.630, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.733 : 1	Maximum Shear Stress Ratio	=	0.481 : 1
Section used for this span		6x10	Section used for this span		6x10
fb: Actual	=	660.12psi	fv: Actual	=	86.49 psi
Fb: Allowable	=	900.0psi	Fv: Allowable	=	180.00 psi
Load Combination		+D+L, LL Comb Run (LL)	Load Combination		+D+L, LL Comb Run (LL)
Location of maximum on span	=	6.000ft	Location of maximum on span	=	5.229 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.021 in	Ratio =		3473 >=360
Max Upward Transient Deflection		-0.009 in	Ratio =		7887 >=360
Max Downward Total Deflection		0.028 in	Ratio =		2563 >=300
Max Upward Total Deflection		-0.005 in	Ratio =		15871 >=300

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v		
D Only																			
	Length = 6.0 ft	1	0.307	0.201	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.72	248.90	810.00	0.00	0.00	0.00	0.00	0.00
	Length = 6.0 ft	2	0.307	0.201	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.72	248.90	810.00	0.00	0.00	0.00	0.00	0.00
+D+L, LL Comb Run (*L)																			
	Length = 6.0 ft	1	0.505	0.443	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.13	454.51	900.00	0.00	0.00	0.00	0.00	0.00
	Length = 6.0 ft	2	0.505	0.443	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.13	454.51	900.00	0.00	0.00	0.00	0.00	0.00
+D+L, LL Comb Run (L*)																			
	Length = 6.0 ft	1	0.505	0.443	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.13	454.51	900.00	0.00	0.00	0.00	0.00	0.00
	Length = 6.0 ft	2	0.505	0.443	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.13	454.51	900.00	0.00	0.00	0.00	0.00	0.00

Title Block Line 1
 You can change this area
 using the "Settings" menu item
 and then using the "Printing &
 Title Block" selection.
 Title Block Line 6

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Printed: 24 AUG 2020, 2:48PM

Wood Beam

File: beam calcs with overstrength.ec6
 Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.17
MULHERN & KULP STRUCTURAL ENGINEERING INC

Lic. # : KW-06004787

DESCRIPTION: B19 -Flush Bottom Beam @ Crawl

Load Combination	Segment Length	Span #	Max Stress Ratios			Moment Values						Shear Values				
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv
+1.090D+0.750L+0.750S+0.5250E,					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1		0.295	0.246	1.60	1.000	1.00	1.00	1.00	1.00	2.93	425.51	1440.00	2.47	70.87	288.00
Length = 6.0 ft	2		0.295	0.246	1.60	1.000	1.00	1.00	1.00	1.00	2.93	425.51	1440.00	2.47	70.87	288.00
+1.090D+0.750L+0.750S+0.5250E,					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1		0.295	0.246	1.60	1.000	1.00	1.00	1.00	1.00	2.93	425.51	1440.00	2.47	70.87	288.00
Length = 6.0 ft	2		0.295	0.246	1.60	1.000	1.00	1.00	1.00	1.00	2.93	425.51	1440.00	1.42	70.87	288.00
+1.090D+0.750L+0.750S+0.5250E,					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1		0.403	0.264	1.60	1.000	1.00	1.00	1.00	1.00	4.00	579.72	1440.00	2.65	75.96	288.00
Length = 6.0 ft	2		0.403	0.264	1.60	1.000	1.00	1.00	1.00	1.00	4.00	579.72	1440.00	2.65	75.96	288.00
+1.090D+0.750L+0.750S-0.5250E, l					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1		0.295	0.246	1.60	1.000	1.00	1.00	1.00	1.00	2.93	425.51	1440.00	2.47	70.87	288.00
Length = 6.0 ft	2		0.295	0.246	1.60	1.000	1.00	1.00	1.00	1.00	2.93	425.51	1440.00	2.47	70.87	288.00
+1.090D+0.750L+0.750S-0.5250E, l					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1		0.295	0.243	1.60	1.000	1.00	1.00	1.00	1.00	2.93	425.51	1440.00	2.44	70.02	288.00
Length = 6.0 ft	2		0.295	0.243	1.60	1.000	1.00	1.00	1.00	1.00	2.93	425.51	1440.00	1.42	70.02	288.00
+1.090D+0.750L+0.750S-0.5250E, l					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1		0.403	0.264	1.60	1.000	1.00	1.00	1.00	1.00	4.00	579.72	1440.00	2.65	75.96	288.00
Length = 6.0 ft	2		0.403	0.264	1.60	1.000	1.00	1.00	1.00	1.00	4.00	579.72	1440.00	2.65	75.96	288.00
+0.60D+0.60W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1		0.104	0.068	1.60	1.000	1.00	1.00	1.00	1.00	1.03	149.34	1440.00	0.68	19.57	288.00
Length = 6.0 ft	2		0.104	0.068	1.60	1.000	1.00	1.00	1.00	1.00	1.03	149.34	1440.00	0.68	19.57	288.00
+0.470D+0.70E					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1		0.081	0.053	1.60	1.000	1.00	1.00	1.00	1.00	0.81	116.98	1440.00	0.53	15.33	288.00
Length = 6.0 ft	2		0.081	0.053	1.60	1.000	1.00	1.00	1.00	1.00	0.81	116.98	1440.00	0.53	15.33	288.00
+0.470D-0.70E					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1		0.081	0.053	1.60	1.000	1.00	1.00	1.00	1.00	0.81	116.98	1440.00	0.53	15.33	288.00
Length = 6.0 ft	2		0.081	0.053	1.60	1.000	1.00	1.00	1.00	1.00	0.81	116.98	1440.00	0.53	15.33	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L, LL Comb Run (L*)	1	0.0281	2.749		0.0000	0.000
+D+L, LL Comb Run (L)	2	0.0279	3.285	L Only, LL Comb Run (L*)	-0.0003	0.034

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	2.512	12.205	2.512
Overall MINimum	0.000	6.200	0.000
D Only	0.858	4.960	0.858
+D+L, LL Comb Run (L)	0.622	7.322	2.512
+D+L, LL Comb Run (L*)	2.512	7.322	0.622
+D+L, LL Comb Run (LL)	2.275	9.685	2.275
+D+Lr, LL Comb Run (L)	0.858	4.960	0.858
+D+Lr, LL Comb Run (L*)	0.858	4.960	0.858
+D+Lr, LL Comb Run (LL)	0.858	4.960	0.858
+D+S	0.858	4.960	0.858
+D+0.750Lr+0.750L, LL Comb Run (L)	0.681	6.732	2.098
+D+0.750Lr+0.750L, LL Comb Run (L*)	2.098	6.732	0.681
+D+0.750Lr+0.750L, LL Comb Run (LL)	1.921	8.504	1.921
+D+0.750L+0.750S, LL Comb Run (L)	0.681	6.732	2.098
+D+0.750L+0.750S, LL Comb Run (L*)	2.098	6.732	0.681
+D+0.750L+0.750S, LL Comb Run (LL)	1.921	8.504	1.921
+D+0.60W	0.858	6.786	0.858
+1.126D+0.70E	0.966	9.925	0.966
+D+0.750Lr+0.750L+0.450W, LL Comb R	0.681	8.101	2.098
+D+0.750Lr+0.750L+0.450W, LL Comb R	2.098	8.101	0.681
+D+0.750Lr+0.750L+0.450W, LL Comb R	1.921	9.873	1.921
+D+0.750L+0.750S+0.450W, LL Comb Ru	0.681	8.101	2.098
+D+0.750L+0.750S+0.450W, LL Comb Ru	2.098	8.101	0.681
+D+0.750L+0.750S+0.450W, LL Comb Ru	1.921	9.873	1.921
+1.090D+0.750L+0.750S+0.5250E, LL C	0.758	10.433	2.176

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 24 AUG 2020, 2:48PM

Wood Beam

File: beam calcs with overstrength.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.17
MULHERN & KULP STRUCTURAL ENGINEERING INC

Lic. # : KW-06004787

DESCRIPTION: B19 -Flush Bottom Beam @ Crawl

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+1.090D+0.750L+0.750S+0.5250E, LL C	2.176	10.433	0.758
+1.090D+0.750L+0.750S+0.5250E, LL C	1.998	12.205	1.998
+0.60D+0.60W	0.515	4.802	0.515
+0.470D+0.70E	0.403	6.671	0.403
D Only	0.858	4.960	0.858
L Only, LL Comb Run (*L)	-0.236	2.362	1.654
L Only, LL Comb Run (L*)	1.654	2.362	-0.236
L Only, LL Comb Run (LL)	1.418	4.725	1.418
W Only	0.000	3.043	0.000
E Only	0.000	6.200	0.000
H Only			

ARCH INNOVATIONS
PRATT PLOT - LOT 4

MERCER ISLAND, WA

SHEAR WALL CALCULATIONS - WIND DESIGN

REVIEWED BY: NJM

MARCH 20, 2020

PARAMETERS:

SINGLE FAMILY HOME

DESIGN WIND SPEED: 110 MPH

WIND EXPOSURE CATEGORY: B

SEISMIC DESIGN CATEGORY: D

CODE & DESIGN STANDARD: 2015 IBC CH. 1609, ASCE 7-10 CH. 26-30



MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING



WIND DESIGN SUMMARY PER ASCE 7-10

PARAMETERS:

WIND SPEED	110
EXPOSURE CATEGORY	B
RISK CATEGORY	II
WIND DIRECTIONALITY FACTOR, K_d	0.85
TOPOGRAPHIC FACTOR, K_{zt}	1.60
GUST FACTOR, G	0.85
DESIGN TYPE	ASD

ROOF GEOMETRY:

TRANS. ROOF PITCH	8	:12
LONG. ROOF PITCH	8	:12
MEAN ROOF HEIGHT, H	25.00	FT

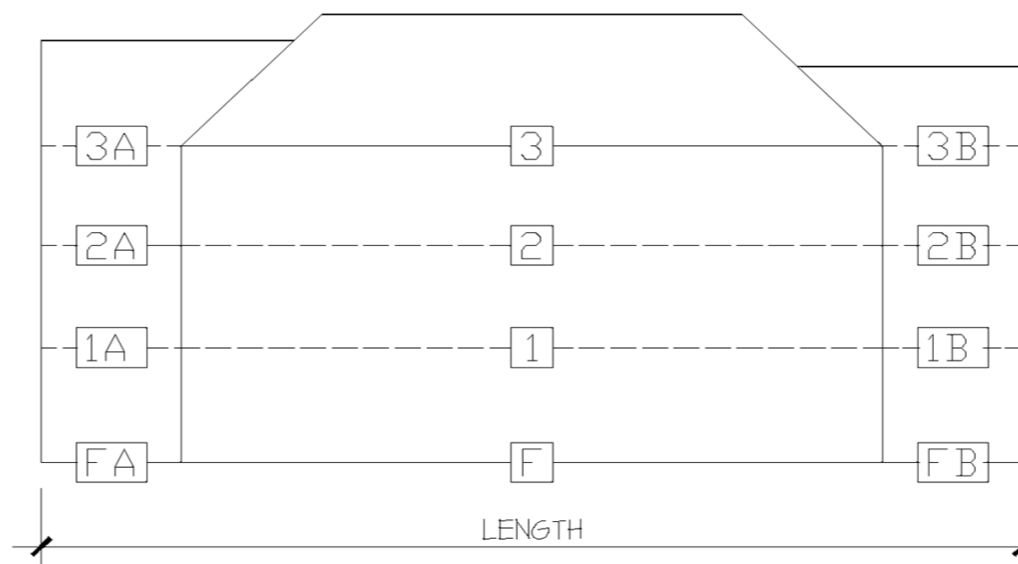
BUILDING GEOMETRY:

LENGTH	82	FT
WIDTH	43	FT
NUMBER OF STORIES	2	

TRANSVERSE DIRECTION (PERPENDICULAR TO MAIN RIDGE LINE)

TRIBUTARY DESIGN AREAS

DIAPHRAGM LEVEL	FLOOR-TO-FLOOR HEIGHT		SECTION			
			A	□	B	
2	9 FT	RooF Surface	0	288	0	sq ft
		Wall surface	0	450	0	sq ft
1	10 FT	RooF Surface	0	120	0	sq ft
		Wall surface	0	788	0	sq ft
FND		RooF Surface	0	0	0	sq ft
		Wall surface	0	0	0	sq ft



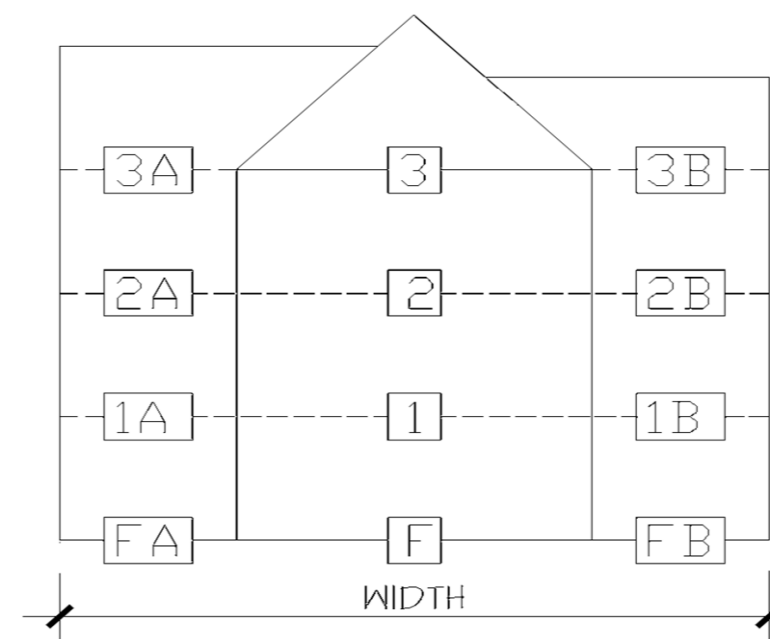
TRIBUTARY DESIGN LOADS: (0.6W)

