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

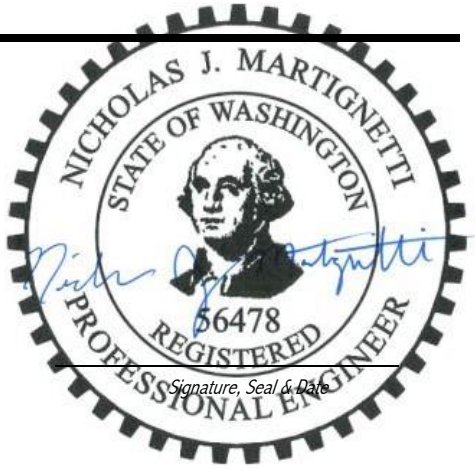
Mercer Island, WA

MULHERN & KULP STRUCTURAL ENGINEERING, INC.

Prepared By:

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

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



Signature, Seal & Date

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: PRATT PLOT
ARCH INNOVATIONS
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 13-MAR-20

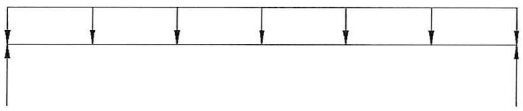
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: 4x10 HDR - WORST CASE LOAD

B1

PARAMETERS:

L = 5 FT
W = 0.91 KLF
P = - K



ANALYSIS:

R_{MAX} =	2.3 K	V_D =	K	< V_{ALL} =	3.885 K	✓	ADEQUATE
M_{MAX} =	2.84 K-FT	< M_{ALL} =	4.492 K-FT			✓	ADEQUATE
Δ_{TL} =	0.034 IN.	L/	994	< L/240		✓	ADEQUATE

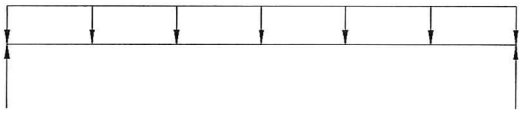
4X10

BEAM DESCRIPTION: 4x10 HDR - WORST CASE LENGTH

B1

PARAMETERS:

L = 8 FT
W = 0.4 KLF
P = - K



ANALYSIS:

R_{MAX} =	1.6 K	V_D =	K	< V_{ALL} =	3.885 K	✓	ADEQUATE
M_{MAX} =	3.2 K-FT	< M_{ALL} =	4.492 K-FT			✓	ADEQUATE
Δ_{TL} =	0.1 IN.	L/	960	< L/240		✓	ADEQUATE

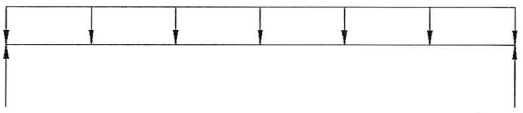
4x10

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

B2

PARAMETERS:

L = 6 FT
W = 0.15 KLF
P = - K



ANALYSIS:

R_{MAX} =	0.45 K	V_D =	K	< V_{ALL} =	2.31 K	✓	ADEQUATE
M_{MAX} =	0.675 K-FT	< M_{ALL} =	1.72 K-FT			✓	ADEQUATE
Δ_{TL} =	0.05 IN.	L/	999	< L/240		✓	ADEQUATE

4X6

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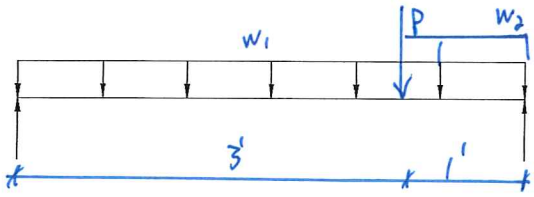
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: ROOF FRAMING - HEADER @ REAR UTILITY WINDOW

B3

PARAMETERS:

L = 4 FT
W_1 = 0.126 KLF W_2 = 0.57
P = 1.7 K



ANALYSIS:

R_{MAX} =	1.915 K	V_D =	K	< V_{ALL} =	3.885 K	✓ ADEQUATE
M_{MAX} =	1.63 K-FT	< M_{ALL} =	4.492 K-FT			✓ ADEQUATE
Δ_{TL} =	0.01 IN.	L/	999+	< L/240		✓ ADEQUATE

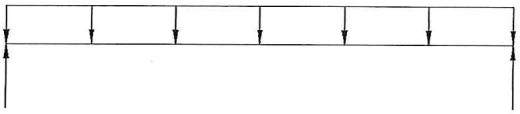
4X10

BEAM DESCRIPTION: UPPER FLOOR FRAMING - 9' GARAGE DOOR

B4

PARAMETERS:

L = 9 FT
W = 0.441 KLF
P = - K



ANALYSIS:

R_{MAX} =	1.98 K	V_D =	K	< V_{ALL} =	4.725 K	✓ ADEQUATE
M_{MAX} =	4.46 K-FT	< M_{ALL} =	6.091 K-FT			✓ ADEQUATE
Δ_{TL} =	0.1 IN.	L/	999+	< L/240		✓ ADEQUATE

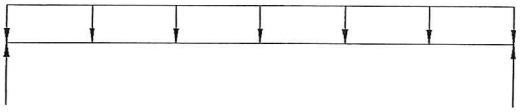
4X12

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

B5

PARAMETERS:

L = 16 FT
W = 0.56 KLF
P = - K



ANALYSIS:

R_{MAX} =	4.5 K	V_D =	K	< V_{ALL} =	14.575 K	✓ ADEQUATE
M_{MAX} =	17.92 K-FT	< M_{ALL} =	41.25 K-FT			✓ ADEQUATE
Δ_{TL} =	0.3 IN.	L/	640	< L/240		✓ ADEQUATE

5 1/2" X 15" GLB

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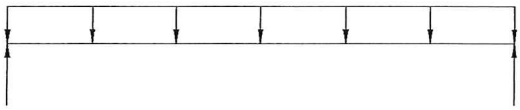
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLOOR FRAMING - FLUSH BOT BEAM @ REAR OF GARAGE B6

PARAMETERS:

L = 16 FT
W = 0.682 KLF
P = - K



ANALYSIS:

R_{MAX} =	5.45 K	V_D =		K	< V_{ALL} =	14.575 K	☑ ADEQUATE
M_{MAX} =	21.82 K-FT	< M_{ALL} =	41.25	K-FT			☑ ADEQUATE
Δ_{TL} =	0.36 IN.	L/	533	< L/240			☐ ADEQUATE

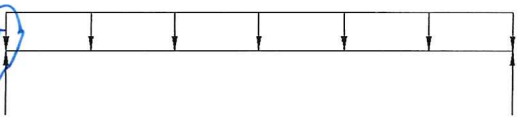
5 1/2" x 15" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING - FRONT TO BACK BEAM @ GARAGE B7

PARAMETERS:

L = FT
W = KLF
P = K

(SEE ENERCALC OUTPUT FOR OVERSTRENGTH CALC)



ANALYSIS:

R_{MAX} =	9.03 K	V_D =		K	< V_{ALL} =	K	☑ ADEQUATE
M_{MAX} =	K-FT	< M_{ALL} =		K-FT			☑ ADEQUATE
Δ_{TL} =	IN.	L/		< L/240			☐ ADEQUATE

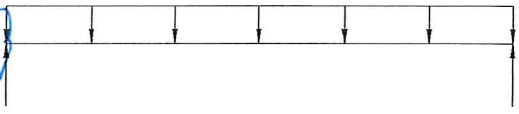
7" x 18" LVL

BEAM DESCRIPTION: UPPER FLOOR FRAMING - 17' GARAGE DOOR HEADER B8

PARAMETERS:

L = FT
W = KLF
P = K

(SEE ENERCALC 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

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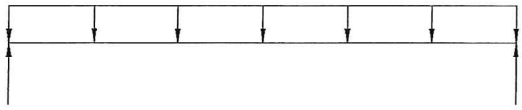
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: UPPER FLOOR FRAMING - FLUSH BOTTOM BEAM @ PANTRY (B9)

PARAMETERS:

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



ANALYSIS:

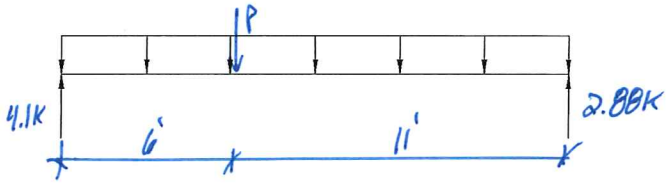
R_{MAX} =	4.14 K	V_D =	K	< V_{ALL} =	7.42 K	✓ ADEQUATE
M_{MAX} =	9.32 K-FT	< M_{ALL} =	16.8 K-FT			✓ ADEQUATE
Δ_{TL} =	0.15 IN.	L/	720	< L/240		✓ ADEQUATE

3½" 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:

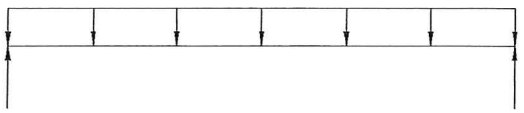
R_{MAX} =	4.1 K	V_D =	K	< V_{ALL} =	11.13 K	✓ ADEQUATE
M_{MAX} =	21.6 K-FT	< M_{ALL} =	37.8 K-FT			✓ ADEQUATE
Δ_{TL} =	0.37 IN.	L/	550	< L/240		✓ ADEQUATE

3½" X 18" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING - HEADERS @ REAR OF KITCHEN (B11)
(WORST CASE)

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
Δ_{TL} =	0.16 IN.	L/	525	< L/240		✓ ADEQUATE

3½" X 9" GLB

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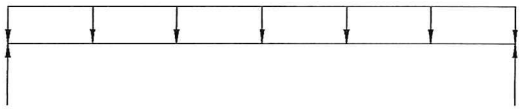
BEAM & HEADER CALCULATIONS

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

PARAMETERS:

L = 15.5 FT
W = 0.57 KLF
P = - K



ANALYSIS:

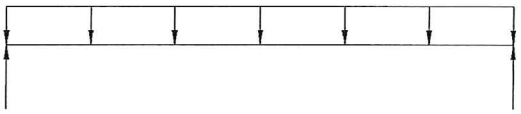
R_{MAX} = 4.41 K V_D = [ ] K < V_{ALL} = 11.13 K ✓ ADEQUATE
M_{MAX} = 17.12 K-FT < M_{ALL} = 37.8 K-FT ✓ ADEQUATE
Δ_{TL} = 0.24 IN. L/ 775 < L/240 ADEQUATE

3 1/2"x18" GLB

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

PARAMETERS:

L = 16 FT
W = 0.2 KLF
P = - K



ANALYSIS:

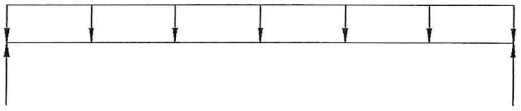
R_{MAX} = 1.6 K V_D = [ ] K < V_{ALL} = 7.168 K ✓ ADEQUATE
M_{MAX} = 6.4 K-FT < M_{ALL} = 8.84 K-FT ✓ ADEQUATE
Δ_{TL} = 0.33 IN. L/ 581 < L/240 ADEQUATE

6X12

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

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

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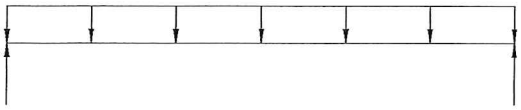
BEAM & HEADER CALCULATIONS

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

PARAMETERS:

L = 12 FT
W = 1.04 KLF
P = - K



ANALYSIS:

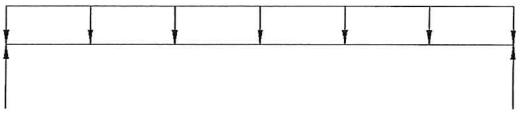
R_{MAX} =	6.24 K	V_D =	K	< V_{ALL} =	13.118 K	☑	ADEQUATE
M_{MAX} =	18.72 K-FT	< M_{ALL} =	33.4 K-FT			☑	ADEQUATE
Δ_{TL} =	0.24 IN.	L/	600	< L/240		☑	ADEQUATE

5½"X13½" GLB

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

PARAMETERS:

L = 16 FT
W = 0.55 KLF
P = - K



ANALYSIS:

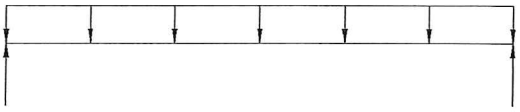
R_{MAX} =	4.4 K	V_D =	K	< V_{ALL} =	11.13 K	☑	ADEQUATE
M_{MAX} =	17.6 K-FT	< M_{ALL} =	37.8 K-FT			☑	ADEQUATE
Δ_{TL} =	0.27 IN.	L/	711	< L/240		☑	ADEQUATE

3½"X18" GLB

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

PARAMETERS:

L = 16 FT
W = 0.57 KLF
P = - K



ANALYSIS:

R_{MAX} =	4.56 K	V_D =	K	< V_{ALL} =	14.575 K	☑	ADEQUATE
M_{MAX} =	18.24 K-FT	< M_{ALL} =	41.25 K-FT			☑	ADEQUATE
Δ_{TL} =	0.3 IN.	L/	640	< L/240		☑	ADEQUATE

3½"X18" GLB

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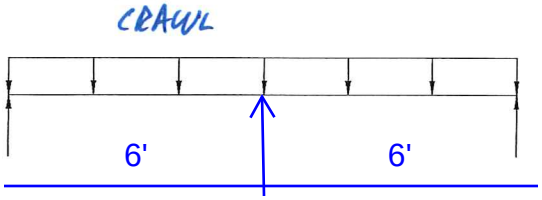
BEAM & HEADER CALCULATIONS

BEAM DESCRIPTION: MAIN FLOOR FRAMING - Dropped BEAM @ REAR OF CRAWL B1B

PARAMETERS:

L = 12 FT
W = 1.1 KLF
P = - K



ANALYSIS:

R_{MAX} = 6.6 K V_D = 3.3 K < V_{ALL} = 5.92 K ✓ ADEQUATE
M_{MAX} = 4.95 K-FT < M_{ALL} = 6.032 K-FT ✓ ADEQUATE
Δ_{TL} = 0.063 IN. L/ 999+ < L/240 ✓ ADEQUATE

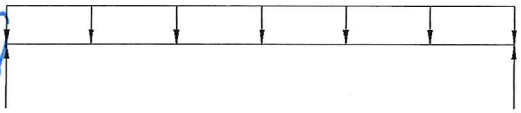
6x10 dropped

BEAM DESCRIPTION: MAIN FLOOR FRAMING - Dropped BEAM @ FRONT OF CRAWL B1F

PARAMETERS:

L =
W =
P =

SEE ENERCALC OUTPUT FOR OVERSTRENGTH CALCS



ANALYSIS:

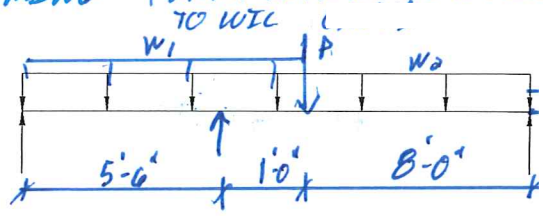
R_{MAX} = K V_D = K < V_{ALL} = K ✓ ADEQUATE
M_{MAX} = K-FT < M_{ALL} = K-FT ✓ ADEQUATE
Δ_{TL} = IN. L/ < L/240 ✓ ADEQUATE

6x10 dropped

BEAM DESCRIPTION: MAIN FLOOR FRAMING - FLUSH BOTTOM BEAM @ MECH TO WIC B3D

PARAMETERS:

L = 18.5 FT
W_1 = 0.93 KLF W_2 = 0.77
P = 4.41 K



ANALYSIS:

R_{MAX} = 12.7 K V_D = K < V_{ALL} = 7.42 K ✓ ADEQUATE
M_{MAX} = 7.8 K-FT < M_{ALL} = 16.8 K-FT ✓ ADEQUATE
Δ_{TL} = 0.13 IN. L/ 830 < L/240 ☐ ADEQUATE

3 1/2" x12" GLB

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BEAM & HEADER CALCULATIONS

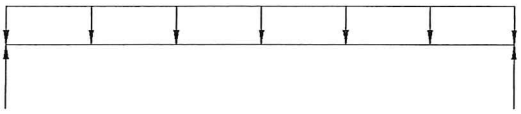
VOID

B21

BEAM DESCRIPTION: MAIN FLOOR FRAMING - FLUSH BEAM @ BEDS W/ DECK ABV. B22

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} =	11.14 K-FT	< M_{ALL} =	378 K-FT			☑	ADEQUATE
Δ_{TL} =	0.08 IN.	L/	9997	< L/240		☑	ADEQUATE

3½"x18" GLB

VOID

B23

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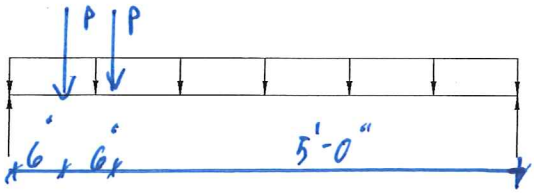
BEAM & HEADER CALCULATIONS

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

B24

PARAMETERS:

L = 6 FT
W = 0.5 KLF
P = 4.0 K



ANALYSIS:

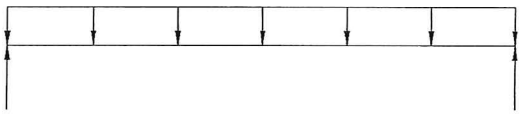
R_{MAX} = 8.5 K V_D = 6.0 K < V_{ALL} = 7.168 K ☑ ADEQUATE
M_{MAX} = 6.25 K-FT < M_{ALL} = 8.84 K-FT ☑ ADEQUATE
Δ_{TL} = 0.05 IN. L/ 999 < L/240 ☐ ADEQUATE

6x12

BEAM DESCRIPTION:

PARAMETERS:

L = FT
W = KLF
P = K



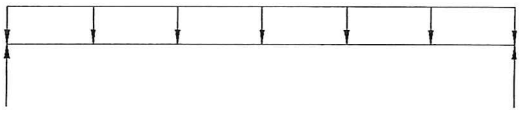
ANALYSIS:

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

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residential structural engineering
20 South Maple Street, Suite 150 • Ambler, PA 19002
p 215.646.8001 • mulhernkulp.com

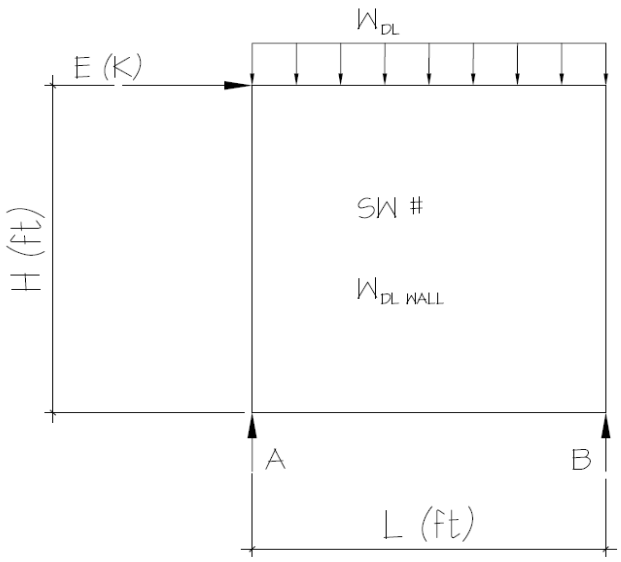
PROJECT NAME: PRATT PLOT LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 23-MAR-20

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
Ω_0 =	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

$E_M = E_{MH} + E_V$

$E_M = E_{MH} + E_V$ = 1.933 K

$E_M = E_{MH} - E_V$

$E_M = E_{MH} - E_V$ = 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 STESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM CALCS FOR LOAD APPLICATION

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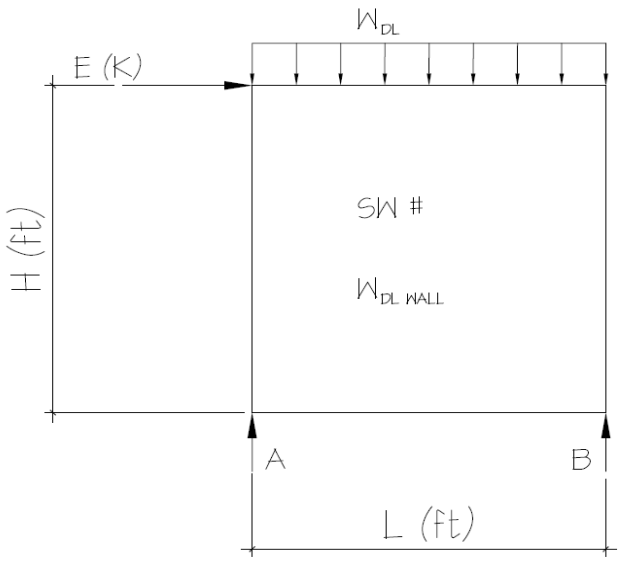
PROJECT NAME: PRATT PLOT LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 23-MAR-20

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
Ω_0 =	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
$E_M = E_{MH} + E_V$		$E_M = E_{MH} + E_V$ =	4.139 K
$E_M = E_{MH} - E_V$		$E_M = E_{MH} - E_V$ =	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 STESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM CALCS FOR LOAD APPLICATION

MULHERN+KULP
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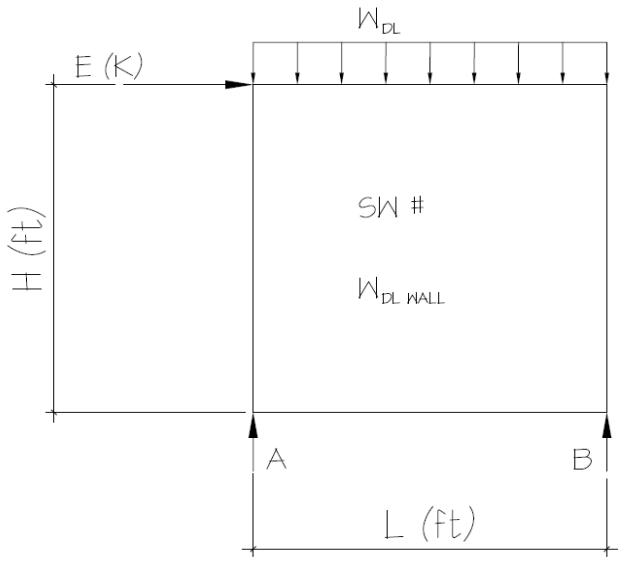
Project Name: Pratt Plot Lot 4
M&K Project #: 203-20001
Engineer: RJZ
Date: 23-Mar-20

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 k	$E_V = 0.2*SDS*DL$ =	0.527 k
$E_M = E_{MH} + E_V$		$E_M = E_{MH} + E_V$ =	4.652 k
$E_M = E_{MH} - E_V$		$E_M = E_{MH} - E_V$ =	3.598 k

E_M (max) $= \sum M_A = 0$ =	4.65(10.0) + 0.2(13.5)(6.75) - RB(13.5)	RB=	1.4DL + 3.4E
		RA=	1.4DL - 3.4E
E_M (min) $= \sum M_A = 0$ =	3.60(10.0) + 0.2(13.5)(6.75) - RB(13.5)	RB=	1.4DL + 2.7E
		RA=	1.4DL - 2.7E

Check beams for axial forces shown using load combos per section 12.4.3.1 (ASD)

Allowable stess permitted to be increased by 1.2

See following beam calcs for load application

Mulhern & Kulp
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

Lic. # : KW-06004787 — Licensee : MULHERN & KULP STRUCTURAL ENGINEERING INC

Description : B7 - Front to back Garage Beam

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

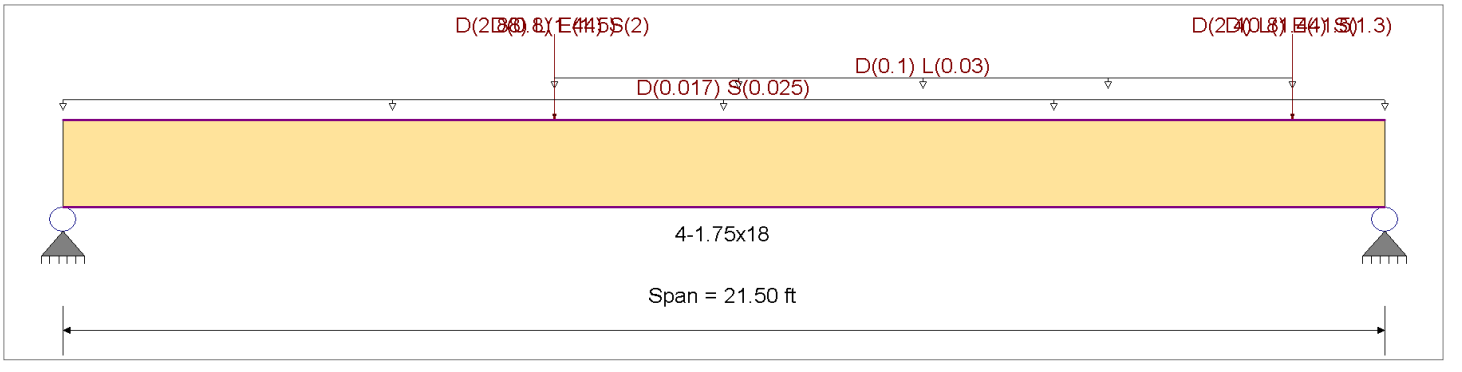
Wood Species : Trus Joist
Wood Grade : MicroLam LVL 2.0 E

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

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

E : Modulus of Elasticity

Ebend- xx	2,000.0 ksi
Eminbend - xx	1,016.54 ksi
Density	42.010 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0170, S = 0.0250 , Tributary Width = 1.0 ft
Uniform Load : D = 0.10, L = 0.030 k/ft, Extent = 8.0 -->> 20.0 ft, Tributary Width = 1.0 ft
Point Load : D = 2.40, L = 1.440, S = 1.30 k @ 20.0 ft
Point Load : D = 2.880, L = 1.440, S = 2.0 k @ 8.0 ft
Point Load : D = 0.80, E = 1.50 k @ 8.0 ft
Point Load : D = 0.80, E = -1.50 k @ 20.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.396 : 1	Maximum Shear Stress Ratio	=	0.269 : 1
Section used for this span		4-1.75x18	Section used for this span		4-1.75x18
fb : Actual	=	1,345.77 psi	fv : Actual	=	92.08 psi
FB : Allowable	=	3,395.50 psi	Fv : Allowable	=	342.00 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+L
Location of maximum on span	=	8.004 ft	Location of maximum on span	=	20.009 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.129 in	Ratio =	2005 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.527 in	Ratio =	489 >=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 M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
D Only													0.00	0.00	0.00	0.00
Length = 21.50 ft	1	0.317	0.218	0.90	0.946	1.00	1.00	1.00	1.00	1.00	26.52	841.95	2657.35	5.63	66.97	307.80
+D+L					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	0.382	0.269	1.00	0.946	1.00	1.00	1.00	1.00	1.00	35.56	1,128.95	2952.61	7.73	92.08	342.00
+D+Lr					0.946	1.00	1.00	1.00	1.00	1.00			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:

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Wood Beam

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Description : B7 - Front to back Garage Beam

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
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		

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:

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Wood Beam

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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

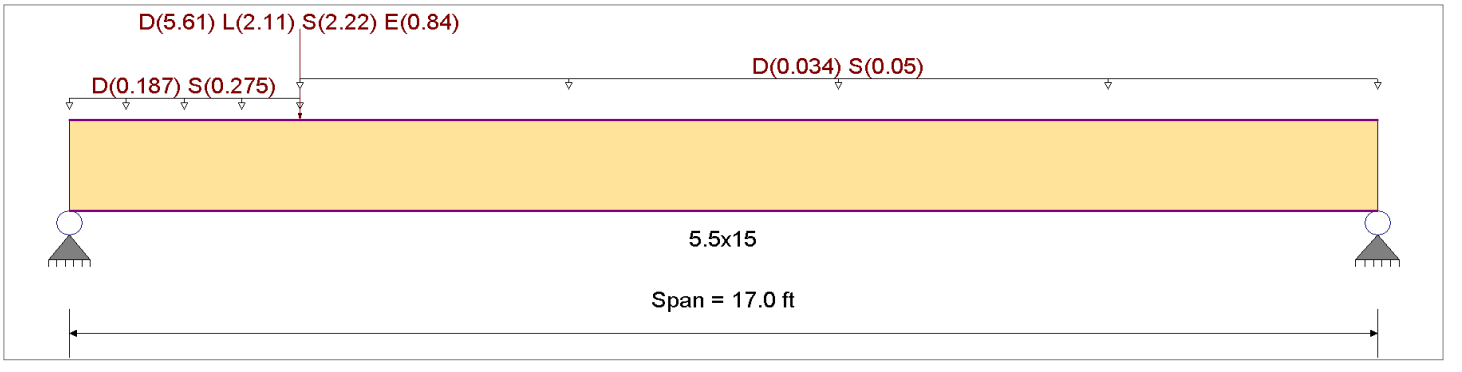
Wood Species : DF/DF
Wood Grade : 24F - V8

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

Fb +	2,880.0 psi
Fb -	2,880.0 psi
Fc - Prll	1,980.0 psi
Fc - Perp	780.0 psi
Fv	318.0 psi
Ft	1,320.0 psi

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight calculated and added to 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 = 0.050 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 M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
D Only													0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.350	0.332	0.90	0.992	1.00	1.00	1.00	1.00	1.00	15.49	901.03	2570.72	5.23	95.00	286.20
+D+L					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	0.421	0.398	1.00	0.992	1.00	1.00	1.00	1.00	1.00	20.68	1,203.46	2856.35	6.96	126.60	318.00
+D+Lr					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	0.252	0.239	1.25	0.992	1.00	1.00	1.00	1.00	1.00	15.49	901.03	3570.44	5.23	95.00	397.50
+D+S					0.992	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Mulhern & Kulp
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20 S. Maple St
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Project Title:
Engineer:
Project ID:
Project Descr:

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Wood Beam

Lic. # : KW-06004787 **Licensee : MULHERN & KULP STRUCTURAL ENGINEERING INC**

Description : B8 - 17' Garage Door Header

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
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
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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

Lic. # : KW-06004787
MULHERN & KULP STRUCTURAL ENGINEERING INC

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

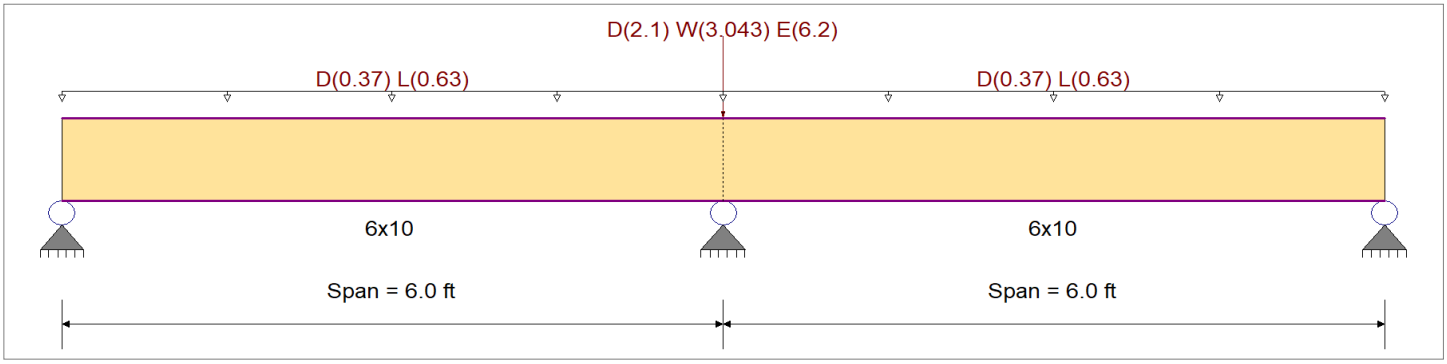
Wood Species : Douglas Fir-Larch
Wood Grade : No.2

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

Fb +	900.0 psi
Fb -	900.0 psi
Fc - Prll	1,350.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	575.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to 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	=	660.12 psi	fv: Actual	=	86.49 psi
Fb: Allowable	=	900.00 psi	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	=	6.000 ft	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 M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
D Only													0.00	0.00	0.00	0.00
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	1.14	32.61	162.00
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	1.14	32.61	162.00
+D+L, LL Comb Run (*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	0.505	0.443	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.13	454.51	900.00	2.78	79.71	180.00
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	2.78	79.71	180.00
+D+L, LL Comb Run (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	0.505	0.443	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.13	454.51	900.00	2.78	79.71	180.00
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	1.37	79.71	180.00

Wood Beam

DESCRIPTION: B19 -Flush Bottom Beam @ Crawl

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+L, LL Comb Run (LL)					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	0.733	0.481	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.55	660.12	900.00	3.01	86.49	180.00
Length = 6.0 ft	2	0.733	0.481	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.55	660.12	900.00	3.01	86.49	180.00
+D+Lr, LL Comb Run (*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	0.221	0.145	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.72	248.90	1125.00	1.14	32.61	225.00
Length = 6.0 ft	2	0.221	0.145	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.72	248.90	1125.00	1.14	32.61	225.00
+D+Lr, LL Comb Run (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	0.221	0.145	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.72	248.90	1125.00	1.14	32.61	225.00
Length = 6.0 ft	2	0.221	0.145	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.72	248.90	1125.00	1.14	32.61	225.00
+D+Lr, LL Comb Run (LL)					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	0.221	0.145	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.72	248.90	1125.00	1.14	32.61	225.00
Length = 6.0 ft	2	0.221	0.145	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.72	248.90	1125.00	1.14	32.61	225.00
+D+S					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	0.240	0.158	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.72	248.90	1035.00	1.14	32.61	207.00
Length = 6.0 ft	2	0.240	0.158	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.72	248.90	1035.00	1.14	32.61	207.00
+D+0.750Lr+0.750L, LL Comb Run (					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	0.358	0.302	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.78	403.11	1125.00	2.37	67.93	225.00
Length = 6.0 ft	2	0.358	0.302	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.78	403.11	1125.00	2.37	67.93	225.00
+D+0.750Lr+0.750L, LL Comb Run (					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	0.358	0.302	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.78	403.11	1125.00	2.37	67.93	225.00
Length = 6.0 ft	2	0.358	0.302	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.78	403.11	1125.00	1.31	67.93	225.00
+D+0.750Lr+0.750L, LL Comb Run (					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	0.495	0.325	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.84	557.32	1125.00	2.54	73.02	225.00
Length = 6.0 ft	2	0.495	0.325	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.84	557.32	1125.00	2.54	73.02	225.00
+D+0.750L+0.750S, LL Comb Run (					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	0.389	0.328	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.78	403.11	1035.00	2.37	67.93	207.00
Length = 6.0 ft	2	0.389	0.328	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.78	403.11	1035.00	2.37	67.93	207.00
+D+0.750L+0.750S, LL Comb Run (					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	0.389	0.328	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.78	403.11	1035.00	2.37	67.93	207.00
Length = 6.0 ft	2	0.389	0.328	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.78	403.11	1035.00	1.31	67.93	207.00
+D+0.750L+0.750S, LL Comb Run (					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	0.538	0.353	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.84	557.32	1035.00	2.54	73.02	207.00
Length = 6.0 ft	2	0.538	0.353	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.84	557.32	1035.00	2.54	73.02	207.00
+D+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	0.173	0.113	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.72	248.90	1440.00	1.14	32.61	288.00
Length = 6.0 ft	2	0.173	0.113	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.72	248.90	1440.00	1.14	32.61	288.00
+1.126D+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	0.195	0.128	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.93	280.26	1440.00	1.28	36.72	288.00
Length = 6.0 ft	2	0.195	0.128	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.93	280.26	1440.00	1.28	36.72	288.00
+1.126D-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	0.195	0.128	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.93	280.26	1440.00	1.28	36.72	288.00
Length = 6.0 ft	2	0.195	0.128	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.93	280.26	1440.00	1.28	36.72	288.00
+D+0.750Lr+0.750L+0.450W, LL Co					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	0.280	0.236	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.78	403.11	1440.00	2.37	67.93	288.00
Length = 6.0 ft	2	0.280	0.236	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.78	403.11	1440.00	2.37	67.93	288.00
+D+0.750Lr+0.750L+0.450W, LL Co					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	0.280	0.236	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.78	403.11	1440.00	2.37	67.93	288.00
Length = 6.0 ft	2	0.280	0.236	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.78	403.11	1440.00	1.31	67.93	288.00
+D+0.750Lr+0.750L+0.450W, LL Co					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	0.387	0.254	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.84	557.32	1440.00	2.54	73.02	288.00
Length = 6.0 ft	2	0.387	0.254	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.84	557.32	1440.00	2.54	73.02	288.00
+D+0.750L+0.750S+0.450W, LL Co					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	0.280	0.236	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.78	403.11	1440.00	2.37	67.93	288.00
Length = 6.0 ft	2	0.280	0.236	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.78	403.11	1440.00	2.37	67.93	288.00
+D+0.750L+0.750S+0.450W, LL Co					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	0.280	0.236	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.78	403.11	1440.00	2.37	67.93	288.00
Length = 6.0 ft	2	0.280	0.236	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.78	403.11	1440.00	1.31	67.93	288.00
+D+0.750L+0.750S+0.450W, LL Co					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	0.387	0.254	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.84	557.32	1440.00	2.54	73.02	288.00
Length = 6.0 ft	2	0.387	0.254	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.84	557.32	1440.00	2.54	73.02	288.00

Title Block Line 1
You can change this area
using the "Settings" menu item
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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

Lic. # : KW-06004787

MULHERN & KULP STRUCTURAL ENGINEERING INC

DESCRIPTION: B19 -Flush Bottom Beam @ Crawl

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+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	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	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	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	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	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	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	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	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	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	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	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	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	1.00	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	1.00	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	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	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	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	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

Wood Beam

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

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Project Name: Pratt Plot - Lot 4
M&K Project #: 203-20001
Engineer: RJZ
Date: 20-Mar-20

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:

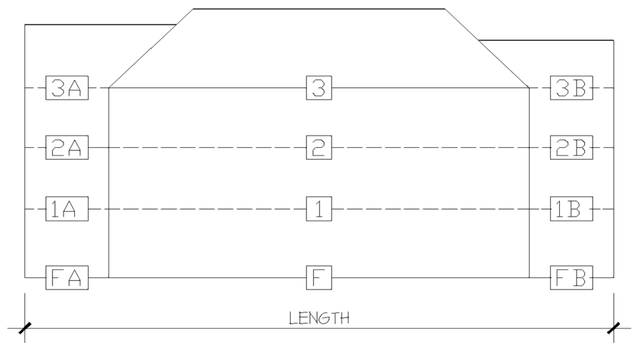
Trans. Roof Pitch	8	:12
Long. Roof Pitch	8	:12
Mean Roof Height, H	25.00	ft

Building Geometry:

length	82	ft
Width	43	ft
Number of stories	2	

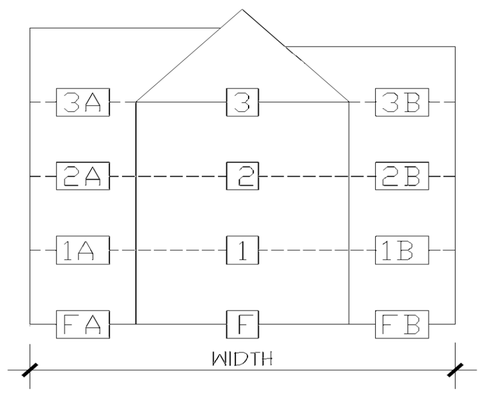
Transverse Direction (Perpendicular to Main Ridge Line)

Diaphragm Level	Floor-to-Floor Height		Tributary Design Areas: Section	A	O	B		Tributary Design Loads: (0.6W) Section	A	O	B	
2	9 ft	Roof Surface		0	288	0	sq ft	Story Shear	0.00	11.54	0.00	kips
		Wall surface		0	450	0	sq ft	Total Shear	0.00	11.54	0.00	kips
										11.54		kips
1	10 ft	Roof Surface		0	120	0	sq ft	Story Shear	0.00	14.90	0.00	kips
		Wall surface		0	788	0	sq ft	Total Shear	0.00	26.44	0.00	kips
										26.44		kips
FND		Roof Surface		0	0	0	sq ft	Story Shear	0.00	0.00	0.00	kips
		Wall surface		0	0	0	sq ft	Total Shear	0.00	26.44	0.00	kips
										26.44		kips