	SECTION			
	A	□	B	
Story Shear	0.00	11.54	0.00	kips
Total Shear	0.00	11.54	0.00	kips
	11.54			kips
Story Shear	0.00	14.90	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	□	B	
2	9 FT	RooF Surface	0	268	0	sq ft
		Wall surface	0	240	0	sq ft
1	10 FT	RooF Surface	0	0	0	sq ft
		Wall surface	0	390	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	□	B	
Story Shear	0.00	7.30	0.00	kips
Total Shear	0.00	7.30	0.00	kips
	7.30			kips
Story Shear	0.00	5.63	0.00	kips
Total Shear	0.00	12.93	0.00	kips
	12.93			kips
Story Shear	0.00	0.00	0.00	kips
Total Shear	0.00	12.93	0.00	kips
	12.93			kips

GENERAL PLAN NOTES

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

FLOOR PLAN KEY NOTES

- P-1** OCCUPANCY SEPARATION:
APPLY (1) LAYER OF 1/2" G.W.B. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY. APPLY (1) LAYER OF 3/8" TYPE 'X' G.W.B. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS. DIGITS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL SEE DIV. 01002.6.A. SHEET A-1.
- P-2** 1 1/2" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR SEE DIV. 01002.6.B. SHEET A-1
- P-3** STAIR ASSEMBLY NOTES: PER IRC. SECTION R301.5 AND DETAIL 12D2.
A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".
B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT, RISERS 7/8" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1/4" ON STAIRS WITH SOLID RISERS.
C. HANDRAIL MIN. 34" TO MAX. 38" ABOVE TREAD NOSING. HANDRAIL TYPE I CIRCULAR TO HAVE 1 1/4" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL, RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER IRC. TABLE R301.5 D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER IRC. SECTION R302.11.
E. COVER USABLE SPACE UNDER STAIR W/ 1/2" G.W.B. PER IRC. SECTION R302.1.
F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
G. PROVIDE STAIRWAY ILLUMINATION PER IRC. SECTION R303.6. SEE DIV. 01002.1 SHEET A-1.
- P-4** SAFETY GLAZING PER IRC. SECTION R308
A. WINDOWS WITHIN 18" OF FLOOR
B. WINDOWS WITHIN A 24" ARC OF DOORS
C. WINDOWS AT TUBS AND SHOWERS
D. GLAZING IN DOORS
E. LESS THAN 60" HORIZ. FROM THE BOT. STAIR TREAD NOSING, 1 BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE SEE DIV. 08000 SHEET A-1
- P-5** EGRESS WINDOW PER IRC. SECTION R310 SEE DIV. 08000 SHEET A-1
- P-6** IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1
- P-7** COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 12" ABOVE DRAIN INLETS, PER IRC. SECTION 3012. SEE DIV. 09250 SHEET A-1
- P-8** (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- P-9** 7/8" MAX. RISER WITH 10" MIN. RUN. IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER IRC. SECTION R301.5. SEE DIV. 01002.1 SHEET A-1
- P-10** 18"x24" CRAWL SPACE ACCESS. INSULATE AND WEATHER STRIP. SEE DIV. 01002.1 SHEET A-1
- P-11** 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE. INSULATE AND WEATHER STRIP. SEE DIV. 01002.2 SHEET A-1
- P-12** FLOOR MATERIAL BREAK LINE
- P-13** WALL LINE ABOVE
- P-14** WALL LINE BELOW
- P-15** FIREPLACE ASSEMBLY NOTES:
A. DIRECT VENT GAS FIREPLACES, MUST BE LISTED, LABELED & INSTALLED PER MFG. SPECIFICATIONS, SHALL CONFORM TO IRC REQUIREMENTS. SEE DIV. 01002.12 SHEET A-1
B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO IRC. REQUIREMENTS. SEE DIV. 01002.12 SHEET A-1
C. HEARTH SHALL CONFORM TO IRC REQUIREMENT SEE DIV. 01002.12
D. FIREBLOCK OPENINGS AROUND PENETRATIONS # EACH FLOOR PER IRC. SECTION R302.12.
E. FIREPLACE MUST COMPLY WITH UL 121 TESTING
- P-16** SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS
- P-17** 3" DIAMETER STEEL POST
- P-18** 36" GUARDRAIL PER IRC. SECTION R312 & TABLE R301.5 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 200LB LOAD ON TOP RAIL ACTING IN ANY DIRECTION.
- P-19** 1" VENT FOR MECHANICAL. 1' CLEARANCE ALL SIDES PER IRC. SECTION R302.12. SEE DIV. 15 SHEET A-1
- P-20** PLANT SHELF
- P-21** UPPER AND LOWER LINEN CABINETS
- P-22** SOFFIT AREA
- P-23** INTEGRATED MAKE UP AIR
- P-24** 2x6 STUDS W/ R-21 INSULATION MIN.

Date	By	Description
02/07/19	SM	PRELIMINARY DESIGN
02/07/19	SM	ELEVATION DESIGN
02/07/19	SM	DESIGN DESIGN
02/07/19	SM	REVISIONS
02/07/19	SM	ELEVATION DESIGN

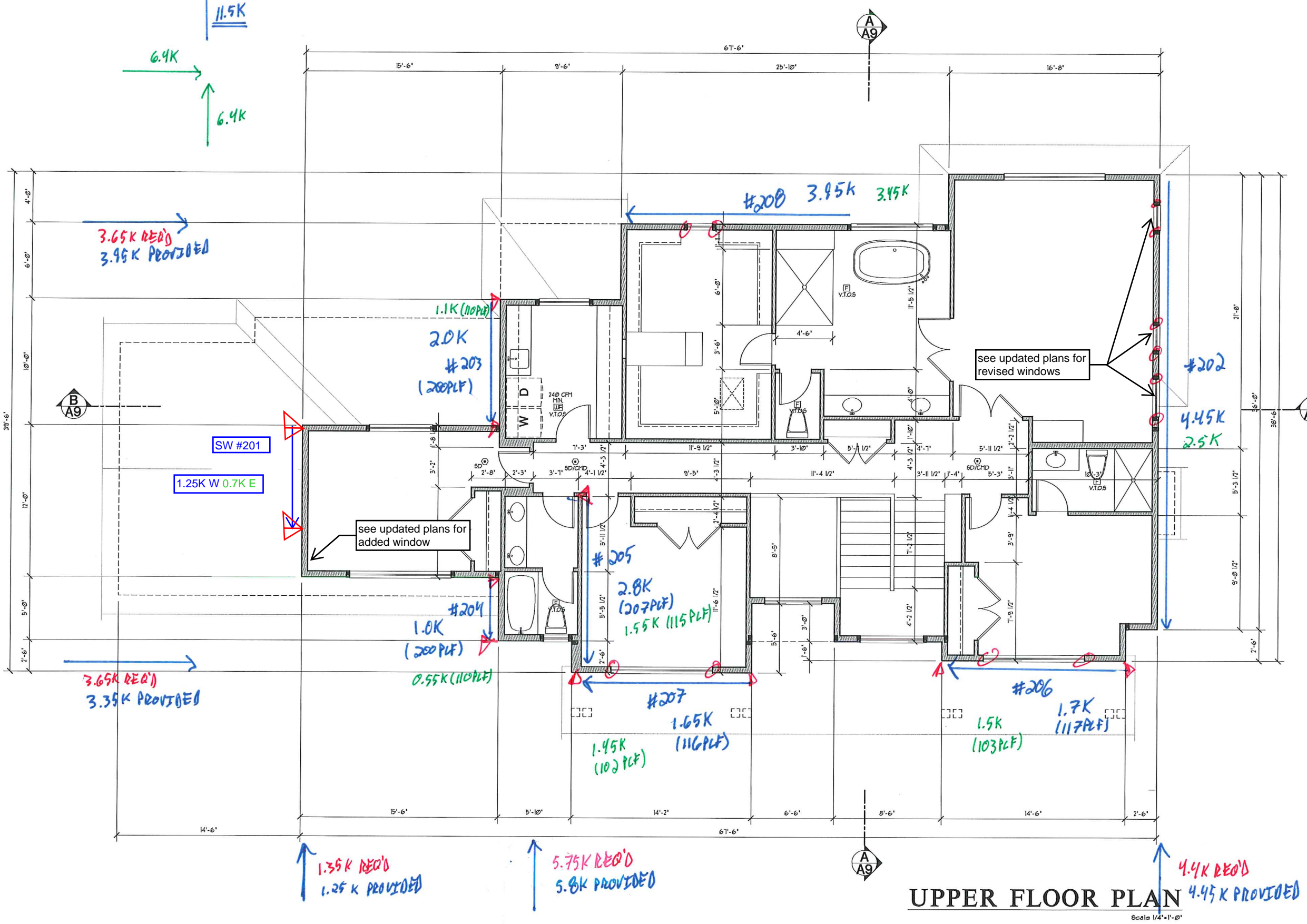
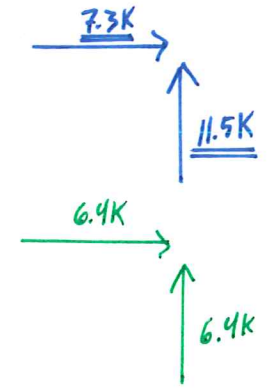
Pratt Plat
 Lot 4
 7233 80th Ave SE
 Mercer Island, WA 98040
 THIS DRAWING IS © COPYRIGHTED ARCHITECTURAL INNOVATIONS, P.S. ALL RIGHTS RESERVED

ARCHITECTURAL INNOVATIONS, P.S.
 Forward Thinking Design Solutions For Your Environment
 14311 SE 16th St.
 Bellevue, WA 98007
 1-800-888-4517
 www.kaprielhomeplans.com

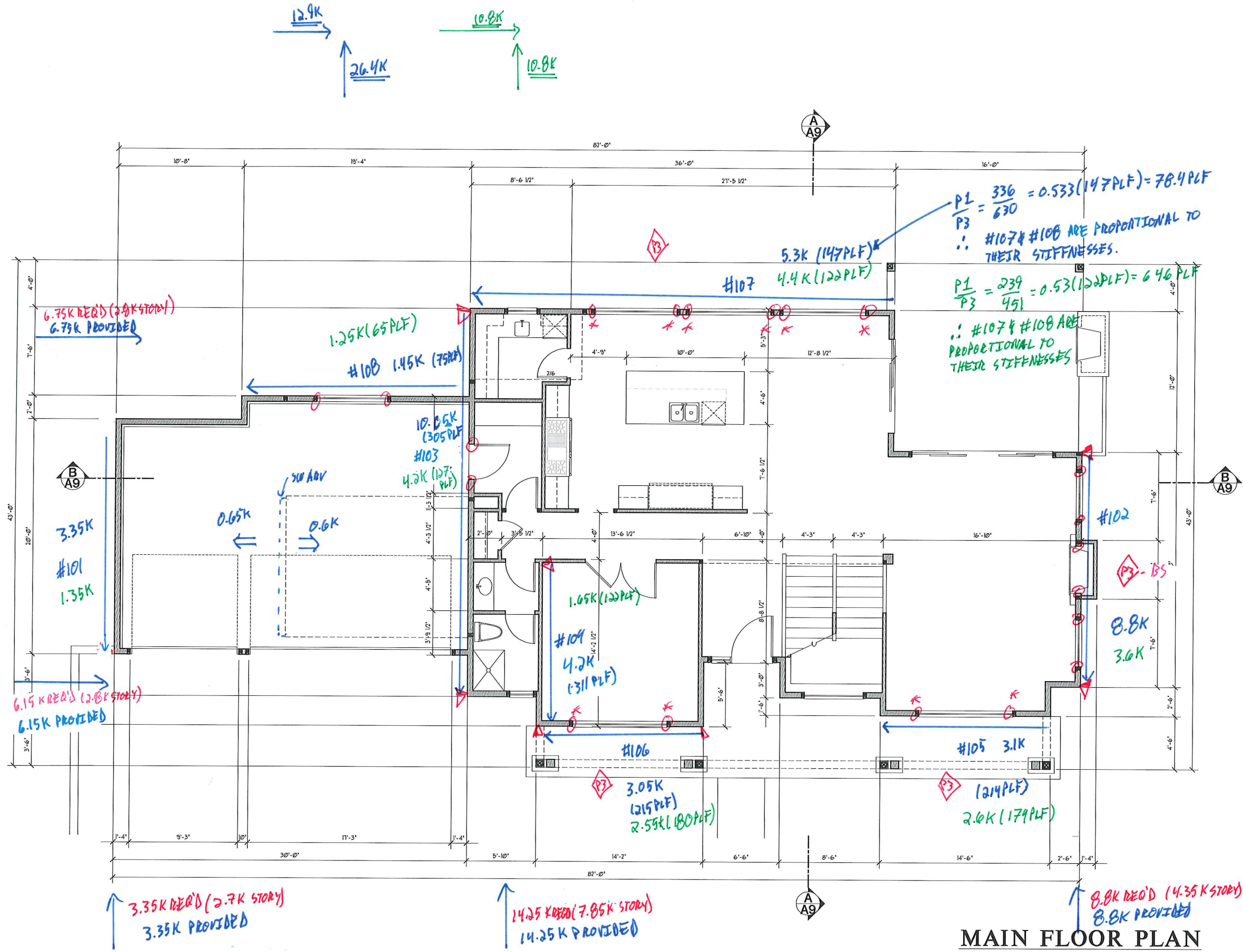
TITLE
JOB NO.: 1903705
STARTING NO.: 1903703

SHEET
A5

WIND DESIGN
 SEISMIC DESIGN



UPPER FLOOR PLAN
 Scale 1/4"=1'-0"