Longitudinal Direction (Parallel to Main Ridge Line)

Diaphragm Level	Floor-to-Floor Height		Tributary Design Areas: Section	A	O	B		Tributary Design Loads: (0.6W) Section	A	O	B	
2	9 ft	Roof Surface		0	268	0	sq ft	Story Shear	0.00	7.30	0.00	kips
		Wall surface		0	240	0	sq ft	Total Shear	0.00	7.30	0.00	kips
										7.30		kips
1	10 ft	Roof Surface		0	0	0	sq ft	Story Shear	0.00	5.63	0.00	kips
		Wall surface		0	390	0	sq ft	Total Shear	0.00	12.93	0.00	kips
										12.93		kips
FND		Roof Surface		0	0	0	sq ft	Story Shear	0.00	0.00	0.00	kips
		Wall surface		0	0	0	sq ft	Total Shear	0.00	12.93	0.00	kips
										12.93		kips



WIND DESIGN

SEISMIC DESIGN

7.3K

11.5K

6.4K

6.4K

3.65K REQ'D
3.95K PROVIDED

#208 3.95K 3.45K

1.1K (110PLF)

20K
#203
(200PLF)

SW #201

1.25K W 0.7K E

see updated plans for added window

#205
2.8K
(207PLF)
1.55K (115PLF)

#204
1.0K
(200PLF)
0.55K (110PLF)

3.65K REQ'D
3.35K PROVIDED

#207
1.65K
(116PLF)
1.45K
(102 PLF)

#206
1.7K
(117PLF)
1.5K
(103PLF)

see updated plans for revised windows

#202
4.45K
2.5K

1.35K REQ'D
1.25 K PROVIDED

5.75K REQ'D
5.8K PROVIDED

4.4K REQ'D
4.45K PROVIDED

UPPER FLOOR PLAN

Scale 1/4"=1'-0"

GENERAL PLAN NOTES

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

FLOOR PLAN KEY NOTES

P-1 OCCUPANCY SEPARATION:
APPLY (1) LAYER OF ½" GWB. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY. APPLY (1) LAYER OF ⅝" TYPE 'X' GWB. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS. DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL
SEE DIV. Ø1ØØ7.6.A. SHEET A-1.

P-2 1⅜" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR
SEE DIV. Ø1ØØ7.6.B. SHEET A-1

P-3 STAIR ASSEMBLY NOTES: PER I.R.C. SECTION R311.5 AND DETAIL 12/D2.
A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".
B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT, RISERS 7¾" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1 1/4" ON STAIRS WITH SOLID RISERS.
C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE 1 CIRCULAR TO HAVE 1¼" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL. RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER I.R.C. TABLE R3Ø15
D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER I.R.C. SECTION R3Ø2.11.
E. COVER USABLE SPACE UNDER STAIR W/ ½" GWB. PER I.R.C. SECTION R3Ø2.7.
F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
G. PROVIDE STAIRWAY ILLUMINATION PER I.R.C. SECTION R3Ø3.6.
SEE DIV. Ø1ØØ7.1 SHEET A-1.

P-4 SAFETY GLAZING PER I.R.C., SECTION R3Ø8
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 6Ø" HORIZ. FROM THE BOT. STAIR TREAD NOSING, (BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE
SEE DIV. Ø8ØØØ SHEET A-1

P-5 EGRESS WINDOW PER I.R.C., SECTION R31Ø
SEE DIV. Ø86ØØ SHEET A-1

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

P-7 COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 72" ABOVE DRAIN INLETS, PER I.R.C. SECTION 3Ø12.
SEE DIV. Ø9250 SHEET A-1

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

P-9 7¾" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER I.R.C. SECTION R311.7.8. SEE DIV. Ø1ØØ2.1 SHEET A-1

P-10 18"x24" CRAWL SPACE ACCESS. INSULATE AND WEATHER STRIP. SEE DIV. Ø1ØØ2.1 SHEET A-1

P-11 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE. INSULATE AND WEATHER STRIP.
SEE DIV. Ø1ØØ2.2 SHEET A-1

P-12 FLOOR MATERIAL BREAK LINE

P-13 WALL LINE ABOVE

P-14 WALL LINE BELOW

P-15 FIREPLACE ASSEMBLY NOTES:
A. DIRECT VENT GAS FIREPLACES, MUST BE LISTED, LABELED INSTALLED PER MFG. SPECIFICATIONS, SHALL CONFORM TO I.R.C.REQUIREMENTS.
SEE DIV. Ø1ØØ2.12 SHEET A-1
B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO I.R.C. REQUIREMENTS. SEE DIV. Ø1ØØ2.12 SHT A-1
C. HEARTH SHALL CONFORM TO I.R.C REQUIREMENT SEE DIV. Ø1ØØ2.12
D. FIREBLOCK OPENINGS AROUND PENETRATIONS @ EACH FLOOR PER I.R.C. SECTION R1ØØ3.19.
E. FIREPLACE MUST COMPLY WITH UL 127 TESTING

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

P-17 3" DIAMETER STEEL POST

P-18 36" GUARDRAIL PER I.R.C. SECTION R312 & TABLE R3Ø15 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 2ØØlb LOAD ON TOP RAIL ACTING IN ANY DIRECTION.

P-19 'B' VENT FOR MECHANICAL. 1" CLEARANCE ALL SIDES PER I.R.C. SECTION R3Ø2.11. 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
09/17/19	SM	PRELIMINARY DESIGN
10/03/19	SM	ELEVATION DESIGN
10/23/19	SM	DESIGN REVISIONS
12/10/19	REY	KITCHEN REVISIONS
1/3/20	SM	ELEVATION DESIGN

Pratt Plat

Lot 4
Mercer Island, WA 98040

7233 80th Ave SE

ARCHITECTURAL INNOVATIONS, P.S.
Forward Thinking Design Solutions For Your Environment
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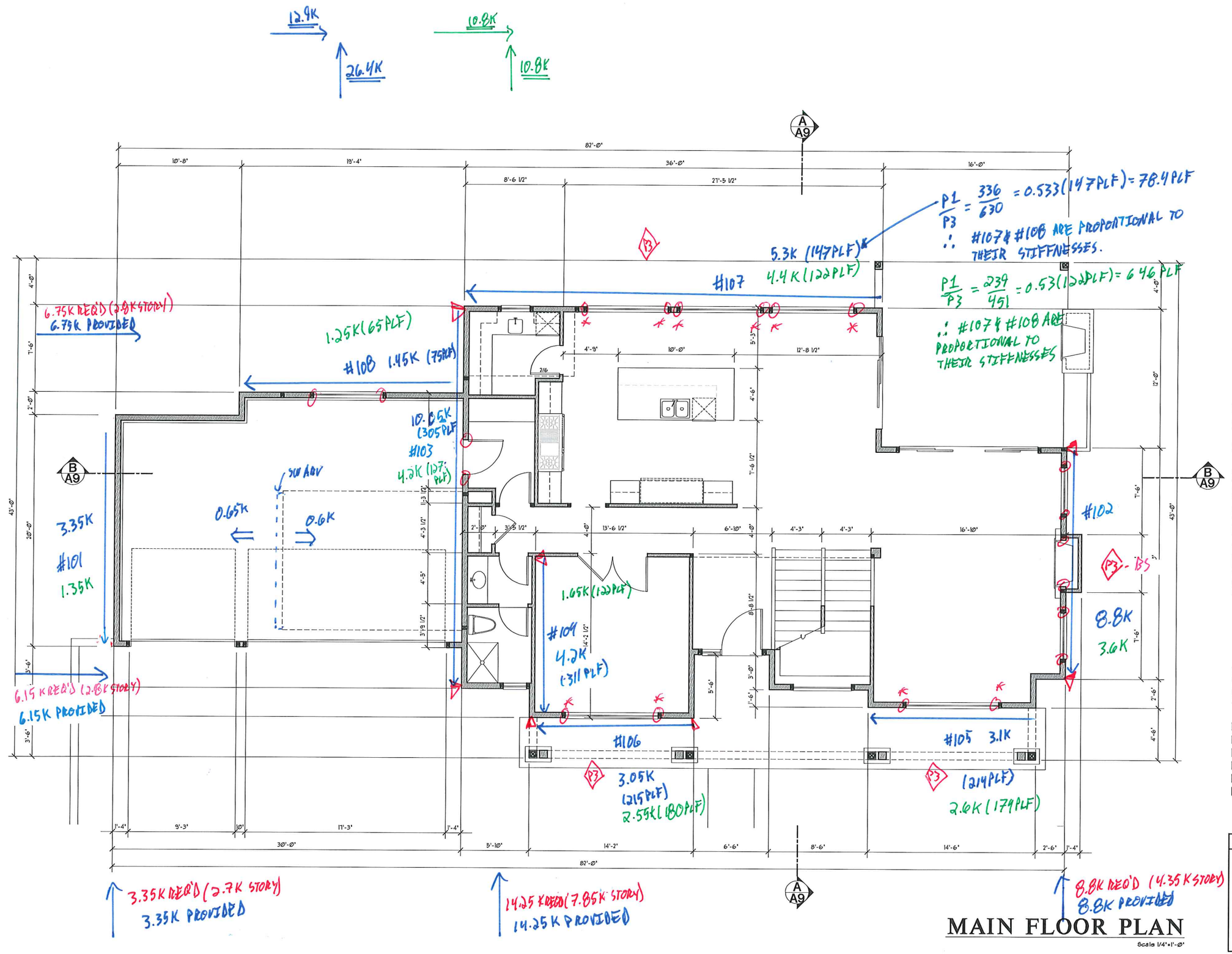
TITLE

JOB NO.: 19037.03
STARTING NO.: 19037.03

SHEET
A5



MAIN FLOOR PLAN

Scale 1/4"=1'-0"

GENERAL PLAN NOTES

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

FLOOR PLAN KEY NOTES

- P-1 OCCUPANCY SEPARATION: APPLY (1) LAYER OF ½" GWB. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY. APPLY (1) LAYER OF ⅝" TYPE 'X' GWB. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS. DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL SEE DIV. 01002.6.A. SHEET A-1.
- P-2 1⅜" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR. SEE DIV. 01002.6.B. SHEET A-1
- P-3 STAIR ASSEMBLY NOTES: PER I.R.C. SECTION R311.5 AND DETAIL 12/D2.
  - A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".
  - B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT, RISERS 7¾" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1 1/4" ON STAIRS WITH SOLID RISERS.
  - C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE 1 CIRCULAR TO HAVE 1¼" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL. RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER I.R.C. TABLE R301.5
  - D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER I.R.C. SECTION R302.11.
  - E. COVER USABLE SPACE UNDER STAIR W/ ½" G.W.B. PER I.R.C. SECTION R302.7.1.
  - F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
  - G. PROVIDE STAIRWAY ILLUMINATION PER I.R.C. SECTION R303.6.

  SEE DIV. 01002.7 SHEET A-1.
- P-4 SAFETY GLAZING PER I.R.C., SECTION R308
  A. WINDOWS WITHIN 18" OF FLOOR
  B. WINDOWS WITHIN A 24" ARC OF DOORS
  C. WINDOWS AT TUBS AND SHOWERS
  D. GLAZING IN DOORS
  E. LESS THAN 60" HORIZ. FROM THE BOT. STAIR TREAD NOSING, & BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE
  SEE DIV. 08800 SHEET A-1
- P-5 EGRESS WINDOW PER I.R.C., SECTION R310 SEE DIV. 08600 SHEET A-1
- P-6 IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1
- P-7 COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 72" ABOVE DRAIN INLETS, PER I.R.C. SECTION 307.2. SEE DIV. 09250 SHEET A-1
- P-8 (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- P-9 7¾" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER I.R.C. SECTION R311.7.8. SEE DIV. 01002.7 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 I.R.C. REQUIREMENTS. SEE DIV. 01002.12 SHEET A-1
  - B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO I.R.C. REQUIREMENTS. SEE DIV. 01002.12 SHT A-1
  - C. HEARTH SHALL CONFORM TO I.R.C. REQUIREMENT SEE DIV. 01002.12
  - D. FIREBLOCK OPENINGS AROUND PENETRATIONS @ EACH FLOOR PER I.R.C. SECTION R1003.19.
  - E. FIREPLACE MUST COMPLY WITH UL 127 TESTING
- P-16 SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS
- P-17 3" DIAMETER STEEL POST
- P-18 36" GUARDRAIL PER I.R.C. SECTION R312 & TABLE R301.5 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 200lb LOAD ON TOP RAIL ACTING IN ANY DIRECTION.
- P-19 'B' VENT FOR MECHANICAL, 1" CLEARANCE ALL SIDES PER I.R.C. SECTION R302.11. SEE DIV. 15 SHEET A-1
- P-20 PLANT SHELF
- P-21 UPPER AND LOWER LINEN CABINETS
- P-22 SOFFIT AREA
- P-23 INTEGRATED MAKE UP AIR
- P-24 2x6 STUDS W/ R-21 INSULATION MIN.

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

Date	By	Description
09/17/19	SM	PRELIMINARY DESIGN
10/03/19	SM	ELEVATION DESIGN
10/23/19	SM	DESIGN REVISIONS
12/17/19	REV	KITCHEN REVISIONS
1/3/20	SM	ELEVATION DESIGN

Pratt Plat

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

ARCHITECTURAL INNOVATIONS, P.S.
Forward Thinking Design Solutions For Your Environment
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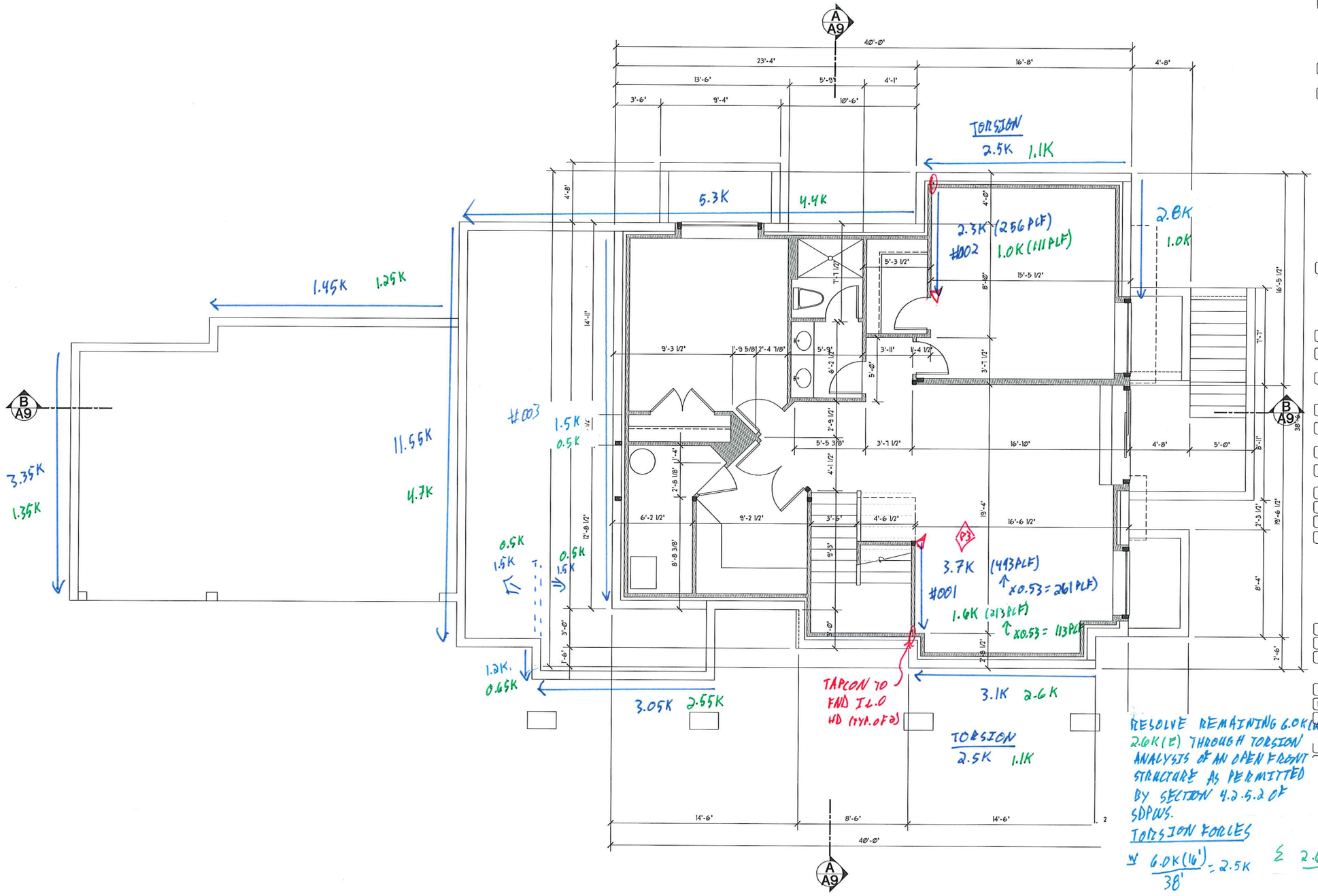
TITLE

JOB NO.: 19037.03
STARTING NO.: 19037.03

SHEET
A3



LOWER FLOOR PLAN

Scale 1/4"=1'-0"

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

W $\frac{6.0K(16')}{38'} = 2.5K$ E $\frac{2.6K(16')}{38'} = 1.1K$

GENERAL PLAN NOTES

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

FLOOR PLAN KEY NOTES

- P-1 OCCUPANCY SEPARATION: APPLY (1) LAYER OF ½" GWB. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY. APPLY (1) LAYER OF ⅝" TYPE 'X' GWB. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS. DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL SEE DIV. 01002.6.A. SHEET A-1.
- P-2 1⅜" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR SEE DIV. 01002.6.B. SHEET A-1
- P-3 STAIR ASSEMBLY NOTES: PER I.R.C. SECTION R311.5 AND DETAIL 11/D2.
  - A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".
  - B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT, RISERS 7¾" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1 1/4" ON STAIRS WITH SOLID RISERS.
  - C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE 1 CIRCULAR TO HAVE 1¼" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL, RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER I.R.C. TABLE R301.5
  - D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER I.R.C. SECTION R302.11.
  - E. COVER USABLE SPACE UNDER STAIR W/ ½" G.W.B. PER I.R.C. SECTION R302.7.1.
  - F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
  - G. PROVIDE STAIRWAY ILLUMINATION PER I.R.C. SECTION R303.6.

  SEE DIV. 01002.1 SHEET A-1.
- P-4 SAFETY GLAZING PER I.R.C. SECTION R308
  - A. WINDOWS WITHIN 18" OF FLOOR
  - B. WINDOWS WITHIN A 24" ARC OF DOORS
  - C. WINDOWS AT TUBS AND SHOWERS
  - D. GLAZING IN DOORS
  - E. LESS THAN 60" HORIZ. FROM THE BOT. STAIR TREAD NOSING, I BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE

  SEE DIV. 08800 SHEET A-1
- P-5 EGRESS WINDOW PER I.R.C. SECTION R310 SEE DIV. 08600 SHEET A-1
- P-6 IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1
- P-7 COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 72" ABOVE DRAIN INLETS PER I.R.C. SECTION 3012. SEE DIV. 09250 SHEET A-1
- P-8 (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- P-9 7¾" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER I.R.C. SECTION R311.7.8. SEE DIV. 01002.1 SHEET A-1
- P-10 18"x24" CRAWL SPACE ACCESS. INSULATE AND WEATHER STRIP. SEE DIV. 01002.1 SHEET A-1
- P-11 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE. INSULATE AND WEATHER STRIP. SEE DIV. 01002.12 SHEET A-1
- P-12 FLOOR MATERIAL BREAK LINE
- P-13 WALL LINE ABOVE
- P-14 WALL LINE BELOW
- P-15 FIREPLACE ASSEMBLY NOTES:
  - A. DIRECT VENT GAS FIREPLACES, MUST BE LISTED, LABELED &INSTALLED PER MFG. SPECIFICATIONS, SHALL CONFORM TO I.R.C.REQUIREMENTS. SEE DIV. 01002.12 SHEET A-1
  - B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO I.R.C. REQUIREMENTS. SEE DIV. 01002.12 SHT A-1
  - C. HEARTH SHALL CONFORM TO I.R.C REQUIREMENT SEE DIV. 01002.12
  - D. FIREBLOCK OPENINGS AROUND PENETRATIONS @ EACH FLOOR PER I.R.C. SECTION R1003.19.
  - E. FIREPLACE MUST COMPLY WITH UL 127 TESTING
- P-16 SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS
- P-17 3" DIAMETER STEEL POST
- P-18 36" GUARDRAIL PER I.R.C. SECTION R312 & TABLE R301.5 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 200lb LOAD ON TOP RAIL ACTING IN ANY DIRECTION.
- P-19 'B' VENT FOR MECHANICAL. 1" CLEARANCE ALL SIDES PER I.R.C. SECTION R302.11. SEE DIV. 15 SHEET A-1
- P-20 PLANT SHELF
- P-21 UPPER AND LOWER LINEN CABINETS
- P-22 SOFFIT AREA
- P-23 INTEGRATED MAKE UP AIR
- ·24 2x6 STUDS W/ R-21 INSULATION MIN.

Date	By	Description
09/17/19	SM	PRELIMINARY DESIGN
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TITLE

JOB NO.: 19037.05
STARTING NO.: 19037.03

SHEET

A2.1

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	7.0	FT.	QUALIFYING WALL LENGTH, L	7.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1250 LBS	<	2352 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	134	PLF	OVERTURNING MOMENT	11.3	K-FT	HOLD DOWN DESIGN LOAD	1326	LBS
DL AT ENDS OF WALL	0	LBS	RESISTIVE MOMENT	2.0	K-FT	HOLDOWN CAPACITY	1705	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	9.0	FT.	MAX WALL OPENING HT, Hc	5.0	FT.		
WALL LENGTH, L	38.5	FT.	QUALIFYING WALL LENGTH, L	32.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
4450 LBS	<	10920 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	134	PLF	OVERTURNING MOMENT	40.1	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	68.8	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	10.0	FT.	QUALIFYING WALL LENGTH, L	10.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
2000 LBS	<	3360 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	134	PLF	OVERTURNING MOMENT	18.0	K-FT	UPLIFT CONNECTOR DESIGN LOAD	1158	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	6.4	K-FT	HOLDOWN CAPACITY	1705	LBS

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	5.0	FT.	QUALIFYING WALL LENGTH, L	5.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1000 LBS	<	1680 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	134	PLF	OVERTURNING MOMENT	9.0	K-FT	HOLD DOWN DESIGN LOAD	1359	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	2.2	K-FT	HOLDOWN CAPACITY	1705	LBS

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	13.5	FT.	QUALIFYING WALL LENGTH, L	13.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
2800 LBS	<	4536 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	100	PLF	OVERTURNING MOMENT	25.2	K-FT	UPLIFT CONNECTOR DESIGN LOAD	1222	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	8.7	K-FT	HOLDOWN CAPACITY	1705	LBS

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, Hc	5.5	FT.		
WALL LENGTH, L	14.5	FT.	QUALIFYING WALL LENGTH, L	6.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1700 LBS	<	2184 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	134	PLF	OVERTURNING MOMENT	15.3	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	15.4	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, H_c	5.5	FT.		
WALL LENGTH, L	14.2	FT.	QUALIFYING WALL LENGTH, L	6.2	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1650 LBS	<	2083 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	134	PLF	OVERTURNING MOMENT	14.9	K-FT	UPLIFT CONNECTOR DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	14.9	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, Hc	6.0	FT.		
WALL LENGTH, L	18.0	FT.	QUALIFYING WALL LENGTH, L	16.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
3950 LBS	<	5376 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	380	PLF	OVERTURNING MOMENT	35.6	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	0	LBS	RESISTIVE MOMENT	36.9	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

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

CAPACITY EVALUATION:

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

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	8.0	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	20.0	FT.	QUALIFYING WALL LENGTH, L	20.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
3350 LBS	<	6720 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	134	PLF	OVERTURNING MOMENT	26.8	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	1080	LBS	RESISTIVE MOMENT	29.0	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
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PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_c	7.0	FT.		
WALL LENGTH, L	20.0	FT.	QUALIFYING WALL LENGTH, L	8.0	FT.	SHEARWALL ASSEMBLY	P3-BS

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
8800 LBS	<	9072 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	234	PLF	OVERTURNING MOMENT	88.0	K-FT	UPLIFT CONNECTOR DESIGN LOAD	2516	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	37.7	K-FT	HOLDOWN CAPACITY	4645	LBS

HOLD-DOWN SPECIFICATION

SIMPSON MSTC66 STRAP TIE (20" END LENGTH)

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	8.0	FT.		
WALL LENGTH, L	33.0	FT.	QUALIFYING WALL LENGTH, L	30.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
10050 LBS	<	10080 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	130	PLF	OVERTURNING MOMENT	100.5	K-FT	HOLD DOWN DESIGN LOAD	1278	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	58.3	K-FT	HOLDOWN CAPACITY	4935	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	13.5	FT.	QUALIFYING WALL LENGTH, L	13.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
4200 LBS	<	4536 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	200	PLF	OVERTURNING MOMENT	58.5	K-FT	UPLIFT CONNECTOR DESIGN LOAD	3043	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	17.4	K-FT	HOLDOWN CAPACITY	4645	LBS

HOLD-DOWN SPECIFICATION

SIMPSON MSTC66 STRAP TIE (20" END LENGTH)

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	6.0	FT.		
WALL LENGTH, L	14.5	FT.	QUALIFYING WALL LENGTH, L	6.5	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
3100 LBS	<	4095 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	399	PLF	OVERTURNING MOMENT	31.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	32.1	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_c	6.0	FT.		
WALL LENGTH, L	14.2	FT.	QUALIFYING WALL LENGTH, L	6.2	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
3050 LBS	<	3906 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	340	PLF	OVERTURNING MOMENT	30.5	K-FT	UPLIFT CONNECTOR DESIGN LOAD	219	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	27.4	K-FT	HOLDOWN CAPACITY	4935	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	8.0	FT.		
WALL LENGTH, L	36.0	FT.	QUALIFYING WALL LENGTH, L	10.8	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
5300 LBS	<	6536 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	151	PLF	OVERTURNING MOMENT	53.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	67.3	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	11.0	FT.	MAX WALL OPENING HT, H_c	4.0	FT.		
WALL LENGTH, L	19.3	FT.	QUALIFYING WALL LENGTH, L	13.3	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1450 LBS	<	4479 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	168	PLF	OVERTURNING MOMENT	16.0	K-FT	UPLIFT CONNECTOR DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	23.5	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

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

CAPACITY EVALUATION:

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

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

SHEARWALL 1: BASEMENT - SIDE INT. WALL @ STAIRS

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	11.0	FT.	QUALIFYING WALL LENGTH, L	11.0	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
3700 LBS	<	6930 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	100	PLF	OVERTURNING MOMENT	33.3	K-FT	UPLIFT CONNECTOR DESIGN LOAD	2217	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	8.9	K-FT	HOLDOWN CAPACITY	4935	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	9.0	FT.	QUALIFYING WALL LENGTH, L	9.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
2300 LBS	<	3024 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	100	PLF	OVERTURNING MOMENT	20.7	K-FT	HOLD DOWN DESIGN LOAD	2030	LBS
DL AT ENDS OF WALL	0	LBS	RESISTIVE MOMENT	2.4	K-FT	HOLDOWN CAPACITY	4935	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	5.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	29.0	FT.	QUALIFYING WALL LENGTH, L	29.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1500 LBS	<	9744 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	100	PLF	OVERTURNING MOMENT	7.5	K-FT	UPLIFT CONNECTOR DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	0	LBS	RESISTIVE MOMENT	25.2	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

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

CAPACITY EVALUATION:

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

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

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

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

Project Name: Pratt Plot - Lot 4
Arch Innovations
M&K Project #: 203-20001
Engineer: RJZ
Date: 20-Mar-20

SEISMIC CALCULATION - ASCE 7-10

Seismic Design Category:

User Inputs:

Site Class	D
Spectral Response Acceleration 0.2 sec, **Ss**	1.464
Spectral Response Acceleration 1.0 sec, **S1**	0.559
Occupancy Category	II

Variables:

Site coefficient, Fa	1.00
Site coefficient, Fv	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_s	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
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				x 0.7 =	Allowable Loads			
Transverse		Longitudinal			Transverse		Longitudinal	
15	k	15	k		11	k	11	k

Story Shear Calculation:

Distribution exponen 1.00

		Ultimate Loads			x 0.7 =	Allowable Loads			
		Transverse	Longitudinal		Transverse		Longitudinal	
Level	Vert. Dist. Factor, C_{vx}	*Story Shear, F_x*	*Story Shear, F_x*		*Story Shear, F_x*	*Σ Story Shear*	*Story Shear, F_x*	*Σ Story Shear*
1	0.403	6.2 k	6.2 k		4.4 k	10.8 k	4.4 k	10.8 k
2	0.597	9.2 k	9.2 k		6.4 k	6.4 k	6.4 k	6.4 k
3	0.000	0.0 k	0.0 k		0.0 k	0.0 k	0.0 k	0.0 k
4	0.000	0.0 k	0.0 k		0.0 k	0.0 k	0.0 k	0.0 k
5	0.00	0.0 k	0.0 k		0.0 k	0.0 k	0.0 k	0.0 k
6	0.00	0.0 k	0.0 k		0.0 k	0.0 k	0.0 k	0.0 k
7	0.00	0.0 k	0.0 k		0.0 k	0.0 k	0.0 k	0.0 k
8	0.00	0.0 k	0.0 k		0.0 k	0.0 k	0.0 k	0.0 k
9	0.00	0.0 k	0.0 k		0.0 k	0.0 k	0.0 k	0.0 k
10	0.00	0.0 k	0.0 k		0.0 k	0.0 k	0.0 k	0.0 k

WIND DESIGN

SEISMIC DESIGN

7.3K

11.5K

6.4K

6.4K

3.65K REQ'D
3.95K PROVIDED

#208 3.95K 3.45K

1.1K (110PLF)

20K
#203
(200PLF)

SW #201

1.25K W 0.7K E

see updated plans for added window

#205
2.8K
(207PLF)
1.55K (115PLF)

#204
1.0K
(200PLF)
0.55K (110PLF)

3.65K REQ'D
3.35K PROVIDED

#207
1.65K
(116PLF)
1.45K
(102 PLF)

#206
1.7K
(117PLF)
1.5K
(103PLF)

see updated plans for revised windows

#202
4.45K
2.5K

1.35K REQ'D
1.25 K PROVIDED

5.75K REQ'D
5.8K PROVIDED

4.4K REQ'D
4.45K PROVIDED

UPPER FLOOR PLAN

Scale 1/4"=1'-0"

GENERAL PLAN NOTES

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

FLOOR PLAN KEY NOTES

P-1 OCCUPANCY SEPARATION:
APPLY (1) LAYER OF ½" GWB. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY. APPLY (1) LAYER OF ⅝" TYPE 'X' GWB. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS. DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL
SEE DIV. Ø1ØØ7.6.A. SHEET A-1.

P-2 1⅜" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR
SEE DIV. Ø1ØØ7.6.B. SHEET A-1

P-3 STAIR ASSEMBLY NOTES: PER I.R.C. SECTION R311.5 AND DETAIL 12/D2.
A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".
B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT, RISERS 7¾" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1 1/4" ON STAIRS WITH SOLID RISERS.
C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE 1 CIRCULAR TO HAVE 1¼" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL. RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER I.R.C. TABLE R3Ø15
D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER I.R.C. SECTION R3Ø2.11.
E. COVER USABLE SPACE UNDER STAIR W/ ½" GWB. PER I.R.C. SECTION R3Ø2.7.
F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
G. PROVIDE STAIRWAY ILLUMINATION PER I.R.C. SECTION R3Ø3.6.
SEE DIV. Ø1ØØ7.1 SHEET A-1.

P-4 SAFETY GLAZING PER I.R.C., SECTION R3Ø8
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 6Ø" HORIZ. FROM THE BOT. STAIR TREAD NOSING, (BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE
SEE DIV. Ø8ØØØ SHEET A-1

P-5 EGRESS WINDOW PER I.R.C., SECTION R31Ø
SEE DIV. Ø86ØØ SHEET A-1

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

P-7 COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 72" ABOVE DRAIN INLETS, PER I.R.C. SECTION 3Ø12.
SEE DIV. Ø9250 SHEET A-1

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

P-9 7¾" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER I.R.C. SECTION R311.7.8. SEE DIV. Ø1ØØ2.1 SHEET A-1

P-10 18"x24" CRAWL SPACE ACCESS. INSULATE AND WEATHER STRIP. SEE DIV. Ø1ØØ2.1 SHEET A-1

P-11 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE. INSULATE AND WEATHER STRIP.
SEE DIV. Ø1ØØ2.2 SHEET A-1

P-12 FLOOR MATERIAL BREAK LINE

P-13 WALL LINE ABOVE

P-14 WALL LINE BELOW

P-15 FIREPLACE ASSEMBLY NOTES:
A. DIRECT VENT GAS FIREPLACES, MUST BE LISTED, LABELED INSTALLED PER MFG. SPECIFICATIONS, SHALL CONFORM TO I.R.C.REQUIREMENTS.
SEE DIV. Ø1ØØ2.12 SHEET A-1
B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO I.R.C. REQUIREMENTS. SEE DIV. Ø1ØØ2.12 SHT A-1
C. HEARTH SHALL CONFORM TO I.R.C REQUIREMENT SEE DIV. Ø1ØØ2.12
D. FIREBLOCK OPENINGS AROUND PENETRATIONS @ EACH FLOOR PER I.R.C. SECTION R1ØØ3.19.
E. FIREPLACE MUST COMPLY WITH UL 127 TESTING

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

P-17 3" DIAMETER STEEL POST

P-18 36" GUARDRAIL PER I.R.C. SECTION R312 & TABLE R3Ø15 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 2ØØlb LOAD ON TOP RAIL ACTING IN ANY DIRECTION.

P-19 'B' VENT FOR MECHANICAL. 1" CLEARANCE ALL SIDES PER I.R.C. SECTION R3Ø2.11. 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
09/17/19	SM	PRELIMINARY DESIGN
10/03/19	SM	ELEVATION DESIGN
10/23/19	SM	DESIGN REVISIONS
12/10/19	REY	KITCHEN REVISIONS
1/3/20	SM	ELEVATION DESIGN

Pratt Plat

Lot 4
Mercer Island, WA 98040

7233 80th Ave SE

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Forward Thinking Design Solutions For Your Environment
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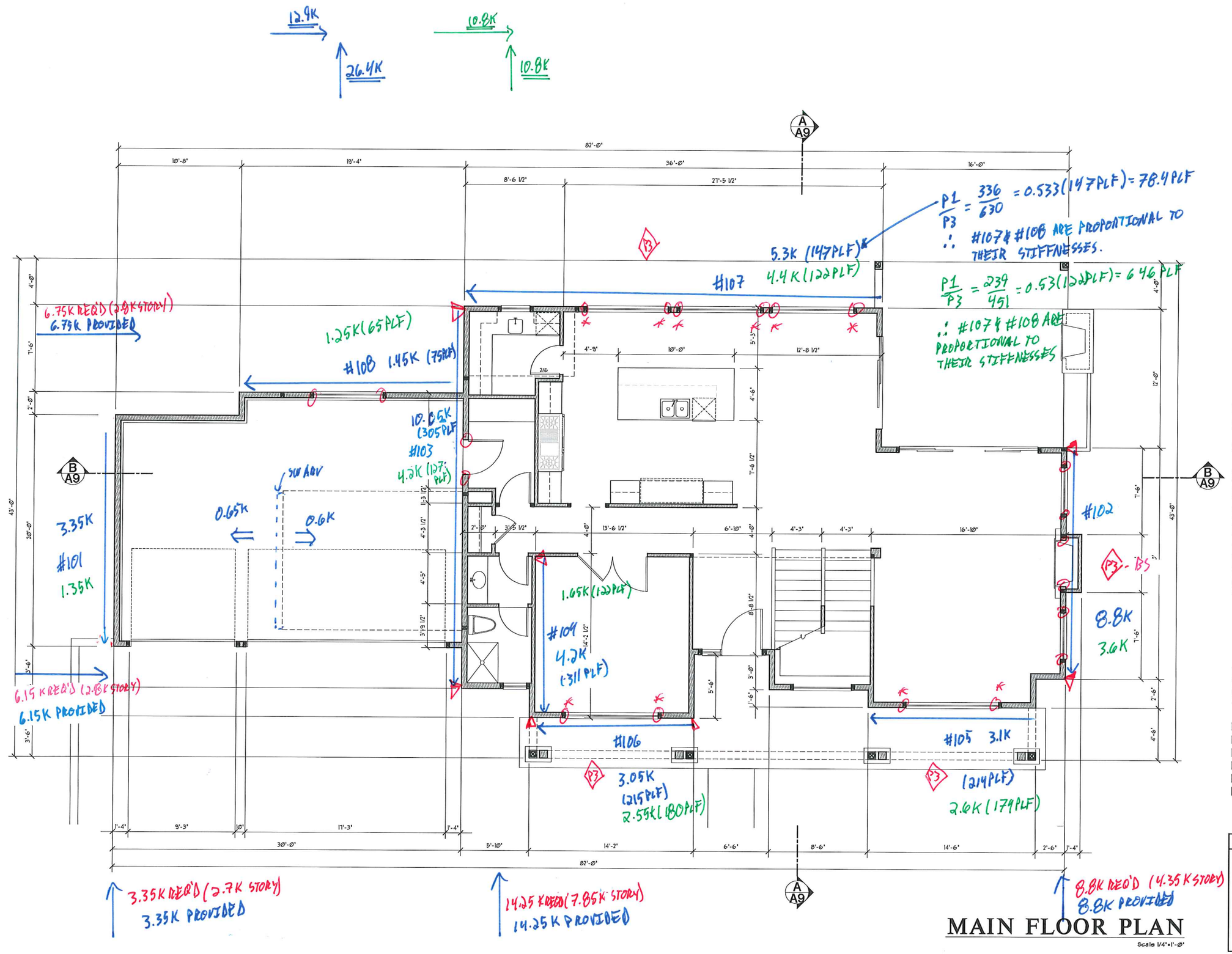
TITLE

JOB NO.: 19037.03
STARTING NO.: 19037.03

SHEET
A5



MAIN FLOOR PLAN

Scale 1/4"=1'-0"

GENERAL PLAN NOTES

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

FLOOR PLAN KEY NOTES

- P-1 OCCUPANCY SEPARATION: APPLY (1) LAYER OF ½" GWB. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY. APPLY (1) LAYER OF ⅝" TYPE 'X' GWB. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS. DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL SEE DIV. 01002.6.A. SHEET A-1.
- P-2 1⅜" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR. SEE DIV. 01002.6.B. SHEET A-1
- P-3 STAIR ASSEMBLY NOTES: PER I.R.C. SECTION R311.5 AND DETAIL 12/D2.
  - A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".
  - B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT, RISERS 7¾" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1 1/4" ON STAIRS WITH SOLID RISERS.
  - C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE 1 CIRCULAR TO HAVE 1¼" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL. RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER I.R.C. TABLE R301.5
  - D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER I.R.C. SECTION R302.11.
  - E. COVER USABLE SPACE UNDER STAIR W/ ½" G.W.B. PER I.R.C. SECTION R302.7.1.
  - F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
  - G. PROVIDE STAIRWAY ILLUMINATION PER I.R.C. SECTION R303.6.