GENERAL PLAN NOTES

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

FLOOR PLAN KEY NOTES

- P-1 OCCUPANCY SEPARATION: AFFLY (1) LAYER OF 1/2" G.W.B. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY. AFFLY (1) LAYER OF 1/2" TYPE 'X' G.W.B. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS. DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL SEE DIV. 01002.6.A SHEET A-1
- P-2 1 1/2" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR SEE DIV. 01002.6.B SHEET A-1
- P-3 STAIR ASSEMBLY NOTES: PER IRC, SECTION R315 AND DETAIL I2/D2.
 - A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".
 - B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT, RISERS 7 1/4" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1/4" ON STAIRS WITH SOLID RISERS.
 - C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE 1 CIRCULAR TO HAVE 1 1/2" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL, RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER IRC, TABLE R301.5
 - D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER IRC, SECTION R302.1
 - E. COVER USABLE SPACE UNDER STAIR W/ 1/2" G.W.B. PER IRC, SECTION R302.1
 - F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
 - G. PROVIDE STAIRWAY ILLUMINATION PER IRC, SECTION R303.6.
 - SEE DIV. 01002.1 SHEET A-1
- P-4 SAFETY GLAZING PER IRC, SECTION R308
 - A. WINDOWS WITHIN 18" OF FLOOR
 - B. WINDOWS WITHIN A 24" ARC OF DOORS
 - C. WINDOWS AT TUBS AND SHOWERS
 - D. GLAZING IN DOORS
 - E. LESS THAN 60" HORIZ. FROM THE BOT. STAIR TREAD NOSING, 4 BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE SEE DIV. 01002.0 SHEET A-1
- P-5 EGRESS WINDOW PER IRC, SECTION R310 SEE DIV. 01002.0 SHEET A-1
- P-6 IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1
- P-7 COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 12" ABOVE DRAIN INLETS, PER IRC, SECTION 301.2. SEE DIV. 01002.0 SHEET A-1
- P-8 (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- P-9 3/4" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER IRC, SECTION R311.A. SEE DIV. 01002.1 SHEET A-1
- P-10 18"x24" CRAWL SPACE ACCESS, INSULATE AND WEATHER STRIP. SEE DIV. 01002.1 SHEET A-1
- P-11 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE, INSULATE AND WEATHER STRIP. SEE DIV. 01002.2 SHEET A-1
- P-12 FLOOR MATERIAL BREAK LINE
- P-13 WALL LINE ABOVE
- P-14 WALL LINE BELOW
- P-15 FIREPLACE ASSEMBLY NOTES:
 - A. DIRECT VENT GAS FIREPLACES, MUST BE LISTED, LABELED (INSTALLED PER MFG. SPECIFICATIONS, SHALL CONFORM TO IRC REQUIREMENTS. SEE DIV. 01002.12 SHEET A-1
 - B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO IRC, REQUIREMENTS. SEE DIV. 01002.12 SHEET A-1
 - C. HEARTH SHALL CONFORM TO IRC REQUIREMENT SEE DIV. 01002.12
 - D. FIREBLOCK OPENINGS AROUND PENETRATIONS EACH FLOOR PER IRC, SECTION R1003.19.
 - E. FIREPLACE MUST COMPLY WITH UL 127 TESTING
- P-16 SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS
- P-17 3" DIAMETER STEEL POST
- P-18 36" GUARDRAIL PER IRC, SECTION R312 & TABLE R301.5 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 200 LB LOAD ON TOP RAIL ACTING IN ANY DIRECTION.
- P-19 18" VENT FOR MECHANICAL, 1" CLEARANCE ALL SIDES PER IRC, SECTION R302.12. SEE DIV. 15 SHEET A-1
- P-20 PLANT SHELVE
- P-21 UPPER AND LOWER LINEN CABINETS
- P-22 SOFFIT AREA
- P-23 INTEGRATED MAKE UP AIR
- P-24 2x6 STUDS W/ R-21 INSULATION MIN.

$\frac{P1}{P3} = \frac{336}{630} = 0.533 (147 PLF) = 78.4 PLF$
 $\therefore \#107 \& \#108 \text{ ARE PROPORTIONAL TO THEIR STIFFNESSES.}$

$\frac{P1}{P3} = \frac{239}{451} = 0.53 (122 PLF) = 64.6 PLF$
 $\therefore \#107 \& \#108 \text{ ARE PROPORTIONAL TO THEIR STIFFNESSES}$

SQUARE FOOTAGE

MAIN FLOOR	1558 SF
UPPER FLOOR	1791 SF
LOWER FLOOR	1278 SF
TOTAL	4622 SF
GARAGE	639 SF
PORCH	224 SF
PATIO	259 SF

MAIN FLOOR PLAN

Scale 1/4"=1'-0"

Pratt Plat
 Lot 4
 7233 80th Ave SE
 Mercer Island, WA 98040

THIS DRAWING IS © COPYRIGHTED ARCHITECTURAL INNOVATIONS, P.S. ALL RIGHTS RESERVED

ARCHITECTURAL INNOVATIONS, P.S.
 Forward Thinking Design Solutions For Your Environment
 14311 SE 16th St
 Bellevue, WA 98007
 1-800-888-4517
 www.kupplarch.com

TITLE

JOB NO.: 19037.05
 STARTING NO.: 19037.03

SHEET

A3

GENERAL PLAN NOTES

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

FLOOR PLAN KEY NOTES

- P-1 OCCUPANCY SEPARATION:
AFFLY (1) LAYER OF 1/2" G.W.B. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY.
AFFLY (1) LAYER OF 3/4" TYPE 'X' G.W.B. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS.
DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL SEE DIV. 01022.6.A. SHEET A-1
- P-2 1 3/4" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR SEE DIV. 01022.6.B. SHEET A-1
- P-3 STAIR ASSEMBLY NOTES: PER IRC. SECTION R301.5 AND DETAIL I2/D2.
A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".
B. TREADS 12" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT, RISERS 7 1/2" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1/4" ON STAIRS WITH SOLID RISERS.
C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE I CIRCULAR TO HAVE 1 1/4" MIN. TO 2" MAX. GROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL, RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 LBS POINT LOAD IN ANY DIRECTION PER IRC. TABLE R302.1.5
D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER IRC. SECTION R302.11
E. COVER USABLE SPACE UNDER STAIR W/ 1/2" G.W.B. PER IRC. SECTION R302.1
F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
G. PROVIDE STAIRWAY ILLUMINATION PER IRC. SECTION R303.6.
SEE DIV. 01022.1 SHEET A-1
- P-4 SAFETY GLAZING PER IRC. SECTION R308
A. WINDOWS WITHIN 18" OF FLOOR
B. WINDOWS WITHIN A 24" ARC OF DOORS
C. WINDOWS AT TUBS AND SHOWERS
D. GLAZING IN DOORS
E. LESS THAN 60" HORIZ. FROM THE BOT. STAIR TREAD NOSING. 4 BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE SEE DIV. 08020 SHEET A-1
- P-5 EGRESS WINDOW PER IRC. SECTION R310 SEE DIV. 08020 SHEET A-1
- P-6 IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1
- P-7 COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 12" ABOVE DRAIN NELTS, PER IRC. SECTION 3012. SEE DIV. 09120 SHEET A-1
- P-8 (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- P-9 1 1/2" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER IRC. SECTION R311.1.8. SEE DIV. 01022.1 SHEET A-1
- P-10 18"x24" CRAWL SPACE ACCESS, INSULATE AND WEATHER STRIP. SEE DIV. 01022.1 SHEET A-1
- P-11 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE. INSULATE AND WEATHER STRIP. SEE DIV. 01022.2 SHEET A-1
- P-12 FLOOR MATERIAL BREAK LINE
- P-13 WALL LINE ABOVE
- P-14 WALL LINE BELOW
- P-15 FIREPLACE ASSEMBLY NOTES:
A. DIRECT VENT GAS FIREPLACES, MUST BE LISTED, LABELED (INSTALLED PER MFG. SPECIFICATIONS, SHALL CONFORM TO IRC REQUIREMENTS. SEE DIV. 01022.12 SHEET A-1
B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO IRC REQUIREMENTS. SEE DIV. 01022.12 SHT A-1
C. HEARTH SHALL CONFORM TO IRC REQUIREMENT SEE DIV. 01022.12
D. FIREBLOCK OPENINGS AROUND PENETRATIONS @ EACH FLOOR PER IRC. SECTION R1003.1.9.
E. FIREPLACE MUST COMPLY WITH UL 127 TESTING
- P-16 SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS
- P-17 3" DIAMETER STEEL POST
- P-18 36" GUARDRAIL PER IRC. SECTION R312 & TABLE R301.5 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 200LB LOAD ON TOP RAIL, ACTING IN ANY DIRECTION.
- P-19 18" VENT FOR MECHANICAL. 1" CLEARANCE ALL SIDES PER IRC. SECTION R307.11. SEE DIV. 15 SHEET A-1
- P-20 PLANT SHELVE
- P-21 UPPER AND LOWER LINEN CABINETS
- P-22 SOFFIT AREA
- P-23 INTEGRATED MAKE UP AIR
- P-24 2x6 STUDS W/ R-21 INSULATION MIN.

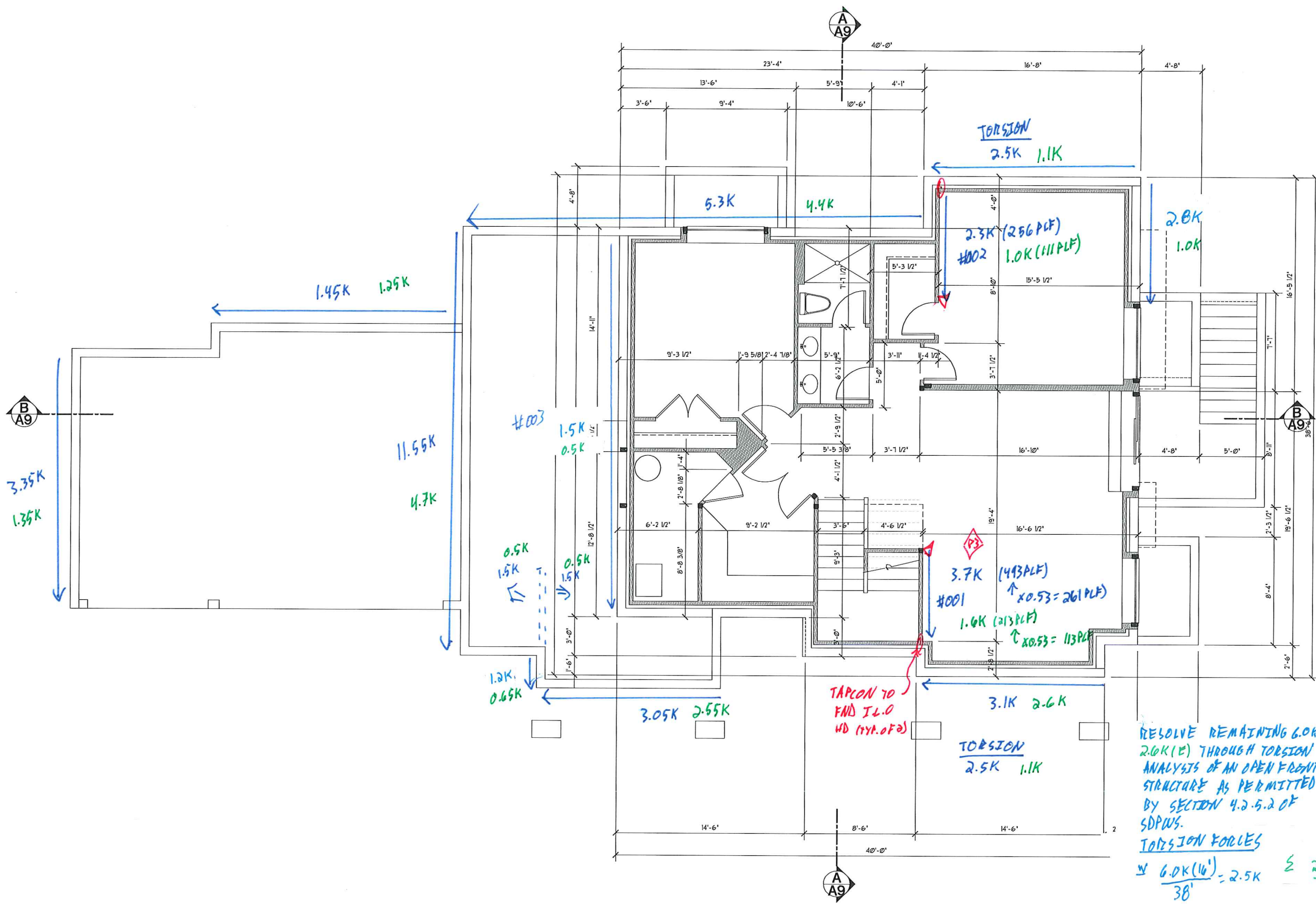
Date	By	Description
05/17/19	SM	PRELIMINARY DESIGN
10/09/19	SM	ELEVATION DESIGN
10/29/19	SM	DESIGN REVISIONS
12/01/19	REY	KITCHEN REVISIONS
12/20	SM	ELEVATION DESIGN

Pratt Plat
 Lot 4
 7233 80th Ave SE
 Mercer Island, WA 98040
 THIS DRAWING IS ©COPYRIGHTED ARCHITECTURAL INNOVATIONS, P.S. ALL RIGHTS RESERVED

ARCHITECTURAL INNOVATIONS, P.S.
 Forward Thinking Design Solutions For Your Environment
 14311 SE 16th St
 Bellevue, WA 98007
 1-800-888-4517
 www.kaphrarchitect.com

TITLE
JOB NO. : 1903705
STARTING NO. : 1903703

SHEET
A2.1



RESOLVE REMAINING 6.0K (W) 2.6K (E) THROUGH TORSION ANALYSIS OF AN OPEN FRONT STRUCTURE AS PERMITTED BY SECTION 4.2.5.2 OF SDPWS.
TORSION FORCES
 $\frac{W}{38'} = \frac{6.0K(16')}{38'} = 2.5K$ $\frac{E}{38'} = \frac{2.6K(16')}{38'} = 1.1K$

LOWER FLOOR PLAN
 Scale 1/4"=1'-0"



SHEARWALL DESIGN SUMMARY

SHEARWALL 201: 2ND - SIDE EXT. WALL @ BED 4

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

SHEARWALL 202: 2ND - SIDE EXT. WALL @ MASTER BED TO BED 2

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 203: 2ND - SIDE EXT. WALL @ UTILITY

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)



SHEARWALL DESIGN SUMMARY

SHEARWALL 205: 2ND - SIDE INT. WALL @ BED 3

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

SHEARWALL 206: 2ND - FRONT EXT. WALL @ BED 2

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 207: 2ND - FRONT EXT. WALL @ BED 3

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 208: 2ND - REAR EXT. WALL @ MASTER BATH TO WIC

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

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

SHEARWALL ASSEMBLY SPECIFICATION

P1 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - EDGES BLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 101: 1ST - SIDE EXT. WALL @ GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS
<

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 102: 1ST - SIDE EXT. WALL @ GREAT ROOM

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

P3-BS - 2-SIDES 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 PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON MSTC66 STRAP TIE (20" END LENGTH)

SHEARWALL 103: 1ST - SIDE INT. WALL @ GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN



SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON MSTC66 STRAP TIE (20" END LENGTH)

SHEARWALL 105: 1ST - FRONT EXT. WALL @ GREAT ROOM

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 106: 1ST - FRONT EXT. WALL @ OFFICE

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

P3 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 3"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - EDGES BLOCKED
ADEQUATE

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

SHEARWALL 107: 1ST - REAR EXT. WALL @ KITCHEN

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ### ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

P1 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - EDGES BLOCKED
#DIV/0!

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 1: BASEMENT - SIDE INT. WALL @ STAIRS

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

P3 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 3"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - EDGES BLOCKED
ADEQUATE

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

SHEARWALL 2: BASEMENT - SIDE INT. WALL @ BED 5

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN



SHEARWALL DESIGN SUMMARY

SHEARWALL 3: BASEMENT - SIDE INT. WALL @ BASEMENT TO CRAWL

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

P1 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - EDGES BLOCKED
#DIV/0!

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

ARCH INNOVATIONS
PRATT PLOT - LOT 4

MERCER ISLAND, WA

SHEAR WALL CALCULATIONS - SEISMIC DESIGN

REVIEWED BY: NJM

MARCH 20, 2020

PARAMETERS:

SINGLE FAMILY HOME

DESIGN WIND SPEED: 110 MPH

WIND EXPOSURE CATEGORY: B

SEISMIC DESIGN CATEGORY: D

CODE & DESIGN STANDARD: 2015 IBC CH. 1609, ASCE 7-10 CH. 26-30



MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

SEISMIC CALCULATION - ASCE 7-10

SEISMIC DESIGN CATEGORY:

USER INPUTS:

SITE CLASS	D
SPECTRAL RESPONSE ACCELERATION 0.2 SEC, S_s	1.464
SPECTRAL RESPONSE ACCELERATION 1.0 SEC, S_1	0.559
OCCUPANCY CATEGORY	II

VARIABLES:

SITE COEFFICIENT, F_A	1.00
SITE COEFFICIENT, F_V	1.50

CALCULATED VALUES:

MAXIMUM SPECTRAL RESPONSE ACCELERATION, S_{MS}	1.464
MAXIMUM SPECTRAL RESPONSE ACCELERATION, S_{M1}	0.839
DESIGN SPECTRAL RESPONSE ACCELERATION, S_{DS}	0.976
DESIGN SPECTRAL RESPONSE ACCELERATION, S_{D1}	0.559
SEISMIC DESIGN CATEGORY (SHORT TERM)	D
SEISMIC DESIGN CATEGORY (1.0 SECOND TERM)	D

BUILDING PERIOD DETERMINATION:

USER INPUTS:

BUILDING PERIOD COEFFICIENT, C_T	0.020
LONG-PERIOD TRANS PERIOD, T_L (SEC)	6
HT. ABV BASE TO HIGHEST LEVEL, h_N	19

CALCULATED VALUES:

APPROXIMATE FUNDAMENTAL PERIOD, T_A , T	0.183
T_0	0.115
T_B	0.573
SPECTRAL RESPONSE ACCELERATION, S_A (G)	0.976

EQUIVALENT LATERAL FORCE PROCEDURE

DEAD LOAD CALCULATION:

LEVEL	STORY HT. (FT.)	AREA (FT ²)	DEAD LOAD (PSF)	DL OF EXT WALL TRIBUTARY TO LEVEL (KIPS)	TOTAL LEVEL DL (KIPS)
1	10.1	2844	15	15.0	58 K
2	9.0	2252	17	6.8	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

TOTAL DEAD LOAD OF STRUCTURE 103 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	0.150	0.150

BASE SHEARS:

ULTIMATE LOADS		ALLOWABLE LOADS	
TRANSVERSE	LONGITUDINAL	TRANSVERSE	LONGITUDINAL
15 K	15 K	11 K	11 K

STORY SHEAR CALCULATION:

LEVEL	VERT. DIST. FACTOR, C_{vx}	ULTIMATE LOADS		ALLOWABLE LOADS	
		TRANSVERSE STORY SHEAR, F_x	LONGITUDINAL STORY SHEAR, F_x	TRANSVERSE STORY SHEAR, F_x	LONGITUDINAL STORY SHEAR, F_x
1	0.403	6.2 K	6.2 K	4.4 K	10.8 K
2	0.597	9.2 K	9.2 K	6.4 K	6.4 K
3	0.000	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
5	0.00	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
7	0.00	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
9	0.00	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

GENERAL PLAN NOTES

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

FLOOR PLAN KEY NOTES

- P-1** OCCUPANCY SEPARATION:
APPLY (1) LAYER OF 1/2" G.W.B. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY. APPLY (1) LAYER OF 3/8" TYPE 'X' G.W.B. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS. DIGITS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL SEE DIV. 01002.6.A. SHEET A-1.
- P-2** 1 3/4" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR SEE DIV. 01002.6.B. SHEET A-1
- P-3** STAIR ASSEMBLY NOTES: PER IRC. SECTION R301.5 AND DETAIL 12D2.
A. HEADROOM MIN. 6'-8". WIDTH MIN. 3'-0".
B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT, RISERS 7/8" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1/4" ON STAIRS WITH SOLID RISERS.
C. HANDRAIL MIN. 34" TO MAX. 38" ABOVE TREAD NOSING. HANDRAIL TYPE I CIRCULAR TO HAVE 1 1/4" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL, RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER IRC. TABLE R301.5 D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER IRC. SECTION R302.11.
E. COVER USABLE SPACE UNDER STAIR W/ 1/2" G.W.B. PER IRC. SECTION R302.1.
F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
G. PROVIDE STAIRWAY ILLUMINATION PER IRC. SECTION R303.6. SEE DIV. 01002.1 SHEET A-1.
- P-4** SAFETY GLAZING PER IRC. SECTION R308
A. WINDOWS WITHIN 18" OF FLOOR
B. WINDOWS WITHIN A 24" ARC OF DOORS
C. WINDOWS AT TUBS AND SHOWERS
D. GLAZING IN DOORS
E. LESS THAN 60" HORIZ. FROM THE BOT. STAIR TREAD NOSING, 4 BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE SEE DIV. 01002.1 SHEET A-1
- P-5** EGRESS WINDOW PER IRC. SECTION R310 SEE DIV. 01002.0 SHEET A-1
- P-6** IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1
- P-7** COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 12" ABOVE DRAIN INLETS, PER IRC. SECTION 3012. SEE DIV. 09250 SHEET A-1
- P-8** (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- P-9** 7/8" MAX. RISER WITH 10" MIN. RUN. IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER IRC. SECTION R301.8. SEE DIV. 01002.1 SHEET A-1
- P-10** 18"x24" CRAWL SPACE ACCESS. INSULATE AND WEATHER STRIP. SEE DIV. 01002.1 SHEET A-1
- P-11** 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE. INSULATE AND WEATHER STRIP. SEE DIV. 01002.2 SHEET A-1
- P-12** FLOOR MATERIAL BREAK LINE
- P-13** WALL LINE ABOVE
- P-14** WALL LINE BELOW
- P-15** FIREPLACE ASSEMBLY NOTES:
A. DIRECT VENT GAS FIREPLACES, MUST BE LISTED, LABELED & INSTALLED PER MFG. SPECIFICATIONS, SHALL CONFORM TO IRC REQUIREMENTS. SEE DIV. 01002.12 SHEET A-1
B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO IRC. REQUIREMENTS. SEE DIV. 01002.12 SHT A-1
C. HEARTH SHALL CONFORM TO IRC REQUIREMENT SEE DIV. 01002.12
D. FIREBLOCK OPENINGS AROUND PENETRATIONS # EACH FLOOR PER IRC. SECTION R302.13.
E. FIREPLACE MUST COMPLY WITH UL 121 TESTING
- P-16** SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS
- P-17** 3" DIAMETER STEEL POST
- P-18** 36" GUARDRAIL PER IRC. SECTION R312 & TABLE R301.5 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 200LB LOAD ON TOP RAIL ACTING IN ANY DIRECTION.
- P-19** 1" VENT FOR MECHANICAL. 1' CLEARANCE ALL SIDES PER IRC. SECTION R302.11. SEE DIV. 15 SHEET A-1
- P-20** PLANT SHELF
- P-21** UPPER AND LOWER LINEN CABINETS
- P-22** SOFFIT AREA
- P-23** INTEGRATED MAKE UP AIR
- P-24** 2x6 STUDS W/ R-21 INSULATION MIN.

Date	By	Description
01/27/19	SM	PRELIMINARY DESIGN
02/07/19	SM	ELEVATION DESIGN
02/27/19	SM	DESIGN DESIGN
02/27/19	SM	REVISIONS
02/27/19	SM	ELEVATION DESIGN

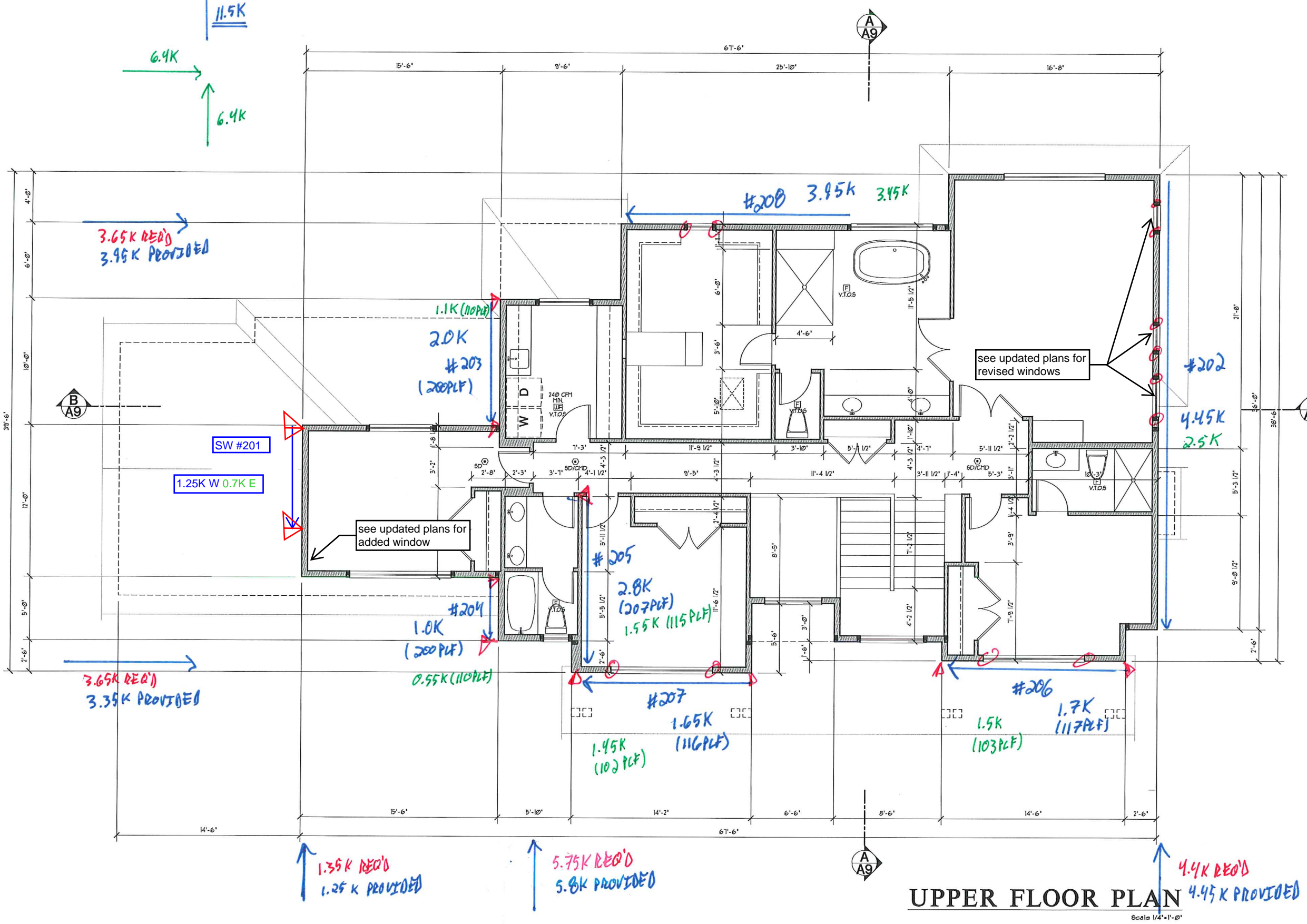
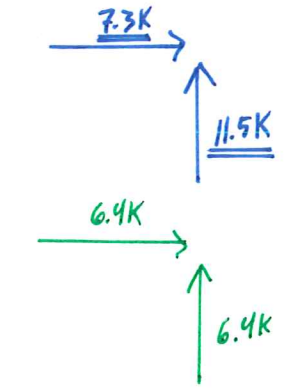
Pratt Plat
 Lot 4
 7233 80th Ave SE
 Mercer Island, WA 98040
 THIS DRAWING IS © COPYRIGHTED ARCHITECTURAL INNOVATIONS, P.S. ALL RIGHTS RESERVED