  SEE DIV. 01002.7 SHEET A-1.
- P-4 SAFETY GLAZING PER I.R.C., SECTION R308
  A. WINDOWS WITHIN 18" OF FLOOR
  B. WINDOWS WITHIN A 24" ARC OF DOORS
  C. WINDOWS AT TUBS AND SHOWERS
  D. GLAZING IN DOORS
  E. LESS THAN 60" HORIZ. FROM THE BOT. STAIR TREAD NOSING, & BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE
  SEE DIV. 08800 SHEET A-1
- P-5 EGRESS WINDOW PER I.R.C., SECTION R310 SEE DIV. 08600 SHEET A-1
- P-6 IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1
- P-7 COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 72" ABOVE DRAIN INLETS, PER I.R.C. SECTION 307.2. SEE DIV. 09250 SHEET A-1
- P-8 (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- P-9 7¾" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER I.R.C. SECTION R311.7.8. SEE DIV. 01002.7 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 I.R.C. REQUIREMENTS. SEE DIV. 01002.12 SHEET A-1
  - B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO I.R.C. REQUIREMENTS. SEE DIV. 01002.12 SHT A-1
  - C. HEARTH SHALL CONFORM TO I.R.C. REQUIREMENT SEE DIV. 01002.12
  - D. FIREBLOCK OPENINGS AROUND PENETRATIONS @ EACH FLOOR PER I.R.C. SECTION R1003.19.
  - E. FIREPLACE MUST COMPLY WITH UL 127 TESTING
- P-16 SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS
- P-17 3" DIAMETER STEEL POST
- P-18 36" GUARDRAIL PER I.R.C. SECTION R312 & TABLE R301.5 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 200lb LOAD ON TOP RAIL ACTING IN ANY DIRECTION.
- P-19 'B' VENT FOR MECHANICAL, 1" CLEARANCE ALL SIDES PER I.R.C. SECTION R302.11. SEE DIV. 15 SHEET A-1
- P-20 PLANT SHELF
- P-21 UPPER AND LOWER LINEN CABINETS
- P-22 SOFFIT AREA
- P-23 INTEGRATED MAKE UP AIR
- P-24 2x6 STUDS W/ R-21 INSULATION MIN.

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

Date	By	Description
09/17/19	SM	PRELIMINARY DESIGN
10/03/19	SM	ELEVATION DESIGN
10/23/19	SM	DESIGN REVISIONS
12/17/19	REV	KITCHEN REVISIONS
1/3/20	SM	ELEVATION DESIGN

Pratt Plat

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7233 80th Ave SE Mercer Island, WA 98040

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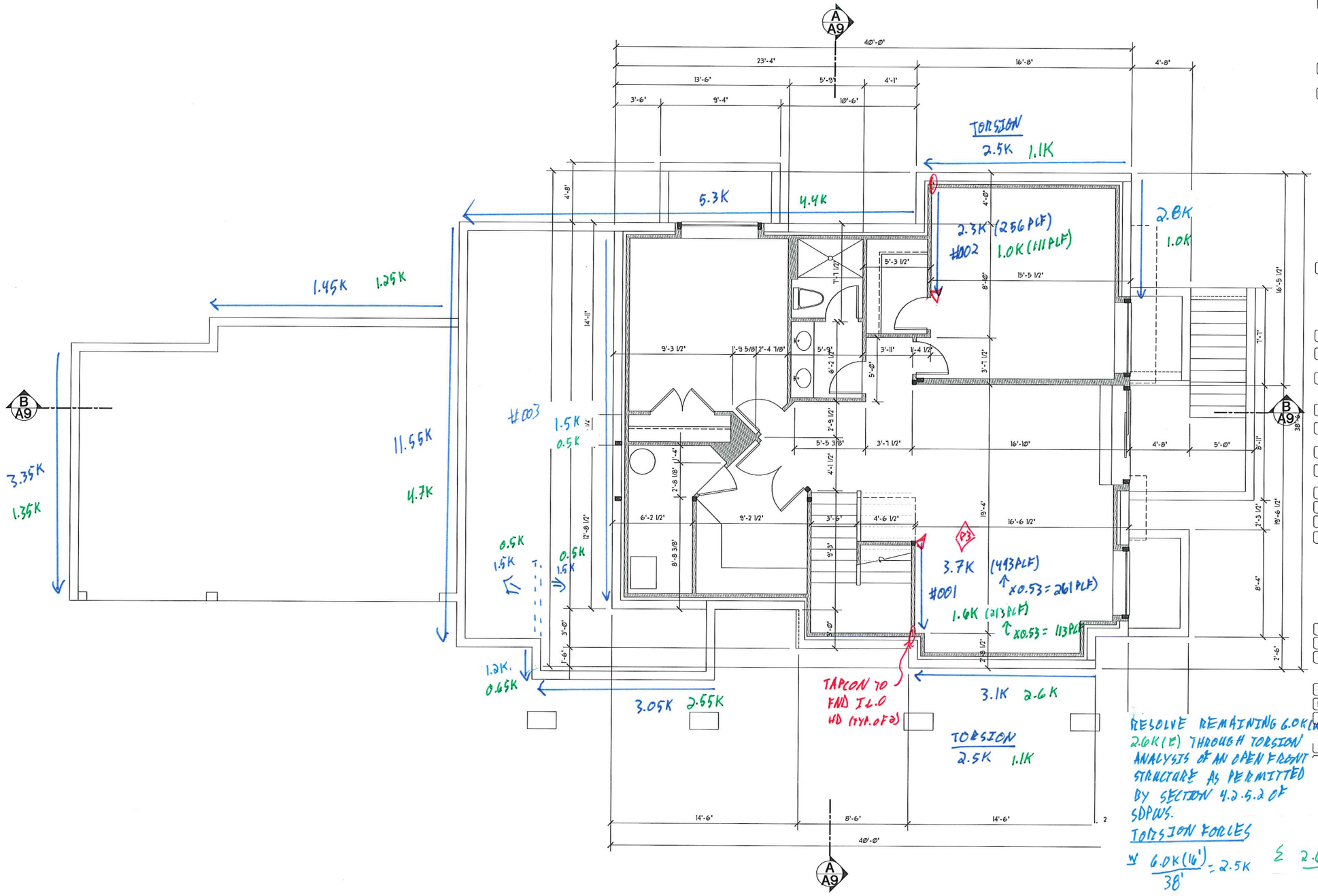
TITLE

JOB NO.: 19037.03
STARTING NO.: 19037.03

SHEET
A3



LOWER FLOOR PLAN

Scale 1/4"=1'-0"

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

W $\frac{6.0K(16')}{38'} = 2.5K$ E $\frac{2.6K(16')}{38'} = 1.1K$

GENERAL PLAN NOTES

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

FLOOR PLAN KEY NOTES

- P-1 OCCUPANCY SEPARATION: APPLY (1) LAYER OF ½" GWB. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY. APPLY (1) LAYER OF ⅝" TYPE 'X' GWB. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS. DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL SEE DIV. 01002.6.A. SHEET A-1.
- P-2 1⅜" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR SEE DIV. 01002.6.B. SHEET A-1
- P-3 STAIR ASSEMBLY NOTES: PER I.R.C. SECTION R311.5 AND DETAIL 11/D2.
  - A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".
  - B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT, RISERS 7¾" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1 1/4" ON STAIRS WITH SOLID RISERS.
  - C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE 1 CIRCULAR TO HAVE 1¼" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL, RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER I.R.C. TABLE R301.5
  - D. INSTALL FIRE BLOCKING BETWEEN STRINGERS AT THE TOP AND BOTTOM OF EACH RUN PER I.R.C. SECTION R302.11.
  - E. COVER USABLE SPACE UNDER STAIR W/ ½" G.W.B. PER I.R.C. SECTION R302.7.1.
  - F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.
  - G. PROVIDE STAIRWAY ILLUMINATION PER I.R.C. SECTION R303.6.

  SEE DIV. 01002.1 SHEET A-1.
- P-4 SAFETY GLAZING PER I.R.C. SECTION R308
  - A. WINDOWS WITHIN 18" OF FLOOR
  - B. WINDOWS WITHIN A 24" ARC OF DOORS
  - C. WINDOWS AT TUBS AND SHOWERS
  - D. GLAZING IN DOORS
  - E. LESS THAN 60" HORIZ. FROM THE BOT. STAIR TREAD NOSING, I BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE

  SEE DIV. 08800 SHEET A-1
- P-5 EGRESS WINDOW PER I.R.C. SECTION R310 SEE DIV. 08600 SHEET A-1
- P-6 IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1
- P-7 COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 72" ABOVE DRAIN INLETS PER I.R.C. SECTION 3012. SEE DIV. 09250 SHEET A-1
- P-8 (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- P-9 7¾" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER I.R.C. SECTION R311.7.8. SEE DIV. 01002.1 SHEET A-1
- P-10 18"x24" CRAWL SPACE ACCESS. INSULATE AND WEATHER STRIP. SEE DIV. 01002.1 SHEET A-1
- P-11 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE. INSULATE AND WEATHER STRIP. SEE DIV. 01002.12 SHEET A-1
- P-12 FLOOR MATERIAL BREAK LINE
- P-13 WALL LINE ABOVE
- P-14 WALL LINE BELOW
- P-15 FIREPLACE ASSEMBLY NOTES:
  - A. DIRECT VENT GAS FIREPLACES, MUST BE LISTED, LABELED &INSTALLED PER MFG. SPECIFICATIONS, SHALL CONFORM TO I.R.C.REQUIREMENTS. SEE DIV. 01002.12 SHEET A-1
  - B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO I.R.C. REQUIREMENTS. SEE DIV. 01002.12 SHT A-1
  - C. HEARTH SHALL CONFORM TO I.R.C REQUIREMENT SEE DIV. 01002.12
  - D. FIREBLOCK OPENINGS AROUND PENETRATIONS @ EACH FLOOR PER I.R.C. SECTION R1003.19.
  - E. FIREPLACE MUST COMPLY WITH UL 127 TESTING
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- P-19 'B' VENT FOR MECHANICAL. 1" CLEARANCE ALL SIDES PER I.R.C. SECTION R302.11. SEE DIV. 15 SHEET A-1
- P-20 PLANT SHELF
- P-21 UPPER AND LOWER LINEN CABINETS
- P-22 SOFFIT AREA
- P-23 INTEGRATED MAKE UP AIR
- ·24 2x6 STUDS W/ R-21 INSULATION MIN.

Date	By	Description
09/17/19	SM	PRELIMINARY DESIGN
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1-800-888-4517
www.kaplerhomeplans.com

TITLE

JOB NO.: 19037.05
STARTING NO.: 19037.03

SHEET

A2.1

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	7.0	FT.	QUALIFYING WALL LENGTH, L	7.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
700 LBS	<	1673 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	134	PLF	OVERTURNING MOMENT	6.3	K-FT	HOLD DOWN DESIGN LOAD	684	LBS
DL AT ENDS OF WALL	0	LBS	RESISTIVE MOMENT	1.5	K-FT	HOLDOWN CAPACITY	1705	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	9.0	FT.	MAX WALL OPENING HT, Hc	5.0	FT.		
WALL LENGTH, L	38.5	FT.	QUALIFYING WALL LENGTH, L	32.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
2500 LBS	<	7768 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	134	PLF	OVERTURNING MOMENT	22.5	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	52.8	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	10.0	FT.	QUALIFYING WALL LENGTH, L	10.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1100 LBS	<	2390 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	134	PLF	OVERTURNING MOMENT	9.9	K-FT	UPLIFT CONNECTOR DESIGN LOAD	498	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	4.9	K-FT	HOLDOWN CAPACITY	1705	LBS

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	5.0	FT.	QUALIFYING WALL LENGTH, L	5.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
550 LBS	<	1195 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	134	PLF	OVERTURNING MOMENT	5.0	K-FT	HOLD DOWN DESIGN LOAD	652	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	1.7	K-FT	HOLDOWN CAPACITY	1705	LBS

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	13.5	FT.	QUALIFYING WALL LENGTH, L	13.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1550 LBS	<	3227 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	100	PLF	OVERTURNING MOMENT	14.0	K-FT	UPLIFT CONNECTOR DESIGN LOAD	539	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	6.7	K-FT	HOLDOWN CAPACITY	1705	LBS

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, Hc	5.5	FT.		
WALL LENGTH, L	14.5	FT.	QUALIFYING WALL LENGTH, L	6.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1500 LBS	<	1554 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	134	PLF	OVERTURNING MOMENT	13.5	K-FT	HOLD DOWN DESIGN LOAD	116	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	11.8	K-FT	HOLDOWN CAPACITY	1705	LBS

HOLD-DOWN SPECIFICATION

SIMPSON CS16 STRAP TIE (14" END LENGTH)

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, H_c	5.5	FT.		
WALL LENGTH, L	14.2	FT.	QUALIFYING WALL LENGTH, L	6.2	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1450 LBS	<	1482 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	134	PLF	OVERTURNING MOMENT	13.1	K-FT	UPLIFT CONNECTOR DESIGN LOAD	113	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	11.4	K-FT	HOLDOWN CAPACITY	1705	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	9.0	FT.	MAX WALL OPENING HT, Hc	6.0	FT.		
WALL LENGTH, L	18.0	FT.	QUALIFYING WALL LENGTH, L	16.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
3450 LBS	<	3824 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	380	PLF	OVERTURNING MOMENT	31.1	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	31.6	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

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

CAPACITY EVALUATION:

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

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	0	PLF	OVERTURNING MOMENT	0.0	K-FT	UPLIFT CONNECTOR DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	0	LBS	RESISTIVE MOMENT	0.0	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	8.0	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	20.0	FT.	QUALIFYING WALL LENGTH, L	20.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1350 LBS	<	4780 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	134	PLF	OVERTURNING MOMENT	10.8	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	1080	LBS	RESISTIVE MOMENT	22.3	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_c	7.0	FT.		
WALL LENGTH, L	20.0	FT.	QUALIFYING WALL LENGTH, L	8.0	FT.	SHEARWALL ASSEMBLY	P3-BS

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
3600 LBS	<	6494 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	234	PLF	OVERTURNING MOMENT	36.0	K-FT	UPLIFT CONNECTOR DESIGN LOAD	356	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	28.9	K-FT	HOLDOWN CAPACITY	4645	LBS

HOLD-DOWN SPECIFICATION

SIMPSON MSTC66 STRAP TIE (20" END LENGTH)