ARCHITECTURAL INNOVATIONS, P.S.
 Forward Thinking Design Solutions For Your Environment
 14311 SE 16th St.
 Bellevue, WA 98007
 1-800-888-4517
 www.kaprielhomeplans.com

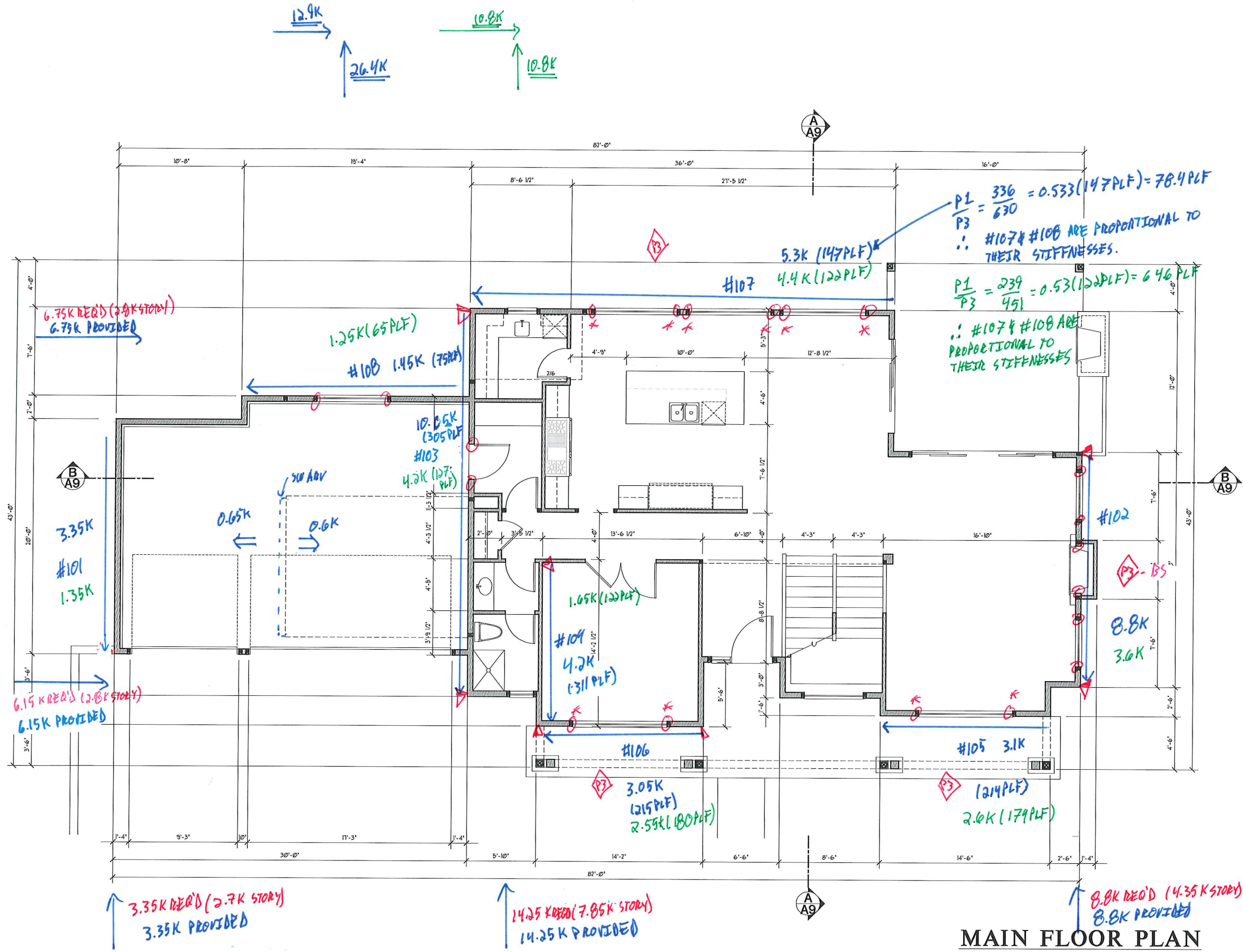
TITLE
JOB NO.: 1903705
STARTING NO.: 1903703

SHEET
A5

WIND DESIGN
 SEISMIC DESIGN



UPPER FLOOR PLAN
 Scale 1/4"=1'-0"



GENERAL PLAN NOTES

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

FLOOR PLAN KEY NOTES

- P-1 OCCUPANCY SEPARATION: AFFLY (1) LAYER OF 1/2" G.W.B. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY. AFFLY (1) LAYER OF 1/2" TYPE 'X' G.W.B. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS. DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL SEE DIV. 01002.6.A SHEET A-1
- P-2 1 1/2" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR SEE DIV. 01002.6.B SHEET A-1
- P-3 STAIR ASSEMBLY NOTES: PER IRC, SECTION R315 AND DETAIL I2/D2.
 - A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".
 - B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT, RISERS 7 1/4" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1/4" ON STAIRS WITH SOLID RISERS.
 - C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE 1 CIRCULAR TO HAVE 1 1/2" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL, RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER IRC, TABLE R301.5
 - D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER IRC, SECTION R302.11
 - E. COVER USABLE SPACE UNDER STAIR W/ 1/2" G.W.B. PER IRC, SECTION R302.1
 - F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
 - G. PROVIDE STAIRWAY ILLUMINATION PER IRC, SECTION R303.6.
 - SEE DIV. 01002.1 SHEET A-1
- P-4 SAFETY GLAZING PER IRC, SECTION R308
 - A. WINDOWS WITHIN 18" OF FLOOR
 - B. WINDOWS WITHIN A 24" ARC OF DOORS
 - C. WINDOWS AT TUBS AND SHOWERS
 - D. GLAZING IN DOORS
 - E. LESS THAN 60" HORIZ. FROM THE BOT. STAIR TREAD NOSING, 4 BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE SEE DIV. 01002.0 SHEET A-1
- P-5 EGRESS WINDOW PER IRC, SECTION R310 SEE DIV. 01002.0 SHEET A-1
- P-6 IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1
- P-7 COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 12" ABOVE DRAIN INLETS, PER IRC, SECTION 301.2. SEE DIV. 01002.0 SHEET A-1
- P-8 (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- P-9 3/4" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER IRC, SECTION R311.8. SEE DIV. 01002.1 SHEET A-1
- P-10 18"x24" CRAWL SPACE ACCESS, INSULATE AND WEATHER STRIP. SEE DIV. 01002.1 SHEET A-1
- P-11 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE, INSULATE AND WEATHER STRIP. SEE DIV. 01002.2 SHEET A-1
- P-12 FLOOR MATERIAL BREAK LINE
- P-13 WALL LINE ABOVE
- P-14 WALL LINE BELOW
- P-15 FIREPLACE ASSEMBLY NOTES:
 - A. DIRECT VENT GAS FIREPLACES, MUST BE LISTED, LABELED (INSTALLED PER MFG. SPECIFICATIONS, SHALL CONFORM TO IRC REQUIREMENTS. SEE DIV. 01002.12 SHEET A-1
 - B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO IRC, REQUIREMENTS. SEE DIV. 01002.12 SHEET A-1
 - C. HEARTH SHALL CONFORM TO IRC REQUIREMENT SEE DIV. 01002.12
 - D. FIREBLOCK OPENINGS AROUND PENETRATIONS EACH FLOOR PER IRC, SECTION R1003.19.
 - E. FIREPLACE MUST COMPLY WITH UL 127 TESTING
- P-16 SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS
- P-17 3" DIAMETER STEEL POST
- P-18 36" GUARDRAIL PER IRC, SECTION R312 & TABLE R301.5 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 200LB LOAD ON TOP RAIL ACTING IN ANY DIRECTION.
- P-19 18" VENT FOR MECHANICAL, 1" CLEARANCE ALL SIDES PER IRC, SECTION R302.11. SEE DIV. 15 SHEET A-1
- P-20 PLANT SHELVE
- P-21 UPPER AND LOWER LINEN CABINETS
- P-22 SOFFIT AREA
- P-23 INTEGRATED MAKE UP AIR
- P-24 2x6 STUDS W/ R-21 INSULATION MIN.

Date	By	Description
09/17/19	SM	PRELIMINARY DESIGN
10/20/19	SM	ELEVATION DESIGN
11/20/19	SM	DESIGN REVISIONS
12/20/19	SM	KEY PLAN REVISIONS
1/20/20	SM	ELEVATION DESIGN

Pratt Plat
 Lot 4
 7233 80th Ave SE
 Mercer Island, WA 98040

THIS DRAWING IS © COPYRIGHTED ARCHITECTURAL INNOVATIONS, P.S. ALL RIGHTS RESERVED

ARCHITECTURAL INNOVATIONS, P.S.
 Forward Thinking Design Solutions For Your Environment
 14311 SE 16th St
 Bellevue, WA 98007
 1-800-888-4517
 www.kaplanhamerplans.com

TITLE	
JOB NO.:	19037.05
STARTING NO.:	19037.03

SHEET
A3

SQUARE FOOTAGE	
MAIN FLOOR	1558 SF
UPPER FLOOR	1791 SF
LOWER FLOOR	1278 SF
TOTAL	4622 SF
GARAGE	639 SF
PORCH	224 SF
PATIO	259 SF

MAIN FLOOR PLAN
 Scale 1/4"=1'-0"

GENERAL PLAN NOTES

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

FLOOR PLAN KEY NOTES

- P-1 OCCUPANCY SEPARATION:
AFFLY (1) LAYER OF 1/2" G.W.B. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY.
AFFLY (1) LAYER OF 3/8" TYPE 'X' G.W.B. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS.
DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL SEE DIV. 01022.6.A. SHEET A-1.
- P-2 1 3/8" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR SEE DIV. 01022.6.B. SHEET A-1
- P-3 STAIR ASSEMBLY NOTES: PER IRC. SECTION R301.5 AND DETAIL I2/D2.
A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".
B. TREADS 12" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT, RISERS 7 1/2" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1/4" ON STAIRS WITH SOLID RISERS.
C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE 1 CIRCULAR TO HAVE 1 1/4" MIN. TO 2" MAX. GROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL, RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 LBS POINT LOAD IN ANY DIRECTION PER IRC. TABLE R302.1.5
D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER IRC. SECTION R302.11
E. COVER USABLE SPACE UNDER STAIR W/ 1/2" G.W.B. PER IRC. SECTION R302.1
F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
G. PROVIDE STAIRWAY ILLUMINATION PER IRC. SECTION R303.6.
SEE DIV. 01022.1 SHEET A-1
- P-4 SAFETY GLAZING PER IRC. SECTION R308
A. WINDOWS WITHIN 18" OF FLOOR
B. WINDOWS WITHIN A 24" ARC OF DOORS
C. WINDOWS AT TUBS AND SHOWERS
D. GLAZING IN DOORS
E. LESS THAN 60" HORIZ. FROM THE BOT. STAIR TREAD NOSING. 4 BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE SEE DIV. 08020 SHEET A-1
- P-5 EGRESS WINDOW PER IRC. SECTION R310 SEE DIV. 08020 SHEET A-1
- P-6 IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1
- P-7 COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 12" ABOVE DRAIN NELTS, PER IRC. SECTION 3012. SEE DIV. 09120 SHEET A-1
- P-8 (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- P-9 1 3/4" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER IRC. SECTION R311.1.8. SEE DIV. 01022.1 SHEET A-1
- P-10 18"x24" CRAWL SPACE ACCESS, INSULATE AND WEATHER STRIP. SEE DIV. 01022.1 SHEET A-1
- P-11 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE. INSULATE AND WEATHER STRIP. SEE DIV. 01022.2 SHEET A-1
- P-12 FLOOR MATERIAL BREAK LINE
- P-13 WALL LINE ABOVE
- P-14 WALL LINE BELOW
- P-15 FIREPLACE ASSEMBLY NOTES:
A. DIRECT VENT GAS FIREPLACES, MUST BE LISTED, LABELED (INSTALLED PER MFG. SPECIFICATIONS, SHALL CONFORM TO IRC REQUIREMENTS. SEE DIV. 01022.12 SHEET A-1
B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO IRC REQUIREMENTS. SEE DIV. 01022.12 SHT A-1
C. HEARTH SHALL CONFORM TO IRC REQUIREMENT SEE DIV. 01022.12
D. FIREBLOCK OPENINGS AROUND PENETRATIONS @ EACH FLOOR PER IRC. SECTION R1003.1.9.
E. FIREPLACE MUST COMPLY WITH UL 127 TESTING
- P-16 SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS
- P-17 3" DIAMETER STEEL POST
- P-18 36" GUARDRAIL PER IRC. SECTION R312 & TABLE R301.5 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 200LB LOAD ON TOP RAIL, ACTING IN ANY DIRECTION.
- P-19 18" VENT FOR MECHANICAL. 1" CLEARANCE ALL SIDES PER IRC. SECTION R307.11. SEE DIV. 15 SHEET A-1
- P-20 PLANT SHELVE
- P-21 UPPER AND LOWER LINEN CABINETS
- P-22 SOFFIT AREA
- P-23 INTEGRATED MAKE UP AIR
- P-24 2x6 STUDS W/ R-21 INSULATION MIN.

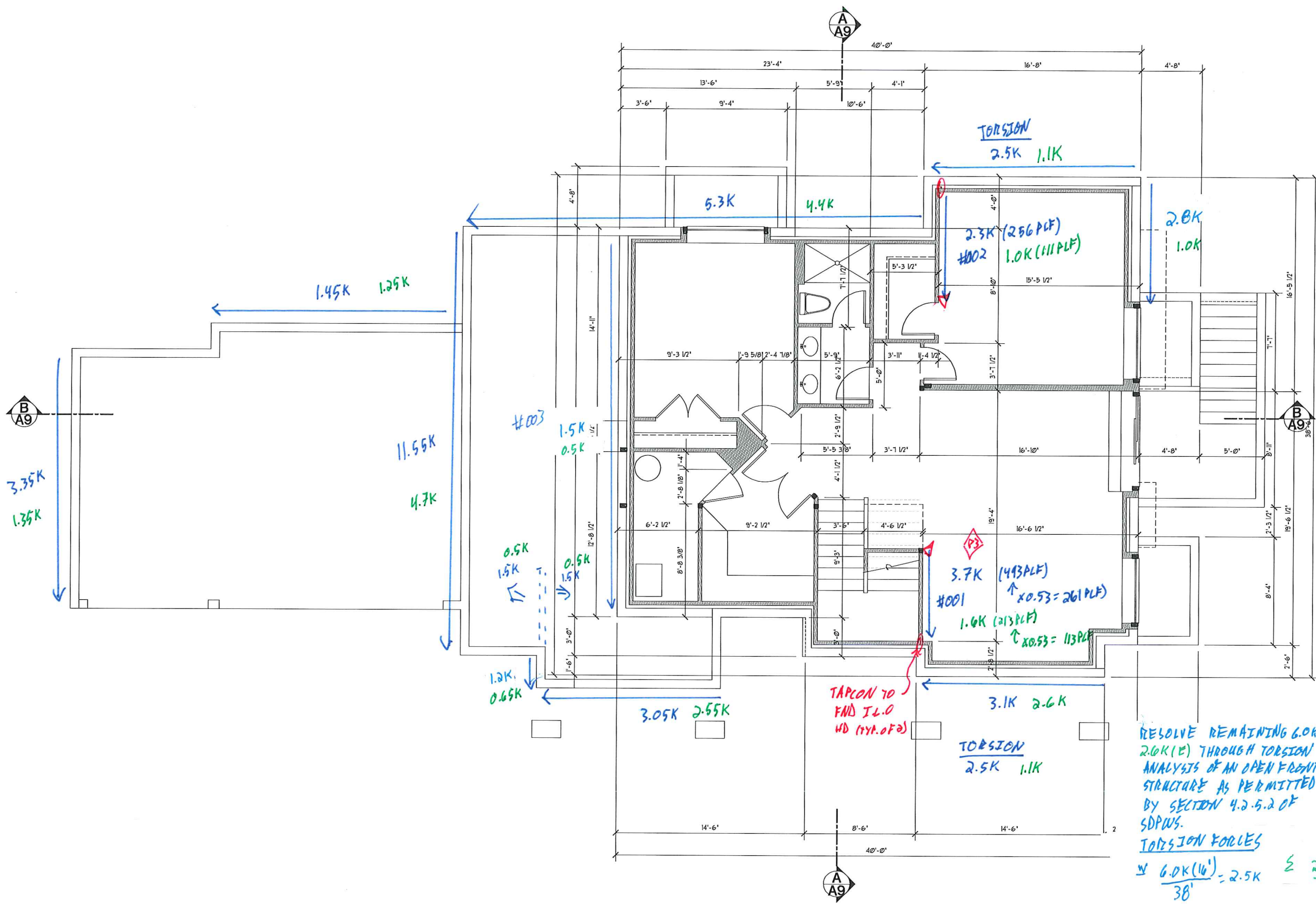
Date	By	Description
05/17/19	SM	PRELIMINARY DESIGN
10/09/19	SM	ELEVATION DESIGN
10/29/19	SM	DESIGN REVISIONS
12/01/19	REY	KITCHEN REVISIONS
12/20	SM	ELEVATION DESIGN

Pratt Plat
 Lot 4
 7233 80th Ave SE
 Mercer Island, WA 98040
 THIS DRAWING IS ©COPYRIGHTED ARCHITECTURAL INNOVATIONS, P.S. ALL RIGHTS RESERVED

ARCHITECTURAL INNOVATIONS, P.S.
 Forward Thinking Design Solutions For Your Environment
 14311 SE 16th St
 Bellevue, WA 98007
 1-800-888-4517
 www.kaphrarchitect.com

TITLE
JOB NO. : 1903705
STARTING NO. : 1903703

SHEET
A2.1



RESOLVE REMAINING 6.0K (W) 2.6K (E) THROUGH TORSION ANALYSIS OF AN OPEN FRONT STRUCTURE AS PERMITTED BY SECTION 4.2.5.2 OF SDPWS.
TORSION FORCES
 $\frac{W}{38'} = \frac{6.0K(16')}{38'} = 2.5K$ $\frac{E}{38'} = \frac{2.6K(16')}{38'} = 1.1K$

LOWER FLOOR PLAN
 Scale 1/4"=1'-0"



SHEARWALL DESIGN SUMMARY

SHEARWALL 201: 2ND - SIDE EXT. WALL @ BED 4

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

SHEARWALL 202: 2ND - SIDE EXT. WALL @ MASTER BED TO BED 2

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 203: 2ND - SIDE EXT. WALL @ UTILITY

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)



SHEARWALL DESIGN SUMMARY

SHEARWALL 205: 2ND - SIDE INT. WALL @ BED 3

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

SHEARWALL 206: 2ND - FRONT EXT. WALL @ BED 2

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)



SHEARWALL DESIGN SUMMARY

SHEARWALL 207: 2ND - FRONT EXT. WALL @ BED 3

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

SHEARWALL 208: 2ND - REAR EXT. WALL @ MASTER BATH TO WIC

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

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

SHEARWALL ASSEMBLY SPECIFICATION

P1 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - EDGES BLOCKED
#DIV/0!

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL 101: 1ST - SIDE EXT. WALL @ GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS
<

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 102: 1ST - SIDE EXT. WALL @ GREAT ROOM

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

P3-BS - 2-SIDES 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 PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON MSTC66 STRAP TIE (20" END LENGTH)

SHEARWALL 103: 1ST - SIDE INT. WALL @ GARAGE

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON MSTC66 STRAP TIE (20" END LENGTH)

SHEARWALL 105: 1ST - FRONT EXT. WALL @ GREAT ROOM

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDDOWN



SHEARWALL DESIGN SUMMARY

SHEARWALL 106: 1ST - FRONT EXT. WALL @ OFFICE

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

P3 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 3"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - EDGES BLOCKED
ADEQUATE

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

SHEARWALL 107: 1ST - REAR EXT. WALL @ KITCHEN

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

P1 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - EDGES BLOCKED
#DIV/0!

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED



SHEARWALL DESIGN SUMMARY

SHEARWALL 1: BASEMENT - SIDE INT. WALL @ STAIRS

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

P3 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 3"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - EDGES BLOCKED
ADEQUATE

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

SHEARWALL 2: BASEMENT - SIDE INT. WALL @ BED 5

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN



SHEARWALL DESIGN SUMMARY

SHEARWALL 3: BASEMENT - SIDE INT. WALL @ BASEMENT TO CRAWL

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS < ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL PLF OVERTURNING MOMENT K-FT UPLIFT CONNECTOR DESIGN LOAD LBS
DL AT ENDS OF WALL LBS RESISTIVE MOMENT K-FT HOLDOWN CAPACITY LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

WALL HEIGHT, H FT. MAX WALL OPENING HT, H_c FT.
WALL LENGTH, L FT. QUALIFYING WALL LENGTH, L FT. SHEARWALL ASSEMBLY

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL LBS ALLOWABLE SHEARWALL CAPACITY LBS

SHEARWALL ASSEMBLY SPECIFICATION

P1 - 1-SIDE 7/16" OSB
FASTENED W/ 8D NAILS AT 6"O.C. PANEL EDGES & 12"O.C. PANEL FIELD - EDGES BLOCKED
#DIV/0!

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

RetainPro (c) 1987-2019, Build 11.20.03.31
 License : KW-06059959
 License To : MULHERN & KULP STRUCTURAL ENGINEERING INC

Cantilevered Retaining Wall

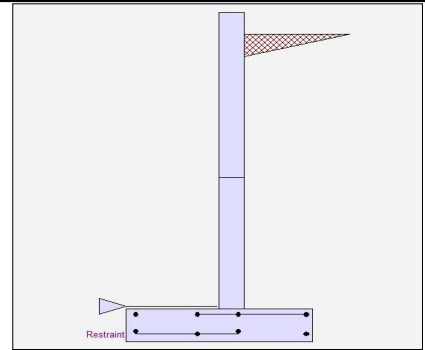
Code: IBC 2015,ACI 318-14,ACI 530-13

Criteria

Retained Height	=	8.33 ft
Wall height above soil	=	0.67 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	3,000.0 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	=	0.00 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		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Service Level)

Adjacent Footing Load

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

Axial Load Applied to Stem

Axial Dead Load	=	100.0 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)		
Uniform Seismic Force	=	65.310
Total Seismic Force	=	609.342

Design Summary

Wall Stability Ratios		
Overturning	=	1.72 OK
Slab Resists All Sliding !		
Total Bearing Load	=	3,430 lbs
...resultant ecc.	=	13.07 in
Soil Pressure @ Toe	=	1,620 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	3,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	2,268 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	28.3 psi OK
Footing Shear @ Heel	=	17.9 psi OK
Allowable	=	75.0 psi
Sliding Calcs		
Lateral Sliding Force	=	1,949.9 lbs

Stem Construction

	2nd	Bottom
Design Height Above Ftg	ft = 4.00	ft = 0.00
Wall Material Above "Ht"	= Concrete	= Concrete
Design Method	= LRFD	= LRFD
Thickness	= 8.00	= 8.00
Rebar Size	= # 5	= # 5
Rebar Spacing	= 16.00	= 8.00
Rebar Placed at	= Edge	= Edge

Design Data

fb/FB + fa/Fa	=	0.219	0.638
Total Force @ Section			
Service Level	lbs =		
Strength Level	lbs =	807.8	2,486.9
Moment....Actual			
Service Level	ft-# =		
Strength Level	ft-# =	1,370.0	7,660.7
Moment....Allowable	ft-# =	6,234.5	11,990.5
Shear.....Actual			
Service Level	psi =		
Strength Level	psi =	10.9	33.5
Shear.....Allowable	psi =	82.2	82.2
Anet (Masonry)	in2 =		
Rebar Depth 'd'	in =	6.19	6.19

Masonry Data

f'm	psi =		
Fs	psi =		
Solid Grouting	=		
Modular Ratio 'n'	=		
Wall Weight	psf =	100.0	100.0
Short Term Factor	=		
Equiv. Solid Thick.	=		
Masonry Block Type	=	Medium Weight	
Masonry Design Method	=	ASD	

Concrete Data

f'c	psi =	3,000.0	3,000.0
Fy	psi =	60,000.0	60,000.0

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing pressures.

Load Factors

Building Code	IBC 2015,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Concrete Stem Rebar Area Details

2nd Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0519 in2/ft		
(4/3) * As :	0.0692 in2/ft	Min Stem T&S Reinf Area 0.960 in2	
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.1728 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.2325 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.0059 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.2901 in2/ft		
(4/3) * As :	0.3868 in2/ft	Min Stem T&S Reinf Area 0.768 in2	
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.2901 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.465 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.0059 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	2.50 ft
Heel Width	=	2.50
Total Footing Width	=	5.00
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>
Factored Pressure	=	2,268	0 psf
Mu' : Upward	=	68,320	108 ft-#
Mu' : Downward	=	6,750	2,150 ft-#
Mu: Design	=	5,131	2,042 ft-#
Actual 1-Way Shear	=	28.25	17.90 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	# 5 @ 8.00 in	
Heel Reinforcing	=	# 4 @ 8.00 in	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46
Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46
Key: No key defined

Min footing T&S reinf Area	1.30	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft
If one layer of horizontal bars:	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	

Summary of Overturning & Resisting Forces & Moments

ItemOVERTURNING.....		RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	1,523.4	3.11	4,737.6	Soil Over HL (ab. water tbl)	1,679.9	4.08	6,859.5
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		4.08	6,859.5
Hydrostatic Force				Watre 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 =	100.0	2.83	283.3
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
Seismic Earth Load =	426.5	4.67	1,989.8	Surcharge Over Toe =			
=				Stem Weight(s) =	900.0	2.83	2,550.0
Total =	1,949.9	O.T.M.	= 6,727.4	Earth @ Stem Transitions =			
				Footing Weight =	750.0	2.50	1,875.0
				Key Weight =			
				Vert. Component =			
				Total =	3,429.9 lbs	R.M.=	11,567.9
Resisting/Overtuning Ratio			= 1.72				
Vertical Loads used for Soil Pressure =			3,429.9 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) 0.081 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.