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	8.0	FT.		
WALL LENGTH, L	33.0	FT.	QUALIFYING WALL LENGTH, L	30.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
4200 LBS	<	7170 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	130	PLF	OVERTURNING MOMENT	42.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	44.7	K-FT	HOLDOWN CAPACITY	3695	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	13.5	FT.	QUALIFYING WALL LENGTH, L	13.5	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1650 LBS	<	3227 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	200	PLF	OVERTURNING MOMENT	33.0	K-FT	UPLIFT CONNECTOR DESIGN LOAD	1455	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	13.4	K-FT	HOLDOWN CAPACITY	4645	LBS

HOLD-DOWN SPECIFICATION

SIMPSON MSTC66 STRAP TIE (20" END LENGTH)

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	6.0	FT.		
WALL LENGTH, L	14.5	FT.	QUALIFYING WALL LENGTH, L	6.5	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
2600 LBS	<	2932 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	399	PLF	OVERTURNING MOMENT	27.7	K-FT	HOLD DOWN DESIGN LOAD	210	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	24.6	K-FT	HOLDOWN CAPACITY	3695	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, H_c	6.0	FT.		
WALL LENGTH, L	14.2	FT.	QUALIFYING WALL LENGTH, L	6.2	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
2550 LBS	<	2796 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	340	PLF	OVERTURNING MOMENT	27.1	K-FT	UPLIFT CONNECTOR DESIGN LOAD	430	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	21.0	K-FT	HOLDOWN CAPACITY	3695	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	10.0	FT.	MAX WALL OPENING HT, Hc	8.0	FT.		
WALL LENGTH, L	36.0	FT.	QUALIFYING WALL LENGTH, L	10.8	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
4400 LBS	<	4679 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	151	PLF	OVERTURNING MOMENT	44.0	K-FT	HOLD DOWN DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	51.6	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	11.0	FT.	MAX WALL OPENING HT, H_c	4.0	FT.		
WALL LENGTH, L	19.3	FT.	QUALIFYING WALL LENGTH, L	13.3	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1250 LBS	<	3186 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	168	PLF	OVERTURNING MOMENT	13.8	K-FT	UPLIFT CONNECTOR DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	18.0	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

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

CAPACITY EVALUATION:

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

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

SHEARWALL 1: BASEMENT - SIDE INT. WALL @ STAIRS

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	11.0	FT.	QUALIFYING WALL LENGTH, L	11.0	FT.	SHEARWALL ASSEMBLY	P3

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1600 LBS	<	4961 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	100	PLF	OVERTURNING MOMENT	14.4	K-FT	UPLIFT CONNECTOR DESIGN LOAD	688	LBS
DL AT ENDS OF WALL	800	LBS	RESISTIVE MOMENT	6.8	K-FT	HOLDOWN CAPACITY	3695	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, Hc	0.0	FT.		
WALL LENGTH, L	9.0	FT.	QUALIFYING WALL LENGTH, L	9.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
1000 LBS	<	2151 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	100	PLF	OVERTURNING MOMENT	9.0	K-FT	HOLD DOWN DESIGN LOAD	793	LBS
DL AT ENDS OF WALL	0	LBS	RESISTIVE MOMENT	1.9	K-FT	HOLDOWN CAPACITY	3695	LBS

HOLD-DOWN SPECIFICATION

SIMPSON STHD14RJ HOLDOWN

MULHERN+KULP
RESIDENTIAL STRUCTURAL ENGINEERING

PROJECT NAME: ARCH INNOVATIONS
PRATT PLOT - LOT 4
M&K PROJECT #: 203-20001
ENGINEER: RJZ
DATE: 20-MAR-20

SHEARWALL DESIGN SUMMARY

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

SHEARWALL PROPERTIES:

WALL HEIGHT, H	5.0	FT.	MAX WALL OPENING HT, H_c	0.0	FT.		
WALL LENGTH, L	29.0	FT.	QUALIFYING WALL LENGTH, L	29.0	FT.	SHEARWALL ASSEMBLY	P1

CAPACITY EVALUATION:

TOTAL SHEAR LOAD ON WALL		ALLOWABLE SHEARWALL CAPACITY
500 LBS	<	6931 LBS

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

RESISTIVE DL	100	PLF	OVERTURNING MOMENT	2.5	K-FT	UPLIFT CONNECTOR DESIGN LOAD	0	LBS
DL AT ENDS OF WALL	0	LBS	RESISTIVE MOMENT	19.3	K-FT	HOLDOWN CAPACITY	0	LBS

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

SHEARWALL XXX: - NOT USED

SHEARWALL PROPERTIES:

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

CAPACITY EVALUATION:

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

SHEARWALL ASSEMBLY SPECIFICATION

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

OVERTURNING EVALUATION:

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

HOLD-DOWN SPECIFICATION

NO HOLDOWN REQUIRED

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Cantilevered Retaining Wall

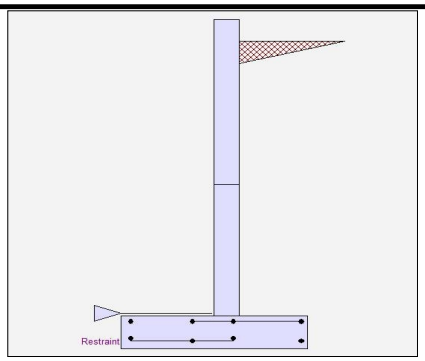
Code: IBC 2015,ACI 318-14,ACI 530-13

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		

Axial Load Applied to Stem

Axial Dead Load	=	100.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

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

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

Stem Construction

		2nd	Bottom
		Stem OK	Stem OK
Design Height Above Ftg	ft =	4.00	0.00
Wall Material Above "Ht"	=	Concrete	Concrete
Design Method	=	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

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Cantilevered Retaining Wall

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

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

		Toe	Heel	
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

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Cantilevered Retaining Wall

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

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		1,523.4	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
					Earth @ Stem Transitions	=		
Total	=	1,949.9	**O.T.M.** =	6,727.4	Footing Weight	= 750.0	2.50	1,875.0
					Key Weight	=		
					Vert. Component	=		
					Total =	3,429.9 lbs	**R.M.=**	11,567.9

Resisting/Overturning 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.

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Cantilevered Retaining Wall

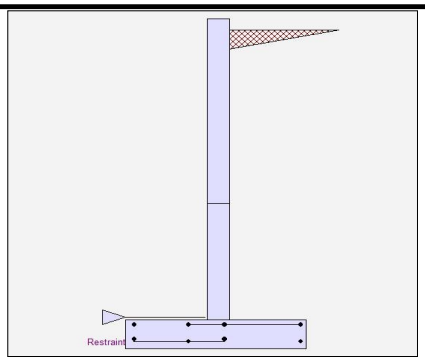
Code: IBC 2015,ACI 318-14,ACI 530-13

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
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 (Service Level)	=	0.0 psf

Adjacent Footing Load

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

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

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

Stem Construction

		2nd	Bottom
		Stem OK	Stem OK
Design Height Above Ftg	ft =	4.00	0.00
Wall Material Above "Ht"	=	Concrete	Concrete
Design Method	=	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	ft-# =	8,206.3	15,562.2
Shear.....Actual			
Service Level	psi =		
Strength Level	psi =	19.8	48.1
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

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Cantilevered Retaining Wall

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

Concrete Stem Rebar Area Details

2nd Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1288 in2/ft		
(4/3) * As :	0.1718 in2/ft	Min Stem T&S Reinf Area 1.225 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 :	0.31 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) :	0.4992 in2/ft		
(4/3) * As :	0.6656 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 :	0.4992 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.62 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.0059 in2/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

		Toe	Heel	
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 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

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Cantilevered Retaining Wall

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

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		2,117.5	3.67	7,764.2	Soil Over HL (ab. water tbl)	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
					Earth @ Stem Transitions	=		
					Footing Weight	= 825.0	2.75	2,268.8
					Key Weight	=		
					Vert. Component	=		
Total	=	2,710.4	**O.T.M.** =	11,025.1	**Total =**	4,529.7 lbs	**R.M.=**	16,615.3

Resisting/Overturning Ratio = **1.51**
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.

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Cantilevered Retaining Wall

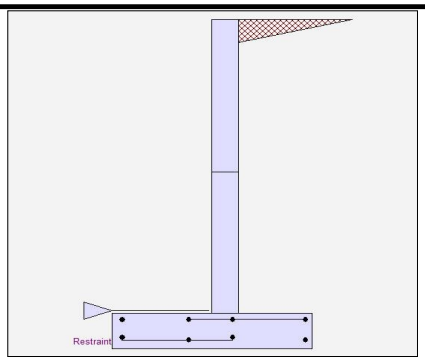
Code: IBC 2015,ACI 318-14,ACI 530-13

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 (Service Level)	=	0.0 psf

Adjacent Footing Load

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

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

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

Stem Construction

		2nd	Bottom
		Stem OK	Stem OK
Design Height Above Ftg	ft =	4.00	0.00
Wall Material Above "Ht"	=	Concrete	Concrete
Design Method	=	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

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Cantilevered Retaining Wall

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

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

		Toe	Heel	
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

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Cantilevered Retaining Wall

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

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#	.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	1,523.4	3.11	4,737.6			
HL Act Pres (be water tbl)						
Hydrostatic Force						
Buoyant Force =						
Surcharge over Heel =						
Surcharge Over Toe =						
Adjacent Footing Load =						
Added Lateral Load =						
Load @ Stem Above Soil =						
Seismic Earth Load =	426.5	4.67	1,989.8			
=						
Soil Over HL (ab. water tbl)				1,679.9	4.08	6,859.5
Soil Over HL (bel. water tbl)					4.08	6,859.5
Watre Table						
Sloped Soil Over Heel =						
Surcharge Over Heel =						
Adjacent Footing Load =						
Axial Dead Load on Stem =						
* Axial Live Load on Stem =						
Soil Over Toe =						
Surcharge Over Toe =						
Stem Weight(s) =				833.0	2.83	2,360.2
Earth @ Stem Transitions =						
Footing Weight =				750.0	2.50	1,875.0
Key Weight =						
Vert. Component =						
Total =	1,949.9	**O.T.M.** =	6,727.4	**Total =** 3,262.9 lbs	**R.M.=**	11,094.7

Resisting/Overturning Ratio = **1.65**
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.

Project Title:
Engineer:
Project ID:
Project Descr:

Concrete Beam

File: Foundation Wall Side to Side.ec6

Lic. # : KW-06004787
MULHERN & KULP STRUCTURAL ENGINEERING INC

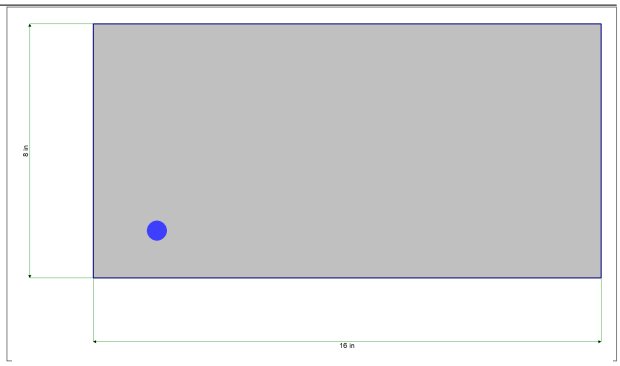
DESCRIPTION: Detail 17/SD-02 (Spanning side to side)

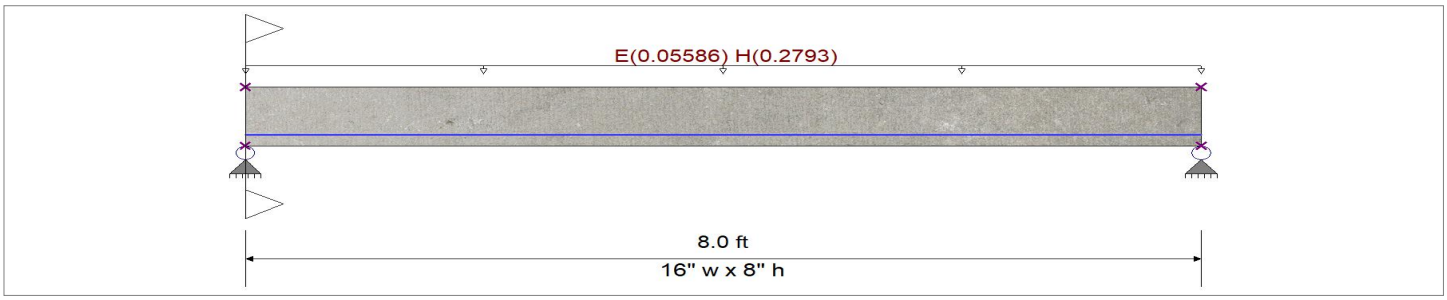
CODE REFERENCES

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
fr = f'c$^{1/2}$ * 7.50	=	410.792 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #		3
			Number of Resisting Legs Per Stirrup =		2





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
Section used for this span **Typical Section**
Mu : Applied 4.022 k-ft
Mn * Phi : Allowable 8.750 k-ft
Location of maximum on span 4.007 ft
Span # where maximum occurs Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.012 in	Ratio =	7951 >=360.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360.0
Max Downward Total Deflection	0.014 in	Ratio =	6974 >=180.
Max Upward Total Deflection	0.000 in	Ratio =	0 <180.0

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

Lic. # : KW-06004787
MULHERN & KULP STRUCTURAL ENGINEERING INC

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) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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	Iot 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

Lic. # : KW-06004787
MULHERN & KULP STRUCTURAL ENGINEERING INC

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

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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 Reqd 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

Lic. # : KW-06004787
MULHERN & KULP STRUCTURAL ENGINEERING INC

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