RetainPro (c) 1987-2019, Build 11.20.03.31
 License : KW-06059959
 License To : MULHERN & KULP STRUCTURAL ENGINEERING INC

Cantilevered Retaining Wall

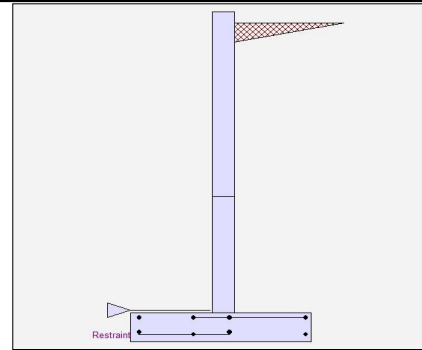
Code: IBC 2015,ACI 318-14,ACI 530-13

Criteria

Retained Height	=	10.00 ft
Wall height above soil	=	0.38 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	3,000.0 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	=	0.00 pcf
Footings 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		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Service Level)

Adjacent Footing Load

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

Axial Load Applied to Stem

Axial Dead Load	=	100.0 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)		
Uniform Seismic Force	=	77.000
Total Seismic Force	=	847.000

Design Summary

Wall Stability Ratios

Overturning	=	1.51 OK
Slab Resists All Sliding !		
Total Bearing Load	=	4,530 lbs
...resultant ecc.	=	18.19 in
Soil Pressure @ Toe	=	2,447 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	3,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	3,426 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	42.5 psi OK
Footing Shear @ Heel	=	29.5 psi OK
Allowable	=	75.0 psi

Sliding Calcs

Lateral Sliding Force	=	2,710.4 lbs
-----------------------	---	-------------

Stem Construction

	2nd	Bottom
Design Height Above Ftg	ft = 4.00	0.00
Wall Material Above "Ht"	Concrete	Concrete
Design Method	LRFD	LRFD
Thickness	= 8.00	8.00
Rebar Size	= # 5	# 5
Rebar Spacing	= 12.00	6.00
Rebar Placed at	= Edge	Edge

Design Data

fb/FB + fa/Fa	=	0.414	0.847
Total Force @ Section			
Service Level	lbs =		
Strength Level	lbs =	1,470.0	3,570.0
Moment....Actual			
Service Level	ft-# =		
Strength Level	ft-# =	3,402.0	13,183.3
Moment....Allowable			
Service Level	ft-# =	8,206.3	15,562.2
Shear.....Actual			
Service Level	psi =		
Strength Level	psi =	19.8	48.1
Shear.....Allowable			
Service Level	psi =	82.2	82.2
Anet (Masonry)	in2 =		
Rebar Depth 'd'	in =	6.19	6.19

Masonry Data

f'm	psi =		
Fs	psi =		
Solid Grouting	=		
Modular Ratio 'n'	=		
Wall Weight	psf =	100.0	100.0
Short Term Factor	=		
Equiv. Solid Thick.	=		
Masonry Block Type	=	Medium Weight	
Masonry Design Method	=	ASD	

Concrete Data

f'c	psi =	3,000.0	3,000.0
Fy	psi =	60,000.0	60,000.0

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing pressures.

Load Factors

Building Code	IBC 2015,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Concrete Stem Rebar Area Details

2nd Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1288 in ² /ft		
(4/3) * As :	0.1718 in ² /ft	Min Stem T&S Reinf Area 1.225 in ²	
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in ² /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in ² /ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in ² /ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.1728 in ² /ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.31 in ² /ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.0059 in ² /ft	#6@ 27.50 in	#6@ 55.00 in

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.4992 in ² /ft		
(4/3) * As :	0.6656 in ² /ft	Min Stem T&S Reinf Area 0.768 in ²	
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in ² /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in ² /ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in ² /ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.4992 in ² /ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.62 in ² /ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.0059 in ² /ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	2.50 ft
Heel Width	=	3.00
Total Footing Width	=	5.50
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>
Factored Pressure	=	3,426	0 psf
Mu' : Upward	=	99,548	24 ft-#
Mu' : Downward	=	6,750	4,083 ft-#
Mu: Design	=	7,733	4,060 ft-#
Actual 1-Way Shear	=	42.45	29.54 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	# 6 @ 6.00 in	
Heel Reinforcing	=	# 4 @ 8.00 in	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe: #4@ 8.56 in, #5@ 13.28 in, #6@ 18.85 in, #7@ 25.70 in, #8@ 33.84 in, #9@ 42
Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46
Key: No key defined

Min footing T&S reinf Area	1.43	in ²
Min footing T&S reinf Area per foot	0.26	in ² /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	

Summary of Overturning & Resisting Forces & Moments

ItemOVERTURNING.....			RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	2,117.5	3.67	7,764.2	Soil Over HL (ab. water tbl)	2,566.7	4.33	11,122.2
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		4.33	11,122.2
Hydrostatic Force				Watre 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 =	100.0	2.83	283.3
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
Seismic Earth Load =	592.9	5.50	3,261.0	Surcharge Over Toe =			
=				Stem Weight(s) =	1,038.0	2.83	2,941.0
Total =	2,710.4	O.T.M.	= 11,025.1	Earth @ Stem Transitions =			
				Footing Weight =	825.0	2.75	2,268.8
				Key Weight =			
				Vert. Component =			
Resisting/Overturning Ratio			= 1.51	Total =	4,529.7 lbs	R.M.=	16,615.3
Vertical Loads used for Soil Pressure =		4,529.7	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) 0.128 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.

RetainPro (c) 1987-2019, Build 11.20.03.31
 License : KW-06059959
 License To : MULHERN & KULP STRUCTURAL ENGINEERING INC

Cantilevered Retaining Wall

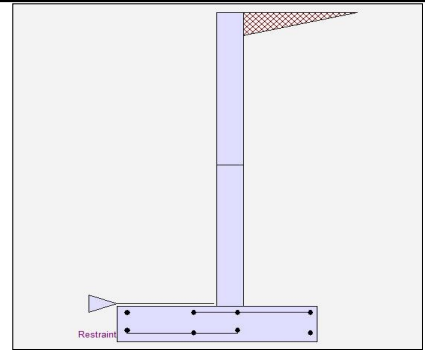
Code: IBC 2015,ACI 318-14,ACI 530-13

Criteria

Retained Height	=	8.33 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	3,000.0 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	=	0.00 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		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Service Level)

Adjacent Footing Load

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

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)		
Uniform Seismic Force	=	65.310
Total Seismic Force	=	609.342

Design Summary

Wall Stability Ratios		
Overturning	=	1.65 OK
Slab Resists All Sliding !		
Total Bearing Load	=	3,263 lbs
...resultant ecc.	=	13.94 in
Soil Pressure @ Toe	=	1,625 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	3,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	2,275 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	27.9 psi OK
Footing Shear @ Heel	=	18.8 psi OK
Allowable	=	75.0 psi
Sliding Calcs		
Lateral Sliding Force	=	1,949.9 lbs

Stem Construction

	2nd	Bottom
Design Height Above Ftg	ft = 4.00	ft = 0.00
Wall Material Above "Ht"	Concrete	Concrete
Design Method	LRFD	LRFD
Thickness	= 8.00	8.00
Rebar Size	= # 5	# 5
Rebar Spacing	= 16.00	8.00
Rebar Placed at	= Edge	Edge

Design Data

fb/FB + fa/Fa	=	0.219	0.638
Total Force @ Section			
Service Level	lbs =		
Strength Level	lbs =	807.8	2,486.9
Moment....Actual			
Service Level	ft-# =		
Strength Level	ft-# =	1,370.0	7,660.7
Moment....Allowable	ft-# =	6,234.5	11,990.5
Shear.....Actual			
Service Level	psi =		
Strength Level	psi =	10.9	33.5
Shear.....Allowable	psi =	82.2	82.2
Anet (Masonry)	in2 =		
Rebar Depth 'd'	in =	6.19	6.19

Masonry Data

f'm	psi =		
Fs	psi =		
Solid Grouting	=		
Modular Ratio 'n'	=		
Wall Weight	psf =	100.0	100.0
Short Term Factor	=		
Equiv. Solid Thick.	=		
Masonry Block Type	=	Medium Weight	
Masonry Design Method	=	ASD	

Concrete Data

f'c	psi =	3,000.0	3,000.0
Fy	psi =	60,000.0	60,000.0

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing pressures.

Load Factors

Building Code	IBC 2015,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Concrete Stem Rebar Area Details

2nd Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0519 in2/ft		
(4/3) * As :	0.0692 in2/ft	Min Stem T&S Reinf Area 0.831 in2	
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.1728 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.2325 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.0059 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.2901 in2/ft		
(4/3) * As :	0.3868 in2/ft	Min Stem T&S Reinf Area 0.768 in2	
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.2901 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.465 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.0059 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	2.50 ft
Heel Width	=	2.50
Total Footing Width	=	5.00
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>
Factored Pressure	=	2,275	0 psf
Mu' : Upward	=	67,615	58 ft-#
Mu' : Downward	=	6,750	2,150 ft-#
Mu: Design	=	5,072	2,093 ft-#
Actual 1-Way Shear	=	27.89	18.79 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	# 5 @ 8.00 in	
Heel Reinforcing	=	# 4 @ 8.00 in	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46
 Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46
 Key: No key defined

Min footing T&S reinf Area	1.30	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft
If one layer of horizontal bars:	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	

Summary of Overturning & Resisting Forces & Moments

ItemOVERTURNING.....		RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	1,523.4	3.11	4,737.6	Soil Over HL (ab. water tbl)	1,679.9	4.08	6,859.5
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		4.08	6,859.5
Hydrostatic Force				Watre 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 =	426.5	4.67	1,989.8	Surcharge Over Toe =			
=				Stem Weight(s) =	833.0	2.83	2,360.2
Total =	1,949.9	O.T.M.	= 6,727.4	Earth @ Stem Transitions =			
				Footing Weight =	750.0	2.50	1,875.0
				Key Weight =			
				Vert. Component =			
Resisting/Overturning Ratio			= 1.65	Total =	3,262.9 lbs	R.M.=	11,094.7
Vertical Loads used for Soil Pressure =		3,262.9	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) 0.075 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.

Concrete Beam

Lic. # : KW-06004787

DESCRIPTION: Detail 17/SD-02 (Spanning side to side)

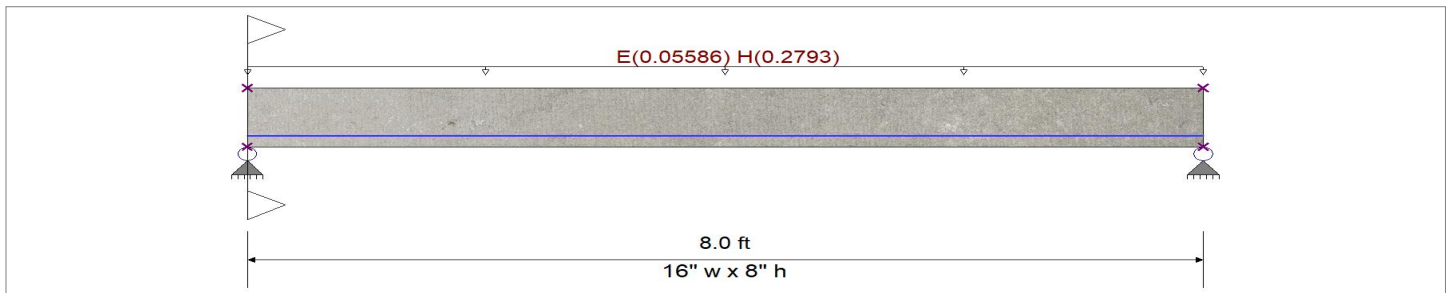
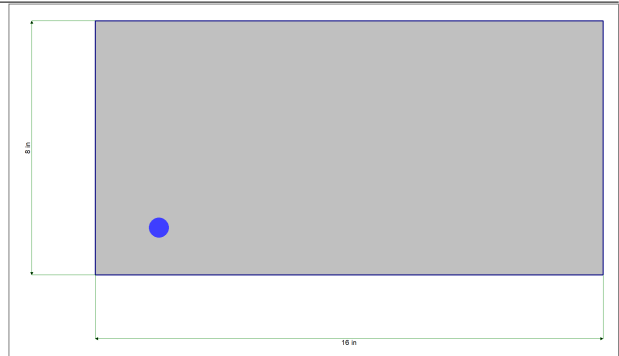
CODE REFERENCES

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : ASCE 7-16

Material Properties

f'_c	=	3.0 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	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
f_y - 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



Cross Section & Reinforcing Details

Rectangular Section, Width = 16.0 in, Height = 8.0 in

Span #1 Reinforcing....

1-#5 at 1.50 in from Bottom, from 0.0 to 8.0 ft in this span

Load for Span Number 1

Uniform Load : E = 0.0420, H = 0.210 ksf, Tributary Width = 1.330 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.460 : 1	Maximum Deflection	
Section used for this span	Typical Section	Max Downward Transient Deflection	0.012 in Ratio = 7951 >=360.
Mu : Applied	4.022 k-ft	Max Upward Transient Deflection	0.000 in Ratio = 0 <360.0
Mn * Phi : Allowable	8.750 k-ft	Max Downward Total Deflection	0.014 in Ratio = 6974 >=180.
Location of maximum on span	4.007 ft	Max Upward Total Deflection	0.000 in Ratio = 0 <180.0
Span # where maximum occurs	Span # 1		

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	1.274	1.274
Overall MINimum	0.223	0.223
+D+H	1.117	1.117
+D+L+H	1.117	1.117
+D+Lr+H	1.117	1.117
+D+S+H	1.117	1.117
+D+0.750Lr+0.750L+H	1.117	1.117
+D+0.750L+0.750S+H	1.117	1.117
+D+0.60W+H	1.117	1.117
+D+0.750Lr+0.750L+0.450W+H	1.117	1.117
+D+0.750L+0.750S+0.450W+H	1.117	1.117
+0.60D+0.60W+0.60H	0.670	0.670
+D+0.70E+0.60H	0.827	0.827
+D+0.750L+0.750S+0.5250E+H	1.235	1.235

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Concrete Beam

File: Foundation Wall Side to Side.ec6
 Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.17
 MULHERN & KULP STRUCTURAL ENGINEERING INC

Lic. #: KW-06004787

DESCRIPTION: Detail 17/SD-02 (Spanning side to side)

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
+0.60D+0.70E+H	1.274	1.274
E Only	0.223	0.223
H Only	1.117	1.117

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k)		Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in)	
				Actual	Design							Req'd	Suggest
+1.20D+L+0.20S+E+1.60H	1	0.00	6.50	2.01	2.01	0.00	1.00	8.70	Vu < PhiVc/2	lot Reqd 11.4	8.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.09	6.50	1.97	1.97	0.17	1.00	8.70	Vu < PhiVc/2	lot Reqd 11.4	8.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.17	6.50	1.92	1.92	0.34	1.00	8.70	Vu < PhiVc/2	lot Reqd 11.4	8.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.26	6.50	1.88	1.88	0.51	1.00	8.70	Vu < PhiVc/2	lot Reqd 11.4	8.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.35	6.50	1.84	1.84	0.67	1.00	8.70	Vu < PhiVc/2	lot Reqd 11.4	8.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.44	6.50	1.79	1.79	0.83	1.00	8.70	Vu < PhiVc/2	lot Reqd 11.4	8.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.52	6.50	1.75	1.75	0.99	0.96	8.68	Vu < PhiVc/2	lot Reqd 11.4	8.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.61	6.50	1.70	1.70	1.14	0.81	8.59	Vu < PhiVc/2	lot Reqd 11.4	8.6	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.70	6.50	1.66	1.66	1.28	0.70	8.52	Vu < PhiVc/2	lot Reqd 11.4	8.5	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.79	6.50	1.62	1.62	1.43	0.61	8.47	Vu < PhiVc/2	lot Reqd 11.4	8.5	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.87	6.50	1.57	1.57	1.57	0.54	8.43	Vu < PhiVc/2	lot Reqd 11.4	8.4	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.96	6.50	1.53	1.53	1.70	0.49	8.40	Vu < PhiVc/2	lot Reqd 11.4	8.4	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.05	6.50	1.48	1.48	1.83	0.44	8.37	Vu < PhiVc/2	lot Reqd 11.4	8.4	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.14	6.50	1.44	1.44	1.96	0.40	8.35	Vu < PhiVc/2	lot Reqd 11.4	8.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.22	6.50	1.40	1.40	2.08	0.36	8.33	Vu < PhiVc/2	lot Reqd 11.4	8.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.31	6.50	1.35	1.35	2.20	0.33	8.31	Vu < PhiVc/2	lot Reqd 11.4	8.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.40	6.50	1.31	1.31	2.32	0.31	8.29	Vu < PhiVc/2	lot Reqd 11.4	8.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.49	6.50	1.26	1.26	2.43	0.28	8.28	Vu < PhiVc/2	lot Reqd 11.4	8.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.57	6.50	1.22	1.22	2.54	0.26	8.27	Vu < PhiVc/2	lot Reqd 11.4	8.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.66	6.50	1.18	1.18	2.65	0.24	8.26	Vu < PhiVc/2	lot Reqd 11.4	8.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.75	6.50	1.13	1.13	2.75	0.22	8.25	Vu < PhiVc/2	lot Reqd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.84	6.50	1.09	1.09	2.84	0.21	8.24	Vu < PhiVc/2	lot Reqd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.92	6.50	1.04	1.04	2.94	0.19	8.23	Vu < PhiVc/2	lot Reqd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.01	6.50	1.00	1.00	3.03	0.18	8.22	Vu < PhiVc/2	lot Reqd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.10	6.50	0.96	0.96	3.11	0.17	8.21	Vu < PhiVc/2	lot Reqd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.19	6.50	0.91	0.91	3.19	0.15	8.21	Vu < PhiVc/2	lot Reqd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.27	6.50	0.87	0.87	3.27	0.14	8.20	Vu < PhiVc/2	lot Reqd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.36	6.50	0.82	0.82	3.35	0.13	8.19	Vu < PhiVc/2	lot Reqd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.45	6.50	0.78	0.78	3.42	0.12	8.19	Vu < PhiVc/2	lot Reqd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.54	6.50	0.74	0.74	3.48	0.11	8.18	Vu < PhiVc/2	lot Reqd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.62	6.50	0.69	0.69	3.55	0.11	8.18	Vu < PhiVc/2	lot Reqd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.71	6.50	0.65	0.65	3.60	0.10	8.17	Vu < PhiVc/2	lot Reqd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.80	6.50	0.60	0.60	3.66	0.09	8.17	Vu < PhiVc/2	lot Reqd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.89	6.50	0.56	0.56	3.71	0.08	8.16	Vu < PhiVc/2	lot Reqd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.97	6.50	0.52	0.52	3.76	0.07	8.16	Vu < PhiVc/2	lot Reqd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.06	6.50	0.47	0.47	3.80	0.07	8.16	Vu < PhiVc/2	lot Reqd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.15	6.50	0.43	0.43	3.84	0.06	8.15	Vu < PhiVc/2	lot Reqd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.23	6.50	0.38	0.38	3.87	0.05	8.15	Vu < PhiVc/2	lot Reqd 11.4	8.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.32	6.50	0.34	0.34	3.91	0.05	8.14	Vu < PhiVc/2	lot Reqd 11.4	8.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.41	6.50	0.30	0.30	3.93	0.04	8.14	Vu < PhiVc/2	lot Reqd 11.4	8.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.50	6.50	0.25	0.25	3.96	0.03	8.14	Vu < PhiVc/2	lot Reqd 11.4	8.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.58	6.50	0.21	0.21	3.98	0.03	8.13	Vu < PhiVc/2	lot Reqd 11.4	8.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.67	6.50	0.16	0.16	3.99	0.02	8.13	Vu < PhiVc/2	lot Reqd 11.4	8.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.76	6.50	0.12	0.12	4.01	0.02	8.13	Vu < PhiVc/2	lot Reqd 11.4	8.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.85	6.50	0.08	0.08	4.02	0.01	8.12	Vu < PhiVc/2	lot Reqd 11.4	8.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.93	6.50	0.03	0.03	4.02	0.00	8.12	Vu < PhiVc/2	lot Reqd 11.4	8.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.02	6.50	-0.01	0.01	4.02	0.00	8.12	Vu < PhiVc/2	lot Reqd 11.4	8.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.11	6.50	-0.05	0.05	4.02	0.01	8.12	Vu < PhiVc/2	lot Reqd 11.4	8.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.20	6.50	-0.10	0.10	4.01	0.01	8.13	Vu < PhiVc/2	lot Reqd 11.4	8.1	0.0	0.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Concrete Beam

File: Foundation Wall Side to Side.ec6
 Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.17
 MULHERN & KULP STRUCTURAL ENGINEERING INC

Lic. #: KW-06004787

DESCRIPTION: Detail 17/SD-02 (Spanning side to side)

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu Actual	(k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd Suggest	
+1.20D+L+0.20S+E+1.60H	1	4.28	6.50	-0.14	0.14	4.00	0.02	8.13	Vu < PhiVc/2	lot Req'd 11.4	8.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.37	6.50	-0.19	0.19	3.99	0.03	8.13	Vu < PhiVc/2	lot Req'd 11.4	8.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.46	6.50	-0.23	0.23	3.97	0.03	8.14	Vu < PhiVc/2	lot Req'd 11.4	8.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.55	6.50	-0.27	0.27	3.95	0.04	8.14	Vu < PhiVc/2	lot Req'd 11.4	8.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.63	6.50	-0.32	0.32	3.92	0.04	8.14	Vu < PhiVc/2	lot Req'd 11.4	8.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.72	6.50	-0.36	0.36	3.89	0.05	8.15	Vu < PhiVc/2	lot Req'd 11.4	8.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.81	6.50	-0.41	0.41	3.86	0.06	8.15	Vu < PhiVc/2	lot Req'd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.90	6.50	-0.45	0.45	3.82	0.06	8.15	Vu < PhiVc/2	lot Req'd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.98	6.50	-0.49	0.49	3.78	0.07	8.16	Vu < PhiVc/2	lot Req'd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.07	6.50	-0.54	0.54	3.73	0.08	8.16	Vu < PhiVc/2	lot Req'd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.16	6.50	-0.58	0.58	3.68	0.09	8.17	Vu < PhiVc/2	lot Req'd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.25	6.50	-0.63	0.63	3.63	0.09	8.17	Vu < PhiVc/2	lot Req'd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.33	6.50	-0.67	0.67	3.58	0.10	8.18	Vu < PhiVc/2	lot Req'd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.42	6.50	-0.71	0.71	3.51	0.11	8.18	Vu < PhiVc/2	lot Req'd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.51	6.50	-0.76	0.76	3.45	0.12	8.19	Vu < PhiVc/2	lot Req'd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.60	6.50	-0.80	0.80	3.38	0.13	8.19	Vu < PhiVc/2	lot Req'd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.68	6.50	-0.85	0.85	3.31	0.14	8.20	Vu < PhiVc/2	lot Req'd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.77	6.50	-0.89	0.89	3.23	0.15	8.20	Vu < PhiVc/2	lot Req'd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.86	6.50	-0.93	0.93	3.15	0.16	8.21	Vu < PhiVc/2	lot Req'd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.95	6.50	-0.98	0.98	3.07	0.17	8.22	Vu < PhiVc/2	lot Req'd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.03	6.50	-1.02	1.02	2.98	0.19	8.23	Vu < PhiVc/2	lot Req'd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.12	6.50	-1.07	1.07	2.89	0.20	8.23	Vu < PhiVc/2	lot Req'd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.21	6.50	-1.11	1.11	2.80	0.21	8.24	Vu < PhiVc/2	lot Req'd 11.4	8.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.30	6.50	-1.15	1.15	2.70	0.23	8.25	Vu < PhiVc/2	lot Req'd 11.4	8.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.38	6.50	-1.20	1.20	2.60	0.25	8.26	Vu < PhiVc/2	lot Req'd 11.4	8.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.47	6.50	-1.24	1.24	2.49	0.27	8.27	Vu < PhiVc/2	lot Req'd 11.4	8.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.56	6.50	-1.29	1.29	2.38	0.29	8.29	Vu < PhiVc/2	lot Req'd 11.4	8.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.64	6.50	-1.33	1.33	2.26	0.32	8.30	Vu < PhiVc/2	lot Req'd 11.4	8.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.73	6.50	-1.37	1.37	2.15	0.35	8.32	Vu < PhiVc/2	lot Req'd 11.4	8.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.82	6.50	-1.42	1.42	2.02	0.38	8.34	Vu < PhiVc/2	lot Req'd 11.4	8.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.91	6.50	-1.46	1.46	1.90	0.42	8.36	Vu < PhiVc/2	lot Req'd 11.4	8.4	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.99	6.50	-1.51	1.51	1.77	0.46	8.39	Vu < PhiVc/2	lot Req'd 11.4	8.4	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.08	6.50	-1.55	1.55	1.63	0.51	8.42	Vu < PhiVc/2	lot Req'd 11.4	8.4	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.17	6.50	-1.59	1.59	1.50	0.58	8.45	Vu < PhiVc/2	lot Req'd 11.4	8.5	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.26	6.50	-1.64	1.64	1.36	0.65	8.50	Vu < PhiVc/2	lot Req'd 11.4	8.5	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.34	6.50	-1.68	1.68	1.21	0.75	8.55	Vu < PhiVc/2	lot Req'd 11.4	8.6	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.43	6.50	-1.73	1.73	1.06	0.88	8.63	Vu < PhiVc/2	lot Req'd 11.4	8.6	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.52	6.50	-1.77	1.77	0.91	1.00	8.70	Vu < PhiVc/2	lot Req'd 11.4	8.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.61	6.50	-1.81	1.81	0.75	1.00	8.70	Vu < PhiVc/2	lot Req'd 11.4	8.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.69	6.50	-1.86	1.86	0.59	1.00	8.70	Vu < PhiVc/2	lot Req'd 11.4	8.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.78	6.50	-1.90	1.90	0.43	1.00	8.70	Vu < PhiVc/2	lot Req'd 11.4	8.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.87	6.50	-1.95	1.95	0.26	1.00	8.70	Vu < PhiVc/2	lot Req'd 11.4	8.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.96	6.50	-1.99	1.99	0.09	1.00	8.70	Vu < PhiVc/2	lot Req'd 11.4	8.7	0.0	0.0

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	4.02	8.75	0.46
+1.40D+1.60H					
Span # 1	1	8.000	3.58	8.75	0.41
+1.20D+0.50Lr+1.60L+1.60H					
Span # 1	1	8.000	3.58	8.75	0.41
+1.20D+1.60L+0.50S+1.60H					
Span # 1	1	8.000	3.58	8.75	0.41
+1.20D+1.60Lr+L+1.60H					
Span # 1	1	8.000	3.58	8.75	0.41

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Concrete Beam

File: Foundation Wall Side to Side.ec6
 Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.17
MULHERN & KULP STRUCTURAL ENGINEERING INC

Lic. # : KW-06004787

DESCRIPTION: Detail 17/SD-02 (Spanning side to side)

Load Combination Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft)		
			Mu : Max	Phi*Mnx	Stress Ratio
+1.20D+1.60Lr+0.50W+1.60H Span # 1	1	8.000	3.58	8.75	0.41
+1.20D+L+1.60S+1.60H Span # 1	1	8.000	3.58	8.75	0.41
+1.20D+1.60S+0.50W+1.60H Span # 1	1	8.000	3.58	8.75	0.41
+1.20D+0.50Lr+L+W+1.60H Span # 1	1	8.000	3.58	8.75	0.41
+1.20D+L+0.50S+W+1.60H Span # 1	1	8.000	3.58	8.75	0.41
+0.90D+W+1.60H Span # 1	1	8.000	3.58	8.75	0.41
+1.20D+L+0.20S+E+1.60H Span # 1	1	8.000	4.02	8.75	0.46
+0.90D+E+0.90H Span # 1	1	8.000	2.46	8.75	0.28

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+0.60D+0.70E+H	1	0.0138	4.000		0.0000	0.000